



D-90046

**OPERATION and MAINTENANCE MANUAL
MILITARY ALTIMASTER
MA-10
(30,000 foot COMPRESSED SCALE: FP-02093)**

January 3, 2008

REV 12



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1. **DESCRIPTION**

ROBUST stepper motor mechanism

0-40,000' dual scale operation

Use in simple "zero" mode for training, or preset DZ altitude and DZ barometric pressure for operational use

Easily accessible batteries (Type AA Lithium)

Electro-luminescent dial face

Robust aluminum frame

Waterproof down to 6 feet of water

One piece wrist strap, no tools required to change

-40 to +80 deg C operation

Weight and dimensions are smaller than the original MA2-30 military Altimaster design.

The MA-10 is designed for high-altitude (40,000'+) military operation.

For training purposes the instrument has a simple zero function. For operational use the DZ altitude and barometric pressure may be preset, the MA-10 will display the correct AGL altitude above the DZ.

The unit is based on a stepper motor design and is extremely robust; dropping the instrument will not damage the mechanism.

The embedded software is updateable.

2.	SPECIFICATION	
Model	MA10 (FP-02093)	
Mechanism	ELECTRONIC - solid state pressure sensor with ROBUST stepper motor driven pointer	
Scale	Dual or Linear (programmable to customer requirements)	
Feet per pointer revolution	30,000' (programmable to customer requirements)	
Max. Operating Altitude	40,000 feet MSL +	
Ability to preset remote DZ altitude and barometric pressure	Yes DZ altitude and pressure may be set at anytime before exit without loss of accuracy.	
Case Material	Aluminum	
Dimensions	3.27" x 3.20" x 1.37" 83mm x 81mm x 34mm	
Weight	9.1 oz (255g) (including batteries and wrist strap)	
Lens Material	High impact 1/16" thick extruded lexan	
Lens Replacement	Supplied with self adhesive lens protector - field replaceable. Lens is factory replaceable.	
Operating Temp Range	-40 to +80 deg C -40 to +172 deg F	
Dial Face	Black print on electro-luminescent white face, with yellow warning sector (3000' - 2500') and red warning sector (2500' - 0')	
LED status indicator	Three status modes: On/Off/Sleep	
Dial face illumination	Electro-luminescence	
Smart Light Monitor	LED status indicator intensity is adjusted to ambient light level and turns off when backlight is activated. Backlight is automatically turned on in low light conditions when MA-10 is active.	
Back-up Illumination	Not Required	

<p>Batteries Required</p> <p>Battery Life</p> <p>Low Battery Warning</p> <p>Automatic power saving mode</p> <p>Automatic Shut-off</p> <p>Tools required to change batteries or wrist strap</p> <p>Waterproof Depth / Duration</p> <p>Metric Available?</p>	<p>2 x AA Lithium Batteries. (Regular AA batteries may be used but will result in shorter battery life)</p> <p>100 Hrs +</p> <p>Battery state indication during self test</p> <p>The system will turn off the motor and backlight if the altitude is below 7000' MSL and there is no significant change in altitude for a period of 30 minutes. The Power On LED at the 12 o'clock position will flash to indicate power saving mode. If altitude activity is sensed, the unit will automatically revert to full function.</p> <p>System shuts down after 18 hrs from turn-on, all settings are retained and the system may be turned on at any time without loss of information or accuracy.</p> <p>None</p> <p>6 feet / 1 hour</p> <p>Yes</p>
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3.

