

M153 CROWS - BORESIGHTING BY TEST TARGET METHOD:

For Training Use Only - (Refer to TM 9-1090-219-10)

This method is used when visibility is limited, when terrain conditions are such that the use of a distant target method is not possible. Four Test Targets (Boresighting Posters: M2, Mk19, M240 & M249) are made available for this method, one for each supported weapon system.

WARNINGS:

- * **Ensure the weapon is clear of ammunition before performing boresighting procedure. Accidental firing of weapon can kill or injure personnel.**
- * **Turn OFF video and system stabilization.**

NOTE:

Align cameras in this order: TIM, VIM and LRF, then proceed to boresight procedures. If LRF and VIM adjustment is necessary seek FSR.

Boresight Procedures:

1. Pin up the testing target (depending on which weapon is being tested) on a stationary object (wall) 15 m from the muzzle end of the weapon and perpendicular to system's line of sight.
2. Select **MILES** from the **AMMO** menu and toggle weapon station to **slowest speed (2%)**. Disable **VIDEO IMAGE STABILIZATION** in the **SETTINGS** menu and disable **STAB** on the control grip.
3. Ensure VIM/TIM is zoomed to approximately **3.3 FOV**.
4. Insert the mandrel and borelight / borescope into the muzzle end of the weapon barrel.

NOTE:

Once Borelight / Borescope is precisely aimed at Target, rotate Borelight / Borescope 180 deg. CW and check whether laser dot / borescope reticle has moved from aiming point. If laser dot or reticle moved, Borelight / Borescope and Mandrel are not true, and Borelight / Borescope must be collimated according to manufacturer's operation manual.

5. Select **BORESIGHTING** from the **SETTINGS** menu.

6. **THEN PRESS SEL/ZERO (FCU/DCP) “SELECT RANGE TO TARGET”**, appears and default range is set to 700m. Press **RANGE +** and set range to maximum range for current mounted weapon system. Weapon's approximate maximum range:
M2 (.50 cal) = 4,900m (5,359y) **M240B** (7.62mm) = 3,000m (3,281y)
MK19 (40mm) = 1,500m (1,640y) **M249** (5.56mm) = 2,500m (2,734y)
(SW ver. 3.3.1 - 2,100m (2,297y))
7. **THEN PRESS SEL/ZERO (FCU/DCP)**. Previous lead text is replaced with **“MOVE BORESCOPE / WEAPON TO TARGET”**.
8. Without touching the weapon, align borescope reticle to the axis of bore on the testing target.
9. Operator - presses **SEL/ZERO (FCU)** or **SEL (DCP)** and the previous lead text is replaced with: **MOVE RETICLE TO TARGET, THEN PRESS SEL/ZERO(FCU) or SEL (DCP)**.
10. Move the sight reticle onto the aiming point of the testing target.
11. Complete the bore sighting procedures by pressing **SEL/ZERO(FCU/DCP)**.
12. Verify that Boresight still is aiming to the borescope target.
13. Reselect designated ammunition in ammo submenu.
14. Remove Borelight / Borescope and Mandrel from Barrel and evacuate WS area.
15. Reset FCU settings to operator preferred settings i.e. Stab/SNP/Vid Stab.
16. Press MENU **SEL/ZERO** (FCU/DCP).
17. Press MENU ON/OFF button to exit Main Menu.
18. Perform Zeroing procedure to ensure accuracy of weapon.

WARNINGS:

- **Personnel must be clear of weapon before selecting ammo type since weapon immediately elevates. To prevent injury to personnel, ensure that adequate communication occurs while boresighting Primary Weapon.**
- **Do not fire MK19 - 40mm HE ammunition at targets less than 310m away during training or 75m away during combat; fragmentation can reach gunner position.**

M153 CROWS - BORESIGHTING USING DISTANT AIMING POINT:

For Training Use Only - (Refer to TM 9-1090-219-10)

WARNINGS:

- Ensure the weapon is clear of ammunition before performing Boresighting Procedure. Accidental firing of weapon can kill or injure personnel.
- Turn off video and system stabilization.
- While performing boresighting operations, personnel must wear approved safety glasses & avoid looking into borescope when WS is moved to prevent eye injury.

