



MICROCode Consulting
Rally Clock/Timer System v2.4
for
Time-Speed-Distance
Car Rallying

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Revision History

<u>Version</u>	<u>Date</u>	<u>Changes</u>
2.4	2011-Feb-20	Document new factory reset and calibration modes
2.0	1998-Aug-11	New design; whole new menu system
1.0	1996-May-08	Original document

1.0 Introduction

If you have ever been on a Time-Speed-Distance (TSD) car rally, you know the fun and excitement of getting a good score, possibly a low-enough overall time error to win a trophy. Getting a good score means that the driver and navigator are working as a team and effectively applying tools to make them competitive. The Rally Clock/Timer System is one such tool.

Up to now, to keep track of time, you would need a clock and at least one stopwatch. Sometimes one stopwatch is not enough and paper and pencil are required to track different times. Worse, anything you can buy at your local store is calibrated in seconds. Seconds can be converted to 1/100th minutes, but why create extra work for yourself, especially when instructions are coming fast and you have a do-it-yourself checkpoint coming up soon?

MICROCode Consulting's Rally Clock/Timer System is intended to alleviate the problems and overload due to not using the right tool for the problem: a system specifically targeted for people who rally and need a better clock and stopwatch!

The Rally Clock/Timer System is intended for use in *any* navigational rally class, including S.O.P. or Beginner. Since the Rally Clock/Timer System does no calculations, it is *not* a computer ... just a state-of-the-art tool for measuring time.

This manual is not required reading. It is provided as an aid so you can get the most out of your Rally Clock/Timer System. If you would rather learn on-the-fly, an interactive learning/demonstration mode can be entered by holding down the *hour*, *minute*, and *hundredth* push-buttons simultaneously for several seconds until learning/demonstration mode starts.

2.0 Features

MICROCode Consulting's Rally Clock/Timer System is an integrated unit that combines the following major features:

- ❑ Accurate time-of-day clock in 1/100th (0.01) minute increments
- ❑ Two timers that can independently count up or count down
- ❑ Timers can be preset to a user-defined value for counting up, or counting down to zero
- ❑ Tactile direction-dependent switches allow you to confidently start or stop timers without looking at the display (unlike a push-button stopwatch)
- ❑ Audible alarm
- ❑ Audible count-down alarm
- ❑ Special checkpoint mode (which also activates a third timer)
- ❑ Lightweight electronics and rugged switches integrated into a convenient clipboard case
- ❑ Bright LCD alphanumeric display for easy viewing, day or night
- ❑ Plugs into your vehicle's 12V source, but incorporates internal battery backup protection

- ❑ Optionally run strictly off of a standard alkaline 9V battery
- ❑ Low-battery detection
- ❑ Optional articulated clipboard light to read your instructions or control card at night
- ❑ Interactive training/demo mode
- ❑ Continuous self-diagnostics
- ❑ Optional remote slaved display

2.1 Accurate time-of-day (TOD) clock

At the heart of the Rally Clock/Timer system is a microprocessor that accurately measures and displays time to 1/100th (0.01) of a minute. It is also quickly changeable to seconds. The complete time-of-day is shown in either 12- or 24-hour format. (The system is easily configured to your preference.)

Once you set the time-of-day (TOD) clock, you can be assured of its accuracy. As delivered, **maximum** clock drift is 0.01 minutes after one full day, which means no re-setting of the clock, and no TOD errors on the vast majority of TSD rallies. If the accuracy is in question due to aging drift, you can recalibrate it as defined in section XXX.

2.2 Two stopwatch timers that count up or down

In addition to the TOD clock, there are two separate and independent timers. These timers are displayed at all times on either side of the TOD clock and can have a positive or negative value which ranges from -23:59.99 to +23:59.99.

The timers are controlled using an intuitive front panel interface for starting and stopping, resetting to zero and changing the count direction of the timers from down to up.

2.3 Timers can be user-preset

The left and right displays are labeled timers as they incorporate the functionality of both a stopwatch and a countdown timer. The timer values are user-settable in 0.05 minute increments and can be changed quickly and easily.

2.4 Tactile direction-dependent switches

MICROCode Consulting's Rally Clock/Timer is constructed using high-quality long-life toggle switches and pushbuttons. The most used switches for the timers are not simple pushbuttons, but rather momentary toggle switches so it is **always** obvious whether you are starting or stopping the timer. Not only does this make timer start-stop changes clear, it can be done without even looking at the clipboard. Instead of having your eyes on a stopwatch with a single start-stop button, you can be looking for signs or other landmarks while starting or stopping the timer.

