

# PICLOC-TR<sub>v2</sub>

## **Camera Mount Stabilizer**

**Beta Version**

**Preliminary**

## **User Manual** <sub>v1.02</sub>

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**modified**

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## 1.1) ThankYou

**Thank you** for purchasing **Picloc-TR**.

This new hardware version of the stabilizer has its sensor board isolated mechanically from the enclosure, to enable the sensors to operate even in moderate vibration levels.  
We hope you enjoy using it.

## 1.2) Features:

- Capable of stabilizing the axis on which **Picloc-TR** is directly mounted. The unit supports being mounted on the axis it is controlling
- Capable of stabilizing one axis out Picloc mounted on parent axis and child being stabilized proportionally (in a parent – child system)). Mounting can be both ON-Axis or Off-Axis
- Capable of **Autonomous** operation with no radio control connected.
- **Picloc-TR** supports **most servos** that are today available for purchase. The servo is the motive force to keep the camera mount in stability. **Picloc-TR** supports 4 different refresh rates and is compatible with most analog and digital servos available in the market up to 560Hz refresh rate. This is the refresh rate at which the unit updates its information to the servo. The faster, the better
- Able to work with both continuous modified rotation servos / robotic servos AND standard servos or servos with their feedback pot mounted on the axis after a gear or pulley reduction
- A **Neutral** setting menu for continuous rotation servos. This also works as an offset/home position for servos that still have their feedback pot ( or Geared Pot). This is the position that the servo will go to when gain is initialized later on during normal operation.
- A choice of **ATV limits**. +-90, +-170, or User Defined from a dedicated Menu.
- **Picloc-TR** has options for 4 different gain multipliers to enable best matching to your camera mount payload and servo drive system: x1, x2, x4, x8
- **Slew or Proportional** control mode of your control stick on the transmitter. In slew mode, the control stick will keep angle at centre position, and will move the mount if the stick is offset from its centre..
- 4 different Gyro/Accelerometer mixes. This allows you to select how much percentage to give attention to the gyro and the remaining to the accelerometer. 80%, 90%, 95%, 99%. The principal reason for this menu is to select the behavior of the mount when subjected to a turn. There are centripetal forces changing the vector to gravity when being subjected to a turn or bank.
- Drift Free using IMU
- Ability to load different firmware personalities for different applications
- Firmware updateable using optional USB-TTL converter
- Slew or Proportional mount control
- Remote Mount Control
- Remote Gain Control
- Adjustable return to Home position using gain switch
- One unit per axis

## 1.3) Menu Structure (Menu 1 -15):

- 1+2) Gyro Calibrate and Save to internal memory.
- 3) Save Gain Position +Menu to internal memory (P)
- 4) Acceleration/Deceleration of servo (D)
- 5) Servo Smooth (I)
- 6) User defined ( sym/asymmetric ) ATV
- 7) Default ATV ( to +- 90 degrees on unmodified servo and +-90 Degrees on IMU )
- 8) **IMU sensor Menu ( refer to page 4 )**
- 9) Fine Tuning of Servo Neutral Pulse\* - See Addendum on Page 16. ( From Firmware TXMenu\_2x\_0042)
- 10) **Servo Menu ( refer to page 4 )**
- 11) Goto Home Type – (return to IMU vertical UP), vs. (Freeze (in cont. modified servos) or Centre in unmodified servos.)
- 12) Gyro Calibrate + Factory Reset to default values
- 13) duplicate of menu 12
- 14) duplicate of menu 12
- 15) Calibration of Home Position in flight

## 1.4) Sub Programming Menu – IMU Parameters: Sub Menu 8(9) sequence

LED Flashes	Initialize IMU Sequence + Save	Options
	Needs 8 or 9 flashes with button pressed after powering up	
1	Multiplier of Gain Knob Value	x1, x2, x4, x8
2	Control stick response	Slew ; Proportional
3	IMU or PanLok emulation	Gyro+Accel; Gyro only
4	Gyro/Accelerometer Mix ( only if IMU is selected in above menu)	70/30; 80/20; 90/10; 95/5
	Save Parameters and Re-Start	No action needed

## 1.5) Sub Programming Menu – Servo Parameters: Sub Menu 10 sequence

Flashes	Initialize Servo Sequence + Save	options by Gain control
	Needs 10 flashes with button pressed after powering up	
1	Set Servo Refresh rate	77Hz, 250Hz, 333Hz, 560Hz
2	Feedback for position of camera mount	Picloc-TR / Potentiometer
3	ATV limit of camera mount (IMU based)	+ -90; + -170
4	Set Neutral position of Servo .	1520us at center of Gain pot, +- trim by gain pot
	Save Parameters and Re-Start	No action needed

Before installing **Picloc-TR** in your camera mount, it is very important that you familiarize yourself fully with the functions, responses and setting up of the unit.

Initial familiarization is best done by connecting a spare servo, that is not mechanically attached to anything (for safety purposes), and preferably one that can rotate beyond +- 60 degrees. The default limit for the servo movement is +- 90 degrees. Therefore, it is advised to use a servo that can mechanically travel this amount.

