EZcal Max Instructions

EZcal Max

Advanced hand-held device with RS232 and CANBUS capabilities

USB connection to PC

General features:

- Diagnosis and configuration of PG Trionic controllers
- "Quick HELP" gives instant access to diagnostic help from any menu
- Built-in USB storage for file transfer between controllers and PCs
- SAVE and LOAD functions allow controller settings to be saved for documentation, and loaded to another controller for easy repeating of machine configuration
- "PGFLASH" function for easy controller software updates
- Advanced features include "GETCURVE", "QUICKLOG" and "CLONE save/restore"

EZcal Max enhancements:

- Many functions faster (including SAVE, PGFLASH)
- Instant QSAVE with LEFT+RIGHT
- More "?" modes (including latched)
- MODE button instantly switches functionality
- Improved file handling including sort-by-date
- CANBUS logging, configuration, etc
- USB powered
- Easier updating (no PC program required)

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1.1 Description

EZcal Max is a hand-held device used to diagnose and configure machine controllers from PG Trionic Inc. The device has a two line x 18 character backlit display, 8 button keypad, RS232 / power connection, CANBUS connection, and USB connection.

When connected to a PG Trionic Inc controller, the buttons and display are used to access, view and alter controller menu diagnostics and adjustments.

When connected to a PC via USB, files can be written to or read from EZcal Max (the USB drive that appears is normally called "EZCALMAX".
Files written by EZcal Max (SAVEs, for example) can be read by PC.
Files written by PC can subsequently be used by EZcal Max to enable field diagnosis and (PGFLASH) update of controllers.

1.2 EZcal Max enhancements

EZcal Max functions in the same way as the original EZcal Pro, but offers a number of enhancements:

- MODE button instantly switches between controller menus, EZcal Max menus, and CANBUS functionality
- Wider display shows more characters of menus/etc
- Faster for most functions, including SAVE, PGFLASH, GETCURVE (SAVE time can be below 5s in some use-cases; PGFLASH could be 25% faster)
- New functions include PGVERIFY, QSAVE, automatic SNAPSHOT, and more
- Easier update via computer (no program needed)
- Improved file handling includes sorting by most recent file for PGFLASH/etc, sequence numbering for SAVE/etc, warning of close-to-full storage, and a file delete feature
- Last entered filename for SAVE / QUICKLOG / GETCURVE is remembered and offered the next time the function is selected (in combination with sequence numbering, this makes for faster use of these functions)
- CANBUS capabilities include auto bus speed detection, logging of all or selected messages, executing pre-written programs that for example can configure CANBUS node / speed, transmit simulation messages, or (CANFLASH) update a CANBUS device
- PGFLASH can be skipped if EZcal Max confirms the controller is already running the selected software

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1.3 EZcal functionality

EZcal Max can be used instead of an EZcal, for diagnosing and configuring a controller – simply use the supplied four pin connector cable between EZcal Max and the controller.

The LEFT (◄) and RIGHT (►) arrow keys can be used to select different controller menus, while the ENTER key opens the menu and the ESC key escapes back out of an opened menu.

The UP (▲) and DOWN (▼) arrow keys can adjust some controller values.

All normal controller menu functions are available, including DIAGNOSTICS, ADJUSTMENTS, and SETUPS menus.

1.4 EZcal "?" Quick HELP

EZcal Max "?" button instantly shows the controllers current HELP message, while viewing any controller menu (there is no need to exit the current menu and navigate to the HELP menu).

The current HELP message is displayed while "?" is pressed; EZcal Max immediately reverts to the original menu display, once the button is released.

EZcal Max adds the optional ability to latch when "?" is pressed, as well as the option to display one, two or three chosen values simultaneously, instead of the HELP message (again with optional latch)

1.5 Accessing EZcal Max functions

EZcal Max incorporates a number of "computer like" features so that a PC is not needed for many controller configuration tasks, such as updating the controller software or copying settings & adjustments from one controller to another.

The MODE button provides instant switching between controller menus, EZcal Max menus (and CANBUS features). Note that when MODE returns to the controller menus, the same menu / access level / etc is shown.

