

Operating Instructions

2nd Generation

Frequency and Mode Switch Box for TIMTER™ Transmitters

P/N: QSX-AC-DSWBX



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Specifications subject to change without notice.

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1 Introduction

The 2nd Generation Quasonix switch box provides six LED digits used to display the mode and frequency. This includes a total of five digits of frequency step up or down, in MHz, and one digit of mode selection, in terms of the ARTM “Tier” number. There is also a channel selector for channel 1 or channel 2. Two channel operation is only valid when connected to a Dual Telemetry Transmitter. Standard transmitters default to Channel 1. In addition, the switch box can send the LDPC code for each channel (for LDPC enabled transmitters). Included with the switch box is an 18” MDM-9 to MDM-9 cable harness.

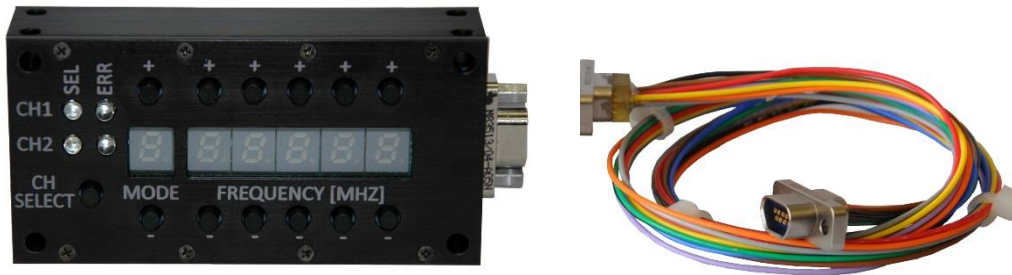


Figure 1: Frequency and Mode Switch Box for TIMTER™ Transmitters with Cable Harness

2 Channel

When the switch box is attached to a Dual Telemetry Transmitter, the user may toggle between channel 1 and channel 2 using the CH Select button, as shown in Figure 2. CH1 or CH2 LED indicators illuminate when a channel is selected. Only one channel selection LED illuminates at a time.

Standard single channel transmitters default to channel 1. If a user attempts to set a single channel transmitter to channel 2, the word “single” is briefly displayed on the character displays, and the channel remains set to CH1.



Figure 2: 2nd Generation Switch Box Channel Selection

3 Mode

The mode buttons allow the user to select the ARTM waveform type for transmission, as shown in Figure 3. Numbers between zero and 15 (hex F) (0-9 and A-F) may be selected. The top button (+) scrolls up from 0-F, while the bottom button (-) scroll down from F-0. The up and down buttons wrap at zero (0) and hex 15 (F).

Valid modes are determined by the modes available on the attached transmitter. Presently, modes 0 through 14 (hex E) are supported. The digits equate to the ARTM “Tier” number, as shown below:

- 0 = ARTM Tier 0, PCM/FM
 - 1 = ARTM Tier I, SOQPSK
 - 2 = ARTM Tier II, ARTM (Multi-h) CPM
 - 3 = BPSK (requires PSK option)
 - 4 = QPSK (requires PSK option)
 - 5 = AQPSK (requires PSK option)
 - 6 = Carrier
 - 7 = OQPSK (requires PSK option)
 - 8 = UQPSK (requires PSK option)
 - *9 = AUQPSK (requires PSK option)
 - *10 = STDN (requires STDN option)
 - *11 = SQPN (requires SQPN option)
 - *12 = AFM (requires FM option)
 - 13 = STC (requires STC option)
 - *14 = DPM
- * Not currently available on the Quasonix Dual Transmitter



Figure 3: 2nd Generation Switch Box Mode Selection

4 Frequency

Each of the five (5) frequency digits is selected independently using the push buttons above or below each digit, as shown in Figure 4. Numbers between zero and nine (0-9) may be selected. The top buttons (+) scroll up from 0-9, while the bottom buttons (-) scroll down from 9-0.



Figure 4: 2nd Generation Switch Box Frequency Selection

5 LDPC

Note: The attached transmitter must have the LDPC option installed for the switch box LDPC Select mode to affect the transmitter settings. If LDPC is not installed on the transmitter, the switch box will still function as described in this section, but the transmitter will indicate LDPC is not available.

The switch box sends the LDPC code for each available transmitter channel. Standard single channel transmitters default to channel 1.

The following button combination may be used to make LDPC selections.

Both buttons *must be pressed at the same time*.

- Enter LDPC Select mode: (CH_SEL | UP_0_1) (Figure 5)

When in LDPC Select mode, the switch box display shows the channel, the letters LDPC, and the current value of the LDPC code as a numerical value from 0-5, or “d” for disable. For example, “1 Ldpc0”.

