



## Akai APC40 Mk2 Communications Protocol

Version 1.2

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## **Introduction**

APC40 Mk2 is a USB bus-powered, compact controller for Ableton Live and other software applications. It features a 5x8 grid of RGB launch clips, 9 faders, and 16 knobs with LED rings for software control. It features an array of UI buttons that will be used in conjunction with Ableton Live and other software.

## **Scope**

This document describes the format of messages between the APC40 Mk2 and the PC/Mac Host.

## **Glossary**

**Outbound:** The term “outbound” is used to describe messages sent from the PC Host to the device, i.e. from the viewpoint of the PC Host.

**Inbound:** The term “inbound” is used to describe messages sent from the device to the PC Host, i.e. from the viewpoint of the PC Host.

## **General**

### **USB Ports**

#### **Akai APC40 Mk2 Port**

This port handles all the Ableton specific messaging. All controls will communicate over this port.

### **General Format of MIDI System Exclusive message**

The System Exclusive messages exchanged between the PC Host and the device will be of the following format:

| <b>Byte Number</b> | <b>Value</b> | <b>Description</b> |
|--------------------|--------------|--------------------|
|--------------------|--------------|--------------------|

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| <b>Byte Number</b> | <b>Value</b>   | <b>Description</b>                                 |
|--------------------|----------------|----------------------------------------------------|
| 1                  | 0xF0           | MIDI System exclusive message start                |
| 2                  | 0x47           | Manufacturers ID Byte                              |
| 3                  | 0x7F           | System Exclusive Device ID                         |
| 4                  | 0x29           | Product model ID                                   |
| 5                  | <Message ID>   | Message type identifier                            |
| 6                  | <DataLengthMS> | Number of data bytes to follow (most significant)  |
| 7                  | <DataLengthLS> | Number of data bytes to follow (least significant) |
| 8                  | n data bytes   | Data field – n bytes long                          |
| n+8                | 0xF7           | MIDI System exclusive message terminator           |

The Manufacturer's identity field will contain the one-byte code allocated to Akai Professional, which is 0x47.

The System Exclusive Device ID is typically used to select between multiple devices connected to the same PC Host. In our application, we only expect one APC40 Mk2 to be connected at any one time and so a value of 0x7F (broadcast) should be used (and it is unlikely that the APC40 Mk2 will pay any regard to this field). If the situation changes and we find that it is appropriate to have more than one APC40 Mk2 connected to a PC Host, this field can be used to determine which device is the intended recipient of the message and we can then determine how this parameter is assigned on each connected device.

The Message type identifier identifies the type of the message. This field will determine the size of the data field and how the data field bytes should be interpreted.

There will be a number of data bytes in the message. Different message types are likely to have a different data field lengths/formats.

### ***“Universal” MIDI messages***

#### ***Device Inquiry***

APC40 Mk2 supports the convention of Device Inquiry

*Format of Device Inquiry Request message from Host to Device*

| <b>Byte Number</b> | <b>Value</b> | <b>Description</b> |
|--------------------|--------------|--------------------|
|--------------------|--------------|--------------------|

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| <b>Byte Number</b> | <b>Value</b>   | <b>Description</b>                                                 |
|--------------------|----------------|--------------------------------------------------------------------|
| 1                  | 0xF0           | MIDI System exclusive message start                                |
| 2                  | 0x7E           | Non-Realtime Message                                               |
| 3                  | <MIDI Channel> | Channel to inquire. 0x00 – 0x0F. If set to 0x0x7F inquiry is omni. |
| 4                  | 0x06           | Inquiry Message                                                    |
| 5                  | 0x01           | Inquiry Request                                                    |
| 6                  | 0xF7           | MIDI System exclusive message terminator                           |

The APC40 Mk2 will respond to a Device Inquiry Request message with the following message:

### *Format of response from APC40 Mk2 to Device Inquiry message*

| <b>Byte Number</b> | <b>Value</b>   | <b>Description</b>                                 |
|--------------------|----------------|----------------------------------------------------|
| 1                  | 0xF0           | MIDI System exclusive message start                |
| 2                  | 0x7E           | Non-Realtime Message                               |
| 3                  | <MIDI Channel> | Common MIDI channel setting                        |
| 4                  | 0x06           | Inquiry Message                                    |
| 5                  | 0x02           | Inquiry Response                                   |
| 6                  | 0x47           | Manufacturers ID Byte                              |
| 7                  | 0x29           | Product model ID                                   |
| 8                  | 0x00           | Number of data bytes to follow (most significant)  |
| 9                  | 0x19           | Number of data bytes to follow (least significant) |
| 10                 | <Version1>     | Software version major most significant            |
| 11                 | <Version2>     | Software version major least significant           |
| 12                 | <Version3>     | Software version minor most significant            |
| 13                 | <Version4>     | Software version minor least significant           |

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| <b>Byte Number</b> | <b>Value</b>      | <b>Description</b>                          |
|--------------------|-------------------|---------------------------------------------|
| 14                 | <DeviceID>        | System Exclusive Device ID                  |
| 15                 | <Serial1>         | <Reserved, Set to 0x00 in this application> |
| 16                 | <Serial2>         | <Reserved, Set to 0x00 in this application> |
| 17                 | <Serial3>         | <Reserved, Set to 0x00 in this application> |
| 18                 | <Serial4>         | <Reserved, Set to 0x00 in this application> |
| 19                 | <Manufacturing1>  | Manufacturing Data byte 1                   |
| 20                 | <Manufacturing2>  | Manufacturing Data byte 2                   |
| 21                 | <Manufacturing3>  | Manufacturing Data byte 3                   |
| 22                 | <Manufacturing4>  | Manufacturing Data byte 4                   |
| 23                 | <Manufacturing5>  | Manufacturing Data byte 5                   |
| 24                 | <Manufacturing6>  | Manufacturing Data byte 6                   |
| 25                 | <Manufacturing7>  | Manufacturing Data byte 7                   |
| 26                 | <Manufacturing8>  | Manufacturing Data byte 8                   |
| 27                 | <Manufacturing9>  | Manufacturing Data byte 9                   |
| 28                 | <Manufacturing10> | Manufacturing Data byte 10                  |
| 29                 | <Manufacturing11> | Manufacturing Data byte 11                  |
| 30                 | <Manufacturing12> | Manufacturing Data byte 12                  |
| 31                 | <Manufacturing13> | Manufacturing Data byte 13                  |
| 32                 | <Manufacturing14> | Manufacturing Data byte 14                  |
| 33                 | <Manufacturing15> | Manufacturing Data byte 15                  |
| 34                 | <Manufacturing16> | This byte should be set to 0x00.            |
| 35                 | 0xF7              | MIDI System exclusive message terminator    |

### **The Note-On Message**

#### *Format of Note-On message*

| <b>Byte Number</b> | <b>Value</b>  | <b>Description</b>                                                                                 |
|--------------------|---------------|----------------------------------------------------------------------------------------------------|
| 1                  | 0x9<Chan>     | MIDI Note on, where Chan is a value from 0 – F and specifies the MIDI channel.                     |
| 2                  | <Note Number> | Note Number                                                                                        |
| 3                  | <Velocity>    | Velocity of the key-press. For controls that are not velocity sensitive, this value should be 0x7F |

### **The Note-Off Message**

#### *Format of Note-Off message*

| <b>Byte Number</b> | <b>Value</b>  | <b>Description</b>                                                                                   |
|--------------------|---------------|------------------------------------------------------------------------------------------------------|
| 1                  | 0x8<Chan>     | MIDI Note on, where Chan is a value from 0 – F and specifies the MIDI channel.                       |
| 2                  | <Note Number> | Note Number                                                                                          |
| 3                  | <Velocity>    | Velocity of the key-release. For controls that are not velocity sensitive, this value should be 0x7F |