Ensure that you fully understand the programming procedure and familiarize yourself with the menu structure and operation of the device.

If the servo is mechanically connected to a device, it can overdrive any items attached to the servo or even the servo itself by excessive travel. Therefore act very cautiously and only in a safe environment.

## 1.6) Planning Ahead

Before connecting, it is a very good idea to plan ahead and select which channels are going to be assigned to **Picloc-TR**.

The basic requirements are two channels from your radio control receiver to each **Picloc-TR**



### Example: TILT

One channel is assigned to control the slewing angle / position and this should be one of your transmitter sticks. The second channel required is used as a gain channel, much like a model helicopter gyro. The gain channel is also your means to communicate with the unit during the setting up and programming procedure during setup. It is also your goto home / stop function, if the gain control is programmed as a mix to centre commanded by a switch from your transmitter. Refer to your Radio Control system's user manual on details of how to program a mix on your transmitter.

Six separate channels are preferably used to control a 3 axis mount.

My personally preferred solution on a Mode2 Radio Control ( throttle on Left )

:

Pan Axis (Slew) = Aileron  
Tilt Axis (Slew) = Elevator  
Roll Axis (Proportional) = Rudder

Ideally, an 8/9 channel computer radio control system that has 3 sliders or rotary knobs is required. Normally, 3 mount control slewing channels are on joystick, and the respective gain channels are on sliders/knobs.

It is preferable to have different gain channels for each **Picloc-TR**, since each unit may need different values on the gain channel for correct operation, sometimes even in opposing directions.

This is because of different mechanical or inertia properties of your mount's roll and tilt axis and/or different servo mechanical arrangements.

However, notwithstanding the above, the function (menu 3) allows all parameters to be stored in the non-volatile flash memory of the device during configuration of the unit.

If auxiliary available channels on the radio control system are at a premium, you can access menu 3 to store all parameters when ready.

Therefore, one can leave the **GAIN** channel disconnected from the receiver and operate only using the control stick.

However, with this method, you will not have online control over the system's gain, and subsequently lose the function of auto centering (home) or stop (menu 11), when the gain is toggled to neutral on a TX setup with mixing.

After fully installing Picloc-TR, it can operate even autonomously with only a servo and a battery power connected.

Therefore, the unit is also capable of standalone operation.

## 1.7) Safety when configuring Picloc-TR

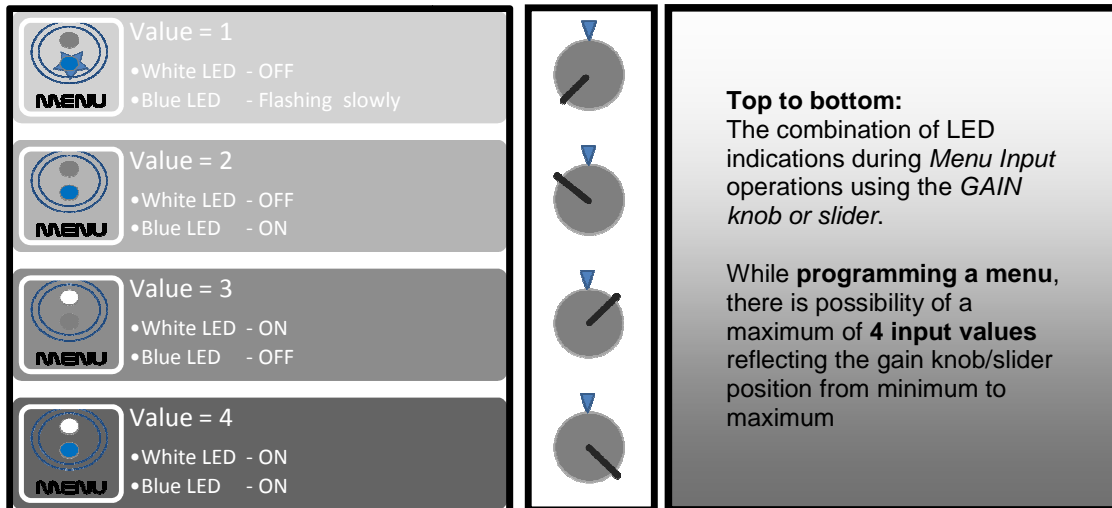
- A **power switch** inserted between the battery source and the receiver is an **Absolute Necessity** when **setting up Picloc-TR** in your camera mount.
- Never attempt to use the unit without a power switch.  
**Reason:** Reversed gains, or other user errors during setup and installation may result in the mount getting out of control really fast!! With high powered servos, your mount can also be dangerous to cables, even more seriously.. Fingers!!  
Consider flying a model helicopter with a reversed gyro setup!!

For safety reasons, keep your finger on the power switch during the initial stages of installation, and gain selection, and be always **Very Focused** on what you are doing.

