WARNING

Failure to follow the instructions outlined in this manual could result in the damage or destruction of the optic, its accessories, and/or bodily injury to the user.

WARNING

Under no circumstances should you look through the optic directly at the sun, laser light devices, or any other bright illumination source. Doing so could result in severe and/or permanent eye damage.

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Chapter 1

GENERAL DESCRIPTION & SPECIFICATIONS

1.1 Description

The **Tangent Theta model TT735P 7-35x56mm Rifle Telescope** (Fig. 1a) is a variable power telescopic rifle sight which may be mounted to a variety of firearms and that which may be adjusted or zeroed without the use of tools, using the TOOL-LESS RE-ZERO[®] feature.

The reticle is situated in the first focal plane, allowing reticle subtentions to remain constant over all magnification ranges.

The rifle telescope consists of a single piece main tube that encloses the optical components. All mechanical adjustments of the sight are controlled by the elevation and windage mechanisms at the top and right side of the tube. Illumination and parallax are controlled by the dial on the left side of the telescope tube. Magnification may be adjusted by the fluted ring forward of the eyepiece and diopter settings may be made at the rear of the eyepiece.

The device incorporates a 56mm objective lens and 48mm eyepiece, which provide excellent image quality in low light levels. It also provides for rapid target acquisition and identification at short, intermediate, and long ranges. The sight incorporates an LED for reticle illumination under low light conditions. The reticle consists of a cross hair with auxiliary stadia lines and dots to assist in shooting at various ranges.

1.1 General Description continued



1.2 Model TT735P Technical Specifications*

Feature	Specification
Magnification	7x-35x
Length	405mm
Width	103mm
Height	86mm
Weight	1230g
Tube diameter	36mm
Objective bell diameter	65mm
Objective lens diameter	56mm nominal
Evepiece diameter	48mm
Field of View @ 7x	3.1 degrees (5.41m @ 100m)
Field of View @ 35x	0.62 degrees (1.08m @ 100m)
Diopter range	-3 to +2.5
Eye relief	90mm
Exit pupil @ 7x	8mm
Exit pupil @ 35x	1.6mm
Re-zero mechanism	TOOL-LESS RE-ZERO [®]
	(US PATENT # 10,591,253)

* specifications subject to change. Current specifications available at www.tangenttheta.com

1.2 Technical Specifications*, continued

Total Adjustment Range	
Elevation	30 mrad
Windage	14mrad
Working Adjustment Range	
Elevation	28 mrad
Windage	+/- 6 mrad
Adjustment resolution	0.1 mrad
Parallax adjustment range	10m to infinity
Crosshair illumination	LED, 11 settings
Battery type	DL2032 3v lithium
Exterior finish	Type II Anodized, matte
Environmental	
Waterproof:	4 hours @ 10 meters
Shockproof:	700g's @ 10,000 cycles
Standard accessories:	Tenebraex lens covers & ARD

* specifications subject to change. Current specifications available at www.tangenttheta.com

1.3 Notes on Mounting:

1) Before mounting any telescope, be sure the firearm is unloaded!

- 2) To get the most useable elevation adjustment from your rifle telescope, Tangent Theta recommends that users install a base with approximately 20 MoA forward declination or 'cant'. This will increase the useable elevation available to the user.
- 3) Tangent Theta recommends that only high quality rings and bases made from steel or aluminum be used to mount the scope to a rifle and that all manufacturers' instructions should be followed. Before installing ring caps, ensure the scope tube slides and rotates smoothly and freely in the lower ring halves. If not, the rings may be misaligned or torqued and will require lapping.
- 4) In general, most lever-type quick-detachable rings employing vertical shafts do not retain zero as well as rings that utilize horizontal cross bolts to apply clamping force. Solid rings with cross bolts and hex nuts are recommended.
- 5) Ring cap screws should not be tightened beyond 25 inch-pounds torque.

CAUTION

Painting or otherwise modifying your Tangent Theta rifle telescope may jeopardize the ability to disassemble the optic and may therefore void the warranty.

