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MODELS APLCK - APOLLO REAL TIME CLOCK/ELAPSED TIME INDICATOR AND PBLCK - 4/6 DIGIT MODULE FOR USE WITH THE LARGE DIGIT DISPLAY (LDD)

- *12-HOUR AND 24-HOUR FORMAT*
- *MONTH/DAY/YEAR CALENDAR*
- *4-HOUR BATTERY BACK-UP*
- *3 TIMING MODES (Including Elapsed Time)*
- *0.006% ACCURACY*
- *NEMA 4/IP65 SEALED FRONT METAL BEZEL*
- *0.56" (14.2 mm) HIGH LED DISPLAY (APLCK)*

CE

DESCRIPTION

The Apollo Clock is a real time clock capable of displaying time in 24 and 12-hour formats. The 24-hour format can be displayed in hours and minutes or in hours, minutes, and seconds. The 12-hour format is displayed in hours, minutes with a P to indicate the PM hours. The Apollo Clock is also capable of calendar display in month and day or in month, day and year. These units will allow for all leap year rollovers *(extra day in February)*, and will account for all yearly and monthly changeovers.

The Apollo Clock has additional timing modes similar to those of a stopwatch. Two control lines are associated with these modes. In Mode A, the APLCK/PBLCK measures the time between a negative going pulse on the first control line and a negative going pulse on the second control line. In Mode B, the unit times between negative edges of two pulses appearing on a control line. In Mode C, the unit times as long as the second control line is low *(time interval measurement or elapsed time)*. All of these modes have four selectable ranges. These are: minutes and seconds, with hundredths of seconds resolution; hours, minutes, and seconds; hours; and hours with tenths of hour resolution.

The Apollo Clock has the capability to maintain real time for a minimum of 4 hours after an AC power loss occurs. *(Under this condition, the display is blanked out.)*

This unit also has a self-test feature which checks the display driver and the microprocessor circuitry after power up *(if self-test is enabled and battery turned off)*. This is a destructive self-test in that all parameters will be reset to zero after its completion. During self-test, the mode select DIP switches can be tested to be certain they are set correctly and are functioning properly.

Power and input connections are made via a removable terminal strip located at the rear of the unit. This strip can accept one #14 AWG wire. DIP switches at the side of the unit are used to select function, timing modes, and also battery back-up or self-test enable.

The APLCK has a sealed metal die-cast bezel which meets NEMA 4/IP65 specifications for wash-down and/or dust, when properly installed. Two mounting clips are provided for easy installation. The clock uses a 6-digit, 0.56" high LED display, which is readable to 23 feet.

⚠ **CAUTION: Risk of Danger.** Read complete instructions prior to installation and operation of the unit.

⚡ **CAUTION:** Risk of electric shock.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

SPECIFICATIONS

1. **DISPLAY:** 6-digit, 0.56" *(14.2 mm)* high LED display. (APLCK)
2. **POWER REQUIREMENTS:**
   APLCK
      AC Operation: Available in two voltage ranges. 115 VAC (±10%), or 230 VAC (±10%), 50/60 Hz, 12 VA.
      DC Operation: 11 to 14 VDC @ 0.5 A max.
   PBLCK
   AC Operation: Switch selected via the LDD power supply board, 115/230 (±10%), 50/60 Hz, 10 VA for 4-digit, 15 VA for 6-digit *(including LDD)*.
3. **SENSOR POWER:** +12 VDC (±25%) @ 100 mA max.
4. **TIME ACCURACY:** 0.006%
5. **TIMING MODE ACCURACY:** ±(0.006% +10 msec)
6. **BATTERY BACK-UP:** 4 hours min. Unit will maintain time and all other settings *(display is blanked out during battery back-up)*.
7. **CONTROL INPUTS:** Response Time = 10 msec max. V_{IL} = 1.2 VDC and V_{IH} = 3.5 VDC. All will work with VCM [E-H].
8. **INPUT & POWER CONNECTIONS:** There is a plug-in compression type, barrier strip located at the rear of the unit. This strip can be removed from the rear of the unit for ease of wiring.
9. **ENVIRONMENTAL CONDITIONS:**
   Operating Temperature: 0 to 45°C
   Storage Temperature: -20 to 50°C
   Operating and Storage Humidity: 85% max. relative humidity (non-condensing) from 0°C to 45°C.
   Altitude: Up to 2000 meters
10. **CERTIFICATIONS AND COMPLIANCES:**
    SAFETY
       IEC 1010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
       IP65 Enclosure rating (Face only)., IEC 529
       Type 4 Enclosure rating (Face only), UL50
    EMC EMISSIONS:
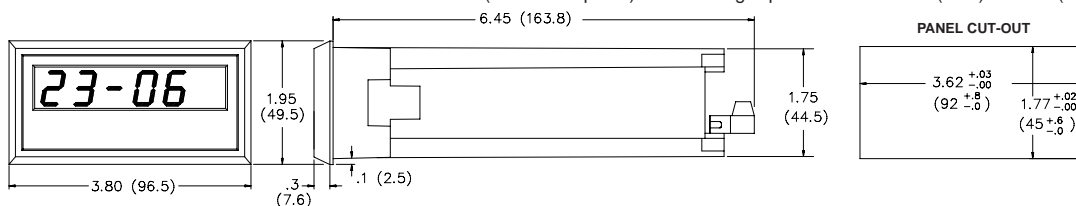   Meets EN 50081-1: Residential, Commercial, and Light Industrial Environment.
       CISPR 22 Radiated and conducted emissions