- **Turn off immediately** if you see that the mount is getting out of control.  
Revise the situation, reason out why and what happened, then take necessary actions, then try again.
- If a low power laser pointer is available, it might help you to install the unit on the camera mount while setting up ( Only when confident that your mount + **Picloc-TR** is working well ), letting you observe the tightness of the corrections that **Picloc-TR** gives to the servos, and how it responds to the control and physical movement.
- The laser beam will enable you to see the response of the mount from the movement of the red dot on a wall in front of you, while it gives us better feedback on how to tune the unit for maximum performance. Specifically used for Menu's 3 and 4.

NB. As a precaution, **never look** into the laser beam, but use the laser as a projection method of the camera direction or the camera mount's angular movement.

## 2.1) General Setup – Gain knob/slider function during Setup Menu



Attention: If you notice that the gain control lights up the LED's in reverse sequence to what is described in the above diagram during programming, Please reverse the direction of your gain channel from your transmitter's menu to conform to diagram above.

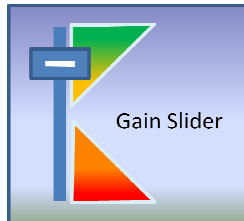
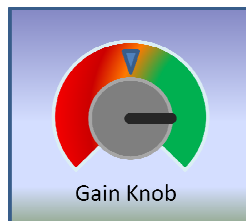
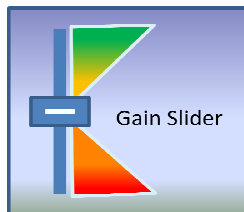
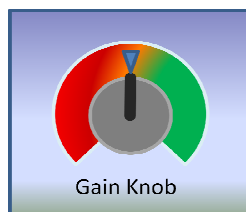
Follow your transmitter's manufacturer's instructions.

**NOTE:** The above LED sequences are relative to a Menu which has 4 options.. eg MENU 10.1  
For Menus that have only 2 options, Blue = option 1, White = option 2 .. eg MENU 10.2

## 2.2) General Setup – Gain knob/slider function during normal operation

Gain multiplier selection is determined by observation, trial and error.

The selection depends on many variables such as servo speed, gearing ratio, camera mount inertia.



It is preferable to start with the lowest value of Gain, which corresponds to the Gain knob or Slider being halfway through its travel.

The criteria for its selection, is aiming to have the maximum amount of gain, with your camera mount starting oscillation somewhere between 50% and 80% of travel about the midpoint of your gain channel

While in normal operation as a gain control or in Menu 4 and 5, the channel behaves as a centre zero control. Its position, in relation to the midpoint becomes the direction or reverse of the gain control value.

## 2.3) General Setup – MENU Button

- 1) Switch On Transmitter
- 2) Switch On Receiver
- 3) If using 2.4GHz Radio Control systems, follow the manufacturer's recommendations.
- 4) If the Menu Push-Button switch is not pressed, your **Picloc-TR** will continue to load its memorized files for normal operation.
- 5) If you are setting up for the first time, make sure that when powering up, your finger is already pressing the **MENU** push-button before applying power to your receiver. This will enter the unit into programming and setup mode.
- 6) During the time that the button is held pressed, the device will flash its LED lights consecutively. There are two LED colors Blue and White. These LED will flash sequentially. Each quick sequential flash of the 2 LED colors is followed by a blank period of 1 second. This is meant as one Flash.
- 7) Count the number of Flashes, and when the desired menu count is reached, release the button. The device will then enter the selected menu.

The values of LED indications during *Menu input* operations using *GAIN knob/slider* is shown above in page 6, item 2.1.

While inside a menu, there is a maximum possibility of 4 input values reflecting the gain knob/slider position from minimum to maximum.

## 2.4) General Setup – Sensor Calibration

**Picloc-TR** is placed facing UP on a flat, horizontal surface. The **CTRL** (control) and **GAIN** channels are connected to your receiver's selected channels. The channels used to control **Picloc-TR**, should ideally remain the same as those intended for use later in your camera mount.

The connections between **Picloc-TR** and your receiver use a female to female servo lead (not supplied). You need two such leads per unit for initial sensor calibration, and also for full operation.