WARNING

When mounting the rifle telescope, be sure to allow for sufficient eye relief.

Mounting the rifle telescope with insufficient eye relief can result in serious bodily harm. Be sure the rear lens of the telescope is a minimum 90mm (3.54 inches) from your eye when the rifle buttstock is held firmly to your shoulder in the prone shooting position. Be aware that wearing lightweight clothing or shooting at elevated targets can significantly reduce eye relief.

Heavy-recoiling rifles, such as those with large or 'magnum' calibers, or those that are especially light in weight pose additional risk. Consult a licensed gunsmith to assist with mounting. Chapter 2

OPERATION

WARNING

Once your telescope has been mounted on a firearm, be careful to ensure the firearm is unloaded and pointed in a safe direction before making setup adjustments to the telescope.

2.1 Adjusting the Diopter:

The diopter adjustment allows the user to adjust the focus of the eyepiece to the individuals eye. To perform this operation, follow these steps:

- 1) **Be sure your firearm is unloaded!** Turn the zoom setting counter-clockwise to the highest magnification (this is described in Section 2.2).
- 2) Loosen the ocular lock ring by turning it counter-clockwise (Fig. 2a).
- 3) Look through the telescope toward a plain background. A blank painted wall or a clear spot in the sky (<u>not</u> at the sun!) are usually good choices. The purpose is to find a background without features that might otherwise distract your view of the reticle. Be sure the background you choose is in a safe direction to be aiming a firearm; even one that is unloaded!
- 4) While viewing through the telescope at the plain background, adjust the ocular by rotating it clockwise and counter-clockwise until you find a setting whereby the reticle is clearly in focus to your eye (Fig. 2b).
- 5) Now rest your eyes by looking away for a few moments. Look back again through the ocular to be sure the reticle is still crisp and clear from edge to edge.
- 6) Once the ocular is set to proper diopter setting, tighten the ocular lock ring by turning it clockwise until it is firmly finger-tight.

2.1 Adjusting the Diopter, continued:



Fig. 2a Loosening and tightening the lock ring.

Fig. 2b Adjustment of the diopter setting.

The diopter lock ring is loosened by turning counter-clockwise. This allows the diopter adjustment to be made by rotating the ocular. Once satisfied with the diopter adjustment, the lock ring may be tightened by turning firmly clockwise.

2.2 Adjusting Magnification:

Grasp the magnification ring and rotate to the desired level of magnification.



Fig. 2c Increase magnification by turning the ring counter-clockwise. Decrease by turning clockwise.

Note: As the magnification increases or decreases the reticle will appear to become thicker or thinner, this is a result of the reticle being in the first focal plane. The reticle does not actually become any thicker or thinner but it maintains its subtention relative to the image so that ranging and trajectory compensation using the reticle can be done anywhere along the magnification range.

2.3 Reticle Illumination Function:

To turn on and adjust the reticle illumination, rotate the illumination dial clockwise and select one of the eleven intensity settings. The illumination is easiest to observe at high magnification. There will be a tactile detent at each of the illumination settings as well as an additional detent between each setting. The illumination is designed to shut off at the detent between each of the intensity settings. The illumination also has a six-hour auto shut off feature that helps preserve battery life.

To turn off the illumination close to any desired setting, rotate the dial counterclockwise one 'click' to rest in the detent between numbered settings. To turn the illumination off without 'saving' a setting, rotate the dial counter-clockwise until the

dial hits the stop.



Fig. 2d Adjusting illumination intensity.

2.4 Adjusting Parallax:

Parallax is the apparent movement of the reticle against the target caused by the reticle and target image not being on the same focal plane. When there is no parallax, the user can move their eye from one side of the exit pupil to the other (or top to bottom) slightly while looking through the scope and see no apparent movement of the reticle against the target. The Tangent Theta model TT735P has a large parallax dial on the left side that will allow the user to adjust the scope to be parallax free from 10 meters to infinity.

