

Operating Instructions
Frequency and Mode Switch Box for TIMTER™ Transmitters
P/N: QSX-AC-SWBX-P9-3B-3M



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Table of Contents

1 Introduction 1

2 Frequency 2

 2.1 Switchbox Operation with a Transmitter that Does Not Support C-band 2

 2.2 Switchbox Operation with a Transmitter that Supports Only C-band and Mid C-band 3

 2.3 Switchbox Operation with a Transmitter that Supports L/S/C band 4

3 Mode 5

4 Pinouts 6

5 Maintenance Instructions 7

6 Product Warranty 8

7 Technical Support and RMA Requests 9

List of Figures

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

Figure 2: Front Close-up of Switch Box, Frequency Digits Highlighted 2

Figure 3: Front Close-up of Switch Box, Mode Digit Highlighted 5

Figure 4: Female MDM-9 Connector 6

List of Tables

Table 1: Parsed Digits for L, U (Upper L), and S Bands 2

Table 2: Parsed Digits for C and Mid-C Bands 3

Table 3: Parsed Digits for L/S/C Band 4

Table 4: Switch Box Pinout 6

1 Introduction

The Quasonix switch box includes a total of five 10-digit switches, four to choose the frequency, in MHz, and one switch to choose the mode, in terms of the ARTM “Tier” number. Included with the switch box is a 36” MDM-9 to MDM-9 cable harness.

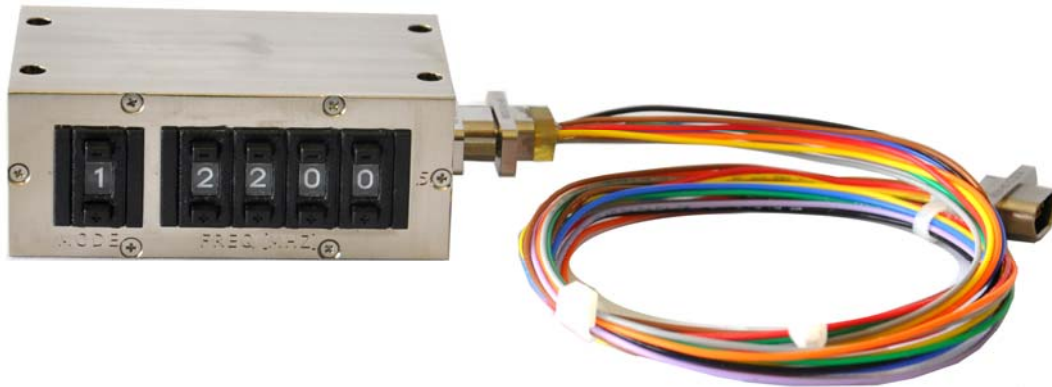


Figure 1: Frequency and Mode Switch Box for TIMTER™ Transmitters with Cable Harness

The transmitter includes a serial command, DD, short for “debounce delay,” that allows the user to adjust the delay incurred after each click. The purpose of this command is to mitigate the risk of inadvertently tuning the transmitter to a disallowed frequency, or mode, while the user is still in the process of clicking through the selections. The minimum debounce delay is 500 mS and the maximum is 9000 mS rounded to the nearest 500 mS. The default delay is three (3) seconds.

2 Frequency

2.1 Switchbox Operation with a Transmitter that Does Not Support C-band

The frequency assigned through the switch box assumes a +0.5 MHz offset. For example, if the digits “2-2-0-0” are dialed, the transmitter will read 2200.5 MHz.

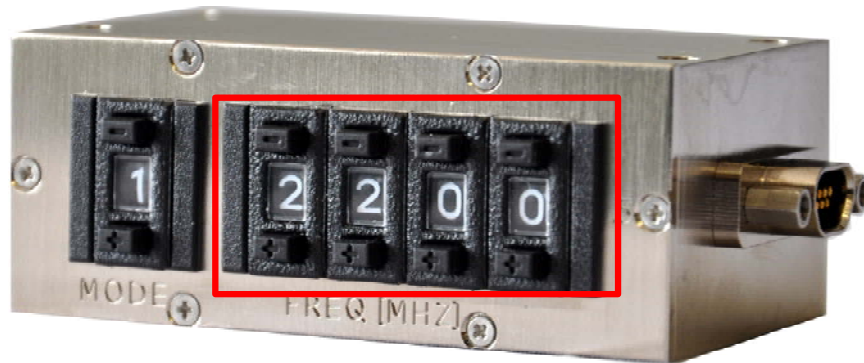


Figure 2: Front Close-up of Switch Box, Frequency Digits Highlighted

This description assumes that the transmitter supports L, U (Upper L), and S bands. Due to the relatively limited frequency range of the transmitter (1435.5 MHz on the low end, 2394.5 MHz on the high end), the switch box’s microprocessor parses only the two least significant binary bits of the most significant digit – the Gigahertz digit.