2.5 Audible alarm

An audible alarm can be set in the background. Although you *could* use it to wake you up in the morning, it is intended for those situations where you need to be notified at a specific time such

as lunch break or checkpoint departure time. The pulsating tone is instantly distinguishable from the count-down alarm so you know which alarm is active without looking. Activating any button or switch silences and cancels the alarm.

2.6 Audible count-down alarm

When a timer is counting down towards zero, an audible alarm is automatically generated at the 1.00, 0.50 and 0.25 minute marks, and every even-numbered mark of 0.10 minutes and below. The alarm is continuous (must be manually silenced) at the 1.00 and 0.00 marks; for other times, the audible alarm emits a short beep. This serves as a heads-up reminder and count-down alert for both the navigator and the driver. Activating any button or switch silences the alarm.

2.7 Special support for checkpoints

Entering a checkpoint, whether do-it-yourself or manned, presents a special challenge. The time-of-day and any down or up time must be noted at the instant the checkpoint in-marker is reached. With the Rally Clock/Timer System, this is a snap – literally. Just flip the centrally-located toggle switch from *normal* to *checkpoint* mode and the TOD clock is frozen so you can note your in-time. In addition, a third timer (Timer 3) is automatically started from zero, and is displayed in the Timer 2 position. This is indispensable for do-it-yourself checkpoints, where you must depart exactly a minute later. You will also see a small ‘checkpoint’ graphic (✓.) on the display in front of the frozen TOD clock time. Putting the toggle switch back into *normal* mode unfreezes the TOD display and restores the current times on Timer 1 and Timer 2.

2.8 Convenient clipboard package

The Rally Clock/Timer System lightweight electronics and rugged switches are integrated into a storage clipboard to which you can clip your route instructions and/or control card. The lid is hinged for storing pens and a spare battery inside, accessing the battery and backlight jumper, and battery start button. This self-contained package makes handling and storage of the Rally Clock/Timer System a breeze!

2.9 Bright LCD alphanumeric display

Rallying can be both a daytime and nighttime event, so having a display that works in both environments is essential. A popular form of display is the Light Emitting Diode (LED – those bright red digits). LED displays are very visible at night, but are difficult to read in the bright sunlight of day; they also consume lots of power that quickly drains any battery.


Not so for a Liquid Crystal Display (LCD) with integral backlighting. LCDs are easily visible during daylight hours. As it gets dark, the integral backlighting means the LCD continues to be easy to read. Finally, the alphanumeric (number *and* letter) capabilities of the LCD allow the Rally Clock/Timer System to display system messages in regular text, instead of some cryptic numeric code.

2.10 Use your vehicle's power

When using the Rally Clock/Timer System in your vehicle, you can plug it into any active power outlet/cigarette lighter jack. Some vehicles have outlets or lighter jacks that are only active when


the key is on. The 9V battery backup protects against those situations where the vehicle may be off and/or has to be restarted.

2.11 Timing system can run solely off of a standard 9V battery.

With the backlight inactive, the Rally Clock/Timer System only sips power. Under this operating mode, a single, fresh alkaline 9V battery will run the system continuously for days! Thus, for daytime use, there is no requirement to use a 12V vehicle source (except to save on 9V batteries). You can easily take the Rally Clock/Timer System with you on your mid-rally lunch break, or into the finish location. While running solely under battery power, a filled-in battery symbol () is shown on the display.

For nighttime use, display backlighting can be made to run under battery power by moving the visible (and only) jumper on the board. Power consumption is significant and a fresh battery will only last several hours. If you need the optional clipboard light as well, the Rally Clock/Timer System will have to be plugged into your vehicle's 12V source. You can still take the Rally Clock/Timer System with you away from the vehicle; however, you may need ambient light to view the display (depending upon the battery backlight jumper).

2.12 Low-battery detection

With any unit that operates on battery power, either as its primary source or its backup source, knowing the condition of the battery is essential to continued operation. When battery voltage initially drops below an acceptable level, a message with audible alert will appear on the display. Pressing any button will clear the message, but a low-battery indicator – a hollow battery symbol () – remains on the display when the 9V battery in the Rally Clock/Timer System should be replaced.