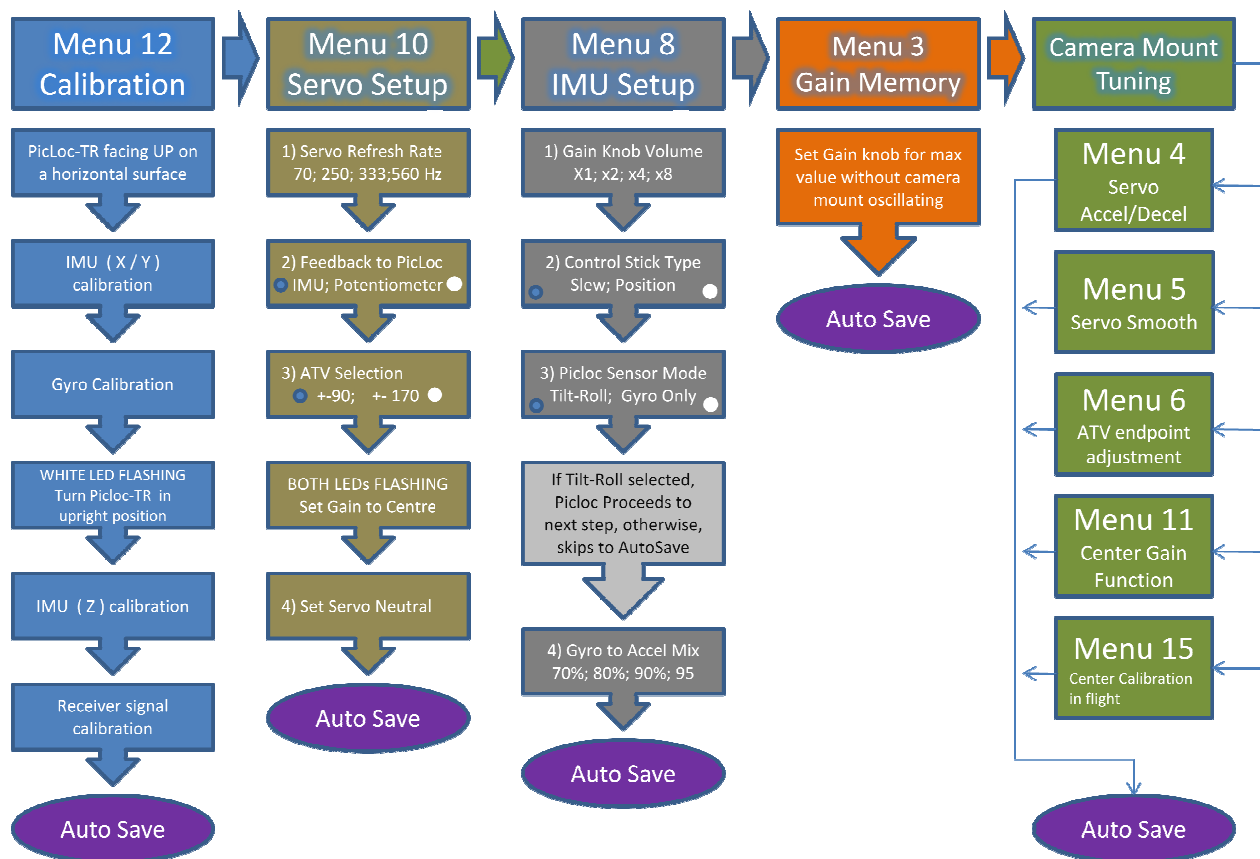
Switch on your transmitter, and make sure that the selected channels are free from any mixes. Make sure also that the control channel and gain channel are in centre position, even from the transmitter's sub-trim and trim menus. Please refer to your transmitter manufacturer's user manual if in doubt.

- With **Picloc-TR** facing up, switch on your transmitter and receiver WHILE holding down the **MENU** Push-Button.
- Count 12 sequential LED flashes
- Release on the 12<sup>th</sup> flash. An internal counter of 4 seconds will now start.
- Do Not Touch the unit during calibration.
- **Picloc-TR** will start flashing both its LED's in a fast manner. During this time, it is calibrating the accelerometer's X and Y axis, and the Gyro axis.
- **Picloc-TR** will then flash the white LED when ready from this calibration.
- Re-Position the unit so that the text is horizontal, while the arrow on the front panel is pointing vertically down.
- Press the **MENU** Push-Button when ready.
- **Picloc-TR** will start flashing again both its LED's in a fast manner. During this time, it is calibrating the accelerometer's Z axis and reading the receiver's radio control information.
- When ready, it will auto save the measurements done, and re-start normally.

If you now connect a servo to the unit, dial in some gain from your transmitter, and the servo should be in neutral position if the unit has remained in the last position. If you turn **Picloc-TR** by hand, the servo should respond proportionally.

## 2.5) General Setup – Workflow Diagram

# Setup and Programming Workflow



When IMU is calibrating (MENU 12), **Picloc-TR** will load the following values as a factory default:

Menu4 : Accel/Decel = 0

Menu5 : Smoothing = 0

Menu 6 : ATV +-90 Degrees

Menu 8 : x2 Gain

: Slow

: Gyro/Accelerometer mix 70%/30%

\*Menu 9 : Gyro Neutral Adjust = 0 (use only in Pan Mode)

Menu 10: 77Hz (standard servo refresh)

: **Picloc-TR** is mounted on axis that is being controlled (therefore it is its own angle sensor)

: Rotation Limiter +-90

: Neutral = 0 (1520us centre +-3%)

Menu 11: Goto Home type = soft return to Horizon.