Users will note that there are no range graduations engraved on the parallax adjustment dial and that the dial will travel slightly past the 'infinity' mark. This is because rifle telescopes may require different focus settings at any particular range depending upon the elevation and windage setting, magnification setting and operating temperature. If using the telescope under fairly stable conditions and/or at fixed distances such as at a rifle range, the user may add reference marks to the dial with a soft lead pencil. These reference marks can be easily removed later without damage to the anodized finish.

2.4 Adjusting Parallax, continued

To remove parallax, look through the telescope toward the target and move your head down slightly, looking for any movement of the reticle against the target. Follow the instructions below to adjust the telescope to be parallax free.





Fig. 2e If while looking through the telescope and moving your head downward slightly, the reticle appears to move downward, turn the dial clockwise.

Fig. 2f If while looking through the telescope and moving your head down-ward slightly, reticle appears to move upward, turn the dial counter-clockwise.

When the telescope eyepiece is correctly adjusted for the user's eye, the parallax adjustment will then bring the image of the target in focus with the reticle with no apparent movement between the two.

2.5 Operating the Elevation and Windage Dials:

The Elevation and Windage dials are used to bring the reticle into coincidence with the trajectory of the projectile at any desired range, thus compensating for ballistic drop as well as wind and other environmental conditions.

The Tangent Theta model TT735P incorporates non-translating Elevation and Windage dials that do not move in and out in relation to the tube when turned. To simplify adjustment settings for the marksman, the Elevation dial is capable of two turns only and the Windage dial is capable of one turn only.

On the first revolution of the Elevation dial, the user reads elevation settings from the lower scale on the dial. Upon reaching the second revolution of the Elevation dial, a small indicator pin will protrude at the base of the Elevation turret, letting the user know that they should now be reading from the upper scale on the Elevation dial.

As a further measure of convenience and safety, the model TT735P also has a 'zero stop' that will prevent the dial from being adjusted more than 5 or 6 clicks (depending upon the model) below the set 'zero'. The purpose of the 'zero stop' is to allow the user to quickly return to a known range zero and to be able to use that setting as a starting point to make further adjustments.



Fig. 2g Elevation and Windage Adjustment Dials (milliradian version shown). **Note:** The elevation and windage dials have been designed to offer a lifetime of service without appreciable change in the feel of their detent clicks.

2.5 Operating the Elevation and Windage Dials, continued



Fig. 2h Elevation Dial on first revolution. Read graduations from lower scale. Note indicator pin is disengaged.

2.5 Operating the Elevation and Windage Dials, continued



Fig. 2i Elevation Dial on second revolution. Read graduations from upper scale. Note indicator pin is engaged.

2.6 Zeroing the Telescope:

The process of zeroing is to adjust the telescope such that the point of aim is coincidental with the point of impact at a chosen distance. This process is most commonly performed at 100 meters or yards, although the zeroing distance is really up to the individual user. Because the telescope incorporates a 'zero stop' it should be zeroed at the shortest range that it is intended to be used.

When zeroing the dials, the reticle can easily be used to calculate the necessary correction since both the adjustments and reticle are calibrated in the same units.

The Tangent Theta model TT735P is shipped optically and mechanically centered; meaning that 'out of the box' the elevation dials are adjusted to the middle of their adjustment range, and the 'working adjustment' is set to the middle of the total internal adjustment range. This way, the user has equal elevation and windage travel to aid in zeroing the optic.

To zero the rifle telescope follow these steps:

- 1) Set the adjustment in the middle of the range: Adjust the Elevation dial to read +15 mrad (or +50 MoA on MoA calibrated versions) and adjust the Windage dial to read zero.
- 2) Reduce the elevation setting by the forward angle of your base. If you have a forward declination or 'canted' base on your rifle (which is recommended), reduce the elevation setting by an amount equal to the tilt of the base. For example, if you are installing a MoA calibrated telescope, and have a 20 MoA

2.6 Zeroing the Telescope, continued

base, start at +50 MoA on the Elevation dial and then reduce the setting by 20 MoA to therefore read +30 MoA on the Elevation dial. If you are installing a milliradian calibrated telescope, start at +15mrad and then reduce the elevation setting by an amount equal to the tilt of the base. For a reference, a 20 MoA base equals about 5.8mrad and a 30 MoA base equals about 8.7mrad. For example, if you are installing a milliradian calibrated telescope, and have a 20 MoA base, start at +15mrad on the telescope and then reduce the setting by 5.8mrad to therefore read +9.2mrad on the Elevation dial.

