

MIDI-Scope



Artistic Licence Engineering Ltd

Software Version V1.3 Manual Revision V1.91

Product Registration Form

Product:	MIDI-Scope
Serial No.	

Version No.
Date Purchased:

Supplier:

Name:	
Company Name:	
Address:	
Post/Zip Code:	Phone No.

Comments:

Please return to: Artistic Licence Engineering Ltd. Studio 1 Spectrum House, 32-34 Gordon House Road, London, NW5 1LP, UK Fax: +44 (0) 20 8426 0551
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I N T R O D U C T I O N

Quick Start

Welcome to the MIDI-Scope manual. MIDI-Scope is a sophisticated MIDI analyser, but is remarkably simple to operate.

Users who are familiar with MIDI should find that a scan of the Control Surface section is sufficient to get started.

Please remember to return your product registration card, so that we can keep you informed of new developments.



Features

MIDI-Scope provides the following features:

- ⇒ Receives MIDI
 - ⇒ 128 character receive capture buffer
 - ⇒ 4 character programmable capture trigger with 'Don't Care' options
 - ⇒ Hexadecimal or MIDI command icon display
 - ⇒ 8 programmable transmit messages held in e2prom
 - ⇒ 5 transmission modes including single character, message and continuous
 - ⇒ Transmit messages can be triggered by receiver
 - ⇒ Cable Test
-

T H E C O N T R O L S U R F A C E

Overview

MIDI-Scope is operated by the six front panel buttons. The buttons function as follows:

MENU

The MENU key is used to select the operating mode of MIDI-Scope. Pressing MENU once will display the currently selected mode. The LEFT and RIGHT cursor keys are then used to select a new operating mode. The process is completed by pressing MENU a second time.

TX

When MIDI-Scope is displaying a MENU, the TX key may be used to accept the selection.

When MIDI-Scope is in either RECEIVE or TRANSMIT mode, the TX key is used to transmit data.

LEFT RIGHT

When MIDI-Scope is displaying a MENU, the LEFT & RIGHT keys are used to move through the menu options.

Otherwise, the LEFT & RIGHT keys are used to move the cursor in the display window.

UP DOWN

The UP and DOWN cursor keys are used to increment or decrement the data displayed at the cursor position.

MENUS

Upon entering MENU mode, eight different operating modes may be selected. These are:

DISPLAY RECEIVED MIDI	Displays the MIDI data as it is received. Errors in received data are shown as character icons.
DISPLAY FORMAT: ICONIC	Selects the format of MIDI data display between hexadecimal and command icons.
REVIEW MIDI CAPTURE BUFFER	Displays MIDI data from receive capture buffer, ie the MIDI data received after a capture trigger.
EDIT CAPTURE TRIGGER	Edits the four character trigger used to start filling the capture buffer.
TRANSMIT MIDI	Allows one of eight programmable messages to be transmitted to the MIDI output.
EDIT TX MESSAGE: 1+ 81 01 7F..	Edits the eight MIDI transmit messages. The first four characters of the selected message are displayed.
COPY CAPTURE TO TX MSGE: 8	Allows the receive capture buffer to be copied to any of the MIDI transmit messages.
CABLE TEST PINS 4 & 5	Tests for short circuits between pins 4 & 5 of the BOOST MIDI output.

DISPLAY OF RECEIVED MIDI

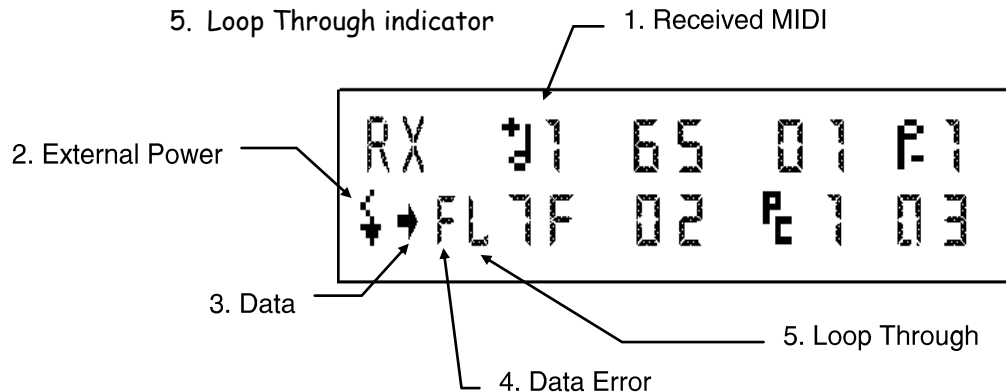
In DISPLAY RECEIVED MIDI mode, the received MIDI data, error status and battery charger status are displayed.