NOTE:

Align cameras in this order: TIM, VIM and LRF, then proceed to Boresight Procedures. If LRF and VIM adjustment is necessary seek FSR.

Boresight Procedures:

1. Press RTCL SEL to select preferred reticle for boresighting procedure.
2. Select a Distant Aiming Point (distant target) that is a clearly defined object at a distance between 700 – 1,000 m (3,281 ft). Use LRF to obtain exact distance to object and record this figure.
3. Match Borescope to appropriate Mandrel for Primary Weapon.

NOTE:

Once Borelight/Borescope is precisely aimed at a Distant Aiming Point, rotate Borelight/Borescope 180 degrees CW and check whether laser dot/Borescope Reticle has moved from Distant Aiming Point. If Reticle moved, Borelight/Borescope and Mandrel are not true, and Borescope must be collimated according to Manufacturer's Operation Manual or another Borescope and Mandrel must be used for boresighting.

4. Select **MILES** from the **AMMO** menu & toggles weapon station to **Slowest Speed (2%)**. Disable **VIDEO IMAGE STABILIZATION** in the **SETTINGS** menu & **Stabilization (STAB)** on the control grip.
5. Insert Borescope and appropriate Mandrel into Weapon Barrel.

6. Select BORESIGHTING from Main Menu.
 - a. Press MENU ON/OFF on FCU/DCP once to display Main Menu.
 - b. Press MENU SEL/ZERO (FCU) or SEL (DCP) to display SETTING submenu.
 - c. Press MENU D (down) until Boresighting is highlighted.
 - d. Press MENU SEL/ZERO (FCU) or SEL (DCP) to start Boresighting.
7. CROWS displays first boresighting text prompt. Enter range to Distant Aiming Point obtained during step 2 by lasing the target. The Ballistic updates automatically. Set Range to Target, then Press 'SEL/ZERO (FCU) or SEL (DCP)'.
8. Press MENU SEL/ZERO (FCU) or SEL (DCP), and CROWS displays second boresighting prompt. Move Borescope / weapon to Target, then Press 'SEL/ZERO (FCU/DCP)'.
9. Without touching weapon, sight through Borescope Eyepiece and aim Borescope Reticle precisely at Distant Aiming Point by moving WS.
10. When Borescope is precisely aimed, press MENU SEL/ZERO (FCU) or SEL (DCP), and CROWS displays last boresighting message. Move Reticle to Target, then Press 'SEL/ZERO (FCU/DCP)'.
11. Lay Sight Reticle onto Distant Aiming Point using CG.
12. Reselect designated ammunition in ammo sub-menu.

WARNING:

Personnel must be clear of weapon before selecting ammo type since weapon immediately elevates. To prevent injury to personnel, ensure that adequate communication occurs while boresighting Primary Weapon.

13. Verify that Boresight still is aiming to the agreed target.
14. Remove Borescope and Mandrel from Barrel and evacuate WS area.
15. Press MENU SEL/ZERO (FCU) or SEL (DCP).
16. Press MENU ON/OFF button to exit Main Menu.
17. Perform Zeroing procedure to ensure accuracy of weapon.

M2 MG - HEADSPACE ADJUSTMENT

WARNING - Weapon may explode if not properly headspaced!

NOTE: Ensure charging handle is retracted before inserting barrel.

NOTE: Headspace and timing must be performed each time the barrel is installed

NOTE: Ensure barrel is a lined barrel (PN 7266131).

