

PARABAM

SOLID STATE DIGITAL CLOCKS

TECHNICAL BULLETIN

No. 663-18



ACTRONIC SALES ENGINEERING, INC.
5306 WEST LAWRENCE AVENUE
CHICAGO 30, ILLINOIS
PHONE 286-1037

PARABAM

The Parabam Solid State Digital Clock is a precision time source that provides time-of-day, elapsed time or count-down/count-up modes in resolutions of minutes, tenths-minutes, seconds and tenths-seconds. The clock has been designed for use in data logging systems, process control systems, time display systems, high speed computer systems or other digital systems requiring time control or programming.

The clock features a single-plane, in-line lampbank display having 1 inch high numerals. The display may be ordered for remote mounting to save valuable front panel space. Set switches are located on the front panel of clock but may also be ordered remotely mounted with the visual display.

Logic outputs in the form of a 10-line decimal code or binary coded decimal provide time information for customer equipment. An interlock signal is also provided to prevent the recording of erroneous time information.

The clock has been designed to permit flexibility in meeting customer requirements. *Inquiries for special configurations are invited.*

FEATURES:

★ Solid State Reliability ★ Logic Output Compatible with Printers, Typewriters and Digital Recording Devices ★ Highly Legible Visual Display ★ Adaptable to Special Requirements.

SOLID STATE DIGITAL CLOCKS

TECHNICAL SPECIFICATIONS

RANGE AND RESOLUTION

(A) The Parabam Solid State Digital Clock is available with a variety of ranges and resolutions. Resolutions (least count) available are tenth-second, one-second, tenth-minute, and one-minute. Ranges from 4 to 6 decades of visual display and logic output time information in hours-minutes-seconds, hours-minutes, minute-seconds or all minutes or all seconds (consistent with the resolution) can be provided with the exception as noted in B.

Clocks with ranges other than time-of-day can be provided either as elapsed time clocks, count-down clocks and count-down/count-up clocks.

(B) Clocks with tenth-second resolution are furnished with logic output only (no visual display) for the tenth-second decade, thus making available up to seven decades of logic output with up to six decades of visual information. The tenth-second decade is automatically zeroed when the Start-Stop switch is placed in Stop, thus enabling the clock to be started with the tenth-second decade always at zero.

(C) Basic configurations include following models:

- C24LM - 00h, 00m to 23h., 59m
- C24LT - 00h, 00m to 23h, 59.9m
- C24LS - 00h, 00m, 00s to 23h, 59m, 59s
- C24LTS - 00h, 00m, 00.0s to 23h, 59m, 59.9s

Model numbers for other configurations are available on request.

VISUAL DISPLAY

The visual display is composed of single-plane, in-line, projection-type lampbanks having 1" high numerals and a 150° viewing angle. Lamp current-limiting resistors are used to increase lamp life. *Lampbank display (with or without time set switches) may be ordered for remote mounting.*

LOGIC OUTPUT

Time information is provided at a connector mounted on the rear of the chassis.

10-line decimal —

1. -10 v dc ± 2 v @ 5 ma
2. Sink 35 ma to ground

Binary-coded-decimal (8-4-2-1), (4-2-2-1), (2-4-2-1) —

1. Binary "0" -0 v dc (sink 10 ma to ground)
2. Binary "1" -10 v dc ± 2 v @ 5 ma

TIME BASE

Binary counting unit (BCU) time base division is used to derive the clock pulse from the 60 cycle line frequency.

May be ordered for operation from customer-furnished external 60 cycle frequency standard. 8VPP sine or square wave input into 5 K impedance.

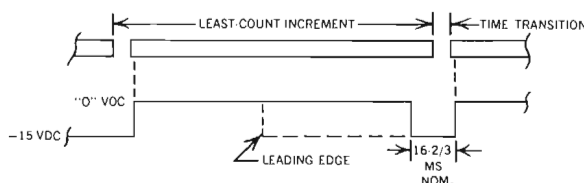
ACCURACY

Operates in exact synchronism with 60 cycle line frequency or external 60 cycle frequency standard.

INTERLOCK

The interlock feature of the clock provides a signal out for customer use in interlocking the readout device with the clock. This prevents recording of erroneous time information due to time transitions occurring during readout.

The interlock signal presents a 0 v dc (sink 10 ma to ground) output during the periods when readouts can be initiated and -10 v dc (@ 5 ma) output during clock time transitions. The leading edge of the -10 v dc output can be factory set in increments of approximately 16-2/3 milliseconds prior to time transitions to prevent readouts from being initiated when insufficient time remains (before the transition) to complete the readout. Maximum interlock can be set to approximately one-half of the least count. Unless otherwise specified standard interlocks are set at a nominal 16-2/3 milliseconds.



TIME COUNTER

Decimal ring counters provide for accumulating the clock pulses and controlling the lampbank and logic output.

TIME SET

Individual time set pushbutton switches located on front panel, centered under the associated decade, provides for setting the desired time. 24 hour clocks have only a single set switch for the hours decades. The time set switches operate without interaction between decades.

START-STOP SWITCH

A front panel toggle switch provides for starting or stopping the time accumulation. When placed in the stop position, the binary counting unit is reset to zero so that when started the first clock pulse occurs exactly one least count later. This enables the clock to be manually set to a known time standard to an accuracy within a small percentage of the least count time increment.

TEMPERATURE

The clock will operate accurately and reliably over an ambient temperature range from -40° to +55° C.

POWER

The clock operates from 115 v ($\pm 10\%$) 60 cps line power @ 50 watts maximum.

PHYSICAL SIZE

The clock is designed for standard 19" relay rack mounting with a 5 1/4" high panel. Depth behind the panel is 17".

ACTRONIC SALES ENGINEERING, INC.

5306 WEST LAWRENCE AVENUE

CHICAGO 30, ILLINOIS

PHONE 286-1037

Represented by:

PARABAM, INC.

12822 YUKON AVENUE, HAWTHORNE, CALIFORNIA • OSBorne 9-3393

PARABAM

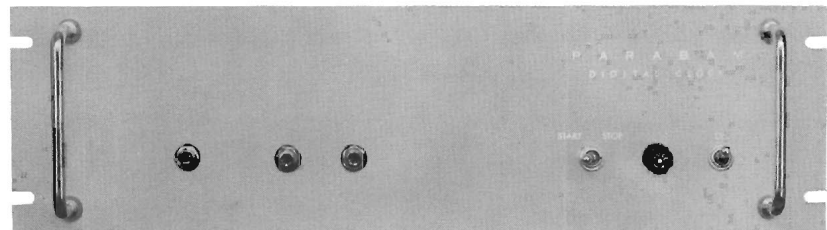
STANDARD DIGITAL CLOCKS

TECHNICAL BULLETIN

No. 162-11



MODEL A24LS-1



MODEL A24RM

features:

- REMOTE MOUNTED LAMPBANK
- HIGHLY LEGIBLE VISUAL DISPLAY FOR TIME BASE or PROGRAM CONTROLLER
- DECIMAL and BINARY CODED DECIMAL OUTPUT
- CONTACT OUTPUT COMPATIBLE WITH PRINTERS, TYPEWRITERS, CARD PUNCHES, etc.