The user can increment or decrement the LDPC code by pressing the UP (plus sign) or DOWN (minus sign) buttons corresponding to the last digit (0.1 position). To change the channel on a dual transmitter, press the Channel Select button.



Figure 5: Select LDPC Key Press Example

LDPC Select mode times out after four (4) seconds with no button presses. It also exits if any OTHER button is pressed on the switch box. In either case, the display reverts to the normal display. However, the channel selection remains changed if the user changed it while in LDPC Select mode.

Upon exiting the LDPC Select mode, a command is sent to the transmitter with the new data. The transmitter decides whether the LDPC mode is valid (LDPC option enabled, etc.), and how it should behave.

The display shows ‘d’ for Disable (Off), as shown in Figure 7, and 0-5 (zero through five) for LDPC codes 0-5, as shown in Figure 6. This ensures consistency with the transmitter user interface LD command.

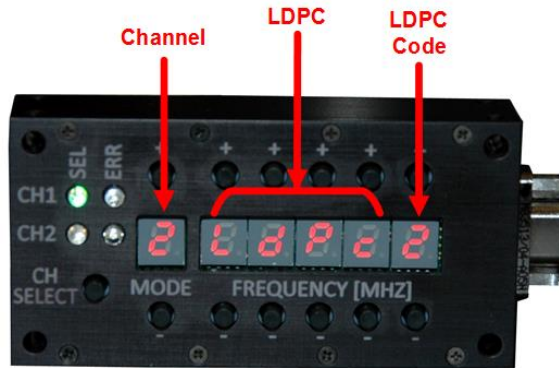


Figure 6: Labeled LDPC Display Example, Channel 2, LDPC Code 2

The available LDPC codes are:

d	Disabled
0	k=4096, r=1/2
1	k=1024, r=1/2
2	k=4096, r=2/3
3	k=1024, r=2/3
4	k=4096, r=4/5
5	k=1024, r=4/5

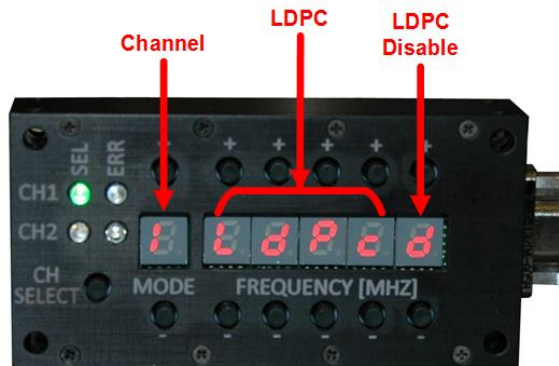


Figure 7: Labeled LDPC Display Example, LDPC Disabled

6 Error LEDs

Invalid frequency or mode selections result in an error condition, illustrated by two Error LEDs (Figure 8). If channel frequency or mode is outside of the allowable range, the channel Error LED illuminates. The Error LED remains on until the error is corrected, even if the user switches channels. For example, if the user is looking at, or setting, channel 1, they will know if there is an error on channel 2 that must be corrected.

Note: Currently, dual transmitters do not support independent modulations on the two channels (coming soon). Therefore, if the modes for the two channels are not the same, BOTH Error LEDs will blink until the problem is corrected, regardless of other errors.



Figure 8: 2nd Generation Switch Box Error LEDs

7 Pinouts

The Switch Box has one external connector—a female MDM-9—shown in Figure 9 with pin locations labeled.

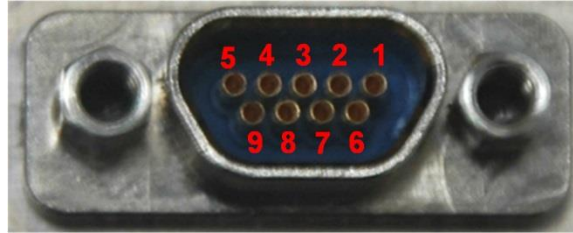


Figure 9: Female MDM-9 Connector

The pin assignments for the switch box MDM-9 connector are listed in Table 1.

Table 1: Switch Box Pinout

Pin	Function
1	Ground
2	I/O 1
3	SPI SCLCK
4	SPI MISO
5	Transmitter Replies to Switch Box
6	2.8 V+ Output
7	SPI MOSI
8	SPI CS
9	Switch Box Commands to Transmitter