It's also possible to instantly access EZcal Max menus by pressing ESC while connecting to the controller.

When EZcal Max menus are selected, LEFT (◄) and RIGHT (►) arrows are used to select different EZcal Max menus, while ENTER selects the menu and ESC escapes back out of an opened menu (in the same way as navigating controller menus).

EZcal Max menus include: SETUP, SNAPSHOT SAVE, LOAD, PGFLASH, PGVERIFY, QUICKLOG, GETCURVE, CANBUS, ABOUT

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2.1 EZcal Max SNAPSHOT SAVE menu

The EZcal Max SNAPSHOT SAVE menu enables all data in the connected controller to be saved to USB storage in EZcal Max; subsequently the file can be accessed from a PC, or used to load the same data to another controller (ie: copying from one controller to another).

EZcal Max automatically executes a SNAPSHOT prior to the SAVE, which provides fast capture of diagnostic data. The display shows "WORKING" while this is happening for a few seconds, after which vehicle/controller functions can be released while SAVE continues to write data.

The function saves all controller information including ADJUSTMENTS, SETUPS, DIAGNOSTICS, etc; an eight character filename can be specified to identify the data, and the file has a ".PGT.TXT" extension – example:

```
[DIAGNOSTICS]
"SYSTEM driveENABLE","NO","0",6
"SYSTEM boomENABLE","NO","0",7
"SYSTEM B+SUPPLY","10.9V","13039",8
 …
[ADJUSTMENTS]
"DRIVE FWD MIN","36%","36",292
"DRIVE FWD MAX","55%","55",293
 …
```

To SAVE all controller data to a USB storage file:

➢ Access EZcal Max menus and select the SNAPSHOT SAVE menu
➢ Enter an appropriate filename; press UP/DOWN to set each character, and LEFT/RIGHT to move between characters; press ENTER when the filename is correct
➢ EZcal Max will prompt for confirmation, displaying ":NO" after the filename; to confirm the filename and begin the SAVE, press UP/DOWN to show ":YES" then press ENTER
➢ EZcal Max will now create the filename in USB storage, read all data from the controller, and write it to file; depending on the controller and whether this is the first or subsequent SAVE, the time will vary from as little as a few seconds, to a minute or more (in all cases EZcal Max is quicker than the original EZcal Pro)
➢ While "SNAPSHOT WAIT" is shown, controller data is being fetched – keep any active function on the machine during this time (it's ok to release when this few seconds SNAPSHOT has finished)
➢ The display will show the data being written to show progress: DIAGNOSTICS, ADJUSTMENTS, SETUPS, etc
➢ When complete the display will show "OK" and the filename written; press ESC to exit (note that the filename may include a sequence number to more easily identify the order in which files are created)

NOTE: Some older PGT controllers do not natively support SNAPSHOT; on these controllers the first SAVE after connection will not have SNAPSHOT, but subsequent ones will.

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2.1.1 EZcal Max QSAVE

While EZcal Max is displaying controller menus, pressing LEFT+RIGHT together triggers an immediate SNAPSHOT SAVE to a file named "QSAVE"; this provides for instant SAVE when a particular machine situation is noted.

NOTE: filename sequencing is recommended so that a new file is created each time.

2.2 EZcal Max LOAD menu

The EZcal Max LOAD menu enables ADJUSTMENTS and SETUPS that have been saved from a controller, to be loaded to another controller – once done, both controllers will be identically configured.

To LOAD controller data from a previously saved USB file:

➢ Access EZcal Max menus and select the LOAD menu
➢ Available files (created with the SAVE menu) are displayed, one by one, followed by the ":NO" confirmation prompt
➢ If the filename displayed is not the correct one, press ENTER with ":NO" to reject that filename and display the next
➢ When the correct filename is displayed, press UP/DOWN to show ":YES" then press ENTER to confirm that filename
➢ EZcal Max will display "WORKING" while the data in the file is compared with that in the controller
➢ EZcal Max will display "CHANGES=", indicating how much data needs to be changed in the controller, followed by a percent complete while the changes are made
➢ EZcal Max will display "OK" when all data in the controller matches that in the file; press ESC to exit the LOAD menu

IMPORTANT: Ensure that data is only transferred between identical controllers running the same software – loading data for one controller to a different type of controller will have unexpected and possibly dangerous effects on the vehicle!