R(1)—REMOTE LAMPBANK
R(2)—REMOTE LAMPBANK
without panel



R—REMOTE LAMPBANK



Represented By
ACTRONIC SALES ENGINEERING, INC.
6272 WEST NORTH AVENUE
CHICAGO 39, ILLINOIS
PHONE 237-5112

PARABAM

DIVISION OF
HOUSTON FEARLESS CORPORATION



Parabam Digital Clocks provide non-ambiguous contact closures in parallel form corresponding to the time-of-day in minutes, tenth-minutes, hundredth-minutes, seconds or hundredth-hours. This contact output can be used in data logging systems, process control systems, or other time oriented digital control or recording systems. *By providing up to 144,000 unique contact combinations per day, these digital clocks can be used for precise time programming throughout the day.*

Outputs in straight decimal, various codes of binary coded decimal, or teletype code can be provided. In addition to the contact closure output, a highly legible single-plane, in-line lampbank provides a visual display. This display may be ordered for remote mounting to save valuable front-panel space. Standard remote assemblies may be ordered panel mounted with set switches, without panel mount, or without set switches. For the remote display without set switches, setting of time is accomplished at the clock front panel. The accurate measurement of time is normally derived from cam operated switches driven by a 60 cycle synchronous motor. For operation from varying frequency sources, separate input connections to the timing motor can be provided to permit operation from a tuning fork oscillator supply. Models are also available for operation from an external pulse source for systems requiring synchronization with a master time standard. The pulses from the timer or external source are used to operate a reliable telephone-type, step-switch counter.

Clocks operating as count-down/count-up or elapsed time indicators as well as clocks with multiple remote displays can be provided on special order. *Also available on special order are digital time programmers with interchangeable program plugs.*

STANDARD DIGITAL CLOCKS

TECHNICAL SPECIFICATIONS

TIME SOURCE:

Standard Digital Clocks are furnished with a timer consisting of a 60 cycle synchronous motor which drives cam operated switches. Models are available for operation from: (a) customer furnished normally-open contacts which close for a minimum of 300 milliseconds once each least-count time increment, (b) customer furnished pulse capable of furnishing a minimum of 10 ma at 50 volts for a minimum of 65 milliseconds, or (c) other mutually agreeable customer furnished pulse source.

COUNTER:

A telephone-type step switch counter is used to accumulate the pulse input and provide the contact output. Pushbutton "set" switches are provided on the front panel or on the remote display for rapid setting of the time without interaction between decades.

VISUAL DISPLAY:

The visual display is composed of single-plane, in-line, projection-type lampbanks having 1" high numerals and a 150° viewing angle. Display is easily readable under high ambient light conditions. Lamp current limiting resistors are used to increase lamp and switching contact life. Lampbank displays may be ordered for remote mounting or mounted in the basic clock. For viewing from extremely long distances, lampbanks with 3% high numerals can be provided on special order.

CONTACT OUTPUT:

Output contacts are available in decimal form, various forms of binary coded decimal, or 5-bit teletype code. Each digit is completely isolated, with individual commons to provide readout flexibility in either parallel form or externally serialized form. Multiple or single outputs may be ordered. Maximum recommended loading is 3 amperes if inhibit contacts are used to prevent switching of the load during count transition. If load is switched directly, output contact loading should not exceed the equivalent of a resistive load of 100 ma at 115 VAC or 30 VDC.

INHIBIT CONTACTS:

On clocks using an internal timer, interlock contacts wired to the output connector provide a signal to be used to inhibit customer readout to prevent erroneous readings or to prevent switching of high current loads during a count transition. If used to inhibit readout, the time of operation in advance of the transition can be adjusted to permit completion of readout if started immediately prior to closure of inhibit switch. If used to remove high current load for output contact protection, the inhibit contacts can be adjusted to operate immediately before transition. Single-pole, normally-closed contacts are furnished as standard. Normally-open contacts can be furnished if specified. As an optional feature, a "hold" circuit can be provided to inhibit clock transfer during a read-out. To inhibit transfer, a customer furnished normally-open contact closes prior to read-out and prevents the time-count transition from occurring during read-out. To prevent loss of time, the external closure duration must be less than 700 milliseconds on a one second clock, 5-2/3 seconds on a tenth-minute clock, and 59 seconds on a one minute clock.

RADIO NOISE SUPPRESSION:

As a standard feature, step switch coils are provided with arc suppression to increase contact life and minimize radio noise. In applications where both conducted and radiated noise is extremely critical, additional suppression can be provided as an optional feature.

POWER INPUT:

Power input to the clock is 110-120 volt, 60 cycle AC applied through a front-panel-mounted fuse.

PHYSICAL DIMENSIONS:

Standard clocks are mounted on a 19" relay rack panel 5 1/4" high. Depth behind panel is 13". In installations with limited space, clocks with remote display can be furnished with 3 1/2" panel height.

OPTIONAL FEATURES:

Other optional features include: power failure indication, analog output, and oil-filled step switches for explosion-proof and maintenance-free applications.

Other Parabam Technical Bulletins available:

- No. 162-12 Digital Calendars
- No. 162-13 Digital Clocks (Explosion Proof type and Analog Output type)
- No. 162-14 Multiple Display Systems
- No. 162-15 Digital Time Programmers
- No. 162-16 Count Down/Count Up Digital Clocks

Represented by:

PARABAM

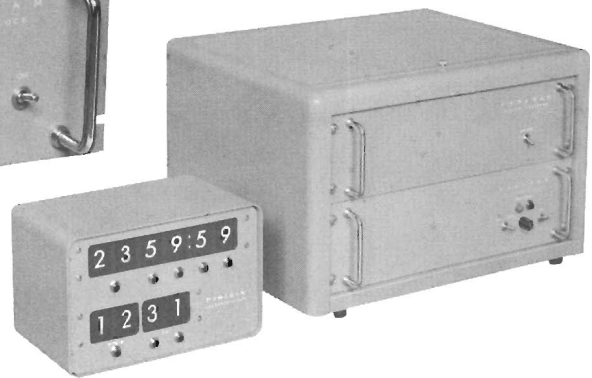
DIGITAL CALENDAR

TECHNICAL BULLETIN

No. 162-12



PARABAM DAY-MONTH CALENDAR Model A12MLD-1
shown in conjunction with a Model A24LM-1
Digital Clock.



PARABAM MONTH-DAY CALENDAR Model A12MR(1)D-1
shown in conjunction with a Model A24R(1)S-1
Digital Clock, Cabinet Mount and Remote Desk
Display Mount.

Represented By
ACTRONIC SALES ENGINEERING, INC.
6272 WEST NORTH AVENUE
CHICAGO 39, ILLINOIS
PHONE 237-5112

PARABAM

DIVISION OF
HOUSTON FEARLESS CORPORATION



Parabam Digital Calendars provide nonambiguous contact closures in parallel form corresponding to the date in days and months or days of the year. They can be used in data logging systems, process control systems, or other time or date oriented digital control or recording systems. Although normally operated in conjunction with a Parabam time-of-day digital clock, they may be operated from other once-a-day contact closures.

Outputs in straight decimal or various codes of binary coded decimal can be provided. In addition to the contact closure output, a highly legible single-plane, in-line, lampbank provides a visual display. This display can be ordered mounted in the calendar unit or for remote mounting.

Two standard configurations of calendars are available. Month-day calendars read months from 01 to 12, and days from 01 to 31. Variation in number of days in each month is corrected automatically. Day-of-the-year calendars indicate the date by counting from 001 to 365. A front panel switch is provided for leap year correction.

Special configurations available include visual displays with three-letter abbreviations for months, and combined Digital Calendar-Clocks to provide months-days-hours-minutes in a single unit.

DIGITAL CALENDAR

TECHNICAL SPECIFICATIONS

TIME INPUT:

Input to the calendar is a contact closure furnished at 00:00 each day from a Parabam Digital Clock (see Parabam Technical Bulletin on Standard Digital Clocks) or from some other appropriate once-a-day contact closure.

COUNTER:

A telephone-type stepswitch counter is used to accumulate the pulse input. Pushbutton "set" switches are provided on the front panel for rapid setting of the correct date.

VISUAL DISPLAY:

The visual display is composed of single plane, in-line, projection-type lampbanks having 1" high numerals and a 150° viewing angle. Display is easily readable under high ambient light conditions. Lamp current limiting resistors are used to increase lamp and switching contact life. Lampbank displays may be ordered for remote mounting or mounted in the basic calendar.