8 Drawing

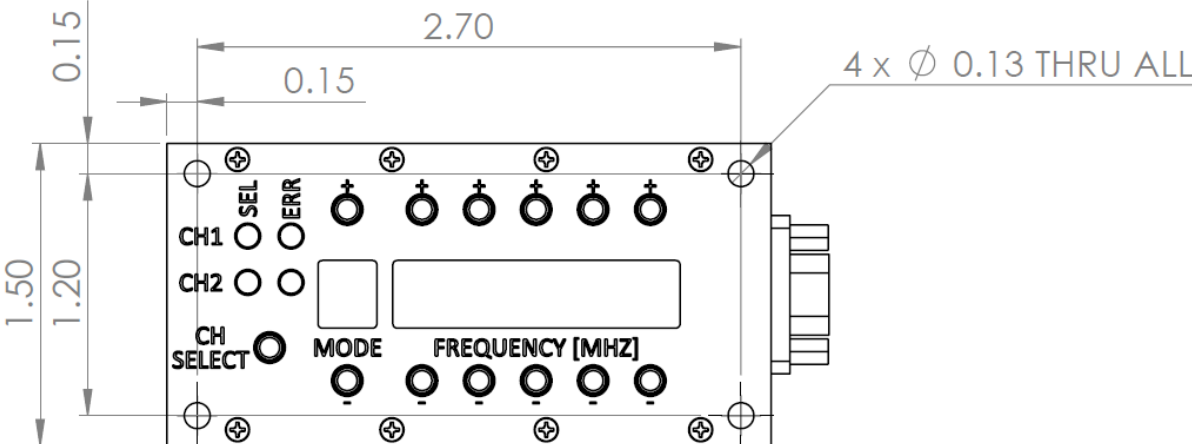


Figure 10: 2nd Generation Switch Box Drawing

9 Switch Box Display Adjustments

The following special button combinations may be used to brighten or dim LEDs or character displays.

All buttons *must be pressed at the same time*.

- LED display PWM percentage increase: (CH_SEL | UP_MODE | DN_MODE) (Figure 11)
This button combination increases the PWM percentage for the LED displays to make them brighter. The default is 1%.



Figure 11: Increase LED Display Brightness Key Press Example

- LED display PWM percentage decrease: (CH_SEL | UP_0_1 | DN_0_1)
This button combination decreases the PWM percentage for the LED displays to make them dimmer.
- 7 segment character PWM percentage increase: (CH_SEL | UP_1000 | DN_1000)
This button combination increases the PWM percentage for the 7 segment displays to make them brighter. The default is 20%.
- 7 segment character PWM percentage decrease: (CH_SEL | UP_1 | DN_1)
This button combination decreases the PWM percentage for the 7 segment displays to make them dimmer.
- Display system parameters: (UP_100 | DN_100 | UP_10 | DN_10)
This button combination starts a subset of the internal parameters cycling on the 7 segment displays. Pressing any button exits the loop and returns the switch box to normal operation. The parameters are displayed in order, as shown in Table 2.

Table 2: Internal Display Parameters for the 7 Segment Displays

Parameter	Parameter Number	Example Display	Description
FW_VERSION	0	F1.013	Firmware version
SERIAL_NUMBER	1	102435	Serial number
SWBX_CONFIG	2	dual	0=legacy, 1=dual, 2=single
CUR_CHAN	3	ch1 (ch2)	Current channel
CH1_MODE	4	0 [ch1]	Channel 1 mode
CH2_MODE	5	0 [ch2]	Channel 2 mode
CH1_FREQ	6	1 2200.5	Channel 1 frequency (MHz)
CH2_FREQ	7	1 2304.5	Channel 2 frequency (MHz)
CH1_LDPC	8	1 ldpc 1	Channel 1 LDPC code
CH2_LDPC	9	2 ldpc 1	Channel 2 LDPC code
ALLOWED_MODES	10	- 2047	Allowed modes
LED_PWM_PERCENT	11	led001	LED 1% PWM
CHAR_PWM_PERCENT	12	dsp020	Displays 20% PWM
INDEP_MODES	13	notind	Independent mode or not

10 Maintenance Instructions

The Switch Box requires no regular maintenance, and there are no user-serviceable parts inside. Please consult Quasonix for any maintenance, upgrade, or repair requirements.

11 Product Warranty

The Switch Box carries a standard parts and labor warranty of one (1) year from the date of delivery.

12 Technical Support and RMA Requests

In the event of a product issue, customers should contact Quasonix via phone (1-513-942-1287) or email (support@quasonix.com) to seek technical support. If the Quasonix representative determines that the product issue must be addressed at Quasonix, a returned materials authorization (RMA) number will be provided for return shipment.

Authorized return shipments must be addressed in the following manner:

**Quasonix, Inc.
ATTN: Repair, RMA #
6025 Schumacher Park Drive
West Chester, OH 45069**

To ensure that your shipment is processed most efficiently, please include the following information with your product return:

- Ship To – Company name, address, zip code, and internal mail-drop, if applicable
- Attention/Contact person – Name, Title, Department, Phone number, email address
- Purchase Order Number – If applicable
- RMA Number – provided by the Quasonix representative

Please note that Quasonix reserves the right to refuse shipments that arrive without RMA numbers.