AEXX SERIES

MULTI-FUNCTION CLOCK/TIMERS

ATS APPLIED TECHNICAL SYSTEMS

AEXX SERIES MULTI-FUNCTION CLOCK/TIMERS
REV 04/09/09

DESCRIPTION

The AEXX Series of Multi-Function Clock/Timers are available with 1", 2.3", 4", 8", or 12" high digits, visible from 5 feet to 500 feet away. Depending on the model, the AEXX Series clock/timers function as four or six digit, 12 or 24 hour stand alone or secondary clocks, and simultaneously, as presettable up or down counting elapsed, timers. A code blue timer which overrides all other time functions is also included.

In addition there are optional enclosures, operating voltages and add-on functions such as the Master/Driver output. Models are available for all types of installations including wall mount, ceiling mount, rack mount, panel mount and free standing applications. Two sided models are also available.

This manual covers all AE Series displays configured as Multi-Function Clock/Timers. To simplify the manual the term's "clock/timer", or "AE Device" may be used to cover any of the specific models.

The model numbers of the AEXX Series clock/timer are derived from the digit size and the number of digits in the display. For example the AE24 is a 2.3-inch, four-digit display and the AE126 is a twelve-inch, six-digit display. For two-sided versions, the model number would have /2. For example: AE84/2 would be the model number for a Two-Sided, Eight Inch, Four-Digit Clock/Timer. Each AE Display can be configured in a number of ways. For more information on your specific model number and hardware configuration refer to the drawings included at the back of this manual.

SPECIFICATIONS

Digits:	1, 2.3, 4, 8 and 12 inch high, seven segment digits are available. For additional digit specifications, see the drawings at the back of this manual for your specific model.
Number of Digits:	Four and six digit versions are available. Colons separate each pair of digits.
Functions:	Displays time of day in 12 or 24-hour format - stand alone or as a secondary clock on a master clock system. Counts up elapsed time to a preset value and holds (on four digit versions specify hours and minutes, or minutes and seconds). Counts down elapsed time from a preset value and holds at $00:00$ or $00:00:00$ (on four digit versions specify hours and minutes, or minutes and seconds). Maximum preset is 30:59:59. A Built-in Code Blue timer overrides all clock/timer functions until it is reset.
Controls:	A built-in switch panel is provided for setting and controlling all clock/timer functions (not included on bezel mount or flush mount versions, which require the 2101 or 2102 Remote Switch Panel). Time of day in 12 or 24-hour format can be set from switch panel. The up and down elapsed timers can be started, stopped, resumed and reset from switch panel. The up and down elapsed timer preset values can be set from switch panel.
	For some versions such as those with the optional NEMA enclosures. these controls could be located on the PCB assembly. See the AEXX Controller Wiring Diagram at the back of this manual.
	Optional 2101 and 2102 Remote Switch Panels are available for setting and controlling the clock/timers. They can be mounted up to 30 feet away.
Accuracy:	Synchronous with the AC power line when power is applied. A crystal time base is optional. On battery backup a 0.005% crystal time base is used. Standard operating temperature is 0 to 50 Degrees C.
Secondary Clock Correction:	Correction modes for 59th minute, Midnight and Noon correction and others are switch selectable by a rotary switch located on the PCB assembly. See the Mode Wiring Diagrams at the back of this manual for more details.
Power:	Standard power is 120 VAC, 60 HZ – The power required varies with the size and number of digits. Optional power includes 220 VAC, 12 VAC, 12 VDC and 50 HZ.
Battery Backup:	Self-charging, Ni-Cad

Enclosures: Standard enclosures are black anodized aluminum with .118" thick red acrylic lens. The back panel is .125" black ABS plastic. The size varies with the size and number of digits. See drawings at the back of this manual.

                A 1210-0101 mounting bracket is provided with all standard enclosures for wall mounting with concealed wiring to a single or double gang box.

                For optional enclosures such as the NEMA12 and NEMA 4X enclosures, see the drawings at the back of this manual for more detail.

Wiring: Clearly labeled, pigtail lead wires (#18 AWG) are provided. Optional terminal blocks, power cords, and connectors are available.