CONTACT OUTPUT:

Output contacts are available in decimal form or various codes of binary coded decimal. Each digit is completely isolated with individual commons to provide readout flexibility in either parallel form or externally serialized form. Multiple or single outputs may be ordered for all models. When operated in conjunction with a Parabam Digital Clock, a readout inhibit switch in the clock is provided for use in removing the external electrical load to prevent erroneous readout during count transition as well as to prevent switching of high current loads on the step switch contacts. If the inhibit switch is used, maximum static contact loading is 3 amperes. If the output is switched directly without the inhibit switch, maximum loading is the equivalent of a resistive load of 100 ma at 115 VAC or 30 VDC.

LEAP YEAR SETTING:

A toggle switch is provided on the front panel for leap year correction. On month-day calendars, the switch must be activated prior to February 28 of the leap year and returned to its initial position prior to February 28 of the following year. On day-of-the-year calendars, the leap year switch extends the maximum count from 365 to 366.

POWER INPUT:

Peak power demand at maximum transition is approximately 60 watts of 110-120 volt, 60 cycle AC. Normal demand is approximately 15 watts.

PHYSICAL DIMENSIONS:

The calendar is mounted on a 19" relay rack panel 5 $\frac{1}{4}$ " high. Depth behind the panel is 13".

OPTIONAL FEATURES:

Calendars can be furnished with internal timer for completely self-contained operation. Other options include cabinet mounting, power failure indication, and desk mounted remote displays.

Other Parabam Technical Bulletins available:

No. 162-11 Digital Clocks (Standard)
No. 162-13 Digital Clocks (Explosion Proof
type and Analog Output type)
No. 162-14 Multiple Display Systems
No. 162-15 Digital Time Programmers
No. 162-16 Count Down/Count Up Digital Clocks

Represented by:

PARABAM DIVISION OF **H** HOUSTON FEARLESS CORPORATION
12822 YUKON AVENUE, HAWTHORNE, CALIFORNIA • OSborne 9-3393

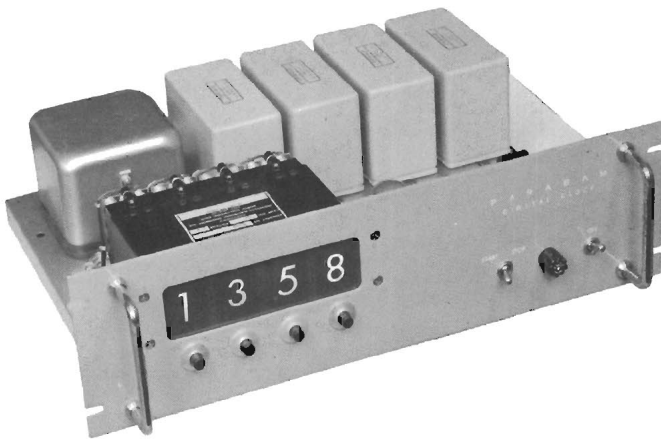
PARABAM

DIGITAL CLOCKS

TECHNICAL BULLETIN

No. 162-13

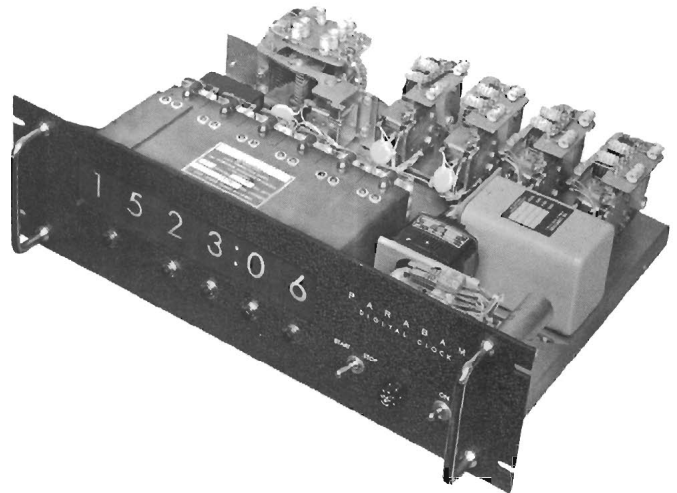
Represented By
ACTRONIC SALES ENGINEERING, INC.
6272 WEST NORTH AVENUE
CHICAGO 39, ILLINOIS
PHONE 237-5112



MODEL E & M DIGITAL CLOCKS (Model M shown)

Model M requires no preventative maintenance.
Model E is explosion proof with oil filled
step switches.

ANALOG OUTPUT DIGITAL CLOCK



MODELS E & M DIGITAL CLOCKS

Parabam Digital Clocks provide non-ambiguous contact closures in parallel form corresponding to the time-of-day in various time increments. This contact output can be used in data logging systems, process control systems, or other time oriented digital control or recording systems. Clocks in either 12 or 24 hour versions with a resolution of minutes, tenth-minutes, hundredth-minutes, seconds, or hundredth-hours can be provided.

Outputs in straight decimal, various codes of binary coded decimal, or teletype code can be provided. In addition to the contact closure output, a highly legible single-plane, in-line lampbank provides a visual display. The display may be ordered for remote mounting in order to conserve valuable front panel space. Rapid setting of the clock is easily accomplished by means of push button set switches.

Models E and M clocks are designed for operation under adverse environmental conditions. By the use of stepping switches which are sealed in oil, preventative maintenance is reduced to essentially zero even under conditions of severe dust and dirt. In addition, both models are highly resistant to moisture, fungus, and corrosion. Model E clocks have the added capability of operating safely in explosive atmospheres. All switching components are either hermetically sealed or rated explosion-proof per MIL-E-5272 (Para. 4.13.1).

ANALOG OUTPUT CLOCK

Parabam Analog Output Clocks provide precise voltage levels representing time-of-day or elapsed time for use as the time input to a computer or to other systems which require analog instead of digital time input. The precise voltage representation of time, accurate to less than $\pm\frac{1}{2}$ digit, is obtained by using the basic contact output of a digital clock in resistive summing circuits energized by a precision transistorized DC supply. A linear relationship is provided between time count and voltage level which is independent of load impedance. The output increases as the load impedance increases, and conversely decreases as the load impedance decreases, but linearity is unaffected. Therefore, by using potentiometers in series with or shunting the load, the output can be adjusted very exactly to a desired level.

In addition to the analog output, contact output in parallel form can be provided in either straight decimal, various codes of binary coded decimal, or teletype code. As in all models of Parabam clocks, a highly legible single-plane, in-line lampbank provides a visual display which can be ordered either located in the clock or for remote mounting.

PARABAM

DIVISION OF **HF** HOUSTON FEARLESS CORPORATION

Model E & M and ANALOG OUTPUT DIGITAL CLOCKS

TECHNICAL SPECIFICATIONS

Basic description of Model E, Model M, and Analog Output Clocks is essentially identical. Where specific differences occur for a particular model, the following description will so state.

TIME SOURCE:

Parabam Digital Clocks are furnished with a timer consisting of a 60 cycle synchronous motor which drives cam operated switches. On Model M clocks, the timer is housed within a dust-tight cover. The timer on Model E clocks is enclosed in a hermetically sealed container. Models are available for operation from external pulses or from external contact closures. Relays used in externally timed clocks are hermetically sealed for Model E and M.

COUNTER:

A telephone-type step switch counter is used to accumulate the pulse input and provide the contact closures for the output or for input to the analog matrix. On Model E and M clocks, the step switches are hermetically sealed in oil after careful adjustment and run-in. Sealed switch life is equivalent to that of an open unit receiving optimum service and lubrication. Maximum arc suppression is provided on sealed units to increase contact life and reduce radio noise. Pushbutton "set" switches are provided on the front panel or on the remote display for rapid setting of the time without interaction between decades. Model E and M clocks use sealed switches rated explosion-proof per paragraph 4.13.1 of MIL-E-5272.