1. Raise cover all the way up, retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 2. With bolt retracted, screw barrel completely into barrel extension; then unscrew barrel two clicks. Allow bolt to go forward; barrel should not rotate.
 3. Charge the weapon and allow the bolt to go forward. (Do not slam)
 4. Retract the bolt until the barrel extension begins to separate (but not more than 1/16 inch) from the trunnion block. **(DO NOT INSERT ANY OBJECT BETWEEN THE BARREL EXTENSION AND TRUNNION BLOCK)**. Hold in this position until gage check is completed.
 5. Raise cartridge extractor; Push in on alignment guide to insert gage. (Apply slight pressure on gage). Attempt to insert "GO" end of headspace gage in the T-slot between the face of bolt and rear of barrel all the way up to the ring. If "GO" end of headspace gage enters down to the ring, attempt to insert the "NO GO" end of headspace gage; if "NO GO" end does not enter, headspace is set. If "NO GO" end enters T-slot or "GO" end does not enter, retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 6. Screw barrel in one click at a time (if "NO GO" end enters slot) or one click out at a time (if GO end does not enter) rechecking after each click starting from **Step 4 above**.
 7. Repeat until "GO" end can enter T-slot and "NO GO" will not enter T-slot.
- CAUTION** - Do not unscrew barrel more than a total of seven clicks. If condition occurs, turn in machine gun for next echelon inspection.

M2 MG - TIMING ADJUSTMENT

WARNING - Never charge gun with back plate off. Do not stand directly behind gun while removing backplate.

NOTE: Gun must be in single shot mode before removing backplate.

NOTE - Ensure proper headspace is set before attempting to adjust timing. Barrel must be installed.

1. Raise cover all the way up. (Do not hold barrel while charging weapon). Charge the weapon and allow the bolt to go forward. (Do not slam).
 2. Retract bolt just enough to insert "FIRE" gage with beveled edge against barrel notches.
 3. Remove backplate (pull backplate latch lock straight back, while lifting up on backplate latch. Raise backplate assembly straight up and remove from receiver).
 4. Turn timing adjustment nut all the way down (to the left), but not completely off the timing stud.
 5. Remove "Fire" Gage. Reinstall backplate. Insert "Fire Gage" and attempt to fire by pressing butterfly trigger; gun should not fire (firing pin not released).
 6. Remove backplate, screw nut one click at a time. Reinstall backplate. Insert "Fire" Gage and attempt to fire by pressing on butterfly trigger (repeat procedure until the gun fires- firing pin releases).
 7. After the gun fires, remove backplate, turn nut up two more clicks. Reinstall backplate, charge the weapon and allow the bolt to go forward. (Do not slam)
 8. Retract bolt just enough to insert "NO FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on the butterfly trigger; machine gun should not fire.
 9. Retract bolt just enough to remove "NO FIRE" gage and insert "FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on butterfly trigger; machine gun should fire. (Remove fire gage). **Timing adjustment is complete**.
- Reference: TM 9-1005-213-10 (WP0005) (<https://aeps2.ria.army.mil/aepshome.cfm>)

M2 MG - HEADSPACE ADJUSTMENT

WARNING - Weapon may explode if not properly headspaced!

Note: Ensure charging handle is retracted before inserting barrel.

Note: Headspace and timing must be performed each time the barrel is installed

Note: Ensure barrel is a lined barrel (PN 7266131).

1. Raise cover all the way up, retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 2. With bolt retracted, screw barrel completely into barrel extension; then unscrew barrel two clicks. Allow bolt to go forward; barrel should not rotate.
 3. Charge the weapon and allow the bolt to go forward. (Do not slam)
 4. Retract the bolt until the barrel extension begins to separate (but not more than 1/16 inch) from the trunnion block. **(DO NOT INSERT ANY OBJECT BETWEEN THE BARREL EXTENSION AND TRUNNION BLOCK)**. Hold in this position until gage check is completed.
 5. Raise cartridge extractor; Push in on alignment guide to insert gage. (Apply slight pressure on gage). Attempt to insert "GO" end of headspace gage in the T-slot between the face of bolt and rear of barrel all the way up to the ring. If "GO" end of headspace gage enters down to the ring, attempt to insert the "NO GO" end of headspace gage; if "NO GO" end does not enter, headspace is set. If "NO GO" end enters T-slot or "GO" end does not enter, retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 6. Screw barrel in one click at a time (if "NO GO" end enters slot) or one click out at a time (if GO end does not enter) rechecking after each click starting from **Step 4 above**.
 7. Repeat until "GO" end can enter T-slot and "NO GO" will not enter T-slot.
- CAUTION** - Do not unscrew barrel more than a total of seven clicks. If condition occurs, turn in machine gun for next echelon inspection.

