BRG Digital Clock/Timer/Counter

Installation and Operation Manual

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Our mission is to offer innovative technology solutions and exceptional service.

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Warranty Agreement

BRG Precision Products One Year Warranty

1. Term of Coverage
Coverage will be for 1 year. Claims must be made during the Warranty Period. This Agreement is not renewable. The warranty becomes null and void if complete payment is not made within the terms specified under Terms of Payment.

2. Warranty
BRG Precision Products, Inc. warrants the Product against defects in workmanship and materials during the Coverage Period.

3. Coverage
BRG Precision Products, Inc. will, at its option, repair or replace the defective Product free of charge, provided that you notify BRG Precision Products, Inc. of the Product defect within the Coverage Period, and provided that BRG Precision Products, Inc. through inspection establishes the existence of such a defect and that it is covered by this Agreement. BRG Precision Products, Inc. will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. BRG Precision Products, Inc. reserves the right to use parts or products of original or improved design in the repair or replacement. If BRG Precision Products, Inc. repairs or replaces a Product, the warranty continues for the remaining portion of the Coverage Period without extension. All replaced Products and all parts removed from repaired Products become the property of BRG Precision Products, Inc. BRG Precision Products, Inc. covers both parts and labor necessary to repair the Product, and return shipment to the Customer via a BRG Precision Products, Inc.-selected non-expedited surface freight within the contiguous United States and Canada. Alaska and Hawaii return shipments to the Customer are via non-expedited air freight.

4. What Is Not Covered
This Agreement does not cover costs related to the removal, installation, or field troubleshooting of the Product under the terms of the Agreement if, and not limited to:
a) the Product has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;
b) the Product has been subjected to fire, splashed water (unless specifically ordered to be water resistant), submersion into any liquid, generalized corrosion, biological infestations, or high input voltage including lighting strikes and generators operating outside the limits of their Product specifications;
c) repairs have been done to it other than by BRG Precision Products, Inc. or its authorized service centers, or as assigned by BRG Precision Products;
d) the Product is used as a component part of a Product expressly warranted by another manufacturer;
e) the Product's original identification (trade-mark, serial number) markings have been defaced, altered, or removed;
f) the Product is located outside of the United States and Canada;
g) the customer has misrepresented the Product information provided to BRG Precision Products, Inc. in order to receive coverage under the terms of this Agreement. This Agreement does not warrant uninterrupted or error-free operation of the Product;
h) Product malfunction or damage resulting from electromagnetic or solar radiation;
i) Shipping charges to the factory more than 30 days after first receiving the product;
j) Undesirable operation resulting from changes to public law after the product was purchased, such as changing the dates for daylight saving time.
k) Normal wear and tear relating to the non-operating functions of the equipment such as discoloration from direct sunlight, heat, etc.

5. Disclaimer and Limitation of Liability
TO THE EXTENT PERMITTED BY APPLICABLE LAW, OTHER THAN THE EXPRESS WARRANTY SET FORTH IN THIS AGREEMENT, BRG PRECISION PRODUCTS, INC. MAKES NO ADDITIONAL WARRANTIES, EXPRESS OR IMPLIED, AND DISCLAIMS ALL IMPLIED WARRANTIES, WHETHER IN

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6. Claim Limits

Claims are limited to repair or replacement, or if in BRG Precision Products, Inc.'s discretion that is not possible to reimbursement up to the purchase price paid for the Product. In no event will BRG Precision Products, Inc.'s liability under this Agreement exceed the purchase price paid for the Product.

7. Cancellation

You may cancel this Agreement by providing to BRG Precision Products, Inc. written notice of your wish to cancel.

8. Insurance

This Agreement is not a contract of insurance.

9. Amendment and Waiver

No amendment, supplement, consent or waiver, express or implied, to or of any provision of this Agreement will be effective unless in writing signed by the parties hereto and then only in the specific instance and for the specific purpose given.

10. Assignment

The Customer may assign or transfer this Agreement provided BRG Precision Products, Inc. is advised by the Customer in writing of such assignment and the new system owner's information.

11. Governing Law

This Agreement will be governed by and interpreted exclusively in accordance with the laws of the State of Kansas, without reference to provisions concerning conflicts of laws. The provisions of the United Nations Convention on Contracts for the Sale of Goods are hereby excluded.

12. Arbitration

Any controversy or claim arising out of or relating to this Agreement, or the breach of it, shall be settled by arbitration in accordance with the relevant rules of the American Arbitration Association, and judgment on the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The place of arbitration shall be Wichita, Kansas, United States of America. There shall be one arbitrator.

13. Severability

If any provision of this Agreement is found by any court or arbitrator to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions will not be affected thereby.

14. Entire Agreement

This Agreement constitutes the entire contract between the parties concerning the subject matter of this Agreement and supersedes all marketing brochures and other expectations, understandings, communications, representations and agreements, whether verbal or written, between the parties. THIS AGREEMENT GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

Once a return authorization number is obtained, ship the products to:

BRG Precision Products
Attn: RA# xxxxxxx (where xxxxxxx is the authorization number provided)
600 N. River
Derby, KS 67037

Optional Extended Warranty:

A two-year extended warranty is available. The extended warranty must me purchased before the end of the standard warranty. The two-year extended warranty costs 20% of the product purchase price.

Optional Advanced Replacement Service ("Hot Swap"):

For critical applications, BRG Precision Products recommends purchasing a complete backup product. If a backup product is too expensive or the application is only semi-critical, BRG Precision Products recommends the optional Replacement Service ("Hot Swap")

This service allows the customer to receive a replacement product right away to replace a defective product that is covered under warranty. BRG Precision Products will pay for ground shipping to send the replacement product. The customer is responsible for expedited shipping charges over the cost of ground shipping. The customer is responsible for shipping charges to return the defective product. The Replacement Service is only available for shipments to the U.S. and Canada.

When the customer receives the replacement product, the defective product must be returned to the factory within 30 days. The invoice for the replacement product will then be voided; otherwise, the full invoice amount for the replacement product is due. This service is only available in conjunction with warranty repairs.

This replacement service may be purchased for 10% of the products purchase price at the time of the initial purchase. The replacement service may also be purchased after the initial product purchase and before the standard warranty expires for 15% of the product purchase price. The term of this service ends when the warranty expires. This service may be repurchased for 10% of the product purchase price when a two-year extended warranty is purchased. The product replacement service is only available on selected models.

30 Day Return Policy:

No returns will be accepted without prior written authorization of BRG. Incorrect merchandise received will receive prompt re-shipment of correct items. Incorrect merchandise, other than custom items, may be returned, shipped prepaid, and will be exchanged on an equivalent basis.

Merchandise, other than custom items, that cannot be used may be returned at a 25% restocking charge if items are shipped prepaid in the original boxes. Carrier is responsible for parts damaged in shipment. The customer should have driver sign for damaged carton on delivery receipt and make a claim with the freight company. Please insist that the carrier's representative conduct an inspection, and retain all packing materials for the inspector. Please report promptly for immediate follow-up on short shipments. No action arising from any sale by BRG may be brought by a customer more than one year after the date of shipment.

Terms of Payment:

New accounts require prepayment. International orders require prepayment by Telegraphic Transfer (bank wire). For established customers, payment is due in full within 30 days from invoice date. Other payment methods include Visa, Mastercard, American Express, Discover, Novus (Domestic Only). Add 4% for ground shipping in the U.S. and Canada. Domestic shipping is prepaid for U.S. Government orders. Other shipping methods are available. All past due accounts will be subject to a finance charge of 1.5% per month. BRG may cancel or delay future deliveries if customer fails to make prompt payment or if customer's financial condition warrant such action in BRG's opinion. BRG is not responsible for delays. The customer will be contacted and given the choice of receiving a partial

shipment or waiting for the full shipment. The firmware license may be suspended, limiting functionality of the equipment, if payment is not received within 90 days.

Pricing:

BRG Precision Products reserves the right to change prices without prior notification. Prices do not include taxes and BRG reserves the right to arrange for insurance on all orders.

The courts of Sedgwick County, Kansas will have exclusive jurisdiction and venue over any disputes arising from any sale by BRG and customer and Buyer consent to personal jurisdiction of the federal and state courts located in Sedgwick County, Kansas. If legal action is brought by BRG for the collection of any amount owed or due to any other dispute, the prevailing party will be entitled to recover its reasonable attorneys' fees and costs incurred. These items constitute the entire agreement between BRG and customer, regardless of any additional or conflicting terms on customer's purchase order or other documentation, which are objected to, or any prior discussions or usages of trade. All sales by BRG are made only on the terms and conditions contained herein.

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CAREFULLY READ THE FOLLOWING TERMS AND CONDITIONS. YOUR OPENING OF THE SOFTWARE PACKET WILL INDICATE YOUR ACCEPTANCE. IF YOU DO NOT AGREE WITH THESE TERMS AND CONDITIONS, YOU SHOULD PROMPTLY RETURN THE COMPLETE UNOPENED PACKAGE.

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BRG Precision Products, Inc. warrants that the original software disk(s) are free from physical defects in material and workmanship under normal use for a period of sixty days from the date of purchase. If during this warranty period you discover that the software disk(s) contains a physical defect, return the defective item along with proof of purchase to BRG Precision Products, Inc. and you will receive a replacement at no charge. This is your sole and exclusive remedy for breach of warranty.

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Limited Warranty

BRG Precision Products, Inc. warrants that the processors or memory use to store the software is free from physical defects in material and workmanship under normal use for a period of sixty days from the date of purchase.

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4. **End User Indemnification**. Licensee shall indemnify and hold harmless AT&T, its Subsidiaries and authorized representatives against any claims, suits or proceedings asserted or commenced by any third party and arising out of, or relating to, Licensee’s or its customer’s use of the Client SDK and/or AT&T Natural Voices Software or the use, in violation of the terms of this Agreement or any license agreement with Wizzard of Client SDK and/or AT&T Natural Voices Software licensed from Wizzard. This obligation shall include indemnifying against all damages, losses, costs and expenses (including attorneys’ fees) incurred by AT&T, its Subsidiaries and authorized representatives as a result of any 8 such claims, suits or proceedings, including any costs or expenses incurred in defending against any such claims, suits, or proceedings.

5. **Dispute Resolution**. This Agreement shall be governed by the laws of the State of New York, U.S.A. without regard to its conflicts of law principles. Any suit and/or arbitration proceeding relating to any Claim shall be brought and prosecuted only in New York, New York. Except as provided in this paragraph, any and all controversies or claims of any nature arising out of or relating to this

Agreement or the breach, termination or validity thereof, whether based on contract, tort, statute, fraud, misrepresentation or any other legal or equitable theory (the "Claim") shall be resolved solely and exclusively by arbitration by the AAA Institute for Dispute Resolution (“AAA”) in accordance with this paragraph and the AAA Rules for Non-Administered Arbitration to the extent such rules do not conflict. The arbitrator shall strictly limit discovery to the production of documents directly relevant to the facts alleged in the notices of arbitration and defense and, if depositions are required, three (3) depositions of no longer than three (3) hours each for each Party. If an evidentiary hearing is held, each Party's presentation of its case shall be limited to three (3) days. Requests for temporary injunctive relief may be submitted to a court of competent jurisdiction if the arbitrator has not yet been appointed but the arbitrator shall have the authority to modify any injunctive relief granted by such a court. The arbitration award shall be made final within six (6) months of Commencement and may be entered by either Party in any court having competent jurisdiction. Each Party shall bear its own expenses, but those related to the compensation of the arbitrator shall be borne equally. The existence and contents of the entire arbitration shall be maintained by all participants as confidential, except as provided. In no event shall this provision be deemed to require either Party to arbitrate any Claim (including defenses thereto) concerning the validity, enforceability or infringement of any patent, copyright or trademark (including trade dress and service mark) right.

6. **Severability**. A determination by any entity with jurisdiction that any provision of this Agreement is unenforceable shall be severed from the remainder of this Agreement which shall remain in full force and effect and shall not be invalidated thereby.

Overview

BRG commercial digital clocks are specifically designed for applications where precision and reliability are of utmost importance. These clocks may be used as accurate stand-alone time displays, or they can be synchronized, so that all clocks display the same time. Further, by using the GPS, CDMA or other atomic time receiver options, all clocks can display the same, accurate, legal time. This means all clocks will not only display the same time, but the time displayed is the true legal U.S. time. Any combination of clock shape, style or size may be synchronized. These clocks are in use by many organizations where accurate, synchronized time is required.

Each clock provides a variety of time zone and display formats, including UTC (Zulu) Time, Any World Time Zone, Half-hour time zones, Enable or Disable Daylight Savings Time, and selectable 12 or 24 hour display formats with digital intensity control.

In addition to displaying real time, each clock includes up/down timers and counters.

General Specifications:

Display Format:
Over 64 User Selectable Display Formats

Tiger Processor Operating Modes:
6 User Selectable Operation modes
- Real Time
- Up Timer
- Down Timer
- Up Counter
- Down Counter
- Event Timer.

Environment:
-32 degrees F to 120 Degrees F, Humidity: 0% to 95% non-condensing

Battery Backup:
10 year Lithium Battery

Clock Accuracy:
+ or - 10 minutes per year at 70 degrees F, correctable to + or - 1 minute per year. An ultra-high precision oscillator option is available the increases accuracy of 1 minute per year, correctable to 1 second per year. For further increases in accuracy, a time receiver option is required. Available time receivers include GPS, CDMA, IRIG-B, SMPTE, PC and Ethernet.

Construction:
Aluminum Frame with anodized finish and anti-glare lens. Saw-tooth picture frame hangers can be included for mounting, when requested.

Power Requirements:
4 watts per 4 digit 4.0 inch display
3 watts per 4 digit 2.5 inch display

Features and Options

The BRG Digital Clock offers flexibility and reliability for a wide variety of time display applications. These clocks perform flawlessly whether you need to simply display hours and minutes, or when you need a synchronized clock system, event counters, elapsed timers, time zone display, etc.

Standard Features Available:

Ultra-reliable, red light emitting diode (L.E.D.) bar segment display
Anti-glare lens allows viewing under most lighting conditions
Quartz oscillator for high accuracy
Time adjustment register to further increase accuracy
10 year lithium battery – uses one millionth of a watt in standby mode
Blinking, Solid or No Colon between hours and minutes
Digital Intensity Control – individual display or all displays
Seconds smaller than hours/minutes for easy viewing in 8 digit display models
99 total alarm settings with 12 day-of-the-week variables
98 alarm schedule groups
Alarm schedule activation by date range
Variable duration for each alarm setting
Variable pulsing for each alarm setting
Display can be set to blink when alarm is active or as silent alarm
Timer with flashing warning alarm for speaking engagements
Enable/Disable auto switching between daylight and standard time – includes world date table
Up/Down Event Counter – range –9999 to 9999 with Start, End and alarm
Counter auto-increment with adjustable increment amount and period
Up/Down Elapsed Timer – Days, Hours : Minutes : Seconds . Hundredths with Start, End and alarm
Display optionally blinks when the alarm activated
Rotating display formats, i.e. time > date or time > temperature
Sunrise/Sunset Calculations
Automatically dim display at nighttime

Available Options:

Clock/Timer/Counter external control line
Auto Brightness Option – This option enhances the standard digital brightness control
Radio Synchronization
GPS atomic time receiver option turns the digital clock into a perpetually accurate master clock
CDMA atomic time receiver – no external antenna required
Serial Wired Synchronization Option – All clocks display the same time. Clock operates as either Master or Slave.
Serial line control and configuration
Power line communications for synchronization
Ethernet communications for configuration, control and synchronization
NTP (Network Time Protocol) allows the clock to obtain the time directly from Government or local timer servers.
IRIG-B/SMPTE/ESE wire sync receiver
Infrared Remote Control Option provides full programming control
Wired remote control option
Electronic Alert Horn or internal beeper for alerting and timer applications
Alarm Relay Output for alerting, timer and control applications
Temperature Sensor – for indoor or outdoor applications
Timer/Counter Change Start/Change End Shortcut Buttons to directly access Start/End values
Digital Zone lettering
Thumb Wheel Switch Direct Start/End and Miscellaneous Parameter Entry
Ultra-bright displays
Timer Indicator Lights
Tripod Display Stand
Ultra-high Precision Oscillator

Standard Display Modes :

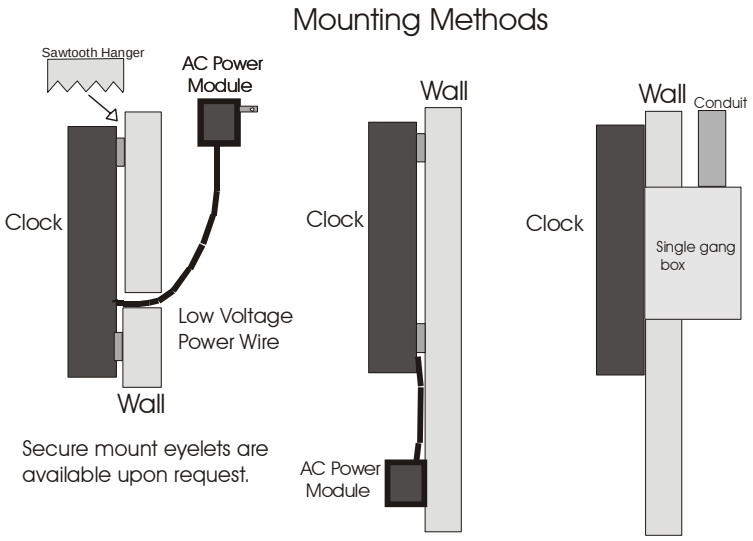
Multiple clocks may be placed adjacent to one another to form a comprehensive display. For example, one clock could display hours/minutes/seconds while a second clock could display the month/day and four digit year. Not all of the following features are included on every clock. Some operating modes must be specifically requested. There is no extra charge for the following features.

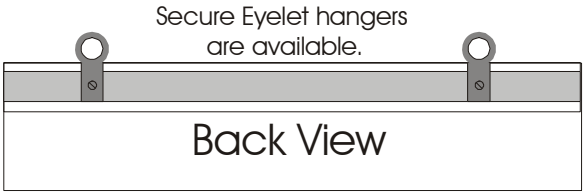
Hours: Minutes (4 or 8 digit display)
Hours: Minutes Seconds (8 digit display)
Hours: Minutes Seconds. Hundredths (8 digit display)
Hours: Minutes Month/Day (8 digit display)
Hours: Minutes + four digit year (8 digit display)
Hours: Minutes + day of the year (8 digit display)
Hours: Minutes Hours: Minutes - two zones (8 digit display)
Hours. Decimal Minutes (4 or 8 digit display)
Minutes: Seconds (4 or 8 digit display)
Seconds - centered (4 or 8 digit display)
Day of the year (4 or 8 digit display)
Day of the year plus last digit of the year (4 or 8 digit displays)
Julian date - 7 digits (8 digit display)
Julian date - last four digits (4 or 8 digit display)
Month/Day - Year (4 or 8 digit display)
Up/Down Elapsed Time - Seconds - centered (4 or 8 digit display)
Up/Down Elapsed Time - Hours: Minutes (4 or 8 digit display)
Up/Down Elapsed Time - Minutes: Seconds (4 or 8 digit display)
Up/Down Elapsed Time - Hours: Minutes :Seconds (8 digit display)
Up/Down Elapsed Time - Hours: Minutes :Seconds. Hundredths (8 digit display)
Up/Down Elapsed Time - Days (4 or 8 digit display)
Up/Down Elapsed Time - Days Hours: Minutes (8 digit display)
Warning time blinks display prior to final time
Up/Down Event Counter - 9999 to 9999 (4 or 8 digit display)
Rotating hours: min > Julian date
Rotating hours: min > month/day > year
Rotating hours: min > temperature F > temperature C
Temperature F
Temperature C
Elapsed hours (-9999 to 9999)
Elapsed hours (99 hours - in place of 23 hour elapsed time)
Elapsed days (-9999 to 9999)
Number of GPS Satellites being received plus data activity
Digital intensity control (4 or 8 digit display)
Blinking digits (4 or 8 digit display)
Blinking or solid colon
Blinking once per second display when alarm activated
Variable rate blinking when alarm activated
12/24 hour display format
PM indicator
Sync reception indicator
Alpha month with numeric day of the month
Alpha day of the week
Automatically dim display at nighttime
Minute decimal point may indicate daytime or night time
Display Sunrise time
Display Sunset time

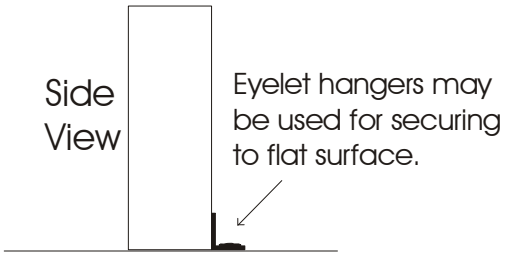
Installation

The digital clocks are constructed using a sturdy aluminum frame with an anti-glare acrylic lens and ABS back plate. Various mounting methods are available. The standard mounting method consists of saw tooth hangers located on the back of the clock. Simply drive the appropriate number of screws into the wall and hang the clock on the screws. Secure eyelet attachments are also available where a more secure mount is required.

The standard U.S. power configuration consists of a wall mount AC adapter. This adapter drops the voltage down to a Class 2 voltage. The power wire may be cut, extended and/or and rerouted through walls as pictured below. Power configurations for other countries may vary.







Operation

The BRG Digital Clock/Calendar/Timer/Counter uses an L.E.D. display for reliable operation. The clock is protected against power failures with a 10-year Lithium battery. During the absence of power, the display is blanked to conserve the battery. All operating parameters are stored in non-volatile memory. The internal clock continues to operate from battery backup. When the A.C. power is restored, the clock resumes normal operation and display.

If you have any questions or do not understand the operating modes listed below, please call technical support at 800-295-0220 before making any changes to the clock's configuration.

The PM indicator light (located in the upper left corner of the display) is used to indicate PM hours and sync status. When 12-hour display mode is used, the PM indicator will illuminate during PM hours. If enabled, the PM indicator will flicker at the top of every minute when the clock is in sync with a master clock.

When a GPS atomic clock receiver is used, the antenna must be extended to a location where a radio time signal is present. The CDMA atomic clock receiver only requires a small antenna located on the clock. Sync signals are sent to slaved clocks whether or not an atomic clock signal is received. The minute decimal point will remain on as long as the clock is in sync with the U.S. time standard.

Changing the Time :

Press the Up button to advance the time, or the Down button to decrement the time. The longer you press the button, the faster the clock will move. Some clocks are configured with these buttons temporarily disabled.

Configuration Menu:

The Mode, Up, and Down buttons are used to select various operating modes and parameters. The values of the Mode, Up and Down buttons will change with increasing speed the longer the buttons are held down. Pressing the buttons quickly will quickly change the value. Some clocks are configured with these buttons temporarily disabled.

If the display blinks when the mode button is pressed, mode lockout has been enabled. Hold down the mode button until the blinking stops (about 5 seconds) then release. A "1" should appear meaning you have access to the menu system.

The optional infrared radio remote control has equivalent buttons for each of the standard control buttons plus the change starting and ending time or count buttons. Please refer to the infrared remote instruction section for further explanation.

Press the mode button to switch from real time display to mode selection. Mode number 1 will display (If the Day/Month displays instead of mode 1, press the mode button again.). Once Mode 1 displays, use the Up and Down buttons to move to the desired mode.

Press the Mode button again to enter a configuration mode. The Up and Down buttons are used to change modes and values. Press the Mode button again to exit the current mode. The mode change function will timeout and return to normal time display mode after 60 seconds of inactivity.

To return to normal time display mode, Press the Timer Control Button, or change the mode number to zero, or allow the menu system to timeout.

Improving Clock Accuracy

All BRG clocks use precision quartz crystal timing circuits. However, while more accurate than resonators, quartz crystals are susceptible to timing fluctuations due to temperature changes, aging and other factors. Thus, nearly all clocks based on quartz crystals will eventually run fast or slow.

To improve the overall time accuracy, all BRG clocks include a time correction register (Mode 4). By measuring the amount of timing skew from the time standard, clock accuracy can be increased. The clock can be slowed down or speeded up to account for variations due to temperature, aging and other factors.

To calibrate the clock, you will need access to the U.S. time standard. This can be found on the Web at http://www.time.gov or by calling BRG Precision products at 316-788-2000.

Setting the clock :

The up and down buttons are used to decrease or advance the time. The longer the buttons are held down, the faster the time moves. Each time the minutes are advanced, the seconds are set to zero. Therefore, set your clock to the exact time by waiting until the top of the minute. The moment the time standard increments to the next minute, advance your clock also.

Calibrating the clock :

One month after setting the clock, check the clock for accuracy against the time standard. First, set the time to display minutes and seconds. For a four-digit display, set display mode 20-1 to a value of 12 to display minutes and seconds. Note how fast or slow the clock is compared to the time standard. Enter the correction value into Mode 4. Use a negative value to slow the clock down, and a positive value to speed the clock up. For example, of the clock is running 20 seconds fast in a month, enter -240 (-20 seconds per month times 12 months) into Mode 4. This will slow the clock down 20 seconds per month. Mode 37-37 can be used to change the range used by Mode four to seconds per month.

Set the clock to the time standard and return the display mode back the original display mode used.

The calibration process may be used again in another month to further increase clock accuracy.

Absolute Accuracy :

Of course, GPS and CDMA atomic time receivers afford the most accurate and reliable method of maintaining the correct time. These receivers obtain the correct, legally traceable, U.S. time by receiving signals from the constellation of U.S. military satellites or CDMA transmitters.

Time Zone Clock Configuration

Your time zone clock has been configured to your specifications. You may change this configuration at any time. For accurate time zone information, see http://www.timeanddate.com.

If included, the optional infrared remote control is shipped attached to the back of the clock. Reference the infrared remote instruction section found later in this manual.

The internal battery will maintain the time for about ten years. All operating parameters are maintained in flash memory which does not lose its' memory when power is lost. When power is applied to the clock, all displays will illuminate and display the time(s) as configured.

Changing operational parameters:

Mode 50-4: Zone Number Identifier – This mode is used to identify the zone number of each four digit display in clocks that use multiple four digit displays.

0=inactive (default),
1=displays the respective zone numbers of each display.

Once the zone number is displayed, pressing either mode, up or down will return to normal display mode.

Press the mode button and mode one will appear on the leftmost display. If the month/day appears, press mode again to return to the mode one display. Press the Up button until you reach Mode 20. Follow the steps below to configure

Mode 20: Position Display Format - Set each display format using this mode. Display formats 2 or 3 are most common. See Mode 20 in the mode definition table for other display formats.

Mode 21: Time Zone Offset from UTC - Set the time zone offset for each time source using this mode. Use 0 for Zulu or UTC time.

Mode 22: Position Time Source- Set the time source for each display using this mode. The time source number usually matches the display number. There are 24 time sources and up to 24 four-digit displays.

Mode 23: Position 12/24 Display Format - Set 12 or 24 hour display format for each zone using this mode.

Mode 24: Position Daylight Savings Setting - Set auto switching for daylight savings time using this mode for each time source. The codes for various locations are:
0=disable daylight time
1=U.S., Canada, Bermuda
2=UK, Ireland, Scotland
3=Australia
4=Argentina
5=Israel
6=Brazil, etc.
See Mode 24 in the mode definition table for other daylight savings codes. Also, daylight start and stop periods may be customized.

Mode 33: Position Incremental Time Zone Offset –This mode optionally forces a 30 or 60 minute time advance for each respective zone.
0= no advance (default),
1=30 minute advance,
2=60 minute advance,
3=30 minute advance during daylight savings time only,
4=60 minute advance during daylight savings time only.

Time Zone Clock Configuration Examples

Four zone display – from left to right, Pacific, Mountain, Central and Eastern time zones –

1. Mode 18 = 4 – set the number of zones
2. Mode 20-1 = 2 – set zone 1 display format to hours: minutes
3. Mode 20-2 = 2 – set zone 1 display format to hours: minutes
4. Mode 20-3 = 2 – set zone 1 display format to hours: minutes
5. Mode 20-4 = 2 – set zone 1 display format to hours: minutes
6. Mode 21-1 = -8 – set Pacific offset from UTC
7. Mode 21-2 = -7 – set Mountain offset from UTC
8. Mode 21-3 = -6 – set Central offset from UTC
9. Mode 21-4 = -5 – set Eastern offset from UTC
10. Mode 22-1 = 1 – point display position to the desired time source
11. Mode 22-2 = 2 – point display position to the desired time source
12. Mode 22-3 = 3 – point display position to the desired time source
13. Mode 22-4 = 4 – point display position to the desired time source
14. Mode 23-1 = 24 – set the display position to 24 hour display format
15. Mode 23-2 = 24 – set the display position to 24 hour display format
16. Mode 23-3 = 24 – set the display position to 24 hour display format
17. Mode 23-4 = 24 – set the display position to 24 hour display format
18. Mode 24-1 = 1 – set to U.S. daylight savings time
19. Mode 24-2 = 1 – set to U.S. daylight savings time
20. Mode 24-3 = 1 – set to U.S. daylight savings time
21. Mode 24-4 = 1 – set to U.S. daylight savings time

Two zone display with digital zone lettering – from left to right, display Pacific and Mountain time and then after a five seconds, display Central and Eastern time – the time zones and the zone lettering will cycle through two sets of zone locations

1. Mode 18 = 2 – set the number of physical zones
2. Mode 20-1 = 2 – set zone 1 display format to hours: minutes
3. Mode 20-2 = 2 – set zone 1 display format to hours: minutes
4. Mode 20-3 = 2 – set zone 1 display format to hours: minutes
5. Mode 20-4 = 2 – set zone 1 display format to hours: minutes
6. Mode 21-1 = -8 – set Pacific offset from UTC
7. Mode 21-2 = -7 – set Mountain offset from UTC
8. Mode 21-3 = -6 – set Central offset from UTC
9. Mode 21-4 = -5 – set Eastern offset from UTC
10. Mode 22-1 = 1 – point display position to the desired time source
11. Mode 22-2 = 2 – point display position to the desired time source
12. Mode 22-3 = 3 – point display position to the desired time source
13. Mode 22-4 = 4 – point display position to the desired time source
14. Mode 23-1 = 24 – set the display position to 24 hour display format
15. Mode 23-2 = 24 – set the display position to 24 hour display format
16. Mode 23-3 = 24 – set the display position to 24 hour display format
17. Mode 23-4 = 24 – set the display position to 24 hour display format
18. Mode 24-1 = 1 – set to U.S. daylight savings time
19. Mode 24-2 = 1 – set to U.S. daylight savings time
20. Mode 24-3 = 1 – set to U.S. daylight savings time
21. Mode 24-4 = 1 – set to U.S. daylight savings time
22. Mode 32-3 = 2 – Numeric display field multiplier
23. Mode 51-1 to 51-32 = enter 8 digital zone letters for each zone
24. Mode 52-2 = 16 – number of alpha digits installed
25. Mode 51-3 = 1 – frame rotating display
26. Mode 51-4 = 50 – set frame rotation speed in seconds (0-59)

Up-Down Elapsed Timer Configuration

The BRG Tiger firmware supports short, medium and long duration timer operations. Short duration typically means less than 24 hours. This mode is used for short timing sequences and does not recover from a power loss. Medium duration timers may run as long as 9,999 days, but does not recover from a power loss. Long duration timers may cover many decades and does recover from a power loss.

The Up button starts, pauses and restarts the elapsed timer. The Down button pauses and resets the timer. Press the Up button to start the timer. Pressing the Up button again will pause the timer. Pressing the Up button a third time will start the time from the paused position. Pressing the Down button once will pause the timer. Pressing the Down button again will reset the timer.

If your clock has serial sync wires, connect the red and black wires to the red and black wires of a master clock. Slave clocks receive sync pulses, while master clocks send pulses ten times per second. Slave clocks may be used for multiple displays of the same timer.

If your clock is equipped with the optional infrared remote control, it is shipped attached to the back of the clock. Reference the infrared remote instruction section found later in this manual.

The internal battery will maintain the time for about ten years. All operating parameters are maintained in flash memory which does not lose its' memory when power is lost.

Changing operational parameters:

The display is used to display and edit all operating modes and parameters.

Press the mode button and mode one will appear on the display. If the month/day appears, press mode again to return to the mode one display. Press the Up button until you reach Mode 20. Follow the steps below to configure

Press the Mode to exit to the previous level. Press the Down button until 0, which will exit to the previous level. Press Down again to mode to mode 14. Once at mode 14, press Mode to display the current operating mode. Using the Up or Down buttons, select mode 2 for up timer or mode 3 for down timer. Press the Mode button to exit back to the previous level. Press the Down button to move to 0, which will exit to normal display mode.

Other modes:

Mode 7: Beginning hours and minutes, or the value to appear when the Down button is pressed.
Mode 8: Beginning seconds, or the value to appear when the Down button is pressed.
Mode 9: Ending hours and minutes. The value is optionally used to activate a contact closure or to stop the timer.
Mode 10: Ending seconds. The value is optionally used to activate a contact closure or to stop the timer.
Mode 13: Stop Timer at End Time or continues when the End time is reached.
Mode 20: Display Mode – set to various display formats as needed.
Mode 26: Blinking Display – Display may be set to blink when the End time is reached.
Mode 32-4: Code Blue Timer Control – stay in timer mode when the End time reached.
Mode 32-5: Code Blue Timer Direction – up or down.
Mode 32-6: External timer control line functionality.
Mode 32-7: Resume real time after timer idle.
Mode 32-10: Timer alarm – enable, disable.
Mode 32-13: Alarm pulsing.
Mode 32-18: Set Long Duration Timer mode
Mode 34: Additional alarm pulsing.
Mode 35: Medium Duration - Elapsed days or hours Reset value.
Mode 36: Code Blue timer control display format
Mode 37-6: Elapsed days and hours functionality
Mode 37-12: Turn off alarm when timer paused or reset
Mode 32-24: Activate alarm relay when timer started

Mode 32-22: Accelerated timer for motion picture special effects
Mode 32-26: Red/Yellow/Green light mode using two relays. Set Mode 43-1=2
Mode 37-9: Use leading edge to start and stop the timer, with variable delay before start will pause the timer
Mode 37-19: Use Start button to Start, Stop and Reset the timer. May be used with Mode 37-9
Mode 37-38: Increase Short Duration timer accuracy
Mode 44-1: Ending month and day. – Used with Mode 18 (auto timer restart).
Mode 44-2: Ending year. – Use with Mode 18 (auto timer restart).

Timer Configuration Examples

The following timer configurations are provided as examples of typical elapsed timers. It is, by no means, intended to be all inclusive. There are many thousands of ways to configure timers. In timer mode, the Up button becomes Start/Pause/Resume, and the Down button becomes Stop/Reset. There is an optional timer control line available for specialized timer applications. Modes 20 and above have two menu levels.

Up timer starting at zero. No upper time limit. Display minutes and seconds only on a four digit display.

1. Mode 23-1=24 – set the display to 24 hour format
2. Mode 7=0:00 – reset to zero
3. Mode 13=0 – allow the timer to pass through the end time, which defaults to 0:00
4. Mode 14=2 – set up timer direction
5. Mode 20-1=12 – configure the display to show minutes and seconds

Hospital Code Blue or Operating Room timer with four digit display. Normally display real time hours, minutes and seconds. An ordinary light switch with red wall plate is recommended to control the timer. When the code blue switch is turned on, the display will immediately switch to up timer mode, reset the timer, start counting up from zero. Turning the timer switch off will pause the timer for the number of minutes specified in Mode 32-7. At the conclusion of the pause delay, the timer will return to real time display.

Mode 23-1=24 – set the real time display to 24 hour format (optional)
Mode 32-4=2 – stay in timer mode until pause timeout
Mode 32-5=0 – set timer direction to up direction
Mode 32-6=1 – timer will run as long as timer switch is on
Mode 32-7=30 – stay in timer mode for 30 minutes after timer is stopped, then return to real time display
Mode 36-1=12 – set timer display format to minutes and seconds

Hospital Code Blue or Operating Room timer with six digit display. Normally display real time hours, minutes and seconds. An ordinary light switch with red wall plate is recommended to control the timer. When the code blue switch is turned on, the display will immediately switch to up timer mode, reset the timer, start counting up from zero. Turning the timer switch off will pause the timer for the number of minutes specified in Mode 32-7. At the conclusion of the pause delay, the timer will return to real time display.

Mode 23-1=24 – set the real time display to 24 hour format (optional)
Mode 32-4=2 – stay in timer mode until pause timeout
Mode 32-5=0 – set timer to up direction
Mode 32-6=1 – The timer will run as long at the Timer Control line is closed. When the timer control line is opened, the timer will pause for the duration specified by Mode 32-7. Once the pause delay has concluded, the timer will return to a real time display.
Mode 32-7=10 – stay in timer mode for 10 minutes after timer is stopped, then return to real time display
Mode 36-1=46 – set timer display format to minutes and seconds
Mode 36-2=48 – set timer display format to minutes and seconds

Hospital Code Blue timer with four digit display. Normally display real time hours and minutes. When the code blue button is pressed or code blue line is turned on, switch to up timer mode, set the display to minutes and seconds, reset the timer, start counting up from zero. Pressing the code blue button again will have no effect until the timer is reset back to real time. Press the reset button once to stop the timer. Pressing the reset button again will have no effect, unless it is held down for more than five seconds, at which time it will return to real time display. The display will remain frozen for 30 minutes. After that, it will automatically return to real time display.

Mode 23-1=24 – set the display to 24 hour format
Mode 13=0 – allow the timer to pass through the end time, which defaults to 0:00
Mode 32-4=2 – stay in timer mode until pause timeout
Mode 32-5=0 – set timer to up direction
Mode 32-6=3 – code blue button will start the timer. Further presses will have no effect until the timer is reset back to real time.
Mode 32-7=30 – stay in timer mode for 30 minutes after timer is stopped, then return to real time display
Mode 36-1=12 – set timer display format to minutes and seconds
Mode 37-10=3 - holding down the reset button for 5 sec or more returns the timer to real time

Up timer starting at zero. Stop the timer at ten minutes and sound the alert horn for five seconds. Display hours and minutes on a four digit display with blinking colon while timer is running.

1. Mode 23-1=24 – display to 24 hour format
2. Mode 5=5 – set alarm duration to 5 seconds
3. Mode 7=0:00 – reset to zero
4. Mode 9=0:10 – end time to 10 minutes
5. Mode 13=1 – stop timer at the end time
6. Mode 14=2 – set up timer direction
7. Mode 20-1=3 – display hours and minutes with blinking colon

Up timer starting at zero. Stop the timer at 10 minutes and sound the alert horn for five seconds. Display hours and minutes on a four digit display with blinking colon while timer is running.

1. Mode 23-1=24 – display to 24 hour format
2. Mode 5=5 – set alarm duration to 5 seconds
3. Mode 7=0:00 – reset to zero
4. Mode 9=0:10 – end time to 10 minutes
5. Mode 13=1 – stop timer at the end time
6. Mode 14=2 – set up timer direction
7. Mode 20-1=3 – display hours and minutes with blinking colon

Up timer using only the Start button to start, stop and reset the timer. Start at zero and count up. After the timer has ran for five seconds, allow the Start button to stop the timer. When the timer is stopped, the start button will reset the timer and start it running again. Display minutes and seconds only.

1. Mode 13=0 – Do not stop the timer at the end time.
2. Mode 20-1=12 – Display minutes and seconds

3. Mode 37-9=5 – Use the leading edge to start and stop the timer. Wait five seconds before allow the start button to stop the timer.
4. Mode 37-19=1 – When the timer is stopped, pressing the Start button will reset the timer and start it running.

Elapsed days since last accident or incident on a four digit display. Up timer starting at 12:00, July 10, 2000. This assumes the starting date is older than the current date.

1. Mode 9=12:00 – set starting hour and minutes
2. Mode 32-18=1 – enable auto timer restart after power failure
3. Mode 44-1=07/10 - starting month and day
4. Mode 44-2=2000 - starting year

Elapsed days, hours, minutes and seconds since last accident or incident using a twelve digit display. Up timer starting at 12:00, July 10, 2000. This assumes the starting date is older than the current date.