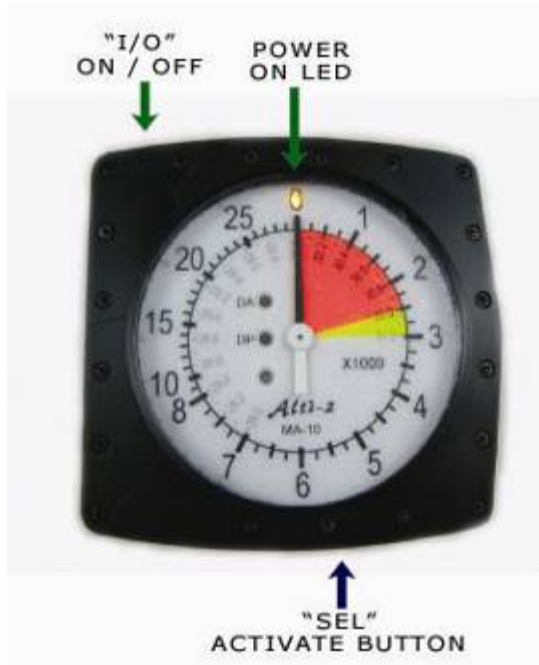
The image shows a square-shaped altimeter with a circular dial. The dial has a scale from 0 to 25, with a 'X1000' multiplier. The needle is pointing to approximately 10. There are five buttons on the device. Four buttons are at the top, labeled 'I/O' ON/OFF, 'PRG' DZ SET UP, 'DWN' DOWN, and 'UP ZERO'. A fifth button is at the bottom, labeled 'SEL' ACTIVATE BUTTON. Green arrows point to the top four buttons, and a blue arrow points to the bottom button.

BUTTONS

The MA-10 Altimeter has a total of 5 buttons.

The single button marked "SEL" near the 6 o'clock position simply activates the other buttons. This eliminates the possibility of accidental button pushes.

4.

**TURN ON/OFF**

The needle parks at approximately 22,000' when the unit is off.

To turn the unit on press and hold the Activate Button marked "SEL" and then press ON/OFF Button marked "I/O".

The needle will first show battery status,
7 - 3 (White) = OK
2.5 - 3 (Yellow) = Be ready to change battery
<2.5 (Red) = Change battery before next jump



The needle will move to the current altitude / pressure.

The Power On LED at the 12 o'clock position will be illuminated.

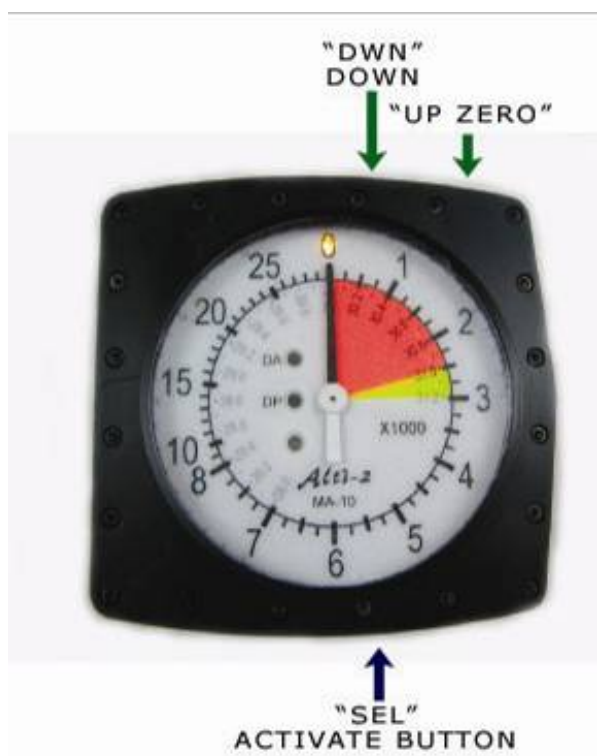
The Power On LED intensity adjusts automatically based on ambient light levels. In very low light conditions the LED is turned off to prevent loss of night vision and the electro-luminescent backlight indicates that the unit is active.

NOTE:

If the needle pauses at 6 o'clock position this indicates that DZ Altitude and Pressure have been set.