VISUAL DISPLAY:

The visual display is composed of single-plane, in-line, projection-type lampbanks having 1" high numerals and a 150° viewing angle. Display is easily readable under high ambient light conditions. Lamp current limiting resistors are used to increase lamp and switching contact life. Lampbank displays may be ordered for remote mounting or mounted in the basic clock. For viewing from extremely long distances, lampbanks with 3/8" high numerals can be provided on special order.

CONTACT OUTPUT:

Output contacts are available on all models in decimal form, various codes of binary coded decimal, or 5-bit teletype code. Each digit is completely isolated, with individual commons to provide readout flexibility in either parallel form or externally serialized form. Maximum recommended loading is 3 amperes if inhibit contacts are used to prevent switching of the load during count transition. If load is switched directly, output contact loading should not exceed the equivalent of a resistive load of 100 ma at 115 VAC or 30 VDC.

OPTIONAL FEATURES:

Other optional features include power failure indication, multiple displays, and count-down/count-up operation.

ANALOG OUTPUT:

On Analog Output Clocks, precise voltage levels comprise the primary clock output. Separate output voltage channels are provided for seconds, minutes, and hours. The actual voltage levels are optional, within limits, but might be as given in the following example:

Hours: Range 00 to 23, voltage range 0 to 2300 mv in 100 mv increments.

Minutes: Range 00 to 59, voltage range 0 to 5900 mv in 100 mv increments.

Seconds: Range 00 to 59, voltage range 0 to 5900 mv in 100 mv increments.

INHIBIT CONTACTS:

On clocks using an internal timer, interlock contacts wired to the output connector provide a signal to be used to inhibit customer readout to prevent erroneous readings or to prevent switching of high current loads during a count transition. If used to inhibit readout, the time of operation in advance of the transition can be adjusted to permit completion of readout if started immediately prior to closure of inhibit switch. If used to remove high current load for contact protection, the inhibit contacts can be adjusted to operate immediately before transition. Single pole, normally-closed contacts are furnished as standard. Normally-open contacts can be furnished if specified. As an optional feature, a "hold" circuit can be provided to inhibit clock transfer during a read-out. To inhibit transfer, a customer furnished normally-open contact closes prior to readout and prevents the time-count transition from occurring during readout. To prevent loss of time, the external closure duration must be less than 700 milliseconds on a one second clock, 5-2/3 seconds on a tenth-minute clock, and 59 seconds on a one minute clock.

RADIO NOISE SUPPRESSION:

As a standard feature, step switch coils are provided with arc suppression to increase contact life and minimize radio noise. In applications where both conducted and radiated noise is extremely critical, additional suppression can be provided as an optional feature.

POWER INPUT:

Power input to the clock is 110-120 volt, 60 cycle AC applied through a front-panel-mounted fuse.

PHYSICAL DIMENSIONS:

All three models are mounted on a 19" relay rack panel 5 1/4" high. Depth behind panel is 13".

Other Parabam Technical Bulletins available:

- No. 162-11 Digital Clocks (Standard)
- No. 162-12 Digital Calendars
- No. 162-14 Multiple Display Systems
- No. 162-15 Digital Time Programmers
- No. 162-16 Count Down/Count Up Digital Clocks

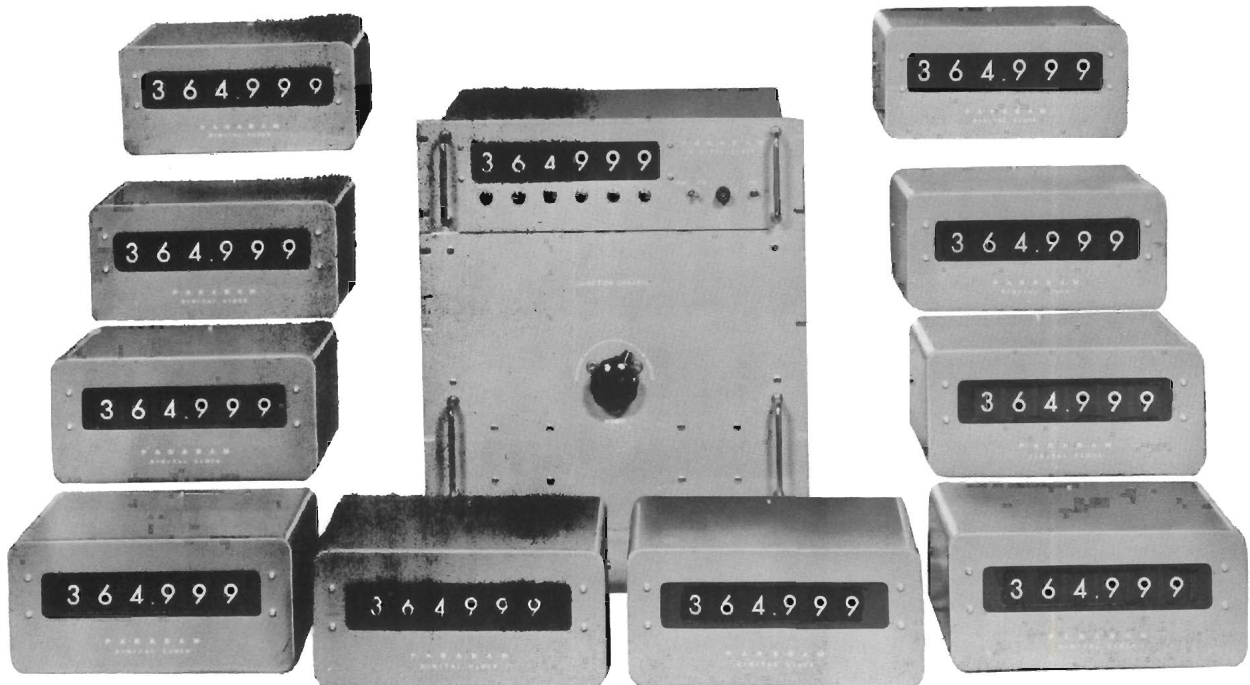
Represented by:

PARABAM

MULTIPLE DISPLAY SYSTEM

TECHNICAL BULLETIN

No. 162-14



Digital Clock reading in thousands-of-a-day with 10 wall mounted Remote Displays.

Represented By
ACTRONIC SALES ENGINEERING INC
6272 WEST NORTH AVENUE
CHICAGO 39, ILLINOIS
PHONE 237-5112

PARABAM

DIVISION OF
HOUSTON FEARLESS CORPORATION



Parabam Multiple Display Systems provide the capability for observation of digital quantities at many remote locations. Operating in conjunction with Parabam Digital Clocks, Digital Calendars, Digital Counters, and Count-Down/Count-Up Clocks, the time, date, or count can be displayed remotely with all displays operating in absolute synchronism. *They can be used to great advantage in schools, office buildings, radio and television studios, test labs or ranges, or any application requiring highly reliable multiple digital displays.*

