

1 52-5170 MB/CR/XD HD-SDI Audio Module

An HD-SDI Embedder/De-Embedder Module is available for the 52-5170 HD-SDI Audio Module. This module comes with an HD/SD-SDI input (BNC) and four HD/SD-SDI outputs (BNC).

The 52-5170 HD-SDI Audio Module can be operated in different modi. These operating modi differ in the number of signals, which

- can be extracted out of the SDI data stream for using them into the 52-5170 HD-SDI Audio Module (De-Embedder) or
- which are coming out of the 52-5170 HD-SDI Audio Module and should be included in the SDI data stream (Embedder).

Depending on the configuration, the module is operated as De-Embedder (8 channel input), as Embedder (8 channel output) or as Embedder/De-Embedder (4 channel input and 4 channel output). The configuration can be changed via the browser.



Important

The Embedder is only working if a valid SDI signal is connected to the SDI input. If no valid SDI signal is connected to the SDI input, there won't be any audio signals on the SDI outputs.

Independent from the chosen operating mode, the incoming SDI signal can also be directly connected to the SDI outputs 1-4 (LOOP, re-clocked).

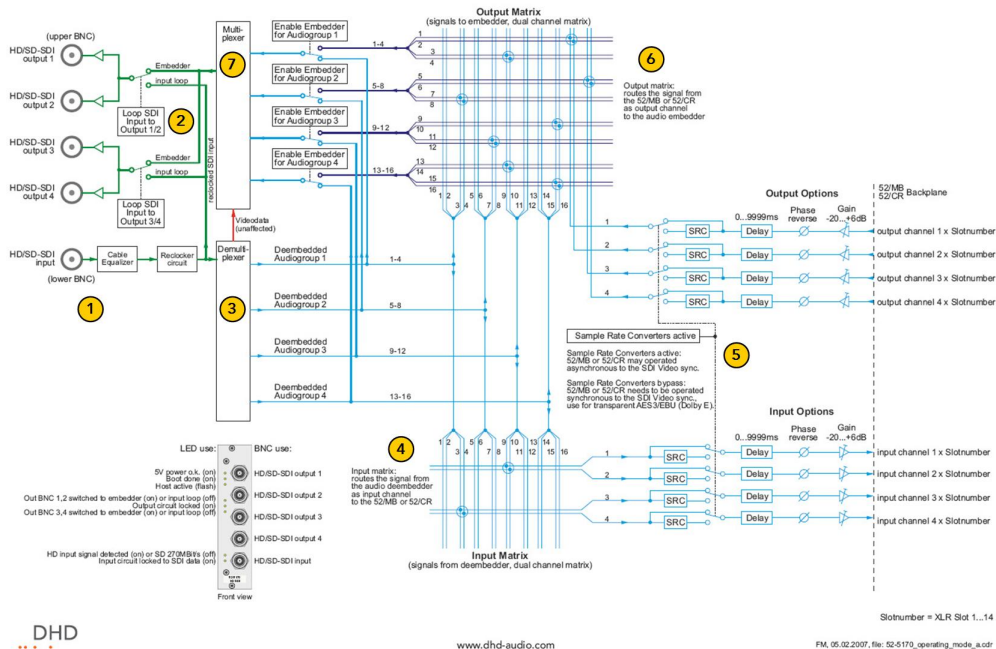
The Embedder function can be deactivated for each of the 4 audio groups outputs. So, the extracted audio groups are supplied to the multiplexer to code them into the data stream.

Activate the SRC (Sample Rate Conversion) to operate the 52-5170 HD-SDI Audio Module asynchronous to the connected SDI Sync. If the SRC is deactivated, the 52-5170 HD-SDI Audio Module needs to be operated synchronous to the connected SDI Sync. Use this option for transparent AES3/EBU (Dolby E).