### **The Controller Change Message**

APC40 Mk2 sends MIDI Controller Change messages from its buttons and knobs. It can also receive Controller Change messages to turn LEDs On/Off

#### *Format of Controller Change message*

| <b>Byte Number</b> | <b>Value</b> | <b>Description</b>                                                                       |
|--------------------|--------------|------------------------------------------------------------------------------------------|
| 1                  | 0xB<Chan>    | MIDI Controller Change, where Chan is a value from 0 – F and specifies the MIDI channel. |
| 2                  | <Controller> | Note Number                                                                              |

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| <b>Byte Number</b> | <b>Value</b> | <b>Description</b>                                                                                   |
|--------------------|--------------|------------------------------------------------------------------------------------------------------|
| 3                  | <Value>      | Velocity of the key-release. For controls that are not velocity sensitive, this value should be 0x7F |

### ***“Akai Specific MIDI messages”***

#### ***Introduction Message***

This message is sent before any other device-specific message (i.e. other than Device Enquiry). It instructs the APC40 Mk2 to perform the necessary initialization and informs the firmware of the version number of the application in order that changes in the application can be catered for in the APC40 Mk2 firmware.

#### ***Format of Introduction message from Host to Device***

| <b>Byte Number</b> | <b>Value</b>   | <b>Description</b>                                 |
|--------------------|----------------|----------------------------------------------------|
| 1                  | 0xF0           | MIDI System exclusive message start                |
| 2                  | 0x47           | Manufacturers ID Byte                              |
| 3                  | 0x7F           | System Exclusive Device ID                         |
| 4                  | 0x29           | Product model ID                                   |
| 5                  | 0x60           | Message type identifier                            |
| 6                  | 0x00           | Number of data bytes to follow (most significant)  |
| 7                  | 0x04           | Number of data bytes to follow (least significant) |
| 8                  | 0x00           | Application/Configuration identifier               |
| 9                  | <Version High> | PC application Software version major              |
| 10                 | <Version Low>  | PC application Software version minor              |
| 11                 | <Bugfix Level> | PC Application Software bug-fix level              |
| 12                 | 0xF7           | MIDI System exclusive message terminator           |

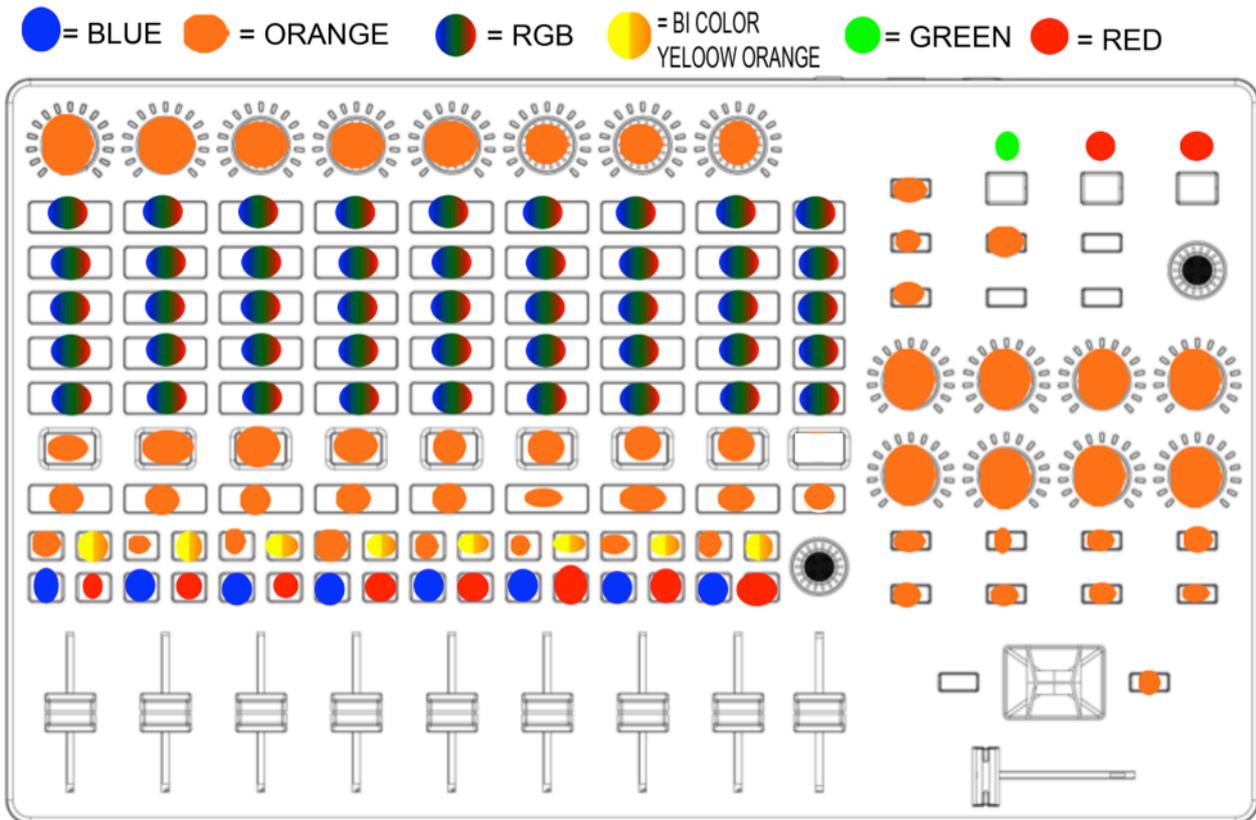
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### *Format of response from APC40 Mk2 Introduction message*

| <b>Byte number</b> | <b>Value</b>      | <b>Description</b>                                 |
|--------------------|-------------------|----------------------------------------------------|
| 1                  | 0xF0              | MIDI System exclusive message start                |
| 2                  | 0x47              | Manufacturers ID Byte                              |
| 3                  | 0x7F              | System Exclusive Device ID                         |
| 4                  | 0x29              | Product model ID                                   |
| 5                  | 0x61              | Message type identifier                            |
| 6                  | 0x00              | Number of data bytes to follow (most significant)  |
| 7                  | 0x04              | Number of data bytes to follow (least significant) |
| 8                  | <Slider #1 Value> | Sends the current value of Knob #1.                |
| 9                  | <Slider #2 Value> | Sends the current value of Knob #2.                |
| 10                 | <Slider #3 Value> | Sends the current value of Knob #3.                |
| 11                 | <Slider #4 Value> | Sends the current value of Knob #4.                |
| 12                 | <Slider #5 Value> | Sends the current value of Knob #5.                |
| 13                 | <Slider #6 Value> | Sends the current value of Knob #6.                |
| 14                 | <Slider #7 Value> | Sends the current value of Knob #7.                |
| 15                 | <Slider #8 Value> | Sends the current value of Knob #8.                |
| 16                 | <Slider #9 Value> | Sends the current value of Knob #9.                |
| 17                 | 0xF7              | MIDI System exclusive message terminator           |

## Akai APC40 Mk2 Communication Protocol

### APC40 Mk 2 LED Map



### Outbound APC40 Mk2 Sysex Message Types

There will be three types of message from the PC host to the device.

#### ***Outbound Message Type 0: Introduction***

This message is sent before any other device-specific message (i.e. other than Device Enquiry). It instructs the APC40 Mk2 to perform the necessary initialization and informs the firmware of the version number of the application in order that changes in the application can be catered for in the APC40 Mk2 firmware.