M2 MG - TIMING ADJUSTMENT

WARNING - Never charge gun with back plate off. Do not stand directly behind gun while removing backplate.

NOTE: Gun must be in single shot mode before removing backplate.

NOTE - Ensure proper headspace is set before attempting to adjust timing. Barrel must be installed.

1. Raise cover all the way up. (Do not hold barrel while charging weapon). Charge the weapon and allow the bolt to go forward. (Do not slam).
 2. Retract bolt just enough to insert "FIRE" gage with beveled edge against barrel notches.
 3. Remove backplate (pull backplate latch lock straight back, while lifting up on backplate latch. Raise backplate assembly straight up and remove from receiver).
 4. Turn timing adjustment nut all the way down (to the left), but not completely off the timing stud.
 5. Remove "Fire" Gage. Reinstall backplate. Insert "Fire Gage" and attempt to fire by pressing butterfly trigger; gun should not fire (firing pin not released).
 6. Remove backplate, screw nut one click at a time. Reinstall backplate. Insert "Fire" Gage and attempt to fire by pressing on butterfly trigger (repeat procedure until the gun fires- firing pin releases).
 7. After the gun fires, remove backplate, turn nut up two more clicks. Reinstall backplate, charge the weapon and allow the bolt to go forward. (Do not slam)
 8. Retract bolt just enough to insert "NO FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on the butterfly trigger; machine gun should not fire.
 9. Retract bolt just enough to remove "NO FIRE" gage and insert "FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on butterfly trigger; machine gun should fire. (Remove fire gage). **Timing adjustment is complete**.
- Reference:TM 9-1005-213-10 (WP0005) (<https://aeps2.ria.army.mil/aepshome.cfm>)

M2 MG - HEADSPACE ADJUSTMENT

WARNING -Ensure charging handle is retracted before inserting barrel. Weapon may explode if not properly headspaced!

Headspace and timing must be performed each time the barrel is installed. Ensure barrel is a lined barrel (PN 7266131).

1. **Raise cover** all the way up; retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 2. **With bolt retracted**, screw barrel completely into barrel extension; then unscrew barrel two clicks. Allow bolt to go forward, barrel should not rotate.
 3. **Charge the weapon** and allow the bolt to go forward. (Do not slam)
 4. * **Retract the bolt** until the barrel extension begins to separate (but not more than 1/16 inch) from the trunnion block. (**Do not insert any object between the barrel extension and trunnion block**) Hold in this position until gage check is completed.
 5. Raise cartridge extractor; **Push in on alignment guide to insert gage**. (Apply slight pressure on gage). Attempt to **insert GO end** of headspace gage in the T-slot between the face of bolt and rear of barrel all the way up to the ring. If "GO" end of headspace gage enters down to the ring, attempt to insert the "NO GO" end of headspace gage; if "NO GO" end does not enter, **headspace is set**. If "NO GO" end enters T-slot or "GO" end does not enter, retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 6. Screw barrel in/out one click at a time rechecking after each click starting from the * above.
 7. Repeat until "GO" end can enter T-slot and "NO GO" will not enter T-slot.
- CAUTION** - Do not unscrew barrel more than a total of seven clicks. If condition occurs, turn in machine gun for next echelon inspection.

M2 MG - TIMING ADJUSTMENT

WARNING - Never charge gun with back plate off. Do not stand directly behind gun while removing backplate.

NOTE: Gun must be in single shot mode before removing backplate.

NOTE - Ensure proper headspace is set before attempting to adjust timing. Barrel must be installed.