EZcal Max will detect an attempt to load data for the wrong controller type, and will display a warning like "MACHINE CODE CHANGED" or "MODEL CHANGED" – this is a warning to cancel the LOAD operation.

2.3 EZcal Max LOADCOMPARE menu

The EZcal Max LOADCOMPARE menu shows which ADJUSTMENTS and SETUPS would be changed by EZcal Max LOAD, showing both the current controller value and the (different) value from the saved file:

➢ Select file in the same way as for the LOAD menu (see above)
➢ EZcal Max will display "WORKING" while the data in the file is compared with that in the controller
➢ EZcal Max will display "REVIEWING x/t", as it works through the changes, converting them to a readable format
➢ EZcal Max will display the first change (for example *"DRIVE FWD MIN" FROM 9% TO 12%*); press RIGHT to step through each change
➢ END is shown after all changes; press RIGHT again to repeat the list
➢ Press ESC to exit the LOADCOMPARE menu
➢ NOTE: changes are also written to file LOADCOMPARE.TXT

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2.4 EZcal Max PGFLASH menu

The EZcal Max PGFLASH menu allows the software of a connected controller to be updated, perhaps to provide new vehicle functionality. Controller software files have a ".REC" or ".SREC" extension, and are provided by PG Trionic Inc according to customer needs. File contents are a meaningless sequence of letters and numbers, and should never be altered!

> S113F600050475420444953504C41592056312E31CF
> S113F610003230303920504720547269 6F6E69636C
> …
> S105FFFEF628DF
> S903F60006

A supplied controller software file must first be transferred to EZcal Max by connecting via USB and drag/dropping the file, then EZcal Max can be connected to the controller to update it.

To PGFLASH new controller software:
- ➢ Access EZcal Max menus and select the PGFLASH menu
- ➢ All available filenames are displayed, one by one, followed by the ":NO" confirmation prompt; EZcal Max will normally show the most recently added file when a new one has been transferred via USB (or will show the most recently used, or each file in time order)
- ➢ If the filename displayed is not the correct one, press ENTER with ":NO" to reject that filename and display the next
- ➢ When the correct filename is displayed, press UP/DOWN to show ":YES" then press ENTER to confirm that filename
- ➢ EZcal Max will proceed with updating the controller software, displaying various messages while working:
  ACCESSING BOOT
  CHECKING BOOT
  ERASING
  PROGRAMMING
- ➢ A percent complete shows progress (the PGFLASH process can take up to a few minutes to complete); when complete an OK/FINISHED message is displayed (the new controller software version is also displayed)
- ➢ If there are any errors, be sure to confirm that the correct software file was chosen, matching the connected controller – if necessary the ABOUT menu can provide additional help with problems

NOTE: PGFLASH may recognize that the controller is already using the selected file; in that case the prompt "SKIP PGFLASH?" appears at the beginning. Press ESC at this point to skip PGFLASH. If you press ENTER (or don't press anything) then PGFLASH will proceed normally and "update" the controller.

NOTE: Normally the PGFLASH routine communicates with the controller at HIGHSPEED (as fast as possible); in rare circumstances this may cause erratic failures. If this is suspected, EZcal Max SETUP menu can be used to disable HIGHSPEED – the PGFLASH routine will then proceed more slowly.

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2.5 EZcal Max PGVERIFY menu

The EZcal Max PGVERIFY menu allows the software of a connected controller to be compared to a file (in the case that the precise controller software isn't known).
To PGVERIFY controller software, proceed exactly as for PGFLASH – but the controller software will NOT be changed, just verified!
If there are any errors, it's likely the controller software is not the same as the file!

2.6 EZcal Max GETCURVE menu

The EZcal Max GETCURVE menu saves the platform overload calibration curve data in the connected controller to USB storage; subsequently the file can be accessed from a PC.
This function is only useful for controllers which implement curve-based platform overload.