Options: There are numerous options available for the AEXX Series Multi-Function Clock/Timers. Some include: (/2) Two Sided Version, (348) Master/Driver Output, (376) Relay Output, (267) Count Up Hundredths of Seconds and (PC8) Add 8 FT. Power Cord. When options are ordered, supplemental information is provided with addenda and additional drawings.
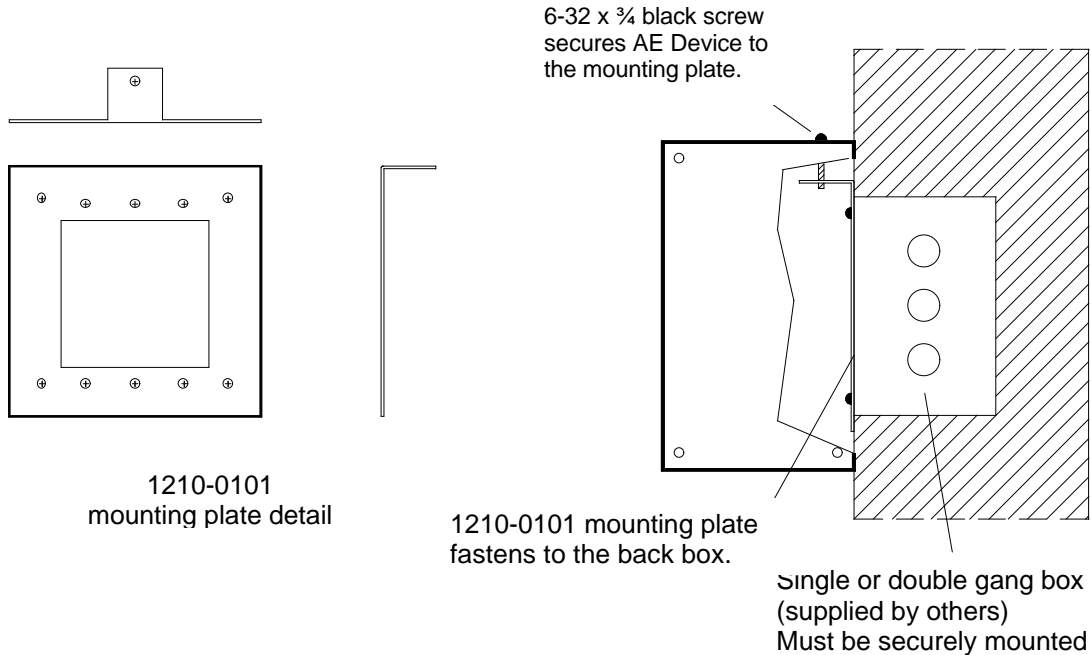
For all other options refer to the drawings at the back of this manual for additional specifications.

INSTALLATION

MOUNTING

The AE Series Displays can be mounted in a variety of ways. Things to consider for mounting include ambient light, viewing area, ambient temperature, dirt or dust. Most models are supplied with one or more 1210-0101 mounting brackets for wall mounting to a single or double gang box. See the detail below. For other mounting options, such as ceiling mounts or double-sided mounts, refer to the specific drawings.

6-32 x ¾ black screw
secures AE Device to
the mounting plate.

1210-0101
mounting plate detail

1210-0101 mounting plate
fastens to the back box.

Single or double gang box
(supplied by others)
Must be securely mounted

WIRING

There are many wiring configurations for the AEXX Series Clock/Timers, depending on the functions used and the options installed.

On most standard units, clearly labeled pigtail leads wires are provided for the power at the back panel of the unit. If you are using the AE Device as a secondary clock, such as on a 3 wire synchronous system, additional pigtail leads can be provided (if specified with the order). In this case, connect the secondary correction wiring to the pigtail lead wires marked K1+ and K1-. Otherwise, you can use the terminal blocks provided on the circuit board assembly. For other options such as the 2101 or 2102 Remote Switch Panel, refer to the addendum sheets provided for that option. Also, see the wiring diagrams for more detail at the back of this manual.

OPERATION

Before applying power, place the SET/RUN switch to the RUN position and the UP/DOWN/CLOCK switch to the CLOCK position. Apply power to the unit. The displays will rotate during the power on self-test and then a version number will appear for a few seconds. The AEXX will display ⌐:00 or ⌐:00:00 and begin keeping time. If a charged battery is installed, the self-test will be bypassed.