There are three modes that are accepted. The unit defaults to Mode 0 on startup.

| Mode | Identifier | Name              |
|------|------------|-------------------|
| 0    | 0x40       | Generic Mode      |
| 1    | 0x41       | Ableton Live Mode |

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|   |      |                             |
|---|------|-----------------------------|
| 2 | 0x42 | Alternate Ableton Live Mode |
|---|------|-----------------------------|

### Notes Regarding Generic Mode (Mode 0):

- [CLIP LAUNCH] buttons are momentary and should light its LED when ON.
- [CLIP STOP] buttons are momentary and should light its LED when ON.
- [ACTIVATOR], [SOLO], [RECORD ARM] are toggle buttons and should light its LED when ON.
- [TRACK SELECTION] buttons (1-8 + MASTER) are radio style and only one of the 9 buttons is ON at a time. When ON its LED should light. These buttons will NOT send out MIDI in generic mode for its state. These buttons dictate which one of nine banks the DEVICE CONTROL knobs and DEVICE CONTROL switches belong to. These knobs and switches will output on a different MIDI channel based on the current Track Selection (track 1 = MIDI channel 0, track 8 = MIDI channel 7, MASTER = MIDI channel 8). Upon pressing one of the Track Selection buttons, the current position of the 8 Device Control knobs will be sent.
- [TRACK ACTIVATOR] buttons (1-8) are toggle buttons and will light its LED when ON.
- [CROSSFADER A/B], is a momentary button and will light its LED when ON.
- [TRACK SOLO], and [RECORD ARM] buttons are toggle buttons and will light its LED when ON.
- [DEVICE LEFT (1)], [DEVICE RIGHT (2)], [BANK LEFT (3)], [BANK RIGHT (4)] will be toggle style and will light its LED when ON.
- [DEVICE ON/OFF (5)], [DEVICE LOCK (6)], [CLIP/DEVICE VIEW (7)], [DETAIL VIEW (8)] will be momentary style and will light its LED when ON.
- [BANK LOCK] button is momentary and will light its LED when ON.
- [SCENE LAUNCH] and [STOP ALL CLIPS] buttons are momentary buttons and will light its LED when ON.
- TRACK CONTROL buttons are toggle buttons and will light its LED when ON.
- TRACK CONTROL KNOBS and buttons are NOT banked in any way.
- [UP], [DOWN], [LEFT], [RIGHT], [SHIFT], [NUDGE+], [NUDGE-], [METRONOME], and [TAP TEMPO] are momentary buttons.
- [PLAY], [RECORD], and [SESSION RECORD] are momentary buttons and will light its LED when ON.
- [PAN], [SENDS], [USER], are toggle buttons and will light its LED when ON.
- LED rings are all set to SINGLE style.

### Notes Regarding Ableton Live Mode (Mode 1):

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- All buttons are momentary buttons.
- Device control knobs and buttons are not banked within the APC40 Mk2.
- LED Rings around the knobs are controlled by the APC40 but can be updated by the Host.
- All other LEDs are controlled by the Host.

### Notes Regarding Alternate Ableton Live Mode (Mode 2):

- All buttons are momentary buttons.
- Device control knobs and buttons are not banked within the APC40 Mk2.
- All LEDs are controlled by the Host.

### *Format of Type 0 outbound message*

| <b>Byte Number</b> | <b>Value</b>         | <b>Description</b>                                 |
|--------------------|----------------------|----------------------------------------------------|
| 1                  | 0xF0                 | MIDI System exclusive message start                |
| 2                  | 0x47                 | Manufacturers ID Byte                              |
| 3                  | <DeviceID>           | System Exclusive Device ID                         |
| 4                  | 0x29                 | Product model ID                                   |
| 5                  | 0x60                 | Message type identifier                            |
| 6                  | 0x00                 | Number of data bytes to follow (most significant)  |
| 7                  | 0x04                 | Number of data bytes to follow (least significant) |
| 8                  | 0x40 or 0x41 or 0x42 | Application/Configuration identifier               |
| 9                  | <Version High>       | PC application Software version major              |
| 10                 | <Version Low>        | PC application Software version minor              |
| 11                 | <Bugfix Level>       | PC Application Software bug-fix level              |
| 12                 | 0xF7                 | MIDI System exclusive message terminator           |

**Outbound Message Type 1: LEDs.**

This message is used to control the states of the LEDs. A note-on message will cause the specified LED to switch on. A note-off message will cause the specified LED to switch off. The field normally associated with note number will be used to specify the LED. The field normally associated with velocity will indicate the LED display type. The field normally associated with MIDI Channel will indicate the Track for certain LEDs. A Note On message with a velocity of zero is equivalent to a Note Off message, however it is preferred that an actual Note Off message is used.

*Format of Type 1 outbound Midi note-on messages*

| <b>Byte Number</b> | <b>Value</b>     | <b>Description</b>                                                                            |
|--------------------|------------------|-----------------------------------------------------------------------------------------------|
| 1                  | 0x9<chan>        | MIDI Note-on. The 4-bit <chan> value will be used for the track strips                        |
| 2                  | <ControllID<br>> | Identifier for LED object (“note number”)                                                     |
| 3                  | State            | Control value (This value will describe the state or color of the LED: OFF/ON/blinking, etc.) |

*Format of Type 1 outbound Midi note-off messages*

| <b>Byte Number</b> | <b>Value</b>     | <b>Description</b>                                                      |
|--------------------|------------------|-------------------------------------------------------------------------|
| 1                  | 0x8<chan>        | MIDI Note-off. The 4-bit <chan> value will be used for the track strips |
| 2                  | <ControllID<br>> | Identifier for LED object (“note number”)                               |
| 3                  | (Unused)         | Control value (ignored)                                                 |

*Assignment of Note number messages to LEDs. Note 0x30 to 0x39 use MIDI Channel 0 to 7 to indicate Tracks 1-8. All other note values ignore the MIDI Channel.*

| <b>Note Number</b> | <b>MIDI Channel</b> | <b>Corresponding LED</b> | <b>Velocity</b>            |
|--------------------|---------------------|--------------------------|----------------------------|
| 0x00               | 0-15 = RGB Type     | Clip Launch 1            | See “RGB LEDS” Table below |
| 0x01               | 0-15 = RGB Type     | Clip Launch 2            | See “RGB LEDS” Table below |

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| <b>Note Number</b> | <b>MIDI Channel</b> | <b>Corresponding LED</b> | <b>Velocity</b>            |
|--------------------|---------------------|--------------------------|----------------------------|
| 0x02               | 0-15 = RGB Type     | Clip Launch 3            | See “RGB LEDS” Table below |
| 0x03               | 0-15 = RGB Type     | Clip Launch 4            | See “RGB LEDS” Table below |
| 0x04               | 0-15 = RGB Type     | Clip Launch 5            | See “RGB LEDS” Table below |
| 0x05               | 0-15 = RGB Type     | Clip Launch 6            | See “RGB LEDS” Table below |
| 0x06               | 0-15 = RGB Type     | Clip Launch 7            | See “RGB LEDS” Table below |
| 0x07               | 0-15 = RGB Type     | Clip Launch 8            | See “RGB LEDS” Table below |
| 0x08               | 0-15 = RGB Type     | Clip Launch 9            | See “RGB LEDS” Table below |
| 0x09               | 0-15 = RGB Type     | Clip Launch 10           | See “RGB LEDS” Table below |
| 0x0A               | 0-15 = RGB Type     | Clip Launch 11           | See “RGB LEDS” Table below |
| 0x0B               | 0-15 = RGB Type     | Clip Launch 12           | See “RGB LEDS” Table below |
| 0x0C               | 0-15 = RGB Type     | Clip Launch 13           | See “RGB LEDS” Table below |
| 0x0D               | 0-15 = RGB Type     | Clip Launch 14           | See “RGB LEDS” Table below |
| 0x0E               | 0-15 = RGB Type     | Clip Launch 15           | See “RGB LEDS” Table below |
| 0x0F               | 0-15 = RGB Type     | Clip Launch 16           | See “RGB LEDS” Table below |
| 0x10               | 0-15 = RGB Type     | Clip Launch 17           | See “RGB LEDS” Table below |
| 0x11               | 0-15 = RGB Type     | Clip Launch 18           | See “RGB LEDS” Table below |
| 0x12               | 0-15 = RGB Type     | Clip Launch 19           | See “RGB LEDS” Table below |
| 0x13               | 0-15 = RGB Type     | Clip Launch 20           | See “RGB LEDS” Table below |
| 0x14               | 0-15 = RGB Type     | Clip Launch 21           | See “RGB LEDS” Table below |
| 0x15               | 0-15 = RGB Type     | Clip Launch 22           | See “RGB LEDS” Table below |
| 0x16               | 0-15 = RGB Type     | Clip Launch 23           | See “RGB LEDS” Table below |
| 0x17               | 0-15 = RGB Type     | Clip Launch 24           | See “RGB LEDS” Table below |
| 0x18               | 0-15 = RGB Type     | Clip Launch 25           | See “RGB LEDS” Table below |