1. Set the current time using the up and/or down buttons
2. Mode 1 – set the current month and day
3. Mode 2 – set the current year
4. Mode 18=3 – number of four digit displays
5. Mode 37-34=21 – display elapsed days on first display (default)
6. Mode 37-35=2 – display hours and minutes (default)
7. Mode 37-36=1 – display seconds on third display
8. Mode 32-18=1 – enable auto timer restart after power failure
9. Mode 44-1=07/10 - starting month and day
10. Mode 44-2=2000 - starting year
11. Mode 9=12:00 – starting hour and minutes

Down timer starting at the 22:00 00, July 4, 2000, and counting down to 00:00 00, January 1, 2001. Display elapsed days, hours, minutes, seconds and hundredths on a twelve digit display. Flash the display for ten seconds when the timer passes through the end of the year, then reverse timer direction and begin up timer operation. Enable the auto-restart feature to automatically restart the timer in the event of a power failure.

1. Set the current time (22:00) using the up and down buttons
2. Mode 1=set the current month and day (07/04)
3. Mode 2=set the current year (2000)
4. Mode 5=10 – set alarm duration to 10 seconds – this also controls the length of time to flash the display
5. Mode 9=00:00 – set ending hours and minutes
6. Mode 10=00 – set the end seconds (default)
7. Mode 37-34=21 – display days elapsed on the leftmost four digits (default)
8. Mode 37-35=2 – display hours and minutes on the center four digits (default)
9. Mode 37-36=11 – display seconds and hundredths on the rightmost four digits
10. Mode 26-1=4 – flash the display full on and off at a rate determined by the alarm pulse rate (mode 32-13)
11. Mode 32-13=10 – flash the display at a rate of ten times per second
12. Mode 32-17=1 – reverse timer direction when the end time is reached
13. Mode 32-18=1 – enable auto timer restart after power failure
14. Mode 44-1=00/00 - ending month and day
15. Mode 44-2=2001 - ending year

Down timer starting at 10:20 15. Stop at zero and sound the alert horn for 5 seconds. Display hours, minutes and seconds using an eight digit display.

1. Mode 23-1=24 – display to 24 hour format
2. Mode 5=5 – set alarm duration to 5 seconds
3. Mode 7=10:20 – set Starting hours and minutes
4. Mode 8=15 – set Starting seconds
5. Mode 13=1 – stop at the end time
6. Mode 14=3 – set down timer direction
7. Mode 20-1=2 – display hours and minutes on the leftmost four digits
8. Mode 20-2=1 – display seconds on the rightmost four digits

Down timer starting at 0:30 00. Stop at zero and sound the alert horn for 5 seconds. Blink the display rapidly one minute before the timer stops. Display hours, minutes and seconds using an eight digit display.

9. Mode 23-1=24 – display to 24 hour format
10. Mode 5=5 – set alarm duration to 5 seconds
11. Mode 7=10:20 – set Starting hours and minutes
12. Mode 8=15 – set Starting seconds
13. Mode 13=1 – stop at the end time
14. Mode 14=3 – set down timer direction
15. Mode 20-1=2 – display hours and minutes on the leftmost four digits
16. Mode 20-2=1 – display seconds on the rightmost four digits
17. Mode 43-1=3 – Warning time enabled, disable relay output
18. Mode 43-2=0:01 – Set warning time one minute before stop time
19. Mode 43-4=5 – Blink the display for five seconds
20. Mode 43-5=20 – Blink the display twenty times per second

Down timer starting at ten minutes and counting down to zero, then stopping. Flash the display for five seconds when the timer stops. Display minutes and seconds on a four digit display.

1. Mode 23-1=24 – display to 24 hour format
2. Mode 5=5 – set alarm duration to 5 seconds – this also controls the length of time to flash the display
3. Mode 7=0:10 – set Starting hours and minutes
4. Mode 13=1 – stop at the end time
5. Mode 14=3 – set down timer direction
6. Mode 20-1=12 – display minutes and seconds
7. Mode 26-1=4 – flash the display full on and off at a rate determined by the alarm pulse rate (mode 32-13)
8. Mode 32-13=10 – flash the display at a rate of ten times per second

Down timer starting at 30 seconds and counting down to zero, then stopping. Close the alarm relay while the timer is running . Use either the timer control button or the start button to start timer. Use the Change Start/Change End buttons to change the Starting time time. Display seconds only, centered on the display.

1. Mode 8=30 – timer Start equals 30 seconds
2. Mode 14=3 – set operating mode to count down timer
3. Mode 32-4=2 – stay in timer mode when the end time is reached
4. Mode 32-5=1 – set code blue timer direction to down timer
5. Mode 32-24=1 – activate relay when timer starts
6. Mode 32-26=1 – enable warning relay
7. Mode 37-12=1- turn off relay when timer stops
8. Mode 37-14=3 – enable Change Start/Change End buttons

Green/Yellow/Red light indicator with down timer starting at 1:30 seconds and counting down to zero, then stopping. When the timer is started, the red light goes out and the green light illuminates. When the timer gets down to 1 minute, the green light goes out and the yellow light illuminates. When the timer is stopped or paused, the red light illuminates.

1. Mode 7=0:01 – timer Starting hours and minutes
2. Mode 8=30 – timer Starting seconds
3. Mode 14=3 – set to down timer mode
4. Mode 20-1=12 – display minutes and seconds
5. Mode 32-26=2 – enable three light operation
6. Mode 43-1=4 – enable optional secondary channel for warning light
7. Mode 43-3=30 – timer warning alarm seconds (yellow light enabled)

New Year's Timer

Display Type: 6 discrete digits

Tiger Processor Version: 3.59 or later

Operation:

The timer will display real time hrs:min:sec

On 12/31/2005 at 22:59:59, the display will switch from real time to down timer mode. The down timer will start at 1:00:00 and count down to 00:00:00. At 00:00:10, the display will blink during the last ten seconds. When the timer stops at 00:00:00, the display will change to display the year (2006). To return the display to real time, cycle power to the display. The alarm relay will close for 1 second if installed.

To test the display, set the date to 12/31/2005. Then set Modes 7=0:00, 8=20, 27-1=23:59 and 28-1=40. Exit the menu system and run the real time forward to 11:59 PM. The display will switch from real time to countdown timer at 11:59:40 PM and countdown starting at 00:00:20. At 00:00:10 the display will blink until it stops at 00:00:00. At this time, the display will switch to 2006.

To restore from test mode, cycle power to the display. Then set Modes 7=1:00, 8=0, 28-1=59. Or restore the original display configuration by restoring customer defaults.

The following configuration can also be used with four digital displays by changing the display types to: 20-1=2 and 36-1=54.

Modes:

5=1	34-1=99
7=1:00	36-1=46 (change for other display types)
9=0:00	36-2=48 (change for other display types)
13=1	37-1=0
20-1=46 (change for other display types)	37-8=1
20-2=48 (change for other display types)	38-1=2
27-1=22:59	43-1=3
28-1=59	43-3=10
29-1=8	43-4=10
30-1=0	43-5=5
32-4=2	53-2=12/31
32-5=1	54-2=12/31
32-13=5	55-2=2005 (change for other years)
32-37=1	56-2=2005 (change for other years)
32-45=71	

Up-Down Counter Configuration

Your counter/clock has been configured to your specifications. You may change this configuration at any time.

If your clock has serial sync wires, connect the red and black wires to the red and black wires of a master clock. Slave clocks receive sync pulses, while master clocks send pulses every second.

If equipped with an external control wire option, the wiring diagram for the breakout box can be found later in this manual. These wires may be attached to normally open dry contact closures for remote operation.

If your clock is equipped with the optional infrared remote control, it is shipped attached to the back of the clock. Reference the infrared remote instruction section found later in this manual.

The internal battery will maintain the time for about ten years. All operating parameters are maintained in flash memory which does not lose its' memory when power is lost. When power is applied to the clock, all displays will illuminate and display the time(s) as configured.

Changing operational parameters:

The display is used to display and edit all operating modes and parameters.

Press the mode button and mode one will appear on the display. If the month/day appears, press mode again to return to the mode one display. Press the Up button until you reach Mode 14.

Once at mode 14, press Mode to display the current operating mode. Using the Up or Down buttons, select mode 4 for up count, or mode 5 for down count. Press the Mode button to exit back to the previous level. Press the Down button to move to 0, which will exit to normal display mode.

The last count is saved to non-volatile memory if power is lost.
Display Mode is automatically set when in counter mode.
Counter Increment Button Debounce – 0-9999 – button delay in milliseconds

Other applicable modes:

Mode 11: Start count, or the value to appear when the Down button is pressed. –
Mode 12: End count. The value is optionally used to activate a contact closure or to stop the counter.
Mode 13: Stop counter at the End count or continue when the End count is reached. If at End and Start=0, then Mode 13=0
Mode 26: Blinking Display – Display may be set to blink when End count is reached. –
Mode 32-13: Alarm pulsing
Mode 34: Additional alarm pulsing
Mode 45-1: Auto-increment count — 0-9999
Mode 45-2: Auto-increment rate value– 0-9999 (Mode 37-13 determines the rate)
Mode 37-13: Auto-increment rate period — 0=tenths of second, 1=second, 2=minutes, 3=hours
Mode 45-4: Increment Amount– (default=1) – the counter will increase by this about for each counter increment

Counter Configuration Examples

Count up from zero using a four digit display. Pressing the Up button or momentarily closing the up line will increment the count. Pressing the timer control button or momentarily closing the code blue line will decrement the count. Pressing the Down button or momentarily closing the down line will reset the count.

1. Mode 14=4 – Set to up counter

Display active production 'goal' and 'actual' count. This example uses 2 four digit displays. Both counters will start at zero at the beginning of the day. The 'actual' counter will increment each time a product is produced. The 'goal' counter will auto-increment so that the count at the end of the day will reflect the total goal for the day. The 'actual' count is configured the same as a simple counter. However, the 'goal' counter will be configured to automatically increment. Pressing the Up button will pause the 'goal' counter during lunch or other break periods. When the counter is paused, the letters, PAUS, will appear on the display. In this example, the goal counter will increment one count every 30 seconds.

Actual counter:
1. Mode 14=4 – Set to up counter

Goal counter:
1. Mode 14=4 – Set to up counter
2. Mode 37-13=1 – Increment amount in seconds (default)
3. Mode 45-1=1 – Amount to increment each period
4. Mode 45-2=30 – Increment every 30 seconds

59th Minute Analog Master Clock Operation

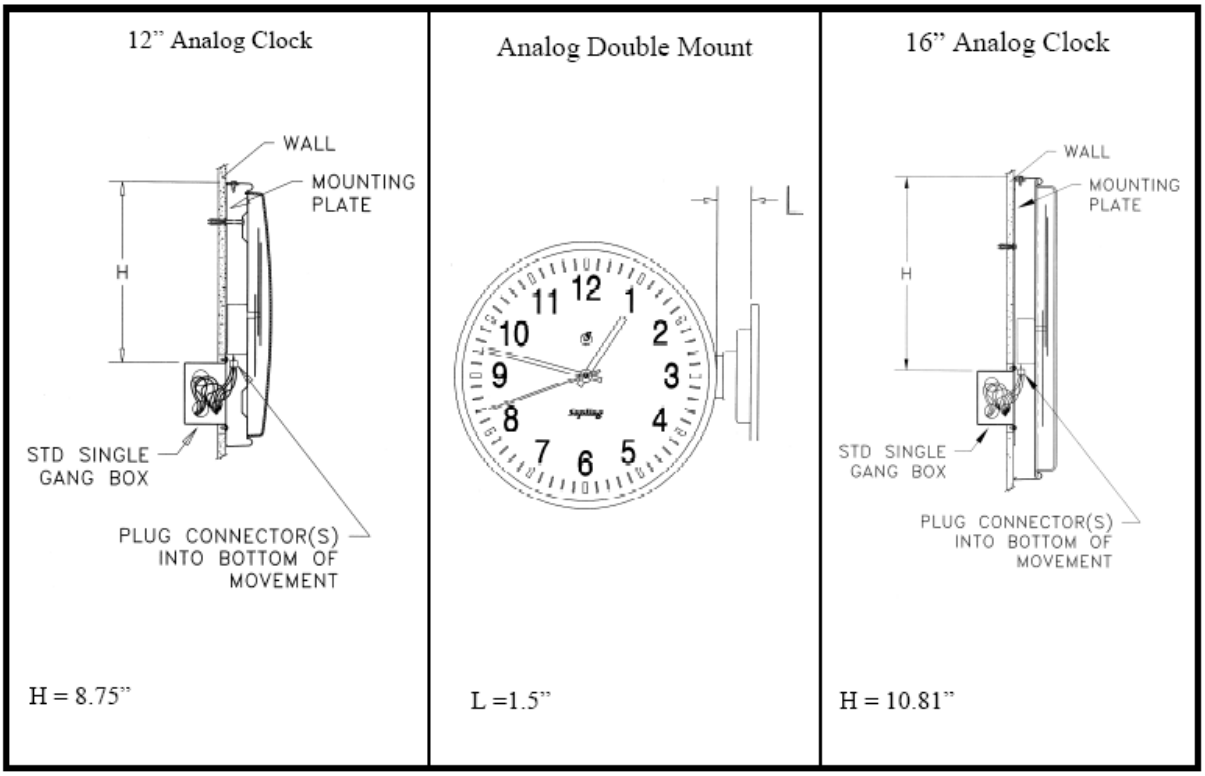
Description

A single BRG digital clock may control 500 or more 59th minute analog slave clocks. 59th minute analog clocks are used for their increased reliability over older analog clock systems. The 59th minute analog clock contains a microprocessor that greatly reduces the power required compared to older clock designs. No relays, ratchets or pawls are used. All power and sync pulses to the analog clocks are provided over a simple three-wire circuit. The master clock sends minute and second correction impulses hourly. Additionally, at 5am and 5pm, the hour is corrected. In the event of a power outage, the master clock will continue to keep time up to ten years. When the power returns, the master clock will correct the analog clocks at the next regular sync interval. If continuous time display is required during a power outage, a simple off-the-shelf uninterruptible power supply (UPS) will provide many hours, if not days of operation for the entire system.

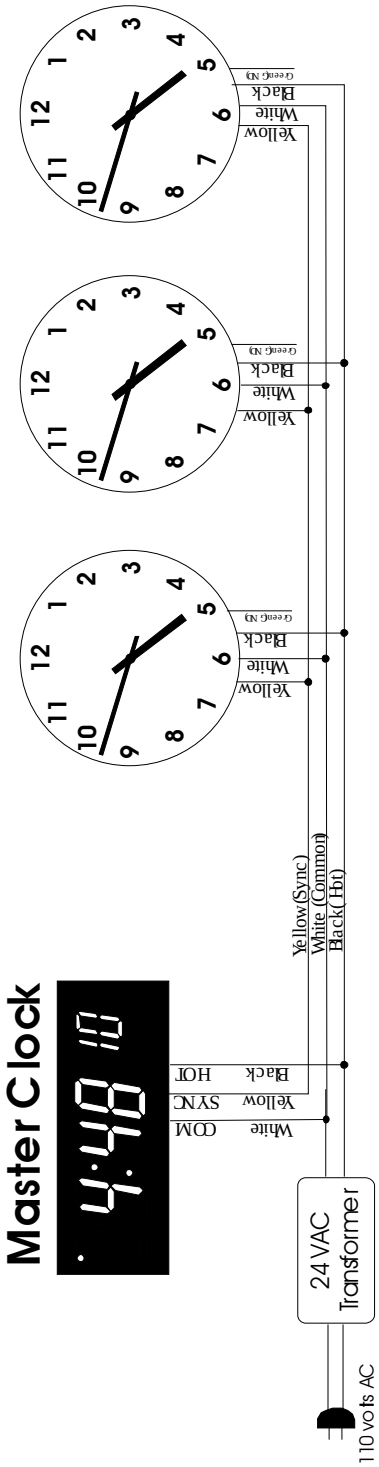
Installation

It is recommended to use 14 ga. to 16 ga. wire between the master clock and analog clocks. Any wiring layout may be used including star, "T", and buss configurations. More wiring "legs" will reduce overall wiring resistance. All wiring should be in parallel. If the master clock needs to be removed for any reason, the slave clocks will continue to operate normally, although they will no longer receive correction pulses from the master clock.

If a single clock needs to be removed for any reason, unplug the connector plug from the analog clock's pins. The master clock may remain powered. To return an analog clock to operation, plug the connector back onto the analog clock's pins. The clock will be corrected at the next regular sync interval.



Digital Master Clock with 59th Minute Analog Secondary Clocks



Operation

Once the master clock is displaying the correct time, changing the analog clocks to the correct time is fully automatic.

Bi-Polar Analog Master Clock Operation

Description

A single BRG digital clock may control up to 200 analog slave clocks. Bipolar analog clocks are used for their increased reliability over older analog clock systems. The basic bipolar analog clock only contains three moving parts. No relays, ratchets or pawls are used. The master clock provides all power and sync pulses to the analog clocks over a simple two-wire circuit. Further, the master clock sends correction impulses each and every minute to maintain precise time over long periods. In the event of a power outage, the master clock will continue to keep time up to ten years. When the power returns, the master clock will "fast step" the analog clocks to the correct time. If continuous time display is required during a power outage, a simple off-the-shelf uninterruptible power supply (UPS) will provide many hours, if not days of operation for the entire system.

Installation

It is recommended to use 14 ga. to 16 ga. wire between the master clock and analog clocks. Any wiring layout may be used including star, "T", and buss configurations. More wiring "legs" will reduce overall wiring resistance. All wiring should be in parallel. All wiring from the red wire of the master clocks should connect to the same terminal on the analog clocks. Likewise, all wiring from the black wire of the master clocks should connect to the same remaining terminal of the analog clocks.

The analog master clock includes heavy gage red and black wires for connection to the analog clocks. The wiring must remain in phase. If some clocks are out of phase, they will operate but will display one minute off from the time displayed on the master clock. To be sure the clocks are in phase, run the red wire from the master clock to the same terminal on all analog clocks. Likewise, run the black wire from the master clock to the same remaining terminal on the analog clocks. Once the system is operational, if the analog clocks are out of phase by one minute, swap the red and black wires at the master clock. This will place all analog clocks in the correct phase.

If a single clock needs to be removed for any reason, unplug the connector plug from the analog clock's pins. The master clock may remain powered. To return an analog clock to operation, plug the connector back onto the analog clock's pins. Then turn the dials to the correct time using the thumbwheel on the back of the clock. If the clock is one minute off after the next minute pulse, then reverse the connector on the pins.

Operation

1. Be sure analog clocks all display the same time. They are typically shipped with the hands pointing to 12:00. The master clock's secondary time display is also pre-configured to 12:00. Change the time of any analog clocks as necessary using the adjustment provided behind the clock.
2. Connect the red and black sync wires from the master clock to all analog clocks.
3. Apply power to the master clock. The clock will not begin sending synchronization pulses to the analog clocks until the master clock is initialized.

4. Check the date. Momentarily, press the Mode button once. A “1” will appear on the display. Press the Up button once and a “2” will appear. Press the Mode button and the Year will appear. Use the Up and Down buttons as necessary to change the year. Once the current year is displayed, press the Mode button and a “2” will again display. Press the Down button and a “1” will display. Press the Mode button and the Month and Day will display. Use the Up and Down buttons as necessary to change the date. Holding the buttons down will cause the date to change faster. If you cross over the end of the year, you will need to again change the year as described previously. Once the correct Month and Day is displayed, press the Mode button and a “1” will appear. Then press the Down button and a “0” will appear briefly, then the current time will again be displayed.

5. Check the current time. Use the Up and Down buttons to change the Hours and Minutes as necessary. Holding the buttons down will cause the time to change faster. If 12 hour display mode is used (default), then note if the “PM” indicator is illuminated in the upper left corner of the display.

6. To initialize the master clock, press the Timer Control button. The current analog clock time will display on the master clock. Use the Up and Down buttons to change the displayed time to match the analog clocks. Pressing the Timer Control button again will return the master clock to normal time display. The master clock will begin sending correction pulses to the analog clocks at the top of the minute and every four seconds thereafter until the slave clocks match the master clock.

7. Check analog clock operation. Be sure all clocks are pulsing to the correct time. If no clocks are pulsing, you can stop the master clock pulsing by holding down the Mode button until a “0” appears, then let go. A “1” will then appear. Press the down button once to return to the time display. Check your connections to the master clock. To restart pulsing, press the Timer Control button, adjust the time displayed to match the analog clocks, then press the Timer Control button again to exit and return to normal time display. The master clock will start sending fast pulses beginning at the top of the minute.

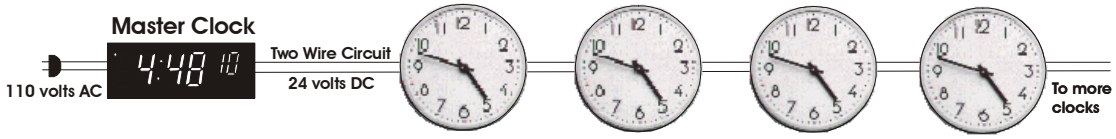
8. If a few analog clocks are not working, but the majority of the clocks are working, check your wiring to these few clocks. Once they being pulsing, manually move the time on the analog clock to match the time on other secondary clocks. This is accomplished by turning the knob on the back of the analog clock.

9. If secondary clocks need to be replaced, simply connect the new clock to the sync wires. Then manually change the time of the analog clock to match other analog clocks. This is accomplished by turning the knob on the back of the analog clock.

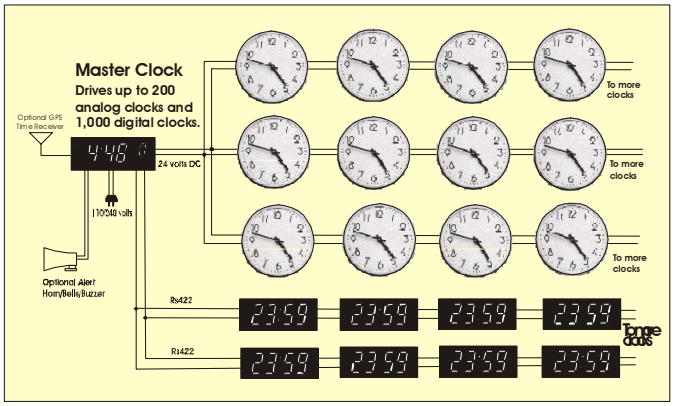
You can stop the master clock pulsing by holding down the Mode button until a “0” appears, then let go. A “1” will then appear. Press the down button once to return to the time display.

See also:
Mode 37-28 – Analog Master Clock
Mode 27 – Alarm time
Mode 29 - Alarm day-of-the-week
Mode 37-3 – 59th Minute Sync Protocol

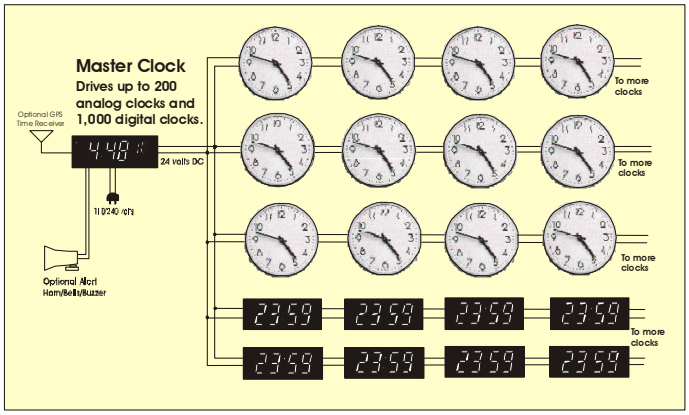
Typical Configuration of a Digital Master Clock with Bi-Polar Analog Secondary Clocks



Digital Master Clock with Smart Digital RS422 and Bi-Polar Analog Secondary Clocks



Digital Master Clock with Bi-Polar Digital Impulse and Bi-Polar Analog Secondary Clocks



Alarm Configuration

Each digital clock has 99 total alarm settings that can be configured to activate a relay, alert horn, or other device at various times and days. The duration of any single alarm can range from 1 to 99 seconds. Additionally, each alarm setting may be pulsed from 1 to 99 times per second. For example a start lunch break alert horn could sound a constant tone for three seconds beginning at 12:00 noon, Monday through Friday. The end of lunch tone could be pulsed twice per second, for three seconds of duration.

The PC Control program for Windows is highly recommended for controlling alarm functions. This software is available for both two-wire serial, USB and Ethernet communications configurations. The clock must be ordered with one of these communications protocols in order to use the PC Control program.

Use the Alarm Configuration Worksheet on the following page to organize your alarm settings.

While your clock has been configured to your specifications, you may change this configuration at any time.

If your clock has serial sync wires, connect the red and black wires to the red and black wires of a master clock. Slave clocks receive sync pulses, while master clocks send pulses every second. If your clock uses radio synchronization, a light will display to the lower right of the minutes when the clock is in sync with the master clock.

If your clock has control wires, the Red and Black wires activate the Up button and the Blue and Black wires activate the Down button. These wires may be attached to normally open dry contact closures for remote operation. If your clock is equipped with the optional infrared remote control, it is shipped attached to the back of the clock. Reference the infrared remote instruction section found later in this manual.

The internal battery will maintain the time for about ten years. All operating parameters are maintained in flash memory which does not lose its' memory when power is lost. When power is applied to the clock, all displays will illuminate and display the time(s) as configured.

When clocks are synchronized using serial wire sync, slave clocks incorporating an alert horn can be configured to follow the schedule of a single clock. This allows the alarm schedule in a single clock to control the alert horns of many clocks. Mode 32-16 enables and/or disables (default) this feature.

Changing operational parameters

The display is used to display and edit all operating modes and parameters.

Applicable modes:

Mode 27: Alarm Hours and Minutes. This field is required.
Mode 28: Alarm Seconds. Use this to optionally set the alarm to the nearest second.
Mode 29: Alarm Day Code. This field is required.
Mode 5: Alarm Output Duration.
Mode 30: Individual Alarm Output Duration.
Mode 32-13: Alarm Pulse Control.
Mode 32-16: Enable or Disable master/slave alarm function. 0=disabled (default), 1=enabled
Mode 34: Individual Alarm Pulse Control.
Mode 37-1: Active Alarm Schedule. This parameter determines which of the ten (0-98) alarm schedules is active. (Default=1)
Mode 37-2: Panic Alarm using the optional Code Blue line.
Mode 39-1: Panic Alarm duration
Mode 38: Alarm schedule is assigned to each (1-99) specific alarm setting. (Default=0)
Mode 34-n=99: Auto-starts the code blue timer from a real time alarm setting.
Mode 53: Set beginning month/day in alarm schedule date range.
Mode 54: Set ending month/day in alarm schedule date range.
Mode 55: Set beginning year in alarm schedule date range.
Mode 56: Set ending year in alarm schedule date range.
Mode 59: Enable four-channel alarm output. Must also set Mode 32-26=2.

Alarm Configuration Worksheet

Alarm Position 1-99	Mode 27 Alarm Hours and Minutes (**required**)	Mode 28 Alarm Seconds	Mode 29 alarm Day Code (**required**)	Mode 5 Alarm Output Duration	Mode 30 Individual Alarm Output Duration	Mode 32-13 Alarm Pulse Control	Mode 34 Individual Alarm Pulse Control	Mode 38 Alarm Schedule Number Default=0	Mode 49 Toggle Alarm on/off 1-on,2=off	Mode 59 Four Channel Relay Output 1,2,4,8
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
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Infrared Remote Control

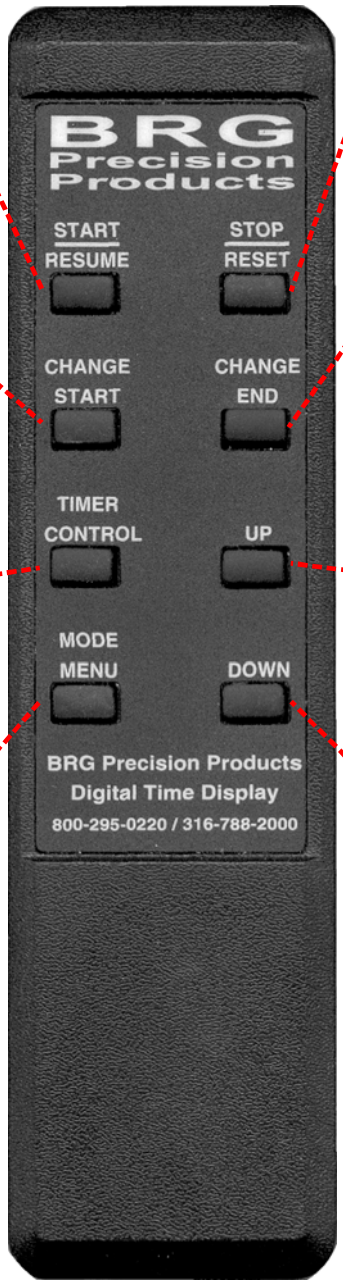
The infrared remote control is standard with time zone displays and optional for other models. It can be used to control real time displays, timers and counters. The remote can also be used to access and change the clock's configuration. The remote control receiver must be factory installed.

Timer - Press once to Start, Press again to Stop, Press again to resume . **Counter** - Press to increment the count.

Timer - Press once to access the starting time. Press Up or Down to change time. Press again to exit. **Counter** - Press once to access the starting count. Press Up or Down to change count. Press again to exit.

Timer - Press to start timer. **Counter** - Press to decrement the count.

Press once to access menu system. Press Up or Down to move to desired menu item. Press mode again to display menu value. Press Up or Down to change value. Press mode to exit menu item. Press Down until zero will exit the menu system.



Actual Size

Timer - Press once to Stop, Press again to reset. **Counter** - Press once to reset.

Timer - Press once to access the ending time. Press Up or Down to change time. Press again to exit. **Counter** - Press once to access the ending count. Press Up or Down to change count. Press again to exit.

Real Time Mode - Increment the time. Holding the button down will move faster. **Menu Mode** - Increment the menu address or menu item value.

Real Time Mode - Decrement the time. Holding the button down will move faster. **Menu Mode** - Decrement the menu address or menu item value.

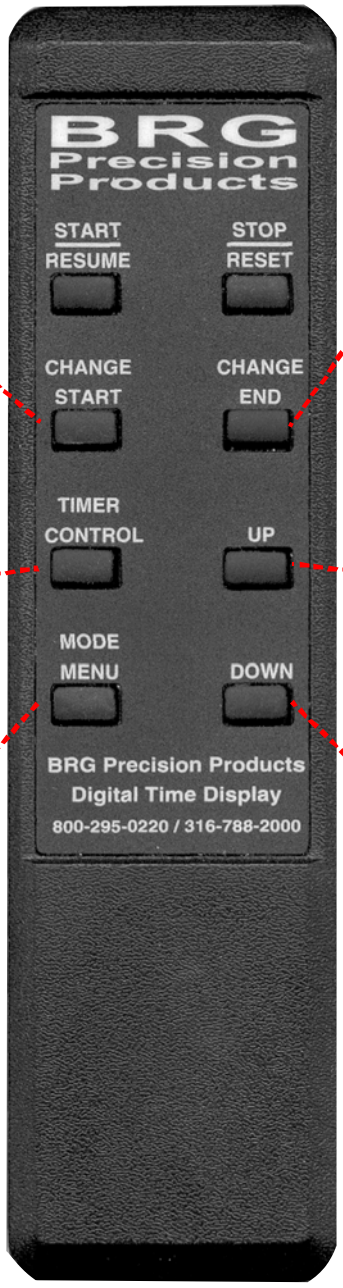
Long Duration Timer Infrared Remote Control

The infrared remote control is standard with time zone displays and optional on other models. It can be used to control real time displays, timers and counters. The remote can also be used to access and change the clock's configuration. The remote control receiver must be factory installed.

Target Month/Day, Year- Press once to access month/day. Press Up or Down to change. Press again to access year. Press Up or Down to change. Press again to exit.

Real Time - Press to display real time. Press Up or Down to change. Press again to return to timer mode.

Menu - Press to access the menu system. Call for assistance before accessing the menu system.



Target Hours:Minutes - Press once to access hours:minutes. Press Up or Down to change. Press again to exit.

Increment Number Displayed

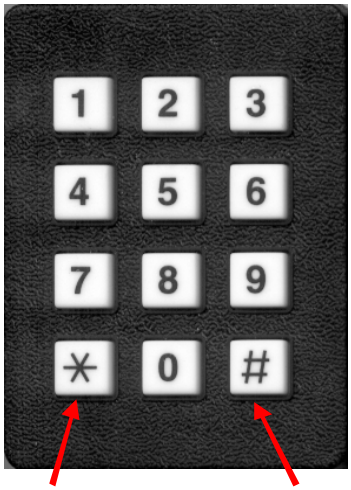
Decrement Number Displayed

Actual Size

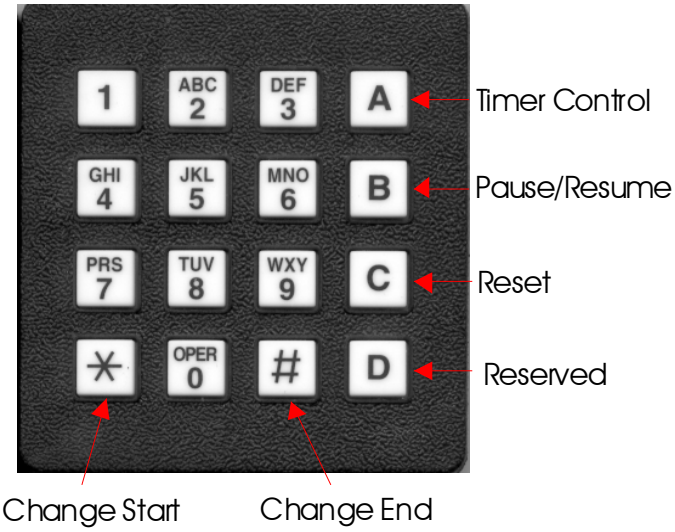
Keypad Parameter Entry

Two optional keypads are available for entering various parameters such as start time, start count, end time, end count, start date, end date, etc. The keypads are available in 12 button and 16 button configurations. The 12 button keypad may be placed on the front, side, top or bottom of the display, but does not include control buttons. The 16 button keypad may be mounted on the front of the display or in a wired remote control box and includes control buttons.

12 button keypad



16 button keypad



Up to two parameters may be entered. For example, if Mode 37-26 equals 4, press "*" to enter the start time and "#" to enter the end time. The "*" and "#" modes only need to be selected once for multiple entries of the same entry type.

The keypad times out after two seconds of inactivity. Allow an additional second for the parameters to save before activating the timer buttons. If you make a mistake during entry, wait at least three seconds and reenter.

To enter a start time of 1 hour and 0 minutes with a stop time of 10 hours and 35 minutes, and then start the timer running, press the following keys:

* , 1 , 0 , 0 , # , 1 , 0 , 3 , 5 then wait at least three seconds and press “A”

Since the “#” was the last entry type selected it does not need to be selected again to change the end time again. For example, to change the end time to 12 hours and 34 minutes, press:

1 , 2, 3, 4 then wait at least three seconds and press “A”

For single parameter modes, pressing the “*” and “#” buttons is not required. For example, if Mode 37-26 equals 1 and you want to change the timer start time to 23 hours and 59 minutes, enter:

2 , 3 , 5 , 9 , then wait at least three seconds and press “A”

Entries are not always shown on the display as they are entered.

Tiger Processor Configuration Menu

Processor Type

Two types of processors are typically used in BRG digital clocks, Tiger and Mega. The Tiger processor is usually found in timers, counters, and more complicated displays. The Mega processor is used where other features are needed that are not available in the Tiger processor, or displays not requiring features found in the Tiger processor. The factory will install the processor type most appropriate for the customer's requirements. The menu will indicate the type of processor used. Once in the menu system, if the Mega processor uses leading zeros and the Tiger processor does not.

General Menu Navigation:

Clock/Timer/Counter configuration is accomplished by editing parameters using a simple menu system. Only four buttons are used to navigate the menu. The Mode button enters the Menu. The Up and Down buttons move up and down through the menu items, and are used to change parameter values. The Timer Control button is used to save any changes and exit the menu system.

Operation - Press the Mode button to access the menu system. Using the Up and Down buttons, select the desired menu item. Press the Mode button again to display the parameter. For menu items above 19, press Mode again to access the menu's second level. When a one appears, indicating the second level menu, press the Up or Down buttons to select the desired menu item, then press Mode to display the parameter value. Press the Up or Down buttons to change the parameter value. Once the parameter value is changed, press Mode to back out of the item and move to another item, or press the Timer Control button to save and exit the menu system. Pressing the Timer Control button at any time will save your changes and exit the menu system.

Pressing the Mode button while a parameter value is displayed will back up one level. Press Up or Down to move to the next mode item. Pressing the Down button until mode 0 is reached will exit the menu system. Pressing the Timer Control button also exits the menu system. The menu will timeout and return to normal operation after 60 seconds in inactivity**. If the display simply blinks when the Mode button is pressed, then the control buttons are locked out.** See Mode 37-29 for more information about control button lockout.

Not all of the following operating modes are included. Some operating modes must be specifically requested.

A special operation menu is available for restoration and diagnostic purposes. Pressing and holding the mode button will cause either four one's or four two' to be displayed. Four one's means no configuration has been stored in secondary memory. Four two's means a previous configuration has been stored in secondary memory.

Continuing to hold down the mode button allows shortcut menu operations. The one's or two will disappear and the display will begin counting up from 0. Special commands will execute if you release the mode button while one of the numbers are displayed. The special commands are:

0=Stop sending analog clock synchronization pulses.