SETTING TIME

With the UP/DOWN/CLOCK switch still in the CLOCK position, place the SET/RUN switch to the SET position. The clock will now prompt for a 12 or 24 hour format. It will display 24Hr for 24 hour and 12Hr for 12-hour format. To change formats press the INCREMENT switch until the desired format is shown and then press ENTER. The clock will now prompt for time. The hours' digits will be flashing. Using the INCREMENT switch, set the hours to the desired hours, then press ENTER. The minutes' digits will be flashing. Again using the INCREMENT switch set the desired minutes and then press ENTER. If this is a six-digit model, once again using the INCREMENT switch set the desired seconds and then press ENTER. On four digit units, the display is normally configured for Hours and Minutes and only hours and minutes will be prompted. In each case after your preset is entered, press ENTER until the display flashes dONE. Set the SET/RUN back to the RUN position. The display will flash . Set the SET/RUN switch back to RUN the instant you want time keeping to begin at the time you just entered. The clock will now keep time as a free running clock or as a secondary clock, if connected to a master clock.

SETTING THE UP COUNTER PRESET TIME

The AEXX Series Clock/Timer can be programmed to operate as an elapsed timer. On six digit models it can count Hours, Minutes and Seconds of elapsed time. Four digit models count Minutes and Seconds of elapsed time. Special four-digit version can count Hours and Minutes of elapsed time. If you want to use the "count up to a preset and hold" feature with the UP timer, you will need to set a preset time for the UP timer. A preset of 00:00 or 00:00:00 allows the clock/timer to be used as a standard elapsed timer with a maximum count of 59:59 or 99:59:59, depending on whether it is a four or six digit model. When the maximum count is reached the timer rolls over and continues to count.

Set the UP/DOWN/CLOCK switch to the UP position. Set the SET/RUN switch to the SET position. The hours' digits will be flashing. Using the INCREMENT switch, set the desired hours for the preset time, then press ENTER. The minutes' digits will now be flashing. Set the desired minutes the same way, then press ENTER. The seconds' digits will then be flashing. If this is a six-digit model, once again using the INCREMENT switch set the desired seconds and then press ENTER. The display will then flash donE. Set the SET/RUN switch back to the RUN position. If this is a four-digit model, the AE Device will only prompt for the minutes and seconds.

UP COUNTER ELAPSED TIME OPERATION

Once the desired preset value has been set, the unit is now ready to function as an UP count elapsed timer.

Be sure the SET/RUN switch is in the RUN position. Press RESET to display 00:00 or 00:00:00. Press the START/STOP switch to begin counting elapsed time. Press the START/STOP switch again to stop and hold the count. Press the START/STOP switch again to resume elapsed time

counting. To start over press RESET to display `00:00` or `00:00:00` again. When the timer reaches the preset value, it will stop and hold the time count. If you are using the 2101 or 2102 Remote Switch Panel with your clock/timer, the piezo alarm will sound for about 3 seconds when the timer reaches the preset value.

During an UP count elapsed time operation, you can display any of the other time functions using the UP/DOWN/CLOCK switch as desired.

SETTING THE DOWN COUNTER PRESET TIME

If you are using the AEXX Series Clock/Timer as a Down counting elapsed timer, you will need to set a preset time to count down from. In this mode, the alarm and hold will occur at `00:00` or `00:00:00`.

Set the UP/DOWN/CLOCK switch to the DOWN position. Set the SET/RUN switch to the SET position. The hours' digits will be flashing. Using the INCREMENT switch, set the desired hours for the preset time, then press ENTER. The minutes' digits will now be flashing. Set the desired minutes the same way, then press ENTER. The seconds' digits will then be flashing. Set the desired seconds the same way, then press ENTER. The display will then flash `donE`. Set the SET/RUN switch back to the RUN position. If this is a four-digit model, the AE Device will only prompt for the minutes and seconds.

DOWN COUNTER ELAPSED TIME OPERATION

Once the desired preset value has been set, the unit is now ready to function as an DOWN count elapsed timer.

Be sure the SET/RUN switch is in the RUN position. Press RESET to display the preset value, which was set previously. Press the START/STOP switch to begin counting down elapsed time. Press the START/STOP switch again to stop and hold the count. Press the START/STOP switch again to resume elapsed time counting. To start over press RESET to display the preset value again. When the timer reaches `00:00` or `00:00:00` it will stop and hold the count. If you are using the 2101 or 2102 Remote Switch Panel with your clock/timer, the piezo alarm will sound for about 3 seconds when the timer reaches zero.

During a DOWN count elapsed time operation, you can display any of the other time functions using the UP/DOWN/CLOCK switch as desired.

FREE RUNNING CLOCK OPERATION

The AEXX Series Clock/Timer can be used as a free running clock, simultaneously with the UP and DOWN elapsed time features. No additional connections are required. It will run as a line synchronous clock once time has been set.