3) **Establish a bore sight if you are able.** The most expeditious way to zero the telescope is to get a rough zero by bore-sighting the telescope to the rifle. This may be done in one of the following ways:

A) Use a barrel-mounted collimator: The barrel-mounted collimator or 'bore sighting collimator' mounts in the bore of the rifle at the muzzle and provides a crosshair target for the rifle telescope to focus on. The user may then adjust the Elevation and Windage dials of the rifle telescope to line up the rifle telescope's reticle with the reticle of the collimator. Alternatively;

B) Sight directly through the bore to establish a bore sight: If, after removal of the bolt, you are able to see clearly through the bore from the breech end, set the rifle in a stable rest, aimed at the target. While looking through the bore, position the rifle such that the target is centered in the view through the bore. Holding the rifle steady in that position, lift your head and look through the rifle telescope. Adjust the Elevation and Windage dials to

2.6 Zeroing the Telescope, continued

bring the crosshairs to be coincidental with the center of the aiming mark.

- 4) Fire a group: From a steady rest, fire a three-round group at the target placed at your desired zeroing distance. Use a fairly precise aiming mark that will assist you in keeping consistent aim, and use a rigid rest for the stock of the rifle in an effort to shoot the smallest group possible. Once the initial group is fired, measure (or estimate using your reticle) the horizontal and vertical distances from the center of the group to the center of the aiming mark.
- 5) Adjust the Elevation and Windage dials: Adjust the Elevation and Windage dials to bring the point of aim to be coincidental with the center of the group. You may wish to fire additional groups to be sure you are satisfied that the group is centered about the aiming mark.

Note: If you are unable to 'lower' your group sufficiently because you have adjusted elevation setting until you have reached the 'zero stop' on the Elevation dial, you will have to set an intermediate elevation zero in order to give you enough 'downward' elevation adjustment range. This is done using the procedure described **Section 2.6.1**

 Reset the dials to zero using the TOOL-LESS RE-ZERO[®] feature: Follow the procedures described in Section 2.7 to reset your Elevation and Windage dials to read zero.

2.6 Zeroing the Telescope, continued

2.6.1 Setting an intermediate elevation zero (only if necessary):

Depending upon the rifle, ammunition and zeroing range, the user may find that he or she has lowered the Elevation dial all the way down to the zero stop position and yet the group is still forming above the aiming point. In this case the user will need to set an intermediate elevation zero so as to be able to adjust the point of impact further downward. To do this, follow these steps:

- Estimate the number of clicks below the 'zero' setting on the dial you would need to move the group in order to achieve a point of impact coincidental with point of aim. Record this number of clicks for use in Step 3.
- 2) Unlock the TOOL-LESS RE-ZERO[®] feature by following the instructions in Step
 1) in Section 2.7 on the following page.
- 3) Turn the Elevation dial counter-clockwise and set it to read 5-10 clicks higher than the number you determined in Step 1 above.
- 4) Lock the TOOL-LESS RE-ZERO[®] feature by following the instructions in Step
 3) in Section 2.7 on following page.
- 5) You should now have enough downward adjustment to achieve a point of aim coincidental with the point of impact, and you may proceed to establish a final zero. See **Section 2.7** to reset the Elevation dial to your desired 'zero'.

2.7 Resetting 'zero' on the Dials using the TOOL-LESS RE-ZERO[®] Feature:

This procedure allows the user to adjust the reading of the adjustment dials without changing the point of aim of the telescope; commonly called 're-zeroing'.

 Using the thumb and forefinger only, loosen the adjustment lock by turning it counter-clockwise. You will hear and feel the lock clicking as it disengages from its retaining detent mechanism. This clicking is different from the adjustment clicks you hear and feel when turning the adjustment dial. Continue to turn the lock approximately 3 turns. Do not remove the adjustment dial completely, just loosen the lock three turns. The adjustment dial will then turn freely without clicking.