The parsed binary digits are shown in Table 1:

Table 1: Parsed Digits for L, U (Upper L), and S Bands

Switch Box Digit		First Two Binary Digits	Last Two Binary Digits	What the TX Sees (in GHz)	Comments
0	=	00	00	= 0	Not valid
1	=	00	01	= 1	Depends on lower digits
2	=	00	10	= 2	Depends on lower digits
3	=	00	11	= 3	Not valid
4	=	01	00	= 0	Not valid
5	=	01	01	= 1	Depends on lower digits
6	=	01	10	= 2	Depends on lower digits
7	=	01	11	= 3	Not valid
8	=	10	00	= 0	Not valid
9	=	10	01	= 1	Depends on lower digits

By design, this means that GHz assignments outside of the expected 1 and 2 will result in either no change to the transmitter, or a retune to the equivalent valid number.

For example, if 6200.5 MHz is dialed in, the unit will retune itself to 2200.5 MHz since the frequency is valid for S-band. If a valid frequency is dialed, the transmitter will retune itself accordingly.

2.2 Switchbox Operation with a Transmitter that Supports Only C-band and Mid C-band

The frequency assigned through the switch box assumes a +0.5 MHz offset. For example, if the digits “4-4-0-0” are dialed, the transmitter will read 4400.0 MHz.

The frequency range of a C-band transmitter is 4400.0 MHz on the low end, 4940.0 MHz on the high end for standard C-band, and 5091.0 MHz on the low end and 5150.0 MHz on the high end for mid-C. The switch box’s microprocessor for a C-band only transmitter parses only the three least significant binary bits of the most significant digit – the Gigahertz digit.

The parsed binary digits for C-bands are shown in Table 2:

Table 2: Parsed Digits for C and Mid-C Bands

Switch Box Digit		First Binary Digit	Last Three Binary Digits	What the TX Sees (in GHz)	Comments
0	=	0	000	= 0	Not valid
1	=	0	001	= 1	Not valid
2	=	0	010	= 2	Not valid
3	=	0	011	= 3	Not valid
4	=	0	100	= 4	Depends on lower digits
5	=	0	101	= 5	Depends on lower digits
6	=	0	110	= 6	Not valid
7	=	0	111	= 7	Not valid
8	=	1	000	= 0	Not valid
9	=	1	001	= 1	Not valid

By design, this means that GHz assignments outside of the expected digits will result in either no change to the transmitter, or a retune to the equivalent valid number.

For example, if 6200.5 MHz is dialed in, the unit will not retune itself since the frequency is out of C band. If 9200.5 MHz is dialed, it will be read as 1200.5 MHz, which is also out of C band.

2.3 Switchbox Operation with a Transmitter that Supports L/S/C band

The frequency assigned through the switch box assumes a +0.5 MHz offset. For example, if the digits “4-4-0-0” are dialed, the transmitter will read 4400.0 MHz.

This description assumes that the transmitter supports L, U (Upper L), S, and C bands. The frequency range of an L/S/C band transmitter is 1435.5 MHz on the low end, 4940.0 MHz on the high end for standard C-band, and 5091.0 MHz on the low end and 5150.0 MHz on the high end for mid-C. The switch box’s microprocessor for an L/S/C band only transmitter parses only the three least significant binary bits of the most significant digit – the Gigahertz digit.

The parsed binary digits for L/S/C band transmitters are shown in Table 3:

Table 3: Parsed Digits for L/S/C Band

Switch Box Digit	=	First Binary Digit	Last Three Binary Digits	=	What the TX Sees (in GHz)	Comments
0	=	0	000	=	0	Not valid
1	=	0	001	=	1	Depends on lower digits
2	=	0	010	=	2	Depends on lower digits
3	=	0	011	=	3	Not valid
4	=	0	100	=	4	Depends on lower digits
5	=	0	101	=	5	Depends on lower digits
6	=	0	110	=	6	Not valid
7	=	0	111	=	7	Not valid
8	=	1	000	=	0	Not valid
9	=	1	001	=	1	Depends on lower digits

By design, this means that GHz assignments outside of the expected digits will result in either no change to the transmitter, or a retune to the equivalent valid number.

For example, if 6200.5 MHz is dialed in, the unit will not retune itself since the frequency is out of all allowed bands. If 9200.5 MHz is dialed, it will be read as 1200.5 MHz, which is also out of band.

3 Mode

The mode switch allows the user to select the ARTM waveform type for transmission. The digits equate to the ARTM “Tier” number, as shown below:

- 0 = ARTM Tier 0, PCM/FM
- 1 = ARTM Tier I, SOQPSK-TG
- 2 = ARTM Tier II, ARTM (Multi-h) CPM
- 3 = Carrier



Figure 3: Front Close-up of Switch Box, Mode Digit Highlighted

As with the frequency implementation, the microprocessor parses only the two least significant digits of the mode. Again, this means that selections made outside of the expected 0, 1, 2, or 3 may reprogram the transmitter to a different mode depending on the mapping of the least significant digits.

For example, if “4” is chosen accidentally then the transmitter would switch to Tier 0, PCM/FM, because both 0 and 4 share the same two least significant digits in binary, 00.

4 Pinouts

The Switch Box has one external connector—a female MDM-9—shown in Figure 4 with pin locations labeled.



Figure 4: Female MDM-9 Connector

The pin assignments for the switch box MDM-9 connector are listed in Table 4.

Table 4: 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

5 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.

6 Product Warranty

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

7 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.