If you change the battery while vehicle power is active, you will not lose any Timer, Alarm or TOD settings.

2.13 Articulated clipboard light

For nighttime use, the backlit LCD is all you need to view the display. However, to read whatever you've attached to the clipboard, another light source is helpful. Overhead 'dome' lights can erode your night vision, so the Rally Clock/Timer System includes a fully articulated clipboard light. You can set the light height, location, and angle to your preference. Plus, it has its own on/off switch. When not needed, the light is easily moved out of the way.

2.14 Continuous self-diagnostics

Upon power-up, the extremely reliable Rally Clock/Timer System performs a set of internal diagnostics to verify its integrity. MICROCode Consulting felt that was not good enough. You need to know *immediately* if there is a problem. The processor at the heart of the Rally Clock/Timer System completes a set of internal diagnostics *several times each second*, and will report a problem even before the next hundredth of a minute has elapsed.

2.15 Optional remote clock display

MICROCode Consulting offers a companion compact display that can be remotely located, primarily for mounting in front of the driver. When plugged into the Rally Clock/Timer expansion outlet, the display can be placed where it will easily be read without having to look down at the Rally Clock/Timer System.

3.0 Rally Clock/Timer System Hardware

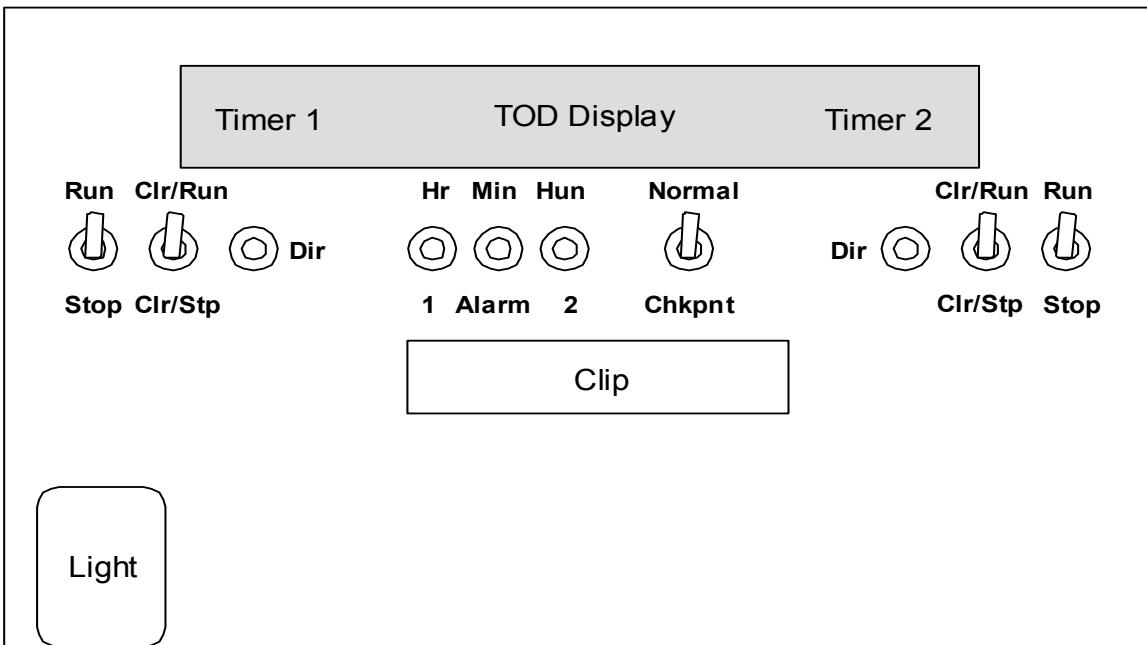
The Rally Clock/Timer System consists of a single storage clipboard containing the display, user interface, clipboard light, backup battery and electronics. A vehicle power cord is also supplied. The only option is the remote clock display, described in Section 2.14.

3.1 Description

In this section, diagrams are included to help you locate the items described. User operation of the Rally Clock/Timer System is contained in Section 4.0.

3.1.1 Top Panel

The top panel is shown in the figure below and includes all of the switch, button and display locations.



At the top of the Rally Clock/Timer System is a 40-character-by-one-line alphanumeric display that is backlit for nighttime use. Normally, it displays Timer 1 to the left, Timer 2 to the right, and TOD (time-of-day) in the middle. Timers are normally displayed with a minus sign (“-”) indicating “down time”; the lack of a minus sign indicates “up time”. Below the display is a row

of switches and buttons having specific functionality. With the exception of the *checkpoint* switch to the right of center, all other buttons and switches are momentary; when released, the buttons will return to their up position and the switches will return to their center position.