NOTE: If the lock has been over-tightened, you may have to use the supplied plastic battery removal disk or a coin in the slot to give you extra leverage to loosen it, however you should avoid using the disk or a coin to tighten the lock. Also, if the lock has been over-tightened, the process of loosening it might also turn the whole adjustment dial. To prevent this from happening, grasp and steady the dial with one hand while you loosen the lock with the other.

- 2) Once the lock has been loosened three turns, slowly rotate the adjustment dial until the 'zero' mark is precisely lined up with the reference arrow at the base of the turret.
- 3) While holding the dial to keep it lined up with the reference arrow, gently tighten the adjustment lock by turning it clockwise. You will begin to hear and feel the lock click as it re-engages its retention mechanism. The lock should only be

2.7 Zeroing the Telescope, continued

tightened 'finger tight' as it is solely used to engage an internal positive torque transfer mechanism. It is important to take care in aligning the lines on the dial with the reference arrow so that the internal drive teeth will mesh together correctly. If the teeth do not align perfectly, the lock will require a little bit of further tightening after the first adjustment of the dial (see step 4).

4) Turn the adjustment dial off zero a few clicks and then back again. Re-check the adjustment lock to ensure it is finger tight. Tighten slightly if necessary. The adjustment dial is now re-zeroed.



Fig. 2j TOOL-LESS RE-ZERO[®] function. Actuate the lock with thumb and forefinger.

2.7 Zeroing the Telescope, continued



Fig. 2k Adjustment lock disengaged

Fig. 2I Adjustment lock engaged

Summary of TOOL-LESS RE-ZERO[®] Steps:

- 1) Loosen the lock three turns.
- 2) Adjust the dial to zero.
- 3) While holding the dial at precisely zero, tighten the lock 'finger tight'.
- 4) Check by adjusting the dial a few clicks and re-checking to ensure lock is 'finger tight'.

2.8 Changing the Battery:

Tangent Theta rifle telescopes use one 2032 battery to provide reticle illumination. Upon shipment, the telescope will have had a fresh 2032 battery installed. To check battery function, turn the telescope to the highest magnification setting and turn the illumination setting to its highest (11) setting .

To change the battery, follow the procedure below. Before proceeding with this step, have a fresh 2032 battery and the supplied plastic **battery removal disk** handy.

- Remove the battery cover: Insert the battery removal disk into the appropriate slot in the battery cover and turn counter-clockwise until the cover can be removed to expose the battery. In an emergency, a coin may be used. Note that there are two perpendicular slots in the battery cover; a narrower slot that fits a U.S. or Canadian quarter coin, and a wider one that fits a EURO coin. Use the slot that best fits the disk or coin you are using.
- 2) Remove the battery from the spring loaded battery cage. Because the battery is held snugly, you will probably need to use a pointed tool, such as the tip of a knife to assist the battery removal. To do this, place the tip of the tool between the edge of the battery and the orange tensioning ring and gently pry the battery loose. Take care not to cut the tensioning ring with the pointed tool. See Fig. 20.
- 3) Replace the old battery with the fresh 2032 battery with the positive (+) side facing outward.
- 4) Replace the battery cover and rotate clockwise until snug, using the same disk or coin and slot you used to loosen the cover.

2.8 Changing the Battery, continued



Fig. 2m Removing and installing the battery cap with the use of a coin. To avoid damage, use the slot that best fits the thickness of the coin.

2.8 Changing the Battery, continued



Fig. 2n View of battery cap removed. Note battery is positioned with positive (+) side out.

2.8 Changing the Battery, continued



Fig. 20 Place the tip of a pointed tool **between** the battery edge and the orange tensioning ring to gently pry the battery out. Be careful not to cut the tensioning ring.

2.9 Lens Covers and Anti-Reflection Device:

The Objective and Ocular Lens covers are attached by pressing them over the corresponding lip at each end of the telescope body. In use, they may be rotated to the radial position most convenient to the user. When open, the covers can be folded at a low angle along the tube so as to minimize occlusion of the user's surrounding field of view.