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| <b>Note Number</b> | <b>MIDI Channel</b> | <b>Corresponding LED</b> | <b>Velocity</b>                                                                   |
|--------------------|---------------------|--------------------------|-----------------------------------------------------------------------------------|
| 0x19               | 0-15 = RGB Type     | Clip Launch 26           | See "RGB LEDS" Table below                                                        |
| 0x1A               | 0-15 = RGB Type     | Clip Launch 27           | See "RGB LEDS" Table below                                                        |
| 0x1B               | 0-15 = RGB Type     | Clip Launch 28           | See "RGB LEDS" Table below                                                        |
| 0x1C               | 0-15 = RGB Type     | Clip Launch 29           | See "RGB LEDS" Table below                                                        |
| 0x1D               | 0-15 = RGB Type     | Clip Launch 30           | See "RGB LEDS" Table below                                                        |
| 0x1E               | 0-15 = RGB Type     | Clip Launch 31           | See "RGB LEDS" Table below                                                        |
| 0x1F               | 0-15 = RGB Type     | Clip Launch 32           | See "RGB LEDS" Table below                                                        |
| 0x20               | 0-15 = RGB Type     | Clip Launch 33           | See "RGB LEDS" Table below                                                        |
| 0x21               | 0-15 = RGB Type     | Clip Launch 34           | See "RGB LEDS" Table below                                                        |
| 0x22               | 0-15 = RGB Type     | Clip Launch 35           | See "RGB LEDS" Table below                                                        |
| 0x23               | 0-15 = RGB Type     | Clip Launch 36           | See "RGB LEDS" Table below                                                        |
| 0x24               | 0-15 = RGB Type     | Clip Launch 37           | See "RGB LEDS" Table below                                                        |
| 0x25               | 0-15 = RGB Type     | Clip Launch 38           | See "RGB LEDS" Table below                                                        |
| 0x26               | 0-15 = RGB Type     | Clip Launch 39           | See "RGB LEDS" Table below                                                        |
| 0x27               | 0-15 = RGB Type     | Clip Launch 40           | See "RGB LEDS" Table below                                                        |
| 0x30               | 0-7 = Track 1-8     | RECORD ARM               |                                                                                   |
| 0x31               | 0-7 = Track 1-8     | SOLO                     |                                                                                   |
| 0x32               | 0-7 = Track 1-8     | ACTIVATOR                |                                                                                   |
| 0x33               | 0-7 = Track 1-8     | TRACK SELECT             |                                                                                   |
| 0x34               | 0-7 = Track 1-8     | TRACK STOP               |                                                                                   |
|                    |                     |                          |                                                                                   |
| 0x34<br>(E_3)      | 0-7 = Track 1-8     | CLIP STOP                | 0=off, 1=on, 2=blink, 3-127=on<br>(Note: Blinking rate will sync to TEMPO at 1/8) |

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| <b>Note Number</b> | <b>MIDI Channel</b>                    | <b>Corresponding LED</b> | <b>Velocity</b>               |
|--------------------|----------------------------------------|--------------------------|-------------------------------|
| 0x3A<br>(A#3)      |                                        | DEVICE LEFT              | 0=off, 1-127=on               |
| 0x3B<br>(B_3)      |                                        | DEVICE RIGHT             | 0=off, 1-127=on               |
| 0x3C<br>(C_4)      |                                        | BANK LEFT                | 0=off, 1-127=on               |
| 0x3D<br>(C#4)      |                                        | BANK RIGHT               | 0=off, 1-127=on               |
| 0x3E<br>(D_4)      |                                        | DEVICE ON/OFF            | 0=off, 1-127=on               |
| 0x3F<br>(D#4)      |                                        | DEVICE LOCK              | 0=off, 1-127=on               |
| 0x40<br>(E_4)      |                                        | CLIP/DEVICE VIEW         | 0=off, 1-127=on               |
| 0x41<br>(F_4)      |                                        | DETAIL VIEW              | 0=off, 1-127=on               |
| 0X42<br>(F#4)      | 0-7 = Track 1-8                        | CROSSFADER A/B           | 0=off, 1=Yellow, 2-127=Orange |
| 0x50<br>(G#5)      |                                        | MASTER                   | 0=off, 1-127=on               |
| 0x51               |                                        | STOP ALL CLIPS           | -none-                        |
| 0x52<br>(A#5)      | 0-15 = RGB LEDs Type (See table below) | SCENE LAUNCH 1           | See "RGB LEDs" Table below    |
| 0x53<br>(B_5)      | 0-15 = RGB LEDs Type (See table below) | SCENE LAUNCH 2           | See "RGB LEDs" Table below    |
| 0x54<br>(C_6)      | 0-15 = RGB LEDs Type (See table below) | SCENE LAUNCH 3           | See "RGB LEDs" Table below    |

Akai APC40 Mk2 Communication Protocol

| <b>Note Number</b> | <b>MIDI Channel</b>                          | <b>Corresponding LED</b> | <b>Velocity</b>            |
|--------------------|----------------------------------------------|--------------------------|----------------------------|
| 0x55<br>(C#7)      | 0-15 = RGB LEDs<br>Type (See table<br>below) | SCENE<br>LAUNCH 4        | See “RGB LEDs” Table below |
| 0x56<br>(D_7)      | 0-15 = RGB LEDs<br>Type (See table<br>below) | SCENE<br>LAUNCH 5        | See “RGB LEDs” Table below |
| 0x57<br>(D#7)      |                                              | PAN                      | 0=off, 1-127=on            |
| 0x58<br>(E_7)      |                                              | SENDS                    | 0=off, 1-127=on            |
| 0x59<br>(F_7)      |                                              | USER                     | 0=off, 1-127=on            |
| 0x5A<br>(F#_7)     |                                              | METRONOME                | 0=off, 1-127=on            |
| 0x5B               |                                              | PLAY                     | 0=off, 1-127=on            |
| 0x5D               |                                              | RECORD                   | 0=off, 1-127=on            |
| 0x5E               |                                              | UP                       | -none-                     |
| 0x5F               |                                              | DOWN                     | -none-                     |
| 0x60               |                                              | RIGHT                    | -none-                     |
| 0x61               |                                              | LEFT                     | -none-                     |
| 0x62               |                                              | SHIFT                    | -none-                     |
| 0x63               |                                              | TAP TEMPO                | -none-                     |
| 0x64               |                                              | NUDGE -                  | -none-                     |
| 0x65               |                                              | NUDGE +                  | -none-                     |
| 0x66               |                                              | SESSION<br>RECORD        | 0=off, 1-127=on            |