\*Menu 16: Gyro Calibration on startup = Yes

(\*) added March 2010 in Firmware TXM\_0045\_01\_PI.hex



## 2.6) Step By Step Procedure – Picloc-TR Setup [-TEXT-] \_ Servo

- The following assumes you have **already calibrated** your **Picloc-TR** as described in **Section 2.4)**
  - Make sure you have the Workflow chart – Page 8, item 2.5) next to you.
  - Switch On your Transmitter.
  - Verify that at this point, your transmitter does not have any mixing enabled on the channels connected to your unit.
  - Press and hold **Picloc-TR MENU** Push-Button, then, apply power.
  - The two led's will start flashing sequentially. Each two quick consecutive flashes followed by a space indicate one count from the Main Menu list.
  - The first Menu you need to go to is the **Servo Configuration Menu** (10 flashes).
  - When 10 are counted, release button and the unit will load the first menu as per table – **Sub Programming Menu – Servo parameters Sub MENU, Item 1.5** on page 4. Refer to this table and follow down to the final item
  - The next steps are designed so that Picloc-TR is able to learn:-
    - 1) Servo Refresh Rate of connected servo
    - 2) If **Picloc-TR** is attached to the moving axis; else one axis out ( parent)
    - 3) ATV selection: +-90, +-170. If you Access Menu 6, ATV will be automatically selected as User Defined
    - 4) Set the neutral position of your modified servo, or neutral position of Standard servo.
  - During this time, the servo will not be active to any commands from **Picloc-TR** until the final sub menu – Servo Neutral ,comes up.
  - Use your gain knob or slider on your TX to input the values you want to select in each menu.
  - Follow the workflow chart table through the steps in **MENU 10**
  - When your selection is made, press briefly the button to take you to the next consecutive sub-menu.
  - The led's will flash the sub-menu next item number to confirm which menu is forthcoming.
  - Example, after sub menu 1 (servo refresh rate) is ready and **MENU** Push-Button is pressed briefly, both LED's will flash two times and menu 2 is loaded..
- **IMPORTANT** - The servo will now become activated, but **not** before centering your gain knob/slider on your TX. This is a safety feature during programming to eliminate the servo becoming active inadvertently. Up to now, **Picloc-TR** did not issue any steering commands to the connected servo.
- This menu is used for all servos, but especially useful for continuous rotation robotic servos that come pre modified by the manufacturer and therefore without any way of modifying their centre null point.
- If your continuous rotation servo has a large deadband (i.e. the neutral part where it doesn't rotate), take care to find the centre of the deadband where the servo is stopped fully.
- If the servo you chose is a non modified one (i.e. standard), then this menu offers a degree of adjustment of the servo centre. This can also be an opportunity to use this menu as a home position... NB... but only for servos with a feedback pot attached on their output shaft for proportional operation.
- When ready, press the **MENU** Push-Button on **Picloc-TR**, and the servo output will be switched off again.
- At this stage, **Picloc-TR** knows what servo is connected to it and how will the camera mount angle be calculated. It will now save the menu, reset itself and boot up again automatically if power is left on.
- Your choice now is to switch off, and re start selection of another menu.
- Later on, when confidence is gained in the menu system, you might opt not to switch off, since after a reset, the unit will again accept Menu push button presses as if when switched on from the switch.
- As from firmware version TXMENU\_2x\_0042, you can call your desired Menu even with the unit switched on, while operating. The servo signal is stopped during Menu accessing, and is maintained without any signal during all menus that do not require the servo to be functioning. This forms part of the safety features built into the unit.

## 2.7) Step By Step Procedure – Picloc-TR Setup |-TEXT-| \_ IMU

- Next is the **Configuration of the IMU electronics**, and therefore the way that angular position is measured.
- Power ON, and keep **MENU** button pressed for 8 flashes.
- When 8 flashes are counted, release button and the unit will load the first menu as per table **Sub Programming Menu – IMU parameters Sub MENU – Item 1.4** on page 4
- The next steps are arranged so that Picloc-TR learns :-
  - 1) Gain control sensitivity (to make up for different servo speeds, gearing or belt reduction),
  - 2) Type of stick response (slew / proportional position). During this Menu, if the LED's start flashing fast, you will not be able to continue further unless you sub-trim your control stick channel to the position where the fast flashing stops.
  - 3) Normal IMU operation with Gyro+Accelerometer or Gyro Only for PanLok
  - 4) Gyro/Accelerometer mix. This menu appears only if (3) Gyro+Accelerometer is selected.

The selections for the IMU menu relate to many aspects of mount control.  
Gyro/Accelerometer mix selection should reflect the type of control that you need.

- With a high Accelerometer mix e.g. 70/30, the stabilization of your mount will be influenced by acceleration, whether axial or centrifugal.
- With the lowest value accelerometer mix e.g. 95/5, the effect of short term accelerations will affect the stabilization to a much lesser extent.
- It is best to find your preferred value by experimentation.
- As a guideline, for smooth flying, a higher percentage of Accelerometer (70/30; 80/20 or 90/10) will not degrade performance. If your flight is more aggressive, then select the highest gyro mix available (95/5).
- For best stabilization results, all 3 axis need to be stabilized.

## 2.8) Mounting Picloc-TR on your camera mount

With sensor calibration ready, Servo menu and IMU menu programmed, Operation is verified by connecting a servo and moving the unit by hand.

With satisfactory operation, it is now time to attach Picloc-TR to your camera mount axis.