3.1.1.1 Run/Stop Switch

On the far left and far right of the Rally Clock/Timer System are switches that start and stop Timer 1 and Timer 2, respectively. Toggling the **Run/Stop** switch up starts a timer running; toggling the switch down stops the timer. This can be done without looking at the display!

3.1.1.2 Clear Run/Clear Stop Switch

Immediately adjacent to (and inside of) the far left and far right switches is a second set of switches labeled **Clr Run/Clr Stop**. These function identical to the **Run/Stop** switches but first clear the existing time to 0:00.00. Toggling the switch up starts the timer running from 0:00.00; toggling the switch down stops and clears the timer. Again, this can be done by feel. Try starting and stopping the timers (or clear/run and clear/stop) WITHOUT looking at the display!

3.1.1.3 Direction Button

Adjacent to the **Clr-Run/Clr-Stop** switches are the **Dir (Direction)** change buttons. By default, a timer will count down, as reflected by the ↓ symbol to the right of its display. Pressing the *Dir* button for a timer changes the direction to up as indicated by the ↑ symbol; pressing it again will return it to the down direction. **Note that the direction indicator arrow always returns to down whenever the timer is activated; thus, it defaults to the most common direction (adding down time).**

3.1.1.4 Checkpoint Switch

The **checkpoint switch** located to the right of center is a toggle switch. In the up position, the Rally Clock/Timer System is in *normal* operation: the TOD clock counts up and the timers visibly respond to all switch and button inputs. In the down position, the Rally Clock/Timer System enters *checkpoint mode*: the TOD, Timer 1 and Timer 2 displays are frozen, although the TOD continues to count and Timers 1 and 2 still count and otherwise respond (invisibly) to most operations. In addition, the display will now show the value of Timer 3, which is counting up from zero. Timer 3 shows elapsed time since the **checkpoint switch** was switched down, using the Timer 2 display position. You will know that you are viewing Timer 3 (not Timer 2), because the direction arrow will be missing, and the Timer 3 display will be the only one visibly running. You will also note that the checkpoint indicator (✓.) is flashing. (The two modes are detailed in Section 4.0.)

3.1.1.5 Set Buttons

The three push-buttons labeled **Hr-Min-Hun** along the top and **1-Alarm-2** along the bottom are dual-function. Their primary function is to put one of the Timers (1 or 2), the Alarm, or the TOD clock into *set mode*. Once in *set mode*, the buttons are used in their secondary role to actually set the hours, minutes and hundredths (or seconds).

3.1.2 Rear Panel

The rear panel of the Rally Clock/Timer System contains two connectors. The protruding connector is a 2.5mm power jack that is used to provide 12V power to the Rally Clock/Timer System. A mini-DIN 4-pin plug is used to connect to the optional remote display.

3.1.3 Clipboard Interior

The Rally Clock/Timer System is contained inside of a lightweight, resilient plastic storage clipboard. Lifting the tab at the bottom of the clipboard opens this box, revealing the electronics, storage area, 9V battery and *9V battery only* start button.

3.1.3.1 Battery Replacement

The 9V battery is located inside the case, in a clip near the top middle of the box. You can safely replace the battery at any time, including when the Rally Clock/Timer System is in operation. (Of course, if you replace the battery and no 12V external power source is present, the Rally Clock/Timer System will turn off and you will lose all data.) A typical alkaline 9V battery will power the system for up to 60 hours of battery-only operation. Using the battery only for backup will yield the longest lifetime – up to 5 years!

3.1.3.2 Start Button

When running strictly under 9V battery power, the Rally Clock/Timer System uses a button inside the clipboard to initiate startup. (This was a design decision. A hidden button is unlikely to be accidentally pushed, thereby draining your battery needlessly.) There is only one button inside the case, located on the circuit board near the battery. Pressing it will start the Rally Clock/Timer System when a usable 9V battery is present. Note that connecting the system to vehicle power will automatically start it without having to open the case. In this situation, the 9V battery will provide backup power.

3.2 Connecting the Rally Clock/Timer System to vehicle power

For 9V battery-only operation, the Rally Clock/Timer System is not connected to vehicle power.

