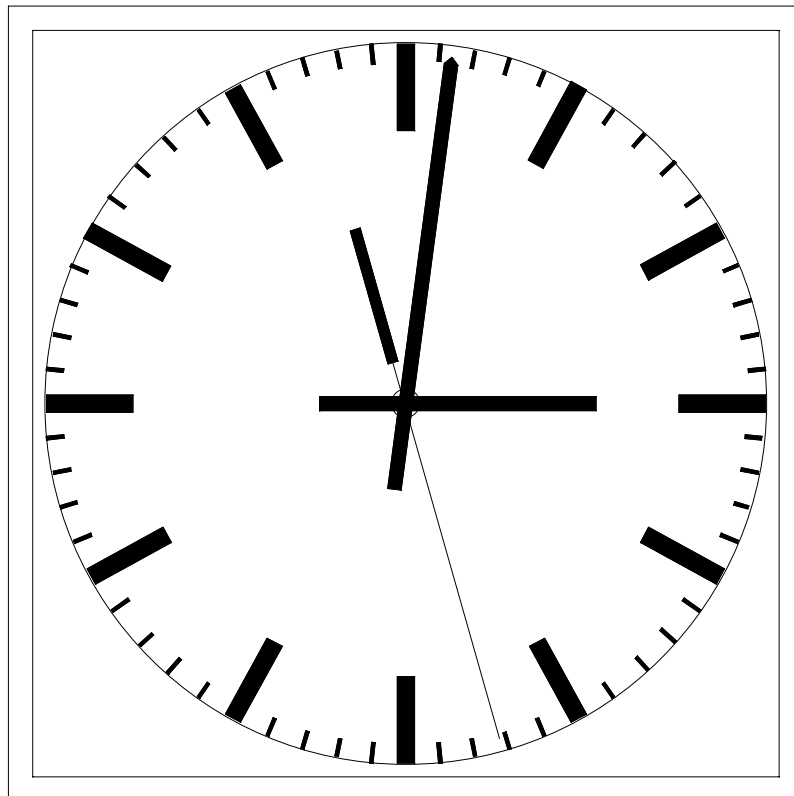


Analogue Clocks of the MTD Time Timer Time Code System

# AV-MTD AC 300





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## A1 Safety Instructions

General rules:	Only use the device as directed in a dry atmosphere. Treat the AV-MTD AC 300 with the same care as other studio devices. Please follow the advice in the following operator's manual.
Damages in transit:	If the device shows obvious damages from transit the shipper in question must be notified and the dealer must be informed.
Positioning:	Position device only where sufficient air circulation can be maintained. Extreme temperatures, dust, humidity, shocks and strong electromagnetic fields must be avoided.
Maintenance:	Use a moist soft textured fabric cloth when cleaning the housing. Do not use polish or any other cleaning agents.
Repairs:	The AV-MTD AC 300 does not require any extra maintenance. There are no user serviceable parts inside the device. Repairs should be sent to an authorized service partner.
EMC:	The EMC regulations are observed only under the following condition: use high quality shielded cables at data inputs and outputs.

### Battery Use Warnings



**CAUTION:** Danger of explosion if battery is incorrectly placed. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

## A2 Copyright

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Information in this publication replaces all previously published information. Alpermann+Velte Electronic Engineering GmbH assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein. Whenever it is likely that safe operation is impaired, the instrument must be made inoperative and secured against unintended operation. The appropriate service authority must then be informed.

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## **A3 CE Declaration of Conformity**

We,

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herewith declare under our sole responsibility that the

### **AV-MTD AC 300**

meets the intent of the following directives, standards and specifications:

73/23/EEC Low Voltage Directive

- EN 60950 electrical and mechanical safety

89/336/EEC Electromagnetic Compatibility

EN 50081-1 Emissions

- EN 55022
- EN 55103-1

EN 50082-1 Immunity

- EN 55024
- EN 55103-2



## Functions Overview

MTD AC 300 is an analogue clock in a square housing (300 x 300 mm approx.). The face is white, its markings of hours and minutes as well as the hands for the hours and minutes are black. The seconds hand is red.

The clock is for use in dry interior rooms only.

*Alpermann + Velte* has developed a system for Multiple Time Displays (MTD). A MTD system consists of a central generator unit, digital displays and/or analogue clocks, and user console(s). The central generator unit outputs a special LTC format. This LTC will henceforth denoted as LTC(MTD). The LTC(MTD) represents the data link to all the digital displays and master analogue clocks, and it contains real time, date and user selectable timers.

MTD AC 300 is configured as a master clock, which may control several slave clocks. The time displayed is provided by the LTC(MTD) signal, i.e. the clock has a built-in LTC reader for normal play speed. Within the MTD System it serves as an analogue display of any time (e.g. real time or LTC time), with automatic adjustment to Daylight Savings Time and automatic setting of the clock hands.