5.	<p>POWER ON LED WILL FLASH TO INDICATE POWER SAVING MODE</p>  <p>The image shows the ALTI-2 altimeter with a green arrow pointing to a small yellow LED at the 12 o'clock position. The altimeter face has a scale from 0 to 25 (x1000) and a red/yellow warning zone between 1 and 3. The text 'ALTI-2 MA-10' and 'X1000' are visible on the dial.</p>	<h3>POWER SAVING MODE</h3> <p>The system will turn off the motor and backlight if the altitude is below 7000' MSL and there is no significant change in altitude for a period of 30 minutes.</p> <p>The Power On LED at the 12 o'clock position will flash to indicate power saving mode.</p> <p>If altitude activity is sensed, the unit will automatically sweep the pointer one revolution and revert to full function.</p>
6.	<p>"UP ZERO"</p>  <p>The image shows the ALTI-2 altimeter with a green arrow pointing to the 'UP ZERO' button at the top and a blue arrow pointing to the 'SEL' button at the bottom. The altimeter face is identical to the one in the previous image.</p> <p>"SEL" ACTIVATE BUTTON</p>	<h3>ZERO TO CURRENT ALTITUDE</h3> <p>For training jumps when the Departure Airfield and the target DZ are the same location, zero the altimeter when standing on the DZ.</p> <p>To zero the altimeter, momentarily press the two buttons shown; "UP ZERO" & the "SEL" Activate Button.</p> <p>Do NOT hold the "UP ZERO" button; this will cause the set altitude to increase.</p> <p>NOTE: This action will clear any preset DZ altitude and pressure settings.</p> <p>NOTE: The manual zero altitude will be retained when the unit is turned off. The MA-10 acts like a mechanical altimeter, it will react to barometric changes and will need to be rezeroed when powered back on.</p>

7.



MANUAL DZ OFFSET

When the Departure Airfield and the target DZ are at different altitudes, the DZ Offset may be set manually.

To manually offset the altitude reading, press and hold the "SEL" Activate Button and then use the "UP ZERO" or "DWN" buttons to set the desired altitude.

The rate of pointer movement will speed up (this helps with larger offsets). If you release the "UP ZERO" or "DWN" button and continue to hold the bottom button, the rate will start slowly again when you press up or down.

NOTE: This action will clear any preset DZ altitude and pressure settings.

8.





IMPORTANT

When setting altitudes, ignore the compressed scale.

There is a barometric pressure graduation dot at every 250' and these may be used to set altitudes below zero feet.

The red arrows indicate the position of -1000, -2000, and -3000 feet.

9.	<p style="text-align: center;">"PRG" DZ SET-UP</p>  <p style="text-align: center;">"SEL" ACTIVATE BUTTON</p>	<h3>SET DZ ALTITUDE AND BAROMETRIC PRESSURE</h3> <p>When the Departure Airfield and target DZ are at different altitudes, the DZ Offset may be entered using the DZ altitude and form of barometric pressure called "Altimeter Setting".</p> <p>Step 1</p> <p>Press the two buttons shown ("PRG" & "SEL" Activate Button), the DZ Altitude set light (DA) will be illuminated.</p>
10.	<p style="text-align: center;">"DWN" DOWN</p> <p style="text-align: center;">"UP ZERO"</p>  <p style="text-align: center;">"SEL" ACTIVATE BUTTON</p>	<p>Step 2</p> <p>Use the "UP ZERO" or "DWN" buttons to set the altitude (feet MSL) of the target DZ.</p> <p>NOTE: This action will clear any preset Manual DZ Offset.</p>

11.

"PRG"
DZ SET-UP



"SEL"
ACTIVATE BUTTON

Step 3

Press the two buttons shown, ("PRG" & "SEL" Activate Button), the DZ Barometric Pressure set light (DP) will be illuminated.

12.

"DWN"
DOWN
"UP ZERO"



"SEL"
ACTIVATE BUTTON

Step 4

Use the "UP ZERO" or "DWN" buttons to set the barometric pressure (in Hg.) of the target DZ.

Barometric pressure is marked in grey numerals inside the scale.

WARNING:
WHEN OBTAINING THE BAROMETRIC PRESSURE ALWAYS REQUEST THE "ALTIMETER SETTING" FOR THE DZ. DO NOT USE THE ACTUAL BAROMETRIC PRESSURE (STATION PRESSURE) OR SEA LEVEL CORRECTED PRESSURE FROM THE DZ.