1. Raise cover all the way up. (Do not hold barrel while charging weapon). Charge the weapon and allow the bolt to go forward. (Do not slam).
 2. Retract bolt just enough to insert "FIRE" gage with beveled edge against barrel notches.
 3. Remove backplate (pull backplate latch lock straight back, while lifting up on backplate latch. Raise backplate assembly straight up and remove from receiver).
 4. Turn timing adjustment nut all the way down (to the left), but not completely off the timing stud.
 5. Remove "Fire" Gage. Reinstall backplate. Insert "Fire Gage" and attempt to fire by pressing butterfly trigger; gun should not fire (firing pin not released).
 6. Remove backplate, screw nut one click at a time. Reinstall backplate. Insert "Fire" Gage and attempt to fire by pressing on butterfly trigger (repeat procedure until the gun fires- firing pin releases).
 7. After the gun fires, remove backplate, turn nut up two more clicks. Reinstall backplate, charge the weapon and allow the bolt to go forward. (Do not slam)
 8. Retract bolt just enough to insert "NO FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on the butterfly trigger; machine gun should not fire.
 9. Retract bolt just enough to remove "NO FIRE" gage and insert "FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on butterfly trigger; machine gun should fire. (Remove fire gage). **Timing adjustment is complete**.
- Reference: TM 9-1005-213-10 (WP0005) (<https://aeps2.ria.army.mil/aepshome.cfm>)

M2 MG - HEADSPACE ADJUSTMENT

WARNING -Ensure charging handle is retracted before inserting barrel. Weapon may explode if not properly headspaced!

Headspace and timing must be performed each time the barrel is installed. Ensure barrel is a lined barrel (PN 7266131).

1. **Raise cover** all the way up; retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 2. **With bolt retracted**, screw barrel completely into barrel extension; then unscrew barrel two clicks. Allow bolt to go forward, barrel should not rotate.
 3. **Charge the weapon** and allow the bolt to go forward. (Do not slam)
 4. * **Retract the bolt** until the barrel extension begins to separate (but not more than 1/16 inch) from the trunnion block. (**Do not insert any object between the barrel extension and trunnion block**) Hold in this position until gage check is completed.
 5. Raise cartridge extractor; **Push in on alignment guide to insert gage**. (Apply slight pressure on gage). Attempt to **insert GO end** of headspace gage in the T-slot between the face of bolt and rear of barrel all the way up to the ring. If "GO" end of headspace gage enters down to the ring, attempt to insert the "NO GO" end of headspace gage; if "NO GO" end does not enter, **headspace is set**. If "NO GO" end enters T-slot or "GO" end does not enter, retract bolt to align barrel locking spring lug with 3/8" hole in right side of receiver.
 6. Screw barrel in/out one click at a time rechecking after each click starting from the * above.
 7. Repeat until "GO" end can enter T-slot and "NO GO" will not enter T-slot.
- CAUTION** - Do not unscrew barrel more than a total of seven clicks. If condition occurs, turn in machine gun for next echelon inspection.

M2 MG - TIMING ADJUSTMENT

WARNING - Never charge gun with back plate off. Do not stand directly behind gun while removing backplate.

NOTE: Gun must be in single shot mode before removing backplate.

NOTE - Ensure proper headspace is set before attempting to adjust timing. Barrel must be installed.

1. Raise cover all the way up. (Do not hold barrel while charging weapon). Charge the weapon and allow the bolt to go forward. (Do not slam).
 2. Retract bolt just enough to insert "FIRE" gage with beveled edge against barrel notches.
 3. Remove backplate (pull backplate latch lock straight back, while lifting up on backplate latch. Raise backplate assembly straight up and remove from receiver).
 4. Turn timing adjustment nut all the way down (to the left), but not completely off the timing stud.
 5. Remove "Fire" Gage. Reinstall backplate. Insert "Fire Gage" and attempt to fire by pressing butterfly trigger; gun should not fire (firing pin not released).
 6. Remove backplate, screw nut one click at a time. Reinstall backplate. Insert "Fire" Gage and attempt to fire by pressing on butterfly trigger (repeat procedure until the gun fires- firing pin releases).
 7. After the gun fires, remove backplate, turn nut up two more clicks. Reinstall backplate, charge the weapon and allow the bolt to go forward. (Do not slam)
 8. Retract bolt just enough to insert "NO FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on the butterfly trigger; machine gun should not fire.
 9. Retract bolt just enough to remove "NO FIRE" gage and insert "FIRE" gage with beveled edge against barrel notches. Attempt to fire by pushing on butterfly trigger; machine gun should fire. (Remove fire gage). **Timing adjustment is complete**.
- Reference: TM 9-1005-213-10 (WP0005)(<https://aeps2.ria.army.mil/aepshome.cfm>)