For powered operation in your vehicle – especially at night where battery power is insufficient to power the LCD backlight or clipboard light – the Rally Clock/Timer System must be plugged into a 1-amp, 11-16 volt supply. (Older cars produce between 12 and 14 volts during normal operation and sometimes as high as 16 volts; modern vehicles have a passenger compartment voltage close to 12 volts.) A 3-foot-long cord with a vehicle power/cigarette lighter plug on one end and power connector on the other is included with your Rally Clock/Timer System. Note: **the center of the plug is connected to the (+) voltage and outside of the plug is connected to the (-) terminal or ground. The center of the power/cigarette lighter plug is connected to the (+) voltage and outside of the power/cigarette lighter plug is connected to the (-) terminal or ground.** If the polarity of your vehicle's wiring is reversed, the Rally Clock/Timer System will only operate on the 9V backup battery, but should not otherwise be harmed if you remove power quickly.

4.0 Rally Clock/Timer Operation

Operating the Rally Clock/Timer System is easy. In fact, it was designed for *heads-up* operation—typical operation of the clock can be done *without even looking at it*. What you now own has been carefully refined from a rally clock/timer that has been in use for over a decade by experienced, top-placing TSD rallyists competing in the S.O.P. class. This second-generation Rally Clock/Timer System has some additional features and refinements to ensure that tracking time is the least of your worries.

The Rally Clock/Timer System has four distinct modes that will be described in subsequent sections.

- ◆ *Normal mode*: the dominant form of operation where Timers (stopwatches) can be operated and the current TOD is constantly updated
- ◆ *Checkpoint mode*: used when entering a manned or unmanned checkpoint, or when you wish to set the TOD
- ◆ *Set mode*: used to set either Countdown Timer, Alarm or the TOD Clock
- ◆ *Configuration mode*: used to set user-definable options in the Rally Clock/Timer System

4.1 System Start-Up

The Rally Clock/Timer System will turn on when it is plugged into your vehicle's power or, if running only a 9V battery, by opening the clipboard and pressing the **Start** button as described in 3.1.3.2 Start Button.

When the Rally Clock/Timer System is first turned on (either by connecting it to a 12V power source, or pressing the **Start** button inside the case), it will emit a short beep and immediately display a sign-on message. If connected to vehicle power, the LCD backlight will turn on as well. While the sign-on message is displayed, self-diagnostics are running. When complete, the sign-on message will disappear and you will see three displays on the LCD in the form of "0:00.00" for Timer 1 and Timer 2 and "00:00.00" for the TOD clock. The TOD clock will be blinking, indicating it is in *set mode* and ready for adjustment (see 4.3 Set Mode).

While operating, the LCD always has *something* displayed on it; however, when operating exclusively on a 9V battery, the LCD will *only* be readable if ambient light is present. The only time the LCD is blank is when the Rally Clock/Timer System is off.

4.2 System Shutdown

The Rally Clock/Timer System does not just automatically turn-off unless all power sources are disconnected. This feature allows you to continue running using the 9V backup battery. There are three ways to shut down the Rally Clock/Timer system:

- ◆ Unplugging the Rally Clock/Timer System from vehicle power without having a backup battery installed (not recommended, because you lose backup capability and will have to reset the TOD clock if accidentally done)
- ◆ Removing external power and physically unplugging the internal 9V battery
- ◆ Pressing and holding both **Dir** buttons; *this is the recommend method*

Pressing and holding both **Dir** buttons simultaneously will cause the Rally Clock/Timer System to respond with a warning that the system is shutting down. Continue to hold both **Dir** buttons to complete shutdown; otherwise, releasing either or both **Dir** buttons will cancel the shutdown request. While the system awaits your response, Timers and the TOD clock all continue to operate normally in the background.

Note that shutdown mode works regardless of whether the system is running under backup battery or vehicle power. However, when running under vehicle power, the backlight will still be on, as may be the clipboard light. Disconnect the power cord to stop all power drain.

4.3 Set Mode

When either of the Timers, the Alarm, or the TOD clock are in *set mode*, the associated time display on the LCD blinks. Note that only one of the displays can be in *set mode* at a time.

4.3.1 Entering set mode

Upon power-up, the TOD Clock is automatically in *set mode*. To enter *set mode* at any other time, press and hold the button associated with the display (Timer **1**, **Alarm**, or Timer **2**) until that display starts blinking. Note that Timer 1 and 2 can only be put into *set mode* from *normal mode*. Alarm can be put into *set mode* from either *normal* or *checkpoint mode* by pressing and holding the **Alarm** button.