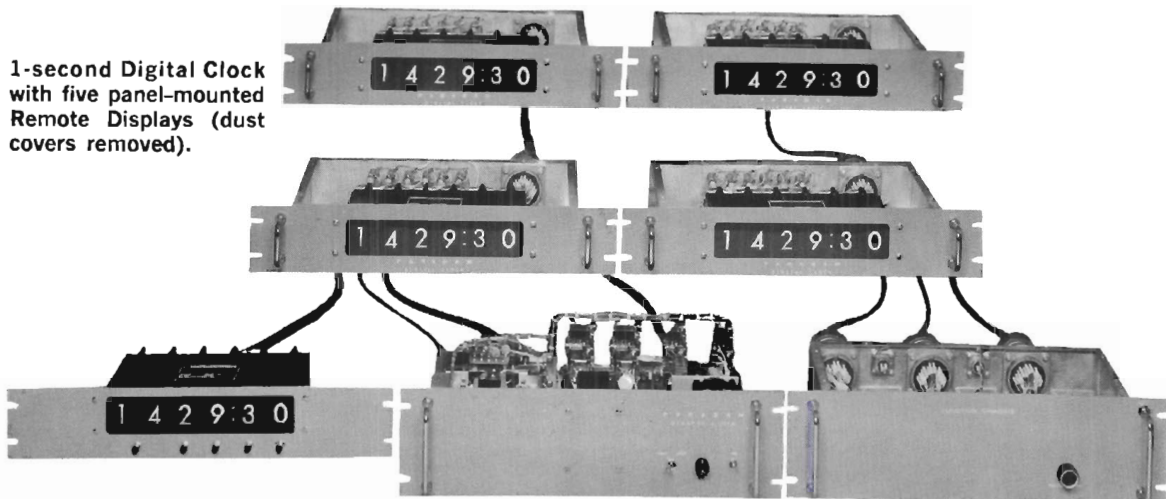
Multiple Display Digital Clock Systems may be ordered in 12 or 24 hour versions with minute, tenth-minute, or second resolution. Calendar Systems can be furnished in month-day or day-of-the-year versions or furnished combined with time or fractional days. Counter and Count-Down/Count-Up Systems can be furnished as standard with up to six decades of straight count with a counting rate of approximately two per second, or for counting cumulatively in minutes and seconds.

Each digital display consists of a highly legible single plane, in-line lampbank assembly. They may be ordered for wall mounting, relay rack panel mounting, or for mounting in custom consoles or panels.

In addition to the multiple displays, contact closures can be provided for digital recording or for entering into a computer.

PARABAM Multiple Display Systems

1-second Digital Clock with five panel-mounted Remote Displays (dust covers removed).



TECHNICAL SPECIFICATIONS

TIME or IMPULSE INPUT:

Multiple Display Digital Clock Systems and Count-Down/Count-Up Systems are available with a timer consisting of a 60-cycle synchronous motor driving cam operated switches. The input to a Digital Calendar system is normally derived either from a Parabam Digital Clock or from an external switch which closes for approximately one second at midnight. Systems can be furnished which can be automatically synchronized with WWV or which are operated from a customer furnished master time pulse occurring once each least-count time increment. Multiple Display Counter Systems operate from customer furnished pulses which are not necessarily related to time except by the maximum counting rate. This counting rate depends on the number of decades used.

COUNTER:

A telephone-type step switch counter is used to accumulate the pulse input in the Master unit. All remote displays are actually lampbanks that are energized through contacts of the step switches in the Master. The remote displays, therefore, must always match that of the Master. Pushbutton "set" switches are provided on the Master unit for rapid setting of the correct time or count.

VISUAL DISPLAYS:

The visual displays are composed of single plane, in-line, projection-type lampbanks having 1" high numerals and a 150° viewing angle. Remote displays having 3/8" high numerals can also be furnished. Displays are easily readable under high ambient light conditions. The contacts of a Master unit can carry the current required for up to 40 remote displays. Above this number and for up to 40 more remote displays, a "Slave" unit wired to

remain permanently synchronized with the Master unit, can be furnished. Lamp current limiting resistors are used in all displays to increase lamp and switching contact life.

JUNCTION CHASSIS:

To provide lampbank power and connection, a Junction Chassis is provided for each set of 20 remote displays. Receptacles can be provided for connecting each remote display, or junction terminal strips may be provided by the customer to be fed by a minimum number of connectors on the Junction Chassis or the Master Unit.

CONTACT OUTPUT:

Output contacts are available in decimal form or various codes of binary coded decimal. Each digit is completely isolated with individual commons to provide readout flexibility in either parallel form or externally serialized form. Maximum recommended static loading is 3 amperes. The maximum number of remote displays is decreased by the addition of contact output, with the amount of decrease depending on the output code selected.

POWER INPUT:

Power input to the system is 110-120 volt, 60 cycle AC applied through a front-panel-mounted fuse.

PHYSICAL DIMENSIONS:

The Master unit and Slave unit, if used, are mounted on 19" relay rack panels 5 1/4" high. Depth behind panel is 13". The height of the Junction Chassis panel depends on the number of remote displays used and the number of decades in the displays. The size of the remote displays depends on whether wall mounted, panel mounted, or unmounted.

Other Parabam Technical Bulletins available:

- No. 162-11 Digital Clocks (Standard)
- No. 162-12 Digital Calendars
- No. 162-13 Digital Clocks (Explosion Proof type and Analog Output type)
- No. 162-15 Digital Time Programmers
- No. 162-16 Count Down/Count Up Digital Clocks

Represented by:

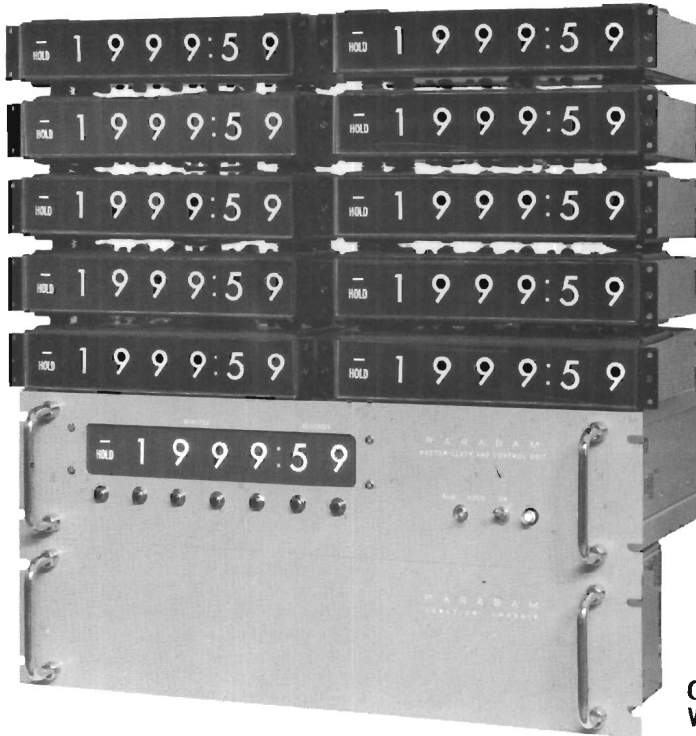
PARABAM DIVISION OF **H** HOUSTON FEARLESS CORPORATION
12822 YUKON AVENUE, HAWTHORNE, CALIFORNIA • OSBorne 9-3393