Fig. 2p Rotate the lens covers to any convenient position.

Steps for Lens Cover installation:

- 1) Place the cover over the ridge on the finish ring. (Fig. 2r)
- 2) Use the heel of the hand to press firmly against the cover until it snaps into place.
- 3) Position the cover as necessary.



Steps for Removal:

1) Place the heel of the hand on the face of the cover and use fingers to pry the edges of the cover over the ridge on the finish ring. (Fig. 2s)

2) Once the edge of the cover is over the ridge in several places, it should easily come off, exposing the ridge that goes around the finish ring.

Installation of the Anti-Reflection Device (ARD)

Every Tangent Theta Professional Marksman Series rifle telescope is shipped with a genuine Tenebraex KillFlash[®] Anti-Reflection Device (ARD). The ARD employs a specially-coated honeycomb pattern of chambers that prevent stray light from entering or reflecting off the objective lens. The ARD effectively prevents glare reflecting from the objective lens and has the added benefit of acting as a very effective sun shade. The ARD reduces light transmission slightly and may be removed for low light operations or rifle range shooting in favorable lighting conditions.

The ARD is installed the following way:

1) Remove Objective Cover as per the preceding instructions.

2) Thread the ARD into the threads on the Finish Ring.

3) Turn the ARD clockwise until snug. Do not tighten beyond hand tight as too much force can cause the ARD to lock up and potentially damage the ARD when attempting to remove it.

The ARD is designed to accept the lens cover when installed on the telescope.

Chapter 3

MAINTENANCE

Maintaining the rifle telescope: The Tangent Theta model TT735P is designed to be a very durable optic built to withstand harsh use, however this does not mean that it is completely maintenance free. Follow the steps below to ensure your instrument will stay in good working order.

3.1 General Maintenance:

1) Inspect the main tube for dents, scrapes, and/or gouges that could affect the function of the scope.

2) Wipe the main tube down with a soft, lint-free cloth.

3.2 Moving Parts:

1) Ensure the fit, form, and function of all moving parts by working them several times to look for any apparent problems.

2) Use a soft bristle brush to remove dust and other debris from moving parts.

3.3 Lenses:

1) Inspect lenses for scratches or nicks to the lens surface.

2) Use a soft bristle, <u>optical-quality</u> lens brush to remove dirt and large particles from the lens surface.

3.3 Maintenance continued..

3) Use a LensPen or <u>optical-quality</u> lens cleaning solution in addition to quality lens paper to clean the lens surface by using a spiral motion beginning at the center of the lens and moving outward toward the edge of the glass.

4) Remove any residue or streaks from the lens surface using the Lens Pen or a clean piece of lens paper.

3.4 Lens Covers

1) Inspect the objective and ocular covers for damaged or missing parts.

2) If excessively dirty, remove the objective and ocular covers and wash with warm soapy water.

3) Rinse with clean water and allow to air dry.

3.5 Anti-Reflection Device (ARD)

1) Remove the ARD from the optic and inspect the honeycomb structure for dirt or other foreign matter.

2) Blow through the honeycomb to remove any loose dirt or foreign matter.

3) If necessary, run plain water through the device to clear any debris.

4) Tap the ARD housing lightly on a sound object to clear any excess water. Blow through the honeycomb structure to dry.

Chapter 4

WARRANTY SERVICE

Tangent Theta *Professional Marksman Series* rifle telescopes are manufactured by Armament Technology Incorporated who also administers warranty service of behalf of the Tangent Theta Division.

For service requirements, all inquiries must be directed to:

support@armament.com

Do not send your telescope in for service until you have made arrangements and have received instruction from our support personnel.

Armament Technology Incorporated will not take responsibility for telescopes that are returned without the proper RMA (Return Material Authorization) arrangements made in advance.

TANGENTOTHETA

60A Otter Lake Court Halifax NS B3S 1L9 CANADA www.tangenttheta.com

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