Other than during power-up, the TOD Clock can only be put into *set mode* from *checkpoint mode* and requires pressing and holding both the **1** and **2** buttons.

4.3.2 Setting the time, alarm or timer value

While in *set mode*, the **Hr**, **Min**, and **Hun** buttons advance their respective values. Hours and minutes advance by one and hundredths advance in 0.05 minute (or 5 second) increments each time the corresponding button is pressed. Holding a button down for more than one second will rapidly advance the Timer. After minutes or hundredths reach their maximum value (59 and 99, respectively), they roll over to zero. Hours roll over from 23 to 00.

For Timers, the default value is positive (though no + sign is shown), indicating up time. While in *set mode* for Timers, pressing the **Dir** button adds or removes a minus (-) sign, with the minus sign indicating down time (where you may have been stuck at a signal waiting for a green light).

4.3.3 Setting Alarm

The Alarm is not normally active or shown. However, if the alarm is “on”, an alarm bell symbol (♣) will be displayed. Pressing and holding the **Alarm** button will put the Alarm into *set mode*. (See 4.7.1 Alarm for more information.)

4.3.4 Exiting set mode

To exit *set mode*, press any Run or Stop switch. The actual function of that switch will be ignored for this purpose and the Rally Clock/Timer System will return to either *checkpoint mode* or *normal mode*, depending upon the position of the **checkpoint switch**. (Changing the position

of the **checkpoint switch** also exits *set mode*, but the **checkpoint switch** functionality is never ignored.)

4.4 Normal Mode

With the **checkpoint switch** in the up position, the Rally Clock/Timer System is in *normal mode*. The timers can be operated while the TOD clock counts up normally.

- ◆ Pushing the **Run/Stop** switch up starts the associated timer running in the direction indicated (↓ or ↑) **before** the switch was pushed
- ◆ Pulling the **Run/Stop** switch down stops the associated timer
- ◆ Pushing the **Clr-Run/Clr-Stop** switch up clears (resets to 0:00:00) and then starts the associated Timer running in the direction indicated (↓ or ↑) **before** the switch was pushed
- ◆ Pulling the **Clr-Run/Clr-Stop** switch down stops and then clears the associated Timer
- ◆ Pressing the **Dir** button toggles the direction for the associated Timer as shown on the display (↓ or ↑). Note that the direction indicator arrow **always** returns to **down**, *each time* a timer is activated, regardless if the Timer running is currently counting up or counting down.

Pulling the **checkpoint switch** down changes the mode to *checkpoint mode*. Pressing and holding **1** or **2** puts that timer into *set mode*; pressing and holding the **Alarm** button puts the Alarm into *set mode*

4.5 Checkpoint Mode

When the **checkpoint switch** is pulled into the down position, the Rally Clock/Timer System enters *checkpoint mode*. The following will be shown on the display:

- ◆ Timer 1 and TOD displays are frozen at the moment *checkpoint mode* is entered to allow easy recording of the TOD and Timer 1 values.
- ◆ A small ‘checkpoint’ graphic (✓.) will be flashing next to the frozen TOD display.
- ◆ A 3rd timer (Timer 3), the checkpoint timer, is started from “0:00.00” and shown in the Timer 2 display area. This is not only confirmation of elapsed time since you entered the checkpoint, but can serve as a departure timer from a DIY checkpoint exactly one minute later (assuming you entered the DIY checkpoint on time). Timer 3 will continue to run until you cancel *checkpoint mode* by returning the switch to *normal*.
- ◆ The value for Timer 2 at the moment *checkpoint mode* was entered is displayed by depressing the **Hun** button. Releasing the button will return the display to Timer 3. Timer 3 can easily be distinguished from Timer 2, since Timer 3 has no direction arrow.

While in *checkpoint mode*, the TOD and Timers 1 and 2 are still counting in the background; their current values will again be displayed when the Rally Clock/Timer System returns to *normal mode*. The background (running) values for Timers 1 and 2 or TOD are not shown while in *checkpoint mode*.

In the rare event that the actual TOD must be adjusted, pressing and holding **both** the **1** and **2** buttons while in *checkpoint mode* puts the TOD clock into *set mode*. TOD cannot be set while in any other mode.