PARABAM

COUNT-DOWN COUNT-UP DIGITAL CLOCKS

TECHNICAL BULLETIN

No. 162-16



**COUNT DOWN/COUNT UP SYSTEM
With 10 Remote Display Units**

PARABAM

DIVISION OF
HOUSTON FEARLESS CORPORATION

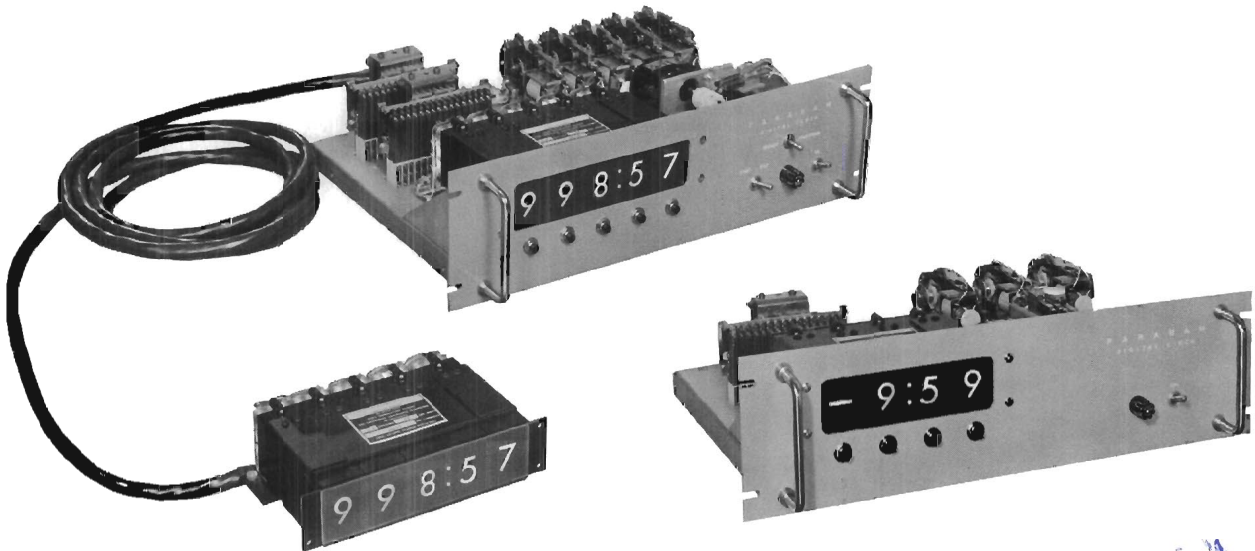


Parabam Count-Down/Count-Up Digital Clocks are ideal for use in missile launching, testing, radio-television broadcasting, or other applications where time is counted down prior to an operation, and after the operation has been initiated, elapsed time is observed. Standard Count-Down/Count-Up Digital Clock models may be ordered in minute, tenth-minute, or second resolution and with a maximum count of up to six decades in any combination of sign, hours, minutes, tenth-minutes, and/or seconds in a standard 19" relay rack unit.

Time is visually displayed on single plane, in-line, lampbank assemblies. Indication of counting mode whether "plus-minus" and/or hold can also be furnished by a similar display. For observation of time at a number of remote stations, multiple display systems can be provided with up to 40 displays operating in absolute synchronism.

The accurate measurement of time is normally derived from cam operated switches driven by a synchronous motor. Models are available for operation from an external pulse source for systems requiring synchronization with master range timing or other timing standards. The pulses from the timer or external source are used to operate a reliable telephone-type step switch counter. Other optional features available include contact output in either decimal or binary codes, automatic stopping when countdown reaches zero with manual restart, and additional decades of indication in 24" relay rack unit.

COUNT-DOWN/COUNT-UP DIGITAL CLOCKS



TECHNICAL SPECIFICATIONS

TIME SOURCE:

Count-Down/Count-Up Clocks and systems are available for operation from the following time sources: (a) Internal timer consisting of a 60-cycle synchronous motor driving cam operated switches, (b) customer furnished normally-open contacts which close for a minimum of 300 milliseconds once each least-count time increment, (c) customer furnished pulse capable of furnishing a minimum of 10 ma at 50 volts for a minimum of 65 milliseconds once each least-count time increment, or (d) other mutually agreeable customer furnished pulse source.

COUNTER:

A telephone-type step switch counter is used to accumulate the pulse input. Pushbutton "set" switches are provided on the front panel for rapid setting of the starting time. The "set" switches are normally disabled except in the "hold" mode to prevent inadvertent operation during a countdown.

VISUAL DISPLAY:

The visual display is composed of single-plane, in-line, projection-type lampbanks having 1" high numerals and a 150° viewing angle. Display is easily readable under high ambient light conditions. Lamp current limiting resistors are used to increase lamp and switching contact life. Lampbank displays may be ordered mounted in the basic unit and/or for mounting at a remote location. Multiple display systems can be furnished for providing up to 40 displays at remote locations, all operating in absolute synchronism.

MODE CONTROL:

Front panel controls include a "Run-Hold" switch

and a "Count-Down/Count-Up" control. A visual indication of the counting mode can be provided in the lampbank display. This indication consists of "+", "-", "+ HOLD", or "- HOLD". When the lampbank display is used, the "Count-Down/Count-Up" control consists of a "set" switch below the indicator to provide selection of "+" or "-". Actuation of this control results in a change in the digital display from an existing number to its complement.

CONTACT OUTPUT:

Output contacts are available in decimal form or various forms of binary coded decimal. Each digit is completely isolated with individual commons to provide readout flexibility in either parallel form or externally serialized form. Multiple or single outputs may be ordered. Maximum recommended loading is 3 amperes if inhibit contacts are used to prevent switching of the load during transition. If load is switched without using inhibit switch to remove load, output contact loading should not exceed the equivalent of a resistive load of 100 ma at 115 VAC or 30 VDC.

POWER INPUT:

Power input to the system is 110-120 volt, 60-cycle AC applied through a front-panel-mounted fuse.

PHYSICAL DIMENSIONS:

The basic unit is normally mounted on a 19" relay rack panel 5 1/4" high, with a depth behind panel of 13". For more than six decades of indication, 24" panels or deeper chassis can be provided. The size of remote displays, if used, depends on the number of decades and whether wall mounted, panel mounted, or unmounted.

Other Parabam Technical Bulletins available:

- No. 162-11 Digital Clocks (Standard)
- No. 162-12 Digital Calendars
- No. 162-13 Digital Clocks (Explosion Proof type and Analog Output type)
- No. 162-14 Multiple Display Systems
- No. 162-15 Digital Time Programmers

Represented by:

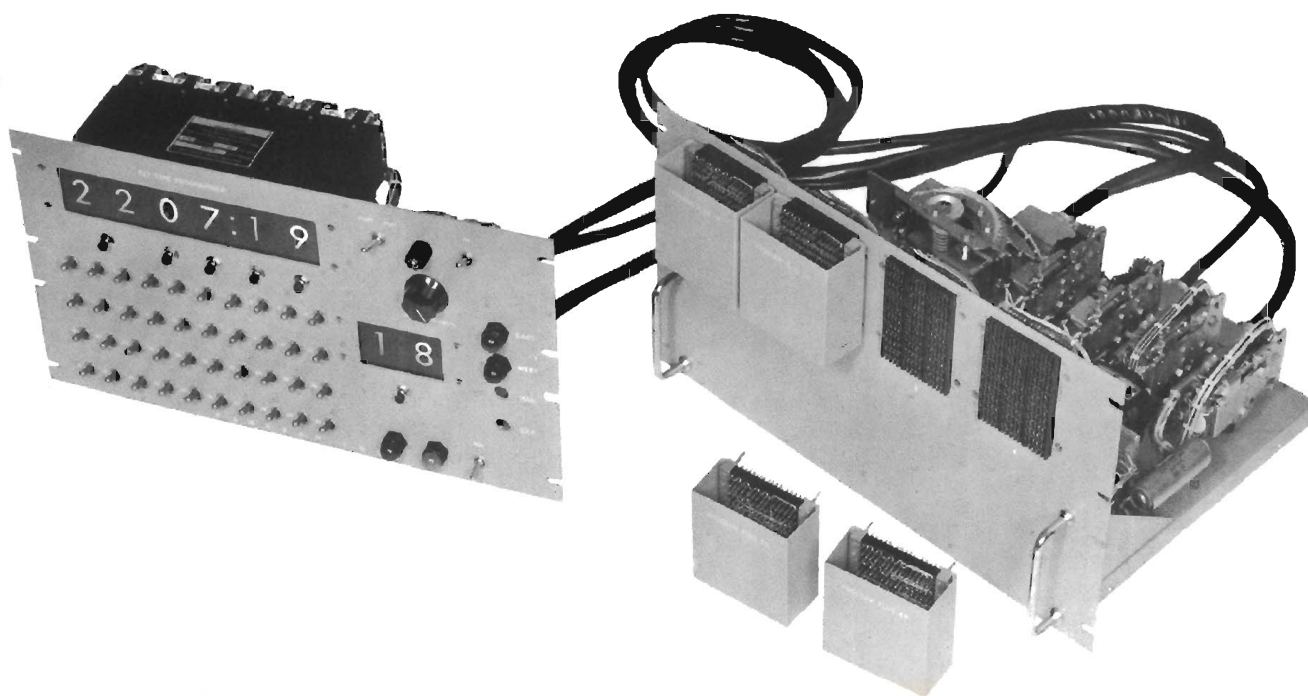
Represented by
ANTRONIC SALES ENGINEERING, INC.
6272 WEST NORTH AVENUE
CHICAGO 39, ILLINOIS
PHONE 237-5112