To store platform overload curve data to a USB file:
➢ Access EZcal Max menus and select the GETCURVE menu
➢ Enter an appropriate filename; press UP/DOWN to set each character, and LEFT/RIGHT to move between characters; press ENTER when the filename is correct
➢ EZcal Max will prompt for confirmation, displaying ":NO" after the filename; to confirm the filename and begin storing the curve data, press UP/DOWN to show ":YES" then press ENTER
➢ EZcal Max will now create the filename in USB storage, read the platform overload data from the controller, and write it to file; this will take a few seconds or more, depending on the controller
➢ The display will show various messages as the data is saved; when complete the display will show "OK" and the filename written; press ESC to exit the GETCURVE menu (note that the filename may include a sequence number to more easily identify the order in which files are created)

NOTE: The file created by GETCURVE may have a ".CRV" or ".LOG" extension, depending on the controller type; in either case the file can be viewed on a PC:
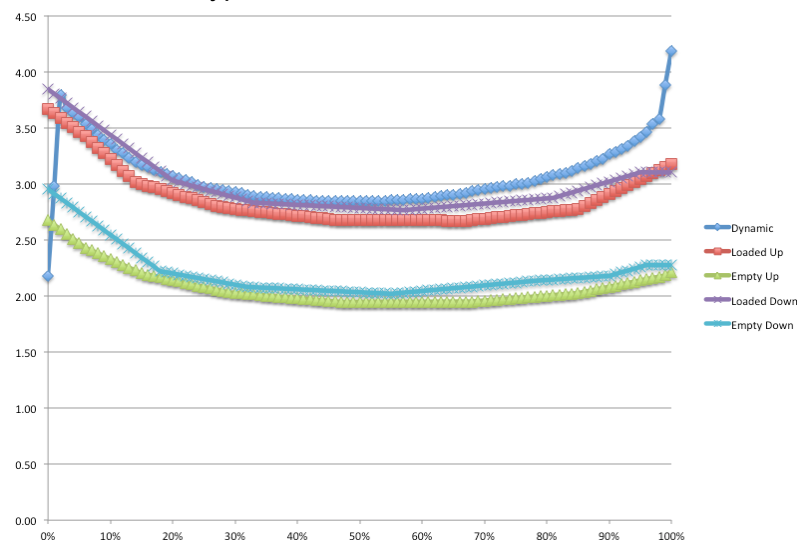
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2.7 EZcal Max QUICKLOG menu

      The EZcal Max QUICKLOG menu can store selected controller values to a file in USB storage, while the machine is being tested (for example to record motor voltage / current). Please see "EZcal Max Advanced Instructions".

2.8 EZcal Max SETUP menu

      EZcal Max has a number of special setup options, accessible in this menu; generally these options are needed only rarely:

- EZCAL MODE (legacy, smart); please see "EZcal Max Advanced Instructions"
- QMODE (normal/latched/multi/multilatched); sets the behavior when "?" is pressed
- SEQUENCING (no/yes/lettered); sets whether filename sequencing is active
- DEBUG (no, yes); assists with resolving communications issues
- HIGHSPEED (yes, no); disables highspeed PGFLASH updating if problems occur
- QUICKLOG / SLOWLOG; please see "EZcal Max Advanced Instructions"
- FLASHSAVE (no, yes); please see "EZcal Max Advanced Instructions"
- CANBUS (AUTO/50K/125K/250K/DISABLED); sets the behavior of CANBUS features
- TRANSLATION (no files, yes, no); please see "EZcal Max Advanced Instructions"
- FILEDELETE; provides file deletion features
- FORMAT (no, yes); formats the USB storage in EZcal Max, **erasing all data**

To select EZcal Max EZCAL MODE:
- ➢ Access EZcal Max menus and select the SETUP menu
- ➢ Access the EZCAL MODE sub-menu; press UP or DOWN to choose LEGACY or SMART, then ENTER to exit EZcal Max menus and return to EZcal mode showing controller menus using the selected mode
- ➢ NOTE: EZcal Max always starts in SMART mode when connected