1.1 Mode A - 4ch Embedder, 4ch Deembedder

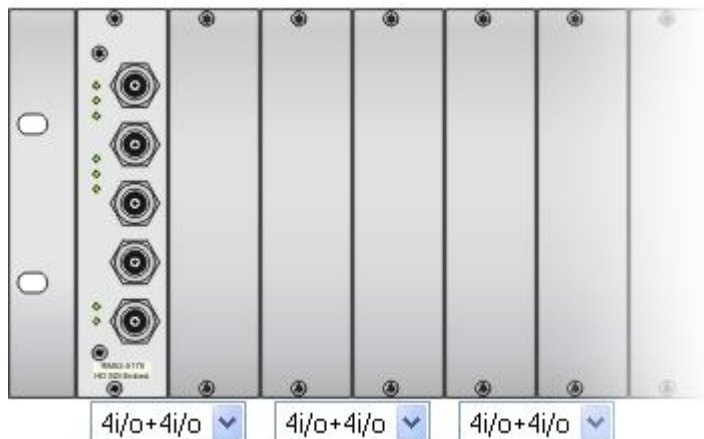
The following example explains in detail the usage of the "4 channel input, 4 channel output" operating mode.

52-5170 operating mode - 4 channel in, 4 channel out



Signal flow in the "4 channel input, 4 channel output" operating mode.

1. A SDI signal is connected to the HD/SD-SDI input.
2. This signal optional can be routed directly onto the HD/SD-SDI outputs 1 and 2 as well as 3 and 4 (Loop SDI Input to Output BNC). For this the signal is re-clocked.
3. The audio groups 1-4 are extracted from SDI data stream within a demultiplexer.
4. The 16 signals of the 4 audio groups are provided pairwise in an input matrix. Here, the signal pairs can be selected, which should be provided within the 52-5170 HD-SDI Audio Module.
5. You can activate an SRC (Sample Rate Conversion) for any signal, coming to or leaving the MADi Breakout System. Independent from that, you can set other parameters of the inputs and outputs like Delay, Phase-Reverse and Gain.
6. The 4 signals, provided by the MADi Breakout System represent the sources of a matrix together with the 16 signals of the 4 audio groups of the SDI input. Within this output matrix the audio groups of the SDI outputs can be connected to the aforementioned signals.
7. Afterwards the encoding of audio and video is done by a multiplexer.



The I/O slot configuration for operating an SDI module.

You have to configure the according I/O slot to 4i/o + 4i/o via the browser, to operate the HD/SD-SDI Module in the "4 channel input, 4 channel output" mode. That means, that the 4 input channels of the slot can be connected to the signals of the SDI data stream and the 4 output channels of the slot are provided in the output matrix of the SDI module. The 4i/o + 4i/o setting applies to two neighbouring HD/SD-SDI Modules. Because of this the menu spreads across two slots.

Adjust SDI IO Settings

Slot 1

General Options

- Loop SDI Input to Output BNC 1/2
- Loop SDI Input to Output BNC 3/4
- Sample Rate Converters active
- Enable Embedder for Audiogroup 1
- Enable Embedder for Audiogroup 2
- Enable Embedder for Audiogroup 3
- Enable Embedder for Audiogroup 4

Input Matrix

- MB/CR Input Channel 1/2 SDI Audiogroup 2 Input 7/8
- MB/CR Input Channel 3/4 SDI Audiogroup 3 Input 9/10

Output Matrix

- SDI Audiogroup 1 Output 1/2 MB/CR Output Channel 1/2
- SDI Audiogroup 1 Output 3/4 MB/CR Output Channel 3/4
- SDI Audiogroup 2 Output 5/6 MUTE
- SDI Audiogroup 2 Output 7/8 MUTE
- SDI Audiogroup 3 Output 9/10 SDI Audiogroup 1 Input 1/2
- SDI Audiogroup 3 Output 11/12 SDI Audiogroup 1 Input 3/4
- SDI Audiogroup 4 Output 13/14 SDI Audiogroup 2 Input 5/6
- SDI Audiogroup 4 Output 15/16 SDI Audiogroup 2 Input 7/8

MB/CR Input Options

- MB/CR Input Channel 1 Gain: +4 dB Delay: 0 ms Phase reverse
- MB/CR Input Channel 2 Gain: +4 dB Delay: 0 ms Phase reverse
- MB/CR Input Channel 3 Gain: +4 dB Delay: 0 ms Phase reverse
- MB/CR Input Channel 4 Gain: +4 dB Delay: 0 ms Phase reverse

