

CLASSAX-V

MD-440

Special AVC Two-board
Optical Transmittance Analyzer
Assembly



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1. General

The MD-440 interface unit used for CLASSAX consists of two stacked MD-220 v2.0 boards where one is called the master board and the other one the slave board.

The upper master board does not differ from a standard MD-220 v2.0 and can be operated as such without restriction. The special MD220CLX-M software lacks only the possibility to expand output pulses beyond their original duration which is useless for CLASSAX but has all other features of current MD220STD software.

The lower slave board is different. It does not have a SUB-D connector but is equipped with a 12-pin screw terminal block which allows for connection of the RS-485 interface via screw terminals. In addition three of the four optocouplers are not assembled but wired to serve as digital inputs with pull-up resistors suitable to be triggered by open-collector outputs. Channels TRG1 and TRG2 (see labels on bottom side) are reserved for query and control of the loop detector but channels AUX and ERR are free for future use.

The same applies for the Jumpers JP1 and JP2 on both boards; they are disabled in the current configuration.

The slave board is loaded with a special MD220CLX-S software which is not suitable for standard MD-220 purposes.

Both boards are interconnected via headers. Connected are four digital ports (two of them carry the slave sensor trigger signals, one the loop trigger signal, the fourth one is free) two I2C bus lines (also usable as digital ports if required) and the power supply lines.

1.1 SIL Switch Settings

Both boards have an 8-way SIL switch immediately behind the display LEDs. The particular switches are numbered from 1 to 8 where switch 1 is the leftmost one. They are in on-position when swiveled towards the front edge of the board i.e. towards the LEDs. Factory setting is all switches off.

Switch Functions:

1	2	3	4	5	6	7	8
Adaptive Threshold Enable	Adaptive Threshold HI	Adaptive Threshold LO	Trigger Threshold HI	Trigger Threshold LO	Baudrate Select	High Speed Enable	RS232/ RS485 Select

Switches 1-3 set the percentage to which the trigger off threshold follows an input pulse:

Way1	Way2	Way3	Percentage
off	X	X	0%
ON	off	off	6.25%
ON	off	ON	12.5%
ON	ON	off	25%
ON	ON	ON	50%

Switches 4 and 5 define the trigger on threshold:

Way4	Way5	Threshold
off	off	0.8%
off	ON	1.6%
ON	off	0.2%
ON	ON	0.4%

Switches 6 and 7 select the baud rate of the serial interface:

Way6	Way7	Baud
off	off	9600
off	ON	115200
ON	off	19200
ON	ON	921600*

* not yet operative

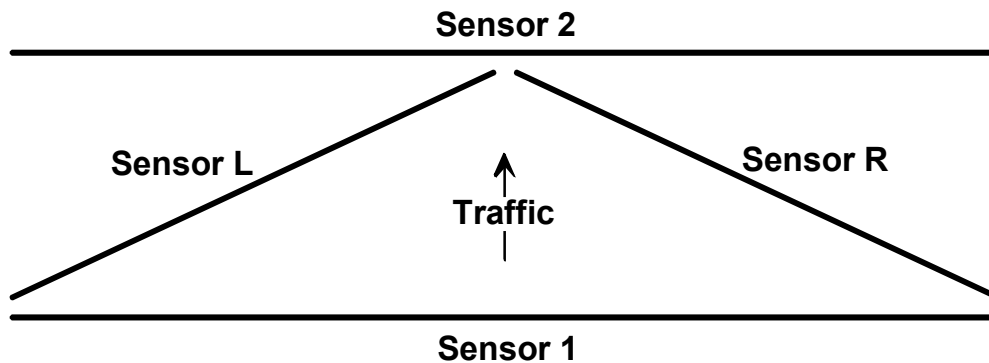
Switch 8 when ON selects the RS-485 interface driver. With present software the RS-485 interface is only useable for special purposes so this switch should always be set to off position.

Important notice!

Especially for AVC purposes never tamper with the settings of Switches 1 to 5! These are required to be absolutely defined. No data or test results are useable with uncertain settings of these switches. Neither may any data or test results be compared or combined when acquired with different settings of these switches.

1.2 Connection of Sensors

The axle sensors of the CLASSAX setup are designated as shown below.



They must be connected to the MD-440 in the following way:

Sensor 1	Master Board	Channel 1
Sensor 2	Master Board	Channel 2
Sensor L	Slave Board	Channel 1
Sensor R	Slave Board	Channel 2

1.3 Special Controller Software Features

1.3.1 Axle and Vehicle Integration

The MD220CLX-M v1.1 master software contains significant extensions compared to MD220STD standard software. There is a module to trace axles across the sensor system and record sensor activation and deactivation times which allow for computation of axle width, tire width and footprint length. This module can handle two axles at a time thus, along with a sensor base of 90cm, allowing for a minimum axle spacing of 45cm which should occur quite seldom.

There is another module to integrate detected axles to detected vehicles, taking the loop activation signal into account and computing axle spacings and electrical vehicle length. These quantities, along with the axle geometry form the data set fed into the CLASSAX algorithm which is not implemented in this preliminary release.

Instead, this version has a number of additional serial output modes meant for initial debugging purposes. They will be deleted again in future versions to free memory for class data storage. There is one new output mode, however, which will be maintained, the 'Z' mode.

1.3.2 New 'Z' Serial Output Mode

When the master receives a 'z' or a 'Z' character it enters a non-continuous output mode where data are only sent when a vehicle has been detected. The format of a vehicle message is

```
<Number of axles n> <electrical length><CR><LF>
<Distance 1> <axle width 1> <tire width 1> <footprint length 1><CR><LF>
<Distance 2> <axle width 2> <tire width 2> <footprint length 3><CR><LF>
etc to
<Distance n> <axle width n> <tire width n> <footprint length n><CR><LF>
<CR><LF>
```

All of the quantities are given decimally in centimeters. "Distance i" means the distance between axle i and the preceding axle; "Distance 1" is the virtual distance traveled from activation of the inductive loop to detection of the first axle. This is analogous to the convention used with the old PC CLASSAX.

In Z Mode all characters received are echoed back. Thus the user can enter comments at any time, and these will be recorded by the log function of a terminal program.

Because of this feature it is no longer possible to leave this output mode by simply sending the control character of an alternative mode. Instead, Z Mode is terminated upon reception of an ESC character which is echoed as "<ESC>". Then the interface enters Off Mode (see section 3.2.5.3.5 of MD-220 manual) and responds to control characters as usual.

1.3.3 Extension of 'S' Output Mode

Since there are now two interface boards of interest Status Mode (see section 3.2.5.3.4 of MD-220 manual) has been extended to show the status of both interfaces. There are two additional 4-byte groups transmitted reflecting the status of Channel 1 and 2 of the slave board. Of course presently the master can only know sensor and loop activation. Sensor activation is reported as usual i.e. as the least significant bit set, the corresponding integer thus evaluating as an odd number (1). Loop activation is signaled by Bit 14 of the slave's channel 1 status being set, i.e. the third 4-byte group looking like "4000".

S Mode has also been configured to echo entered characters as described in the preceding paragraph.

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