A hex turn switch ZONE inside the housing allows mode adjustment of the analogue clock and the connected slave clocks.

## LTC Reader and the Modes of the ZONE Switch

LTC (longitudinal time code) according to SMPTE/EBU specification is read at normal speed, i.e. 25 or 30 frames/second – with automatically adjustment of the frame rate. A plausible time can only be displayed if the read time information is continuously counting upward and without any jumps. The time read is converted to a telegram of a format similar to the German radio time telegram DCF77. The data bits are transmitted every second, at the change of the minute the seconds pulse will be suppressed. The telegram is synchronous to the readout LTC. This telegram is used internally to synchronise the clockwork and is provided as output to connect slave clocks. The clockwork synchronises to the telegram following a RESET (e.g. selection of an operating mode with ZONE switch) and one time every full hour. In addition to the usual LTC time information, it is also possible to display a time of the special LTC(MTD). The LTC(MTD) contains several times encoded in the user bits of the time code. To select what time should be displayed use ZONE turn switch:

ZONE	Description	Remarks
2	real time	= time H of the LTC(MTD)
6	LTC time information	LTC reader: display of time
A	time A	display of time A of the LTC(MTD)
B	time B	display of time B of the LTC(MTD)
C	time C	display of time C of the LTC(MTD)
D	time D	display of time D of the LTC(MTD)
E	time E	display of time E of the LTC(MTD)
F	time F	display of time F of the LTC(MTD)

All other switch positions are not assigned.

After turning the ZONE switch, the analogue clock (and all connected slave clocks) will start with the automatic setting, i.e. the hands move to the 12 o'clock position and then adjust to the time transferred. This process takes about three minutes time.

ZONE 2 = real time

The real time encoded in the special LTC(MTD) receives one additional frame and is then converted to the telegram.

The analogue clock automatically adjusts to Daylight Savings Time as well as to every difference to real time occurring during daily operation. Such adjustments can only be made if the central generator of the MTD system receives correct signals from a reference (e.g. from DCF77).

ZONE 6 = LTC time information

The time of the LTC is converted to the telegram and displayed by the analogue clock. It is necessary for the LTC to be provided continuously, without any jumps and at normal frequency.

ZONE = A, B, C, D, E, F

Basically it is possible to select one of these operating modes, but only up-counting times will be accepted. It should also be taken into consideration that the analogue clocks will only synchronise once every full hour to the telegram. For this reason, stop timer functions cannot be recommended as operating modes. One possible application is the display of time zones. In this case, the times A...F are programmed as real time + offset; see manual for MTD system operation.

## Description of the Analogue Clock

The three independent stepper motors of the clockwork drive the three hands. With delivery the hands as well as the clockwork are set to the 12 o'clock position. The two built-in sensors of the clockwork serve to detect this position enabling a check and correction of the hands.

Following a RESET (= after power-on or after an operating mode has been selected with the ZONE switch or after pressing the RESET key on the SLAVE printed circuit board), the stepper motors start moving to reach the 12 o'clock position. First the hours and seconds hands are moved, and then the minutes hand. This process takes up to 3 minutes time. After this adjustment, all hands must exactly point at the 12 o'clock position. If not, the hands must be manually adjusted (by qualified personnel only).

After RESET the clock is immediately ready to receive the telegram. If a telegram is received, the seconds hand will move in sync with the data bits received (after the 12 o'clock position has been reached). If two valid telegrams are received, the clock adjusts to the time received, the internal reference is locked. This process normally takes up to 3 minutes time. If no telegram can be received, the hands will stand still.

The clock will execute a self-test to check the position of the hours and minute's stepper motors every 12:00:00 and 00:00:00 o'clock. The check regarding the seconds is made every minute. If necessary, the position of the hands will be corrected automatically to achieve precise sync to the internal reference. Every hour the clock will synchronise the internal reference by reading the telegram at every 59th minute. As a usual process, the minutes hand will take the last two seconds of every minute to move to the next marking. If no valid telegram can be received, the minutes hand will change to a quasi-continuous run, i.e. the minutes hand will take 30 positions every minute. This quasi-continuous run will automatically be changed to the stepping run only if at a following full hour a valid telegram can be received. This way, a continuous stepping run will indicate the presence of the time telegram.

## Special Features within the MTD Time Timer Time Code System

The adjustment to Daylight Savings Time in mode ZONE=2 is made automatically.

For a "usual" adjustment, i.e. correction for 1 hour at the full hour, the clock will start to adjust the hand (of the hours) after 38 seconds.

Example: An adjustment from 2 o'clock to 3 o'clock will be made at 2 o'clock 38 seconds of the old time by shifting the hour's hand.

For any other adjustment the clock will start correction at the next full hour.