M153 CROWS - ZEROING:

For Training Use Only - (Refer to TM 9-1090-219-10)

WARNING:

Boresighting must be performed prior to loading Ammo and Zeroing.

1. Load the weapon with ammunition.
2. Power up the system IAW TM.
3. Select the Day or Night sight (VIM or TIM)
4. Lay crosshair of the reticle on the center of the zero target and Laze target.
5. Charge the weapon and set GUN ARM/SAFE switch to 'ARM' position.
6. Receive the proper clearance to Fire the weapon system.
7. Fire five to eight round burst and observe the rounds impact.

NOTE:

Image/System stabilization needs to be 'OFF' prior to Zeroing. If reticle aiming point is not in the center of the impact zone - continue to next step. If the reticle aiming point is centered in the impact zone the weapon is zeroed - go to step 14.

8. Press the **MENU ON/OFF** button once to highlight the main menu.
SETTING is highlighted on the menu field.
9. Press **SEL/ZERO (FCU)** or **SEL (DCP)** button to activate the submenu
10. Press **MENU D-** button until 'ZEROING' is displayed on the menu field.
11. Press **SEL/ZERO (FCU)** or **SEL (DCP)** button until "Move reticle to point of impact, press **SEL/ZERO (FCU)** or **SEL (DCP)** is highlighted on the status field on display.
12. Lay reticle onto the point of impact by using the joystick.
13. Press the **SEL/ZERO(FCU)** or **SEL (DCP)** button. ZEROING disappears from the screen.
14. Fire another burst and readjust if necessary until the aiming point is centered on the hit point.

M153 CROWS - ELECTRONIC TIMING FOR M2 - .50 Cal:

For Training Use Only - (Refer to TM 9-1090-219-10)

- 1) Ensure mechanical headspace and timing has been performed correctly.
- 2) Rotate solenoid dial clockwise until it stops or cannot rotate anymore.
- 3) Lock weapon in automatic mode.
- 4) Power up CROWS.
- 5) Charge weapon from the CG / Insert **FIRE GAGE**.
- 6) **ARM** the Weapon Station (on FCU/DCP).
- 7) Squeeze trigger on CG 3 consecutive times. Listen for solenoid click.
- 8) Rotate solenoid dial **ONE** click **Counter-clockwise** and fire. **REPEAT** until metallic click of weapon occurs, checking to ensure firing pin is protruding from the face of the bolt.
- 9) **WHEN METALLIC CLICK OCCURS (fires)**, remove fire gage, close feed tray cover, and charge weapon. Raise feed tray cover and insert **NO FIRE GAGE**, fire system 3 times (3 solenoid clicks and NO weapon metallic click)
- 10) Rotate solenoid dial **counter-clockwise** 1 click and fire, repeat until weapon fires.
(Remember to Count clicks from this point until weapon fires with the No Fire Gage)

NOTE:

If weapon does not fire and the limit of M2, .50 - Cal firing solenoid is reached, ensure solenoid is not overly-tightened to weapon and Sere slide is properly installed on the bolt. Retry from step 2. If not corrected, remove and replace solenoid.