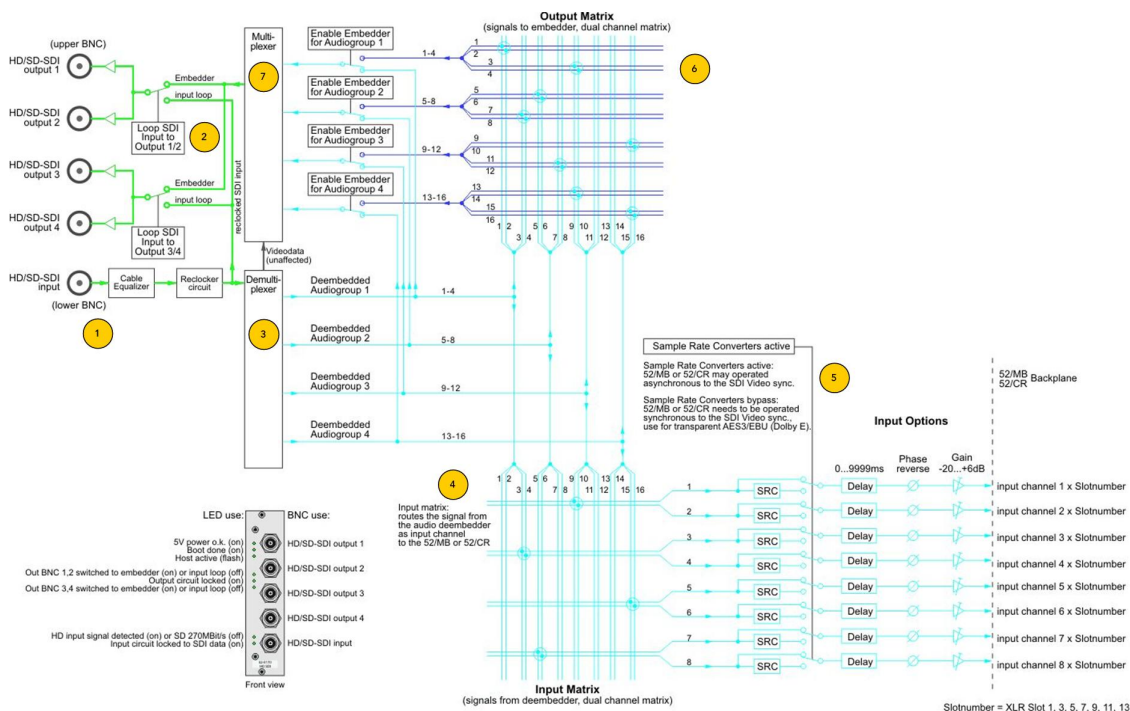
MB/CR Output Options

- MB/CR Output Channel 1 Gain: +0 dB Delay: 20 ms Phase reverse
- MB/CR Output Channel 2 Gain: +0 dB Delay: 20 ms Phase reverse
- MB/CR Output Channel 3 Gain: +0 dB Delay: 20 ms Phase reverse
- MB/CR Output Channel 4 Gain: +0 dB Delay: 20 ms Phase reverse

Set the HD/SD-SDI Module options.

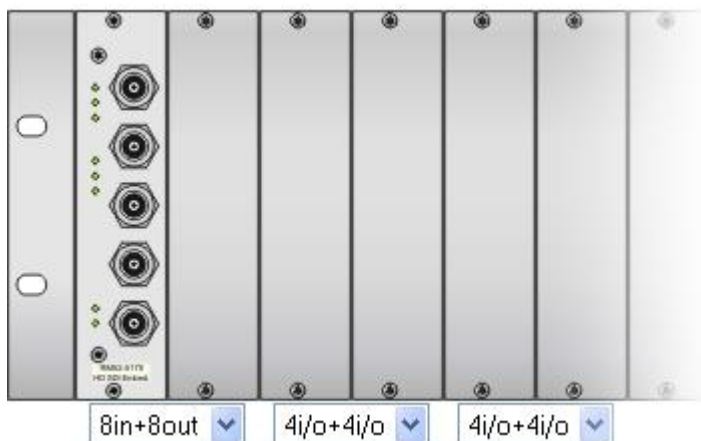
1.2 Mode B - 8ch Deembedder

The following example explains in detail the usage of the "8 channel input" operating mode.



Signal flow in the "8 channel input" operating mode.