## Akai APC40 Mk2 Communication Protocol

### **RGB LEDs Type**

| MIDI Channel | Function                        |
|--------------|---------------------------------|
| 0            | Primary Color                   |
| 1            | Secondary Color – Oneshot 1/24  |
| 2            | Secondary Color – Oneshot 1/16  |
| 3            | Secondary Color – Oneshot 1/8   |
| 4            | Secondary Color – Oneshot 1/4   |
| 5            | Secondary Color – Oneshot 1/2   |
| 6            | Secondary Color – Pulsing 1/24  |
| 7            | Secondary Color – Pulsing 1/16  |
| 8            | Secondary Color – Pulsing 1/8   |
| 9            | Secondary Color – Pulsing 1/4   |
| 10           | Secondary Color – Pulsing 1/2   |
| 11           | Secondary Color – Blinking 1/24 |
| 12           | Secondary Color – Blinking 1/16 |
| 13           | Secondary Color – Blinking 1/8  |
| 14           | Secondary Color – Blinking 1/4  |
| 15           | Secondary Color – Blinking 1/2  |

### **RGB LEDs**

| Name | Color   | Velocity |
|------|---------|----------|
| 60   | #000000 | 0        |
| 59   | #1E1E1E | 1        |
| 58   | #7F7F7F | 2        |
| 57   | #FFFFFF | 3        |
| 1    | #FF4C4C | 4        |
| 2    | #FF0000 | 5        |
| 3    | #590000 | 6        |
| 4    | #190000 | 7        |
| 5    | #FFBD6C | 8        |
| 6    | #FF5400 | 9        |

## Akai APC40 Mk2 Communication Protocol

|    |         |    |
|----|---------|----|
| 7  | #591D00 | 10 |
| 8  | #271B00 | 11 |
| 9  | #FFFF4C | 12 |
| 10 | #FFFF00 | 13 |
| 11 | #595900 | 14 |
| 12 | #191900 | 15 |
| 13 | #88FF4C | 16 |
| 14 | #54FF00 | 17 |
| 15 | #1D5900 | 18 |
| 16 | #142B00 | 19 |
| 17 | #4CFF4C | 20 |
| 18 | #00FF00 | 21 |
| 19 | #005900 | 22 |
| 20 | #001900 | 23 |
| 21 | #4CFF5E | 24 |
| 22 | #00FF19 | 25 |
| 23 | #00590D | 26 |
| 24 | #001902 | 27 |
| 25 | #4CFF88 | 28 |
| 26 | #00FF55 | 29 |
| 27 | #00591D | 30 |
| 28 | #001F12 | 31 |
| 29 | #4CFFB7 | 32 |
| 30 | #00FF99 | 33 |
| 31 | #005935 | 34 |
| 32 | #001912 | 35 |
| 33 | #4CC3FF | 36 |
| 34 | #00A9FF | 37 |
| 35 | #004152 | 38 |
| 36 | #001019 | 39 |
| 37 | #4C88FF | 40 |

## Akai APC40 Mk2 Communication Protocol

|          |         |    |
|----------|---------|----|
| 38       | #0055FF | 41 |
| 39       | #001D59 | 42 |
| 40       | #000819 | 43 |
| 41       | #4C4CFF | 44 |
| 42       | #0000FF | 45 |
| 43       | #000059 | 46 |
| 44       | #000019 | 47 |
| 45       | #874CFF | 48 |
| 46       | #5400FF | 49 |
| 47       | #190064 | 50 |
| 48       | #0F0030 | 51 |
| 49       | #FF4CFF | 52 |
| 50       | #FF00FF | 53 |
| 51       | #590059 | 54 |
| 52       | #190019 | 55 |
| 53       | #FF4C87 | 56 |
| 54       | #FF0054 | 57 |
| 55       | #59001D | 58 |
| 56       | #220013 | 59 |
| 0xED4325 | #FF1500 | 60 |
| 0xBD6100 | #993500 | 61 |
| 0xB08B00 | #795100 | 62 |
| 0x85961F | #436400 | 63 |
| 0x539F31 | #033900 | 64 |
| 0x0A9C8E | #005735 | 65 |
| 0x007ABD | #00547F | 66 |
| 0x0303FF | #0000FF | 67 |
| 0x2F52A2 | #00454F | 68 |
| 0x624BAD | #2500CC | 69 |
| 0x7B7B7B | #7F7F7F | 70 |
| 0x3C3C3C | #202020 | 71 |

## Akai APC40 Mk2 Communication Protocol

|           |         |     |
|-----------|---------|-----|
| 0xFF0505  | #FF0000 | 72  |
| 0xBFBA69  | #BDFF2D | 73  |
| 0xA6BE00  | #AFED06 | 74  |
| 0x7AC634  | #64FF09 | 75  |
| 0x3DC300  | #108B00 | 76  |
| 0x00BFAF  | #00FF87 | 77  |
| 0x10A4EE  | #00A9FF | 78  |
| 0x5480E4  | #002AFF | 79  |
| 0x886CE4  | #3F00FF | 80  |
| 0xA34BAD  | #7A00FF | 81  |
| 0xB73D69  | #B21A7D | 82  |
| 0x965735  | #402100 | 83  |
| 0xF66C03  | #FF4A00 | 84  |
| 0xBFFB00  | #88E106 | 85  |
| 0x87FF67  | #72FF15 | 86  |
| 0x1AFF2F  | #00FF00 | 87  |
| 0x25FFA8  | #3BFF26 | 88  |
| 0x5CFFE8  | #59FF71 | 89  |
| 0x19E9FF  | #38FFCC | 90  |
| 0x8BC5FF  | #5B8AFF | 91  |
| 0x92A7FF  | #3151C6 | 92  |
| 0xB88DFF  | #877FE9 | 93  |
| 0xD86CE4  | #D31DFF | 94  |
| 0xFF39D4  | #FF005D | 95  |
| 0xFFA529  | #FF7F00 | 96  |
| 0xFFFF034 | #B9B000 | 97  |
| 0xE3F403  | #90FF00 | 98  |
| 0xDBC300  | #835D07 | 99  |
| 0xBE9D63  | #392b00 | 100 |
| 0x89B47D  | #144C10 | 101 |
| 0x88C2BA  | #0D5038 | 102 |

## Akai APC40 Mk2 Communication Protocol

|             |         |     |
|-------------|---------|-----|
| 0x9BB3C4    | #15152A | 103 |
| 0x85A5C2    | #16205A | 104 |
| 0xC68B7C    | #693C1C | 105 |
| 0xF14080    | #A8000A | 106 |
| 0xFF94A6    | #DE513D | 107 |
| 0xFFA374    | #D86A1C | 108 |
| 0xFFEE9F    | #FFE126 | 109 |
| 0xD2E498    | #9EE12F | 110 |
| 0xBAD074    | #67B50F | 111 |
| 0xA9A9A9    | #1E1E30 | 112 |
| 0xD4FDE1    | #DCFF6B | 113 |
| 0xCDF1F8    | #80FFBD | 114 |
| 0xB9C1E3    | #9A99FF | 115 |
| 0xCDBBE4    | #8E66FF | 116 |
| 0xD0D0D0    | #404040 | 117 |
| 0xDFE6E5    | #757575 | 118 |
| 0xFFFFFFFF  | #E0FFFF | 119 |
| Red         | #A00000 | 120 |
| Red Half    | #350000 | 121 |
| Green       | #1AD000 | 122 |
| Green Half  | #074200 | 123 |
| Yellow      | #B9B000 | 124 |
| Yellow Half | #3F3100 | 125 |
| Amber       | #B35F00 | 126 |
| Amber Half  | #4B1502 | 127 |

### ***Outbound Message Type 2: Controller Value Update messages***

Controls that report an absolute value for their position for inbound messages can have their controller value updated via a Controller Value Update message. This will be done using a MIDI controller message. The field normally associated with controller number will be used to specify the Control ID. The field normally associated with controller value will be used to update the value of a controller on the APC40 Mk2.