The received data is displayed in real time. This MENU is most useful when working with slow data transmission or to simply confirm that MIDI is present and error free.

Only the TX key is active, it behaves as selected in the TRANSMIT MIDI MENU, allowing the effect of transmitted MIDI to be viewed. This feature is particularly useful when testing MIDI Merge or MIDI Filter devices.

The display comprises the following sections:

1. Received MIDI
2. External Power Indicator
3. Data received indicator
4. Data error indicator
5. Loop Through indicator



RECEIVED MIDI

Eight characters of MIDI data are displayed. The most recently received character is displayed in the bottom right of the window. The data is displayed in either hexadecimal or iconic format. See DISPLAY FORMAT.

EXTERNAL POWER INDICATOR

The first character of the bottom row is reserved for the External Power Indicator. When External Power is connected to MIDI-Scope, a Lightning Strike icon is displayed.

DATA RECEIVED

This character cell displays an arrow when data is received. The data is not necessarily valid MIDI.

DATA ERROR

This character cell is clear when good data is being received. If an error occurs, one of the following is displayed:

- F** Data is being received with framing errors. This can be caused by noise pick-up and also occurs when the phase pins of the connector are reversed.
- O** Data is being received with overrun errors. This can be caused by noise pick-up or very long MIDI cables.

LOOP THROUGH

This character cell displays 'L' when MIDI-Scope's output is providing a clean and buffered version of the MIDI IN data. ie the MIDI output is a second LOOP or THROUGH connection. When the character cell is clear, MIDI-Scope's MIDI generator is connected to the output.

DISPLAY FORMAT

Whenever MIDI-Scope displays MIDI data, there are two possible formats:

- ⇒ HEXADECIMAL
- ⇒ ICONIC

**DISPLAY FORMAT:
ICONIC**

These two formats are selected by using the UP and DOWN cursor keys. In hexadecimal format all data is displayed in the range 00 to FF (which equates to 000 to 255 in decimal). The hexadecimal display format can be very time consuming to decode when searching for a particular command. The iconic display makes the MIDI data much simpler to interpret by replacing the hexadecimal with a command icon.

The following two excerpts of MIDI data illustrate this:

90 23 7F B0 11 C0 09

90 23 7F B0 11 C0 09

MIDI ICONS

The MIDI commands are displayed as follows:

8X	☐	NOTE OFF
9X	☐	NOTE ON
AX	☐	AFTER TOUCH
BX	☐	CONTROL CHANGE
CX	☐	PROGRAM CHANGE
DX	☐	CHANNEL PRESSURE
EX	☐	PITCH BEND

REVIEW MIDI CAPTURE

The Capture buffer is used to record data as it is received at the MIDI input. The buffer is 128 characters deep and starts to fill when a TRIGGER occurs.

The Capture Display shows eight characters from the buffer (in either hexadecimal or iconic format). A character counter shows the position of the cursor character within the buffer.

CAP	00	90	23	7f
001	80	11	C0	09

The following keys are active:

- | | |
|---------|-----------------------------------|
| ⇒ LEFT | Decrement the cursor character |
| ⇒ RIGHT | Increment the cursor character |
| ⇒ L & R | Reset cursor character to one |
| ⇒ TX | As selected in TRANSMIT MIDI MENU |

The Capture Buffer continues to update whilst in review mode. When the Capture Buffer is Triggered, a '!' icon is displayed. This icon is cleared when the Capture Buffer becomes full.

The first four characters of the Capture Buffer are always identical to the Trigger Sequence.

EDIT CAPTURE TRIGGER

The Capture Trigger is used for three related functions of MIDI-Scope:

- ⇒ Start receiving characters to Capture Buffer
- ⇒ Pulse Scope Trigger Output
- ⇒ Trigger Transmit Message

TRIGGER
XX 90 XX 7F

The Capture Trigger is a sequence of four characters.