Mount the plastic enclosure with the longest side of the plastic case horizontal.

The text on the front panel should be also horizontal, with the arrow pointing straight down.

The front panel should be upright.

This orientation counts for both ROLL and TILT applications.



If your camera mount has severe vibration, correct operation of Picloc-TR cannot be guaranteed.

Try your best to isolate vibration from reaching the camera mount.

If more mass is placed on the isolated side, vibration isolation is enhanced. e.g. Batteries add more mass to the system, therefore lowering its natural resonant frequency.

### 3.1) Setting up Gain direction

- Switch on your system.

- **THIS IS A VERY IMPORTANT TIME TO PAY EXTRA ATTENTION: THE CAMERA MOUNT WILL EITHER LEVEL BY ITSELF OR ELSE DEVELOP POSITIVE FEEDBACK AND WILL START TO ROTATE ENDLESSLY**

- Picloc-TR will start up and be ready for action within 3 seconds. During this time, it is **VERY** important to have one hand on the power switch, and the other on the gain control of your transmitter. If the mount levels by itself, then the gain is on the correct side from neutral for normal stabilizing operation.
- If the mount goes rapidly out of balance and start rotating seemingly without control, it means that the gain control should be on the other side of neutral. If you feel confident, you may quickly turn the gain to the other side, and Picloc-TR should bring the mount back to horizontal. However, If you do not feel up to it at this point, just switch off, do the required change in the gain setting from your TX. ..eg. if you had +3 gain, this time choose -3. Switch on again, and the mount should go to horizontal by itself if the gain orientation is on the proper side.
- You can now adjust the gain setting to maximize the performance of the IMU.

**We are here looking for as much gain as possible, without the camera mount going into oscillation.**

- Please note that this gain value is dependent on the inertia of the camera mount plus the inertia of the camera itself. Please make sure that your camera is mounted very well to the mount. Any play will immensely degrade performance due to perceived "backlash" by Picloc-TR
- You will notice that if advanced too much, the mount will start to oscillate wildly, therefore back off the gain control input, and the mount should start behaving normally again. Take a note of this gain setting and write it down on a paper so that you will mentally and visually remember it.
- When happy with correct gain, switch off the unit, but DO NOT alter the gain setting from the transmitter. We need to memorize this value for the forthcoming menus.
- Therefore we need Menu 3. Press the push button, switch on again, and count 3 flashes, and release. Picloc-TR will store the value of the present Gain setting and re-start.

**Menu 3 is a very important step.**

**If you skip or forget this menu, all tuning menus referred to further on, will not work, or work on the last memorized value of this menu.**

- Now is the time to start optimizing the tuning using the menus 4,5,6 and 11.
- Follow Workflow chart – Page 8, item **2.5**).
- After saving, the unit does a soft reset, and goes through the bootup sequence, this time loading also the memories you have just saved.
- By Now, you should have a camera mount that is stabilizing quite well against movements applied to it, but perhaps a bit sluggish.
- If not, please analyze whether you need more gain by selecting a higher multiplier, or else need either a faster servo or else less gear/belt reduction ratio.

### 3.2) Step By Step – Accel / Deceleration, Servo Smooth

- Now it's time to start optimizing the response of Picloc-TR together with your mount.
- Therefore, the menu you should select is Menu 4... Acceleration/Deceleration of servo.
- Switch Off, and On again and count up to 4 LED counts to bring you to Menu 4
- There is a **safety feature** that will not let the unit become operational **unless the gain is centered**.
- During this waiting time, both LED's are flashing fast together. This safety feature will eliminate the chance of forgetting the gain in a high setting from the previous menu and getting the mount out of control.
- Once zeroed, the two LED's will turn on continuously, and the unit will start functioning using the gain memorized from last Menu 3.
- The Gain control now effectively becomes the acceleration/deceleration control. It is a centre zero control and the opposite side of neutral on the gain knob/slider gives inverse value.
- Move Gain control until the mount starts to oscillate with a high frequency. Then back off slightly.
- Higher levels are normally needed for larger cameras with high inertia, whereas smaller inputs are needed for lighter cameras. The LED will flash faster as the gain command is advanced towards maximum.
- You will notice that the response tightens up a lot when the control is advanced, while too much of this value, and the mount will oscillate and vibrate heavily, but will remain in the same control zone.
- When you think you have your best setting, (here having the laser projection method really helps!!) you may press the button again, and this accel/decal value is added and stored in memory.
- Now you may either switch off and on again, otherwise you may keep the button pressed because the unit would have just reset itself, and start counting the menu flashes again from zero.
- Next Menu you are requested to optimize is Menu 5... This is the smoothing control.
- Once again, release button when you have counted up to 5, then you will have to Zero the gain control on the transmitter so that the unit becomes active. Otherwise LED will flash.
- The smoothing control works both ways of neutral, depending on your camera Inertia.
- When optimized, you can press again the push button, and the unit will save this setting together with all previous and reset itself, and get ready to boot up.

### 3.3) Step By Step - ATV's, Goto Home parameters

Only program the following menus when satisfactory operation is obtained in the above menus.