1=Software reset
2=Restore factory defaults, once the 2 appears, release the mode button and momentarily press the Timer Control button

3=Restore customer defaults from secondary memory (if previously stored) , once the 3 appears, release the mode button and momentarily press the Timer Control button

4=Store customer defaults in secondary memory, once the 4 appears, release the mode button and momentarily press the Timer Control button

5=Disables wireless transmitter test mode, or if wireless test disabled, enter demo unlock key

6=Display zone numbers of a time zone display. For wireless master clock, enable transmitter test mode until clock is reset, blinks display

7=Illuminate all numeric segments, press up or down to cancel

To force a display to use all alpha digits, press and hold the Timer Control button during power up. This will configure the display with 5 alpha digits allowing access to the menu.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
0	N/A	00:00 to 23:59	**Exit Menu System** Simply press the Up button to advance the time, or the Down button to decrement the time. The longer the buttons are held down, the faster the time will change. Pressing the Timer Control button will also exit the menu system.
1	N/A	01/01 to 12/31	**Day/Month** Pressing the Up button advances the days and months, pressing the Down button decrements the days and months. Incrementing past the end of the year, or decrementing past the beginning of the year, will change the year respectively
2	N/A	1992-2075	**Year** Change using the Up and Down buttons
3	N/A	1-15	**Display Intensity** 1=lowest intensity, 15=highest intensity. (Default=12) See also mode 25 for individual display intensity control.
4	N/A	-9999 to +9999 seconds per month or year	**Automatic Time Correction** Enter a negative value to slow the clock down, or a positive value to speed it up. The default scale is seconds per year. Use Mode 37-37 to configure the scale to seconds per month. (Default=0)
5	N/A	0-99 seconds	**Alarm Output Duration** This value determines how many seconds the alarm line is held active. A value of zero disables the alarm. For extended alarm duration beyond 99 seconds, see Mode 45-15. This mode is a multiplier for the alarm duration setting. It allows an alarm duration up to 12 days. (Default=3 seconds) See also Mode 30 for setting individual alarm duration.
6	N/A	0,1	**Sync Pulse Transmit Mode** 0=inactive (Default) 1=active This value determines if the radio sync pulse transmitter will be used when the clock

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			is not connected to an atomic clock and/or a sync pulse is received. When an atomic clock receiver is connected, or a sync pulse is received – this value is ignored and the pulse is transmitted. Example: Send a 100 ms pulse at 3:00 am over radio sync using the alarm relay. Mode 6=1 Mode 16= 3:00 Mode 17= 00 Mode 32-33=1 Mode 37-3=1 Mode 45=8=100
7	N/A	00:00 to 23:59	**Starting Time (hours: minutes)** This value determines the starting hours and minutes of the elapsed timer. The display must be placed in 24 hour mode (i.e. 23-1=24); otherwise, zero will appear as 12:00.
8	N/A	00 to 59	**Starting Time (seconds)** This value determines the starting seconds of the elapsed timer.
9	N/A	00:00 to 23:59	**Ending Time (hours: minutes)** This value determines the optional ending hours and minutes of the elapsed timer. The display must be placed in 24 hour mode (i.e. 23-1=24); otherwise, zero will appear as 12:00.
10	N/A	00 to 59	**Ending Time (seconds)** This value determines the optional ending seconds of the elapsed timer.
11	N/A	-9999 to 9999	**Beginning Count** This value determines the starting count for the event counter
12	N/A	-9999 to 9999	**Ending Count** This value determines the optional ending count for the event counter.
13	N/A	0,1	**Stop Counter or Elapsed Timer, Auto** 0=don't stop at the End, 1=stop at End (Default). 2=don't stop at the End time, but turn on the red signal light in a signal light display The elapsed time or count may either continue when the End value is reached or stop at the End value. If the Start and End times are the same and mode 13=1, then the timer will not start running. This mode is ignored when auto-restart timer is active (32-18=1). A value of 2 is used with an up timer in conjunction with signal lights. When the timer hits the End time, the yellow light turns off, the red light turn on, and the timer continues counting.
14	N/A	0 - 5	**Operating Mode** This value determines the operating function of the clock. 1=Real Time Clock (default), 2=Up Timer, 3=Down Timer, 4=Up Counter, 5=Down Counter.
15	N/A	1-10	**Sync Pulse Output Duration**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
		seconds	This value determines how many seconds the sync pulse line is held active. This impulse sync line is used primarily with sync radio transmitters. (default=2 seconds)
16	N/A	00:00 to 23:59	**System Starting Time – hours / minutes** This value determines the Starting value when the reset line is activated. This applies to once-per-day resets only. See Mode 37-3 for setting the update frequency. (default=3:00 am) Example: Send a 100 ms pulse at 3:00 am over radio sync using the alarm relay. Mode 6=1 Mode 16= 3:00 Mode 17= 00 Mode 32-33=1 Mode 37-3=1 Mode 45=8=100
17	N/A	00 to 59	**System Starting Time –seconds** This value determines the Starting value when the reset line is activated. It also determines when to output a sync pulse. This value is not used to determine the second a pulse is transmitted. (default=0) Example: Send a 100 ms pulse at 3:00 am over radio sync using the alarm relay. Mode 6=1 Mode 16= 3:00 Mode 17= 00 Mode 32-33=1 Mode 37-3=1 Mode 45=8=100
18	N/A	1-24	**Number of Displays** The value sets the total number of four digit displays within a single clock display. For example, an eight digit clock would require a value of 2. A time zone clock with 6, four digit displays, requires a value of 6. (default=2)
19	N/A	0 00 to 9 99	**Software Version Number** Displays the clock software version number. Press the Mode button to exit or let the menu timeout.
20	1-24 display	Display format number	**Display Format** This mode selects the desired display format for each four digit display. A clock with a single four digit display would be 1. An eight digit clock would have display positions 1 and 2, with 1 being the left most four digits. After selecting this mode, select the desired display from 1 to 24 to be changed. **The display format values are:** 1 = ss xx – seconds xx, where xx is blank 2 = hh:mm - hours:minutes 3 = hh(:)mm - hours(:)minutes with blinking colon 4 = yyyy - four digit year 5 = mm dd - month and day 6 = ddd – Julian date or day of the year

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			7 = j j j j – lower four digits of Modified Julian date 8 = x j j j – upper three digits of Modified Julian date 9 = xxxx – blank display 10 = xx ss - xx seconds, where xx is blank 11 = ss.99 – seconds.hundredths of seconds 12 = mm:ss - minutes:seconds 13 = bs sb – seconds centered in a four digit display 14 = dd dy – day of the year, plus last digit of the year 15 = yddd - last digit of the year plus day of the year 16 = nnxd – nn=number of GPS satellites being tracked, d=data reception indicator 17 = dd/mm - day/month for international use 18 = hh:mm > month/day – alternating hours:min and month/day 19 = hh:mm > ddd – alternating hours:min and Julian date (day of the year) 20 = hh.mm – hours and decimal minutes separated by a decimal point 21 = dddd – elapsed days for timer operation – See also Mode 35 and Mode 37-48 22 = hhhh – elapsed hours for timer operation – See also Mode 35 and Mode 37-48 23 = hh:mm > mm dd > yyyy – alternating hours;minutes, month-day, and year. 24 = nnnF – Temperature in degrees F – See also Mode 32-50 25 = nnnC – Temperature in degrees C – See also Mode 32-50 26 = hh:mm > nnnF > nnnC – Alternating hours:minutes, temp F and temp C – See also Modes 37-41, 37-42, 37-43, 37-13 and 32-50 27 = hh:mm – hours up to 99 and minutes for timer operation – set mode 32-2=4 and use Mode 35-2 to set the starting value. 28 = ss xx – seconds xx, where xx is blank – no leading zero 29 = yy xx – yy=last two digits of the year, xx=blank 30 = xx dd – xx=blank, dd= day of the month 31 = hh mm – hours minutes – with leading zero, see mode 32-52 – military format 32 = nnno – temperature in degrees F with degree sign instead of F – Set Modes 32-54=0, 32-29=4 33 = nnno – temperature in degrees C with degree sign instead of C – – Set Modes 32-54=0, 32-29=4 34 = aaa - alpha month plus numeric day of the month (JAN, FEB, MAR, etc.) – Set Modes 32-29=4, 32-63=1 35 = aaa - alpha day of the week (MON, TUE, WED, etc.) Set Modes 32-29=4, 32-63=1 36 = xyyx – last two digits of the year centered on the display 37 = xddd – Julian date or day of the year with leading zero on 3 digits 38 = nnnF > nnnC – alternating temperature between F and C – See also Mode 32-50 39 = 00:00 – idle display mode, zeros do not change 40 = 9999 – most significant four digits of and eight digit number – factory use only 41 = ss.9x – seconds and tenths of a second 42 = dd/xx – day of the month left justified 43 = Axxx or Pxxx – AM/PM indicator 44 = PUAS – Use by auto-increment counter to indicate paused condition 45 = xmmx – minutes centered 46 = hh:mm: - hours and minutes with trailing colon 47 = :ss.99 – seconds.hundredths of seconds with colon – See Mode 37-33 48 = :ssxx – seconds with colon – discrete displays only 49 = 99 99 - special split counter for discrete “goal / actual” counter displays 50 = dd hh - two digit days and hours, no colon, trailing decimal point 51 = mm:ss – minutes:seconds with pm indicator for discrete displays 52 = 9999 – counter End value – used for “goal” on second display 53 = mm dd - month and day, where the day shifts left if less than ten 54 = hh(:)mm > mm:ss – switch from hrs:min to min:sec when hrs=0 55 = dd hh - two digit days and hours, no colon

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			56 = hh:mm – Sunrise hours:minutes 57 = hh:mm – Sunset hours:minutes 58 = hh:mm – Sunrise hours:minutes – with leading zero, no colon – military format 59 = hh:mm – Sunset hours:minutes – with leading zero, no colon – military format 60 = wwdd – Elapsed weeks (0-99) and days (0-7) 61 = hh:mm – Update the hours and minutes only while the alarm output is active 62 = xddx – Day of the Month - centered 63 = PMxx/AMxx – AM/PM using special two digit alphanumeric display 64 = axxx – Military Shipping Code – A-Z, no I or O – alpha display only 65 = 9999 - Elapsed minutes – set Mode 37-6=2 or 3 66 = 9999 – Elapsed seconds – set Mode 37-6=2 or 3 67 = xssx > nnnF > nnnC – Seconds for used with alternating time/temp displays – See also Modes 37-41, 37-42, 37-43, 37-13 and 32-50 68 = xssx > xxxx > xxxx – Seconds for used with alternating displays – See also Modes 37-41, 37-42, 37-43, 37-13 and 32-50 69 = xnn - alpha day of the month – use with display mode 34 – Set Modes 32-29=4, 32-69=1 70= 9999 - Elapsed weeks (0-9999) 71=yyyy – Year – Special year for use in the first zone 87=nnnn – Current day count of the pay enforcement timer
21	1-24 time source	-12 to 12 hours from UTC	**Time Zone Offset** This value determines the number of hours to add or subtract from Universal Coordinated Time. This parameter is usually only used with time zone clocks or clocks containing an atomic clock receiver. See also Mode 33 for forced half hour and one hour offsets. For accurate time zone information, see http://www.timeanddate.com The clock's internal time base is Universal Coordinated Time (UTC, GMT or ZULU). A time zone offset may be applied to each time source
22	1-24 display	1-24 time source	**Time Source** This mode selects the time source (1-24) for each four digit display (1-24). Four and eight digits displays are typically set to the first time source by default. (default=1)
23	1-24 display	12, 24	**12 or 24 hour display format** This mode selects either 12 or 24 hour display format for each four digit display when displaying real time. (default=12) See Mode 48 for 12/24 hour format selection while in timer/counter mode.
24	1-24 time source	0-14	**Daylight / Standard Time** This mode selects the rules to use when automatically switching between Daylight and Standard time. The rules for various locations are: 0=disable daylight time; 1= See Mode 24-n=14 for version 3.64 or later. U.S. (old rule), Canada, Bermuda (default in version 3.63 or older). For the new U.S. rule, use Display Mode 10 and set Mode 45-20=327 and Mode 45-21=1117. See Modes 45-20, 45-21, 45-22 and 45-23. 2=UK, Ireland, Scotland 3=Australia 4=Argentina 5=Israel

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			6=Brazil 7=Egypt 8=Iran 9=New Zealand 10=user defined – see also Mode 52 and Mode 45-20, Mode 45-21 11= user defined – see also Mode 52 and Mode 45-22, Mode 45-23 12=Western Europe 13=Reserved 14=New and old U.S. rule (default version 3.64 or later) This will cause the Tiger to use the old U.S. rule during 2006. In 2007 and later, the Tiger will automatically begin using the new U.S. rule. 20=user defined – see also Mode 52 and Mode 45-30, Mode 45-31 (ver. 4.64) 21=user defined – see also Mode 52 and Mode 45-32, Mode 45-33 (ver. 4.64) 22=user defined – see also Mode 52 and Mode 45-34, Mode 45-35 (ver. 4.64) 23=user defined – see also Mode 52 and Mode 45-36, Mode 45-37 (ver. 4.64) 24=user defined – see also Mode 52 and Mode 45-38, Mode 45-39 (ver. 4.64)
25	1-24 display	1-15	**Intensity- Individual Display** This value determines the intensity in 15 steps for 1 through 24 four digit displays. This mode selection overrides the intensity set in Mode 3 the selected four digit display. (default=0) See also Mode 32-14 – optional Auto Brightness Control.
26	1-24 display	0-9	**Blinking – Individual Display** The mode determines if one or more four digit displays will blink once per second. 0=disables blinking , 1=enables dim blinking, 2=dim blink while alarm active, 3=blinks the display full off and on while alarm active, 4=pulse the display full on and off at the alarm pulse rate. **GPS automatic coordinates for Sunrise/Sunset and Sidereal Time** 5=Set Sunrise/Set coordinates for the selected zone when using a GPS receiver. 6=Set Local Sidereal Time coordinates for the selected zone when using a GPS receiver. **Timer Starting and Ending Times** 7= Display the timer Start Time at the selected display position. 8= Display the timer End Time at the selected display position.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Change Display Intensity While Alarm Active 9=change the display intensity while the alarm is active. The dimming value to use is set by Mode 37-60 (1-15). The intensity will be returned to the original intensity when the alarm goes inactive. See also Mode 37-60, Mode 37-46.
27	1-99 alarm setting	00:00 to 23:59	**Alarm Set Time Hours / Minutes** This mode is used to set the alarm hour and minutes. There are 99 possible settings. Mode 28 optionally sets the seconds. Mode 29 determines the day(s) to activate the alarm(s). A day code must be set to enable alarm. Mode 32-23 enables (default) or disables the alarms. Mode 38 contains alarm schedule assignments. Mode 37-1 determines which schedule is active. Mode 32-16 activates alarms in slave clocks. Mode 49 enables alarm toggle on/off. This overrides momentary alarm activation. Mode 37-2=1 enables snooze function to turn off alarm before the predefined alarm duration has expired. See Mode 34 to activate the alarm at sunrise and/or sunset. See Mode 49 to use the real time alarm settings to control timer functions. See also Modes 28, 29, and 59. In Tiger version 3.75 and later, the number of alarm entries has expanded from 100 to 1000. The 1000 alarm entries are stored in 10 different schedules of 100 entries each. When Mode 37-1=0, alarm schedules will automatically change depending on the active date range. There are 20 date ranges available. The Mode 38 function has changed. It now determines which schedule is active for date ranges defined in Modes 53, 54, 55 and 56. Setting Mode 32-4=4 allows the Timer control button to switch between schedules 0-10 (0 activates date range switching). Press Timer Control to access Mode 37-1. Use the Up and Down buttons to change the schedule from 0-10, then press Timer Control to save and exit.
28	1-99 alarm setting	00 to 59	**Alarm Set Time Seconds** This mode is used to set the alarm seconds. There are 99 possible settings. Mode 29 determines the day(s) to activate the alarm(s). A day code must be set to enable alarm.
29	1-99 alarm setting	0-15 day code	**Alarm Day Code** This mode is used to set the alarm day code. The possible values for each alarm setting are: 0=no alarm, 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday, 8=Everyday, 9=Weekdays,

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			10=Sat/Sun, 11=Mon/Wed/Fri, 12=Tue/Thu, 13=Tue-Sat., 14=Mon-Thu, 15=Mon-Sat Display and time source number 1 is used for alarm activation in multi-display clocks. In addition to day-of-the-week combination codes, Mode 29 also accepts any day combination. A value greater than 128 is treated as a binary command. Days of the week are assigned the following binary numbers: Mon=1, Tue=2, Wed=4, Thu=8, Fri=16, Sat=32 and Sun=64. Any combination of days may be selected by adding their assigned numbers together and then adding 128 to that value. For example, if Mon, Wed and Fri are required, then the value would be 149 (1+4+16+128=149).
30	1-99 alarm setting	0-99 seconds	**Individual Alarm Output Duration** This mode controls individual alarm output duration. Mode 5 controls the output duration for all alarm times. Mode 30 overrides Mode 5 for specific alarm duration values. For example, this mode may be used when one alarm tone needs to be longer or shorter than other alarm tones. A value of zero allows Mode 5 to control alarm output duration. For extended alarm duration beyond 99 seconds, see Mode 45-15. This mode is a multiplier for the alarm duration setting. It allows an alarm duration up to 12 days. See also Mode 32-13, Mode 34 for pulse alarm operation, and Mode 37-56 for wireless alarm systems.
32	1	0-3	**Sync Status** General purpose clock sync indicator using decimal point or blinking colon, 0=disable (default), 1=enable. While enabled, the PM indicator will flicker at the top of the minute if the displayed time is in sync with a radio sync pulse, wired sync data, GPS or CDMA time receivers. 2= if PL or SR sync signals received, then change the display mode to 3 (blinking colon). 3=if SR sync signal lost then blink the colon. Set 32-15=7 to activate the sync indicator on the SR port (Ethernet and wire sync) See also Mode 37-65 to configure the sync status timeout delay.
32	2	0-4	**Sync Status** Special Sync indication using decimal point or blinking colon 0=disabled, 1=turn on decimal when sync received (default), (GPS/CDMA/IRIG-B) 2=turn on decimal when sync is lost, (GPS/CDMA/IRIG-B) 3=blink colon once per second when sync received (must use display mode 2),) (GPS/CDMA/IRIG-B/Ethernet)

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Setting Mode 51-7-n=16 (where n is the alpha character position) will blink one or more alpha characters once per second. Mode 51-7 is used to indicate which character positions are to blink. If no sync source is used, setting Mode 32-2=4 will blink the designated characters continuously. See also Mode 51-7. 4=blink colon once per second when sync is lost (must use display mode 2) (GPS/CDMA/IRIG-B/Ethernet). Setting Mode 51-7-n=16 (where n is the alpha character position) will blink one or more alpha characters once per second. Mode 51-7 is used to indicate which character positions are to blink. If no sync source is used, setting Mode 32-2=4 will blink the designated characters continuously. See also Mode 51-7. See also Mode 37-65 to configure the sync status timeout delay.
32	3	1-24	**Numeric Display Fields** This value determines the number of zone fields to use for a rotating zone display. (default=1) This mode is usually used in conjunction with digital alpha zone lettering. For example, a display that has four physical zones, but needs to display eight zones total, could alternate the display four zones at a time. For this example, Mode 32-3 would be set to 2. Mode 51 controls the zone lettering rotation.
32	4	0-3	**Timer Control Action** 1=resume real time when End time is reached., 2=stay in timer mode when End time is reached, 3=enable split time display (default). 4=enable alarm schedule switching (Tiger version 4.00 or later) If mode 32-4=1, the timer will switch immediately to real time when the End time is reached. If a delay is required before switching back to real time, then set mode 32-4=2 and set mode 32-7 to the minutes of delay before returning to real time. If mode 32-4=2 and mode 32-7=0, then the timer will remain in timer mode when the End is reached. The code blue line overrides the start button. Mode 34-n=99 auto-starts code blue timer from a real time alarm setting. Mode 34-n=99 auto-starts code blue timer from a real time alarm setting. Mode 32-4=3 enables the split time display. The Start and Stop buttons operate the timer. Momentarily pressing the timer control button while the timer is running freezes the display for the number of seconds specified by Mode 32-31. The default is 3 seconds. The timer continues to run while the display is frozen. See also Mode 32-31. See also Mode 32-13 to activate the Timer Control using the real time alarm schedule.
32	5	0,1	**Timer control Timer/Counter Direction** 0=up (default), 1=down.
32	6	0-3	**External Timer Control Line** 0=momentary contact closure, (default)

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			1 or 2=constant contact closure. 3=one time start from real time. 0=A momentary contact closure will switch the display from real time to timer mode, reset the timer, then starts the timer running. Each time the code blue line is pulsed, the timer resets and restarts. A value of either 1 or 2 will cause the timer to run as long as the contact is closed, and stop the timer when contact opens. 1 = timer will be reset each time the timer is started, 2 = time will accumulate and will not reset when timer started. Mode 32-6 overrides the start button. The stop/reset button only resets the timer in this mode. 3 = allows the timer to start from real time once only. The code blue line may be momentarily closed or constantly closed to start the timer. Once out of real time and into timer mode, the code blue button has no effect. The start and reset buttons work normally when a value of 3 is used. Mode 34-n=99 auto-starts code blue timer from a real time alarm setting. See also Mode 26-7 and 26-8.
32	7	0-99	**Timer to Real Time Switch Delay** This parameter determines if or when the timer will resume real time display after the timer is paused. Resetting the timer will cause it to remain in timer mode. For example, pressing Up or Down while the timer is running will pause the timer and it will return to real time after the designated delay period. But, pressing Down again will reset the timer back to the Starting value and the timer will remain in timer mode. 0=disabled, 1-99 = minutes. If 32-37=1, then pressing the timer control button while the timer is stopped or paused, will return to real time. Set mode 32-4=2 when using this mode.
32	8	0-2	**UTC/Local Time Serial Receive** 0 = expects to receive UTC time on RS-422, Sets hours, minutes and seconds (no date) when receiving IRIG-B/SMPTE/ESE time codes. 1 = expects to receive local time on RS-422. This mode is used when the slaves are to display the same time as the master or computer. (default) Sets minutes and seconds only (no hours or date) when receiving IRIG-B/SMPTE/ESE time codes. 2 = This mode is used to cancel daylight savings time when sending time from a computer to a time zone display. Set Mode 45-5 to the time zone of the time received. For example, if CDMA is used to receive the time, set Mode 45-5 to the local offset from UTC. Also, set Mode 32-65 to the local daylight saving rule in version 4.28 and later. The default is U.S. daylight saving time. See also Mode 45-5 to set the incoming time zone offset.
32	9	0,1	**UTC/Local Time Serial Transmit** 0 = transmits UTC time on RS-422, 1 = transmits local time on RS-422. (default)
32	10	0,1	**Timer/Counter Alarm Control** 0 = enable counter/timer alarm, 1 = disable counter/timer alarm.
32	11	0,1	**Mode and Display Format Switching Over Serial Sync Line**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0 = disable auto mode and format switching from RS422, (default) 1 = enable auto mode switch
32	12	0-3	**Serial Sync Transmission** 0 = disable serial sync output (default), 1 = enable serial sync output with variable delay in real time only. Timer and Counter modes transmit serial data at full speed. This also applies to power line sync. 2= enable serial sync output with variable delay in real time, timer and counter modes. This also applies to power line sync. 3=enable serial sync output with variable delay in real time. No sync is transmitted while in timer and counter mode. 4=transmit time sync out SR/ST port only to control radio paging transmitter If Mode 37-59=0 then 35 byte data will also be sent out the GPS port once per minute. In this case, also set Mode 32-15=7. 5= transmit time sync out GPS port only to control radio paging transmitter If Mode 37-59=1 then 35 byte data will also be sent out the SR/ST port once per minute. In this case, also set Mode 32-15=7. Enable this function if the clock is to be a master clock not connected to other time sources. Disable sync output if clock is a slave, or it is receiving time from a PC. Enable if clock is to server as a master clock sending time to other clocks or a PC. **Wireless Master Clock Configuration Examples** 1. Receive Ethernet on SR/ST, transmit time on GPS port. 32-12=5, 32-15=7 – also 21-1=n, 24-1=n, 32-8=0 2. Receive Motorola GPS on GPS port, transmit time on SR/ST port 32-12=4, 32-15=2 – also 21-1=n, 24-1=n, 32-8=0 3. Receive NMEA083 GPS on GPS port, transmit time on SR/ST port 32-12=4, 32-15=11 – also 21-1=n, 24-1=n, 32-8=0 4. Receive CDMA GPS on GPS port, transmit time on SR/ST port 32-12=4, 32-15=10 5. Receive IRIG-B on GPS port, transmit time on SR/ST port 32-12=4, 32-15=4 – also 21-1=n, 24-1=n, 32-8=0 See also Mode 45-9 to alter the sync transmission rate.
32	13	0-94	**Alarm Pulsing** 0 = disable alarm output pulsing for all alarm settings (default). 1-94 = alarm pulses per second for all alarm settings. If this setting is 0, when the alarm sounds, it will remain on for the entire selected alarm duration period. A value of 1 – 94 determines the number of times the alarm is pulsed per second. For example, if the alarm duration is set for three seconds and Mode 32-13 is set for 2 pulses per second, the alarm will turn on and off six times throughout the three second alarm duration period. See also Mode 34 for individual alarm pulsing override and mode 26.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
32	14	0-99	**Auto Brightness Option** 0 = disable optional auto brightness control, 1-99 optional auto brightness offset to all display intensity. This option is typically used in areas where lighting conditions change such as video conferencing rooms and communications centers.
32	15	0-10	**Special Controls and Devices** 0=no special devices present (default), (GPS=9600, SRST=9600/600), 1=WWVB receiver, (GPS=300, SRST=9600/600), 2=GPS receiver, (GPS=9600, SRST=9600/600) . In addition to setting the time and date, coordinate data may be set to calculate Sunrise/Sunset and Sidereal time. See also Mode 26 and Mode 45-14 (ver.3.26) , 3=CDMA receiver, (GPS=9600, SRST=9600/600), 4=SMPTE/IRIG-B/ESE receiver, (GPS=2400, SRST=9600/600), (see also 32-15=13) 5=Thumb Wheel Switch or Keypad on GPS port , (GPS=9600, SRST=9600/600), 6=DATUM Tymserve 2100 GPS receiver, , (GPS=9600, SRST=9600/600), 7=Use the GPS port for 9600 baud serial sync and the SR/ST port for 600 baud power line sync or 9600 baud serial sync. , (GPS=9600, SRST=9600/600), This is the same setup as 0 except serial sync transmits on the GPS port and the sync light will activate when sync data is received. 8=9600 baud SR/ST port and 9600 or 600 baud GPS port (PL transmit only), (GPS=9600/600, SRST=9600) 9=Enable Mode 32-56 and Mode 32-57 – selectable serial port baud rate 10=CDMA receiver (Model MTSMC) – reception of local time is assumed. If Zulu time is required for a multi-time zone display, set Mode 21-x as needed and set Mode 32-8=2 and Mode 45-5 to the local time zone. The clock is updated once per minute at 22 seconds after the minute. Display Mode 16 may be used to monitor reception activity. The left two digits indicate signal quality. 01 is a good signal where 30 is a poor signal. 00 or 99 means no signal is present. The rightmost digit blinks rapidly at 22 seconds after the minute indicating data activity. The CDMA receiver is reset every ten minutes, when the minute ends in zero. If all three digits are solid 0, then there is a problem with the CDMA receiver. 11=NMEA-0183 National Marine Electronics Association (NMEA) standard for communicating GPS data. Only the $GPRMC sentence is used. Data must be valid before the time will be used. The time will update once per hour. The sync indicator will disable after 90 minutes of no GPS data received. Display mode 16 will display 1 1 when the time is received. It does not display the number of satellites. In addition to setting the time and date, coordinate data may be obtained to calculate Sunrise/Sunset and Sidereal time. See also Mode 26, Mode Mode 45-18, 32-64 and Mode 32-69. 12= CDMA receiver (Model MTSMC-C1 – second generation) – reception of local time is assumed. The offset for Daylight Saving Time is included in the time received. The time is updated every minute at 30 seconds after the minute. For use with time zone displays, set Mode 32-8=2 to strip daylight saving time. See also Mode 32-65. 13=Second generation IRIG-B receiver - (GPS=9600, SRST=9600/600) – Irig-B

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			does not provide date informatiuon, only time. Examples: 0=PL transmits or receives on SRST port. 0=Serial sync transmits or receives on SRST port. 0=Serial sync receives on GPS port, Ethernet sync transmits on SRST port. 2=GPS receives on GPS port and PL transmits on SRST port. 2=GPS receives on GPS port and serial sync transmits/receives on SRST port. 3=CDMA receives on GPS port and serial sync transmits on SRST port. 3=CDMA receives on GPS port and PL transmits on SRST port. 4=IRIG-B receives on GPS port and PL transmits on SRST port. 4=IRIG-B receives on GPS port and serial sync transmits on SRST port. 5=Thumbwheel switch on GPS port, serial sync receives/transmits on SRST port. 5=Keypad on GPS port, serial sync receives/transmits on SRST port. 7=Serial sync transmit on GPS port, PL receives on SRST port. 7=Serial sync transmits on GPS port, Ethernet sync receives on SRST port. 8=PL transmit only on the GPS port, Ethernet receives on the SRST port DATUM Tymserve 2100 Notes – Connect the clock to Serial Port A using an RS232 to RS422 converter. Set the Sysplex timer to AUTO ON so it will begin sending time automatically on power-up. Because the year is not included in the data from the Tymserve 2100, the day of the year is not used. Only the hours, minutes and seconds are set. The date may be manually set use the clock's control buttons. Once set, the date will increment normally.
32	16	0-2	**Alarm master/slave control** 0=disable (default), 1=enable separate start/stop and warning alarms 2= combine start/stop and warning alarms into the main relay output When using wired sync, slave clocks may follow the alarm sounding of a master clock. This allows one clock to control the alarm sounding of several alert horns. For example, one master clock could contain the alert horn schedule for the entire plant. Several slave clocks with the AL or AH alert horn options could be controlled by the alarm schedule of the master clock. Both Master and Slave clock must have Mode 32-16 enabled for this method to operate. Set to a value of 2 to activate the slave relay when either start/stop or warning alarms are activated.
32	17	0,1	**Timer Direction Auto-reverse** 0 = do not reverse timer direction when the end time is reached, (default) 1 = When the end time is reached., reverse timer direction from down to up and continue with elapsed time This only applies to a down timer.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Mode 13 is ignored. Direction reverse for medium duration timers requires version 4.50 or later.
32	18	0,1	**Long Duration Elapsed Time** 0 = Starting time and day is not set on power-up, (default) 1 = set the Starting time and day from target time and date on power-up or when exiting the menu. This mode is typically used with long term elapsed timers so that if power is lost, the timer will resume correct operation when the power is restored. While in long duration timer mode, pressing the timer control button will temporarily switch to real time operation. At this point, you can change the time, and by pressing the mode button, you enter the menu system to change the real time month, day and year. Pressing the timer control button again will return to long duration timer mode. **Modes 37-34, 37-35 and 37-36 determines the display format used for long duration timer operation. See also Modes 32-17, 32-21, 37-40.** When counting down to a future time and date, the timer will stop at the target time and date is reached. If you want to pass through the target time and begin displaying the elapsed time from the target time, then set Mode 32-17=1. This will enable the auto-reverse feature. Mode 13 is ignored when Mode 32-17=1. Mode 32-21 allows time updates from an external source to maintain the accuracy of a long duration timer. See also Mode 37-49 for displaying days and hours on an alpha display.
32	19	1-24	**Timer Time Zone** Applies only when Mode 32-18=1. This value must point to the appropriate time zone if a time zone offset value is used. For example, if a GPS receiver is connected to a single display and a time zone offset from UTC is used, then the mode 32-19 value must equal 1. (default=1)
32	20	0-7	**Power Line Communications** 0=disabled(default), 1=transmit, 2=repeater, 3=slave, 4=transmit every ten minutes when the minutes end in 0, 5=receive and transmit every ten minutes when the minutes ends in 5, 6=transmit daily at 04:00, 7=receive and transmit daily at 05:00. Set Mode 32-12=1 to enable power line sync transmit modes. When transmit enabled (1), the clock will send the time over the power line every ten seconds when the seconds ends in '0'. When the repeater is enabled (2), the clock will receive time transmissions, and will transmit every ten seconds when the seconds ends in '5'. The repeater mode is used to extend the power line sync range. When receive is enabled, the clock only receives time transmissions. Mode 32-34, Serial Communications Checksum, is automatically enabled anytime Power Line Sync is enable.
32	21	0,1	**Sync Receive Override**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0=disable (default), 1= Allow time from RS422 sync wire or GPS or CDMA to update real time clock while in timer or counter mode. Only the seconds are updated in counter mode. This increases the accuracy of the elapsed timer. This feature is intended to prevent the timer from running at a different rate than the real time clock. When this mode is active, the timer will not increment unless sync data is received once per second. When sync data is receive, the timer seconds are set to the sync seconds received. A down timer will use the difference between sync seconds received and 59 to produce the correct value. 2=Updates the time and date while in timer or counter mode. A setting of 1 only updates seconds while in counter mode.
32	22	0-9	**Accelerated Timer for Special Effects** Speed up elapsed timer for special effects. 0=disabled (default), 1-9 for faster timer operation.
32	23	0,1	**Scheduled Alarm Time Activation** 0=deactivate scheduled alarms, 1=activate scheduled alarms (default).
32	24	0,1	**Close Alarm Relay When Timer Started and/or Stopped** 0=deactivate (default), 1=activate alarm when timer started, 2=activate alarm when timer stopped, 3=activate alarm when timer started and stopped 4=activate the alarm while the timer is running. Also, set Mode 32-10=0 (default) This selection will cause the alarm relay to activate when the timer is started and/or stopped The alarm will activate for a period determined by the alarm duration value (Mode 5). See also Mode 37-9.
32	25	0,1	**Real Time Clock Chip Installed** 0=DS1307(default), 1=DS1302 – this value is set at the factory.
32	26	0-2	**Dual Relay Output** 0=disabled (default) 1=enabled - Red/Yellow/Green light mode using two relays – also set Mode 43-1=2, 2=enable using internal transistor array, **also set 43-1=1**. This value also enables four channel relay output. If the four channel relay option is installed, then the clock expects at least one alarm setting for relays 2,3 or 4. If relays 2,3 or 4 are not included in any alarm scheduled at this time, then set Mode 59-99=16. This will cause the relays to correctly initialize at power up. When Mode 32-26=1, then set Mode 37-12=0.
32	27	0,1	**Display Driver Selection**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Factory Use Only - display driver type used for numeric displays – 0=TB62709 (default), 1=TB62706
32	28	0,1	**Leading Zero Blanking on Selected Display Modes** 0=disabled, 1=enabled (default) The effected display modes include 4,5,6,7,17,19,21,22,23,30,37,52,55 and some menu functions. This mode also controls the leading zero blanking for the special characters of digital alpha lettering. See also mode 20-31.
32	29	0-7	**Reset and Initialize Display Drivers** This mode periodically resets and initializes numeric display drivers (including alpha digits on the numeric buss). The alpha drivers are not affected. 0=disabled, 1=fast, but only if 4 physical zones or more, 2=fast display reset, reboot daily, 3=reset displays once per min, reboot daily, 4=(default) reset displays once per hour, 5=reset displays once per day, 6=reboot once per day 7=reboot once per hour if sync not received in last hour (do NOT use for wireless transmitters) Alpha digits on the numeric data buss will flicker if refresh rate is too fast.
32	30	0,1	**Special Serial Sync Control Codes** 0=disable, receipt of special control codes over the sync wire, (default) 1=enable receipt of special codes. These codes are typically sent from a PC to the clocks to set and reset long duration elapsed timers. This mode allows other clocks on the same sync circuit to ignore these control codes.
32	31	0-50	**Split Time Timer Display** Number of seconds to display split time. Default is 3 seconds. See also Mode 32-4. Split time is displayed when the timer control button is momentarily pressed while the timer is running.
32	32	0,1	**Auto-Counter Auto-Start** 0=disabled, (default) 1=enable the auto-counter to automatically start running at power-up. The count will resume from the last count saved. See also Mode 45-1.
32	33	0,1	**Midnight Sync Output Using Alarm Relay** 0-disabled (default), 1-enabled - use alarm relay for midnight sync output. Example: Send a 100 ms pulse at 3:00 am over radio sync using the alarm relay. Mode 6=1 Mode 16= 3:00 Mode 17= 00

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Mode 32-33=1 Mode 37-3=1 Mode 45=8=100
32	34	0,1	**Serial Communications Checksum** 0=disabled (default), 1=enabled for real time and timer modes, but unavailable for counter mode. This function improves the reliability when sending and receiving time updates over serial wire sync and power line sync. It may be disabled for compatibility with older clocks. This mode is automatically enabled when power line sync, mode 32-20, is enabled.
32	35	0-2	**Sunrise/Sunset Indication** 0=disabled (default), 1=use display intensity to indicate nighttime, 2=use decimal point to indicate daytime. See also, Modes 32-36, 61,62,63,64 and Display Modes 56,57,58 and 59.
32	36	1-15	**Display Intensity to Indicate Nighttime for each respective time zone** Default intensity is 7. See also, Modes 32-35, 61,62,63,64 and Display Modes 56,57,58 and 59.
32	37	0,1	**Return to Real Time from Timer Mode** 0=disabled (default), 1=Pressing the timer control while the timer is stopped or paused will return the display to real time. See also Mode 32-45.
32	38	0-99	**Number of Seconds to add to PL Sync Received** The time received over power line sync is adjusted by the specified number of seconds to account for propagation delay. (default=2)
32	39	0,1	**Display Absolute Value** 0-disabled (default), 1=enabled – Display the absolute value of various four digit counter and timer display modes. This effectively removes the negative sign when the value is less than zero.
32	40	0-9	**Ethernet Interface NTP Time Correction** 0=disabled (default), 1-9=number of seconds to add to the time received This delay is used in conjunction with Mode 45-17. The value in Mode 32-40 is the number of seconds to add to the time received over serial sync communications. A delay is then applied to add fractional seconds to the time received. This will effectively cancel the delay caused by the time required to send the time over a serial communications line. This mode will not work with once per second sync. Once per minute sync or greater is recommended. See also Mode 32-40, 32-64, 45-17, 70, and 71.
32	41	0,1	**Refresh Display prior to Serial Data Transmission**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0=enabled (default), 1=disabled. When enabled, the displays will be refreshed just prior to sending serial sync data.
32	42	0-99	**Clock Address for PC Control, Moving Message Marquee and Remote Control** (default=0) When sending control data to clocks, individual clocks or moving message displays may be addressed by including the clock's address. If the address value sent equals the value specified in this mode, then the clock will accept the data packet. For PC control, all clocks may be addressed by sending address 0. For addressable remote control operation, hold down the Mode button. The display will flicker. Continue holding down the Mode button until the clock's address appears then release the mode button to access that clock's menu system. See also Mode 37-29, 32-49, 32-55 and 32-59.
32	43	0,1	**Ethernet Interface Flash Memory Auto-Save** 0=disabled, 1=enabled (default) – This parameter disables or enables the automatic memory save when an Ethernet command is issued (Mode 71 commands).
32	44	0-5	**Moving Message Command Repeater** 0=Moving Message commands are ignored, 1=The moving message data, without header, address and footer, is sent out the GPS port. Data received on the SR/ST port will only be sent out the GPS port if the address received equals zero or the address received equals the address set in mode 32-42. , (default) Tiger version 4.06 or later. Increase the inter-packet delay in the Windows control program when sending to a wireless master clock. 2=The complete 35 byte moving message string received on the SR/ST port is repeated out the GPS port. 3= The moving message data received on the SR/ST port is sent out the SR/ST port. The data will only be sent out the SR/ST port if the address received equals zero or the address received equals the address set in mode 32-42. , 4=The complete 35 byte moving message string received on the SR/ST port is repeated out the SR/ST port. 5= The moving message data, without header, address and footer, is sent out the SR/ST port. Data received on the SR/ST port will only be sent out the SR/ST port if the address received equals zero or the address received equals the address set in mode 32-42. , (default) Tiger version 4.06 or later. Increase the inter-packet delay in the Windows control program when sending to a wireless master clock. To send decoded data out the GPS port and raw data out the SR/ST port, set 32-44=1, remove pin 2 from the RS422 chip on the SR/ST port and jumper SR/ST.
32	45	Display format number	**Switch to Real Time Display Format** This mode determines which display format to use when switching from timer to real time display. Available in version 3.59 or later. If 0, the all displays modes will be restored. If greater than 0, then the value supplied will be used in zone one and zones 2 and 3 will be blank.
32	46	0,1	**Ethernet Interface Hardware Reset on Power-up** A reset is no longer required with Ethernet version 5.8 or later. This mode was removed in Tiger version 3.45.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0=disabled, 1=enabled using port L35 (default) Mode 32-60 must equal 0 to use the port reset feature (3.11).
32	47	0-3	**Repeat Clock Control Commands** Control commands coming in the SR/ST port are repeated out the ST port, GPS port, or both. 0=disabled (default), 1=SR/ST port , 2=GPS port, 3=both.
32	48	0,1	**Ethernet Control Port** 0=SR/ST port (default), 1=GPS port. For example, if an Ethernet interface is connected to the SR/ST port and the GPS port is used to send serial sync data, set Mode 32-15=7 to set both ports to 9600 baud, and Mode 32-48=0.
32	49	0-99	**Menu Lockout Timer** – (1=default) This mode determines the number of minutes from the last menu access before the buttons are locked out again. This mode can be used in conjunction with the remote control address Mode 37-29. See also Mode 32-42 and 32-55.
32	50	0,3	**Temperature Sensor** - 0=disabled (default), 1=enable temperature sensor. 2=enable temperature sensor and send temp data over serial sync port. 3=receive temperature data from serial sync port. Available in real time only and with serial wire sync and Ethernet UDP, but not PL sync. See also Mode 45-16 and Mode 46-1 See also display modes 24, 25, 26, 32, 33 and 38.
32	51	0,1,2	**Timer Transmit Control** – 0=disabled (default), 1=enable using the SR/ST port, 2=enable using the GPS port. This mode allows timer control commands to be sent out the serial sync ports to control other timers. The timers will not be synchronized again once they are started. For timers that require synchronization to the second over long periods, the ultra-high precision oscillator option is recommended. When the Reset button is pressed, the Start, End and warning times will be sent along with a command to reset the timer. Mode 32-12, serial sync transmit, should be disabled, otherwise it may interfere with the commands. When Mode 32-51 is enabled, pressing the Up button on the master clock will send a timer Start command to the slave clock(s). Pressing the Down