The high or low nibble of each

character may be set to "Don't Care" 'X'. A Trigger occurs when received MIDI data matches the Capture Trigger.

The following keys are active:

- | | |
|---------|--|
| ⇒ LEFT | Decrement the cursor character |
| ⇒ RIGHT | Increment the cursor character |
| ⇒ UP | Increment the nibble at the cursor character |
| ⇒ DOWN | Decrement the nibble at the cursor character |

The "Don't Care" character is found between 'F' and '0'.

TRIGGER OUTPUT

The Trigger Output is an active low TTL signal connected to the BOOST connector:

- ⇒ Pin 1 TRIGGER
- ⇒ Pin 2 GROUND

The output is driven low when a Capture Trigger Sequence occurs, the output returns to the inactive, high state when the next character is received.

TRANSMIT MIDI

The TRANSMIT MIDI MENU is used to transmit any one of eight Transmit Messages to the MIDI output. The Transmit Message may be any length between 1 and 128 characters.

Tx 1 90 23 7f 80 Msge 11 c0 09 90
--

The following keys are active:

- ⇒ LEFT Change the Transmit Mode
- ⇒ RIGHT Change the Transmit Mode
- ⇒ UP Increment the Transmit Message number
- ⇒ DOWN Decrement the Transmit Message number
- ⇒ TX Transmit data

Five different Transmit Modes may be selected. The Transmit Modes define the operation of the TX key as follows:

MESSAGE

In Message Mode the entire selected Transmit Message is transmitted to the output when the TX key is pressed. The display shows 'MSGE' in the bottom left corner.

TRIGGER

In Trigger Mode the entire selected Transmit Message is transmitted whenever a Capture Trigger occurs. The TX key is not used. The display shows 'TRIG' in the bottom left corner.

LOOP

In Loop Mode the MIDI Output and BOOST Output operate as MIDI LOOP Through Outputs. The TX key is not used. The display shows 'LOOP' in the bottom left corner.

CHARACTER

In Character Mode consecutive characters from the selected Transmit Message are transmitted when the TX key is pressed. The display shows 'CHAR' in the bottom left corner.

CONTIN UOUS

In Continuous Mode the selected Transmit Message is transmitted continuously. The TX key is toggles transmission on or off.

The display shows 'CONT' in the bottom left corner.

TX KEY

The TX key is also active in the RECEIVE MIDI & REVIEW CAPTURE BUFFER menus.

EDIT TX MESSAGE

The TRANSMIT MIDI MENU is used to transmit any one of eight possible Transmit Messages used by TX MIDI.

A specific message is selected from the menu display using the UP & DOWN keys. The display shows the message number along with the first four characters of the message to simplify selection.

Edit Tx Message:

3 = 90 23 7f . .

The edit display shows a window of eight characters from the possible 128.

The position of the cursor within the Transmit Message is also displayed. The

Msg 90 23 7f . .

001

example below shows a three character message with the cursor on character one.

The following keys are active:

- ⇒ LEFT Move the cursor left
- ⇒ RIGHT Move the cursor right
- ⇒ UP Increment the cursor character
- ⇒ DOWN Decrement the cursor character
- ⇒ TX Set the cursor character as the last in character in the message

COPY CAPTURE TO TX MESSAGE

The COPY CAPTURE menu is used to copy the data from the Receive Capture Buffer to one of the TX Messages. The destination Transmit Message is selected from the menu display using the UP & DOWN keys.

Copy Capture to

Tx Message: 3

Pressing the MENU key completes the copying process. MIDI-Scope then reverts to the EDIT TX MESSAGE menu.

CABLE TEST

The CABLE TEST display shows the short circuit status of pins 4 and 5 of the MIDI BOOST Output connector. The display will show the following when the resistance between pins 4 & 5

**CABLE TEST
4&5 SHORT**

is less than 30 ohms. This allows the test to be performed whilst the other end of the cable is connected to another receiver.