Example: Correction at 2 o'clock to 4 o'clock will be made at 3 o'clock 38 seconds of the old time.

## Connecting Slave Clocks

A built-in distribution amplifier supplies slave analogue clocks with power as well as with time data. The outputs are connected at a DSUB 9-pins female. Below the pin assignment and a wiring example:

from Slave Connector	to Analogue Clocks
DSUB9F	open ends (to screwing posts)
1: V+ Out	Vdd (1)
2: V- Out	GND (2)
7: Signal Out	Signal (3)
8: Signal GND	GND (4)

The pins not specified should not be used. Use e.g. a two-paired, twisted cable, twist 1 with 2 and 7 with 8.

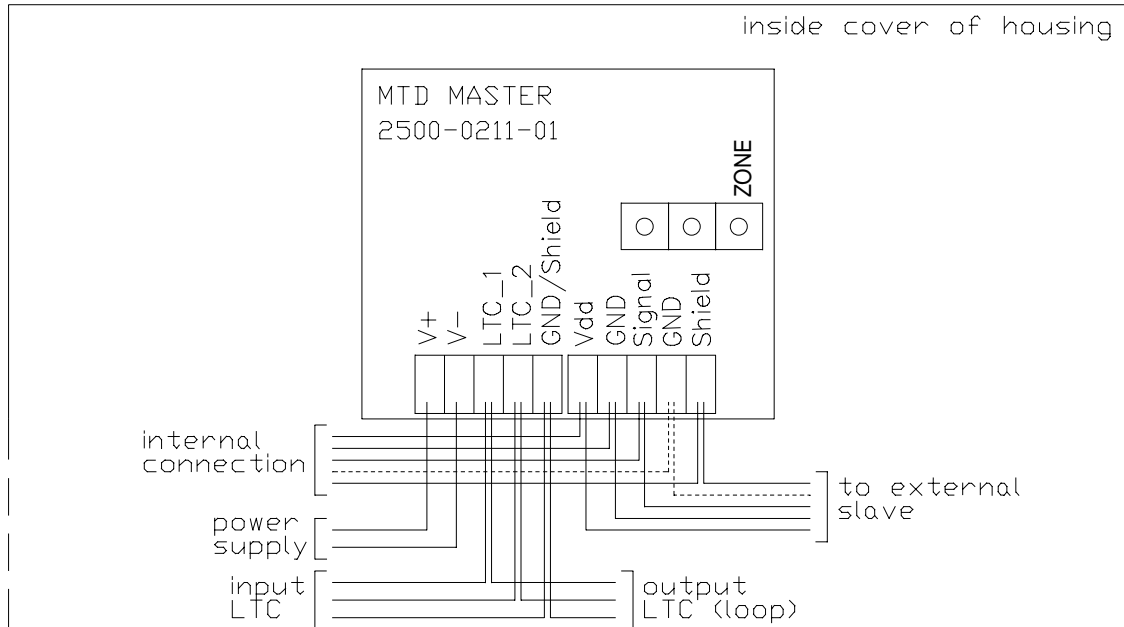
Every slave clock requires  $\leq 11\text{mA}$  at  $\geq 6\text{V}$ . To calculate the maximum cable length the output voltage, cross section, specific resistance and number of clocks have to be involved. For radial arrangement of copper cables with a cross section of  $0,22\text{mm}^2$  and a output voltage of  $12\text{V}$ , the following cable lengths are possible:

no. of clocks	1	2	5	10	20	30
length (m)	3500	1750	700	350	175	117

The maximum count of clocks is limited by a 300mA fuse to 30 clocks each driver.

## Connections and Specifications

The MASTER printed circuit board inside is located at the housing cover, the ZONE turn switch is assembled there:



Backup batteries may be placed in the battery shed of the clockwork to ensure a continuous run even in case of a power failure. As long as there is external power available, the battery automatically remains disconnected. Please observe the Battery Use Warnings.

- Power supply: 85-250 VAC, 47-63 Hz
- Power consumption: 8 W
- Operating temperature: 5°C to 40°C
- Relative humidity: 35% to 85%, non-condensing
- Dimensions: 307 (W) x 307 (H) x 63 (D) mm
- Weight: 3.0 kg approx.
- LTC input: input at 3-pins XLR female connector:  
pin 1 = GND, pins 2/3 = signal.  
100mV - 5V, balanced, 100K-Ohm.
- Slave output: 9-pins DSUB female:  
pin 1 = V+ out  
pin 2 = V- out  
pin 7 = signal out  
pin 8 = signal GND
- Technical data of the clockwork:  
Crystal time base: 32kHz (accuracy  $\pm 0.5$  s/day)  
Clockwork: Junghans W718  
Type of battery: 2x round cell 1.5V IEC LR14  
alkali-mangan (do not use zinc-carbon batteries)
- Mean power consumption under battery operation: 1 mA