- With **Asymmetric ATV**, you can set the end limit that the mount will be allowed to travel. This depends on whether you have selected continuous rotation or servos with feedback potentiometer (or unmodified servos).
- Load Menu 6 using the same process as described for the previous menus.
- After centering the gain knob/slider on your TX, the LEDs will stop flashing and will light up fully at center (like previous menus 4 and 5).
- This action will bring ATV high and ATV low to the current mount position.
- Now, using your transmitter stick, command the mount axis away from centre so that you can start inputting your chosen ATV's.
- The servo will now become operational. When moving your TX stick, the mount will move and the LED's will flash accordingly.
- You will notice that when you move the mount to one direction, both led's light up, while when moving the reverse direction, only one LED will be lit.

Explanation:

- When Both LED's are ON, the unit is registering high ATV and is giving the low ATV the same value.
- When Single LED is ON alone, will Picloc-TR be registering low ATV
- Once you maneuvered the camera mount to your desired end points, you will notice that in between the Low and High ATV's, the led's do not light. They will flash only when either ATV value is updated or surpassed.

- When happy with the range of travel needed, press the menu button once more and the unit will save these ATV settings and discard the previous default values in obtained in Servo menu (10).
- Note that these new ATV values are the actual IMU measured angles (n relation to gravity).
- If for some reason there is an offset (e.g. a big shock to the IMU, a High G turn, or a sudden turn while in flight), your ATV values are then in relation to this offset, that is where the IMU thinks its position is right now.
- Normally, the unit will self align itself again to the previous position depending on the gyro/accel mix selected, unless it is tilted more than about 60 degrees in relation to horizon... in both tilt and roll. This is a known bug that I'm still working on.
- The camera mount can be brought back to home position by reducing the gain to zero or by setting up a switch on your TX to bring the Gain to the centre value.
- By flicking this switch, you will notice that your camera mount goes to horizon, while still maintaining stability.
- This brings us to the final tuning menu - **Goto Home type**.
- Load Menu 11 using the same process as described for the previous menus
- Two options in this menu.
  - 1) Picloc drives the mount to home position when TX Gain switch is toggled ( Blue LED)
  - 2) Picloc Neutralizes servo, freezing the mount if in servo is Continuous Rotation modified.
 Choose your selection from the above two options.

Attention: if not using a Pan Stabilization device like Picloc-TR in Panlock mode, or a helicopter tail gyro, a high rate of turning will cause the Tilt and Roll axis to skew because of centrifugal forces affecting the gravity reading of the accelerometer.

Your Options for this menu are here:

- If using Pan stabilization, set Goto Home to Option 1 (Blue LED) because if there is unlikely to be any fast panning motion, and therefore, no large disturbance to the IMU measurement. However flicking the gain switch on your TX will bring the mount back to home position, should the need arise.
- If **not** using Pan stabilizing of any kind, then choose Goto Home Option 2 ( White LED).  
When sport flying your helicopter, you can flick and Hold the Gain switch on your TX ( Gain = zero), enabling you to make quick turns with your helicopter, without negatively affecting the stabilization, because the IMU will hold last attitude while the TX Gain switch is held.

With this menu chosen, the final press of the menu button will save all values again to flash memory, and Picloc-TR will self reset.

You can still go though the menu's at any time, and update the values. This counts especially for Menu 4 and 5, where most of the tuning needs to be done to get high performance.

Setup other axis using the same procedure

### 3.4) Flying your camera mount

Observe whether your camera mount is operating comfortably.  
Fly your helicopter or get someone to fly it for you.  
If you have your gain channels still connected, adjust accordingly if needed.

### 3.5) Trimming the camera mount's default horizon or tilt while flying

No isolation absorber is 100% efficient, and some vibrations that affect Picloc-TR's stabilization may be present. This will be noticed as a difference in the default angle being different from when standstill with no vibrations and operational vibrations that still go through to the sensors.

**Menu 15** is designed to operate Picloc-TR off its stored Gain value (Menu3), while leaving the gain channel free. We therefore use this channel to command the unit to store the current IMU measured position while flying, so that it becomes the default value. For the following, you need to have setup your transmitter to bring your selected gain control channel to neutral at the flick of a switch.

- Load Picloc-TR into **Menu 15**
- Get someone to fly your helicopter into a stable hover
- Observe any continuous deviations from horizon.
- Command the mount to your desired default position
- Flick switch to bring gain to neutral
- Picloc-TR will save this position while momentarily stopping lighting up both LED's and switching off the servo for the time it takes to save the values ( 0.1 second)
- Bring helicopter down from hover and switch off camera mount for a few seconds
- Switch on again, and the camera mount should default to a skewed setting in relation to how much measured vibration it has measured in the previous exercise.
- While in a stable hover, Picloc-TR should assume the previously recorded position.

If not satisfied, repeat above procedure.

### 3.6) Picloc-TR Standalone Operation

Picloc-TR is capable of operating autonomously using the data stored from setting up the unit.  
For standalone operations, it is sufficient to connect only the power source to Picloc-TR, and the servo on which the tuning procedure was carried on.  
The battery can be plugged in either the **CTRL** or **GAIN** socket.