SECONDARY CLOCK OPERATION

The AEXX Series Clock/Timer can be used as a secondary clock, simultaneously with the UP and DOWN elapsed time features. The most common secondary clock correction is the 59th Minute, 3-Wire System (Mode 2). Simply connect it to a 3-wire, synchronous master clock system (see the Mode 2 wiring diagrams at the back of this manual), and set the mode switch on the circuit board to position 2. It will free run in between corrections, synchronized to the AC power line. The unit should <u>not</u> be used in the 24-hour format mode, if it is connected to a 3- wire synchronous system, since the 12-hour corrections cannot distinguish AM and PM. During power outages, a backup battery provides time keeping for up to 4 hours (rechargeable Ni-Cad).

SETTING THE SECONDARY CLOCK MODE SWITCH

A small rotary switch on the AEXX circuit board assembly is used to set the secondary clock mode. To gain access to the circuit board assembly on standard units, remove one of the side panels and slide out the back panel. On other versions refer to the specific drawing for instructions. The numbers on this switch correspond to the modes indicated at the back of this manual. For example, if your master clock supports a Simplex 93-9 secondary clock, you will need to set the switch to MODE 2 by turning the switch to position 2. See the circuit board assembly drawing at the back of this manual for details.

CODE BLUE OPERATION

The code blue feature provides an override to the AE Device, which forces it into a special, count up elapsed time mode. A code blue is initiated by applying a signal ranging from 5 VDC to 120 VAC to the K2+ and K2- terminals. If your system has a dry contact output for code blue, the 12 VAC from the AE Device's power terminals can be used in conjunction with your dry contact. See the sample wiring diagram below for more detail.

The code blue timer is the highest priority function of the AE Device while in the RUN mode. No matter which of the 3 normal functions is being displayed, the code blue input will cause the AE Device to begin counting elapsed time from `00:00` or `00:00:00`.

The code blue timer can be stopped and the time held for viewing by pressing the START/STOP button on the built-in control panel or the 2101 or 2102 Remote Switch Panel. The code blue timer cannot be restarted from the switch panel.

To reset the AE Device back to normal operation, the RUN/SET switch must be set to the SET position momentarily and then returned to the RUN position.

All other functions of the AE Device continue to operate in the background during a code blue. Time of day and even time corrections from the master clock will not be affected. The standard count up timer and the count down timer will continue as well, however if one of these timers is switched on for display when a code blue occurs, that particular timer will be reset when the AE Device is reset back to normal operation.

IMPORTANT CODE BLUE CONSIDERATIONS

The AE Device must be in the RUN mode for code blue to override.

The code blue contact does not have to open before resetting the AE Device back to normal operation, but must be opened before another code blue can occur. You must have a transition from open contact to closed contact to initiate a code blue.

If the code blue contact opens and closes again before the AE Device is reset back to normal operation, the code blue timer will start over from `00:00` or `00:00:00`, even if it had been stopped using the START/STOP switch.

If a power fail occurs during a code blue and the back up battery is in place, and the code blue switch is still closed when power returns, the code blue timer will start over from `00:00` or `00:00:00`. If the code blue switch is open when power returns, the code blue timer will continue counting the elapsed time including the time while power was off.

If a power failure occurs during a code blue and the code blue timer had been stopped for viewing, and the code blue switch is still closed when power returns, the code blue timer will start over from `00:00` or `00:00:00`. If the code blue switch is open when power returns, the code blue time where the code blue timer was stopped prior to the power failure will be shown.

OPTIONAL RS232 SERIAL DATA CORRECTION (MULTI-FUNCTION CLOCK/TIMER)

For RS232 Serial Data Correction a 10 Byte Message is required from a master clock or other control device such as a computer.

Features:	Corrects Time - 12/24Hr
12/24Hr Format:	Sets and displays 12 or 24 Hr Format

This feature allows AE Series Multi-Function Clock/Timers to communicate with Master Clocks, host computers, process computers (PLC"S), industrial instruments, and other equipment with RS232 output ports, via a 10-byte message. This 10-byte message provides address and mode selection, sends 6 characters of data, and sets display attributes sent by the host device.

RS232 WIRING DIAGRAM
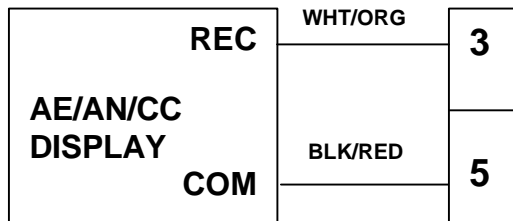
Typical connection from DB9 Serial port from computer to AE device shown on left. Some DB9 connectors require pins 4,6, and 8 to be jumpered.