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			button will send a timer Reset command. If Mode 37-10=1, then the master clock will reset when the Down button is pressed just like the slave clock. Pressing the Timer Control button will simulate pressing the Timer Control button on the slave clock(s). The slave clocks must be configured as timers and are typically configured identically as the master, except for Mode 32-51. See Mode 37-38 to increase timer accuracy.
32	52	0,1,2	**Display Colon -** 0=disabled, 1=(default) enable colon in display mode 31, 58 and 59. 2= enable the colon and decimal point in display mode 12.
32	53	0,1	**Counter Actual/Goal Difference** – 0=place counter actual minus goal in display position 3 (default), 1=place goal minus actual in display position 3.
32	54	0,1	**Digital Lettering Type** - 0=alpha message digits are 16 segment type, 1=5x7 type (default) This parameter determines what type of displays are used with digital message displays or digital zone lettering in a time zone display. 16 segment type displays use a group of 16 segments to form characters; whereas, 5X7 type displays use a matrix of 35 dots to form alpha-numeric characters. Upon exiting Mode 32-54, the clock will save any changes, exit the menu and re-initialize the message display. If a clock has only digital lettering and the clock is restored back to factory defaults, control of the clock will be lost. To regain control of a clock using 16 segment lettering, hold down the Up button while power is applied. To regain control of a clocks using 5x7 lettering hold down the Timer Control button while applying power. This will provide enough control to restore customer defaults.
32	55	0,1	**Infrared Remote Control When Using Multiple Clock/Processors** 0=disabled (default), 1=enabled A display with multiple processors or multiple stand-alone displays may be configured such that when the mode is pressed, the right-hand decimal point will illuminate on the active display. When the light is on, all buttons function normally on that display. The buttons are disabled on all other displays. To access another display, press the mode button multiple times until the desired display's decimal point illuminates. When the display is powered on, the display with clock address 1 (Mode 32-42) will be the active display. If it is desired to not have any display active when first powered on, don't use clock address 1. **To configure multiple processors to use a single infrared remote control, set:** **Mode 32-42 = n** (enter an address from 1-99 for each respective processor) **Mode 32-49 = 0** – No menu lockout timer is required **Mode 32-55 = 1** – Enable multiple processor quick access **Mode 37-29 = 1** – Control button lockout must be set to 1, 4, 5 or 6

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			The Mode button should be pressed at a rate of approximately 2 times per second when moving from display to display. To disable the control buttons on all displays, press the mode button until no decimal indicators are illuminated.
32	56	5,6,8,10,12, 14,16,18,20, 22	**SR/ST Serial Port Speed** – default=14 (9600 baud) – Mode 32-15=9 to enable. 5 = 300 Baud 6 = 600 Baud 8 = 1,200 Baud 10 = 2,400 Baud 12 = 4,800 Baud 14 = 9,600 Baud 16 = 19,200 Baud 18 = 38,400 Baud 20 = 76,800 Baud 22 = 153,600 Baud
32	57	5,6,8,10,12, 14,16,18,20, 22	**GPS Serial Port Speed** – default=14 (9600 baud) – Mode 32-15=9 to enable 5 = 300 Baud 6 = 600 Baud 8 = 1,200 Baud 10 = 2,400 Baud 12 = 4,800 Baud 14 = 9,600 Baud 16 = 19,200 Baud 18 = 38,400 Baud 20 = 76,800 Baud 22 = 153,600 Baud
32	58	0,1	**Alpha Digital Lettering Menu System** - 0=disabled (default), 1=enabled This mode displays the menu system on the digital alpha-numeric lettering in addition to the normal numeric digits. This allows the alpha digits to be used without numeric time digits. See Mode 32-54 to configure the type of digital lettering used. If a clock has only digital lettering and the clock is restored back to factory defaults, control of the clock will be lost. To regain control of a clock using 16 segment lettering, hold down the Up button while power is applied. To regain control of a clocks using 5x7 lettering hold down the Timer Control button while applying power. This will provide enough control to restore customer defaults.
32	59	0,1	**Accept or Ignore Global PC Commands** – 1=accept (default) 0=reject global address PC commands PC commands received with an address of 0 will be ignored if Mode 32-59=0. This mode also affects global moving message commands received. See also Mode 32-42.
32	60	0-3	**SR/ST Port Operation and Ethernet Hardware Reset** 0=Ethernet hardware reset (default), 1=ST - receive and local processor transmit

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			2=SR/ST - hardware repeat, no local processor transmit 3=SR/ST - hardware repeat, with local processor time transmission on ST port (v4.48) For Tiger PC board version 4.5 or older, always set Mode 32-60=0. For Tiger PC board version 4.6 or later, setting Mode 32-60=2 will immediately repeat all serial data received on the SR port out the ST port. The local processor cannot transmit on this port in this mode. The local Tiger processor receives the data, but will not be able to transmit. Setting Mode 32-60=1 allows the local processor to receive and transmit data. The data will not be repeated out the ST port unless the processor is configured to do so. If the data is repeated, a small delay will be introduced due to the time required to process the data. When Mode 60=3, all serial data received on the SR port will be hardware repeated out the ST port, and local time transmissions will also be sent out the ST port. For example, a large time zone display with digital lettering and IRIG-B on the GPS port can repeat all commands received on the SR port out the ST port to other clocks, and also send time out the ST port. For a clock system, it is recommended to set Mode 32-60 to 2 to immediately repeat the data. Each clock will regenerate the data stream and no delays will be introduced. For configurations where the local clock must transmit, as in the case of a master clock, then set Mode 32-60=1 to allow the clock to transmit. See also Mode 32-46 (3.11 5/10/040)
32	61	0,1	**Counter/Timer Control Using Real Time Alarms** – 0=Disabled (default) 1=Enabled – The real time alarm schedule entered using Modes 27, 28 and 29 will be used to activate timer functions. Mode 49 is used to specify the timer functions required. Auto-incrementing counters are also supported. Alarm groups are not supported. Mode 49-n=3 – Counter/Timer Reset Mode 49-n=4 – Counter/Timer Pause / Resume (same as Up button) Mode 49-n=5 – Timer Reset and Start (same as Timer Control button) For example, to automatically start the timer at 8:00 am, pause for lunch between 12:00 noon and 1:00pm, and stop the timer at 5:00pm, set Mode 27-1=8:00, Mode 27-2=12:00, Mode 27-3=13:00 and Mode 27-4=17:00. Set Mode 29-1 through Mode 29-4 to the desired day of the week codes. Set Mode 32-61=1 to enable the automatic timer control feature. Set Mode 49-1=5 to start the timer at 8:00. Set Mode 49-2=4 to pause the timer at 12:00 and Mode 49-3=4 to resume the timer at 13:00. Set Mode 49-4=4 to stop the timer at 17:00. Alarm schedule switching (manual or by date range) is also supported. See Modes 37-1 and 38.
32	62	1-24	**Serial Transmit Zone** – 1 (default) – 24 – Zone to use for serial transmit time data. This applies to serial two wire Ethernet, and power line sync.
32	63	0,1	**Display Load Line Level** 0=high (default) 1=low – must be used when 16 segment displays are used on the numeric data port. A value of 0 is used when large amounts of digital lettering are used and/or a large number of display zones. This will help reduce display flickering due to interference

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			on long data cables. A value of 1 is required when use 16 segment digital lettering on the numeric data port.
32	64	0,1	**Serial Polling Rate** 0= (default) 1=Increase the polling rate for serial data received on the SR/ST port. This will increase the reliability of serial data received on slow displays. See also Modes 32-40 and 45-17.
32	65	0-99	**CDMA Daylight Saving Time Rule** 0= No Daylight Saving Rule 10= U.S. Daylight Saving Rule (default) This value determines the rule to be used when stripping daylight saving time from the time received for a time zone display using with CDMA receiver. The daylight saving offset is removed to allow converting local time to UTC.
32	66	0-9	**Daylight Saving Time End Hour Offset** Default=2 (default=2 for 02:00) This mode determines the hour to switch between standard and DST for custom DST rules, both North and South of the Equator, including leap years.
32	67	0-9	**Daylight Saving Time Begin Hour Offset** Default=2 (default=2 for 02:00) This mode determines the hour to switch between standard and DST for custom DST rules, both North and South of the Equator, including leap years.
32	68	0-5	**Time Reception Port Control** 0= (default) receive time on both ports if configured otherwise, does not receive remote GPS time packet either over the air or from Ethernet. 1= receive time on SR/ST port only, does not receive remote GPS time packet either over the air or from Ethernet. 2= receive time on GPS port only, does not receive remote GPS time packet either over the air or from Ethernet. 3= do not receive time on any port, does not receive remote GPS time packet either over the air or from Ethernet. 4= receive time on GPS port from a remote GPS receiver over the air. 5= receive time on SRST port from a remote GPS receiver using the Ethernet cable (SRST port). NTP time and other standard time packets will be ignored. 6=receive standard time packets (NTP) over the Ethernet port and time packets over the air from a remote GPS receiver. The configuration provides a redundant time source. If one of the time sources provides incorrect time, the master and slave clocks may jump periodically between the two times. This configuration does not affect the reception of commands, only the reception of

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			time broadcasts.
32	69	0,1	**NMEA GPS Operation** 0 = Configure GPS receiver to send NMEA GPS data continuously 1 = (default) Configure GPS receiver to send NMEA GPS data once every five seconds at the top of the hour for one minute or until a valid time update is received. Once the GPS receiver is connected to a clock with Mode 32-69 set to 1, the GPS receiver will be disabled until the top of the hour. The GPS receiver will no longer work with older clocks that expect a continuous data stream. To reconfigure a GPS receiver to work with older clocks, set Mode 32-69 to 0, connect the GPS receiver, then cycle power. This will configure the GPS receiver to transmit GPS data continuously.
32	70	0,1,2,3	**Enable Serial Port Time Sync Transmissions** 0=disable both serial ports 1=enable SR/ST port (default) 2=enable GPS port 3=enable both serial ports This mode is useful to limit time sync transmissions from going out the ports that could interfere with other devices attached to the port. For example, a clock configured with Ethernet on the SR/St port and 900 MHz transmitter on the GPS port should only send time sync out the GPS port, not the SR/ST port. Therefore, Mode 32-70 should be set to 2.
32	71		**Reserved**
33	1-24 time source	0-5 code	**Force Time Advance** This mode optionally forces a 30 to 60 minute time advance. 0= no advance (default), 1=30 minute advance, 2=60 minute advance, 3=30 minute advance during daylight savings time only, 4=60 minute advance during daylight savings time only, 5=45 minute advance. This is used in areas that have a 30 to 60 minute advance over the area time zone. For example, Mumbai, India's time zone offset is +5:30. To configure the time zone, first set the respective zone to +5 hours using Mode 21. Then set the same respective zone in Mode 33 to 1.
34	1-99 alarm setting	0-94 seconds 95=reboot, 96,97,98=sunrise-sunset alarms 99-code	**Alarm Pulse – Individual and Auto-Start Timer (Timer Control Line)** This Mode sets the number of times the alarm is pulsed per second for each alarm setting. It overrides Mode 32-13 (all alarm pulsing) - 0 = disable individual alarm output pulsing (default). 1-94 = alarm pulses per second for individual alarm settings.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
		timer auto start	**Reboot Clock Program at the Alarm Time** **95=** Reboot the clock software at the alarm time. This will also perform a hardware reset on the Ethernet interface. **Sunrise and Sunset Alarms** **96=** Activate the alarm at the specified sunrise and sunset time. See Modes 61, 62, 63 and 64 to configure the sunrise and sunset parameters. See also Mode 29, day codes. **97**=Activate the alarm at the specified sunrise time. See Modes 61, 62, 63 and 64 to configure the sunrise and sunset parameters. See also Mode 29, day codes **98=** Activate the alarm at the specified sunset time. See Modes 61, 62, 63 and 64 to configure the sunrise and sunset parameters. See also Mode 29, day codes **99 = Timer Control Activation by Alarm Schedule** If this setting is 0, when the alarm sounds, and Mode 32-13=0, the alarm will remain on for the entire selected alarm duration period. A value of 1 – 94 determines the number of times the alarm is pulsed per second for the individual alarm setting selected. For example, if the alarm duration is set for three seconds and Mode 34 (1-98) is set for 2 pulses per second, the alarm will turn on and off six times throughout the three second alarm duration period. A value of 99 will activate the timer control line at the alarm time setting. This feature is used to automatically switch from real time to timer operation at the specified time. See also Mode 32-13 for alarm pulsing all alarm settings.
35	1=days 2=hrs	-9999 to 9999	**Elapsed days and hours Starting value** While in timer mode, the number of days are counted. The day counter is incremented every 24 hours elapsed time or at midnight as determined by mode 37-6. Elapsed days may be displayed using Mode 20-21. For down-timers, use a negative day value. For up-timers, use a positive day value. Elapsed hours may be displayed using Mode 20-22. Position 1 = elapsed days Starting value (-9999 to 9999 days), and position 2 = elapsed hours Starting value (-9999 to 9999 hours). Pressing the Down (reset) button resets the day or hour counter to the value set in Mode 35. 0= default See also Mode 37-48 and Mode 51. See also Mode 37-49 for displaying days and hours on an alpha display. Direction reverse in medium duration timers requires version 4.50 or later.
36	1-24	Display format number	**Timer Control Display Format** When the code blue line is enabled, the display format will optionally change to the value specified in Mode 36 for each respective display position. If the mode value is zero, the default display mode will be used. See Mode 20 for a list of available display modes. See also Mode 26-7 and 26-8 to display the Start and Ending times.
37	1	1-99	**Active Alarm Schedule** (default=1) This parameter determines which (1-98) alarm schedules is active. Setting Mode 37-1=0 will cause the date ranges to be used. Use Mode 53,54,55 and

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			56 to change date ranges. Alarm group 1 is different than the other 19 alarm groups. If no date range is active, then group is 1 the default. This feature reduces the number of alarm entries required in some schedule situations. See also Mode 38 – Alarm Schedule Group Assignment. A value of 99 in mode 38 will cause the alarm to activate in all schedules if the day code matches the current day. In Tiger version 3.75 and later, the number of alarm entries has expanded from 100 to 1000. The 1000 alarm entries are stored in 10 different schedules of 100 entries each. When Mode 37-1=0, alarm schedules will automatically change depending on the active date range. There are 20 date ranges available. The Mode 38 function has changed. It now determines which schedule is active for date ranges defined in Modes 53, 54, 55 and 56. Setting Mode 32-4=4 allows the Timer control button to switch between schedules 0-10 (0 activates date range switching). Press Timer Control to access Mode 37-1. Use the Up and Down buttons to change the schedule from 0-10, then press Timer Control to save and exit.
37	2	0-2	**Panic Alarm Button** 0=not active (default), 1=code blue line toggles alert horn on and off. Mode 39-1 optionally determines the number of seconds the alarm will sound before automatically turning off. If the timeout value is 0, the alarm will sound until the code blue line is momentarily closed. For alarms in real time mode, this setting will cause the timer control button to act as a snooze button, turning off the alarm before the alarm period has expired. 2=alert horn will sound as long as code blue line is closed. The Panic Alarm function overrides all other code blue functions. This mode may used with real time alarms to turn off the alarm before the predefined alarm duration expires.
37	3	0-12	**Sync Pulse Period** This mode determines the frequency at which the clock sends or expects to receive sync pulses. The values are: 0=disabled (default), 1= receive or transmit once per day, Example: Send a 100 ms pulse at 3:00 am over radio sync using the alarm relay. Mode 6=1 Mode 16= 3:00 Mode 17= 00 Mode 32-33=1 Mode 37-3=1 Mode 45=8=100 2= receive or transmit once per hour, 3= receive or transmit once per minute, 4=enable receiving bipolar minute impulse, 5=enable receiving 59th minute sync – set 21-1=0, 24-1=0 6=enable receiving seconds impulse - used for AC power line sync,

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			7=receive counter pulses from port L35. Do not use when SR/ST serial sync IC and 7400 IC is installed. Set Modes 32-46=0 and 32-60=0. 8=send counter pulses from increment (up) button out port L35. Do not use when SR/ST serial sync IC and 7400 IC is installed. Set Modes 32-46=0 and 32-60=0 9=enable 59th minute sync output using the channel 1 alarm output relay. 10= enable 59th minute sync output using the channel 2 alarm output relay. Set Mode 32-26=2 and 43-1=1 to activate the four channel relay output. 11= enable 59th minute sync output using the channel 3 alarm output relay. Set Mode 32-26=2 and 43-1=1 to activate the four channel relay output. 12= enable 59th minute sync output using the channel 4 alarm output relay. Set Mode 32-26=2 and 43-1=1 to activate the four channel relay output. **Sending 59th Minute Sync Impulse** - The clock must have the relay output option installed (AL). A pulse will be output hourly at xx:57:54 for 8 seconds, except for 05:57:54 and 17:57:54 for 14 seconds. If a four channel alarm relay is installed, Mode 32-26 must be set to 2 to enable the four channel relay. Any one of the four alarm channels may be used for 59th minute sync output by selecting Mode 37-3=9 through 37-3=12. Digital clocks receiving the 59th minute sync protocol must be within 6 hours of the correct time and date before the 59th minute correction protocol can force them to the correct time. **When the sync frequency is set to once per day** (1), the time values at Modes 16 and 17 are used to trigger sync transmission and the Starting value. When the sync frequency is set to once per hour (2), a sync pulse is transmitted hourly at 30 minutes after the hour. Hours remain unchanged and seconds are set to 0. When the sync frequency is set to once per minute (3), a sync pulse is transmitted every minute at 30 seconds after the minute. Hours and Minutes remain unchanged.
37	4	0-99	**Display Refresh Delay** value 0-99 (default=0) – Display refresh delay in tenths of a second. The mode is for factory use only.
37	5	0,1	**Zone Number Identifier** This mode is used to identify the zone number of each four digit display in clocks that use multiple four digit displays. 0=inactive(default), 1=displays the respective zone numbers of each display. Press the Mode button to cancel zone display and return to the normal time display.
37	6	0,1	**Elapsed Days and Hours Modifier** 0 = true elapsed time in days where one day equals 24 hours or 3600 minutes or 86,400 seconds, 1 (default) = causes the elapsed day counter to always change at 00:00 (midnight), regardless of the number of hours elapsed. When displaying elapsed hours, 1 = hours will increment at 00 minutes, regardless of the time that has elapsed. 2 = display elapsed seconds up to 99,999,999 using counter display modes 66 and 40. 3 = converts the displayed time to seconds after midnight – can be used in real time. Use with display modes 40 and 66.
37	7	0,1	**Daylight Saving Active Indication**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0 (default)=disabled, 1=enabled The right most decimal point will illuminate when this flag is active and a specific zone is displaying daylight savings time. Display modes 2 and 3 are used to display the daylight savings indicator.
37	8	0,1	**Auto-restart Timer** 0 (default)=disabled, 1=enabled – This parameter will cause the timer to reset and restart when the End time is reached and the alarm has timed-out (finished sounding). The Timer Control button must be configured to enable this feature. To enable Timer Control, Set mode 32-4 and 32-5 as required. Set Mode 13=1 to stop at the ending time.
37	9	0-99	**Timer Start Button** 0= with the timer stopped, pressing the start button starts the timer when the button is released. Pressing the start button again pauses the timer. Pressing the start button once more resumes timing. 1=With the timer stopped, pressing the start button starts timer as soon as the button is pressed. Pressing the start button again has no effect. Pressing the Stop/Reset button will pause the timer. 2-99 = With the timer stopped, pressing the start button starts timer as soon as the button is pressed. After 2-99 seconds have elapsed since the timer was started, pressing the start button again will stop the timer. Further presses have no effect. The reset button is used to reset the timer. Once the timer is paused or reset, it returns to leading edge operation. See also Mode 37-19 for single line timer control, and Mode 32-24 for alarm activation when the timer is started and/or stopped.
37	10	0-3	**Timer Reset Button** 0= Pressing the reset button once stops the timer, pressing it again resets the timer. 1=Pressing the reset button once stops and resets the timer. 2= Pressing the reset button once stops the timer, pressing it again for more than 5 seconds resets the timer. 3= Pressing the reset button once stops the timer, pressing it again for more than 5 seconds returns the timer to real time display.
37	11	0,1	**Timer Reset Mode** 0= When the timer is reset, the timer is set to the Starting time. 1=When the timer is reset, the timer is set to the Ending time.
37	12	0,1	**Timer Alarm Control** 0=disabled, 1=turn off alarm when the timer reset (down) button is pressed (default). This mode is used with modes 32-24=1, 32-26=1, and various code blue modes. When mode 32-26=1, then set mode 37-12=0.
37	13	0-3	**Counter Auto-increment rate period** 0=tenths of second, 1=second (default),

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			2=minutes, 3=hours – see also Modes 45-1, 45-2 The Up/Start/Pause button pauses and resumes auto-increment. Mode 37-13 also acts as a multiplier for Modes 37-41, 37-42 and 37-43. For example, if 37-13=10, then setting Mode 37-41=99 would cause a 99 second delay.
37	14	0-11	**Timer/Counter Change Start/Change End Button Configuration** This setting enables or disables the optional Timer/Counter Change Start/Change End shortcut buttons. This set of buttons allows changing the Timer/Counter Change Start /Change End values without going through the menu system. These optional buttons are in addition to the standard Mode, Up and Down buttons. 0=disable, 1= (seconds disabled) When changing timer Change End/ Change Start times, press the Start or End button once to change the hours and minutes. Press the same button again to return the display to the previous display mode. 2=(seconds enabled) - When changing timer Change End/ Change Start times, press the Start or End button once to change the hours and minutes. Press the same button again to change the seconds. Press the same button once more to return the display to the previous display mode. 3=(seconds only) - When changing timer Change End/ Change Start times, press the Start or End button once to change the seconds. Press the same button again to return the display to the previous display mode. 4=Enable Salary Calculator for auto-incrementing salary counter. See Mode 45-6, and 45-7. 5=Alternate Start Time – If the Reset line is open Mode 27-1 sets the Starting hours and minutes, Mode 28-1 sets the Starting seconds. If the Reset line is closed to ground, Mode 27-2 set the Starting hours and minutes, Mode 28-2 sets the Starting seconds. 6=Alternate End Time – If the Change End line is open Mode 27-3 sets the Ending hours and minutes, Mode 28-3 sets the Ending seconds. If the Change End line is closed to ground, Mode 27-4 set the Starting hours and minutes, Mode 28-4 sets the Starting seconds. 7= Alternate Start /End Times – If the Reset line is open Mode 27-1 sets the Starting hours and minutes, Mode 28-1 sets the Starting seconds. If the Reset line is closed to ground, Mode 27-2 set the Starting hours and minutes, Mode 28-2 sets the Starting seconds. If the Change End line is open Mode 27-3 sets the Ending hours and minutes, Mode 28-3 sets the Ending seconds. If the Change End line is closed to ground, Mode 27-4 set the Starting hours and minutes, Mode 28-4 sets the Starting seconds. 8= Alternate Starting Times – This mode provides up to four alternate Starting times. If the Reset line is open Mode 27-1 sets the Starting hours and minutes, Mode 28-1 sets the Starting seconds. If the Reset line is closed to ground, Mode 27-2 set the Starting hours and minutes, Mode 28-2 sets the Starting seconds. If the Change End line is open Mode 27-3 sets the Starting hours and minutes, Mode 28-3 sets the Starting seconds. If the Reset line is closed to ground, Mode 27-4 set the Starting hours and minutes, Mode 28-4 sets the Starting seconds.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			9= Medium Timer Reset Days, Hours and Minutes - The Change Start button is used to set the timer reset days. The Change End button is used to change the timer reset hours and minutes. When changing the medium duration timer Reset times, press the Start or End button once to change the days, hours and minutes. Press the same button again to return the display to the previous display mode. Use with display modes 2, 3, 21, 50, 55 and 60. 10= Medium Timer Reset Hours - The Change Start button is used to set the timer reset hours. The Change End button is used to change the timer reset minutes. When changing the medium duration timer Reset times, press the Change Start button once to change the hours. Press the same button again to return the display to the previous display mode. Use with display modes 22, 27, 65 and 66. 11 = Multiple Reset Values - Pressing the Change Start button will display the current predefined timer reset value. The Up and Down buttons may be used to move up and down through a list of up to 99 reset values. Press the Change Start button again to use the reset value displayed and exit. The Hour and Minute reset values are stored in Mode 27-1 to 27=99. As of Version 4.51, the Second reset values are stored in Mode 28-1 to 28-99. If Auto-resume Elapsed Time is enabled (mode 32-18=1), the Reset button changes the Ending month/day and year. The Change End button displays the Ending hour, minute, and optionally, seconds. Press the Reset button to display the month and day. Use the Up or Down buttons to change the value displayed. Press the Reset button again to display the year. Press the Reset button once more to return the display to the previous display mode. Press the Change End button once to display the hour and minute. Use the Up or Down buttons to change the value displayed. If 37-14=2, press the Change End button again to display the seconds. Press the Change End button once more to return the display to the previous display mode. When changing counter End/ Start values, pressing the Change Start or Change End button once allows changing the Start/End value. Pressing the same button once more returns the display to the previous display mode. To accelerate setting four and eight digit counters, see Mode 57.
37	15	Display format number	**Counter Display Mode – Least Significant Four Digits** (default = 4), This value determines the display mode for the least significant four digits of an eight digit counter value. See also Mode 37-21.
37	16	0-2	**Counter Auto Reset at Ending Value** 0 (default) disabled, 1= When the Ending value is reached, the counter will be reset back to the starting value. 2=When the Ending value is reached, the counter will be reset back to the starting value plus one count.
37	17	0,1	**PM Indicator** 0=disabled, 1=enabled (default) – This applies to most display modes where hours and minutes are displayed.
37	18	0,1	**Production Counter "Goal" Set** 0=disabled(default), 1=While in counter mode, the up and down buttons run the count forward or

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			backward. This is used to set a Goal value in an Actual/Goal production display.
37	19	0,1	**Timer Start/Stop/Reset Single Line Control** 0=disabled (default), 1=Pressing the Start button when the timer is stopped starts the timer. Pressing the Start button again pauses the timer. Pressing the Start button once more resets the timer and starts it running again. See also Mode 37-9.
37	20	0,1	**Time Zone Digital Lettering Manual Frame Change** 0=disabled (default), 1=code blue button will increment through pre-configured time zones. 2-24 = frame to start with on power up. This mode is used with alpha zone lettering. See also Mode 32-3 and Mode 51. When 37-20=1, automatic zone switching is disabled. When an array of clocks use frame rotation and each clock is to display a different, synchronized frame, a value of 2-24 may be used to determine what frame is used at startup. All clocks would need to be powered up at the same time, or a single clock can be powered up with the knowledge up what frame it will begin with.
37	21	Display format number	**Counter Display Mode – Most Significant Four Digits** Default counter display mode for the most significant four digits of an eight digit counter value (default=40). See also Modes 36 and 37-15.
37	22	1-24	**Alpha Time Character Time Zone Source** (0-24) - 0 = disabled (default) - This mode is used to specify which time zone is to be used for special alpha time characters. Mode 51-6 is used to assign multiple unique time zone offsets to special alpha characters. Mode 37-22 must be 0 for Mode 51-6 to take effect; otherwise, Mode 37-22 will override any Mode 51-6 settings. See mode 51-1 for a list of special alpha time characters. See also Mode 51-6.
37	23	0,3	**Serial Sync Data Protocol** 0=seven data bits (old protocol), 3= (default) eight data bits (new protocol)
37	24	1-24	**Alarm Schedule Time Zone Source** 1 (default) This mode determines which time zone will be used for alarm schedules.
37	25	0,1	**Display Colon on Date Display Mode 53** 0=disable(default), 1=enable
37	26	0-24	**Keypad or Thumb Wheel Switch Configuration** Set Mode 32-15=5 to enable Thumbwheel or Keypad switches. The optional Keypad or Thumb Wheel switch may be configured to perform a variety of functions. Unpredictable operation may result from entering invalid values. For example, entering hours and minutes greater than 23:59 may cause incorrect operation. Keypad switch operation – 12 and 16 button keypad switches are available. The "*" and "#" keys are available on both keypad styles. Some configuration parameters listed below allow entering more than one parameters. For example, item 5 allows the entry of the timer beginning and ending times. To enter the beginning time,

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			press the "*" button before entering the hours and minutes. To enter the ending time, press the "#" before entering the ending time. Once either "*" or "#" is pressed, the keypad stays in the selected entry mode until another mode is selected. The "*" is the default on power up. The required number of installed thumb wheel digits are listed with each parameter below. **Keypad or Thumb Wheel configuration parameters:** 1= 4 digits – Starting hours and minutes - hh:mm (keypad "*") 2= 6 digits – Starting hours, minutes and seconds - hh:mm:sec (keypad "*") 3= 4 digits – Ending hours and minutes - hh:mm (keypad "*") 4= 6 digits – Ending hours, minutes and seconds - hh:mm:sec (keypad "*") 5= 8 digits – Starting (keypad "*") and Ending (keypad "#") hours and minutes - hh:mm 6= 12 digits – Starting (keypad "*") and Ending (keypad "#") hours, minutes and seconds – hh:mm:sec 7= 4 digits – Ending month/day (keypad "*") 8= 6 digits – Ending month/day/year - mm/dd/yy (keypad "*") 9= 10 digits – Ending hours/mintes (keypad "*") month/day/year - hh/mm/MM/DD/YY (keypad "#") 10= 4 digits – Start count (keypad "*") 11= 4 digits – End count (keypad "*") 12= 6 digits – Start count (keypad "*") 13= 6 digits – End count (keypad "*") 14= 8 digits – Start count (keypad "*") 15= 8 digits – End count (keypad "*") 16= 8 digits – Start (keypad "*") and End (keypad "#") count 17= 4 digits – Counter auto-increment amount 0-9999 (keypad "*") 18= 4 digits – Counter auto-increment period 0-9999 (keypad "*") 19= 4 digits – Counter auto-increment amount (keypad "*") 0-99 and period (keypad "#") 0-99 20= 8 digits – Counter auto-increment amount (keypad "*") 0-9999 and period (keypad "#") 0-9999 21= 4 digits – Starting minutes and seconds - min:sec (keypad "*") 22= 4 digits – End minutes and seconds - min:sec (keypad "*") 23= 8 digits - thumb wheel switch format - 8d-6 digit auto-count amount plus 2 digit multiplier (keypad "*") 24= 4 digits – Counter increment amount 0-9999 (keypad "*")
37	27	0-99	**Number of People for Auto People Times Salary Counter** (1=default) Used with thumb wheel switch . See also Modes 37-26, 45-6 and 45-7.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
37	28	0-2	**Analog Master Clock – Bi-polar Sync Method** 0=disable (default), 1=enabled, but paused 2=enabled and running. The Analog Master Clock mode allows the clock to send correction pulses to analog slave clocks. The AM analog slave clock option is required to implement this mode. Setting mode 37-28=1 will enable the analog master clock option, but sync pulses will not be sent. The master clock will not begin sending pulses to the slave clocks until the master clock is given the go ahead to do so. To start the master clock sending pulses to the analog clocks, first press the Timer Control button. The master clock will display the current analog clock time. Use the Up and Down buttons to change the displayed time to match the analog clocks. Then press the Timer Control button a second time to return the master clock to normal time display. If the master clock's hours do not equal the analog clock's hours, or the master clock's minutes are greater than the analog clock's minutes, then the master clock will begin sending correction pulses to the slave clocks at the top of the minute and every four seconds thereafter until the slave clocks match the master clock. If the master clock's hours equal the analog clock's hours and the maser clock's minutes are less than the analog clock's minutes, then the master clock will pause pulses to the analog clock until the master clock equals the analog clock. The AM option also includes the alarm output relay. For the 59th minute sync method, see Mode 37-3.
37	29	0-99	**Control Button Lockout and Addressable Clock Function** 0=Disabled (default) 1=Disable the Mode button x minutes after the last button press. Up and Down button work normally. See also Mode 32-55. 2=Disable the Mode, Up and Down buttons x minutes after the last button press. Mode 32-49 determines the delay period. To enable the buttons, press and hold the Mode button until four one's or four two's appear (about 5 seconds), then release the mode button. Pressing the Up and Down buttons simultaneously will also enable the buttons. 3=Disable the Mode, Up and Down buttons x minutes after the last button press. Mode 32-49 determines the delay period. Pressing the Up and Down buttons together will not enable the buttons. To enable the buttons, press and hold the Mode button until four one's or four two's appear (about 5 seconds), then release the mode button. 4=Addressable Clock Function with Inactive Up and Down buttons – This mode disables access to the clock until the clock's address is displayed. To display the clock's address, hold the mode button down until the display stops flickering and a number appears. This is the clock's address. If the mode button is released while the clocks address is displayed, then access to the menu system will be granted. Once the buttons are enabled, a one will appear and the clock will display the first menu address position. Press down to return to the normal display or use the Up button to move to the desired menu item. After exiting the menu system, the access will be denied after a delayed period determined by Mode 32-49. Mode 32-42 is used to set the clock's address. See also Mode 32-55. 5=Addressable Clock Function with Active Up and Down buttons when the clock as actively selected – This mode is the same as Mode 37-29=4, except the Up and Down buttons remain active. For example, a display could have three displays. Two of the

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			displays could show real time, while the third displays may be a timer that requires active Up and Down buttons. The remote could be used to access any of the displays. In this scenario, if one of the real time displays is accessed, you may see activity on the timer because the Up and Down buttons would be active on both the real time display and the timer. See also, Mode 32-55, Mode 32-42 and Mode 32-49. 6=Addressable Clock Function with Active Up and Down buttons whether or not the clock as actively selected – This mode is the same as Mode 37-29=5, except the Up and Down buttons remain active all the time, whether the clock is actively selected or not. For example, a display could have three displays. Two of the displays could show real time, while the third displays may be a timer with external control that requires active Up and Down buttons. The remote could be used to access any of the displays. In this scenario, if one of the real time displays is accessed, you may see activity on the timer because the Up and Down buttons would be active on both the real time display and the timer. See also, Mode 32-55, Mode 32-42 and Mode 32-49.
37	30	0-8	**Circle Line Display Modes** Set Mode 32-54=0, Mode 32-29=4 and Mode 32-63=1 0=disabled (default), 1=seconds with accumulated dots, 2=seconds with single dot, 3=accumulated dots, starts over at zero, 4=alternating dots every second, 5=rotate and reverse dots every second, 6=variation of rotate and reverse dots every second, 7=rotate and reverse dots with inner circle blanked, 8=another rotate and reverse dots with no inner circle, rotate eight dots every second with no inner circle.
37	31	0,1	**Auto-Counter Pause Mode** 0=display "PAUS" when auto-counter is paused (default), 1=freeze time when auto-counter is paused.
37	32	0,1	**Alarm Output Logic Toggle** 0= Normal alarm output logic (default), 1=reversed alarm relay output logic.
37	33	0,1	**Decimal Point Reverse** 0=disabled (default), 1=move decimal point on Display Mode 47 from top to bottom.
37	34		**Long Duration Timer Display Format – Display Zone 1** Default=21 – This mode determines the display zone one format for long duration timer operation (When Mode 32-18=1).