1. A SDI signal is connected to the HD/SD-SDI input.
2. This signal optional can be routed directly onto the HD/SD-SDI outputs 1 and 2 as well as 3 and 4 (Loop SDI Input to Output BNC). For this the signal is re-clocked.
3. The audio groups 1-4 are extracted from SDI data stream within a demultiplexer.
4. The 16 signals of the 4 audio groups are provided pairwise in an input matrix. Here, the signal pairs can be selected, which should be provided within the 52-5170 HD-SDI Audio Module.
5. You can activate an SRC (Sample Rate Conversion) for any signal, coming to the MADi Breakout System. Independent from that, you can set other parameters of the inputs and outputs like Delay, Phase-Reverse and Gain.
6. The audio groups of the SDI outputs can be connected to the signals of the SDI input audio groups. Thus, the channels of the SDI data stream can be interchanged.
7. Afterwards the encoding of audio and video is done by a multiplexer.



The I/O slot configuration for operating an SDI module.

You have to configure the according I/O slot to 8_{in} + 8_{out} via the browser, to operate the HD/SD-SDI Module in the "8 channel input" mode. That means, that the 8 input channels of two neighbouring slots can be connected to the signals of the SDI data stream. The 8_{in} + 8_{out} setting applies to two neighbouring HD/SD-SDI Modules. Because of this the menu spreads across two slots. At same time the outputs of this slot can be used by a neighbouring module.

Adjust SDI IO Settings

Slot 1

General Options

- Loop SDI Input to Output BNC 1/2
- Loop SDI Input to Output BNC 3/4
- Sample Rate Converters active
- Enable Embedder for Audiogroup 1
- Enable Embedder for Audiogroup 2
- Enable Embedder for Audiogroup 3
- Enable Embedder for Audiogroup 4

Input Matrix

- MB/CR Input Channel 1/2: SDI Audiogroup 2 Input 5/6
- MB/CR Input Channel 3/4: SDI Audiogroup 2 Input 7/8
- MB/CR Input Channel 5/6: SDI Audiogroup 3 Input 11/12
- MB/CR Input Channel 7/8: SDI Audiogroup 4 Input 15/16

Output Matrix

- SDI Audiogroup 1 Output 1/2: SDI Audiogroup 1 Input 1/2
- SDI Audiogroup 1 Output 3/4: SDI Audiogroup 1 Input 3/4
- SDI Audiogroup 2 Output 5/6: SDI Audiogroup 2 Input 5/6
- SDI Audiogroup 2 Output 7/8: SDI Audiogroup 2 Input 7/8
- SDI Audiogroup 3 Output 9/10: MUTE
- SDI Audiogroup 3 Output 11/12: SDI Audiogroup 4 Input 13/14
- SDI Audiogroup 4 Output 13/14: SDI Audiogroup 4 Input 15/16
- SDI Audiogroup 4 Output 15/16: MUTE

MB/CR Input Options

- MB/CR Input Channel 1: Gain +6 dB Delay 0 ms Phase reverse
- MB/CR Input Channel 2: Gain +6 dB Delay 0 ms Phase reverse
- MB/CR Input Channel 3: Gain +0 dB Delay 0 ms Phase reverse
- MB/CR Input Channel 4: Gain +0 dB Delay 0 ms Phase reverse
- MB/CR Input Channel 5: Gain -12 dB Delay 0 ms Phase reverse
- MB/CR Input Channel 6: Gain -12 dB Delay 0 ms Phase reverse
- MB/CR Input Channel 7: Gain +0 dB Delay 1000 ms Phase reverse
- MB/CR Input Channel 8: Gain +0 dB Delay 1000 ms Phase reverse

