

Purpose:

The purpose of these additional IR codes is to interface to remote touchpads that communicate via an IR remote protocol. Operation is designed to function better without the visual feedback the user would get from the LCD while standing in front of the XM-3000 using a handheld remote. Commands are zone specific, so that a touchpad in a particular zone can be made to control only that zone and the user cannot accidentally change the settings in another zone. The need for the “SEL” button, as is on the handheld remote, has been eliminated. This eliminates the need for macros, or strings of commands. For example, a single channel up command for zone 1 would take the place 3 button presses on the handheld IR remote: Zone 1, Channel Up, and Select. This will minimize the possibility of collisions from touchpads in 2 different zones being operated at the same time.

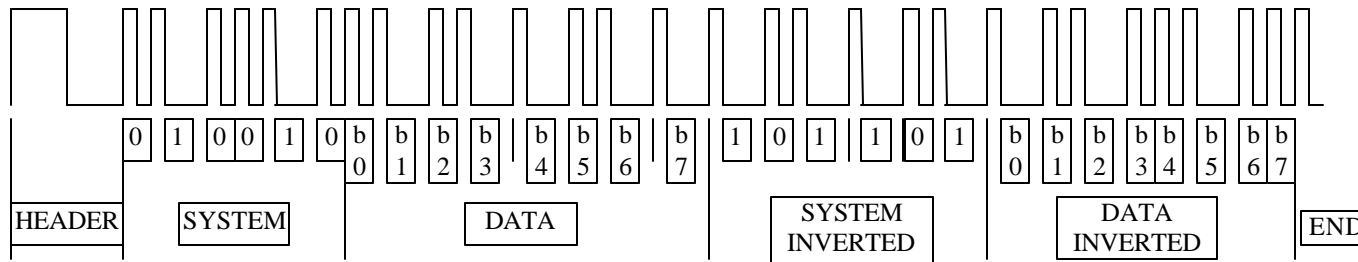
XM-3000 Firmware:

This document applies only to XM-3000 receivers with firmware versions of 6.20.230 or higher.

Pulse Train Format:

The IR protocol consists of 5 parts:

1. Header
2. System code (6 bits) “010010”
3. Command (8 bits)
4. System code inverted (6 bits) “101101”
5. Command inverted (8 bits)



Example of Channel Up, Direct Tuning Mode, Zone 3

- Notes:
1. Carrier frequency is 57KHz.
 2. High going pulses represent carrier on time.
 3. TTL level signals at the IR receiver will look exactly inverted from this.
 4. Logic "0" bit is 840 uS carrier on followed by 840 uS carrier off.
 5. Logic "1" bit is 840 uS carrier on followed by 2540 uS carrier off.
 6. In the above example, the data sent is 01011011. Lsb is first. The data will be converted by microcontroller firmware to 0xDA.

Explanation of Bits in Command Byte:

The bits of the command byte have the following meaning. This makes the command bytes follow a pattern, rather than being random sequential numbers. Not all possible commands are valid. See the table of valid commands in the next section.

Note: The bits are shown in the order they would appear on an oscilloscope, which is backwards from a software convention, which has the most significant bit on the left.

b0 b1 b2 b3 b4 b5 b6 b7

b6, b7 Zone

00 = Zone independent. Used only for Power On and Power Off.

10 = Zone 1

01 = Zone 2

11 = Zone 3

b4, b5 Mode

00 = Mode independent functions

10 = Direct tuning mode

01 = Category tuning mode

11 = Preset tuning mode

b0, b1, b2, b3 Function

	Tuning Function (b4, b5 <> 00)	Mode Independent Function (b4, b5 = 00)
0000	Number 0	Direct tuning mode (1)
1000	Number 1	Category tuning mode (1)
0100	Number 2	Preset tuning mode (1)
1100	Number 3	Program Preset
0010	Number 4	Cancel Program Preset
1010	Number 5	Power On (2)
0110	Number 6	Power Off (2)
1110	Number 7	Select (1)
0001	Number 8	reserved
1001	Number 9	reserved
0101	Channel Up	reserved
1101	Channel Down	reserved
0011	Category Left (3)	reserved
1011	Category Right (3)	reserved
0111	reserved	reserved
1111	reserved	reserved

- (1) Function provided, but no foreseen use.
- (2) Power On/Off only valid for b6, b7 = 00 (Zone independent).
- (3) Category Left and Right expected only for Direct tuning mode, (b4, b5 = 10).

Examples:

To tune Zone 2 to Preset 7, “11101101” would be sent, which decodes “1110”(Number 7) + “11” (Preset tuning mode) + “01” (Zone 2).

To tune up one channel in Zone 1, staying within the category, “01010110” would be sent, which decodes to “0101” (Channel Up) + “01” (Category Tuning Mode) + “10” (Zone 1).

To tune Zone 3 to Channel 123, “1000111”, “01000111”, “11000111” would be sent.

Summary of Valid Commands:

Function	ZONE 1			ZONE 2			ZONE 3		
	Tuning mode			Tuning mode			Tuning mode		
	Direct	Category	Preset	Direct	Category	Preset	Direct	Category	Preset
Number 0	00001010	not used	00001110	00001001	not used	00001101	00001011	not used	00001111
Number 1	10001010	not used	10001110	10001001	not used	10001101	10001011	not used	10001111
Number 2	01001010	not used	01001110	01001001	not used	01001101	01001011	not used	01001111
Number 3	11001010	not used	11001110	11001001	not used	11001101	11001011	not used	11001111
Number 4	00101010	not used	00101110	00101001	not used	00101101	00101011	not used	00101111
Number 5	10101010	not used	10101110	10101001	not used	10101101	10101011	not used	10101111
Number 6	01101010	not used	01101110	01101001	not used	01101101	01101011	not used	01101111
Number 7	11101010	not used	11101110	11101001	not used	11101101	11101011	not used	11101111
Number 8	00011010	not used	00011110	00011001	not used	00011101	00011011	not used	00011111
Number 9	10011010	not used	10011110	10011001	not used	10011101	10011011	not used	10011111
Channel Up	01011010	01010110	01011110	01011001	01010101	01011101	01011011	01010111	01011111
Channel Down	11011010	11010110	11011110	11011001	11010101	11011101	11011011	11010111	11011111
Category Left	00111010	not used	not used	00111001	not used	not used	00111011	not used	not used
Category Right	10111010	not used	not used	10111001	not used	not used	10111011	not used	not used
Program Preset	11000010			11000001			11000011		
Cancel Prog. Preset	00100010			00100001			00100011		
Power On	10100000								
Power Off	01100000								