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.3)H x 5.5" (140)W.

6.45 (163.8)

1.95 (49.5)

1.75 (44.5)

3.80 (96.5)

.3 (7.6)

.1 (2.5)

PANEL CUT-OUT

3.62 +.03 -.00 (92 +.8 -.0)

1.77 +.02 -.00 (45 +.6 -.0)

SPECIFICATIONS (Cont'd)

EMC IMMUNITY:
    Meets EN 50082-2: Industrial Environment.
        ENV 50140 - Radio-frequency radiated electromagnetic field
        ENV 50141 - Radio-frequency conducted electromagnetic field
        EN 61000-4-2 - Electrostatic discharge (ESD)
        EN 61000-4-4 - Electrical fast transient/burst (EFT)
        EN 61000-4-8 - Power frequency magnetic field
    Note: Refer to the EMC Installation Guidelines section of this bulletin for additional information.

11. **CONSTRUCTION:** Die-cast metal front bezel with black, high impact plastic insert. Front panel meets NEMA 4/IP65 requirements for indoor use when properly installed. Installation Category II, Pollution Degree 2. (Panel gasket and mounting clip included with unit.)

12. **WEIGHT:**
    APLCK: 1.5 lbs (0.68 kg)
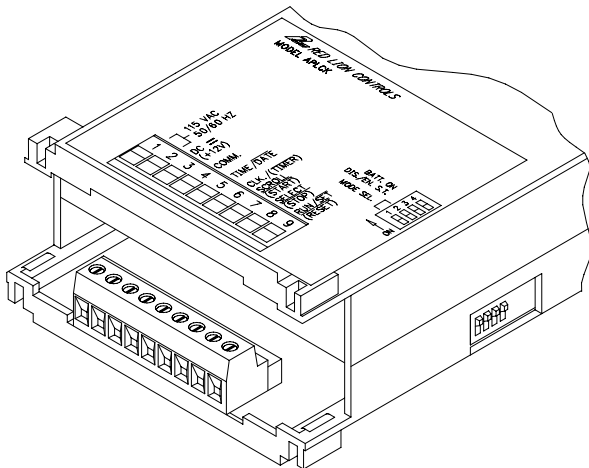   **PBLCK**: 0.4 lbs (0.18 Kg)

INPUT & POWER CONNECTIONS

Primary AC power is connected to terminals 1 and 2 *(marked AC power, located on the left-hand side of the rear terminal block)*. Enclosed with the PBLPT module is an adhesive backed label(s) showing the terminal block pin-out. This label is for wiring reference only, do not use for specifications. This label should be applied to the appropriate location by the user.
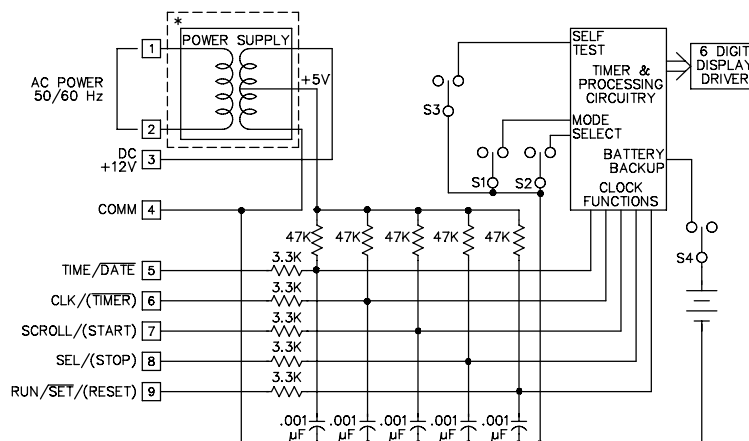
⚠️ *CAUTION: The terminal block should NOT be removed with power applied to unit. The module should not be removed from the LDD with power applied to the LDD or the module.*

All conductors should meet voltage and current ratings for each terminal. Also cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that power supplied to the unit be protected by a fuse or circuit breaker. For best results, the AC power should be relatively *"clean"* and within the specified ±10% variation limits. Drawing power from heavily loaded circuits, or from circuits that also power loads that cycle on and off, should be avoided.