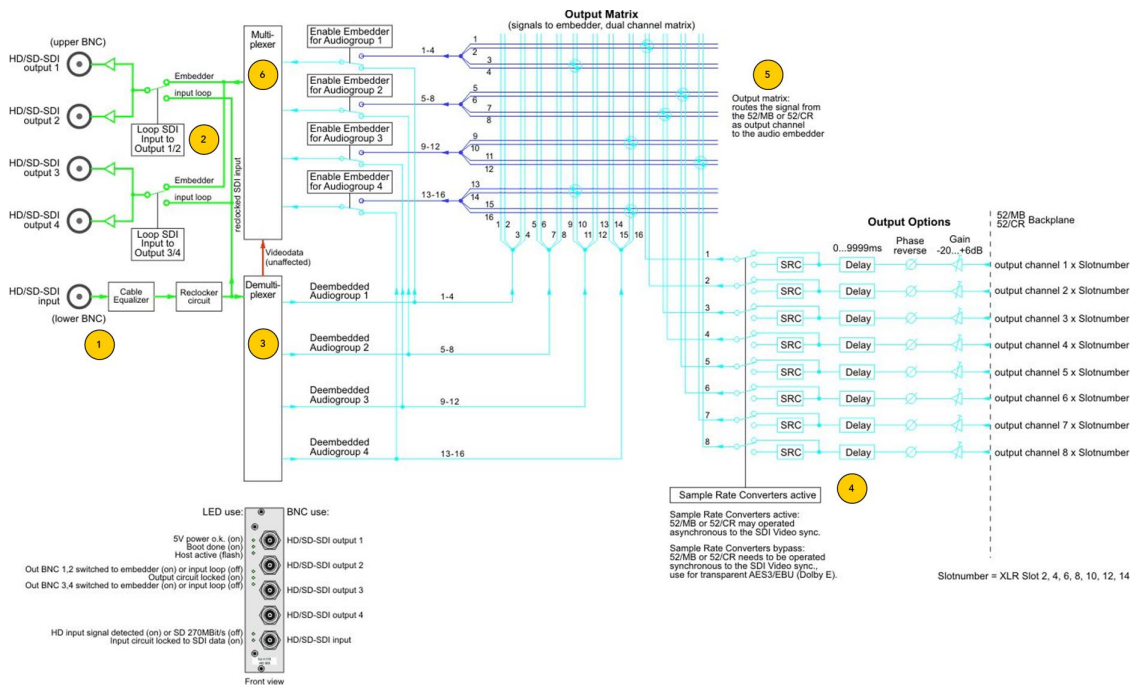
MB/CR Output Options

Set

Set the HD/SD-SDI Module options.

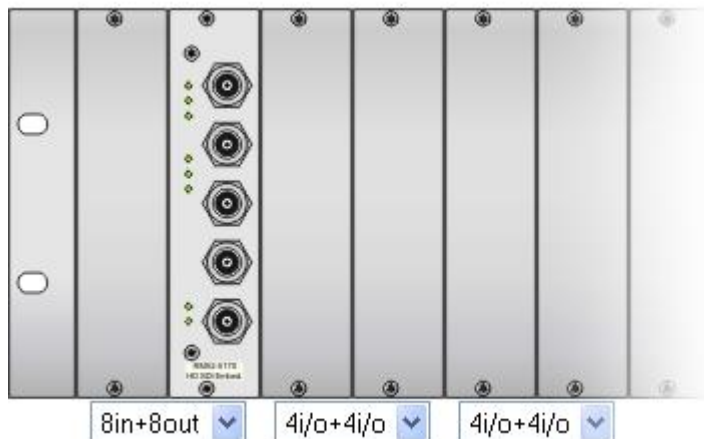
1.3 Mode C - 8ch Embedder

The following example explains in detail the usage of the "8 channel output" operating mode.



Signal flow in the "8 channel output" operating mode.

1. A SDI signal is connected to the HD/SD-SDI input.
2. This signal optional can be routed directly onto the HD/SD-SDI outputs 1 and 2 as well as 3 and 4 (Loop SDI Input to Output BNC). For this the signal is re-clocked.
3. The audio groups 1-4 are extracted from SDI data stream within a demultiplexer.
4. You can activate an SRC (Sample Rate Conversion) for any signal, leaving the MADI Breakout System. Independent from that, you can set other parameters of the inputs and outputs like Delay, Phase-Reverse and Gain.
5. The output signals, provided by the MADI Breakout System represent a matrix together with the 16 signals of the 4 audio groups of the SDI input. Within this output matrix the audio groups of the SDI outputs can be connected to the aforementioned signals.
6. Afterwards the encoding of audio and video is done by a multiplexer.



The I/O slot configuration for operating an SDI module.

You have to configure the according I/O slot to 8_{in} + 8_{out} via the browser, to operate the HD/SD-SDI Module in the "8 channel output" mode. That means, that the 8 output channels of two neighbouring slots can be used in the output matrix of the SDI module. The 8_{in} + 8_{out} setting applies to two neighbouring HD/SD-SDI Modules. Because of this the menu spreads across two slots. At same time the inputs of this slot can be used by a neighbouring module.