THE CURRENT "ALTIMETER SETTING" FOR THE DZ IN INCHES OF MERCURY (Hg) WITHIN 100 MILES OF THE INTENDED DZ MUST BE DETERMINED BY USING THE MOST ACCURATE METHODS AVAILABLE. IF THERE ARE NO AVAILABLE MEANS TO CALCULATE THE CURRENT "ALTIMETER SETTING", THE COMBAT SETTING OF 29.92 INCHES OF MERCURY WILL BE USED.

13.



Step 5

Press the two buttons shown ("PRG" & "SEL" Activate Button).

This completes the DZ setup and the altimeter is in RUN mode.

The altimeter displays the DZ Offset between your current altitude and the target DZ.

NOTE: Since your altitude is below 8000' AGL from the DZ, the scale is LINEAR, i.e. ignore the compressed scale.

NOTE: The DZ altitude and pressure settings will be retained when the unit is turned off.

14.






BATTERY REPLACEMENT

Step 1




Remove the wrist strap.

Locate the battery door lever.

Press firmly on battery door to release pressure on latch, and rotate latch 90 degrees past lever lock to unlocked position.

15.		<p>Step 2</p> <p>Replace batteries with 2 type AA lithium batteries.</p> <p>NOTE: Alkaline batteries may be used, however battery life will be shorter and the unit may not function if soaked to temperatures below -20 deg C.</p>
16.		<p>Step 3</p> <p>Press firmly on battery door and rotate latch 90 degrees past lever lock into locked position.</p> <p>Replace wrist strap.</p>
17.		<p>CLEANING AFTER SALTWATER SUBMERSION</p> <p>Equipment needed to clean MA-10 altimeters.</p> <p>Tap, bottled or filtered water.</p> <p>Two (2) clean containers.</p>

18.		<p>Step 1</p> <p>Fill two adequately sized containers (for the number of altimeters to be rinsed) with tap, bottled or filtered water.</p>
19.		<p>Step 2</p> <p>Remove wrist strap.</p> <p>Open battery compartment and remove batteries.</p> <p>NOTE: Do not reuse these batteries.</p>

20.		<p>Step 3</p> <p>With the battery door open, completely submerge altimeters in the first container and let soak for 10 minutes.</p> <p>NOTE: Be sure to remove any air pockets from the battery compartment.</p>
21.		<p>Step 4</p> <p>When soak time is completed, dunk the soaked altimeters at least five times in the same container.</p> <p>Shake off excess water by hand.</p>
22.		<p>Step 5</p> <p>Place the drained altimeters into the second container and again dunk at least five times.</p>

23.



Step 6

Place rinsed altimeters right side up with battery door open, on a stable surface to drip dry.

24.



CLEANING AFTER FRESH WATER SUBMERSION

Follow the procedure for "Cleaning After Saltwater Submersion" using one rinse container.

NOTE: The removed batteries may be reused.



D-90073

**OPERATION and MAINTENANCE MANUAL
MILITARY ALTIMASTER
MA-10
(12,000 foot LINEAR SCALE: FP-02096)**

January 3, 2008

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1. **DESCRIPTION**

ROBUST stepper motor mechanism

0 – 12,000' scale. **0-40,000'** operation.

Use in simple "zero" mode for training, or preset DZ altitude and DZ barometric pressure for operational use

Easily accessible batteries (Type AA - Lithium)

Electro-luminescent dial face

Robust aluminum frame

Waterproof down to 6 feet of water

One piece wrist strap, no tools required to change

-40 to +80 deg C operation

Weight and dimensions are smaller than the original MA2-30 military Altimaster design

The MA-10 is designed for high altitude (40,000'+) military operation.

For training purposes the instrument has a simple zero function. For operational use the DZ altitude and barometric pressure may be preset, the MA-10 will display the correct AGL altitude above the DZ.

The unit is based on a stepper motor design and is extremely robust; dropping the instrument will not damage the mechanism.

The embedded software is updateable.