Terminal 3 is the +12 VDC terminal. +12 VDC power can be applied to this terminal, or 100 mA @ +12 V can be drawn from this terminal. Terminal 4 is the *"COMM."* terminal to which the time and calendar inputs can be connected.

EMC INSTALLATION GUIDELINES

Although this unit is designed with a high degree of immunity to ElectroMagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the unit may be different for various installations. The unit becomes more immune to EMI with fewer I/O connections. Cable length, routing and shield termination are very important and can mean the difference between a successful or a troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The unit should be mounted in a metal enclosure, that is properly connected to protective earth.
    a. If the bezel is exposed to high Electro-Static Discharge (ESD) levels, above 4 Kv, it should be connected to protective earth. This can be done by making sure the metal bezel makes proper contact to the panel cut-out or connecting the bezel screw with a spade terminal and wire to protective earth.

2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
    a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
    b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
    c. Connect the shield to common of the unit and leave the other end of the shield unconnected and insulated from earth ground.

3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.

4. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.

5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:
Ferrite Suppression Cores for signal and control cables:
    Fair-Rite # 0443167251 (RLC #FCOR0000)
    TDK # ZCAT3035-1330A
    Steward #28B2029-0A0
Line Filters for input power cables:
    Schaffner # FN610-1/07 (RLC #LFIL0000)
    Schaffner # FN670-1.8/07
    Corcom #1VB3
    Corcom #1VR3
Note: Reference manufacturer's instructions when installing a line filter.

6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

BLOCK DIAGRAM

* Transformer for the PBLCK is located in the LDD.

CLOCK TIME/CALENDAR DATE DISPLAY MODES

The APLCK/PBLCK has the capability of displaying time and date in three different modes. They are: 24-hour clock in hours, minutes, seconds with month/ day/year; 24-hour clock in hours and minutes with month and day; or 12-hour clock in hours and

DIP SWITCH		CLOCK DISPLAY	CALENDAR DISPLAY
1	2		
↓	↓	23.59.59	MO.DAY.YR
↓	↑	23-59	MONTH-DAY
↑	↓	12-59 P	MO.DAY.YR
↑	↑	12-59 P	MONTH-DAY

minutes *(P indicates PM hours, blank indicates AM hours)* with month and day. The table shows the position DIP switches 1 and 2 *(located along the side of the unit)* must be set at to obtain the desired display mode.

Note: DIP switches 1 and 2 also sets the Timer ranges in the Timer mode.

To activate the clock time display (real time clock function) Terminal 5 (Time/Date) and Terminal 6 (CLK/(Timer)) should **NOT** have a closed circuit to Terminal 4 (Comm.). To activate the calendar date display, close the circuit between Terminal 5 and *"COMM."* Leave Terminal 6 open.

HOW TO DISPLAY & CHANGE DATE & CLOCK TIME

Whenever the date is changed, the time must be reset. Therefore, the date should always be changed before the time is changed. Setting of date and time on the Apollo Clock is very similar to that of most digital wristwatches. Procedures below describe how to do this.

TO DISPLAY CALENDAR DATE

Close the circuit from Terminal 5 to *"COMM."* in order to place the unit into the date display mode.

TO CHANGE CALENDAR DATE

1. Close the circuit from Terminal 5 *(DATE)* to *"COMM."* The date display mode must be selected before it can be changed.
2. Close the circuit from Terminal 9 *(SET)* to *"COMM." (This places the unit into the "SET" mode)*. At this point, the right-most digit of the display will flash.
3. Close the circuit from Terminal 7 *(SCROLL)* to *"COMM."* Now the right-most digit will scroll *(increment from 0 through 9)*. When the desired digit value appears, open the circuit between Terminal 7 and *"COMM."*
4. Close the circuit from Terminal 8 *(SELECT)* to *"COMM."* until the next digit to the left flashes, then open the circuit between Terminal 8 and *"COMM."*
5. Close the circuit from Terminal 7 to *"COMM."* until the desired value appears in this position.
6. Continue this process of scrolling and selecting until all 6 digits have been set to the desired date. Open the circuits on Terminals 5 & 9.