- 11) Rotate solenoid dial **CLOCKWISE half of the clicks** that you counted during step 10, remove the **NO FIRE GAGE** and close the feed tray cover.
- 12) Charge weapon / open feed tray cover/ Insert **FIRE GAGE** / Fire
- 13) Gun should fire with single pull of trigger. Repeat steps 12, **three consecutive times**.
If gun does not fire, repeat procedures starting at step 1
- 14) Remove **FIRE GAGE**; close feed tray cover, charge weapon
- 15) Open feed tray cover and insert **NO FIRE GAGE**; fire weapon multiple times.
- 16) Gun should not fire with multiple trigger pulls. If gun fires, repeat procedures starting at step 1.
- 17) Remove NO FIRE timing gage, close feed tray cover. Electronic timing is set.

M153 CROWS - PRE-COMBAT CHECK LIST:

For Training Use Only - (Refer to TM 9-1090-219-10)

1. Ensure Power is OFF.
2. Ensure CROWS is clear of obstructions.
3. Ensure cable connections are tight.
4. Remove lens covers (store TIM cover in Bag).
5. Ensure Elevation Transport and Stow Azimuth locks are disengaged.
6. Remove Safety Clamp from Cocking Actuator and Sight Assembly (store in Bag).
7. Ensure the Elevation and Azimuth Release Mechanisms are engaged w/ locking pins.
8. Mount Weapon and Weapon Accessory Kit (WAK) IAW TM 9-1090-219-10 installed.
9. Ensure all 3 red Guard Covers (Safety Override, Remote Safe, & System) are down.
10. Power system ON.
11. Verify FCU/DCP Display Bit Test (all systems OK).
12. Perform TIM Calibration.
13. Verify VIM/TIM Camera Zoom and Focus Functions on FCU/DCP and Control Grip.
14. Verify Brightness/Level/Gains Functions on FCU/DCP.
15. Verify Azimuth and Elevation Functions with Control Grip.
16. Verify Slew Functions on Control Grip to include speed change (2%) on FCU/DCP.
17. Verify Thermal Camera Zoom, Focus and Polarity Functions on FCU and Control Grip, then
18. Verify Charging Function of system on FCU/DCP and Control Grip. perform TIM Calibration.
19. Verify Hatch Interlock and Override Functions on FCU/DCP.
20. Verify No Fire Zones with Control Grip on FCU/DCP.
21. Verify Engagement Screen on FCU/ DCP (AZ/EL, WPN / Ammo, etc.).
22. Verify Boresight (perform new bore sight if new weapon/barrel has been mounted).
23. Verify Firing Action through Control Grip and Weapon Trigger (dry-fire).
24. Load Ammo.

M153 CROWS - POST OPERATION CHECK LIST:

For Training Use Only - (Refer to TM 9-1090-219-10)

1. **Ensure Armed and Override switches are DOWN.**
2. **Clear Weapon.**
3. **Traverse WS to 12 o'clock position.**
4. **Turn OFF WS power.**
5. **Remove Weapon and mounting hardware.**
6. **Attach Lens covers.**
7. **Install SSA Clamp Assembly.**
8. **Place Elevation Transport Lock in Transport Mode.**
9. **Engage Azimuth Transport Lock.**
10. **Place Protective Cover on Weapon Station.**

M153 CROWS – SSA SENSOR ALIGNMENT VERIFICATION

For Training Use Only - (Refer to TM 9-1090-219-10)

NOTE:

Improper alignment of the SSA sensors may result in an inaccurate boresight and/or deadline the WS. Alignment verification should be performed periodically, or immediately after the WS has been subjected to severe mechanical shock. If SSA sensors are out of alignment, contact FSR for maintenance.

Procedures:

1. Pin a Boresighting Alignment poster (test target) to a stationary target 15ms from the end of the weapon barrel and perpendicular to the weapons line of sight.
2. Disable **IMAGE STABILIZATION** in the **SETTINGS** menu and **WS STAB** on the control grip. Operator will place WS on preferred speed.
3. Switch to the **TIM** and zoom to approximately **3.3 FOV**, adjust focus as necessary. **TIM Calibration** may be required.
4. Have an assistant provide a heat source to the center of the TIM aiming point of the test target (finger tip, heated screw/pin, etc.).