PARABAM DIVISION OF **HF** HOUSTON FEARLESS CORPORATION
12822 YUKON AVENUE, HAWTHORNE, CALIFORNIA • OSBORN 9-3393

PARABAM

DIGITAL TIME PROGRAMMER

TECHNICAL BULLETIN
No. 162-15



PARABAM

DIVISION OF
HOUSTON FEARLESS CORPORATION



Parabam Digital Time Programmers provide output signals or contact closures at predetermined times in accordance with easily changeable program plugs. They perform the same basic function as multiple cam switch timers and electronic preset counters. However, since they are digital devices with novel logic circuitry, the Time Programmers provide a combination of timing accuracy, ease of programming, and economical multiple circuit control that is not feasible with cam-switch units or electronic counters. *Time Programmers can be used for such applications as complete programming of radio and television broadcasts, process control operations, test sequences, and missile launching countdown operations.* Digital Time Programmers operate on the basis of sensing coincidence between time data prewired into a group of program plugs and the contact output of a self-contained digital clock. The inherent timing accuracy is, therefore, the accuracy of the digital clock. Accuracy can be within one second in a day, week, month, or year. Timing cycles can be rapidly changed by simply changing program plugs.

For applications requiring the recording of time at the control points or throughout the day, contact closures in parallel form in straight decimal, various codes of binary coded decimal, or teletype code can be provided.

Highly legible single plane, in-line lampbanks provide a visual display of the time as well as the sequential controlled circuit number.

The Digital Time Programmer illustrated above provides 40 timing operations by the use of four 10-point program plugs. Least count in this case is one second with a full scale of 24 hours. Forty toggle switches permit deletion of any of the programmed timing operations. Time programmers with more or less programmed points and with various other options can be furnished to satisfy individual requirements.

DIGITAL TIME PROGRAMMER

TECHNICAL SPECIFICATIONS

DIGITAL CLOCK:

The clock portion of the Digital Time Programmer can have any of the features of the standard Parabam Digital Clocks. Characteristics to be specified are: (a) Time range and resolution, (b) type of contact output if required for digitally recording the programmed times, (c) internal timer synchronized with line frequency or external precision frequency, or operated from external pulse source, (d) local and/or remote time and channel number displays, (e) count-up or count-down operation.

PROGRAM PLUGS:

Each standard program plug provides for the programming of 10 time points. Contact wiring can be accomplished with patch cords or by soldering.

NUMBER OF CHANNELS:

Receptacles for any number of time-controlled channels can be provided, with one receptacle required for each 10 time points. The theoretical maximum number of controlled points is limited only by the clock range and resolution. *As an example, there can be a maximum of 86,400 controlled points for a 24-hour clock with one-second resolution.*

TIME CYCLING:

Any Digital Time Programmer can be used on either a single cycle or repeat cycle basis. The unit can be reset to zero at any time within its maximum range and can be made to either automatically repeat this cycle or to wait for a "start cycle" command. Reset time is approximately $\frac{1}{4}$ second regardless of time resolution.

OUTPUT:

Time Programmer output can be a pulse or contact closure occurring at each programmed time on one line, or it can occur sequentially on a number of lines representing the time-controlled circuits.

AUXILIARY OUTPUTS:

Additional circuit closures or pulses can be provided on a fixed program to occur at certain times for special control purposes.

OPERATING CONTROLS:

Operating controls normally consist of a Power switch, Time Set push-button switches and/or a Zero Reset switch, a Start-Stop switch, a Channel Set switch, and a Run-Off switch to prevent inadvertent outputs during set-up operations. Time Point Delete switches can be provided for each controlled time point.

POWER INPUT:

Power input to the Digital Time Programmer is 110-120 volts 60 cycle AC applied through a front-panel-mounted fuse.

PHYSICAL DIMENSION:

Standard Digital Time Programmers are mounted on 19" relay rack panels and normally, depending on the number of optional features desired, are mounted on two chassis. One chassis contains the clock, the timing logic circuitry and the program receptacle. The other chassis provides the operating controls and the visual displays. Height of the panel is determined by the time point capacity and the number of optional features.

Other Parabam Technical Bulletins available:

- No. 162-11 Digital Clocks (Standard)
- No. 162-12 Digital Calendars
- No. 162-13 Digital Clocks (Explosion Proof type and Analog Output type)
- No. 162-14 Multiple Display Systems
- No. 162-16 Count Down/Count Up Digital Clocks

Represented by:

ACTRONIC SALES ENGINEERING, INC.
5306 WEST LAWRENCE AVENUE
CHICAGO 30, ILLINOIS
PHONE 286-1037

PARABAM, INC.

12822 Yukon Ave., Hawthorne, Calif. • OSborne 9-3393

PRICE LIST

SOLID STATE DIGITAL CLOCKS (MODEL C)