TO DISPLAY CLOCK TIME

Terminal 5 must be at a high level *(no connections)*.

TO CHANGE CLOCK TIME

When setting time, the unit must be set as if it were a 24-hour clock *(23.59.59)*.
1. Close the circuit from Terminal 9 *(SET)* to *"COMM." (This places the unit into the "SET" mode)*. At this point, the right-most digit of the display will flash.
2. Close the circuit from Terminal 7 *(SCROLL)* to *"COMM."* Now, the right-most digit will scroll *(increment from zero through 9)*. When the desired digit value appears, open the circuit between Terminal 7 and *"COMM."*
3. Close the circuit from Terminal 8 *(SELECT)* to *"COMM."* until the next digit to the left flashes, then open the circuit between Terminal 8 and *"COMM."*
4. Close the circuit from Terminal 7 to *"COMM."* until the desired value appears in this position.
5. Continue this process of scrolling and selecting until all 6 digits have been set to the desired time. Remember, the time must always be set as a 24-hour unit. Open the circuit between Terminal 9 and *"COMM."* Approximately one second after opening the circuit between Terminal 9 and *"COMM."*, the unit will start timing from the new value.

TIMER MODE RANGES

The APLCK/PBLCK has four range settings when used in the Timer mode. They are: hours; tenths of hours; hours, minutes, and seconds; or minutes, seconds, and hundredths of seconds. The table shows what positions DIP switches 1 and 2 *(located along*

DIP SWITCH		TIMER MODE RANGES (Max. Values)	
1	2		
↓	↓	999999	HOURS
↓	↑	99999.9	HOURS.TENTH
↑	↓	99.59.59	HR.MIN.SEC
↑	↑	59.59.99	MIN.SEC.HUN

the side of the unit) must be set at to obtain the desired range.

Note: DIP switches 1 and 2 also sets the clock/calendar display in the real time clock function.

To activate the Timer mode ranges, close the circuit from Terminal 6 (CLK/(Timer)) to Terminal 4 (Comm.). Terminal 5 has no effect on the operation of the Timer.

HOW TO USE THE TIMER MODES

Terminals 7 and 8 are at a +5 VDC (high) level when not connected to Terminal 4 "COMM.". Timer modes are implemented by closing the circuit from one or both of these terminals to *"COMM."* as described below.

Note: While the unit is used as a timer, the real time clock (time and date) continues to update. However, none of the Timer modes will continue to update while the unit is in the real time clock mode. Therefore, once in the Timer mode, it must remain there until all timing requirements are completed.
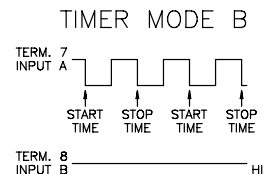
TIMER MODE A

Closing the circuit from Terminal 7 *(START)* to *"COMM."* will cause the unit to increment time. Closing the circuit from Terminal 8 *(STOP)* to *"COMM."* will cause the unit to stop incrementing time. This cycle can be repeated without resetting to *"0"* in order to accumulate a total of several timings.
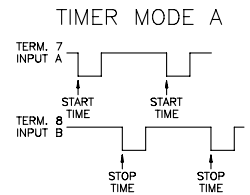

TIMER MODE B

Closing the circuit from Terminal 7 *(START)* to *"COMM."* will cause the unit to increment time. A second closed connection to *"COMM." (input must go high first)* on Terminal 7 will cause the unit to stop incrementing time. *[Terminal 8 must remain at a high level during this mode.]* This cycle can be repeated without resetting to *"0"* in order to accumulate a total of several timings.

TIMER MODE C

When Terminal 8 *(STOP)* is low *(closed circuit to "COMM.")*, the unit will increment time. *(In this mode, the unit acts as an elapsed time indicator.)* When Terminal 8 goes high, the unit will stop incrementing time. *[Terminal 7 must remain at a high level during this mode.]* This cycle can be repeated without resetting to *"0"* in order to accumulate a total of several timings.
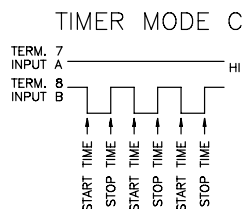
TIMER RESET

Closing the circuit from Terminal 9 *(RESET)* to "COMM." resets the timer back to zero. *(This will not affect the real time clock function.)*

SELF-TEST

The unit has a built-in Self-Test feature which will only be entered immediately after AC power-up with the following conditions:

1. DIP switch 3, the self-test enable/disable switch *(located along the side of the unit)* is in the Enable (down) position.
2. DIP switch 4, the BATT. ON/OFF switch is in the OFF (down) position.