2. SPECIFICATION

Model	MA-10 (FP-02096)
Mechanism	ELECTRONIC - solid state pressure sensor with ROBUST stepper motor driven pointer
Scale	Linear
Feet per pointer revolution	12,000' (programmable to customer requirements)
Max. Operating Altitude	40,000 feet MSL +
Ability to preset remote DZ altitude and barometric pressure	Yes DZ altitude and pressure may be set at anytime before exit without loss of accuracy
Case Material	Aluminum
Dimensions	3.27" x 3.20" x 1.37" 83mm x 81mm x 34mm
Weight	9.1 oz (255g) (including batteries and wrist strap)
Lens Material	High impact 1/16" thick extruded lexan
Lens Replacement	Supplied with self adhesive lens protector - field replaceable. Lens is factory replaceable.
Operating Temp Range	-40 to +80 deg C -40 to +172 deg F
Dial Face	Black print on electro-luminescent white face, with red warning sector (2500' - 0').
LED Status Indicator	Three status modes: On/Off/Sleep.
Dial face illumination	Electro-luminescence
Smart Light Monitor	LED status indicator intensity is adjusted to ambient light level and turns off when backlight is activated. Backlight is automatically turned on in low light conditions when MA-10 is active.
Back-up Illumination	Not Required
Batteries Required	2 x AA Lithium Batteries. (Regular AA batteries may be used but will result in shorter battery life.)
Battery Life	100 Hrs +
Low Battery Warning	Battery state indication during self test

	<p>Automatic power saving mode</p> <p>Automatic Shut-off</p> <p>Tools required to change batteries or wrist strap</p> <p>Waterproof Depth / Duration</p> <p>Metric Available?</p>	<p>The system will turn off the motor and backlight if the altitude is below 7000' MSL and there is no significant change in altitude for a period of 30 minutes. The Power On LED at the 12 o'clock position will flash to indicate power saving mode. If altitude activity is sensed, the unit will automatically revert to full function.</p> <p>System shuts down after 18 hrs from turn-on, all settings are retained and the system may be turned on at any time without loss of information or accuracy.</p> <p>None</p> <p>6 feet / 1 hour</p> <p>Yes</p>
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3.

The diagram shows the ALTI-2 altimeter with five buttons highlighted by arrows. From left to right, the buttons are labeled: "I/O ON/OFF", "PRG DZ SET UP", "DWN DOWN", and "UP ZERO". A fifth button, labeled "SEL ACTIVATE BUTTON", is located at the bottom center of the device. The altimeter face shows a scale from 0 to 11, with a red arc indicating a range from approximately 1 to 3 on the scale.

BUTTONS

The MA-10 Altimeter has a total of 5 buttons.

The single button marked "SEL" near the 6 o'clock position simply activates the other buttons. This eliminates the possibility of accidental button pushes.

4.

**TURN ON/OFF**

The needle parks at approximately 10,000' when the unit is off.

To turn the unit on press and hold the Activate Button marked "SEL" and then press ON/OFF Button marked "I/O".

The needle will first show battery status,
7 - 3 (White) = OK
2.5 - 3 (White) = Be ready to change battery.
<2.5 (Red) = Change battery before next jump.

The needle will move to the current altitude / pressure.

The Power On LED at the 12 o'clock position will be illuminated.

The Power On LED intensity adjusts automatically based on ambient light levels. In very low light conditions the LED is turned off to prevent loss of night vision and the electro-luminescent backlight indicates that the unit is active.

NOTE: If the needle pauses at 6 o'clock position this indicates that DZ Altitude and Pressure have been set.

5.

Power on LED
will flash when
unit is in power
saving mode



POWER SAVING MODE

The system will turn off the motor and backlight if the altitude is below 7000' MSL and there is no significant change in altitude for a period of 30 minutes.

The Power On LED at the 12 o'clock position will flash to indicate power saving mode.

If altitude activity is sensed, the unit will automatically sweep the pointer one revolution and revert to full function.

6.

"UP ZERO"



"SEL"
ACTIVATE BUTTON

ZERO TO CURRENT ALTITUDE

For training jumps when the Departure Airfield and the target DZ are the same location, zero the altimeter when standing on the DZ.

To zero the altimeter, press the two buttons shown; "UP ZERO" & the "SEL" Activate Button.

Do NOT hold the "UP ZERO" button; this will cause the set altitude to increase.

NOTE: This action will clear any preset DZ altitude and pressure settings.