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
37	35		**Long Duration Timer Display Format – Display Zone 2** Default=2 – This mode determines the display zone two format for long duration timer operation (When Mode 32-18=1).
37	36		**Long Duration Timer Display Format – Display Zone 3** Default=2 – This mode determines the display zone three format for long duration timer operation (When Mode 32-18=1).
37	37	0,1	**Time Adjustment Range** This mode determines the scale used by Mode 4 to adjust the real time clock. 0=Seconds per month. 1=Seconds per year (default). A setting of 1, or seconds per year, is recommended when the high precision oscillator is installed (HX option). See also Mode 4.
37	38	0,1	**Timer Precision Control** 0=disabled (default), 1=enabled - This mode improves timer precision when displaying fractions of a second, but changes the real time seconds each time timer is started or stopped. USE ONLY WITH SHORT DURATION TIMERS. If real time accuracy is a priority, then disable this mode. If timer precision is a priority, especially when displaying tenths and hundredths of a second, then enable this more.
37	39	2-10, 12-20, 22-30	**Timer Signal Light Blinking Precursor** Available for down timers only – (default=0) setting this parameter will blink the green and/or yellow signal lights near the completion of their respective cycle. Setting Mode 37-39 to 1 through 10 will blink the yellow light near the completion of the warning time. The point at which the light begins blinking is determined by dividing the warning time by the value of Mode 37-39. For example, if Mode 37-39=3, then the warning time will be divided by three. This is the point at which the yellow light will begin blinking. The blink rate is fixed at two cycles per second. Setting Mode 37-39 to 11-20 will blink the green light before the signal turns yellow. A value of ten will be subtracted from the mode value to produce the divisor. Setting Mode 37-39 to 21-30 will blink the green and yellow lights near the completion of their respective cycle. Twenty is subtracted from the mode value to produce the divisor.
37	40	0,1,2	**Timer Days or Hours Master/Slave Mode** This mode allows elapsed days or hours to be sent and received over sync lines. 0=disabled (default), 1=elapsed days, 2=elapsed hours. The counter field is used to send the days or hours; therefore, this mode cannot be used with checksum serial communications. See display modes 21 and 22. See also Mode 32-18, 37-34, 37-35 and 37-36.
37	41	0-99 tenths of a second	**First Alternating Display Duration** First in Sequence to Display – This delay value allows easier viewing when alternating display modes are used. For example, when alternating between time and date, the time could display for 5 seconds while the date only displays for 2 seconds. This reduces confusion when numbered displays are alternating back and forth. Mode 37-13 acts as a multiplier for Modes 37-41, 37-42 and 37-43. For example, if 37-13=10, then setting Mode 37-41=99 would cause a 99 second delay.
37	42	0-99 tenths of a second	**Second Alternating Display Duration** Second in Sequence to Display – This delay value allows easier viewing when alternating display modes are used. For example, when alternating between time and date, the time could display for 5 seconds while the date only displays for 2 seconds. This reduces confusion when numbered displays are alternating back and forth.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Mode 37-13 acts as a multiplier for Modes 37-41, 37-42 and 37-43. For example, if 37-13=10, then setting Mode 37-41=99 would cause a 99 second delay.
37	43	0-99 tenths of a second	**Third Alternating Display Duration** Third in Sequence to Display – This delay value allows easier viewing when alternating display modes are used. For example, when alternating between time and date, the time could display for 5 seconds while the date only displays for 2 seconds. This reduces confusion when numbered displays are alternating back and forth. The value. Mode 37-13 acts as a multiplier for Modes 37-41, 37-42 and 37-43. For example, if 37-13=10, then setting Mode 37-41=99 would cause a 99 second delay.
37	44	1-98	**Timer Reset List Entry Point** – This mode is used to store the timer reset list entry point used when Mode 37-14=11. This mode is automatically set and does not require any changes using the menu system.
37	45	0-3	**Language Used by Date Displays** 0=English (default), 1=Spanish, 2=German. 3=French This Mode determines the laugauge to use when the alpha-month or alpha-day-of-the-week is displayed.
37	46	0-2	**Display Blanking** – 0 = disabled (default) 1 = Manual Display Blanking using the Timer Control button 2 = Automatic Display Blanking using the Alarm Toggle function This feature overrides other Timer Control functions and is for real time mode only. Timer Control Blanking Pressing the Timer Control button blanks the display. Pressing the Timer Control button again or cycling power restores the display to normal operation. Alarm Toggle Blanking The real time alarm may be used to turn the display on and off. For example, setting the alarm toggle to turn the relay off at 8:00pm will blank the display. If the relay is then configured to turn on at 6:00am the display will illuminate. Pressing the Timer Control button while the display is blanked will illuminate the display. The alarm toggle function uses Modes 27, 28, 29 and 49.
37	47	0-1	**Thermostat Temperature Range – Degrees F or C** 0=disabled (default) 1=Degrees F 2=Degrees C This setting determines the temperature range to be used by the thermostat feature, Mode 45-16. A value of 0 disables the thermostat. Set Mode 32-50=1 to enable the temperature sensor. If using thermostat operation with Timer Mode, set Mode 37-12=0.
37	48		**Reserved**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
37	49	0-2	**Use Alpha Special Counter Digits to Display Timer Days or Hours** 0=disabled (default) 1= Use alpha special counter characters to display timer days 2=Use alpha special counter characters to display timer hours 3=Display seconds derived from hrs:min:sec 4=Display Start Count using the Alpha Counter Mode 5=Display End count using the Alpha Counter Mode The digital lettering may be used to display elapsed days or hours by using special counter characters and enabling Mode 37-49 to displays days or hours in the counter positions.
37	50	0,3	**Wireless Transmitter/Clock Test** 0=disabled (default) 3=Enabled This mode is useful for surveying radio signal coverage. Once enabled, the time test will be transmitted to pagers at the top of every minute for Tiger version 4.00 and lower. Tiger version 4.01 or later transmits the test data 3 times per minute at 0, 20 and 40 seconds after the minute. Version 4.07 and later transmits the string "00000111". The new field test receiver will receive this data string. Quick Mode 5 will disable test mode (Mode 37-50=0) Quick Mode 6 will enable test mode (Mode 37-50=3) **Timer Control Button Test Messages** The timer control button may be used to send test messages in processor version W4.92 and later. To send a test message, momentarily press the timer control button. Then use the Up and Down buttons to select a test mode. Then momentarily press the timer control button again to send the test. The following test modes are available: 1. Send the time and date to message boards. 2. Blank message boards 3. Unblank message boards 4. Send time format using orange characters 5. Sent test message :This is only a test." 6. Activate wireless speaker lights and audio amplifier 7. Enable message 16 in message boards 8. erase all message in message boards 9. Sound the beeper in message boards 10. Reset the message boards 11. Send time format using red characters 12. Send time format using green characters 13. Send station identification using Morse code (see also Mode 49) 14. Send command to start countdown timer in digital clocks
37	51	0-59	**Wireless Analog Clock Transmit Point**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0-59 (57=default) Second of the minute to send time to paging transmitter For receiver BRG1751v5.0, either 47 or 57 may be used for analog clocks. When 47 is used, signals received other than 47 seconds after the minute, and transmissions from competing brands on the same frequency and address are ignored.
37	52	0-2	**Wireless Clock Types** 0= Disable analog and digital clock time transmissions (version 5.53 or later). Values of 5-8 may be used for older firmware versions to disable time transmissions to analog and digital clocks. This is useful when only message display time transmissions are required. (previous command meaning: Send time to only analog clocks, 1 transmitter only. 1= Send time to analog clocks, digital clocks (default) 2= Analog clocks only - on even minutes – for 2 transmitters 3= Analog clocks only - on odd minutes – for 2 transmitters 4= Digital clocks only – for 2-10 transmitters. If Mode 37-53=0, then transmission will occur every minute. If Mode 37-53 > 0, then the transmission will occur only when the minute ends in the same value. 5= Configure capcode for 0800828 to send 35 byte commands out the SR/ST port 6= Configure capcode for 0800828 to send 35 byte commands out the GPS port 7= Configure capcode for 0800828 to send 35 byte commands and time packets out the SR/ST port – Set Modes 32-12=2 and 45-9>600. 8= Configure capcode for 0800828 to send 35 byte commands and time packets out the GPS port – Set Modes 32-12=2 and 45-9>600. **Switching Analog Clocks between Daylight Saving and Standard Time** **Tiger Version W4.78 and older** **If Chouchin and Shengbang movements are used in the same system, then install hands on both movements in the 10:00 position, set Mode 37-62=9 and Mode 37-76 =1. When switching between daylight saving and standard time, the change will occur when the clock hands are at 2:04.** **Tiger Version W4.79 and later** **If Chouchin and Shengbang movements are combined in the same system or by themselves, install hands on both movements in the 12:00 position, set Mode 37-62=7 and Mode 37-76 =0. When switching between daylight saving and standard time, the master transmitter will not broadcast time from 8:00 pm to 1:00am the following day on the day to switch between daylight saving and standard time. The clock will begin changing to the new time when the clock hands are at 2:04. In addition to Mode 24-1=14, Modes 45-20 and Mode 45-21 must be set to the correct DST rule.** FALL When the clock is reset, the hands are set to 12:00 at the factory. (10:00 for Chouchin movements) 1. The second following 01:59:59 local daylight saving time, the master clock will change to 01:00:00 local standard time.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			2. At 01:00:40 standard time (02:00:40 analog clock time), the analog clocks will turn on the internal wireless receiver. 3. At 01:00:57 standard time (02:00:57 analog clock time), the master clock will send time data, lasting three seconds. 4. At 01:01:00 standard time (02:01:00 analog clock time), the analog clock will turn off the wireless receiver and begin processing the time data The analog clock will make nine attempts to receive a valid time transmission before turning off the receiver. 5. At 01:04:00 standard time (02:04:00 analog clock time), the analog clock hands will fast forward 11 hours to the correct time. 6. At 01:08:00 standard time, the analog clock changes from fast forward to normal speed and displays the correct standard time. The entire operation takes 8 minutes, during which the second hand will run normally, always displaying the correct seconds. SPRING 1. The second following 01:59:59 local standard time, the master clock will change to 03:00:00 local daylight saving time. 2. At 03:00:40 daylight saving time (02:00:40 analog clock time), the analog clocks will turn on the internal wireless receiver. 3. At 03:00:57 daylight saving time (02:00:57 analog clock time), the master clock will send time data, lasting three seconds. 4. At 03:01:00 daylight saving time (02:01:00 analog clock time), the analog clock will turn off the wireless receiver and begin processing the time data. The analog clock will make nine attempts to receive a valid time transmission before turning off the receiver. 5. At 03:04:00 daylight saving time (02:04:00 analog clock time), the analog clock hands will fast forward 1 hour to the correct time. 6. At 03:04:21 daylight saving time, the analog clock changes from fast forward to normal speed and displays the correct daylight saving time. The entire operation takes 4 minutes and 22 seconds, during which the second hand will run normally, always displaying the correct seconds. Notes: 1. All electro-mechanical clocks introduce a delay while the hands physically move to the correct time. For time critical applications, BRG offers digital locks that instantly switch between daylight saving and standard time, but are typically more expensive than analog clocks. 2. Shengbang analog clock movements activate the internal wireless receiver at

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			the following times as displayed on the clock : 00:00:40, 02:00:40, 04:00:40, 06:00:40, 11:00:40, 15:00:40, 20:00:40. Chouchin analog clock movements activate the internal wireless receiver at the following times as displayed on the clock : 11:00:40, 12:00:40, 02:00:40, 04:00:40, 9:00:40, 13:00:40, 18:00:40. 3. The time zone switch located on the back of the Shengbang analog clock movments should <u>always</u> be set to "M". The "DST" switch has no effect. Chouchin movments do not have a time zone for DST switch. 4. Activating the wireless receiver at 40 seconds after the minute conserves battery power under normal operation by limiting the time the receiver is turned on. 5. The detailed operation above assumes normal operation. Low batteries or poor radio signal reception can affect these times. 6. BRG battery powered analog clocks utilize only Lithium batteries. Lithium batteries provide a more constant voltage over the life of the battery compared to Alkaline batteries. Lithium batteries also provide a higher voltage which is required by the battery isolation circuit.
37	53	1-9	**<u>Wireless Digital Clock Transmit Time Offset</u>** This value represents the minute-unit that will be used to transmit to digital clocks. This will allow nine digital master clocks to be located in the same building and on the same frequency. For example, master clock 1 could be set to transmit at the 1 minute unit, master clock 2 would transmit on the 2 minute unit, master clock 3 would transmit on the 3 minute unit, etc.
37	54	0-23	**<u>Wireless Transmit Hour Range</u>** 0 = continuous transmit (default), 1 = Transmit to BRG movements between 20:00 and 06:00, and 11:00:00, 15:00:00 local time. (Tiger Version 4.09 or later) 2 = Transmit to UTS movements from 00:00 to 07:00, and 19:00:00, N = 3-23 – Transmit between 02:00 and n inclusive (Rev. 4.72) Setting n=3 for Chouchin movements will force the movement to perform a complete reception everyday at 2:00:40. See also Mode 37-77 Setting Mode 37-54=1 will eliminate transmissions during the day to reduce radio traffic congestion. It also allows the master clock to provide time data to analog clocks 5 out of the 7 times per day they expect to receive a transmission. Alarm and other transmissions will occur normally throughout the day.
37	55	0-1	**<u>Wireless Transceiver Carrier Detect Function</u>** 0=disabled, 1=enabled (default) When enabled, this function causes the transceiver to monitor the radio channel before transmitting. If the channel is busy, then no time transmission will occur. The clock must be restarted after changing this value
37	56	0-2	**<u>Wireless Alarm Function -</u>** Mode 37-56 - wireless alarm relays – 0=disabled (default), 1=use the GPS port to

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			control the transmitter, 2=use the SR/ST port to control the transmitter. Four alarm channels and multiple relay modules are supported. If wireless time synchronization is enabled, time sync transmissions will be omitted during a scheduled wireless alarm transmission to avoid conflicts. The relay output of the transmitter clock can be used when wireless alarms are enabled beginning with version 3.67. Previous versions did not support simultaneous wired and wireless alarms. It is recommended to enable four channel relay operation (Mode 32-26=2) and place the wired alarms on channel 1 and the wireless alarms on channel 2, 3 or 4. See also Mode 32-12. **Addressable Wireless Speakers** Audio may be played over addressable wireless speakers. To enable this feature, check "Enable Alarms using Wireless Speakers" in the Windows control program Setup > Communications screen. In the Alarm Schedule screen, 1. Add a new record by clicking on "Create New Alarm Record". 2. Set the desired audio to be played under "Wireless Relay Function and Audio Selection". 3. Set the address under "Wireless Speaker Address". 4. Set "Alarm Function" to "Wireless Speaker Alarm". Requires Tiger master clock version 4.61 and Window control program 2.10.53 or later. **Direct Serial Connection to a Digital Clock** The audio player can be directly connected to a Tiger digital clock's serial port. To enable, set Mode 37-56>0 (1 = GPS port, 2 = SR/ST port). Set Mode 49-n=7, where n is the alarm schedule position number. Set Mode 34-n=xx, where n is the alarm schedule position number and xx is the decimal file name converted from the hex file name. Set Mode 30-n=x where n is the alarm schedule position number and x is the audio player address of 0-9 (defaults to 0, all audio players). (data format: ~!nXX#). **Wireless alarm relays and tone generator selection** **Mode 30-n=ar** - n=alarm number 1-99, a= relay module address 0-9, r=relay to use – 0=relays one and two, 1=relay one, 2=relay two. The default is 00, capcode address 0800830 and both relays. The most significant digit (a) determines the last digit of the capcode (relay module address) to use (default=0). The least significant digit (r) determines which of the two relays to use. For example, if Mode 30-n=00, (where n=alarm number) then the capcode address will be set to 0800830 and both relays will be used. If Mode 30-n=11 then the capcode address will be set to 0800831 and relay 1 will be used. This function supports 2 channel and 6 channel relay control modules. **Mode 37-56** must be greater than 0 to enable wireless relays (disabled=default) **Mode 34-n=f** – where n is the alarm number and f determines the alarm function and duration. The value 0-59 determines the relay function (0=default)

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Relay Output Function (H=Relay On, L=Relay Off, S=Seconds, T=times, Z=endless) for dual relay modules 0=Turn off relay 1=Turn on relay 12=H2S / 1T 13=H1S / L1S / 3T 14=H2S / l2S / 4T 15=H10S / L10S / Z 16=H20S / L20S / Z 17=H1S / L1S / Z 18=H0.5S / L0.5S / Z 19=H6S / L1S / Z 21=H0.2S / L10S / H0.5S / L10S / H1S / L10S / H2S / L10S / HZ 22=H0.5S / 1T 23=H3S / 1T 24=H20S / 1T 25=H3S / L3S / 10T 26=H2S / L2S / 20T 27=H1S / L1S / 30T 28=H0.5S / L0.5H / 30T 29=H30S / 1T 31=H0.5S / 1T 32=H1S / 1T 33=H3S / 1T 34=H5S / 1T 35=H8S / 1T 36=H10S / 1T 37=H12S / 1T 38=H30S / 1T 39=H50S / 1T 41=H1min / 1T 42=H2min / 1T 43=H5min / 1T 44=H8min / 1T 45=H10min / 1T 46=H15min / 1T 47=H20min / 1T 48=H30min / 1T 49=H45min / 1T 51=H1hour / 1T 52=H2hour / 1T 53=H3hour / 1T 54=H4hour / 1T 55=H6hour / 1T 56=H8hour / 1T 57=H12hour / 1T 58=H13hour / 1T 59=H24hour / 1T **Wireless Transmitter Alarm Configuration Example** 1. Sound 3 second alert tone at 8am, 12pm, 1pm and 5pm., Monday thru Friday. The

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			tone generator is attached to alarm channel 1. 27-1=08:00 – 8am alarm time 27-2=12:00 – 12pm alarm time 27-3=13:00 – 1pm alarm time 27-4=17:00 – 5pm alarm time 29-1=9 – alarm number 1 active Monday through Friday 29-2=9 – alarm number 2 active Monday through Friday 29-3=9 – alarm number 3 active Monday through Friday 29-4=9 – alarm number 4 active Monday through Friday 30-1=01 – alarm 1, use wireless relay module address 0, relay number 1 30-2=01 – alarm 2, use wireless relay module address 0, relay number 1 30-3=01 – alarm 3, use wireless relay module address 0, relay number 1 30-4=01 – alarm 4, use wireless relay module address 0, relay number 1 34-1=33 – alarm 1 function and duration 34-2=33 – alarm 2 function and duration 34-3=33 – alarm 3 function and duration 34-4=33 – alarm 4 function and duration 32-12=4 – transmit alarm data out the SR/ST port 37-56=2 – enable wireless alarm control using SR/ST port **See Mode 37-70 for additional relay functions**
37	57	0-99	**Wireless Transmitter Address -** Analog Time clock (time only) wireless clock address code - default 24 produces an actual address of 0800824.
37	58	0-99	**Wireless Transmitter Address -** BRG Digital clock (time only) wireless clock address code - default 25 produces an actual address of 0800825.
37	59	0-99	**Wireless Transmitter Address -** BRG Digital clock (time or commands) wireless clock address code - default 28 produces an actual address of 0800828.
37	60	0-15	**Dim Display When Alarm Active** – 0, 1 - 15 (1=default) – Change individual display intensity (Mode 3) to this value when the alarm is active. Mode 26-n must be set to 9 to enable this feature. The display will restore to the original intensity when alarm goes inactive. See also Mode 26, Mode 37-46.
37	61	0-1	**Wireless Clock Timer Countdown** – 0=disabled (default) 1=enabled, 2 digit time, all relays 2=enabled, 1 digit time, relays 0-9, 0=all relays **Requires Tiger processor version 4.31 or later** **Requires BRG1751v3 or later UHF decoder/receiver** Mode 37-56 must be greater than 0. This feature allows the Tiger digital secondary clocks to perform a countdown when the alarm sounds. This mode, once enabled, allows the wireless master clock to send alarm commands

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			that cause a Tiger digital secondary clock to set the timer reset minutes and activate the timer control function. <u>This mode must be enabled in both the wireless master clock and the Tiger digital secondary clocks. Mega clocks are enabled by default.</u> The Tiger secondary clock must have Mode 37-61=1-9 and be configured to have the timer control button switch to timer mode, countdown and return to real time. Wireless receivers must be BRG1750v3.1, BRG1751v3, or later. Mode 37-56 must be greater than 0 to enable. <u>Requires Tiger processor version 4.29 or later</u> <u>From the Windows control program</u> Go to Setup > Communications – Check "Enable Wireless Digital Clock Countdown" Go to the drop down box titled "Duration of Individual Alarms". Click on a selection that includes all receivers and a timer value of 1-9 minutes. Other receivers may be selected in special configurations. If a wireless relay will be used in conjunction with the countdown timer to activate a tone or bell, select the desired switching pattern from the drop down box titled "Wireless Relay Switch Pattern". Both relays in the wireless relay module will be activated during the wireless relay transmission. EXAMPLES <u>Wireless Master clock configuration - processor version 4.29 or later:</u> Mode 27-1=13:00 – alarm set to activate at 1:00 pm – alarm position 1 Mode 29-1 =8 – alarm set to activate everyday - alarm position 1 Mode 30-1=5 – 5 minute countdown in alarm position 1 Mode 34-1=23 – clock wireless relay for 3 seconds – alarm position 1 Mode 37-56=2 – send alarms out the wireless port Mode 37-61=1 – enable secondary clock countdown timers <u>Tiger processor, four digit secondary clock configuration example:</u> Mode 9 = 0:00 – Set preset time to 0:00 Mode 37-61=2 – Enable alarm count down operation, clock receiver address 2 Mode 32-4=1 – resume real time when end is reached Mode 32-5=1 – set timer to down direction Mode 36-1=12 – set timer display format to minutes and seconds. <u>Mega processor, four digit secondary clock configuration example:</u> Mode 9=0 to disable countdown timer Mode 9= 1-9 countdown timer address **Requires BRG1751v3 or later UHF decoder/receiver** See also Mode 37-79 (processor W4.89 or later)
37	62	5-9	**<u>Wireless Analog Clock Transmit Time Offset</u>** This parameter controls the wireless analog clock hour offset from local time. **<u>Shengbang movements: Set Mode 37-62=7</u>** **<u>Chouchin movements: Set Mode 37-62=9</u>** This parameter disables analog clock time transmissions between 22:00 and 2:00 if Mode 37-74 is also less than 4. This action causes the Chouchin movement to receive and use the complete time transmission at 02:00:40. This allows prompt switching between Daylight Saving and Standard time. The hour hand on the Chouchin

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			movement's hour hand must be set to 10:00 at the factory and Mode 37-62 set to 9. The DST rule in Mode 45-20 and Mode 45-21 is used to calculate the DST date. **Chouchin Movements require Tiger Version W4.75 or later** **Tiger Version W4.78 and older** **If Chouchin and Shengbang movements are used in the same system, then install hands on both movements in the 10:00 position, set Mode 37-62=9 and Mode 37-76 =1. When switching between daylight saving and standard time, the change will occur when the clock hands are at 2:04.** **Tiger Version W4.79 and later** **If Chouchin and Shengbang movements are combined in the same system or by themselves, install hands on both movements in the 12:00 position, set Mode 37-62=7 and Mode 37-76 =0. When switching between daylight saving and standard time, the master transmitter will not broadcast time from 8:00pm to 1:00am the following day on the day to switch between daylight saving and standard time. The clock will begin changing to the new time when the clock hands are at 2:04. In addition to Mode 24-1=14, Modes 45-20 and Mode 45-21 must be set to the correct DST rule.**
37	63	0-2	**Transmit Time to Moving Message Displays** 0=disabled 1=(default) Transmit the time and date to all moving message displays hourly at the number of seconds after the hour determined by Mode 37-75 (default=10), every day over wireless connection. 2= Transmit the time and date to all moving message displays at 02:00:10 and 03:00:10 every day over wireless connection.
37	64	0-1	**Transmit Sync Status to Wireless Signal Monitor** 0=disabled 1= enabled (default) Transmits master clock sync receive status changes to the wireless signal monitor. If sync status from GPS, CDMA or NTP changes, a command will be sent to the wireless monitor. Configure signal monitor to use 0800828 only.
37	65	0-99	**Wireless/Ethernet Sync Indicator Delay** 30=disabled (default) This value determines the number of minutes between a change in sync status and resetting the sync status indicator. The sync status indicator is always set immediately. For example, if Mode 32-2=4 to blink the colon when sync is lost, Mode 37-65 determines the delay in minutes before the colon begins blinking after a loss of sync.
37	66	0,1	**Alarm Schedule Display and Quick Select** 0=disabled (default) 1=enabled The display must be configured with Mode 20-2=1. This mode allows quick alarm schedule group change. Simply use the Up and Down buttons to change the alarm schedule. The schedule change will occur in 10 seconds after the last button press.
37	67	0-6	**Data Radio Communications**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0=disabled (default) – no data radios installed 1=client (slave) radio on the GPS port 2=client (slave) radio on the SR/ST port 3=server (master) radio on the GPS port (use with 900 MHz master clock) 4=server (master) radio on the SR/ST port 5=repeater radio on the GPS port 6=repeater radio on the SR/ST port This mode supports the use of data radios to send and receive data to and from remote electronic message displays, timers, counters and clocks. **CEL Radios** – Values of 1, 3 and 5 configures the CEL commands from menu Mode 74 and 74 to use the GPS port. Values of 2,3 and 6 configures the CEL commands from menu Mode 74 and 74 to use the ST/STport. BRG data radios incorporate DES data encryption developed for the U.S. Government. This two key secure communications method prevents changing or reading communications data, and other interference. This secure communications method provides accurate, secure and reliable communications. When Mode 37-67=1 or 2 (receive and transmit in client mode - typically assigned to slave clocks), time sync data, control and configuration commands may be sent to the clock. Mode 37-68 determines the radio channel. When Mode 37-67=3 or 4 (receive and transmit in server mode - typically assigned to the master clock), time sync data, control and configuration commands may be sent from the clock to other clocks or a PC. Mode 37-68 determines the radio channel. For master clock operation, if Mode 37-67=3 (GPS port), then set Mode 32-15=7. If Mode 37-67=4 (SR/ST port) then set Mode 32-60=0. Set Mode 32-12=1 to enable time sync transmissions. When Mode 37-67=5 or 6 (receive in client mode and transmit in server mode - typically assigned to the repeaters) Mode 37-68 determines the radio channels used in client mode. Server mode will used this value plus one. For this reason, it is recommended that Mode 37-68 be set only to even channels. For repeater operation, if Mode 37-67=5 (GPS port), then set Mode 32-15=7. If Mode 37-67=6 (SR/ST port) then set Mode 32-60=0. Mode 32-12 will be controlled automatically. The repeater alternates between transmit and receive channels every ten seconds. In lieu of using repeater mode to expand the coverage area, multiple network enabled master clocks may be used. Each master clock includes its own alarm schedule. Any and all master clocks may be accessed from one or more PC's anywhere over the network.
37	68	1-95	**Data Radio Channel - 450 MHz and 900 MHz radios** This mode determines the radio channel to be used. 1-16 - (1=default) – 406-420 MHz and 450-470 Mhz – **Set Mode 32-15=7** UHF radio channel frequency assignments prior to 10/20/09 Channel Frequency CTCSS 1 464.650 100 2 464.600 100

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions

3	462.450	100
4	462.425	100
5	462.400	100
6	464.650	123
7	464.600	123
8	462.450	123
9	462.425	123
10	462.400	123
11	464.650	0
12	464.600	0
13	462.450	0
14	462.425	0
15	462.400	0
16	464.6375	0

UHF radio channel frequency assignments beginning 10/20/09 and later

Channel	Frequency	CTCSS
1	464.650	100
2	464.600	100
3	462.450	100
4	462.425	100
5	462.400	100
6	462.375	100
7	462.350	100
8	462.325	100
9	462.300	100
10	462.275	100
11	462.250	100
12	462.225	100
13	462.200	100
14	464.650	123
15	462.450	123
16	460.400	100

UHF radio channel frequency assignments for the 406-420 MHz government band:

Channel	Frequency	CTCSS
1	411.7125	100
2	412.4125	100
3	413.3125	100
4	414.2875	100
5	415.0625	100
6	411.7125	123
7	412.4125	123
8	413.3125	123
9	414.2875	123
10	415.0625	123
11	411.7125	0
12	412.4125	0
13	413.3125	0
14	414.2875	0
15	415.0625	0
16	411.6375	0

20 - (default for 900 Mhz) U.S. / Canada - radio channel - scan all channels in receive

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			mode 16-47 - U.S. / Canada - radio channel - scan all channels in receive mode 48-55 – Australia / New Zealand - scan all channels in receive mode 56-87 - U.S. / Canada – no channel scanning– includes +40 offset 88-95 - Australia / New Zealand – no channel scanning– includes +40 offset Transmit and Repeat mode always uses fixed channel assignments. Repeaters use both odd and even channels; therefore, it is recommended to configure Mode 37-68 to use only even channel numbers in case multiple repeaters are deployed. Setting this mode to a channel less than 60 will cause the radio to scan all available channels while in receive mode (Mode 37-67=1 or Mode 37-67=2). BRG data radios incorporate DES data encryption developed for the U.S. Government. This two key secure communications method prevents changing or reading communications data, and other interference. This secure communications method provides accurate, secure and reliable communications.
37	69	0-99	**Data Radio Group Number** 0-99 = data radio group number (5=default) Configure Mode 37-68 before changing this value. This value is similar to a network password. All radios that you want to communicate with must have the same group number. Furthermore, all radio must use the same DES encryption password. The encryption password is set at the factory and cannot be changed. There may be cases when you want to place radios into different groups. For example, a high school adjacent to a middle school may want to operate independently. Assigning each school their own group number will accomplish allow them to operate data radios without interference between the two systems. Changing this parameter will cause the clock to perform a system reboot.
37	70	0-99	**Wireless Relay Function Code** This parameter includes the relay functions found in Mode 37-56, but also includes the following dual relay functions. The functions are specifically intended to control wireless speakers. 61 - Relay 1 ON 1 Minute + Relay 2 LED 250mS ON/750mS OFF for 1 Minute 62 - Relay 1 ON 3 Minutes + Relay 2 LED 250mS ON/750mS OFF for 3 Minutes 63 - Relay 1 ON 5 Minutes + Relay 2 LED 250mS ON/750mS OFF for 5 Minutes 64 - Relay 1 ON 6 Minutes + Relay 2 LED 250mS ON/750mS OFF for 6 Minutes 71 - Relay 1 ON 1 Minute + Relay 2 LED 500mS ON/500mS OFF for 1 Minute 72 - Relay 1 ON 3 Minutes + Relay 2 LED 500mS ON/500mS OFF for 3 Minutes 73 - Relay 1 ON 5 Minutes + Relay 2 LED 500mS ON/500mS OFF for 5 Minutes 74 - Relay 1 ON 6 Minutes + Relay 2 LED 500mS ON/500mS OFF for 6 Minutes
37	71	0-96	**900 MHz Maximum Power Level**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			1= 10 mW 96=1000 mW The 900 MHz radio maximum power is initialized on power up.
37	72	0,1	**Y1707 Wireless Receiver Operation** 0 = disabled (default) 1 = enabled This parameter is used with mass notification commands from a telephone. The Y1707 data receiver uses a limited storage receive buffer that must be considered when send long message data. Enable this parameter when using Y1707 type receivers.
37	73	0-99	**Relay Function Code for a Telephone Activated Wireless Relay** Wireless Relay function. To activate a wireless relay from a telephone, enter xxyyyzz. xx= clock address, yyy=wireless relay starting address as defined by Mode 45-27, zz = relay number. Mode 37-73 determines the wireless relay action mode. Example 1: Phone command 6410001 will activate wireless relay 1 at address 101 for 3 seconds using master clock 64. Mode 45-27=101, Mode 37-73=23, Address 101=pager capcode 07001010 Example 2: Phone command 6420010 will activate wireless relay 10 at address 210 for 5 minutes using master clock 64. Mode 45-27=201, Mode 37-73=43, Address 210=pager capcode 07002100 Use also Mode 37-56 to for wireless relay function codes. Both relays within one wireless relay receiver will activate using the same function. See also Mode 45-27
37	74	0-2	**Wireless Message Board, Audio and Relay Baud Rate** 0 = all POCSAG transmission are 512 bps 1= all transmissions are 1200 bps, except analog and digital clocks 2= all transmissions are 2400 bps, except analog and digital clocks Time is always sent to Analog and Digital clocks using 512 bps.
37	75	1-50	**Message Board and Wireless Time Receiver Transmit Point** Default=10 This mode determines when the Tiger processor will send a time update command to the message boards and wireless time receivers.
37	76	0-3	**Chouchin Wireless Analog Clock Movement Support** **The current recommended settings for either Chouchin or Shengbang movenents are: Mode 37-62=7 and Mode 37-76 =0.**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Chouchin Movements require Tiger Version W4.75 or later 0 =activate full time reception only on the days of DST (default), This setting is for Chouchin or Shengbang movements with the hands installed at the 10:00 position, and Mode 37-62=9. If Mode 37-62=9 then on the day to switch from ST to DST or DST to ST, and the previous day, no transmissions will occur if the hour is less than 2 or greater than 19. 1= activate full time reception once per month on the 1st, If Mode 37-62=7 or 9 then on the first day of the month, no transmissions will occur when the hour equals 0, 22, or 23. 2= activate full time reception twice a month on the 1st and 15th, If Mode 37-62=7 or 9 then on the first and fifteenth day of the month, no transmissions will occur when the hour equals 0, 22, or 23. 3= activate full time reception every day. If Mode 37-62=7 or 9 then everyday, no transmissions will occur when the hour equals 0, 22, or 23. 4= activate full time reception every day. If Mode 37-62=7 or 9 then everyday, no transmissions will occur if the hour is less than 2 or greater than 19. This mode can be used for externally powered clocks and DuraTime battery powered analog clocks. This mode determines when movements are forced to use all time data received. All other regular reception times, the Chouchin just receives and corrects the seconds. Full time reception also occurs when the batteries are inserted, when the reset pins are shorted, or when the receive button is pressed for three seconds. During full time reception, the clock hands stop until all time is received. Then the hands move to the time received. **Tiger Version W4.78 and older** **If Chouchin and Shengbang movements are used in the same system, then install hands on both movements in the 10:00 position, set Mode 37-62=9 and Mode 37-76 =1. When switching between daylight saving and standard time, the change will occur when the clock hands are at 2:04.** **Tiger Version W4.79 and later** **If Chouchin and Shengbang movements are combined in the same system or by themselves, install hands on both movements in the 12:00 position, set Mode 37-62=7 and Mode 37-76 =0. When switching between daylight saving and standard time, the master transmitter will not broadcast time from 8:00pm to 1:00am the following day on the day to switch between daylight saving and standard time. The clock will begin changing to the new time when the clock hands are at 2:04. In addition to Mode 24-1=14, Modes 45-20 and Mode 45-21 must be set to the correct DST rule.**
37	77	0-59	**Standard Tiger Clock Time Reception Control** 0=(default) – receive time updates from all devices 1=receive only standard time updates on the GPS port

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			7=receive only DuraTime wireless CDMA updates on the GPS port 9=receive only DuraTime wireless GPS updates on the GPS port 11= receive only standard time updates on the SR/ST port 17= receive only DuraTime wireless CDMA updates on the SR/ST port 19= receive only DuraTime wireless GPS updates on the SR/ST port Supports reception of DuraTime wireless GPS and CDMA devices. 0=accept all time packets, 9=accept only DuraTime wireless GPS time packets, 7=accept only DuraTime wireless CDMA time packets. To use this function, connect a 2.4 GHz DuraTime radio to the GPS port. Set Mode 32-15=7. Set Mode 37-77=9 to receive GPS and optionally transmit local time. If an RC100 is present, set Mode 32-15=7 and Mode 37-77=1 to receive local time updates and reject GPS or CDMA updates. The radio can also be connected to the SR/ST port. Mode 37-77 also affects reception on the SR/ST port if the value of Mode 37-77 is greater than 10. If Ethernet is connected to the SR/ST port to control the clock, then connect the DuraTime radio to the GPS port to obtain time updates and/or transmit time. Otherwise, connect the DuraTime radio to the SR/ST port to receive time updates from wireless GPS or CDMA and optionally transmit time. If the digital clock is to receive and transmit time packets, use DuraTime firmware BRG_RC190_digital_master. This version will not repeat radio packets. However, the radio can be reconfigured using the command buttons. If the clock needs to repeat radio packet and does not need to transmit time packets, use DuraTime firmware BRG_RC190_digital_slave. PC commands may be sent through the DuraTime radio. See also Mode 32-15. **<u>UHF Master Clocks - Wireless Transmit Minute Range</u>** 10 = default 0-59 – minute range to send time transmissions This mode determines how often time transmissions are sent throughout the hour. This is another method used to limit the number of transmission per day. For example, if Mode 37-77=10, then time transmissions are sent to analog clocks only when the minute is equal to, or less than 10. Further, when Mode 37-77 <>59, then time is only sent when the hour equals 1, 2, 3, 4, 6, 11, 15, and 20. Digital clock transmissions would only occur once per hour when the minute equals 9 (provided Mode 37-53=9). If this mode is used to limit time transmission, then analog clocks should be manually set to the correct time during installation so they will receive updates. Or, Mode 37-77 could temporarily set to 59 <u>Beginning with Tiger version W4.82, Mode 37-77 default equals 10.</u> After power up, time is sent to analog clocks every minute. Five days after the last power cycle or reset, time is only sent to master clocks for eleven minutes at hours 1, 2, 3, 4, 6, 11, 15, and 20. Time is sent while the minute is less than 11. This reduces time

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			transmissions from 1440 to 88 times per day. A software reset or power cycle will reset the clock for another period of five days of once per minute transmissions. The five day period allows time to install clocks during the initial installation. When installing clocks after the five day period, they should be manually set to the correct time using the button on the back, or the master clock can be reset to restore transmissions every minute for another five days. To restore sending time to analog clocks once per minute indefinitely, set Mode 37-77 to 59.
37	78	0-18	**2.4 GHz and 900 MHz Wireless Analog Time Zone Clocks** 0 = Disabled 1-18 = Number of analog clock zones (8=default) **2.4 GHz Wireless Analog Time Zone Clocks using an RC100TZ master clock** This mode allows wireless analog clocks to be used as a time zone display. An RC100TZ master clock is configured to wirelessly send time updates to the analog clocks. Up to 18 unique zones are supported with an unlimited number of analog clocks. Each analog clock receives and repeats the time transmissions. Repeaters are available to increase the coverage area of the clock system. All BRG analog clock movements are supported. The RC100TZ requires Tiger processor version BRG_analog_tz_475 or later. The CEL radio firmware is the same as used in the RC100. The RC100TZ does not support primary and secondary master clock operation. The RC100TZ defaults to radio channel 10. The default time source for the RC100TZ master clock is Ethernet NTP. The RC100TZ cannot use a GPS or CDMA time source that is being used to support a DuraTime system on another channel. DuraTime GPS and CDMA receivers can be used if configured on the same channel as the RC100TZ. Analog slave clocks in a time zone configuration require CEL firmware BRG_analo_TZ_slave_zone_NN_V11.py, where NN is the zone number of the clock. Every time packet includes a zone identifier. If an analog clock receiving the time packet matches the zone indicated, it will use the time to update the clock. Set Mode 18 and Mode 37-78 to the desired number of zones. The default is 8 which will support 8 or less zones without change. Many of the parameters that must be configured in a BRG digital master clock are the default in the RC100TZ and do not require modification. Example for RC100TZ 2.4 GHz analog time zone systems: To configure 5 analog time zone clocks with the transmitter receiving time from Ethernet NTP and the radio connected to the GPS port: Mode 21-1= zone 1 offset Mode 21-2= zone 2 offset

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Mode 21-3= zone 3 offset Mode 21-4= zone 4 offset Mode 21-5= zone 5 offset Mode 24-1= zone 1 DST rule Mode 24-2= zone 2 DST rule Mode 24-3= zone 3 DST rule Mode 24-4= zone 4 DST rule Mode 24-5= zone 5 DST rule If necessary, set Mode 33 for the respective zone to force half hour time offsets. Mode 18=8 – (default) supports 8 or less zones Mode 37-78=8 – (default) configure for 5 transmit channels **2.4 GHz Wireless Analog Time Zone Clocks using a BRG digital master clock** BRG digital clocks incorporating a 2.4 GHz radio and be used as a master clock to drive analog clocks in a time zone array. Each analog clock incorporates a 2.4 GHz receiver configured to receive a single zone. The master clock transmits a time packet to all clocks. All BRG analog clock movements are supported. The Tiger master clock must be Tiger version 4.75 or later. The 2.4 GHz master clock radio firmware must be BRG_analog_timezone_master_v11.py or later. Analog slave clocks in a time zone configuration require CEL firmware BRG_analo_TZ_slave_zone_NN_V11.py, where NN is the zone number of the clock. Each analog clock is loaded with firmware for a specific zone. Every time packet includes a zone identifier. If an analog clock receiving the time packet matches the zone indicated, it will use the time to update the clock. The BRG digital master clock does not support primary and secondary master clock operation. The 2.4 GHz radio defaults to channel 10. Set Mode 18 and Mode 37-78 to the desired number of zones. Set Mode 32-12=1 to enable transmissions once per second. Mode 37-67= 3 configures the master clock to send time data out the GPS port to the CEL 2.4 GHz radio. Example for BRG digital master 2.4 GHz systems: To configure 5 analog time zone clocks with the transmitter receiving time from Ethernet NTP and the radio connected to the GPS port: Mode 18=5 - configure for 5 display zones Mode 21-1= zone 1 offset Mode 21-2= zone 2 offset Mode 21-3= zone 3 offset Mode 21-4= zone 4 offset Mode 21-5= zone 5 offset Mode 24-1= zone 1 DST rule

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Mode 24-2= zone 2 DST rule Mode 24-3= zone 3 DST rule Mode 24-4= zone 4 DST rule Mode 24-5= zone 5 DST rule Mode 32-8=0 – use time zone offsets for received time Mode 32-12=1 – enable transmission once per second Mode 32-15=7 – enable the GPS port for the radio transmission Mode 32-70=2 – enable the GPS port for time transmissions Mode 37-67=3 – transmit time on the GPS port to the radio Mode 37-78=5 – configure for 5 transmit channels If necessary, set Mode 33 for the respective zone to force half hour time offsets. **900 MHz Wireless Analog Time Zone Clocks** 1-24 = Number of analog clock zones This 900 MHz analog time zone display system has been replaced with the 2.4 GHz analog time zone display system. This mode allows wireless analog clocks to be used as a time zone display. Each analog clock incorporates a 900 MHz receiver configured to receive a single channel. The master clock transmits on multiple channels, sending the time for each channel that matches the respective time zone. Time is transmitted to a different clock every other second. When the last clock is reached, the sequence starts over with the first clock. Configure each analog clock to receive on channel 16 through 39, for time zone positions 1 through 24 respectively. Position 1 is the local time as displayed on the master clock. This zone may be used to drive other clocks not in the time zone array. Set Mode 18 to the same value used for Mode 37-78. The number of zones to display must equal the radio channels to use. Set Mode 32-12=1 to enable transmissions once per second. Mode 37-67= 3 configures the master clock to send time data out the GPS port to the CEL or 900 MHz transmitter. For 900 MHz systems, to determine the channel to assign each analog clock, add 15 to the desired zone number. For example, zone 1 will use channel 16 (1+15=16). Configure each analog clock with the desired channel. Disable channel scanning. Assign all analog clocks the same group number and encryption key. Example for 900 MHz systems: To configure 5 analog time zone clocks with the transmitter receiving time from Ethernet NTP and the radio connected to the GPS port: Mode 18=5 - configure for 5 display zones Mode 21-1= zone 1 offset Mode 21-2= zone 2 offset Mode 21-3= zone 3 offset Mode 21-4= zone 4 offset Mode 21-5= zone 5 offset Mode 24-1= zone 1 DST rule