Pushing the *checkpoint switch* up returns the system to *normal mode*.

4.6 Configuration Mode

To set user-definable values in the Rally Clock/Timer System or view specific system information, *configuration mode* is used. Pressing and holding the **Hr**, **Min**, or **Hun** buttons will first prompt for **training/demo** mode. Release the buttons to enter *configuration mode*; continuing to hold the buttons will automatically engage **training/demo** mode.

Configuration mode is a **menu system** where a single option is given and three responses are allowed; note that no other buttons or switches are active while in *configuration mode* (other than the *checkpoint switch* as noted earlier).

- ◆ Pressing the **Hr** button accepts/enables the option shown
- ◆ Pressing the **Min** button ends *configuration mode*
- ◆ Pressing the **Hun** button skips to the next option

Options available in *configuration mode* include the following:

- ◆ running an interactive training/demonstration session
- ◆ switching the system between 12-hour and 24-hour mode
- ◆ switching the system between hundredths of a minute and seconds
- ◆ showing the Rally Clock/Timer System information/status: serial number, external voltage, battery voltage, and lifetime timer or demonstration time remaining (whichever is applicable)
- ◆ setting the display contrast
- ◆ recalibrating the clock

The most recent configuration is always retained and used regardless of whether external power or a battery is present. While the system is in configuration mode, all active Timers and the Clock continue to run normally in the background.

4.7 Indicators

In addition to the displays described for different modes, there are supplemental indicators that may appear on the display in *normal* and *checkpoint modes*.


4.7.1 Alarm


While the Alarm is active, an alarm bell symbol (🔔) is shown on the LCD display (between TOD and Timer 2). When the Alarm time is reached and the alarm is active, an alarm will go off. The alarm bell symbol will start flashing and the clock will repetitively emit short beeps. As always, the alarm that is beeping is canceled by pressing any one of the **Hr**, **Min**, or **Hun** buttons.

Accessing and changing the Alarm is as follows:


- ◆ Whether the Alarm is active or not, pressing the **Alarm** button will display the Alarm setting in the TOD display position preceded by a small flashing “AL” prefix.
- ◆ Holding the **Alarm** button down for several seconds will put the Alarm into *set mode*. When *set mode* is exited, the alarm is activated automatically.
- ◆ To change the Alarm between active (“on”) and inactive (“off”), momentarily press either the **Hr** or **Hun** button while you hold down the **Alarm** button.

4.7.2 Low Battery

Regardless of whether you are running under external or internal power, when the 9V battery voltage falls to a low level, a warning message will appear on the LCD display (along with a short beep) that is canceled by pressing either the **Hr**, **Min**, or **Hun** buttons. The LCD display will then return to its previous mode, but a small low-battery-indicator symbol () will remain. A low-battery warning typically occurs when you have an hour or two left of battery-only operation, but this is highly battery-dependent. Some batteries may last longer; others, considerably shorter. It is best not to take chances if that is your only source of power. Check the voltage before the rally starts, and replace the battery if there is any question.

When a good battery is installed, the low-battery indicator will disappear, although it is replaced by a full-battery indicator () if running solely under 9V battery power. If running under vehicle power with an acceptable 9V battery, NO battery symbol will be shown.

4.7.3 Missing Battery

When running under 12 volt vehicle power with no 9V backup battery present, a “missing battery” indicator () is displayed. Although running the Rally Clock/Timer System without a 9V battery is supported, it is not recommended. Installing a 9V battery will either remove the “missing battery” indicator or replace it with a low-battery indicator, depending upon the power remaining in the battery.

4.8 Special Functions

There are two special functions that are rarely used, but may be needed at times: reset to factory settings and recalibrating the clock.

4.8.1 Reset to Factory Settings

Although you should never need it, if your unit behaves erratically (e.g. clock counting extremely slow or extremely fast), then resetting the unit should clear the problem. This option is available by pressing and holding the HR and HUN button during unit power-up only. You will be prompted to confirm the reset. Note that we have never had to use factory reset on our own personal clock/timer units used for rallying.