## Akai APC40 Mk2 Communication Protocol

### *MIDI Controller message*

| <b>Byte Number</b> | <b>Value</b>    | <b>Description</b>                                                        |
|--------------------|-----------------|---------------------------------------------------------------------------|
| 1                  | 0xB<chan>       | MIDI Controller. The 4-bit <chan> value will be used for the track strips |
| 2                  | <Controller ID> | Identifier for control surface object                                     |
| 3                  | Data            | Control value                                                             |

### *Assignment of controller numbers to absolute controllers*

| <b>Control</b> | <b>MIDI Channel</b>                        | <b>Control ID</b> | <b>Notes</b>                           |
|----------------|--------------------------------------------|-------------------|----------------------------------------|
| TRACK FADER    | 0-7 = Tracks 1-8                           | 0x07              |                                        |
| TEMPO KNOB     |                                            | 0x0D              |                                        |
| MASTER FADER   |                                            | 0x0E              |                                        |
| CROSSFADER     |                                            | 0x0F              |                                        |
| DEVICE KNOB 1  | 0-8 = Tracks 1-8, Master (for mode 0 only) | 0x10              | See “Interpretation of LED Ring Types” |
| DEVICE KNOB 2  | 0-8 = Tracks 1-8, Master (for mode 0 only) | 0x11              | See “Interpretation of LED Ring Types” |
| DEVICE KNOB 3  | 0-8 = Tracks 1-8, Master (for mode 0 only) | 0x12              | See “Interpretation of LED Ring Types” |
| DEVICE KNOB 4  | 0-8 = Tracks 1-8, Master (for mode 0 only) | 0x13              | See “Interpretation of LED Ring Types” |
| DEVICE         | 0-8 = Tracks 1-8,                          | 0x14              | See “Interpretation of LED Ring Types” |

Akai APC40 Mk2 Communication Protocol

| <b>Control</b>                 | <b>MIDI Channel</b>                              | <b>Control ID</b> | <b>Notes</b>                                               |
|--------------------------------|--------------------------------------------------|-------------------|------------------------------------------------------------|
| KNOB 5                         | Master<br>(for mode 0 only)                      |                   |                                                            |
| DEVICE KNOB 6                  | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x15              | See "Interpretation of LED Ring Types"                     |
| DEVICE KNOB 7                  | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x16              | See "Interpretation of LED Ring Types"                     |
| DEVICE KNOB 8                  | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x17              | See "Interpretation of LED Ring Types"                     |
| DEVICE KNOB 1<br>LED Ring Type | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x18              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| DEVICE KNOB 2<br>LED Ring Type | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x19              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| DEVICE KNOB 3<br>LED Ring Type | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x1A              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| DEVICE KNOB 4<br>LED Ring Type | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x1B              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| DEVICE KNOB 5<br>LED Ring Type | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x1C              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| DEVICE KNOB 6<br>LED Ring Type | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x1D              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |

Akai APC40 Mk2 Communication Protocol

| <b>Control</b>              | <b>MIDI Channel</b>                        | <b>Control ID</b> | <b>Notes</b>                                               |
|-----------------------------|--------------------------------------------|-------------------|------------------------------------------------------------|
| DEVICE KNOB 7 LED Ring Type | 0-8 = Tracks 1-8, Master (for mode 0 only) | 0x1E              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| DEVICE KNOB 8 LED Ring Type | 0-8 = Tracks 1-8, Master (for mode 0 only) | 0x1F              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| CUE LEVEL                   |                                            | 0x2F              |                                                            |
| TRACK KNOB 1                |                                            | 0x30              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 2                |                                            | 0x31              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 3                |                                            | 0x32              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 4                |                                            | 0x33              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 5                |                                            | 0x34              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 6                |                                            | 0x35              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 7                |                                            | 0x36              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 8                |                                            | 0x37              | APC40 Mk2 will light up ring LEDs according to ring type   |
| TRACK KNOB 1 LED Ring Type  |                                            | 0x38              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| TRACK KNOB 2 LED Ring Type  |                                            | 0x39              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |

## Akai APC40 Mk2 Communication Protocol

| <b>Control</b>             | <b>MIDI Channel</b> | <b>Control ID</b> | <b>Notes</b>                                               |
|----------------------------|---------------------|-------------------|------------------------------------------------------------|
| TRACK KNOB 3 LED Ring Type |                     | 0x3A              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| TRACK KNOB 4 LED Ring Type |                     | 0x3B              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| TRACK KNOB 5 LED Ring Type |                     | 0x3C              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| TRACK KNOB 6 LED Ring Type |                     | 0x3D              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| TRACK KNOB 7 LED Ring Type |                     | 0x3E              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| TRACK KNOB 8 LED Ring Type |                     | 0x3F              | 0=off, 1=Single, 2=Volume Style, 3=Pan Style, 4-127=Single |
| Footswitch                 |                     | 0x40              |                                                            |

### ***Interpretation of LED Ring Types***

The LED rings will display its controller value with the LEDs based on the LED Ring Types. This LED Ring Type can be set by the Host by sending an appropriate controller value message. The “Min” and “Max” columns below will state the range of the controller value that will match the LED states as shown in the “Display” column. The “LED STATES” column below will show the state of each of the 15 LEDs going from left to right. A “0” indicates that the LED within the LED ring is OFF. A “1” indicates that the LED within the LED ring is ON.

#### **A. SINGLE**

| <b>MIN</b> | <b>MAX</b> | <b>LED STATES</b> |
|------------|------------|-------------------|
| 0          | 3          | 100000000000000   |

## Akai APC40 Mk2 Communication Protocol

| <b>MIN</b> | <b>MAX</b> | <b>LED STATES</b> |
|------------|------------|-------------------|
| 4          | 8          | 1100000000000000  |
| 9          | 12         | 0100000000000000  |
| 13         | 17         | 0110000000000000  |
| 18         | 21         | 0010000000000000  |
| 22         | 25         | 0011000000000000  |
| 26         | 30         | 0001000000000000  |
| 31         | 34         | 0001100000000000  |
| 35         | 38         | 0000100000000000  |
| 39         | 43         | 0000110000000000  |
| 44         | 47         | 0000010000000000  |
| 48         | 52         | 0000011000000000  |
| 53         | 56         | 0000001000000000  |
| 57         | 60         | 0000001100000000  |
| 61         | 65         | 0000000100000000  |
| 66         | 69         | 0000000110000000  |
| 70         | 73         | 0000000010000000  |
| 74         | 78         | 0000000011000000  |
| 79         | 82         | 0000000001000000  |
| 83         | 87         | 0000000001100000  |
| 88         | 91         | 0000000000100000  |
| 92         | 95         | 0000000000110000  |
| 96         | 100        | 0000000000010000  |
| 101        | 104        | 0000000000011000  |
| 105        | 108        | 0000000000001000  |
| 109        | 113        | 0000000000001100  |
| 114        | 117        | 0000000000000010  |
| 118        | 122        | 0000000000000011  |
| 123        | 127        | 0000000000000001  |

### B. VOLUME STYLE

## Akai APC40 Mk2 Communication Protocol

| <b>MIN</b> | <b>MAX</b> | <b>LED STATES</b> |
|------------|------------|-------------------|
| 0          | 0          | 0000000000000000  |
| 1          | 9          | 1000000000000000  |
| 10         | 18         | 1100000000000000  |
| 19         | 27         | 1110000000000000  |
| 28         | 36         | 1111000000000000  |
| 37         | 45         | 1111100000000000  |
| 46         | 54         | 1111110000000000  |
| 55         | 63         | 1111111000000000  |
| 64         | 71         | 1111111100000000  |
| 72         | 80         | 1111111110000000  |
| 81         | 89         | 1111111111000000  |
| 90         | 98         | 1111111111100000  |
| 99         | 107        | 1111111111110000  |
| 108        | 116        | 1111111111111000  |
| 117        | 126        | 1111111111111100  |
| 127        | 127        | 1111111111111111  |