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Mode 24-2= zone 2 DST rule Mode 24-3= zone 3 DST rule Mode 24-4= zone 4 DST rule Mode 24-5= zone 5 DST rule Mode 32-8=0 – use time zone offsets for received time Mode 32-12=1 – enable transmission once per second Mode 32-15=7 – enable the GPS port for the radio transmission Mode 37-67=3 – transmit time on the GPS port to the radio Mode 32-70=2 – enable the GPS port for time transmissions Mode 37-78=5 – configure for 5 transmit channels If necessary, set Mode 33 for the respective zone to force half hour time offsets.
37	79	0-3	**Forced Wireless Relay Selection** 0=both relays, 1=relay 1 (default) 2=relay 2 3=relay selected from alarm schedule This mode forces which relay (1, 2, or both) to use in a wireless relay module. A value of 3 reverts back to obtaining the relay number from the alarm schedule. The forced mode should be used when using the countdown mode of wireless digital clocks along with wireless relays. See also Mode 37-61.
37	80	0,1	**Wireless Device Test Mode** 0=disabled, 1(default)= enable wireless test mode using the Timer Control button Pressing the Timer Control button once displays the current test mode setting. Press the Timer Control button again to send the test message, or use the Up or Down buttons to change to another mode, then press the timer control button to send the message. 1=Send real time to message board 2=Blank message board 3=Unblank message board 4=Sent time format to message board 5=Send "This is only a test" to board 6=Activate speaker amp and lights 7=Enable message 16 8=Erase all messages 9=Beep message board 10=Reset message board Mode 11 determines the upper three digits of the capcode (example 080 of 0800828), default=0080 Mode 12 determines the lower four digits of the capcode (example 0828 of 0800828), default=0828 This test mode is not available for 900 MHz wireless systems.
37	81	0,1	**Message Data Padding Stripper**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			0=disabled (default) 1=enabled Strip spaces from message board data inserted by the control program to overcome problem with 1707 type receivers with a buffer overrun issue.
37	82	0,1	**Message Board Command Acknowledge** 0=disabled 1=enabled (default) Acknowledge commands send from the command console to the master transmitter by sending an acknowledge from the master transmitter to the command console. If time or message commands are not acknowledged, the command console will produce a chime alert sound. **To obtain a command acknowledgement across subnets, set the Clock response IP address to the IP address of the control computer.**
38	1-99	1-99	**Alarm Schedule Group Assignment** Assigns each alarm setting to an alarm schedule group. (default=1) See also Mode 37-1 – Active Alarm Schedule. Setting Mode 37-1=0 will cause the date ranges to be used to determine which alarm schedule is active. Date ranges for each alarm schedule are set in Modes 53, 54, 55, and 56. Alarm group 1 is different than the other 19 alarm groups. If no date range is active, then group is 1 the default. This feature reduces the number of alarm entries required in some schedule situations. In Tiger version 3.75 and later, the number of alarm entries has expanded from 100 to 1000. The 1000 alarm entries are stored in 10 different schedules of 100 entries each. When Mode 37-1=0, alarm schedules will automatically change depending on the active date range. There are 20 date ranges available. The Mode 38 function has changed. It now determines which schedule is active for date ranges defined in Modes 53, 54, 55 and 56. Setting Mode 32-4=4 allows the Timer control button to switch between schedules 0-10 (0 activates date range switching). Press Timer Control to access Mode 37-1. Use the Up and Down buttons to change the schedule from 0-10, then press Timer Control to save and exit.
39		0-9999	**Panic Alarm Timeout Value (See Mode 45-19)** This mode was moved to Mode 45-19 on 2/14/05 (Tiger Version 3.41) 0=default - This value is used in conjunction with Mode 37-2 (Alarm Panic Button). When timeout seconds are greater than zero, the panic alarm will turnoff when the timeout time is reached.
40			See Mode 37-41
41			See Mode 37-42
42			See Mode 37-43
43	1	0-5	**Warning alarm** 0=disabled, 1=enabled using primary output relay with warning display flash rate, This setting is also used to enable four channel relays. If the four channel relay option is installed, then the clock expects at least one alarm setting for relays 2,3 or 4. If relays 2,3 or 4 are not included in any alarm scheduled at this time, then set Mode 59-99=16. This will cause the relays to correctly initialize at power up. Also set Mode

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			32-26=2 for four channels relays. 2=use secondary output relay with warning display flash rate, 3=no relay output with warning display flash rate, 4=use internal transistor array to drive lamps(set 32-26=2), (disables temperature Sensor and WS Sync Input) 5=allow red/yel/light with flashing display (set 32-26=2) See also Mode 37-39
43	2	00:00 to 23:59	**Warning Alarm Hours and Minutes**- Use Mode 43-1 to enable the warning alarm. The warning alarm activates before the Ending alarm and therefore, the warning time should occur before the End time.
43	3	0-59	**Warning Alarm Seconds** Use Mode 43-1 to enable the warning alarm.
43	4	0-50	**Warning Alarm Duration** 0=disabled (default). This mode will activate the output relay at the designated warning time for 1-50 seconds. This time is independent of the ending alarm duration. Alarm duration = 1-50 seconds. The warning alarm may be used with the transistor array output (signal lights), i.e. 43-1=4, 32-26=2. The warning alarm may also be used without signal lights.
43	5	0-99	**Warning Alarm Display Blink Rate** 0=no flashing, 1-99 flashes per second. See also Modes 37-39
44	1	01/01 to 12/31	**Ending Month, Day** This selection is used in conjunction with modes 9 and 10 (Ending hours, minutes and seconds). See also, Mode 32-18 to enable long duration timer mode. While in long duration timer mode, pressing the timer control button will temporarily switch to real time operation. At this point, you can change the time, and by pressing the mode button, you enter the menu system to change the real time month, day and year. Pressing the timer control button again will return to long duration timer mode. See also Modes 32-17, 32-18, 37-34, 37-35, 37-36, and 37-40
44	2	1990 to 2075	**Ending Year** This selection is used in conjunction with modes 9 and 10 (Ending hours, minutes and seconds). See also, Mode 32-18 to enable long duration timer mode. While in long duration timer mode, pressing the timer control button will temporarily switch to real time operation. At this point, you can change the time, and by pressing the mode button, you enter the menu system to change the real time month, day and year. Pressing the timer control button again will return to long duration timer mode. See also Modes 32-17, 32-18, 37-34, 37-35, 37-36, and 37-40
45	1	0-9999	**Counter Auto-increment Amount** The counter will auto-increment by the designated amount for the period indicated in mode 45-2. The Up/Start/Pause button pauses and resumes auto-increment.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
45	2	-9999 to 9999	**Counter Auto-increment Rate Value** The counter will auto-increment by the amount designated in mode 45-1. Mode 37-13 determines whether this value is tenths of seconds, seconds (default), minutes, or hours. See also mode 37-13.
45	3	0-9999	**Counter Increment Button Debounce** 5=default – This parameter is used to introduce a short delay after a button press has been detected before accepting further input. This delay is used to eliminate false input due to button contact bounce. The increment line may be paused for 0-9999 milliseconds. This parameter is also used to control the scroll speed of alpha digital lettering. See also Mode 51.
45	4	-9999 to 9999	**Counter Increment Amount** (default=1) – The counter will increase or decrease by this amount each time the counter is incremented or decremented.
45	5	-12 to 12	**Sync Receive Time Zone Offset** = -12 to 12 - (0 default) – time zone offset for wire sync receive to convert incoming local time from a computer to Zulu time. Use the same time zone offset that the computer uses. For example, if the computer is set to central time or the CDMA receiver is receiving central time (-6), then set this mode to –6 to cancel the local time zone offset. Set Mode 32-8=2 to enable this mode. Also, set Mode 24-24 to the local daylight saving time rule. The default is U.S. daylight saving time.
45	6	0-9999	**Hours Worked Per Year** (2080 default) - used with 37-26=23 thumb wheel switch. See also Mode 37-14=4
45	7	0-9999	**Salary** 0=default – Auto count salary See also modes 37-26, 37-27, and 45-6. . See also Mode 37
45	8	0-9999	**Midnight Sync Output Duration Override** milliseconds - midnight sync output duration override in milliseconds Example: Send a 100 ms pulse at 3:00 am over radio sync using the alarm relay. Mode 6=1 Mode 16= 3:00 Mode 17= 00 Mode 32-33=1 Mode 37-3=1 Mode 45=8=100
45	9	-2 to 9999	**Serial Sync Output Delay** Duration between serial sync output transmissions in tenths of seconds. A value of (minus) -1 (default) causes the sync data to be transmitted once per second. (Ver. 4.51) A value of (minus) -2 (default) causes the sync data to be transmitted once per minute. A value of -3 causes the sync data to be transmitted once per hour. A value of -4 causes the sync data to be transmitted twice daily at 2 and 3 am. In timer and counter modes, sync data is sent full speed, or about 5-10 times per second. See also Mode 32-12.
45	10	1-1440	**NTP Update Interval in Minutes** 1(default) Stores the frequency of clock updates using NTP. Select mode 70-2 to send the stored value to the Ethernet interface. See also Modes 45-11, 45-12, 70, and

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			71.
45	11		**Ethernet Configuration Port** The least significant four digits of the port address is displayed. 10,000 will be added to the stored valued. The default stored value is 6437; therefore, the port address is 16437. Select mode 70-3 to send the stored value to the Ethernet interface. See also Modes 45-10, 45-12, 70, and 71.
45	12		**Ethernet UDP Time Synchronization Port** The least significant four digits of the port address is displayed. 10,000 will be added to the stored valued. The default stored value is 6000; therefore, the port address is 16000. Select mode 70-4 to send the stored value to the Ethernet interface. See also Modes 45-10, 45-11, 70, and 71
45	13	0-9999	**Alarm Frequency** 0=disabled, 1-9999 seconds between alarms. This mode is used with the Alarm Toggle Mode 49. During the period the alarm is normally toggled on, the alarm can be turned on and off at a periodic rate. Mode 45-13 determines how often the alarm activates within the toggle on period, while Mode 5 determines the alarm duration.
45	14	0-9999	**GPS, IRIG-B and SMPTE Receiver Delay Correction** – 0-9999 milliseconds - This mode cancels the reception delay introduced by the serial cable between the receiver and the clock. One second is added to the time received, the update is then delayed by the specified number of milliseconds before being displayed. 50ms is the default. The number of zones and/or digital lettering can also affect the displayed time.
45	15	1-9999	**Alarm duration multiplier -** 1 (default) - 9999 This value is a multiplier for the alarm duration values in Mode 5 and Mode 30. This feature allows much longer alarm duration times. For example, if Mode 5=3 and Mode 45-15=10, the alarm duration is 300 seconds, or five minutes.
45	16	-50 – 150	**Thermostat** –50 to 150 Fahrenheit or Celsius This mode is used to configure the thermostat feature. The temperature sensor is used to operate the alarm output relay. The default setting of -50 disables thermostat operation. If the setting does not equal -50 degrees (F or C), then the setting will be compared against the measured temperature. If the measured temperature is greater than Mode 45-16, then the alarm output will be active. Mode 37-47 determines whether Mode 45-16 is in degrees F or C (0=F-default, 1=C). The thermostat feature cannot be used with four channel relay operation. Use Mode 37-32 to optionally set the relay activation state. Set Mode 32-50=1 to enable the temperature sensor. If using thermostat operation with Timer Mode, set Mode 37-12=0. See also Mode 32-50 and Mode 46-1.
45	17	0-9999	**Serial Communications Propagation Cancellation Delay** This delay is used in conjunction with Mode 32-40. The value in Mode 32-40 is added to the seconds received over serial sync communications. A delay is then applied to add fractional seconds to the time received. This will effectively cancel the delay caused by the time required to send the time over a serial communications line. See also Mode 32-40.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
45	18	-9999 - 9999	**NMEA Propagation Delay Cancellation** 0 - disabled 1 – (default) This mode is designed to cancel the delay introduced by the NMEA 4800 baud serial communications mode and other delays. If 45-18>0 then the NMEA time received will be advanced one second plus the a number of milliseconds specified by Mode 45-18. For example, the default setting will advance the NMEA time received by 1.001 seconds. If 45-18<0 then the NMEA time received will be advanced two seconds plus the positive number of milliseconds specified by Mode 45-18. For example, if Mode 45-18= -500, then NMEA time received will be advanced by 2.500 seconds.
45	19	0-9999	**Panic Alarm Timeout Value (formerly Mode 39)** 0=default - This value is used in conjunction with Mode 37-2 (Alarm Panic Button). When timeout seconds are greater than zero, the panic alarm will turnoff when the timeout time is reached. This mode was previously assigned to Mode 39 but was moved to Mode 45-19 on 2/14/05 (Tiger Version 3.41)
45	20	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=10** Default=327 – (Second Sunday in March) Values for rule driven custom daylight saving time for Mode 24-n=10. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-1. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-1 instead.** See Mode 24-n=10 and Mode 24-n=11. See also Mode 45-21, Mode 45-22 and Mode 45-23.
45	21	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=10** Default=1117 – (First Sunday in November) Values for rule driven custom daylight saving time for Mode 24-n=10. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-2. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-2 instead.** See Mode 24-n=10 and Mode 24-n=11. See also Mode 45-20, Mode 45-22 and Mode 45-23.
45	22	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=11** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=11. The format is

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-3. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-3 instead.** See Mode 24-n=10 and Mode 24-n=11. See also Mode 45-20, Mode 45-21 and Mode 45-23.
45	23	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=11** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=11. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-4. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-4 instead.** See Mode 24-n=10 and Mode 24-n=11. See also Mode 45-20, Mode 45-21 and Mode 45-22.
45	24	0-9999	**Temperature Sensor Samples** 1000=default. This value determines the number of temperature samples used to produce the average temperature displayed. Reducing this value to increase the response time to temperature changes.
45	25	0-240	**Digital Lettering Command Offset** This value provides an offset to the starting position for the 5, 10, 15, and 20 character digital lettering commands. For example, if the first 25 positions contain five, 5 digit special characters to display the hour and minute, then character positions 26 through 75 could be used for five, 10 character zone titles. In this case, Mode 45-25 would be set to 25. The control program could then send new zone titles using either the TZ6610 form or the ten character time zone form. The first 25 positions containing the special characters would remain unchanged. The Flexible Zone Title form can be used to configure the special characters in the first 25 characters. Then the TZ6610 form or the Ten Character Title form can be used to change the zone titles without affecting the special characters. Tiger version 3.71 or later is required.
45	26	0-9999	**Pager Password** Requires four digit value - This password is required for various transmissions that utilize POCSAG data communications, including wireless relays, message boards and speakers.
45	27	0-255	**Relay Starting Address for a Telephone Activated Wireless Relay** Default=999

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			This mode determines the starting address for up to 16 wireless relays. When a telephone activation command is sent to an address equal to the value stored in Mode 45-27, plus the two digit relay number minus 1, then the function in Mode 37-73 will be sent to a wireless relay at the same address. For example, if Mode 45-27 = 100 and the relay number entered was 05, then the command would activate the relay (both relay contacts 1 and 2) at address 104. The last two digits of the command determine which one of 16 wireless relay addresses to use. To activate a wireless relay from a telephone, enter xxyyyzz. xx= clock address, yyy=wireless relay starting address as defined by Mode 45-27, zz = relay number. Mode 37-73 determines the wireless relay action mode. Example 1: Phone command 6410001 will activate the wireless relay at address 100 for 3 seconds using master clock 64. Mode 45-27=100, Mode 37-73=23, Address 100 = pager capcode 0701000 Example 2: Phone command 6421010 will activate the wireless relay at address 219 for 5 minutes using master clock 64. Mode 45-27=210, Mode 37-73=43, Address 219 = pager capcode 0702190 See also Mode 37-56 for wireless relay function codes. Both relays within one wireless relay receiver will activate using the same function. See also Mode 37-73
45	28	0-1023	**Forward Power** This read only value represents the forward power of the last transmission. This is for 406-470 MHz radio transmitters only. See also Mode 46
45	29	0-1023	**Reverse Power** This read only value represents the reverse power of the last transmission. This is for 406-470 MHz radio transmitters only. See also Mode 46
45	30	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=20** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=20. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-5. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-5 instead.** See Mode 24-n=20 and Mode 45-31.
45	31	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=20 (ver 4.64)** Default=0

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Values for rule driven custom daylight saving time for Mode 24-n=20. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-6. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-6 instead.** See Mode 24-n=20 and Mode 45-30.
45	32	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=21 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=21. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-7. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-7 instead.** See Mode 24-n=21 and Mode 45-33.
45	33	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=21 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=21. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-8. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-8 instead.** See Mode 24-n=21 and Mode 45-32.
45	34	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=22 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=22. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-9. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-9 instead.**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			See Mode 24-n=22 and Mode 45-35.
45	35	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=22 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=22. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-10. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-10 instead.** See Mode 24-n=22 and Mode 45-34.
45	36	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=23 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=23. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-11. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-11 instead.** See Mode 24-n=23 and Mode 45-37.
45	37	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=23 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=23. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-12. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-12 instead.** See Mode 24-n=23 and Mode 45-36.
45	38	111 – 3231	**Custom Daylight Saving Rule – Starting Value for Mode 24-n=24 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=24. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-13. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-13 instead.** See Mode 24-n=23 and Mode 45-398.
45	39	111 – 3231	**Custom Daylight Saving Rule – Ending Value for Mode 24-n=24 (ver 4.64)** Default=0 Values for rule driven custom daylight saving time for Mode 24-n=24. The format is MMRD, where MM = month (1-12), R = instance of the select day of the week (1-5 5=last instance), D = day of the week (1-7), where 1=Monday and 7=Sunday. For example, 357 represents the last Sunday in March, or 1117 represents the First Sunday in November. If the value >2000 then the right two digits represent the day of the month. The left two digits, minus 20, equal the month. For example, March 15th = 2315, April 1st = 2401. The day of the year derived from this rule is stored in Mode 52-14. **If the DST date is a fixed day (i.e. 15th of the month), then set this mode to 0 and enter the Julian day into Mode 52-14 instead.** See Mode 24-n=23 and Mode 45-38.
46	1	-9999-9999	**Temperature Sensor Adjustment** The temperature sensor may be adjusted up or down in degrees Kelvin to overcome line loss attributed to a long cable run to remote sensor. The adjustment is linear across the operating temperature range from –40 F (-40 C) to 212 F (100 C). **Wattmeter Offset Value** 0-999, default=135 The value is used to calibrate the Wattmeter located in the master transmitter. The value entered is divided by 100 and multiplied against the reading from the Wattmeter sensor. A value of 100 will cause not adjustment.
47	1-24 display	0,1	**Alpha Display Position Map** This parameter is factory configured and should not be changed. 0=numeric display at position, 1=four digit alpha display position (alpha month plus numeric day of month counts as one position)
48	1-24 display	12,24	**Timer 12/24 Hour Display Format** This value determines whether the display is in 12 or 24 hour format while in timer mode. See Mode 23 for 12/24 hour format selection while in real time mode.
49	1-99 alarms	0-5	**Scheduled Alarm Toggle On/Off** This mode is used to turn the alarm output on and off in real time mode. In timer mode, it can be used to execute specified timer control commands. This mode can also be used to control an auto-incrementing counter (see Mode 32-61). 0 = Deactivate alarm toggle output, 1 = turn on alarm output,

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			2 = turn off alarm output. 3 = Counter/Timer Reset 4 = Counter/Timer Pause / Resume (same as Up button) 5 = Timer Reset and Start (same as Timer Control button) 6 = Play an audio file over a wireless connection 7 = Send audio player commands directly out the serial port 8 = Send command to switch Midland UHF transmitter to channel A 9 = Send command to switch Midland UHF transmitter to channel B 10 = Send command to enable UHF wireless speakers for 5 minutes 11-27 = enable MM message file (11=file 1 or A, 27=file 16 or P) 99 = Enable message board internal sounders for 3 seconds. (Ver. W4.76 or later) This mode has 99 positions, one for each corresponding alarm setting. Once the alarm output is turned on, it will remain on until it is turned off. See also modes 27, 28, 29 and Mode 32-61. **Morse Code Station Identification (** Mode 49-90 through Mode 49-99 is used to hold the ASCII FCC station identification string. The wireless control program is typically used to enter this string.
50	1		**Restore Factory Defaults** This special diagnostic mode is for factory use only. This mode is used restore the factory defaults.
50	2		**Software Reset** This special diagnostic mode is for factory use only. This mode is used to reset the software without removing power from the display.
50	3		**Illuminate all Segments** This special diagnostic mode is for factory use only. This mode is used to illuminate all LED segments of all displays. Pressing either Up or Down buttons returns to the previous display mode.
50	4	0,1	**Zone Number Identifier** This mode is used to identify the zone number of each four digit display in clocks that use multiple four digit displays. 0=inactive(default), 1=displays the respective zone numbers of each display. Once the zone number is displayed, pressing either mode, up or down will return to normal display mode.
50	5		**Restore-User Default Configuration** This mode may be used to retrieve the custom configuration from memory if it was previously stored using mode 50-6. To execute the configuration retrieval process, press the mode button while 50-5 is displayed. The clock will resume normal

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			operation after the configuration is retrieved. Version 2.35 or later.
50	6	1-3	**Save-User Default Configuration** This mode is used to store a custom configuration. Use mode 50-5 to restore the configuration. To execute the configuration save process, press the mode button while 50-6 is displayed. The clock will resume normal operation after the configuration is saved. Version 2.35 or later.
51	1	1-255	**Digital Lettering Character String** 0=exit menu level, 1-255 alpha characters This mode is used to edit the digital alpha characters. These characters are used for zone titles on time zone displays and general message displays. You can enter a message up to 255 characters regardless of the number of alpha digits installed. If the message length exceeds the number of digits installed, the message can be displayed by rotating the message into view one section at a time. **See also Mode 51-6 to determine time zone offsets for special characters.** **See also 32-54 to determine the type of displays installed (16 segment or 5X7 matrix).** **See also Mode 45-25 to configure a protected area for special characters.** Special Characters – The following macro characters are available for special display applications: Value – Description 1 - Julian date or day of the year, Hundreds (see also 2 and 31) 2 - Julian date or day of the year, Tens (see also 1 and 31) 3 – Time – hours, ten 4 – Time – hours, unit 5 – Time – Minute, ten 6 – Time – Minute, unit 7 – Time – Second, ten 8 – Time – Second, unit 9 – Day of the Week – alpha character one 10 – Day of the Week – alpha character two 11 – Day of the Week – alpha character three 12 – Month – alpha character one 13 – Month – alpha character two 14 – Month – alpha character three 15 – Month – ten 16 – Month – unit

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			17 – Day – ten 18 – Day – unit 19 – Year – thousand 20 – Year – hundred 21 – Year – ten 22 – Year – unit 23 – “P” or “A” - AM/PM indicator 24 – Military Shipping Code A-Z, no I or O 25 – Temp F, hundred 26 - Temp F, ten 27 – Temp F, unit 28 – Temp C, hundred 29 – Temp C, ten 30 – Temp C, unit 31 - Julian date or day of the year, Unit (see also 1 and 2) 128 – Counter – hundred millions digit 129 – Counter – ten millions digit 130 – Counter – millions digit 131 – Counter – one hundred thousands digit 132 – Counter – ten thousands digit 133 – Counter – thousands digit 134 – Counter – hundreds digit 135 – Counter – tens digit 136 – Counter – units digit 137 – Counter - millions comma 138 – Counter – thousands comma 139 – GPS, CDMA, IRIG-B and Ethernet Sync Status – “*” = sync, space=no sync 140 – GPS, CDMA, IRIG-B and Ethernet sync Status – “*” = no sync, space= sync 141 – Sunrise Time – hours, ten 142 – Sunrise Time – hours, unit 143 – Sunrise Time – Minute, ten 144 – Sunrise Time – Minute, unit 145 – Sunset Time – hours, ten 146 – Sunset Time – hours, unit 147 – Sunset Time – Minute, ten 148 – Sunset Time – Minute, unit

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			149 – Up/Down Timer/Counter direction arrow, blank for real time 150 – Week of the Year, ten - value = int(DOY/7)+1 151 – Week of the Year, unit - value = int(DOY/7)+1
51	2	0-255	**Number of Alpha Digits Installed** This value is configured at the factory and should not be changed. See also 32-54 to determine the type of displays installed (16 segment or 5X7 matrix). **If the display has only 5x7 matrix digital lettering and the program is reset to factory defaults, the display will blank and control will be lost. To regain control of the display, hold down the Timer Control button while powering up the display. When the display test pattern appears, release the Timer Control button. The display character length will be set to 5 digits and the display format will be set to the hours and minutes.** (Version 3.10 or later)
51	3	0-6	**Alpha Display Operating Mode** 0=solid , Display a fixed message on the alpha digital lettering. 1=frame rotating display (default),. For example, if eight alpha digits are installed and the message length entered is 24 characters long, the message will flip one frame at a time, displaying eight characters at a time. See also Mode 32-3 to set the number of rotating display pages. Mode 51-4 determines the period between frames. **Automatic frame rotation occurs on the second. Therefore, if multiple clocks have their time synchronized, then frame rotation will occur in sync. Multiple displays may start with the same frame, or the starting frame may be specified using Mode 32-3 (2-24). An alternative to specifying a starting frame is to simply program different information into the frames on the different displays.** 2=scroll characters to the left . For example, if eight alpha digits are installed and the message length entered is 24 characters long, the message will flip one frame at a time, displaying eight characters at a time. See also Mode 32-3 to set the number of rotating display pages. . Mode 51-4 determines the period between frames. Mode 45-3 determines the scroll speed delay in milliseconds. The default speed delay is 5 milliseconds. 3=alternate between two alpha messages depending on red warning light status This mode is used to switch between two fixed messages depending upon the condition of the warning lights. Set Modes 43-1=4, 32-26=2. See also Modes 43-2, 43-3, 52-1, and 51-2. 4=alternate between two alpha messages depending on yellow warning light status This mode is used to switch between two fixed messages depending upon the condition of the warning lights. See also Modes 43-1=4, 32-26=2, 43-2, 43-3, 52-1, and 51-2. 5=alternate between two alpha messages depending on green warning light status This mode is used to switch between two fixed messages depending upon the condition of the warning lights. See also Modes 43-1=4, 32-26=2, 43-2, 43-3, 52-1, and 51-2.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			6=select one of four alpha messages depending on warning light status This mode is used to switch between one of four fixed messages depending upon the condition of the warning lights. If no lights are on, message frame 1 is selected. If the red light is on, then message frame 2 is selected. If the yellow light is on, then message frame 3 is selected. If the green light is on, then message frame 4 is selected. See also Modes 43-1=4, 32-26=2, 43-2, 43-3, 52-1, and 51-2.
51	4		**Alpha Frame Rotation Speed** 0-59 seconds. The higher the number, the slower the display moves. Automatic rotation is disabled when manual switching is enabled (Mode 37-20=1). See also Mode 32-3. See Mode 32-20 when an array of synchronized frame rotating clocks will be used and each clock is to display a different frame.
51	5	0,1	**Digital Lettering Character Sequence** 0=normal 1=reversed – (default)
51	6	1-255 then 1-24	**Digital Lettering Zone Position for Special Time and Date Characters** This parameter is used in conjunction with special characters in the alpha digital lettering display. Mode 18 must be set to the number of time zones that will be used. Modes 21 and 24 must also be configured. For example, if the time is display on the digital lettering using special characters, this parameter determines what time zone offsets and other rules apply to the time displayed. If hour and minutes, plus a colon is displayed on character position 10-15, then set Mode 51-6-10 through 51-6-15 to the desired zone position (1-24). If Mode 37-22 is greater than 0, then Mode 37-22 overrides all Mode 51-6 parameters.
51	7	1-255 then 0-16	**Digital Lettering Individual Intensity for 5X7 Alpha Digits Only** 0=default – Use default intensity set using Mode 3. 1-15 = Override default intensity with a setting of 1 through 15 with 1 being low intensity and 15 the highest intensity. 16= Blink alpha characters once per second to indicate sync GPS, CDMA, IRIG-B and Ethernet reception. If no sync source is used, setting Mode 32-2=4 will blink the designated characters continuously. Mode 51-7-n=16 (where n is the alpha character position) is used to indicate which character positions are to blink. See also Mode 32-2. 17= Blink alpha characters once per second when timer is running. Set Mode 32-2=4 to activate. This mode is helpful to blink the colon on alpha timer that do not show seconds. Mode 51-7-n=17 (where n is the alpha character position) is used to indicate which character positions are to blink. 18=turn on digit when second is odd. Modes 51-7=18 and 51-7=19 can be used together with adjacent digits to make an alternating digit display, as with railroad crossing alternating lights. Any dig can be made to blink with the second. 19=turn off digit when second is even. Modes 51-7=18 and 51-7=19 can be used together with adjacent digits to make an alternating digit display, as with railroad crossing alternating lights. Any dig can be made to blink with the second.

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
52	1	1-365	**Custom Daylight Time Switch -User Defined 10** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 10. Both modes 52-1 and 52-2 must be set to the desired day of the year. See also Mode 45-20 to define new daylight saving rule. **Mode 45-20 must be set to 0 to enable this mode; otherwise, use Mode 45-20 to enable rule base switching.** For U.S. Spring switch to Daylight Saving Time: 2008=69, 2009=67, 2010=73, 2011=72, 2012=71, 2013=69,2014=68, 2015=67, 2016=73, 2017=71
52	2	1-365	**Custom Julian Standard Time Switch -User Defined 10** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 24, code 10. Both modes 52-1 and 52-2 must be set to the desired day of the year. See also Mode 45-21 to define new daylight saving rule. **Mode 45-21 must be set to 0 to enable this mode; otherwise, use Mode 45-21 to enable rule base switching.** For U.S. Fall switch to Standard Time: 2008=307, 2009=305, 2010=311, 2011=310, 2012=309, 2013=307,2014=306, 2015=305, 2016=311, 2017=309
52	3	1-365	**Custom Julian Daylight Time Switch -User Defined 11** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 11. Both modes 52-3 and 52-4 must be set to the desired day of the year. See also Mode 45-22 to define new daylight saving rule. **Mode 45-22 must be set to 0 to enable this mode; otherwise, use Mode 45-22 to enable rule base switching.**
52	4	1-365	**Custom Julian Standard Time Switch -User Defined 11** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 24, code 11. Both modes 52-3 and 52-4 must be set to the desired day of the year. See also Mode 45-23 to define new daylight saving rule. **Mode 45-23 must be set to 0 to enable this mode; otherwise, use Mode 45-23 to enable rule base switching.**
52	5	1-365	**Custom Julian Daylight Time Switch -User Defined 20** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 20. Both modes 52-5 and 52-6 must be set to the desired day of the year. See also Mode 45-30 to define new daylight saving rule. **Mode 45-30 must be set to 0 to enable this mode; otherwise, use Mode 45-30 to enable rule base switching.**
52	6	1-365	**Custom Julian Standard Time Switch -User Defined 20** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 24, code 20. Both modes 52-5 and 52-6 must be set to the desired day of the year. See also Mode 45-31 to define new daylight saving rule. **Mode 45-31 must be set to 0 to enable this mode; otherwise, use Mode 45-31 to enable rule base switching.**
52	7	1-365	**Custom Julian Daylight Time Switch -User Defined 21** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 21. Both modes 52-7 and 52-8 must be set to the desired day of the year. See also Mode 45-32 to define new daylight saving rule. **Mode 45-32 must be set to 0 to enable this mode; otherwise, use Mode 45-32 to enable rule base switching.**
52	8	1-365	**Custom Julian Standard Time Switch -User Defined 21** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 24, code 210. Both modes 52-7 and 52-8 must be set to the desired day of the year. See also Mode 45-33 to define new daylight saving rule. **Mode 45-33**

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			must be set to 0 to enable this mode; otherwise, use Mode 45-33 to enable rule base switching.
52	9	1-365	**Custom Julian Daylight Time Switch -User Defined 22** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 22. Both modes 52-9 and 52-10 must be set to the desired day of the year. See also Mode 45-34 to define new daylight saving rule. **Mode 45-34 must be set to 0 to enable this mode; otherwise, use Mode 45-34 to enable rule base switching.**
52	10	1-365	**Custom Julian Standard Time Switch -User Defined 22** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 22, code 20. Both modes 52-9 and 52-10 must be set to the desired day of the year. See also Mode 45-35 to define new daylight saving rule. **Mode 45-35 must be set to 0 to enable this mode; otherwise, use Mode 45-35 to enable rule base switching.**
52	11	1-365	**Custom Julian Daylight Time Switch -User Defined 23** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 23. Both modes 52-11 and 52-12 must be set to the desired day of the year. See also Mode 45-36 to define new daylight saving rule. **Mode 45-36 must be set to 0 to enable this mode; otherwise, use Mode 45-36 to enable rule base switching.**
52	12	1-365	**Custom Julian Standard Time Switch -User Defined 23** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 24, code 23. Both modes 52-11 and 52-12 must be set to the desired day of the year. See also Mode 45-37 to define new daylight saving rule. **Mode 45-37 must be set to 0 to enable this mode; otherwise, use Mode 45-37 to enable rule base switching.**
52	13	1-365	**Custom Julian Daylight Time Switch -User Defined 24** Enter the day of the year to switch from standard time to daylight time. This value is used by Mode 24, code 24. Both modes 52-13 and 52-14 must be set to the desired day of the year. See also Mode 45-380 to define new daylight saving rule. **Mode 45-38 must be set to 0 to enable this mode; otherwise, use Mode 45-38 to enable rule base switching.**
52	14	1-365	**Custom Julian Standard Time Switch -User Defined 24** Enter the day of the year to switch from daylight time to standard time. This value is used by Mode 24, code 24. Both modes 52-135 and 52-14 must be set to the desired day of the year. See also Mode 45-39 to define new daylight saving rule. **Mode 45-39 must be set to 0 to enable this mode; otherwise, use Mode 45-39 to enable rule base switching.**
53	1-20	01/01 to 12/31	**Alarm Schedule Date Range - Beginning Month/Day** 12/31 (default) - Set Mode 37-1=0 to enable. This mode is used to set the beginning month and day of an alarm date range. If Mode 54 has the same date, the alarm will activate only one day. If the Year in Mode 55 equals 2000, then the alarm will activate every year with the month/day range specified. The ending date must be occur after the beginning date. See also Mode 38 to force an alarm schedule active. Alarm group 1 is different than the other 19 alarm groups. If no date range is active, then group is 1 the default. This feature reduces the number of alarm entries required in some schedule situations. Mode 27 set the hours and minutes. Mode 29 sets the day of the week (required).
54	1-20	01/01 to	**Alarm Schedule Date Range - Ending Month/Day** 12/31 (default) - Set Mode 37-1=0 to enable. This mode is used to set the ending

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
		12/31	month and day of an alarm date range. If Mode 53 has the same date, the alarm will activate only one day. If the Year in Mode 55 equals 2000, then the alarm will activate every year with the month/day range specified. The ending date must be occur after the beginning date. See also Mode 38 to force an alarm schedule active. Alarm group 1 is different than the other 19 alarm groups. If no date range is active, then group is 1 the default. This feature reduces the number of alarm entries required in some schedule situations. Mode 27 set the hours and minutes. Mode 29 sets the day of the week (required).
55	1-20	2000 to 2050	**Alarm Schedule Date Range - Beginning Year** 2050 (default) - Set Mode 37-1=0 to enable. This mode is used to set the beginning year of an alarm date range. If the Year in Mode 55 equals 2000, then the alarm will activate every year with the month/day range specified. The ending date must be occur after the beginning date. See also Mode 38 to force an alarm schedule active. Alarm group 1 is different than the other 19 alarm groups. If no date range is active, then group is 1 the default. This feature reduces the number of alarm entries required in some schedule situations. Mode 27 set the hours and minutes. Mode 29 sets the day of the week (required).
56	1-20	2000 to 2050	**Alarm Schedule Date Range – Ending Year** 2050 (default) - Set Mode 37-1=0 to enable. This mode is used to set the ending year of an alarm date range. If the Year in Mode 55 equals 2000, then the alarm will activate every year with the month/day range specified. The ending date must be occur after the beginning date. See also Mode 38 to force an alarm schedule active. Alarm group 1 is different than the other 19 alarm groups. If no date range is active, then group is 1 the default. This feature reduces the number of alarm entries required in some schedule situations. Mode 27 set the hours and minutes. Mode 29 sets the day of the week (required).
57	1	1-9999	**Accelerated advance for changing values i.e. Start/End count** – 1=default
59	1-99	1-15	**Four Channel Alarm Relay Configuration** If the four channel relay option is installed, then the clock expects at least one alarm setting for relays 2,3 or 4. If relays 2,3 or 4 are not included in any alarm scheduled at this time, then set Mode 59-99=16. This will cause the relays to correctly initialize at power up. Value=1(default) - 15 – Set Mode 32-26=2 and 43-1=4 to activate the four channel relay output. Mode 59. position 1-99 corresponds to alarm positions 1-99. To set or reset a relay at a specific time, enter one of the following values or combinations of values in the position that corresponds to the alarm position. Value of 1=relay 1 Value of 2=relay 2 Value of 4=relay 3 Value of 8=relay 4 Binary combinations are allowed. For example, use a value of 12 (4+8) to turn on relays 3 and 4. You cannot turn on one relay and turn off another relay at the same time. When using timed alarm output form 1-50 seconds, do not schedule any other alarm times during the period any alarm is active. Because relays 2,3 and 4 use the signal light outputs, these relays cannot be used with signal lights, temperature sensor and Sync Input. Relay Channels: 1=L67, 2=L37, 3=L63, 4=L36

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
60	1-99		**SYSVARN System Information Register** The second parameter is passed to the SYSVARN function. The value returned by SYSVARN is displayed RE_CNT <01> Taskname Runtime error counter level RE_SEMA <02> Taskname Current error flag (0=ok, 1=error) RE_IDRES <15> Taskname Resets error flag and returns error code CALL_LEVEL <16> Taskname Stack nesting level DSTACK_FILL <17> Taskname Stack filling in bytes DSTACK_FREE <18> Taskname Free stack space in bytes DSTACK_SIZE <19> Dummy Stack size in bytes DRAM <30> 0 Total DRAM in System SRAM <31> 0 Total SRAM in System FLASH_CHIPS <32> Dummy Number of Flash-Chips FLASH_SIZE <33> Dummy Size of Flash-Chips in bytes FLASH_SEC <34> Dummy Number of sectors per chip FLASH_SSIZE <35> Dummy Flash sector size FLASH_ASEC <36> Dummy Number of Flash sectors FLASH_GSIZE <37> Dummy Size of Flash memory in bytes FLASH_DSEC <38> Dummy Number of Flash sectors for User-Data FLASH_DSIZE <39> Dummy Size of Flash memory in bytes for User-Data FLASH_DMODE <40> Dummy 0=system waits during Flash operations 1=system continues to run during Flash operations ACT_TASK <48> Dummy Current task number TASK_PRIO <49> Taskname Current task priority of this task SUM_PRIO <50> Dummy Sum total of all task priorities NR_OF_TASKS <51> Dummy Number of tasks in program NR_ACT_TASKS <52> Dummy Number of active tasks TIGER_MODE <67> Dummy Tiger-Mode:0: RUN-Mode1: PC-Mode =Debug-MODE TIGER_VERS <68> Dummy Tiger-Version TIGER_MODULE <69> Dummy Tiger module Type:0 = module family A
61	1-24	-90 to +90	**Sunrise/Sunset Latitude - Integer** If the Latitude integer is negative, then the Latitude decimal fraction must also be negative. Enter South latitudes as negative values. Mode 21-x must be set to display Sunrise/Sunset times for a time other than UTC. See also, Modes 32-35, 32-36 and Display Modes 56,57,58 and 59. See also Mode 34 to activate an alarm at the

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			Sunrise/Sunset time.
62	1-24	-9999 to +9999	**Sunrise/Sunset Latitude - Decimal Fraction** If the Latitude integer is negative, then the Latitude decimal fraction must also be negative. Enter South latitudes as negative values. Beginning with software version 2.92, the fraction is entered as four digits. For example, .1230 is entered as 1230. Enter -.25 as –2500. Prior versions use a two digit fraction. Mode 21-n must be set to display Sunrise/Sunset times for a time other than UTC. See also, Modes 32-35, 32-36 and Display Modes 56,57,58 and 59. See also Mode 34 to activate an alarm at the Sunrise time. **Local Sidereal Time Offset – 10 Millionths of a Degree** – This parameter is also used to define the Longitude offset for Local Sidereal Time in fractional decimal degrees. To enter an offset to UTC, enter a negative number for fractional decimal degrees West, and a positive number for fractional decimal degrees East. The fractional portion of the offset may extend into the ten millionths. When entering negative numbers, a minus sign will appear until four digits are used. At that time, a light will appear in the upper left corner of the display to indicate the value is negative. See also Modes 62 and 63. See also Mode 72 to enable/disable Sidereal Time. **Sidereal Time Example:** 97 degrees, 37 minutes, 45 seconds West Convert to decimal: 97 + (37/60) + (45/3600), then make it negative for Western Longitude = -97.62916666 degrees Mode 63-n = -97 (n=display position; note the negative value) Mode 64-n = -6291 (n=display position; a dot on the display indicates negative) Mode 62-n = -6666 (n=display position; a dot on the display indicates negative)
63	1-24	-180 to +180	**Sunrise/Sunset Longitude – Integer** If the Longitude integer is negative, then the Longitude decimal fraction must also be negative. Enter West longitudes as negative values. Mode 21-n must be set to display Sunrise/Sunset times for a time other than UTC. See also, Modes 32-35, 32-36 and Display Modes 56, 57, 58 and 59. See also Mode 34 to activate an alarm at the Sunrise/Sunset time. **Local Sidereal Time Offset –Degree** – This parameter is also used to define the Longitude offset for Local Sidereal Time in degrees. To enter an offset to UTC, enter a negative number for degrees West, and a positive number for degrees East. See also Modes 62 and 64 to enter the decimal portion of the offset. See also Mode 72 to enable/disable Sidereal Time. **Sidereal Time Example:** 97 degrees, 37 minutes, 45 seconds West Convert to decimal: 97 + (37/60) + (45/3600), then make it negative for Western Longitude = -97.62916666 degrees Mode 63-n = -97 (n=display position; note the negative value) Mode 64-n = -6291 (n=display position; a dot on the display indicates negative) Mode 62-n = -6666 (n=display position; a dot on the display indicates negative)
64	1-24	-9999 to +9999	**Sunrise/Sunset Longitude - Decimal Fraction** If the Longitude integer is negative, then the Longitude decimal fraction must also be

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			negative. Enter West longitudes as negative values. Beginning with software version 2.92, the fraction is entered as four digits. For example, .1230 is entered as 1230. Enter -.25 as –2500. Prior versions use a two digit fraction. Mode 21-n must be set to display Sunrise/Sunset times for a time other than UTC. See also, Modes 32-35, 32-36 and Display Modes 56,57,58 and 59. See also Mode 34 to activate an alarm at the Sunrise/Sunset time. **Local Sidereal Time Offset – 10 Thousandths of a Degree** – This parameter is also used to define the Longitude offset for Local Sidereal Time in fractional decimal degrees. To enter an offset to UTC, enter a negative number for fractional decimal degrees West, and a positive number for fractional decimal degrees East. The fractional portion of the offset may extend into the ten thousandths. When entering negative numbers, a minus sign will appear until four digits are used. At that time, a light will appear in the upper left corner of the display to indicate the value is negative. See also Modes 62 and 63. See also Mode 72 to enable/disable Sidereal Time. **Sidereal Time Example:** 97 degrees, 37 minutes, 45 seconds West Convert to decimal: 97 + (37/60) + (45/3600), then make it negative for Western Longitude = -97.62916666 degrees Mode 63-n = -97 (n=display position; note the negative value) Mode 64-n = -6291 (n=display position; a dot on the display indicates negative) Mode 62-n = -6666 (n=display position; a dot on the display indicates negative)
72	1-24	0,1	**Sidereal Time** 0=Disable Sidereal Time (default), 1=Enable Sidereal Time for display zones 1 through 24. Sidereal time runs about four minutes faster per day than Solar time. This method of time measurement is used in Astronomy and other disciplines. Once Sidereal time is enabled for one ore more zones, all time display modes for those zones will be based on Sidereal Time. If two displays, that include seconds, are used to show Solar time and Sidereal time, the seconds on the displays will not necessarily match or increment at the same time because Sidereal time runs at a different rate than Solar time. If no offset is entered in Mode 62, 63 and 64, then Universal Sidereal Time is used. If Longitude offsets are entered, then Local Sidereal Time is used for the zones where an offset has been entered. See also, Modes 62, 63 and 64.
74	1-99	0-255	**CEL FH/SS Radio NV Ram Parameter** Mode 74-n=y ; n=NV mode, y=value - change any NV ram Mode 37-67 configures the port used for CEL commands.
75	1-6	0-255	**CEL FH/SS Radio Functions** Mode 75-1=n - number of hops (5 default) Mode 75-2=n - transmit power level (17 default) Mode 75-3=n - 1=master (default) with repeater mode disabled, 2=slave with repeater mode enabled, 3=both with repeater mode disabled. Mode 75-4=n – physical channel number 0-15 (14 default) Mode 75-5=n - logical channel (group) 0-15 (0 default) Mode 75-5=15 transmits and

First Menu Level Mode Number	Second Menu Level	Value Range	Mode Description and Instructions
			receives on all channels. Mode 75-6=n - 1= reboots the radio , 2=restore initialization defaults Mode 37-67 configures the port used for CEL commands.