## Attention:

Be extra careful when connecting your servo leads and battery power to the unit.

Reversing your power supply direction will damage your Picloc-TR and render the unit unusable.

If the cause of a reported fault is determined to be originating from a polarity reversal of the power supply connected to Picloc-TR, the unit will not be covered under the Limited Warranty.

## Specifications:

Unit Description	Microprocessor controlled Camera Mount Stabilizer using a 1DOF MEMS sensor IMU.
Unit Control	Radio control system using Futaba or JR (or Compatible systems with 1500us center)
Sensors	1x MEMS Gyro sensor with 300 degree/sec, 1x 3 axis MEMS Accelerometer
Maximum G	2G while in operation.
Output	PPM control to standard or modified R/C servos from 77Hz to 560Hz inclusive
Supply Voltage	4.8volts min to 6volts max. (7.4v HV support is enabled by taking off an internal jumper.) Make sure your receiver supports HV operation.
Unit Dimensions	36x28x19mm (LxWxH)
Unit Weight	40 grams
Input channels	Futaba/JR compatible. 2 channels ( <b>CTRL</b> and <b>GAIN</b> )
Output:	1x Futaba/JR compatible output. Servo receives same voltage as input from receiver.
Internal processing resolution	- 32Bit
Operating Temperature	0-40 Celsius (non-condensing)

### ATTENTION:

Specifications subject to change without notice.

Picloc-TR may not be used to control/stabilize any vehicle carrying Humans or animals

Picloc-TR may not be used to control/stabilize any flying surfaces.

Picloc-TR may not be used to c control/stabilize or give assistance to control moving vehicles or models.

## Support:

Questions regarding the Picloc-TR can be sent via email. [gmamo@hotmail.com](mailto:gmamo@hotmail.com)

## Legal:

The design of the Picloc-TR is Copyright © 2009 George Mamo. This includes the electrical design, the circuit board layouts and all software designed for the system. You may not reverse engineer, decompile, or disassemble any Picloc-TR software, nor may you reverse engineer the Picloc-TR hardware for any reason.  
All Trademarks of their respective Owners.

## Limited Warranty:

Picloc-TR is warranted to be free from defects in materials and workmanship for a period of one year from the date of purchase. This limited warranty covers normal use and does not cover abuse or use not in accordance with this manual.

Under no circumstance will the seller be responsible for any incidental or consequential damages, which may occur during the legal or illegal use of this product, or as a result of the product's failure to perform.

In all cases, the customer's sole remedy for a product failure is limited to the repair or replacement of the product.



## 4.0) Firmware Releases:

January 6<sup>th</sup> 2010: TXMENU\_2x\_0042.hex

This firmware upgrade, has the following additions and bug fixes:

- 1) Menu's are now accessible even when the unit is switched ON and stabilizing. For reasons of Safety, while the **MENU** button is being pressed, and when the Menu accessed does not need the servo to be active, the servo output signal is switched off automatically by Picloc-TR.
- 2) The Slew mode has been improved, resulting in smoother and more controllable movement.
- 3) The extremes of servo travel have been reduced to comply with certain servos that did not like the extra wide resolution that Picloc-TR was outputting in previous firmware versions.  
Servo output pulse limit is now 860uS - 2180uS.
- 4) Added Menu 9: this is an "online" adjustment of the servo's neutral. This is particularly useful to stop any slight drifting if using Picloc-TR as you Panlock device for your PAN axis. This menu works just like Menu10.4 ( Set Servo Neutral)

March 6<sup>th</sup> 2010: TXM\_0045\_01\_Pi.hex

This firmware upgrade, has the following additions above and including the above 4 additions

- 1) Added Menu 16:

During startup, you have a selection whether Picloc performs a Gyro calibration ( the sensor that is mostly susceptible for temperature differences) or not.

By Default, startup Gyro calibration is set to ON, on each power up.

Menu 16 offers two options:

Blue ( no Calibration on startup ).. i.e. works from the cal values stored in memory from the last Menu 12 or Menu 1.

White (Gyro calibration every power-up)

Press **MENU** button when ready to Save you selection (as usual).

- 2) Menu 11:

When Freeze is selected in this already existing Menu, Picloc will now allow manual slewing of the camera mount ( if fitted with continuous rotation modified servos )

Picloc now allows a very small percentage of stick input, to be able to slew the mount manually, rather than a Freeze.

- 3) Another major change is the way the Gyro/Accel mix is done internally in Picloc.  
This has been revised, and now Picloc offers more immunity to lateral accelerations.  
This means that on transitions, Picloc is able to hold better to its direction.

For this reason, and also for the new menus added, you are kindly requested to do a Menu 12 (calibration and default settings) as soon as you have loaded the new firmware.

Of course, as usual, one must have at least CTRL connected to your receiver, with your radio system switched ON, so that the incoming pulses are measured and the stick centre position is memorized as well.