To select EZcal Max QMODE:
- ➢ Access EZcal Max menus and select the SETUP menu
- ➢ Access the QMODE sub-menu; press UP or DOWN to choose between NORMAL, LATCHED, MULTI and MULTILATCHED; press ENTER to set
- ➢ QMODE changes the behavior when "?" is pressed while viewing controller menus:
  - ◦ NORMAL shows HELP message (or a QUICKLOG value) while button pressed
  - ◦ LATCHED shows HELP message (or value) and latches till ESC pressed
  - ◦ MULTI shows 1 to 3 QUICKLOG values while button pressed
  - ◦ MULTILATCHED shows 1 to 3 values and latches till ESC pressed
- ➢ MULTI/MULTILATCHED shows values set up for QUICKLOG (if there are any); when there are more than 3, press LEFT/RIGHT while viewing the MULTI values, to move through the available values
- ➢ NOTE: The display does not scroll while MULTI/MULTILATCHED is shown, so there are limits to what can be seen

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To select EZcal Max SEQUENCING MODE:
➤ Access EZcal Max menus and select the SETUP menu
➤ Access the SEQUENCING sub-menu; press UP or DOWN to choose NO, YES, or a letter-coded sequence; press ENTER to set.
➤ When SEQUENCING=YES, every created filename (SAVE, QUICKLOG, GETCURVE) will have a four digit sequence number added (eg: SAVE.0123.PGT); the number increases after every file created; the current sequence number is shown with the SEQUENCING sub-menu
➤ When SEQUENGING=YES with a letter, every created filename will have the letter and a three digit sequence number added (eg: SAVE.X123.PGT)
➤ When SEQUENCING=NO, nothing is added to filenames
➤ IT IS RECOMMENDED TO KEEP SEQUENCING=YES to make it easier to identify the order that files are created (EZcal Max does not have a built-in clock)
➤ NOTE: The selected mode is remembered until it is changed again

To use EZcal Max DEBUG mode:
➤ Access EZcal Max menus and select the SETUP menu
➤ Access the DEBUG sub-menu; press UP/DOWN to choose ":YES" to enable debug
➤ Now all RS232 communications with the controller will be logged
➤ Carry out the problem activity with the controller
➤ Once the problem activity has been completed, return to this DEBUG sub-menu and press UP/DOWN to choose ":NO" to stop debug – this is critical, so that the created debug file is properly available for access in USB storage
➤ Finally, connect EZcal Max to a PC and copy the file DEBUG.TXT from USB storage – this file can be provided to PG Trionic Inc engineers to assist with resolving the communications problem

To set EZcal Max HIGHSPEED mode:
➤ Access EZcal Max menus and select the SETUP menu
➤ Access the HIGHSPEED sub-menu; press UP/DOWN to choose ":YES" to enable highspeed, or ":NO" to disable; press ENTER to set
➤ When HIGHSPEED is enabled, many EZcal Max controller communications occur at maximum speed (including PGFLASH, SAVE, GETCURVE)
➤ When HIGHSPEED is disabled, all communications occur at standard speed
➤ Using the HIGHSPEED mode is recommended!
➤ NOTE: The selected mode is remembered until it is changed again

To set EZcal Max CANBUS mode:
➤ Access EZcal Max menus and select the SETUP menu
➤ Access the CANBUS sub-menu; press UP/DOWN to choose "AUTO", "50K", "125", "250K", or "DISABLED"; press ENTER to set
➤ It is recommended to set CANBUS=AUTO so that CANBUS speed is automatically detected when EZcal Max is connected to an active CANBUS
➤ If CANBUS features are never needed, setting CANBUS=DISABLED will stop the MODE button offering CANBUS (return to this sub-menu to restore CANBUS functionality)