### C. PAN STYLE

| <b>MIN</b> | <b>MAX</b> | <b>LED STATES</b> |
|------------|------------|-------------------|
| 0          | 8          | 1111111100000000  |
| 9          | 17         | 0111111100000000  |
| 18         | 26         | 0011111100000000  |

## Akai APC40 Mk2 Communication Protocol

| MIN | MAX | LED STATES      |
|-----|-----|-----------------|
| 27  | 35  | 000111110000000 |
| 36  | 44  | 000011110000000 |
| 45  | 53  | 000001110000000 |
| 54  | 62  | 000000110000000 |
| 63  | 64  | 000000010000000 |
| 65  | 73  | 000000011000000 |
| 74  | 82  | 000000011100000 |
| 83  | 91  | 000000011110000 |
| 92  | 100 | 000000011111000 |
| 101 | 109 | 000000011111100 |
| 110 | 118 | 000000011111110 |
| 119 | 127 | 000000011111111 |

### ***Communications from device to PC Host - “Inbound” messages***

These messages will be used to report control surface events from the device to the PC Host and as a response to requests from the PC host.

### **Inbound Standard MIDI Message types**

These messages will use standard MIDI messages.

Each message type will contain a Control Identifier field, which will identify the control surface object to which the message pertains.

Each message type will contain a data field, which may contain information about either the new value of the control surface object or how it has changed since the last report.

### ***Type NOTE1: Note-on/Note-off messages***

Some devices (such as buttons) have two states and the transitions between these states will be reported using MIDI note-on (when the button is depressed) and note-off (when the button is released). The field normally associated with note number will be used to specify

## Akai APC40 Mk2 Communication Protocol

the Control ID.

### *Midi note-on messages*

| <b>Byte Number</b> | <b>Value</b> | <b>Description</b>                                                      |
|--------------------|--------------|-------------------------------------------------------------------------|
| 1                  | 0x9<chan>    | MIDI Note-on. The 4-bit <chan> value will be used for the track strips. |
| 2                  | <Control ID> | Identifier for control surface object ("note number")                   |
| 3                  | 0x7F         | Control value (non-zero)                                                |

### *Midi note-off messages*

| <b>Byte Number</b> | <b>Value</b> | <b>Description</b>                                                      |
|--------------------|--------------|-------------------------------------------------------------------------|
| 1                  | 0x8<chan>    | MIDI Note-off. The 4-bit <chan> value will be used for the track strips |
| 2                  | <Control ID> | Identifier for control surface object ("note number")                   |
| 3                  | 0x7F         | Control value (ignored)                                                 |

Assignment of note numbers to buttons. Note 0x30 to 0x49 use MIDI Channel 0 to 7 to indicate Tracks 1-8. All other note values ignore the MIDI Channel. In Mode 1 or Mode 2, all buttons act as momentary buttons.

| <b>Control</b> | <b>MIDI Channel</b> | <b>Note Number</b> |
|----------------|---------------------|--------------------|
| CLIP LAUNCH 1  |                     | 0x00               |
| CLIP LAUNCH 2  |                     | 0x01               |
| CLIP LAUNCH 3  |                     | 0x02               |
| CLIP LAUNCH 4  |                     | 0x03               |
| CLIP LAUNCH 5  |                     | 0x04               |
| CLIP LAUNCH 6  |                     | 0x05               |

## Akai APC40 Mk2 Communication Protocol

|                |  |      |
|----------------|--|------|
| CLIP LAUNCH 7  |  | 0x06 |
| CLIP LAUNCH 8  |  | 0x07 |
| CLIP LAUNCH 9  |  | 0x08 |
| CLIP LAUNCH 10 |  | 0x09 |
| CLIP LAUNCH 11 |  | 0x0A |
| CLIP LAUNCH 12 |  | 0x0B |
| CLIP LAUNCH 13 |  | 0x0C |
| CLIP LAUNCH 14 |  | 0x0D |
| CLIP LAUNCH 15 |  | 0x0E |
| CLIP LAUNCH 16 |  | 0x0F |
| CLIP LAUNCH 17 |  | 0x10 |
| CLIP LAUNCH 18 |  | 0x11 |
| CLIP LAUNCH 19 |  | 0x12 |
| CLIP LAUNCH 20 |  | 0x13 |
| CLIP LAUNCH 21 |  | 0x14 |
| CLIP LAUNCH 22 |  | 0x15 |
| CLIP LAUNCH 23 |  | 0x16 |
| CLIP LAUNCH 24 |  | 0x17 |
| CLIP LAUNCH 25 |  | 0x18 |
| CLIP LAUNCH 26 |  | 0x19 |
| CLIP LAUNCH 27 |  | 0x1A |
| CLIP LAUNCH 28 |  | 0x1B |
| CLIP LAUNCH 29 |  | 0x1C |
| CLIP LAUNCH 30 |  | 0x1D |
| CLIP LAUNCH 31 |  | 0x1E |

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|                     |  |            |
|---------------------|--|------------|
| CLIP LAUNCH 32      |  | 0x1F       |
| CLIP LAUNCH 33      |  | 0x20       |
| CLIP LAUNCH 34      |  | 0x21       |
| CLIP LAUNCH 35      |  | 0x22       |
| CLIP LAUNCH 36      |  | 0x23       |
| CLIP LAUNCH 37      |  | 0x24       |
| CLIP LAUNCH 38      |  | 0x25       |
| CLIP LAUNCH 39      |  | 0x26       |
| CLIP LAUNCH 40      |  | 0x27       |
| RECORD ARM          |  | 0x30 (C_3) |
| SOLO                |  | 0x31 (C#3) |
| ACTIVATOR           |  | 0x32 (D_3) |
| TRACK<br>SELECTION  |  | 0x33 (D#3) |
| TRACK STOP          |  | 0x34 (E_3) |
| DEVICE LEFT         |  | 0x3A       |
| DEVICE RIGHT        |  | 0x3B       |
| BANK LEFT           |  | 0x3C       |
| BANK RIGHT          |  | 0x3D       |
| DEVICE ON/OFF       |  | 0x3E       |
| DEVICE LOCK         |  | 0x3F       |
| CLIP/DEVICE<br>VIEW |  | 0x40       |
| DETAIL VIEW         |  | 0x41       |
| CROSSFADER<br>A/B   |  | 0x42       |

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|                   |                                                  |               |
|-------------------|--------------------------------------------------|---------------|
| CLIP STOP         | 0-7 = Track 1-8                                  |               |
| MASTER            |                                                  | 0x50 (G#5)    |
| STOP ALL CLIPS    |                                                  | 0x51 (A_5)    |
| SCENE LAUNCH<br>1 |                                                  | 0x52 (A#5)    |
| SCENE LAUNCH<br>2 |                                                  | 0x53 (B_5)    |
| SCENE LAUNCH<br>3 |                                                  | 0x54 (C_6)    |
| SCENE LAUNCH<br>4 |                                                  | 0x55 (C#6)    |
| SCENE LAUNCH<br>5 |                                                  | 0x56 (D_6)    |
| METRONOME<br>(8)  | 0-8 = Tracks 1-8,<br>Master<br>(for mode 0 only) | 0x41 (F_4)    |
| PAN               |                                                  | 0x57 (D#6)    |
| SENDS             |                                                  | 0x58 (E_6)    |
| USER              |                                                  | 0x59 (F_6)    |
| METRONOME         |                                                  | 0x5A (F#6)    |
| PLAY              |                                                  | 0x5B (G_6)    |
| STOP              |                                                  | 0x5C<br>(G#6) |
| RECORD            |                                                  | 0x5D (A_6)    |
| UP                |                                                  | 0x5E (A#6)    |
| DOWN              |                                                  | 0x5F (B_6)    |
| RIGHT             |                                                  | 0x60 (C_7)    |
| LEFT              |                                                  | 0x61 (C#7)    |

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|                |  |            |
|----------------|--|------------|
| SHIFT          |  | 0x62 (D_7) |
| TAP TEMPO      |  | 0x63 (D#7) |
| NUDGE -        |  | 0x64 (E_7) |
| NUDGE +        |  | 0x65 (F_7) |
| SESSION RECORD |  | 0x66       |
| BANK LOCK      |  | 0x67       |

### **Type CC1: Absolute Controller messages**

Most controls will report an absolute value for their position. This will be done using a MIDI controller message. The field normally associated with controller number will be used to specify the Control ID. The field normally associated with controller value will be used to report the absolute control value.