NOTE: The manual zero altitude will be retained when the unit is turned off. The MA-10 acts like a mechanical altimeter, it will react to barometric changes and will need to be rezeroed when powered back on.

7.

**MANUAL DZ OFFSET**

When the Departure Airfield and the target DZ are at different altitudes, the DZ Offset may be set manually.

To manually offset the altitude reading, press and hold the "SEL" Activate Button and then use the "UP ZERO" or "DWN" buttons to set the desired altitude.

The rate of pointer movement will speed up (this helps with larger offsets). If you release the "UP ZERO" or "DWN" button and continue to hold the bottom button, the rate will start slowly again when you press up or down.

Note: This action will clear any preset DZ altitude and pressure settings.

8.

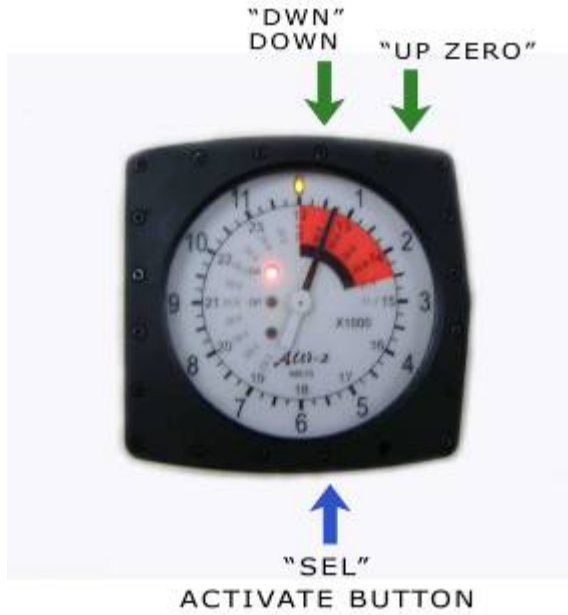
**SET DZ ALTITUDE AND BAROMETRIC PRESSURE**

When the Departure Airfield and target DZ are at different altitudes, the DZ Offset may be entered using the DZ altitude and form of barometric pressure called "Altimeter Setting".

Step 1

Press the two buttons shown ("PRG" & "SEL" Activate Button), the DZ Altitude set light (DA) will be illuminated.

9.



Step 2

Use the "UP ZERO" or "DWN" buttons to set the altitude (feet MSL) of the target DZ.

NOTE: This action will clear any preset Manual DZ Offset.

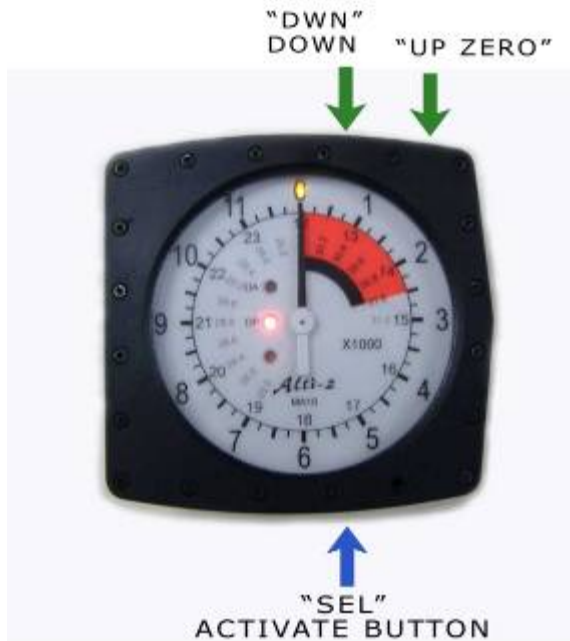
10.



Step 3

Press the two buttons shown ("PRG & "SEL" Activate Button), the DZ Barometric Pressure set light (DP) will be illuminated.

11.



Step 4

Use the "UP ZERO" or "DWN" buttons to set the barometric pressure (in Hg.) of the target DZ.

Barometric pressure is marked in grey numerals inside the scale.