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To use FILEDELETE:
- ➢ Access EZcal Max menus and select the SETUP menu
- ➢ Access the FILEDELETE sub-menu then press ENTER
- ➢ In turn, each file stored in EZcal Max USB storage is displayed; press RIGHT to step through the list ("END" is shown after all files have been shown, then the list repeats); note that you can only step through the list "forward" (pressing LEFT has no effect)
- ➢ To delete a file, press UP (to display "DELETE?") then press ENTER ("DELETED!" is displayed – press RIGHT to step to the next file, or ESC to exit FILEDELETE
- ➢ BE VERY CAREFUL when deleting files! It's recommended that you do not delete EZCALPRO.INI or QUICKLOG.TXT

To FORMAT EZcal Max USB storage:
- ➢ Access EZcal Max menus and select the SETUP menu
- ➢ Access the FORMAT sub-menu; press UP or DOWN to choose YES, then ENTER to begin wiping all USB storage in EZcal Max
- ➢ The message "WORKING" will be displayed, followed by "OK"

The FORMAT sub-menu wipes the USB storage in EZcal Max, **erasing all files**; this should be used in preference to using the format command on a computer, to ensure that the storage is prepared so that EZcal Max can access it.

2.9 EZcal Max ABOUT menu

The EZcal Max ABOUT menu displays various information about EZcal Max, as well as information about the connected controller, most recent PGFLASH, etc
- ➢ Access EZcal Max menus and select the ABOUT menu
- ➢ Press LEFT or RIGHT to move through the different ABOUT information displays; press ESC to exit
- ➢ Information displays in the ABOUT menu include:
    - ◦ Copyright information
    - ◦ EZcal Max version build information
    - ◦ USB storage information (including file count and used/total storage)
    - ◦ CACHE storage information
    - ◦ MACHINE information (model/version for connected controller)
    - ◦ RS232 code/tx/rx information (details last RS232 message to/from controller)
    - ◦ BOOT/FLASH/CODE information (details last PGFLASH activity)
    - ◦ LASTFILE information
    - ◦ DCODE information (details any unsupported SMART EZcal menu)
    - ◦ NONVOL information
    - ◦ IO information (supply voltage, internal temperature, etc)

IMPORTANT: When the ABOUT menu is entered, the file EZCALPRO.TXT is created in USB storage, with all information – this file can be provided to PG Trionic engineers to assist with problem resolution.

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3.1 EZcal Max USB connection

EZcal Max provides an industry standard "mini USB" connector which allows for stored files to be accessed by PC.

Files created on EZcal Max (by SAVE, GETCURVE, etc) can be read by the PC.

New files can also be transferred to EZcal Max from the PC (for later access by PGFLASH, LOAD, etc)

IMPORTANT: When changing/deleting/adding files, do not disconnect until the change is complete; EZcal Max will flash the display illumination when files are being changed by a PC connected via USB.

Be sure to properly "eject" before disconnecting; some computers do not properly finish writing files until the device is ejected. EZcal Max will display "EJECTED" showing that it's ok to disconnect.

If EZcal Max is connected both to a PC and a controller and a new PGFLASH file is added to EZcal Max storage by the PC, a prompt appears showing the filename and offering to immediately use the file to PGFLASH update the controller – confirm if needed by pressing ENTER (or press ESC to cancel).

When using this feature, do not access USB on the PC while PGFLASH is executing!

(September 2021) If EZcal Max is connected both to a PC and a controller, pressing LEFT+RIGHT together triggers an immediate SNAPSHOT SAVE to a file named "QSAVE"; USB is disconnected while this happens, then reconnected afterwards.

Do not leave EZcal Max connected via USB to a PC which goes to sleep (the extra current drawn may drain batteries and cause the PC to switch off).

The USB connection also allows EZcal Max itself to be updated; please see "EZcal Max Advanced Instructions".

3.1.1 EZcal Max powered by USB

EZcal Max is powered by USB from either a PC or USB power supply (5V, 0.25A or more). While USB is connected, EZcal Max cannot run most functions but once ejected from PC, press MODE to start using RS232, EZcal Max menus, CANBUS, etc all while powered from USB (in the event that RS232 is not providing power, or to maintain power if RS232 power is switched off).

If MODE or ESC is held pressed while connecting USB, EZcal Max will not connect to PC and will immediately be available for CANBUS / RS232 functions.