Adjust SDI IO Settings

Slot 2

General Options

- Loop SDI Input to Output BNC 1/2
- Loop SDI Input to Output BNC 3/4
- Sample Rate Converters active
- Enable Embedder for Audiogroup 1
- Enable Embedder for Audiogroup 2
- Enable Embedder for Audiogroup 3
- Enable Embedder for Audiogroup 4

Input Matrix

Output Matrix

- SDI Audiogroup 1 Output 1/2 MB/CR Output Channel 1/2
- SDI Audiogroup 1 Output 3/4 MB/CR Output Channel 3/4
- SDI Audiogroup 2 Output 5/6 MB/CR Output Channel 5/6
- SDI Audiogroup 2 Output 7/8 MB/CR Output Channel 7/8
- SDI Audiogroup 3 Output 9/10 SDI Audiogroup 1 Input 1/2
- SDI Audiogroup 3 Output 11/12 SDI Audiogroup 1 Input 3/4
- SDI Audiogroup 4 Output 13/14 SDI Audiogroup 2 Input 5/6
- SDI Audiogroup 4 Output 15/16 SDI Audiogroup 2 Input 7/8

MB/CR Input Options

MB/CR Output Options

- MB/CR Output Channel 1 Gain: +0 dB Delay: 0 ms Phase reverse
- MB/CR Output Channel 2 Gain: +0 dB Delay: 0 ms Phase reverse
- MB/CR Output Channel 3 Gain: +6 dB Delay: 100 ms Phase reverse
- MB/CR Output Channel 4 Gain: +6 dB Delay: 100 ms Phase reverse
- MB/CR Output Channel 5 Gain: -9 dB Delay: 0 ms Phase reverse
- MB/CR Output Channel 6 Gain: -9 dB Delay: 0 ms Phase reverse
- MB/CR Output Channel 7 Gain: +0 dB Delay: 5880 ms Phase reverse
- MB/CR Output Channel 8 Gain: +0 dB Delay: 5880 ms Phase reverse

Set

Set the HD/SD-SDI Module options.

1.4 Supported Video Formats

The 52-5170 SDI module supports the following video formats:

SD-SDI

SD-SDI (SMPTE-259M): Used to transport uncompressed standard-definition digital video.



Note

The 52-5170 module only supports 270MBit/s data rate, PAL and NTSC format!

HD-SDI

HD-SDI (SMPTE-292M): Used to transport uncompressed high-definition digital video.

SMPTE Standard	260M		295M	274M								296M	
	A	B	C	D	E	F	G	H	I	J	K	L	M
Format ⁽¹⁾	1035i	1035i	1080i	1080i	1080i	1080i	1080p	1080p	1080p	1080p	1080p	720p	720p
Frame Rate (Hz)	30	30/M	25	30	30/M	25	30	30/M	25	24	24/M	60	60/M
Sample Rate (MHz)	74.25	74.25/ M	74.25	74.25	74.25/ M	74.25	74.25	74.25/ M	74.25	74.25	74.25/ M	74.25	74.25/ M
Active Samples per Line and Active Lines per Frame (words x lines) ⁽²⁾	1920 x 1035	1920 x 1035	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080	1920 x 1080	1280 x 720	1280 x 720
Total Samples per Line and Total Lines per Frame (words x lines) ⁽²⁾	2200 x 1125	2200 x 1125	2376 x 1250	2200 x 1125	2200 x 1125	2640 x 1125	2200 x 1125	2200 x 1125	2640 x 1125	2750 x 1125	2750 x 1125	1650 x 750	1650 x 750

HD-SDI Compatible Video Formats from SMPTE 292M

- (1) The format designations follow the industry practice of using the number of active lines per frame plus either the letter "i" indicating interlaced scan or the letter "p" indicating progressive scan. Thus, a format listed as 1080i has 1080 active lines per frame and is interlaced, while a format given as 720p has 720 active lines per frame and is progressive scan.
- (2) The active samples per line and total samples per line shown are 2-word samples, one word of Y and one word of C. If there are 1920 active samples in a line, then there are 3840 10-bit active words per line after the channels have been interleaved.