When self-test is activated, all digits are cycled through starting with a string of six zeros. This will be shown for about half a second, then a string of ones will appear for about the same time duration. Following these, a string of twos and so on, up to nines will be displayed. *(During this time, all the decimal points will be displayed.)* After the nines are shown, the whole display will blank out. Next, an interlace pattern of 1, 0, 1, 0, 1, 0, then 1, 2, 1, 2, 1, 2, and so on until all digits from zero to nine have been displayed.

The next portion of self-test will display a group of zeros and/or ones. The first two digits from the left will always show a zero. The third digit from the left indicates the status of DIP switch one. Zero indicates the switch is down *(OFF)*. One indicates the switch is up *(ON)*. The fourth digit from the left indicates the status of DIP switch two. The remaining two digits are always shown as zero.

Self-test is automatically exited eight seconds after the DIP switch test.
Note: Clock time, date, and timer will be reset to zero after exiting self-test.

BATTERY BACKUP

This unit has internal, rechargeable batteries that can operate the unit for a minimum of 4 hours without AC power *(provided the unit has been previously powered up for at least 48 continuous hours. This is necessary to charge the batteries)*. To enable battery backup, DIP switch 4 *(BATT.)* must be in the up *(ON)* position. When the unit is not going to be used for long periods of time *(days)*, DIP switch 4 should be in the down *(OFF)* position.

INSTALLATION ENVIRONMENT

The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation. Placing the unit near devices that generate excessive heat should be avoided.

The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents.

Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.
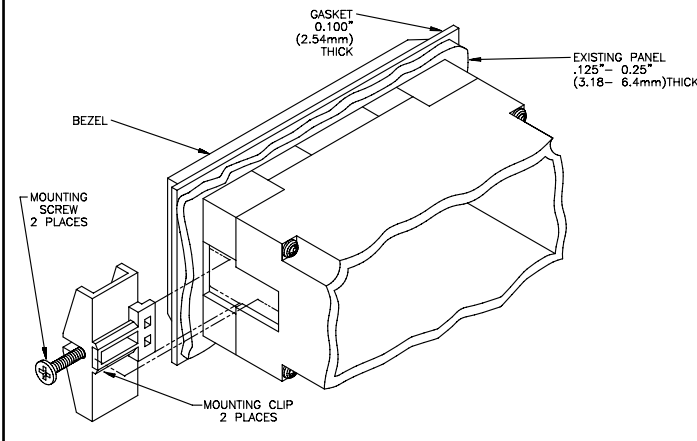

INSTALLATION

PBLCK installation information is contained in the LDD bulletin. Refer to that bulletin for instructions on installing the module.

The APLCK unit meets NEMA 4/IP65 requirements for indoor use, when properly installed. The units are intended to be mounted into an enclosed panel with a gasket to provide a water-tight seal. Two mounting clips and screws are provided for easy installation. Consideration should be given to the thickness of the panel. A panel which is too thin may distort and not provide a water-tight seal. (Recommended minimum panel thickness is 1/8".)

After the panel cut-out has been completed and deburred, carefully slide the panel gasket over the rear of the unit to the back of the bezel. Insert the unit into the panel. As depicted in the drawing, install the screws into the narrow end of the mounting clips. Thread the screws into the clips until the pointed end just protrudes through the other side.

Install each of the mounting clips by inserting the wide lip of the clips into the wide end of the hole, located on either side of the case. Then snap the clip onto the case. Tighten the screws evenly to apply uniform compression, thus providing a water-tight seal. *CAUTION: Only minimum pressure is required to seal panel. Do **NOT** overtighten screws.*
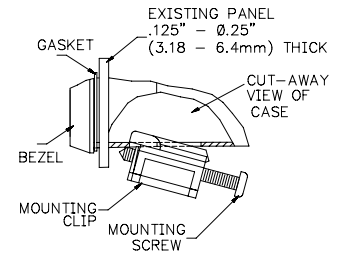
TROUBLESHOOTING

For further technical assistance, contact technical support at the appropriate company numbers listed.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBERS	
		230 VAC	**115 VAC**
APLCK	Apollo Real Time Clock	APLCK010	APLCK000

For more information on Pricing, Enclosures & Panel Mount Kits refer to the RLC Catalog or contact your local RLC distributor.

PERSONALITY MODULE

MODEL NO.	DESCRIPTION	PART NUMBERS
PBLCK	Apollo Real Time Clock Module for use with the 6-digit Large Digit Display	PBLCK000