MIDI CONNECTORS

MIDI-Scope provides four MIDI connectors wired as follows:

MIDI IN	PIN	FUNCTION
	1	NC
	2	NC
	3	NC
	4	Input + to opto-isolator
	5	Input + to opto-isolator

MIDI LOOP	PIN	FUNCTION
	1	NC
	2	GROUND (0V)
	3	NC
	4	5 Volt
	5	Signal output

MIDI OUT	PIN	FUNCTION
	1	NC
	2	GROUND (0V)
	3	NC
	4	5 Volt
	5	Signal output

MIDI BOOST	PIN	FUNCTION
	1	TTL Scope Trigger
	2	GROUND (0V)
	3	NC
	4	Signal output + (RS485)
	5	Signal output - (RS485)

The BOOST MIDI Output functions identically to the MIDI Output, but provides a RS485 signal that can drive much longer cable lengths.

POWER SUPPLY

MIDI-Scope has an internal Ni-Cd rechargeable battery which provides a life of about 30 hours between recharges. The external 9 Volt, 300mA DC power supply is used to power and recharge MIDI-Scope.

As with all Ni-Cd battery products, the best battery life is obtained by completely discharging MIDI-Scope prior to recharging.

The power switch is used to switch off MIDI-Scope, battery charging will continue if the power connector is plugged in.

MIDI-Scope contains a sophisticated battery manager, which regulates battery charging. A full charge is obtained in three hours, after which the external power supply is used solely to power MIDI-Scope.

In order to further conserve battery power, MIDI-Scope reverts to stand-by mode after 10 minutes of no key presses. Stand-by is exited by pressing any key.

Appendix

Conversion Table

Dec	Hex	Binary	Dec	Hex	Binary	Dec	Hex	Binary
0	00	0000 0000	32	20	0010 0000	64	40	0100 0000
1	01	0000 0001	33	21	0010 0001	65	41	0100 0001
2	02	0000 0010	34	22	0010 0010	66	42	0100 0010
3	03	0000 0011	35	23	0010 0011	67	43	0100 0011
4	04	0000 0100	36	24	0010 0100	68	44	0100 0100
5	05	0000 0101	37	25	0010 0101	69	45	0100 0101
6	06	0000 0110	38	26	0010 0110	70	46	0100 0110
7	07	0000 0111	39	27	0010 0111	71	47	0100 0111
8	08	0000 1000	40	28	0010 1000	72	48	0100 1000
9	09	0000 1001	41	29	0010 1001	73	49	0100 1001
10	0A	0000 1010	42	2A	0010 1010	74	4A	0100 1010
11	0B	0000 1011	43	2B	0010 1011	75	4B	0100 1011
12	0C	0000 1100	44	2C	0010 1100	76	4C	0100 1100
13	0D	0000 1101	45	2D	0010 1101	77	4D	0100 1101
14	0E	0000 1110	46	2E	0010 1110	78	4E	0100 1110
15	0F	0000 1111	47	2F	0010 1111	79	4F	0100 1111
16	10	0001 0000	48	30	0011 0000	80	50	0101 0000
17	11	0001 0001	49	31	0011 0001	81	51	0101 0001
18	12	0001 0010	50	32	0011 0010	82	52	0101 0010
19	13	0001 0011	51	33	0011 0011	83	53	0101 0011
20	14	0001 0100	52	34	0011 0100	84	54	0101 0100
21	15	0001 0101	53	35	0011 0101	85	55	0101 0101
22	16	0001 0110	54	36	0011 0110	86	56	0101 0110
23	17	0001 0111	55	37	0011 0111	87	57	0101 0111
24	18	0001 1000	56	38	0011 1000	88	58	0101 1000
25	19	0001 1001	57	39	0011 1001	89	59	0101 1001
26	1A	0001 1010	58	3A	0011 1010	90	5A	0101 1010
27	1B	0001 1011	59	3B	0011 1011	91	5B	0101 1011
28	1C	0001 1100	60	3C	0011 1100	92	5C	0101 1100
29	1D	0001 1101	61	3D	0011 1101	93	5D	0101 1101
30	1E	0001 1110	62	3E	0011 1110	94	5E	0101 1110
31	1F	0001 1111	63	3F	0011 1111	95	5F	0101 1111