ACTRONIC SALES ENGINEERING, INC.
5306 WEST LAWRENCE AVENUE
CHICAGO 30, ILLINOIS
PHONE 286-1037

BASIC MODELS INCL. LOCAL LAMPBANK				OPTIONS [ADD (DEDUCT) FROM BASE PRICE]						
MODEL NO.	MAXIMUM COUNT			BASE PRICE	LESS: (L) LOCAL DISPLAY	REMOTE (R) DISPLAY ²	LOGIC OUTPUT OPTIONS ¹			
	HR.	MIN.	SEC.				DECIMAL (-1)	8421 (-BCD)	4221 (-BCDA)	2421 (-BCDB)
REAL TIME CLOCKS										
C24LM	23	59	—	\$ 850.00	\$(135.00)	\$50.00	\$145.00	\$ 135.00	\$145.00	\$135.00
C24LT	23	59.9	—	960.00	(160.00)	70.00	190.00	170.00	180.00	170.00
C24LS	23	59	: 59	1010.00	(185.00)	85.00	215.00	190.00	205.00	190.00
C24LST ³	23	59	: 59.9	1025.00	(185.00)	85.00	340.00	305.00	325.00	305.00
ELAPSED TIME CLOCKS										
C101HLM	99	59	—	\$ 915.00	\$(150.00)	\$ 60.00	\$180.00	\$ 165.00	\$180.00	\$165.00
C102HLM	999	59	—	1065.00	(175.00)	75.00	225.00	200.00	225.00	200.00
C103HLM	9999	59	—	1200.00	(200.00)	95.00	270.00	245.00	260.00	245.00
C101HLS	99	59	: 59	1075.00	(200.00)	90.00	250.00	220.00	240.00	220.00
C101MLS	—	99	: 59	830.00	(150.00)	60.00	180.00	165.00	180.00	165.00
C102MLS	—	999	: 59	970.00	(175.00)	75.00	225.00	200.00	215.00	200.00
C102LM	—	999	—	810.00	(130.00)	40.00	150.00	145.00	150.00	145.00
C103MLS	—	9999	59	1110.00	(200.00)	95.00	270.00	245.00	260.00	245.00
C103LM	—	9999	—	950.00	(150.00)	60.00	195.00	185.00	195.00	185.00
C104LM	—	99999	—	1090.00	(180.00)	85.00	240.00	225.00	230.00	225.00
C105LM	—	999999	—	1230.00	(205.00)	100.00	285.00	265.00	275.00	265.00
C103LS	—	—	9999	870.00	(150.00)	60.00	195.00	185.00	195.00	185.00
C104LS	—	—	99999	1010.00	(180.00)	85.00	240.00	225.00	230.00	225.00
C105LS	—	—	999999	1150.00	(205.00)	100.00	285.00	265.00	275.00	265.00
COUNT DOWN/ELAPSED TIME CLOCKS⁴										
C101HLM-CDU	99	59	—	\$1095.00	\$(150.00)	60.00	200.00	180.00	200.00	180.00
C102HLM-CDU	999	59	—	1285.00	(175.00)	75.00	250.00	225.00	245.00	225.00
C103HLM-CDU	9999	59	—	1450.00	(200.00)	95.00	300.00	270.00	290.00	270.00
C101HLS-CDU	99	59	: 59	1320.00	(200.00)	90.00	280.00	250.00	270.00	250.00
C101MLS-CDU	—	99	: 59	1010.00	(150.00)	60.00	200.00	180.00	200.00	180.00
C102MLS-CDU	—	999	: 59	1190.00	(175.00)	75.00	250.00	225.00	245.00	225.00
C102LM-CDU	—	999	—	950.00	(130.00)	40.00	170.00	150.00	170.00	150.00
C103MLS-CDU	—	9999	: 59	1360.00	(200.00)	95.00	300.00	270.00	290.00	270.00
C103LM-CDU	—	9999	—	1130.00	(150.00)	60.00	220.00	195.00	215.00	195.00
C104LM-CDU	—	99999	—	1310.00	(180.00)	85.00	270.00	240.00	260.00	240.00
C105LM-CDU	—	999999	—	1480.00	(205.00)	100.00	320.00	285.00	310.00	285.00
C103LS-CDU	—	—	9999	1050.00	(150.00)	60.00	220.00	195.00	215.00	195.00
C104LS-CDU	—	—	99999	1230.00	(180.00)	85.00	270.00	240.00	260.00	240.00
C105LS-CDU	—	—	999999	1410.00	(205.00)	100.00	320.00	285.00	310.00	285.00

NOTES:

1. PRICES ARE BASED ON PROVIDING ONLY ONE LOGIC OUTPUT. MATING CONNECTORS ARE NOT INCLUDED IN PRICES INTERLOCK SIGNAL PROVIDED AS SPECIFIED IN TECH BULLETIN 663-18.
2. PRICE IS FOR PROVIDING A REMOTE DISPLAY IN LIEU OF LOCAL DISPLAY REMOTE DISPLAY INCLUDES 6 FT. OF CABLE & CONNECTOR,
3. DISPLAY DOES NOT INCLUDE 1/10 SEC. LAMPBANK, 1/10 SEC. RESOLUTION IS INCLUDED IN LOGIC OUTPUT, ONLY.
4. COUNT MODE INDICATION INCLUDED IN PRICE. PLUS-MINUS LAMPBANK INDICATION AVAILABLE AT ADDITIONAL COST.

MODEL NO. FOR OPTIONAL FEATURES

SUBSTITUTE "R" IF DISPLAY IS TO BE REMOTE TYPE
DELETE "L" IF DISPLAY NOT REQUIRED

C101HLM - - CDU

ADD LOGIC OUTPUT NO.
- 1 FOR 10 LINE DECIMAL
- BCD FOR 8421 CODE
- BCDA FOR 4221 CODE
- BCDB FOR 2421 CODE

DELIVERY. 45 DAYS FROM RECEIPT OF ORDER
F.O.B. HAWTHORNE, CALIF.
TERMS: 1%, 10 DAYS, NET 30 DAYS
PRICES SUBJECT TO CHANGE WITHOUT NOTICE
EFFECTIVE 6/1/63

STANDARD 24 HOUR (A246) CLOCK PRICES

	A24LM-1 MINUTES \$475.00	A24LT-1 .1 MINUTE \$615.00	A24LH-1 .01 MINUTE \$725.00	A24LS-1 SECONDS \$725.00	A24LHH-1 .01 HOURS \$560.00
OPTIONAL FEATURES					
SPECIAL FEATURES:					
H-	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00
I-	4.75	7.50	8.50	8.50	4.75
J-	35.00	50.00	65.00	65.00	35.00
K-	25.00	25.00	25.00	25.00	25.00
L-	45.00	45.00	45.00	45.00	45.00
M-	35.00	35.00	35.00	35.00	35.00
N-	-	-	-	-	-
P-	45.00 ²	45.00 ²	45.00 ²	45.00 ²	45.00 ²
Q-	45.00 ²	50.00 ²	60.00 ²	60.00 ²	45.00 ²
S-	N. A.	N. A.	N. A.	N. A.	N. A.
CONTACT OUTPUT:					
1-	Included in basic clock price				
2-	60.00	70.00	80.00	80.00	60.00
3-	130.00	150.00	175.00	175.00	130.00
BCD-	10.00	12.50	15.00	15.00	10.00
BCDA-	15.00	17.50	20.00	20.00	15.00
BCDB-	15.00	17.50	20.00	20.00	15.00
BCDC-	15.00	17.50	20.00	20.00	15.00
TT-	35.00	40.00	50.00	50.00	35.00
VISUAL DISPLAY:					
L-	Included in basic clock price				
R-	55.00	65.00	75.00	75.00	55.00
R(1)-	55.00	65.00	75.00	75.00	55.00
R(2)-	55.00	65.00	75.00	75.00	55.00
LR-	175.00	210.00	250.00	250.00	175.00

A 24 L M - 1 - XX--

PARABAM INC.
12822 Yukon Ave., Hawthorne, Calif.
Osborne 9-3393 SPring 2-1206

DIGITAL CLOCK PRICE LIST

ACTRONIC SALES ENGINEERING, INC.

5306 WEST LAWRENCE AVENUE

CHICAGO 30, ILLINOIS

PHONE 286-1037

Time transition hold
Mating output connectors and hoods
Additional RF noise supression
Calendar control output
External timing source input-300msec contact closure²
External timing source input-10ma, 50VDC,65msec pulse¹
Normally open inhibit contact
Power failure indicator and output contact
Interconnect cable for remote lampbank (specify length)
Other special requirements ("S" number to be assigned)

One 10-line decimal/digit
Two 10-line decimal/digit
Three 10-line decimal/digit
One 8421 binary coded decimal⁴
One 4221 binary coded decimal⁴
One 2421 binary coded decimal⁴
One excess 3 binary coded decimal⁴
One 5-bit teletype coded decimal⁴

Local lampbank and set switches on clock
Remote lampbank, set switches on clock⁵
Remote lampbank and set switches with Panel⁵
Remote lampbank and set switches without Panel⁵
One remote lampbank in addition to local lampbank⁵

DELIVERY: 30 days from receipt of order

TERMS: 1% 10 days, net 30 days

Prices are subject to change without notice
Effective December 1, 1962

1. Replaces internal timer.
2. Basic price does not include charge for cable, see note 5 for cable costs.
3. A maximum of one 10 line decimal output may be combined with any one of the other codes.
4. Price adder for binary and teletype codes provides for converting the standard 10 line decimal output to the desired code. If both a 10 line decimal and other code are required combine the price for an additional 10 line decimal output with the price adder for the specified code.
5. Remote lampbanks include 6 feet of cable. Price of additional cable length is \$1.75 per foot for six decade type R(1) and R(2) lampbanks and \$1.00 per foot for all other models.