<p>Do not reset to factory settings casually. All calibration information is lost and replaced with a good default, but you will need to recalibrate the clock as the clock calibration for your specific unit will be lost.</p>

4.8.2 Recalibrating the Clock

Although each unit is calibrated at the factory to high accuracy, due to aging or normally operating in a very high or very low temperature, you may not be satisfied with the accuracy. Recalibration is one of the configuration menu items available, but it is important to follow these steps before and during recalibration:

- ◆ Install a fresh 9v battery into your rally clock/timer. You will only operate the unit off of the 9v battery for recalibration.
- ◆ Ensure you have a precision clock. It is best to use a radio-synchronized clock (WWVB) or a radio listening on a time broadcast frequency.
- ◆ Calibration takes exactly 12 hours, so only perform the calibration where you can get back to your rally clock/time at the 12 hour point.
- ◆ Start the unit up (again, only using the 9v battery).
- ◆ Enter the configuration menu and choose the “Recalibrate” option. You will be prompted to confirm you wish to recalibrate.
- ◆ When the unit is ready, it will prompt you to start the calibration by pushing the right RUN switch. Synchronize this start properly so that the 12 hour mark is obvious.
- ◆ Once calibration starts, the unit will prompt to stop the calibration at 12 hours by pulling the right STOP switch. There is no other indicator.
- ◆ At precisely 12 hours from the start time, pull the right STOP switch.
- ◆ The unit will display a message while it calculates the calibration and then displays the calibration values on the screen.
- ◆ Calibration values are stored and will be used for all future clock operation until another recalibration is performed.

4.9 Summary of Set Button Functions

The set buttons, **1 (Hr)**, **Alarm (Min)**, and **2 (Hun)**, serve multiple functions while the Rally Clock/Timer System is running. Other than shutdown (where holding down both **Dir** buttons is used), the set buttons are used to access all of the advanced clock functionality. The table below summarizes all functions that are supported by these buttons.

Action	Button			Allowed in mode		
	Hr	Min	Hun	Normal	Checkpoint	Set
Clear active alarm (countdown or TOD)	Push	--	--	Yes	Yes	Yes
Clear active alarm (countdown or TOD)	--	Push	--	Yes	Yes	Yes
Clear active alarm (countdown or TOD)	--	--	Push	Yes	Yes	Yes
Show Alarm in TOD display position	--	Push	--	Yes	Yes	--
Show frozen Timer 2 value instead of Timer 3	--	--	Hold	--	Yes	--
Put Timer 1 into <i>set mode</i>	Hold	--	--	Yes	--	--
Put Alarm into <i>set mode</i>	--	Hold	--	Yes	Yes	--
Put Timer 2 into <i>set mode</i>	--	--	Hold	Yes	--	--
Start <i>training</i> or enter <i>configuration mode</i>	Hold	Hold	Hold	Yes	Yes	Yes
Put TOD into <i>set mode</i>	Hold	--	Hold	--	Yes	--
Advance Hours; hold to scroll rapidly	Push	--	--	--	--	Yes
Advance Minutes; hold to scroll rapidly	--	Push	--	--	--	Yes
Advance Hours; hold to scroll rapidly	--	--	Push	--	--	Yes

5.0 Remote Display Operation

The optional remote display is plugged into the back of the main Rally Clock/Timer unit via a cable with a DIN plug on the end. It is recommended you mount the remote display to your dashboard with Velcro or other strong material so the unit does not move while driving.

The remote display has a number of fixed modes that it can be set to show. These modes depend upon the size of the display. Pressing the red button on top of the unit will sequence to the next mode, returning to the first mode after the last one is shown. Here are some typical modes for single-line displays (it will briefly flash the mode before showing the time):

- ◆ Timer 1
- ◆ Timer 2
- ◆ Time-of-day (TOD)

And here are the typical modes for dual-line displays:

- ◆ Timer 1 on top and Time-of-day at the bottom
- ◆ Timer 2 on top and Time-of-day at the bottom
- ◆ Timer 1 on top and Timer 2 at the bottom
- ◆ Timer 1 only
- ◆ Timer 2 only

Note that the remote display will remember the last mode used the next time it is plugged in.

Finally, the remote display will *only* operate when the TSD Rally Clock/Timer is powered from your vehicle. **Let us repeat: the remote display will not operate using only the main unit internal 9v battery; it must have vehicle power.**

6.0 Documentation and Updates

The latest User Guide can be found on our website, <http://www.microcodeconsulting.com/rally/>, and is available for download in PDF format.

7.0 Contacting MICROCode Consulting

We hope you find your Rally Clock/Timer System as versatile and useful as we have for TSD rallying. If you have any questions, you can reach us a number of ways. We recommend e-mail, as that makes it easier to communicate at any time.

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