WARNING:
WHEN OBTAINING THE BAROMETRIC PRESSURE ALWAYS REQUEST THE "ALTIMETER SETTING" FOR THE DZ. DO NOT USE THE ACTUAL BAROMETRIC PRESSURE (STATION PRESSURE) OR SEA LEVEL CORRECTED PRESSURE FROM THE DZ.

THE CURRENT "ALTIMETER SETTING" FOR THE DZ IN INCHES OF MERCURY (HG) WITHIN 100 MILES OF THE INTENDED DZ MUST BE DETERMINED BY USING THE MOST ACCURATE METHODS AVAILABLE. IF THERE ARE NO AVAILABLE MEANS TO CALCULATE THE CURRENT "ALTIMETER SETTING", THE COMBAT SETTING OF 29.92 INCHES OF MERCURY WILL BE USED.

12.



Step 5

Press the two buttons shown ("PRG" & "SEL" Activate Button).

This completes the DZ setup and the altimeter is in RUN mode.

The altimeter displays the DZ Offset between your current altitude and the target DZ.

NOTE: The DZ altitude and pressure settings will be retained when the unit is turned off.

13.



BATTERY REPLACEMENT

Step 1

Remove the wrist strap

Locate the battery door lever.

Press firmly on battery door to release pressure on latch, and rotate latch 90 degrees past lever lock to unlocked position.

14.



Step 2

Replace batteries with 2 type AA lithium batteries.

NOTE: Alkaline batteries may be used, however battery life will be shorter and the unit may not function if soaked to temperatures below -20 deg C.

15.



Step 3

Press firmly on battery door and rotate latch 90 degrees past lever lock into locked position.

Replace wrist strap.

16.






CLEANING AFTER SALTWATER SUBMERSION.

Equipment needed to clean MA-10 altimeters.

Tap, bottled or filtered water.

Two (2) clean containers.

17.		<p>STEP 1</p> <p>Fill two adequately sized containers (for the number of altimeters to be rinsed) with tap, bottled or filtered water.</p>
18.		<p>STEP 2</p> <p>Remove wrist strap</p> <p>Open battery compartment and remove batteries.</p> <p>NOTE: Do not reuse these batteries.</p>
19.		<p>Step 3</p> <p>With the battery door open, completely submerge altimeters in the first container and let soak for 10 minutes.</p> <p>NOTE: Be sure to remove any air pockets from the battery compartment.</p>

20.	 A hand is holding a black altimeter with a white dial and a red needle. The altimeter is positioned over a pink plastic container. The dial has markings for altitude and a red arc indicating a specific range.	<p>STEP 4</p> <p>When soak time is completed, dunk the soaked altimeters at least five times in the same container.</p> <p>Shake off excess water by hand.</p>
21.	 A hand is holding a black altimeter with a white dial and a red needle. The altimeter is positioned over a blue plastic container. The dial has markings for altitude and a red arc indicating a specific range.	<p>STEP 5</p> <p>Place the drained altimeters into the second container and again dunk at least five times.</p>
22.	 A black altimeter with a white dial and a red needle is lying on a white surface. The battery door is open, and the altimeter is positioned right side up. The dial has markings for altitude and a red arc indicating a specific range.	<p>STEP 6</p> <p>Place rinsed altimeters right side up with battery door open, on a stable surface to drip dry.</p>

23.

**CLEANING AFTER FRESH WATER SUBMERSION**

Follow the procedure for "Cleaning After Saltwater Submersion" using one rinse container.

NOTE:
The removed batteries may be reused.

Servicing

If the altimeter behaves abnormally or unusually, discontinue use IMMEDIATELY and return to Alti-2, Inc.

Alti-2, Inc.
1400 Flightline Blvd.
Suite E
Deland, FL 32724

Tel: (386) 943 9333

Fax: (386) 943 9303

e-mail: info@alti-2.com

Please be sure to include contact information such as Phone Number, Fax Number, and/or email address, and a description of the problem.

Status on your altimeter can be checked by contacting the Alti-2, Inc. Service Department, or by initiating a Request for Repair Status through the Alti-2, Inc. web-page.

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The Altimaster Dial Face design is a registered trademark of Alti-2 Incorporated

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