Time Synchronization Method Comparison Chart

BRG Precision Sync. Methods	Description	Advantages	Disadvantages	Cost per Clock
59th Minute Impulse Correction	Time correction pulses are sent hourly over dedicated wiring.	Compatible with many older analog clock systems, uses existing dedicated clock wiring.	Time data only, date is not updated; however, all BRG digital clocks will automatically maintain the correct date.	$25
Bi-Polar Impulse Time Receiver	Time correction pulses are sent every minute over dedicated wiring.	Compatible with many analog clock systems, uses existing dedicated clock wiring, low cost.	Time update pulses only, no time or date data is sent or received. However, all BRG digital clocks will automatically maintain the correct date.	$25
CDMA Time Receiver	Time is received directly from CDMA cellular telephone transmissions. Provides absolute timing accuracy.	Obtains highly accurate time from cell phone towers, no fees or ongoing charges, no sync wires. Signal is typically available deep inside building without the need for antenna wires.	Signal may not be available in some areas. A signal test device is available.	$495
PC Time Server	A PC may be used to obtain the time from the internet or other time source, then distribute the time to clocks using Sync Wire or Ethernet.	Existing computers may serve as a time server. Using an existing PC as a time server is less costly than a dedicated time server.	A PC time server is typically not as reliable as a dedicated time server or master clock. The wire sync distribution method requires a serial interface adapter.	$125
Ethernet Communications	NTP or UDP time data is distributed over the existing computer network.	Obtains time from existing local or internet time servers. Highly accurate, med cost.	Long term reliability questionable as computer technology changes rapidly.	$125
Fiber Optic Modem	Clocks, Timers and Counters and other displays may be linked over great distances using fiber optic cable. Usually for secure point-to-point links.	Clocks may be up to 20km apart. Fiber Optic cable transmission is secure. Highly reliable. Not prone to creating or receiving interference.	Requires the installation of fiber optic cable.	$695
GPS Time Receiver	Time is received from the U.S. Government's Global Positioning System. Used mostly on master clocks. Provides absolute timing accuracy.	Obtains highly accurate time directly from military satellites. Worldwide coverage. Good long-term reliability. Window antennas are available.	Antenna must have a view of the sky. Requires line from clock to antenna.	$495-$595
IRIG-B Time Receiver	Time is distributed over dedicated time network wiring. Typically used for missile and space applications.	Obtains time from existing dedicated time network, compatible with military and space systems.	Dedicated wiring required	$250

Midnight Reset or PLC Reset	Time correction pulses may be received from older master clock systems, computers or PLC's.	The clock can be configured to expect resets at a variety of times and periods. Not prone to interference.	Requires dedicated wiring.	$25
Power Line Communications	Time, date and other data is distributed over existing power lines.	No new wires, medium cost, reliable	Electrical distribution transformers block the time signal.	$100
Radio Sync	Time data is sent to clocks using time-proven UHF radio paging system. The master clock obtains the correct time using GPS or Network Time and sends it over a standard radio paging system to all clocks in the area.	No sync wires required, high reliability, very long range, reliable small or large scale synchronization. Battery powered analog clocks are available.	Cost comparable to wire sync systems for large systems. Smaller systems may cost more dues to the cost of the transmitter(s)	$125
Radio Impulse	Correction pulses are sent periodically using UHF radio.	No wires required, medium reliability, use for isolated applications.	Medium reliability, limited range and unpredictable indoor communications	$100
Serial Wire Communications	Time is distributed using a dedicated twisted pair wire.	Up to 4,000 feet between and two clocks, low cost, reliable	Dedicated wiring must be installed.	$25-$50
SMPTE Time Receiver	Time is distributed over dedicated time network wiring.	Obtains time from existing dedicated time network.	Dedicated wiring required	$250
Time Server – Stratum 1	A dedicated time server will obtain accurate time using GPS or CDMA and distribute it to computers and time displays over the computer network.	Use NTP and standard protocols to distribute the time. GPS and CDMA are highly reliable and accurate time sources. CDMA version does not require an outdoor antenna. Supports many standard protocols.	Available in rack mount only. GPS version requires that the antenna must have a view of the sky.	$2,750 to $2,875
Ultra-high Precision Oscillator	A precision oscillator maintains accurate time, avoiding the need for frequent time updates. The clock automatically adjusts for crystal aging and ambient temperature changes.	No sync wire is required, low cost, clocks may be relocated with ease, high accuracy, reliable.	Clocks may require adjustment in 5-8 years. Not recommended where split second long-term accuracy is required.	$25
WWVB Time Receiver	Time is received from the NIST low frequency transmissions.	Highly accurate, medium cost.	Unreliable, prone to interference, outdoor antenna required, signal not available in all areas.	N/A Discontinued

Power Line Communications

The Master Clock sends the time to slave clocks over the power line. It can optionally include a GPS or CDMA time receiver.

Slave Clocks receive time synchronization data over the power line. Various power line connections are available including, hard wired connections, short power cords for plugging into an outlet located behind the clock, and long power cords.

Clock synchronization over the existing power line eliminates or greatly reduces the need for sync wiring. First, the master clock places the time onto the power grid. Then, all slave clocks receive the time from the power line. This means "No New Wires". All digital clocks within a one mile diameter circle around the master clock will display the same time by simply communicating over existing power lines.

The distance between the master and slave clocks may be up to 1,500 feet (500 meters), depending on line loading and other factors. Furthermore, slave clocks may be configured to repeat the time signal, for total range up to 3,000 feet (1,000 meters) between the master and slave clocks. This amounts to a communications area over one mile in diameter. Power Line sync will not pass through electrical distribution transformers. Multiple master clocks or Ethernet sync may be used overcome limitations imposed by multiple distribution transformers.

Operation Mode:

Mode 32-20 controls the power line synchronization operating modes. 0=disabled(default). 1=Transmit – this mode is used on the master clock to send time and date data to slave clocks. By default, sync data is transmitted every ten seconds when the seconds end in zero (i.e. 10,20,30,40,50). 2=Repeater – This mode allows the clocks to both receive and transmit power line sync data. This effectively repeats or doubles the range of the signal. It will receive data from a master clock sending data when the seconds end in zero. It will transmit sync data every ten seconds when the seconds end in five (i.e. 5,15,25,35,45,55). 3=Receive – This mode allows the clock to receive power line sync data from either a transmitter or repeater. There can be no more than one transmitter and one repeater within a single broadcast area.

Available Models:

Two power line communication models are available. PL is for common, single phase power lines, and PL3 is for industrial, three phase power lines. The three phase model is only used on the master clock. The PL (single phase model) is used in most installations, including most three phase installations. Valid power options include P2 (110 volts AC), P3 (220 volts AC), P5 (100-240 volts AC), P8 (110 volts AC with 12' power cord) and P9 (110 volts AC with flat plug). The power line communications signal will not pass through power distribution transformers.

The master clock may optionally include a GPS or CDMA time receiver for the correct time, all the time. If no time receiver is used, the master clock can be manually set. For special applications, other options may also be used with power line communications including, serial wire sync, IRIG-B, SMPTE, midnight reset pulse sync, and more.

Ethernet Communications Option

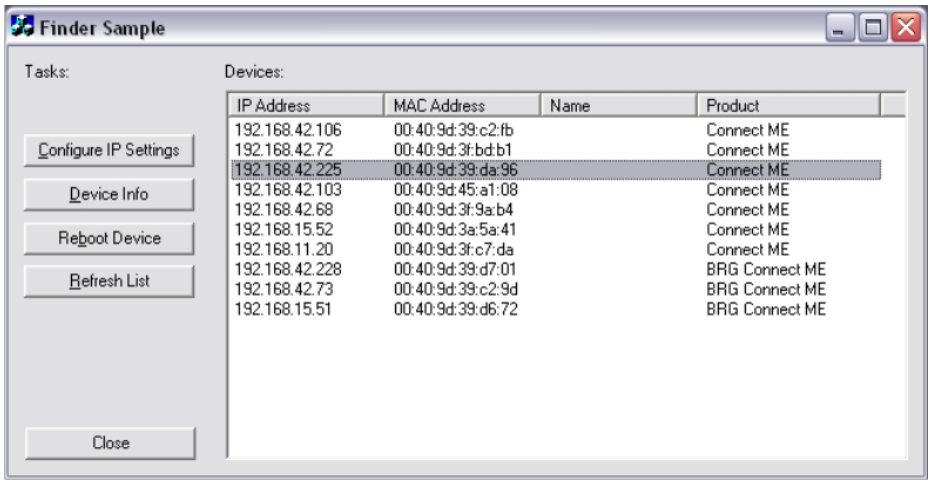
Overview

Once the clock is connected to the network and power is applied, DHCP is used to automatically assign each clock an IP address on the network. The clock will then search the Internet or local area network for NTP time servers. NTP (Network Time Protocol) is a uniform method of sending time over a computer network. By default, the clock will automatically connect to the local network and attempt to act as a client to public or local SNTP time servers. SNTP is a subset of the NTP protocol. SNTP provides Universal Coordinated Time (UTC) to the clock. The clock then implements local time zone offsets and daylight saving rules to display the correct local time. The correct time will display within a few minutes of obtaining a time server lock. The clock includes a list of 10 Internet SNTP time servers. Local SNTP time servers may also be used. The clock includes a network web server which is used to configure various network communication parameters.

Ethernet Interface

The Ethernet interface includes an easy to use web interface. Automatic address configuration (DHCP) is enabled by default. However, if a fixed network address will be used instead of DHCP, then the interface configuration will need to be changed.

To configure the Ethernet interface, it must first be located on the network. The Clock Control program is used to discover clock(s) located on the same subnet as the PC. Alternatively, a program is available (finder.exe) that will locate the clock most anywhere on the local network if DHCP successfully configured it.



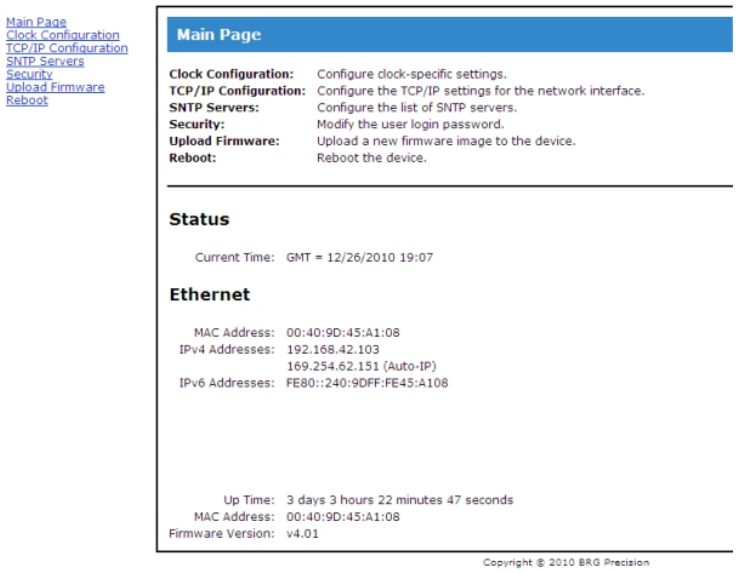
The finder.exe program is a software tool that can be used to locate the Ethernet interface just about anywhere on the local network. However, it cannot be used to configure the interface. Compare the MAC address on the product label with those listed on the finder.exe program. If there is a match, then the IP address will be listed next to it.

Once the IP address is discovered, click on the desired address to configure. Then, click on the "Browse" button to access the configuration menu where the IP address, net mask, and gateway address can be entered.

Another method of configuring the Ethernet interface is to connect the PC directly to the Ethernet interface using a special cross over cable. Later model computers will automatically detect the need to cross over the signal pairs. All network connections must be disabled on the computer except "Local Area Connection". Right click on the network icon at the bottom of the screen. Click on “Open Network Connections”, or go to, Start > Control Panel > Network Connections. If "Local Area Connection" is not the only enabled connection, right click on the other connections and click on disable.

Network Interface Configuration Web Interface

The main page displays a variety of general information about the configuration and activity of the Ethernet interface.



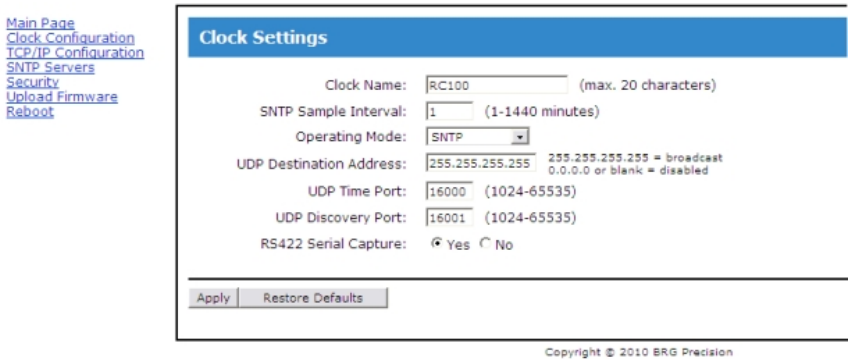
User Name and Password

The menu in the left column allows selecting several sections of the interface. A user name and password is required to enter any section other than the main page.

The default user name is: user
The default password is: password

The user name and password should be changed after installation. Store the user name and password in a safe location for later reference.

Clock Configuration



Clock Name - is the user defined name used to identify the device during a network search.

SNTP Sample Interval - is the time in minutes between SNTP time updates. The default is one minute.

Operating Mode - defaults to SNTP and should not be changed unless directed by factory technical support staff.

UDP Destination Address – is the IP address for the clock to send responses to, typically the control PC.

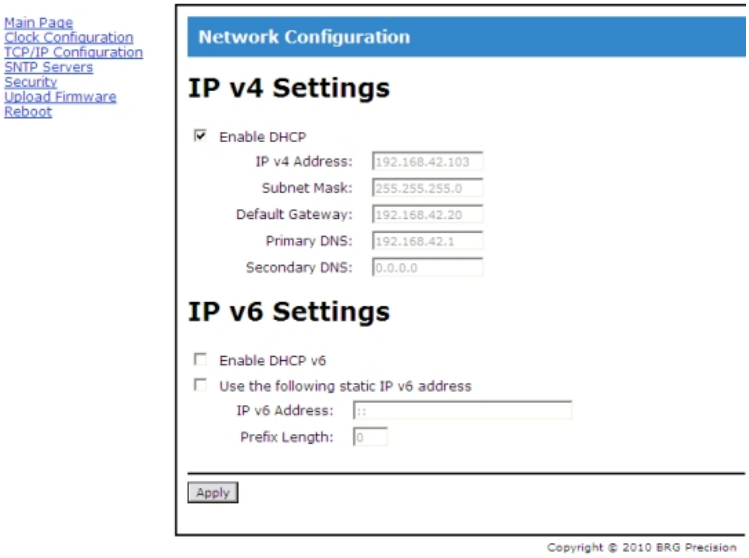
UDP Time Port – default 16000, for UDP time broadcasting, not usually used for SNTP time acquisition.

UDP Discovery Port - default 16001, for UDP commands and discovery by the Windows control program.

RS422 Serial Capture – is used by factory support staff only.

Click on the Apply button to save changes.

TCP/IP Configuration

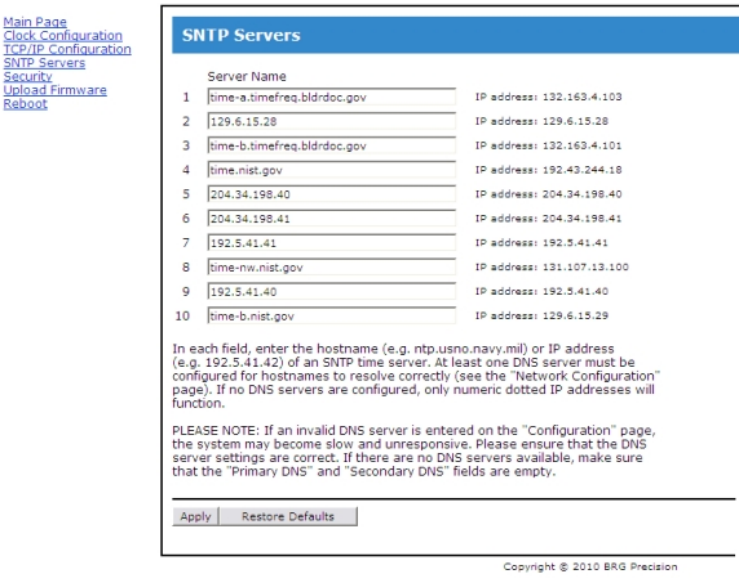


Enable DHCP – check to enable automatic IP address configuration using DHCP. Uncheck to use manual address configuration. The address fields will be grayed out when checked.

IP v4 Address – enter the IP address using version 4 protocol
Subnet Mask – enter the subnet mask
Default Gateway – enter the gateway IP address
Primary DNS – Domain Naming Service address - required if one or more alphabetic named SNTP servers will be used. Not required if all SNTP server addresses are numeric.
Secondary DNS - Domain Naming Service address - optional

The factory default addressing mode is DHCP. If your network has a DHCP server, simply connect the clock to your network and the clock will acquire a leased IP address. The lease acquisition can be almost immediate or may take several minutes. You can use the Clock Control program to determine the leased IP address by going to Setup/Clock IP Discovery. You may not see your clock listed in the discovery panel until it has acquired a lease. You cannot access the Ethernet interface until it's acquired an IP address. Once the clock has acquired an IP address, you then select the clock from the discovery listing by clicking on it. Then click the browse button to open a session to the Ethernet interface.

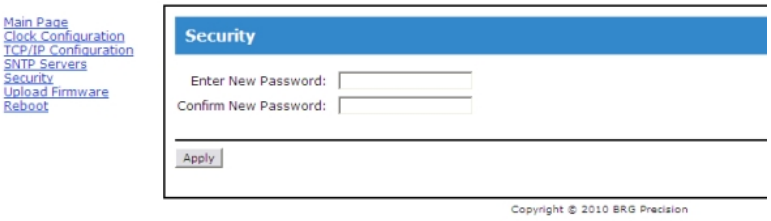
SNTP Time Servers



Server Name – enter the numeric IP addresses or alphanumeric named addresses of the desired network time servers. The default configuration includes ten government time server addresses.

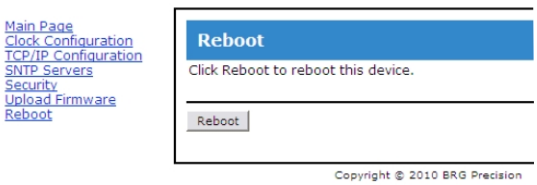
Once the clock has an IP address it will attempt to contact the first SNTP time server in the list. If the network firewall prevents the clock from reaching the Internet, change the SNTP addresses listed to only local network SNTP time servers. Remove any server addresses outside the local network.

Security



Change the password as needed. Be sure to store in a safe location for future reference. Click on the Apply button to invoke the change.

Reboot



Click on the Reboot button to restart the network interface.

Time Synchronization Problems

If your clock is not synchronizing with an Internet SNTP time server, check the following items:

- The NIC must have a valid DHCP or fixed IP address.
- The NIC must be in the SNTP operating mode.
- If you are using fixed IP addressing, the clock must have the correct gateway address to access the Internet. The gateway is the first router that the clock must go through to access other networks or the Internet.
- Your network firewall must allow the clock to access the Internet through port 123.
- The clock must have the default NTP timer server IP address loaded into the NIC.
- If using named SNTP servers, be sure a valid DNS address is provided, or use only numeric SNTP server addresses.

If your clock is not synchronizing with a local network NTP time server, check the following items:

- The NIC must have a valid DHCP or fixed IP address.
- The NIC must be in the SNTP operating mode.
- If you are using fixed IP addressing, the NIC must have the correct gateway if the server is on another network. The gateway is the first router that the clock must go through to access other networks.
- The correct NTP timer server IP address must be loaded into the NIC.
- If using named SNTP servers, be sure a valid DNS address is provided, or use only numeric SNTP server addresses.

Technical Support

For BRG Technical Support, call 1-316-788-2000, 8am-5pm, U.S. Central time, or email www.support@brightclock.com.

Power over Ethernet Option (PoE)

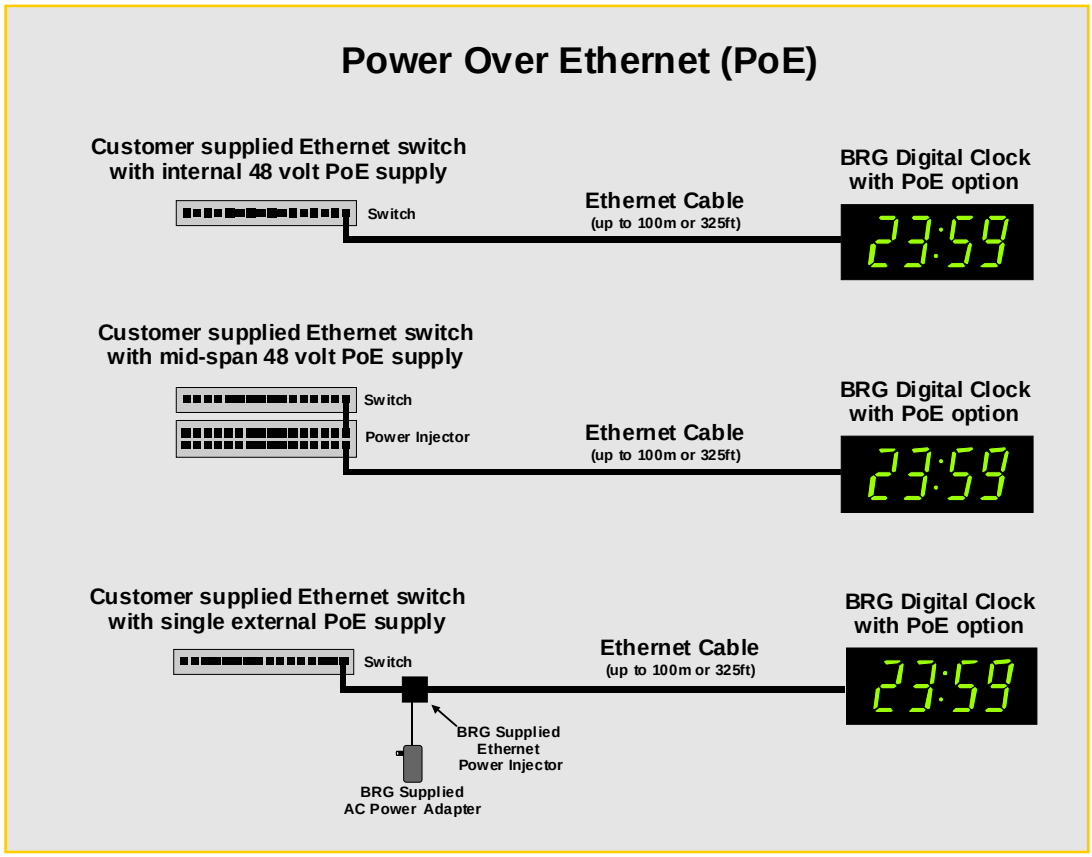
Power-over-Ethernet (PoE) is a network standard based on IEEE 802.3af that provides a means of delivering power to devices connected to the LAN. This technology eliminates AC electrical wiring, wall transformers, allows centralized UPS backup, and is fully compatible with both powered and non-powered Ethernet devices.

In addition to providing time synchronization and control over Ethernet, PoE enabled Ethernet cable provides power to the clock. System installers need run only a single Ethernet cable that carries both power and data to each clock. This allows greater flexibility placing clocks and, in most cases, significantly decreases installation costs. BRG clocks are fully compliant with the IEEE 802.3af standard for providing power over Ethernet. The clocks will work with older non-standard and passive power sources, as well as newer, auto-sensing PoE switches and mid-span power injectors.

Power-over-Ethernet begins with a Ethernet power source such as a PoE compatible Switch or a mid-span power "Injector". These devices insert power onto the Ethernet cable. The power source is typically installed in the "wiring closet" near the Ethernet switch or hub.

Clocks may be ordered as PoE compatible by adding the (P13) power option. This option adds the necessary circuitry to fully implement the IEEE 802.3af standard. PoE is able to supply a maximum of about 15 watts of power over the Ethernet cable. This means that not all clocks are candidates for PoE.

If the access point is not PoE compatible, BRG offers single port mid-span power injectors designed to provide power to a single clock (P14 power option). Multiport mid-span PoE power injectors are available from most network equipment vendors. The voltage injected is 48 volts DC at 0.35 Amps.



Digital Radio Synchronization

BRG offers two type of digital radios for clock synchronization, control, and mass communications. The 400 MHz UHF digital radio system is a high power system for very large coverage areas. This system requires an FCC license and is used primarily for clock synchronization and mass communications. The 900 MHz UHF digital radio system operates at a lower power on the license-free band. This system is used primarily for clock synchronization and control.

Digital Radio System Comparison

400 MHz Digital Radio System	900 MHz Digital Radio System
Transmit power can be in the hundreds of Watts	Maximum 1 Watt transmission power
Very large coverage area than can include a university campus or an entire community.	Medium coverage up to one million square feet without a repeater. However, any digital clock can be configured to repeat the signal to dramatically increase the coverage area.
An FCC License is required. BRG provides a service to obtain the license for a fee.	No FCC license is required in the U.S. or Canada. Can be used by the U.S. government without additional frequency authorization. Operates on the Industrial, Scientific and Medical (ISM) band.
Transmitter can be more difficult to install than the 900 MHz system. Slave clocks are simple to install.	Simple master and slave clock installation
Wireless relays and audio/tone generators are available	Wireless relays and audio/tone generators are available
Wireless speakers are available that can reproduce live audio	Live audio wireless speakers are unavailable
The radio signals are not encrypted, but they are encoded. Wireless audio speakers utilize sub-carrier “channel guard” for privacy.	All radio transmission are encrypted using the DES encryption standard for increased security and reliability
Excellent indoor coverage compared to frequencies below 400 MHz or higher than 1000 MHz.	Excellent indoor coverage compared to frequencies below 400 MHz or higher than 1000 MHz.
Uses the POCSAG world-wide communications standard	Uses standard sequential spread spectrum communications
Digital and Analog clocks are available. Also supports electronic message displays.	Digital and Analog clocks are available. Also supports electronic message displays.
Master clocks range from $2,000 to $10,000. Slave clocks are slightly lower priced than the equivalent 900 MHz models.	The master clock is less than $1000. Slave clocks are slightly higher priced than the equivalent 400 MHz models.
A 400 MHz, 25 Watt system, with 50 analog or digital clocks cost about the same as an equivalent number of 900 MHz clocks. Increasing the number of 400 MHz clocks would cost less than an equivalent 900 MHz system.	A 900 MHz system with 50 analog or digital clocks cost about the same as an equivalent number of 400 MHz clocks. Increasing the number of 900 MHz clocks would cost more than an equivalent 400 MHz system.

Digital Radio Synchronization (continued)

900 MHz Digital Radio Overview

A 900 MHz digital radio synchronized clock system is comprised of a master clock and one ore more slave clocks. The master clock can use one of a variety of optional time acquisition methods, include GPS (Global Positioning System), CDMA (cell towers), Ethernet NTP (Network Time Protocol), IRIG-B (missile and space protocol), SMPTE (motion picture and television protocol), and others. The master clock can also be manually set to operate from its internal ultra-high precision oscillator.

To increase coverage, one or more digital slave clock can be configured in the field to repeat the signal. This important feature can dramatically increase the coverage area.

The digital receivers automatically scan

The DES data encryption system is a standard developed for the U.S. Government. Every BRG 900 MHz digital radio utilizes DES for increased security and reliability.

Only a few clock configuration parameters are needed to enable the master clock.

Digital Master Clock

This configuration will enable a digital clock as a master clock, sending time data once per second. To expand the coverage area, see Digital Repeater Clock below.

Mode 32-12 = 1 – enables serial data output

Mode 37-67 = 4 or 5 – places the 900 MHz data radio in transmit mode. (4=GPS port, 5=SR/ST port)

Mode 37-68 – Determines the radio channel to be used for transmissions. See channel operation below.

Mode 37-69 –Determines the radio group assignment (5=default).

20 = (default) U.S. / Canada - radio channel - scan all channels in receive mode

16-47 - U.S. / Canada - radio channel - scan all channels in receive mode
48-55 U.S. / Canada - no channel scanning – includes +40 offset

56-87 – Australia / New Zealand – scan all channels in receive mode
88-95 - Australia / New Zealand – no channel scanning– includes +40 offset

Transmit and Repeat mode always uses fixed channel assignments.

Digital Slave Clock

This configuration will enable a digital clock as a slave clock, receiving time data from either a master clock or a repeater clock.

Mode 32-12 =0 – disables serial data output

Mode 37-67 = 1 or 2 – places the 900 MHz data radio in receive mode. (1=GPS port,2=SR/ST port)

Mode 37-68 – Determines the radio channel to be used for receive. See channel operation below.

Mode 37-69 –Determines the radio group assignment (5=default).

20 = (default) U.S. / Canada - radio channel - scan all channels in receive mode

16-47 - U.S. / Canada - radio channel - scan all channels in receive mode
48-55 U.S. / Canada - no channel scanning – includes +40 offset

56-87 – Australia / New Zealand – scan all channels in receive mode
88-95 - Australia / New Zealand – no channel scanning– includes +40 offset

Setting this mode to a channel less than 60 will cause the radio to scan all available channels while in receive mode (Mode 37-67=1 or Mode 37-67=2).

Digital Repeater Clock

A digital clock can be configured to repeat the data received to extend the coverage area. Set Mode 37-68 to the same channel as the master clock. The repeater clock will transmit on the next channel higher. Set all digital clocks to be covered by the repeater to one channel higher than the master clock, or configured them to scan all channels by setting a channel less than 60. This is the default configuration. Analog clocks always scan all channels.

Mode 32-12 = 1 – enables serial data output

Mode 37-67 = 5 or 6 – places the 900 MHz data radio in repeater mode. (5=GPS port, 6=SR/ST port)

Mode 37-68 – Determines the radio channel to be used for transmitting and receive. See channel operation below.

Mode 37-69 –Determines the radio group assignment (5=default).

20 = (default) U.S. / Canada - radio channel - scan all channels in receive mode

16-47 - U.S. / Canada - radio channel - scan all channels in receive mode
48-55 U.S. / Canada - no channel scanning – includes +40 offset

56-87 – Australia / New Zealand – scan all channels in receive mode
88-95 - Australia / New Zealand – no channel scanning– includes +40 offset

Transmit and Repeat mode always uses fixed channel assignments.

Repeaters use both odd and even channels; therefore, it is recommended to configure Mode 37-68 to use only even channel numbers in case multiple repeaters are deployed.

59th Minute Wire Synchronization

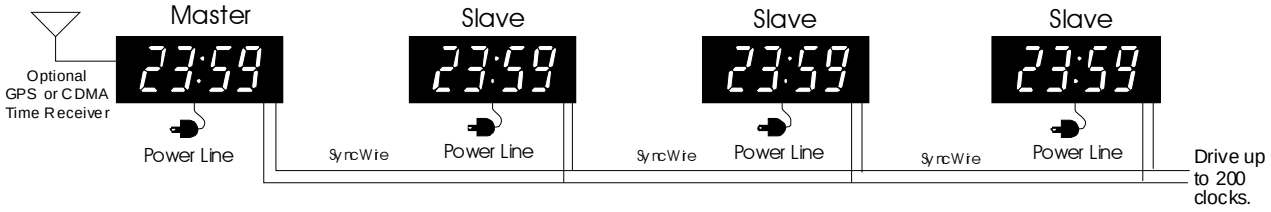
The wire sync system utilizes the 59th minute protocol. This sync method sets the minutes and seconds hourly, and corrects the hour twice a day. The clocks will maintain split accuracy throughout the day. In the absence of the master clock, the slave clocks will continue to operate normally on their own clock circuit, even switching between daylight saving and standard time if necessary. Power outages and/or glitches have little or no effect on time accuracy.

Sync wiring is very flexible. Most any combination of star, parallel buss, or network wiring may be used. Hundreds of clocks may be driven from a single master clock. Sync wire length may be 5,000 feet, or more depending on wire size the number of slave clocks.

Clocks may be ordered with individual power cords and/or AC adapters. Additionally, clocks can be powered by one or more low voltage transformers. Low voltage systems eliminate the need for an AC outlet at the clock.

The 59th minute sync protocol is resistant to interference and is considered one of the most reliable sync methods available.

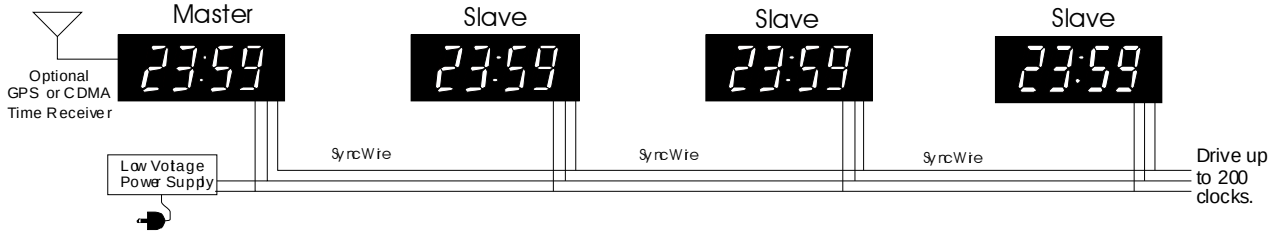
AC Line Powered Clocks



The Master Clock sends the time to the slave clocks over sync wires. The master clock may optionally include a GPS or CDMA time receiver.

Slave Clocks receive time synchronization data hourly over the sync wires. The sync wires may be 5,000 feet or more. Any number of wiring schemes may be used including parallel, star, network or any combination. Sync wire may be ordinary 14-16 gauge bell wire. The sync system is resistant to radio or other magnetic interference.

Low Voltage Clocks



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Serial Wire Synchronization

The RS-422 protocol used for wire sync communications greatly expands the practical possibilities of the serial bus. It provides a mechanism by which serial data can be transmitted over great distances (to 4,000 feet). This is accomplished by splitting each signal across two separate wires in opposite states, one inverted and one not inverted. The difference in voltage between the two lines is compared by the receiver to determine the logical state of the signal. This wire configuration, called differential data transmission, or balanced transmission is well suited to noisy environments. With balanced transmission, this potential difference will affect both wires equally, and thus not affect their inverse relationship. Twisted pairs of wire, which ensure that neither line is permanently closer to a noise source than the other, are often used to best equalize influences on the two lines. Errors can also be caused by high noise levels which affect one side of the receiver to a different extent than the other. To combat this, each receiver is generally grounded.

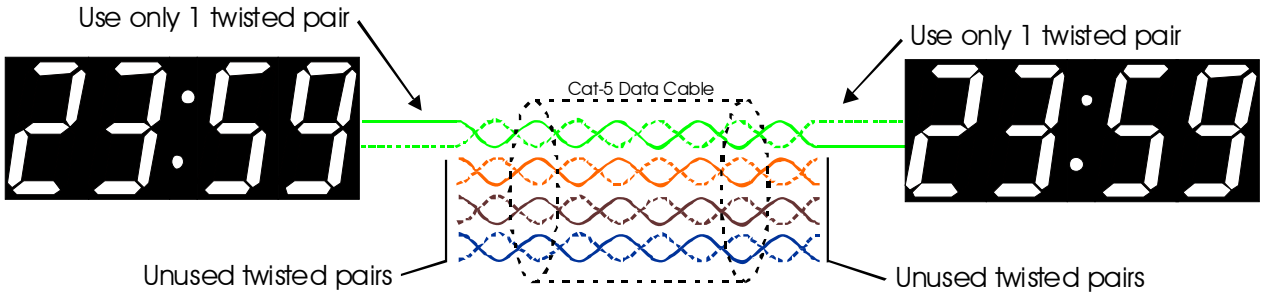
RS422 Serial Communications

BRG clocks utilized an industry standard RS422 buss transceiver that meets or exceeds ANSI Standards EIA/TIA-422-B and ITU Recommendation V.11. This device includes the following features for improved reliability: USE ONLY RS422 VOLTAGES. DO NOT APPLY POWER VOLTAGES TO THE SYNC WIRING.