#### *MIDI Controller message*

| <b>Byte number</b> | <b>Value</b> | <b>Description</b>                                                  |
|--------------------|--------------|---------------------------------------------------------------------|
| 1                  | 0xB<chan>    | MIDI Controller. The 4-bit <chan> value will be used for the track. |
| 2                  | <ControlID>  | identifier for control surface object                               |
| 3                  | data         | control value                                                       |

#### *Assignment of controller numbers to absolute controllers*

| <b>Control</b> | <b>MIDI Channel</b>                        | <b>Control ID</b> | <b>Notes</b> |
|----------------|--------------------------------------------|-------------------|--------------|
| TRACK FADER    | 0-7 = Tracks 1-8                           | 0x07              |              |
| MASTER FADER   |                                            | 0x0E              |              |
| CROSSFADER     |                                            | 0x0F              |              |
| DEVICE KNOB 1  | 0-8 = Tracks 1-8, Master (for Mode 0 only) | 0x10              |              |
| DEVICE KNOB 2  | 0-8 = Tracks 1-8, Master                   | 0x11              |              |

Akai APC40 Mk2 Communication Protocol

| <b>Control</b> | <b>MIDI Channel</b>                           | <b>Control ID</b> | <b>Notes</b> |
|----------------|-----------------------------------------------|-------------------|--------------|
|                | (for Mode 0 only)                             |                   |              |
| DEVICE KNOB 3  | 0-8 = Tracks 1-8, Master<br>(for Mode 0 only) | 0x12              |              |
| DEVICE KNOB 4  | 0-8 = Tracks 1-8, Master<br>(for Mode 0 only) | 0x13              |              |
| DEVICE KNOB 5  | 0-8 = Tracks 1-8, Master<br>(for Mode 0 only) | 0x14              |              |
| DEVICE KNOB 6  | 0-8 = Tracks 1-8, Master<br>(for Mode 0 only) | 0x15              |              |
| DEVICE KNOB 7  | 0-8 = Tracks 1-8, Master<br>(for Mode 0 only) | 0x16              |              |
| DEVICE KNOB 8  | 0-8 = Tracks 1-8, Master<br>(for Mode 0 only) | 0x17              |              |
| DEVICE KNOB 1  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x18              |              |
| DEVICE KNOB 2  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x19              |              |
| DEVICE KNOB 3  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x1A              |              |
| DEVICE KNOB 4  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x1B              |              |
| DEVICE KNOB 5  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x1C              |              |
| DEVICE KNOB 6  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x1D              |              |
| DEVICE KNOB 7  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x1E              |              |
| DEVICE KNOB 8  | 0-8 = Tracks 1-8, Master<br>(for mode 0 only) | 0x1F              |              |
| CUE LEVEL      |                                               | 0x2F              |              |

## Akai APC40 Mk2 Communication Protocol

| <b>Control</b> | <b>MIDI Channel</b> | <b>Control ID</b> | <b>Notes</b>                                                   |
|----------------|---------------------|-------------------|----------------------------------------------------------------|
| TRACK KNOB 1   |                     | 0x30              |                                                                |
| TRACK KNOB 2   |                     | 0x31              |                                                                |
| TRACK KNOB 3   |                     | 0x32              |                                                                |
| TRACK KNOB 4   |                     | 0x33              |                                                                |
| TRACK KNOB 5   |                     | 0x34              |                                                                |
| TRACK KNOB 6   |                     | 0x35              |                                                                |
| TRACK KNOB 7   |                     | 0x36              |                                                                |
| TRACK KNOB 8   |                     | 0x37              |                                                                |
| TRACK KNOB 1   |                     | 0x38              |                                                                |
| TRACK KNOB 2   |                     | 0x39              |                                                                |
| TRACK KNOB 3   |                     | 0x3A              |                                                                |
| TRACK KNOB 4   |                     | 0x3B              |                                                                |
| TRACK KNOB 5   |                     | 0x3C              |                                                                |
| TRACK KNOB 6   |                     | 0x3D              |                                                                |
| TRACK KNOB 7   |                     | 0x3E              |                                                                |
| TRACK KNOB 8   |                     | 0x3F              |                                                                |
| Footswitch     |                     | 0x40              | Value of 0x7F when depressed and a value of 0x00 when released |

### ***Type CC2: Relative Controller messages***

Some controls will report a relative change in their value. This will be done using a MIDI controller message. The field normally associated with controller number will be used to specify the Control ID. The field normally associated with controller value will be used to report the change in the control value.

## Akai APC40 Mk2 Communication Protocol

### *MIDI Controller message*

| <b>Byte Number</b> | <b>Value</b> | <b>Description</b>                                                        |
|--------------------|--------------|---------------------------------------------------------------------------|
| 1                  | 0xB<chan>    | MIDI Controller. The 4-bit <chan> value will be used for the track strips |
| 2                  | <ControlID>  | identifier for control surface object                                     |
| 3                  | data         | control change                                                            |

### *Interpretation of MIDI Controller values for Relative Controllers*

The value in the data field will indicate a relative change; values 01 to 63 describe a positive change and values 127 down to 64 describe a negative change.

| <b>Data Value Sent</b> | <b>Interpretation</b>                                            |
|------------------------|------------------------------------------------------------------|
| 0x00                   | No change occurred. Control is stationary.                       |
| 0x01                   | The controller incremented its value by 1 since the last report  |
| 0x02                   | The controller incremented its value by 2 since the last report  |
| ...                    | ...                                                              |
| 0x3f                   | The controller incremented its value by 63 since the last report |
| 0x40                   | The controller decremented its value by 64 since the last report |
| 0x41                   | The controller decremented its value by 63 since the last report |
| ...                    | ...                                                              |
| 0x7e                   | The controller decremented its value by 2 since the last report  |
| 0x7f                   | The controller decremented its value by 1 since the last report  |

### *Assignment of controller numbers to relative controllers*

| <b>Control</b> | <b>Control ID</b> | <b>Notes</b> |
|----------------|-------------------|--------------|
| CUE LEVEL      | 0x2F              |              |
| TEMPO KNOB     | 0x0D              |              |

**Document History**

| <b><i>Date</i></b> |                                                                                                                                                                                                     | <b><i>Author</i></b> |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| January 7, 2015    | First Draft based on APC40 Communications Protocol document                                                                                                                                         | Kris Stevenson       |
| January 8, 2015    | Revisions made to 1 <sup>st</sup> draft after review with Eng.                                                                                                                                      | Kris Stevenson       |
| January 19, 2015   | Tempo Knob removed from Absolute Controller Messages table on p36 and added to Relative Controller Messages table on p39.                                                                           | Kris Stevenson       |
| January 19, 2015   | Added Track Activator, Crossfader A/B, Track Solo, Track Record, Bank, Play, Record, Session Record, Pan, Sends, User, and Metronome button types to Outbound Message Type: Generic Mode on p12-13. | Kris Stevenson       |