Appendix

Conversion Table

Dec	Hex	Binary	Dec	Hex	Binary	Dec	Hex	Binary
96	60	0110 0000	128	80	1000 0000	160	A0	1010 0000
97	61	0110 0001	129	81	1000 0001	161	A1	1010 0001
98	62	0110 0010	130	82	1000 0010	162	A2	1010 0010
99	63	0110 0011	131	83	1000 0011	163	A3	1010 0011
100	64	0110 0100	132	84	1000 0100	164	A4	1010 0100
101	65	0110 0101	133	85	1000 0101	165	A5	1010 0101
102	66	0110 0110	134	86	1000 0110	166	A6	1010 0110
103	67	0110 0111	135	87	1000 0111	167	A7	1010 0111
104	68	0110 1000	136	88	1000 1000	168	A8	1010 1000
105	69	0110 1001	137	89	1000 1001	169	A9	1010 1001
106	6A	0110 1010	138	8A	1000 1010	170	AA	1010 1010
107	6B	0110 1011	139	8B	1000 1011	171	AB	1010 1011
108	6C	0110 1100	140	8C	1000 1100	172	AC	1010 1100
109	6D	0110 1101	141	8D	1000 1101	173	AD	1010 1101
110	6E	0110 1110	142	8E	1000 1110	174	AE	1010 1110
111	6F	0110 1111	143	8F	1000 1111	175	AF	1010 1111
112	70	0111 0000	144	90	1001 0000	176	B0	1011 0000
113	71	0111 0001	145	91	1001 0001	177	B1	1011 0001
114	72	0111 0010	146	92	1001 0010	178	B2	1011 0010
115	73	0111 0011	147	93	1001 0011	179	B3	1011 0011
116	74	0111 0100	148	94	1001 0100	180	B4	1011 0100
117	75	0111 0101	149	95	1001 0101	181	B5	1011 0101
118	76	0111 0110	150	96	1001 0110	182	B6	1011 0110
118	77	0111 0111	151	97	1001 0111	183	B7	1011 0111
119	78	0111 1000	152	98	1001 1000	184	B8	1011 1000
120	79	0111 1001	153	99	1001 1001	185	B9	1011 1001
121	7A	0111 1010	154	9A	1001 1010	186	BA	1011 1010
122	7B	0111 1011	155	9B	1001 1011	187	BB	1011 1011
123	7C	0111 1100	156	9C	1001 1100	188	BC	1011 1100
124	7D	0111 1101	157	9D	1001 1101	189	BD	1011 1101
125	7E	0111 1110	158	9E	1001 1110	190	BE	1011 1110
126	7F	0111 1111	159	9F	1001 1111	191	BF	1011 1111

Appendix

Conversion Table

Dec	Hex	Binary	Dec	Hex	Binary
192	60	0110 0000	224	E0	1110 0000
193	61	0110 0001	225	E1	1110 0001
194	62	0110 0010	226	E2	1110 0010
195	63	0110 0011	227	E3	1110 0011
196	64	0110 0100	228	E4	1110 0100
197	65	0110 0101	229	E5	1110 0101
198	66	0110 0110	230	E6	1110 0110
199	67	0110 0111	231	E7	1110 0111
200	68	0110 1000	232	E8	1110 1000
201	69	0110 1001	233	E9	1110 1001
202	6A	0110 1010	234	EA	1110 1010
203	6B	0110 1011	235	EB	1110 1011
204	6C	0110 1100	236	EC	1110 1100
205	6D	0110 1101	237	ED	1110 1101
206	6E	0110 1110	238	EE	1110 1110
207	6F	0110 1111	239	EF	1110 1111
208	70	0111 0000	240	F0	1111 0000
209	71	0111 0001	241	F1	1111 0001
210	72	0111 0010	242	F2	1111 0010
211	73	0111 0011	243	F3	1111 0011
212	74	0111 0100	244	F4	1111 0100
213	75	0111 0101	245	F5	1111 0101
214	76	0111 0110	246	F6	1111 0110
215	77	0111 0111	247	F7	1111 0111
216	78	0111 1000	248	F8	1111 1000
217	79	0111 1001	249	F9	1111 1001
218	7A	0111 1010	250	FA	1111 1010
219	7B	0111 1011	251	FB	1111 1011
220	7C	0111 1100	252	FC	1111 1100
221	7D	0111 1101	253	FD	1111 1101
222	7E	0111 1110	254	FE	1111 1110
223	7F	0111 1111	255	FF	1111 1111

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