1. Thermal Shutdown Protection
2. Positive and Negative Current Limiting
3. 60 mA Output Current
4. Automatic Noise Suppression

One BRG clock will drive up to 5 slave clocks when wired in parallel, or an unlimited number of clocks if they include and input and output, and are wired in series.

Common Cat-5 twisted pair data cable may be used to carry serial data between clocks. DO NOT USE POWER WIRE OR NON-TWISTED WIRE AS DATA CABLE.



Diagnostics –

The sync output of the clock may be measured with a volt meter. There should be 5 volts when the meter's read lead is connected to the red Output sync wire, and the meter's black lead connected to the clock's black Output sync wire. If the clock is configured as a master to send sync data once per second, you will see a momentary voltage drop using an analog meter.

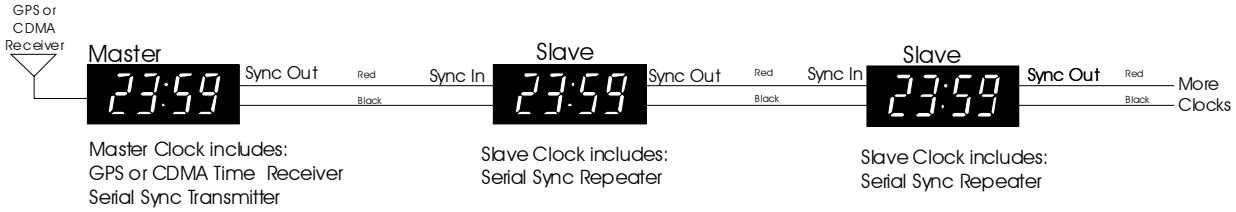
Digital meters may not be fast enough to detect the sync pulse. If the clock is configured as a repeating slave, it will only send sync data when sync data is received. In other words, it is configured to repeat all sync data received.

LED sync detector –

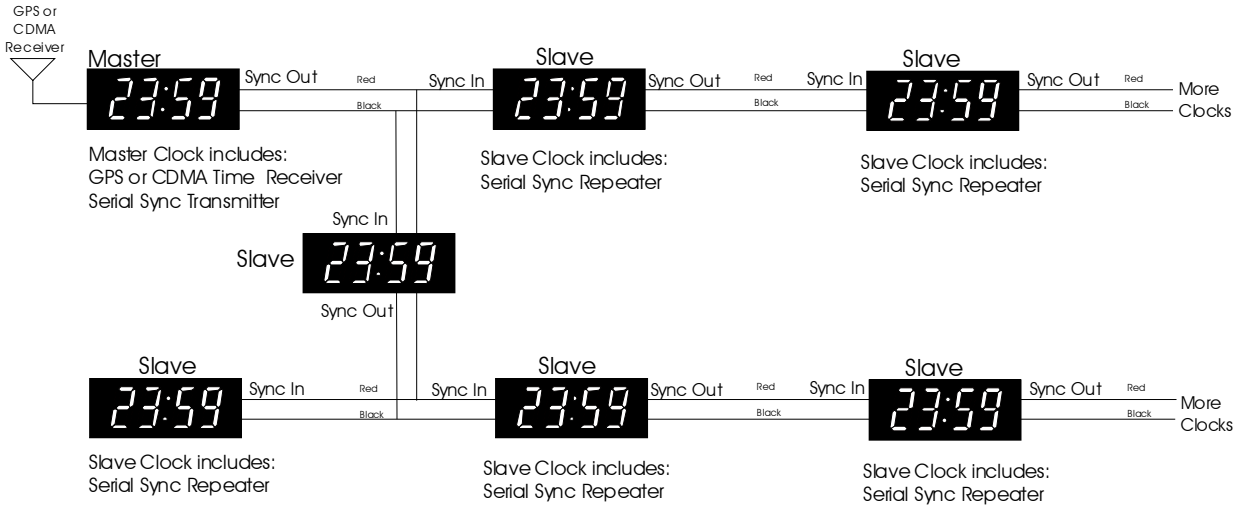
A common LED (light emitting diode) may be used to detect the presence and polarity of sync data. Connect the anode of the LED to the red Output sync wire and the LED cathode to the black Output sync wire. On most 5mm LED's, the anode lead is the longer of the two leads. The LED should continuously illuminate. If the clock is configured to transmit, the LED should blink off momentarily when the sync data is sent. If the LED polarity is reversed, the LED will remain off. When the clock sends sync data, the LED will blink momentarily.

Wired Synchronization Examples

The following example illustrates how all clocks may be synchronized to the master using only two wires. The slave clocks repeat the sync signal. Use Cat-5 twisted pair wire for up to 4,000 feet between any two clocks.



The following example illustrates how the sync wiring may be "T" or "Y" connected to supply more clocks. Any Sync Output may be split to supply two other clocks. This allows greater flexibility during installation.



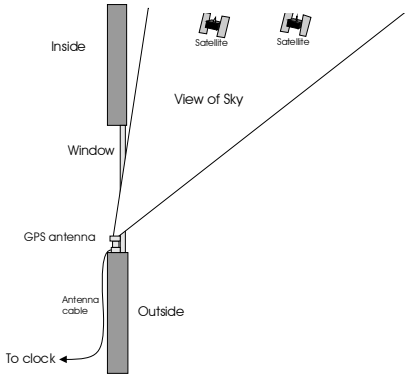
GPS Atomic Time Receiver

The GPS option allows legally traceable time to be obtained from global positioning satellites. The digital clock is updated every second from the satellite signal and is accurate to a few milliseconds. Clocks ordered with a GPS atomic time receiver have a short pigtail at the back of the clock. This pigtail includes a RJ-45 plug with in-line adapter.. Attach the line from the GPS receiver to this connector. **The clock must be connected to the GPS receiver before applying power to the clock.** Otherwise, the clock will not properly initialize the GPS receiver.

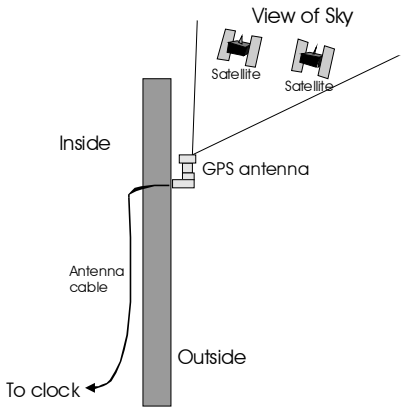
The lower-right decimal point will illuminate when the clock is locked onto the GPS time signal. If the sync indicator does not illuminate at all, try turning off the power to the clock momentarily, then powering it back up. Once the clock locks onto the time signal, the sync indicator will remain on. Other sync indication methods are available using Mode 32-2. Mode 32-15 must be set to 11 to enable GPS reception. The lower-right decimal point will go out if sync is lost.

RS422 wiring protocol is used between the clock and the GPS receiver/antenna. The CAT-5 cable may be extended up to 4,000 feet long. **DO NOT USE PRE-MADE TELEPHONE RJ-14 IN-LINE CONNECTORS OR CABLES.**

There are usually several satellites overhead at any point in time. The GPS receiver only needs to receive one satellite to obtain atomic time. The antenna may be mounted indoors on a windowsill. This mounting method allows a partial view of the sky, which is enough to receive 2 to 3 satellites. The antenna may also be placed below a skylight. The GPS antenna is water tight and may be mounted outdoors, on a roof or exterior wall. A rotating, swivel mount is included to facilitate antenna mounting. The following diagrams illustrate antenna positioning:

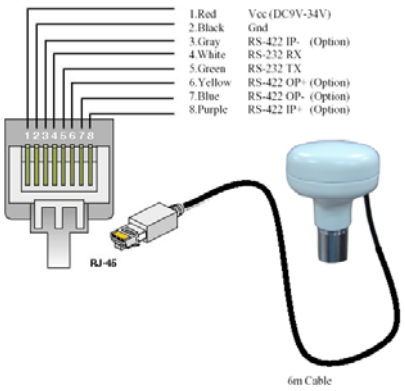


Indoor Installation



Outdoor Installation

PMA-111 Pin Assignment



CDMA Atomic Time Receiver

Overview:

An exciting new way of obtaining precision, Universal Coordinated Time (UTC) has come of age. Made possible by the rapidly expanding, global deployment of Code Division Multiple Access (CDMA) mobile telecommunications systems. The CDMA base stations act as repeaters for the global positioning system (GPS). The transmission standard requires that the time transmissions be within ten millionths of a second of the UTC time standard. The spread spectrum CDMA radio signal is easily received inside buildings without the need for an external antenna, as with GPS.

Generally speaking, if you are able to use a cell phone, even marginally, in a specific location, then the CDMA receiver will work.

The CDMA receiver must be deployed in a 'cellular' IS-95 CDMA coverage area. 'Cellular' is a commonly used term that implies that the frequency band for the base station carrier transmissions is 824-895 Mhz.

Configuration:

The CDMA receiver is contained within the body of the clock with a small stub antenna on top.

Your time display should already be factory configured if equipped with a CDMA atomic time receiver. This configuration can be changed at any time. The following modes are useful when configuring the time display.

There are two types of CDMA receivers used, standard and enhanced CDMA. Standard CDMA provides UTC and Enhanced CDMA provides local time. Neither receiver provides daylight saving time information. Mode 32-15=3 – Enables standard CDMA reception and Mode 32-15=10 enables enhanced CDMA reception (model MTSMC). – If this value is changed, power down the clock for a few seconds and power it back up to initialize the CDMA receiver.

Mode 21-n - (n=display position 1-24) This is the time offset from UTC. It ranges from –12 to +12

Mode 24-n – (n=display position 1-24) Daylight Savings code – a value of 1 implements U.S. rules

Mode 20-n=16 – (n=display position 1-24) Displays CDMA diagnostics – For standard CDMA, the first two digits will display "00" or "06". When first powered-up, the "00" will blink every few seconds as it attempts to receive a time signal. When a standard CDMA is locked onto the time signal a"06" will display constantly. These two digits are followed by a space, then a 0, or an alternating 0 and 1. Once the receiver is locked onto the time signal, this digit will alternate between 0 and 1 once per second. For enhanced CDMA, the first two digits will indicate signal strength. A value of 99 indicates the signal was lost. The third digit indicates data communications to and from the CDMA receiver.

The lower-right decimal point will illuminate if the clock is locked onto the sync signal. Other sync indication methods are available using Mode 32-2.

PC / Digital Clock Control Software

Clock Control Windows Program Installation

Insert the CD into the computer. The control program should auto-install. If the installation program does not start, execute the SETUP.EXE program on the CD.

The control program is used to control many functions and parameters. The digital clock must be configured to accept control commands in most cases.

The control program will send data to clocks using both serial wire and Ethernet.

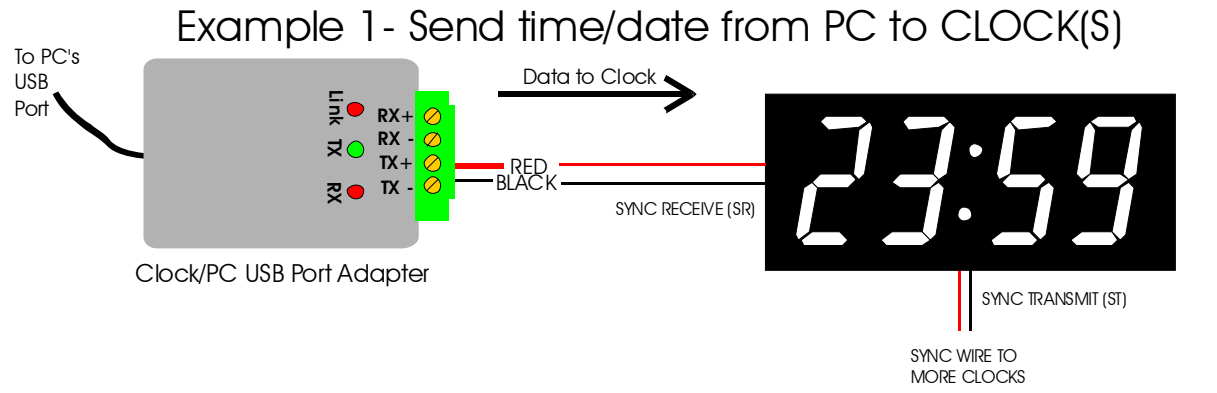
PC USB / RS422 Adapter

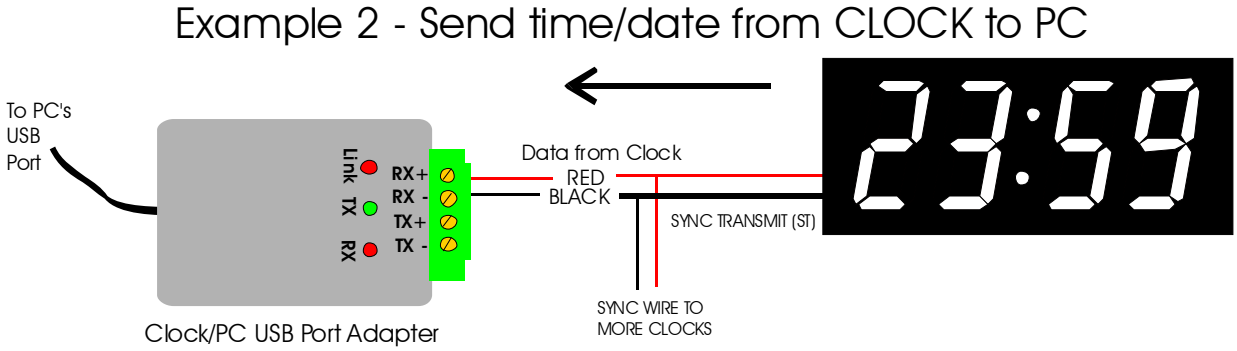
USB/422 Adapter

This option allows the clock to be set by PC or the PC to be set by the clock. A USB interface adapter is included for connecting the clock to a computer. Simply attach the adapter to the clock sync line and plug into the PC's USB port. A software CD is included for the Windows operating system. A driver is also included on the BRG Digital Clock controller software CD under the directory – USB Adapter Driver 2.0. The driver can also be downloaded from http://www.brgprecision.com. Windows will detect the USB connection and will direct you to insert the CD. Once connected, the time and date may be exchanged between the PC and clock(s). The scheduling program included with Windows can be configured to run the time send software anytime between once per minute and once a day, or longer. The serial sync options, ST and/or SR, are required. When sending time from a PC to a time zone display, set mode 32-8=2 and mode 45-5 to the source time zone offset. This will strip off daylight savings time and convert the local time to UTC time for use by the time zone display. One BRG clock will drive up to 5 slave clocks when wired in parallel, or an unlimited number of clocks if they include and input and output and are wired in series.

PC/Clock USB Interface Adapter package includes: USB Adapter, USB patch cable, software CD, installation and operating instructions (this sheet**). <u>The USB adapter draws its' power directly from the USB port. No AC power module is required</u>.**

PC / Clock USB Port Adapter





PC Serial RS232/RS422 Adapter

Ic485-I Adapter

This option allows the clock to be set by PC or the PC to be set by the clock. A serial interface adapter is included for connecting the clock to a computer. Simply attach the adapter to the clock sync line and plug into the PC's serial port. Software is included for DOS, Windows 3.x, 95, 98, NT, ME, XP and 2000. Once connected, the time and date may be exchanged between the PC and clock(s). The scheduling program included with Windows can be configured to run the time send software anytime between once per minute and once a day, or longer. The serial sync options, ST and/or SR, are required. When sending time from a PC to a time zone display, set mode 32-8=2 and mode 45-5 to the source time zone offset. This will strip off daylight savings time and convert the local time to UTC time for use by the time zone display.

RS422 Serial Communications

BRG clocks utilized an industry standard RS422 buss transceiver that meets or exceeds ANSI Standards EIA/TIA-422-B and ITU Recommendation V.11. This device includes the following features for improved reliability:

1. Thermal Shutdown Protection
2. Positive and Negative Current Limiting
3. 60 mA Output Current
4. Automatic Noise Suppression

One BRG clock will drive up to 5 slave clocks when wired in parallel, or an unlimited number of clocks if they include and input and output and are wired in series.

Diagnostics –

With power applied to the clock, connect a meters red lead the red Input sync wire and the black meter lead to the black Input sync wire. You should see a reading of 12 K ohms. A lower resistance indicates a short in the sync wiring or clock circuit. A higher resistance indicates a disconnected sync wire or a problem with the clock's sync circuit.

The sync output of the clock may be measured with a volt meter. There should be 5 volts when the meter's read lead is connected to the red Output sync wire, and the meter's black lead connected to the clock's black Output sync wire. If the clock is configured as a master to send sync data once per second, you will see a momentary voltage drop using an analog meter. Digital meters may not be fast enough to detect the sync pulse.
If the clock is configured as a repeating slave, it will only send sync data when sync data is received. In other words, it is configured to repeat all sync data received.

LED sync detector -

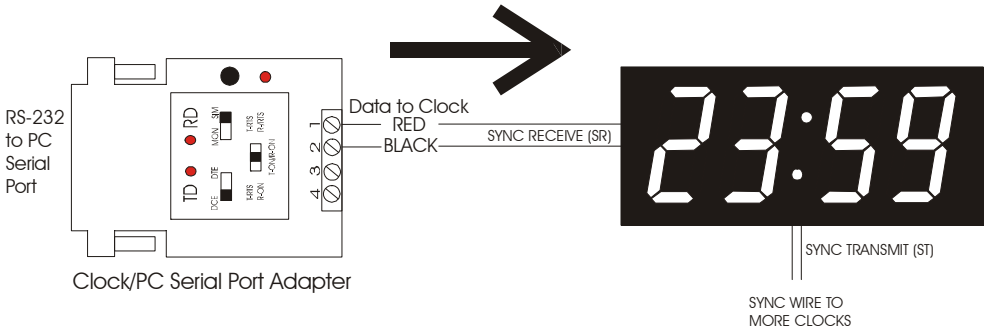
A common LED (light emitting diode) may be used to detect the presence and polarity of sync data. Connect the anode of the LED to the red Output sync wire and the LED cathode to the

black Output sync wire. On most 5mm LED's, the anode lead is the longer of the two leads. The LED should continuously illuminate. If the clock is configured to transmit, the LED should blink off momentarily when the sync data is sent.

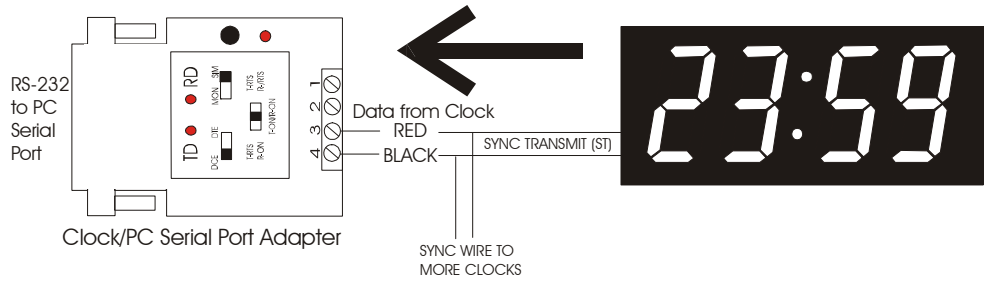
If the LED polarity is reversed, the LED will remain off. When the clock sends sync data, the LED will blink momentarily.

PC/Clock Serial Interface Adapter package includes: Serial Adapter, 9 to 25 pin adapter, software CD, installation and operating instructions (this sheet**). <u>The serial adapter draws its' power directly from the serial port. No AC power module is required</u>.**

Example 1- Send time/date from PC to CLOCK(S)



Example 2 - Send time/date from CLOCK to PC



Serial Sync Communications Protocol

' serial communications: 9600 baud,8 data bits, no parity
' the time, date and data string is 35 bytes long, beginning at position 0

' begin data string - position 0, length 1: "*"

' time - position 1, length 2: seconds
' time - position 3, length 2: minutes
' time - position 5, length 2: hours
' date - position 7, length 2: day
' date - position 9, length 2: month
' date - position 11, length 4: four digit year

' count - position 15, length 9: count ‘ used for event counter mode
' misc data position 24, length 1: btime_source ' a one is required when sending time to the clock
' misc data position 25, length 1: alarm_master_slave - 0=invalid, 1=alarm on, 2=alarm off
' misc data position 26, length 1: alarm2_master_slave - 0=invalid, 1=alarm on, 2=alarm off
' misc data position 27, length 1: wireless clock control – 7 or 9 = TZ offset
' misc data position 28, length 2: sec_fraction
' misc data position 30, length 2: display_format(1)
' misc data position 32, length 2: display_format(2)

' end data string - position 34, length 1: "#

BRG Clock/Timer/Counter Serial Command Structure

Commands may be sent over a serial line to control various parameters of the BRG clock/timer/counter. The command string consists of a 35 byte fixed length ASCII string. The command string may include configuration parameters or operating commands. The following commands are available in Tiger Digital Clock software version 2.65 or later.

Command String Format (35 ASCII bytes – x= ASCII space)

```
----------1---------2---------3----
01234567890123456789012345678901234
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
^ ^ ^ ^--------Data--------------^
| | |
| |  -- Command (2 bytes – 00-FF)
|  -- Display address(2 bytes – 0-99)
 -- Command start (2 bytes - *!)
```

If the display address is zero, all clocks will accept the commands; otherwise only clocks with a matching address number will receive the command. Mode 32-42 is used to configure the display address.

The BRG clock/timer/counter can be configured many ways. For example, a display configured as a simple up timer can be controlled with a few simple commands.

To reset the timer to the starting value, send:

```
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
AA=display address (00)
CC= 63
```

xx= space

To start, stop or pause the timer, send:

```
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
AA= display address (00)
CC= 61
```

xx= space

General Purpose PC Commands

Most commands, except Modes 70 and 71, can be changed from a PC over serial or Ethernet. PC command 99 is used to pass on the required address and values. The communications protocol follows:

General PC Command - Fixed Fields (x=pad with ASCII space)

```
*!AACCNNMMVVVVVVVVVxLLLLLLLLLxxxxx#
AA= Display address (x0-99)
CC= Command (01-99)
NN=First level mode address (x0-99)
MM=Second level mode address (optional – x0-99)
VVVVVVVVV= First Value (optional – -99999999 to 999999999)
LLLLLLLLL= Second Value (optional – -99999999 to 999999999)
```

Command List

--- Basic Operating Commands ---

Start Timer / Pause Timer / Increment Count

```
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=61
```

Timer Control / Decrement Counter

```
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=62
```

Reset Timer / Reset Counter

```
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=63
```

Enable Long Duration Timer (Mode 32-18=1)
*!AACCNxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=64
N=1

Disable Long Duration Timer (Mode 32-18=0)
*!AACCNxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=64
N=0

--- Utility Commands ---

Save Current Parameters
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=11

Store End User Configuration (Mode 50-6)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=12

Restore End User Configuration (Mode 50-5)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=13

Restore Factory Defaults (Mode 50-1)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=71

Display Zone Location Numbers (Mode 50-4)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=14

Turn On All Numeric Segments (Mode 50-3)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=15

Software Reset (Mode 50-2)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=16

Idle Timer Display (See Modes 37-34, 37-35, 37-36)
*!AACCxxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=17

--- Configuration Commands ---

Timer Start Time (Modes 7,8)
*!AACCSSmmHHxxxxxxxxxxxxxxxxxxxxxx#
CC=53
SS= second
MM= minute
HH= hour

Timer End and Long Timer Target Time (Modes 9,10)
*!AACCSSmmHHxxxxxxxxxxxxxxxxxxxxx#
CC=52
SS= second
MM= minute
HH= hour

Set Operating Mode (Mode 14)
*!AACCnxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=10
n=operating mode 1-5

Display Format (Mode 20-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=21
ZZ=1-24 zone number
VV=1-99 display format

Zone Offset (Mode 21-n)
*!AACCZZVVVxxxxxxxxxxxxxxxxxxxxxxx#
CC=22
ZZ=1-24 zone number
VV= -12 to 12 zone offset

Display Pointer (Mode 22-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=23
ZZ=1-24 zone number
VV=1-24 display pointer

12/24 Hour Display Format (Mode 23-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=24
ZZ=1-24 zone number
VV= 12 or 24 12/24 format

Daylight Savings Code (Mode 24-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=25
ZZ=1-24 zone number
VV= 0-99 daylight savings code

Force Time Offset (Mode 33-n)
*!AACCZZVxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=26
ZZ=1-24 zone number
V= 0-5 force time offset code

Timer Control Display Format (Mode 36-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=27
ZZ=1-24 zone number
VV= 1-99 timer control display format

Display Intensity (Mode 3)
*!AACCZZxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=28
ZZ=1-15 display intensity

Individual Display Intensity (Mode 25-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=29
ZZ=1-24 zone number
VV= 0-15 display intensity

Digital 8 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDxxxxxxxxxxxxxxxxxx#
CC=31
ZZ=1-32 eight character zone position
DDDDDDDD= eight character title

Digital 16 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDDDDDDDDDxxxxxxxxxx#
CC=32
ZZ=1-16 sixteen character zone position
DDDDDDDDDDDDDDDD = sixteen character title

Digital 24 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDDDDDDDDDDDDDDDDDxx#
CC=33
ZZ=1-10 twenty four character zone position
DDDDDDDDDDDDDDDDDDDDDDDD = twenty four character title

Digital 9 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDDxxxxxxxxxxxxxxxxxx#
CC=34
ZZ=1-28 nine character zone position
DDDDDDDDD= nine character title

Digital 5 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDxxxxxxxxxxxxxxxxxxxxxx#
CC=38
ZZ=1-51 five character zone position
DDDDD= five character title

Digital 10 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDDDxxxxxxxxxxxxxxxxxx#
CC=37
ZZ=1-25 ten character zone position
DDDDDDDDDD= ten character title

Digital 15 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDDDDDDDDxxxxxxxxxxx#
CC=36
ZZ=1-17 fifteen character zone position
DDDDDDDDDDDDDDD= ten character title

Digital 20 Char. Zone Lettering (Mode 51-1)
*!AACCZZDDDDDDDDDDDDDDDDDDDDxxxxxx#
CC=20
ZZ=1-12 twenty character zone position
DDDDDDDDDDDDDDDDDDDD= twenty character title

Digital Lettering Padding (Mode 51)
*!AACCZZZxxxxxxxxxxxxxxxxxxxxxxxx#
CC=75
ZZZ=0-255 All positions including and after ZZZ will be replaced with ASCII 32.

Alarm Channel Relay Output (Mode 59-n)
*!AACCZZVVxxxxxxxxxxxxxxxxxxxxxxxx#
CC=40
ZZ=1-99 alarm position
VV= 0-16 alarm relay value (combination of 1,2,4,8)

Alarm Times (Mode 27-n and 28-n)
*!AACCZZSSMMHHxxxxxxxxxxxxxxxxxxxx#
CC=41
ZZ=1-99 alarm position
SS= second
MM= minute
HH= hour

Alarm Day of the Week Code (Mode 29-n)
*!AACCZZVVVxxxxxxxxxxxxxxxxxxxxxxx#
CC=42
ZZ=1-99 alarm position
VVV= 0-255 alarm day of the week code
In addition to day-of-the-week combination codes, Mode 29 also accepts any day combination. A value greater than 128 is treated as a binary command. Days of the week are assigned the following binary numbers: Mon=1, Tue=2, Wed=4, Thu=8, Fri=16, Sat=32 and Sun=64. Any combination of days may be selected by adding their assigned numbers together and then adding 128 to that value. For example, if Mon, Wed and Fri are required, then the value would be 149 (1+4+16+128=149).

Alarm Schedule Group Assignment (Mode 38-n)
*!AACCZZxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=43
ZZ=0-99 alarm schedule group assignment

Active Alarm Schedule (Mode 37-1)
*!AACCZZxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=45
ZZ=1-99 active alarm schedule

Alarm Schedule Beginning Date Range (Mode 53-n)
*!AACCZZMMDDYYYYxxxxxxxxxxxxxxxxxx#
CC=46
ZZ=1-20 alarm schedule season
MM= month
DD= day
YYYY= year

Alarm Schedule Ending Date Range (Mode 54-n)
*!AACCZZMMDDYYYYxxxxxxxxxxxxxxxxxx#
CC=47
ZZ=1-20 alarm schedule season
MM= month
DD= day
YYYY= year

Alarm Duration (Mode 5)
*!AACCZZxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=48
ZZ=0-50 alarm duration in seconds

Alarm Toggle (Mode 49)
*!AACCZZxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=49
ZZ=0-2 - 0=disables, 1=Alarm On, 2=Alarm Off

Periodic Alarm Frequency in Seconds (Mode 45-13)
*!AACCNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=72
N=0-99999999 – frequency in seconds

Alarm Multi-mode Macro
*!AACCLLSSMMHHCCDDSSTTPPRRZZZxxxxx#
CC=73
LL=alarm position number 1-99
SS=alarm seconds
MM=alarm minutes
HH=alarm hours
CC=alarm relay channel
DD=alarm day of the week code
SS=alarm schedule
TT=alarm toggle
PP=alarm individual pulse time (pulses per second)
RR=individual alarm duration in seconds
ZZZ=alternate three digit alarm day-of-week code – if greater than zero, this code will be used in place of the two digit code, DD.

In addition to day-of-the-week combination codes, Mode 29 also accepts any day combination. A value greater than 128 is treated as a binary command. Days of the week are assigned the following binary numbers: Mon=1, Tue=2, Wed=4, Thu=8, Fri=16, Sat=32 and Sun=64. Any combination of days may be selected by adding their assigned numbers together and then adding 128 to that value. For example, if Mon, Wed and Fri are required, then the value would be 149 (1+4+16+128=149).

Alarm Day-of-the-Week Padding (Mode 29-n)
*!AACCZZxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=74
ZZ=0-00 All positions including and after ZZ will be replaced with 0.

Long Timer Target Date (Modes 44-1,44-2)
*!AACCDDMMYYYYxxxxxxxxxxxxxxxxxxxx#
CC=51
DD= day
MM= month
YYYY= year

Medium Duration Timer Days Reset Value (Mode 35-1)
*!AACCNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=54
N=End count –99999999 to 99999999

Medium Duration Timer Hours Reset Value (Mode 35-2)
*!AACCNNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=60
N=End count –99999999 to 99999999

Counter Start Value (Mode 11)
*!AACCNNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=56
N=End count –99999999 to 99999999

Counter End Value (Mode 12)
*!AACCNNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=55
N=End count –99999999 to 99999999

Set Count
*!AACCNNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=57
N=End count –99999999 to 99999999

Elapsed Days Start Value (Mode 35-1)
*!AACCDNNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=58
D = 1 - days
N=End count –99999999 to 99999999

Elapsed Hours Start Value (Mode 35-2)
*!AACCDNNNNNNNNNxxxxxxxxxxxxxxxxxxx#
CC=58
D = 2 - hours
N=End count –99999999 to 99999999

Warning Alarm Time (Mode 43-2, 43-3)
*!AACCSSmmHHxxxxxxxxxxxxxxxxxxxxxx#
CC=59
SS= second
MM= minute
HH= hour

Timer Control Operating Mode (Mode 32-4)
*!AACCNxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=65
N=1-3 - timer control operating mode

Timer Control Timer Direction (Mode 32-5=0)
*!AACCNxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=66
N=0 - up timer

Timer Control Timer Direction (Mode 32-5=1)
*!AACCNxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=66
N=1 - down timer

Timer Control Switch Mode (Mode 32-6)
*!AACCNxxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=67
N=1-3 - timer control switch mode

Timer to Real Time Delay (Mode 32-7)

*!AACCNNxxxxxxxxxxxxxxxxxxxxxxxxxx#
CC=68
N=0-99 Delay in minutes, 0=disabled

Timer Starting Time, Ending Time, Warning Time and Timer Reset (Modes 7,8,42-3,42-4)

*!AACCSSmmHHSSmmHHSSmmHHxxxxxxxxxx#
CC=69
SS= Starting second
MM= Starting minute
HH= Starting hour
SS= ending second
MM= ending minute
HH= ending hour
SS= warning second
MM= warning minute
HH= warning hour

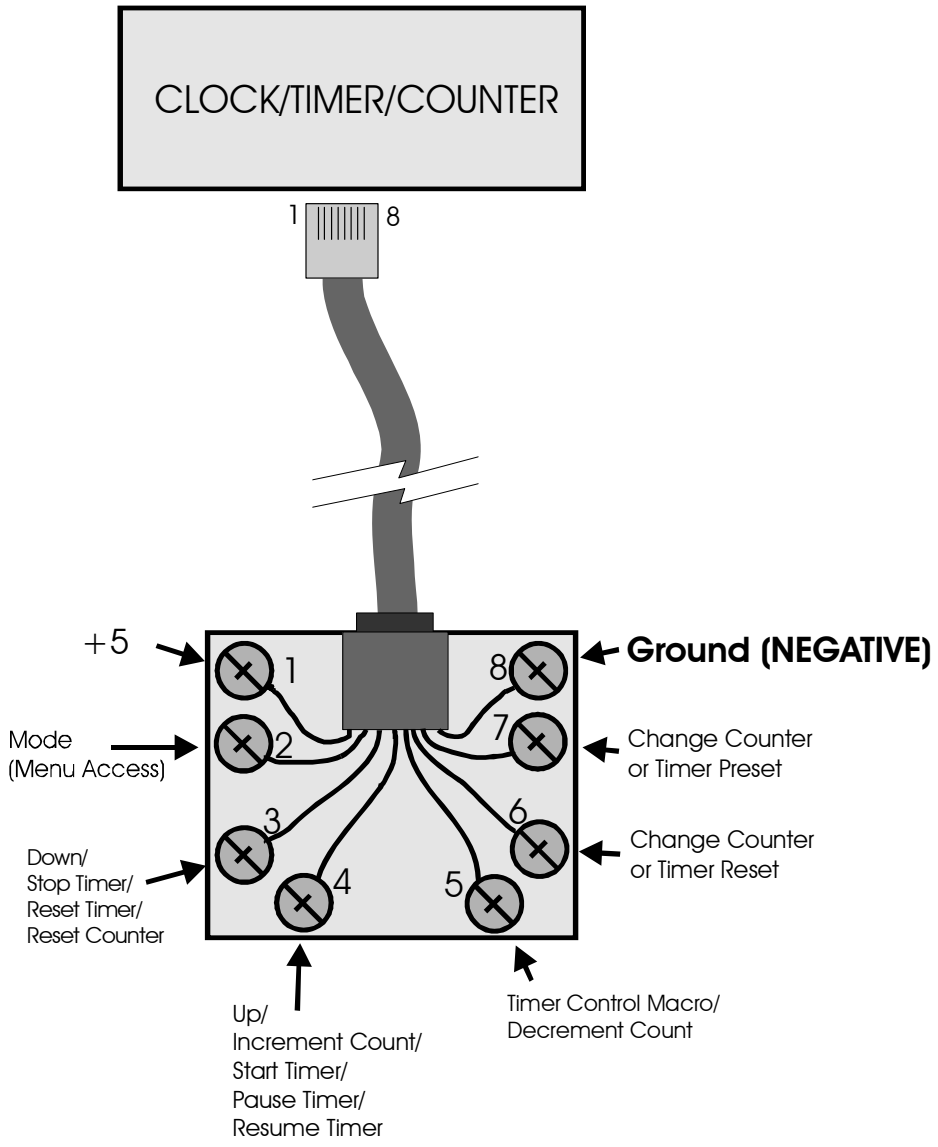
Sunrise/Sunset Lat/Long (Modes 32-35, 32-36, 61, 62, 63, 64)

*!AACCNNBBBDDELLLOOMVYYxxxxxxxxxxx#
CC=70
N=Display zone number
B=Latitude degrees
D=Latitude minutes
E=Latitude direction – 0=North, 1=South
L=Longitude degrees
O=Longitude minutes
M=Longitude direction – 0=East, 1=West
V=Display method (Mode 32-35)
Y=Display intensity (Mode 32-36)

External Control Line Wiring Diagram (CL Option)

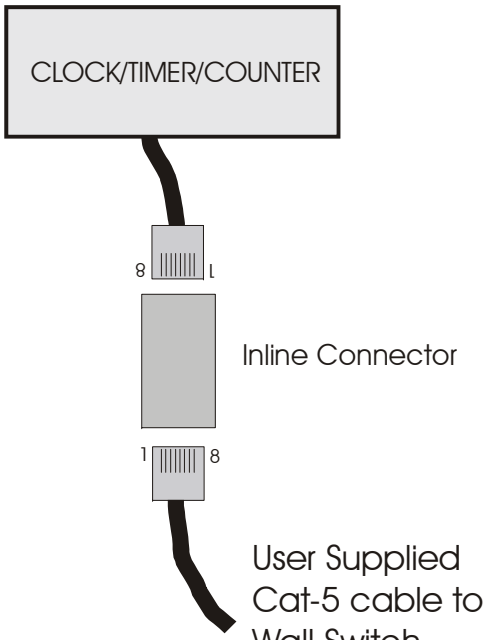
The external clock/timer/counter control line includes eight terminals for controlling the display with external devices. Apply 12-24 volts DC between the ground terminal and the desired control terminal to activate the respective line.

Use 5-24 volts DC only.

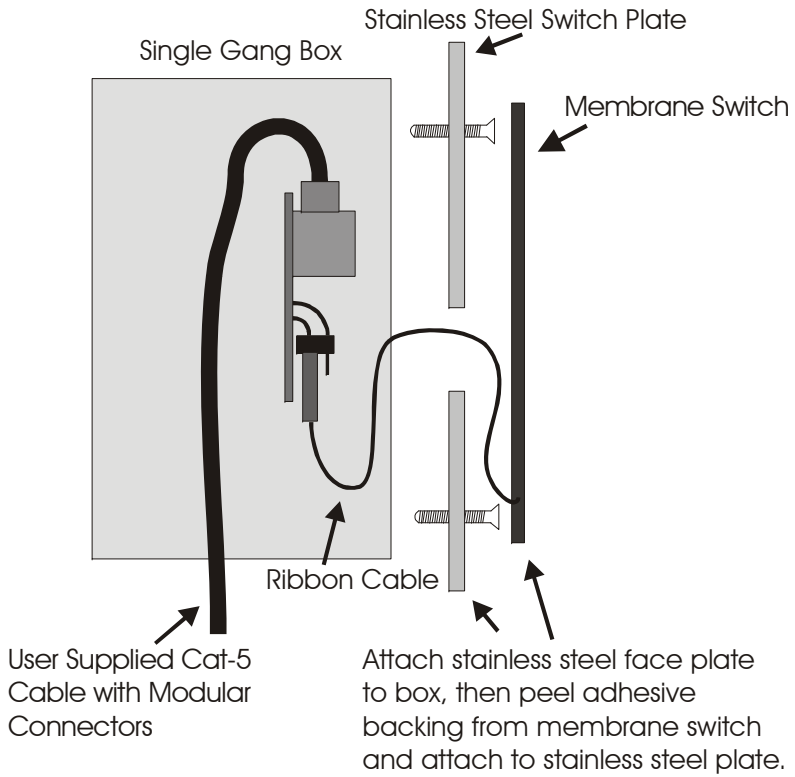


To activate a control function, apply 5-24 volts DC between terminal 8 and the desired control terminal. For dry contact switch operation, connect the switch between terminal 1 and the desired control terminal.

Clock/Timer/Counter with Wall Switch Connector



Clock/Timer/Counter Wall Switch Side View



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