On ATS Master Clocks connect Wh/Org to XMIT Terminal and Blk/Red to COM. See Master Clock manual for details.

2400 BAUD, NO PARITY, 8 DATA BITS, 1 STOP BIT

OPERATION

Before applying power, be sure all wiring is completed.   Apply power to the unit.

A 10-byte instruction is required to communicate with the AE Series Multi-Function Clock/Timer. The first byte, byte 0, is the preamble. It establishes communication. The second byte, byte 1, is the address byte that is used for addressing purposes. This AE device uses addresses 15 and 0. Byte 2 is the mode byte. See Mode 3 for 12 hour time information. See Mode 4 for 24 hour time information. Bytes 3 through 8 are associated with the six numbers required for setting time. Byte 9 is the miscellaneous digit, which provides attributes such as colons, AM/PM indicators, flash, etc.

BYTE 0: START CHARACTER - An 11H is required to establish communications.

BYTE 1: ADDRESS BYTE - Range is from 0 to 15. AE Series Multi-Function Clock/Timers respond to addresses 15 and 0, only.

BYTE 2: MODE BYTE - Range is from 0 to 255. This byte provides complete control of all AE Series devices with the RS232 option installed. The modes are:

MODE 3 - 12 Hour Time/timer mode. Bytes 3 through 8 are set as the time, and time keeping begins.

MODE 4 - 24 Hour Time/timer mode. Bytes 3 through 8 are set as the time, and time keeping begins.

BYTES 3 - 8: SIX CHARACTER BYTES – The six characters received provide the digits for setting the time.

BYTE 9: MISCELLANEOUS DIGIT BYTE - This byte provides colons, AM/PM indicators, and other attributes such as display flashing.

BIT 0 - Turns on the AM/PM indicator.

BIT 1 - Turns on the colons. Colons are automatically turned on in the time/timer mode, i.e. byte 2 = 3.

BIT 7 - Flash display.

SET TIME (SAMPLE PROGRAM)

```
5 REM 232TIME.BAS SETS TIME IN A CC2000 OR AN AE DEVICE WITH RS232 INPUT
6 REM WRITTEN BY JIM RECCELLI, APPLIED TECHNICAL SYSTEMS, 1/22/94
10 OPEN "COM1:2400,N,8,1" AS 1
20 H1$=MID$(TIME$,1,1)
30 H2$=MID$(TIME$,2,1)
40 H1H2$=MID$(TIME$,1,2)
45 PRINT H1H2$
46 IF VAL(H1H2$)=22 THEN H1$="1":H2$="0":GOTO 60
47 IF VAL(H1H2$)=23 THEN H1$="1":H2$="1":GOTO 60
50 IF VAL(H1H2$)>12 THEN H1H2=VAL(H1H2$)-12:
H1H2$=STR$(H1H2):H1$=MID$(H1H2$,1,1):H2$=MID$(H1H2$,2,1):PRINT H1H2$,H1H2
60 PRINT TIME$
70 M1$=MID$(TIME$,4,1)
80 M2$=MID$(TIME$,5,1)
90 S1$=MID$(TIME$,7,1)
100 S2$=MID$(TIME$,8,1)
120 PRINT#1, CHR$(0);CHR$(0);CHR$(17);CHR$(0);CHR$(3);H1$;H2$;M1$;M2$;S1$;S2$;CHR$(0)
130 CLOSE 1
140 END
```

TECHNICAL SUPPORT

For any questions concerning installation and operation of this product, contact our factory at:

PHONE (800) 444-7161
OR
FAX (318) 797-4864

SERVICE POLICY

It is recommended that all service for this product be done by the factory or by a factory authorized service representative. Applied Technical Systems will provide ongoing service support in and out of warranty. Send your repairs to:

APPLIED TECHNICAL SYSTEMS
849 KING PLACE
SHREVEPORT, LA 71115

APPLIED TECHNICAL SYSTEMS
WARRANTY POLICY

ATS warrants its products to be free of defects in material and workmanship for a period of 24 months from the date of purchase. ATS will repair or replace any product returned to its authorized factory service center within the warranty period so long as there is no evidence that the product has been abused, misused, damaged by lightning, overloads of any kind or water, or altered in any way.

Products returned for warranty must be returned with freight prepaid. ATS will pay normal freight charges to return the product to the customer. Special premium freight requested by the customer will be charged to the customer.

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