5. Align **TIM** reticle to center of TIM aiming point (heat source) on the test target.
6. **WITHOUT MOVING THE CONTROL GRIP**, switch camera to the **VIM**. Verify the **VIM** reticle is within the acceptable limits of the **VIM** aiming point on the test target (inside the circle surrounding the reticle center).

NOTE:

**LRF laser will only be visible on the VIM display during low light conditions.
Placing reflective tape on the laser target will allow the laser to be visible
during high density light conditions.**

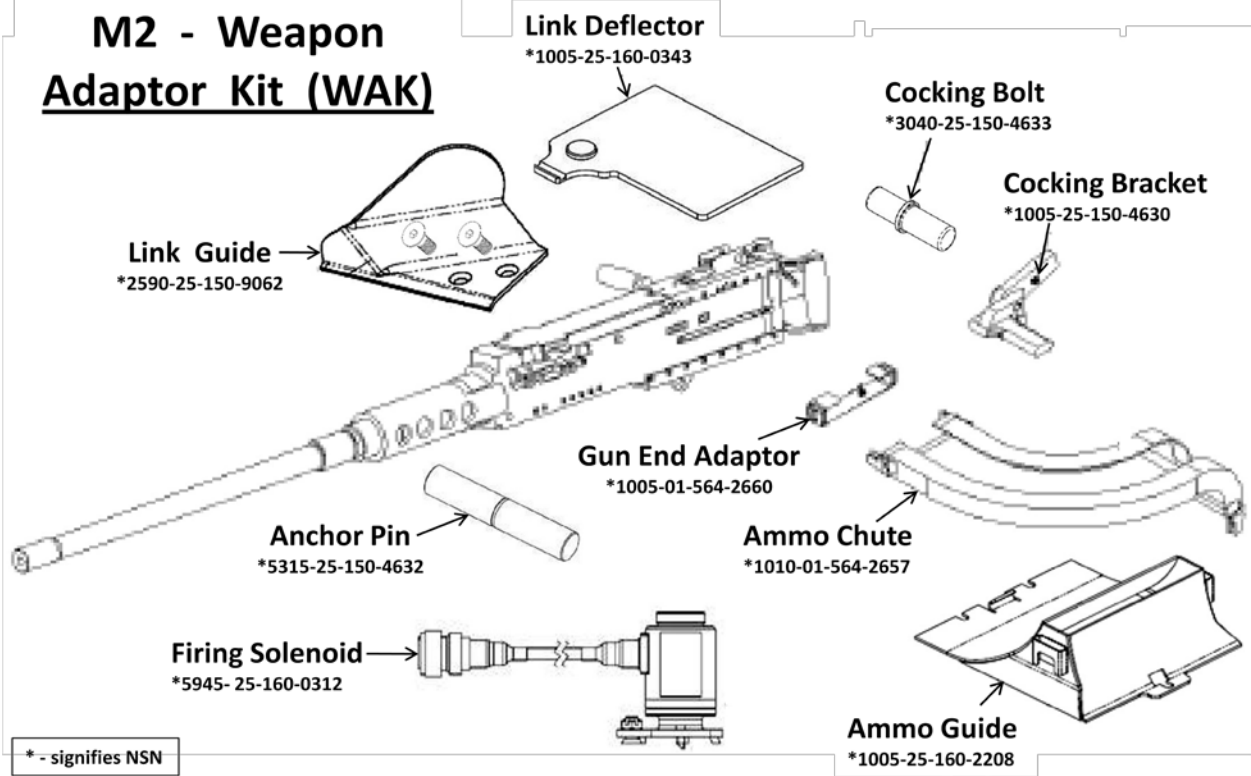
7. **WITHOUT MOVING THE CONTROL GRIP**, place the **LRF** on **continuous mode** by double clicking the **LRF** button. Ensure the **LRF** is within the acceptable limits of the **LRF** aiming point on the test target.

NOTE:

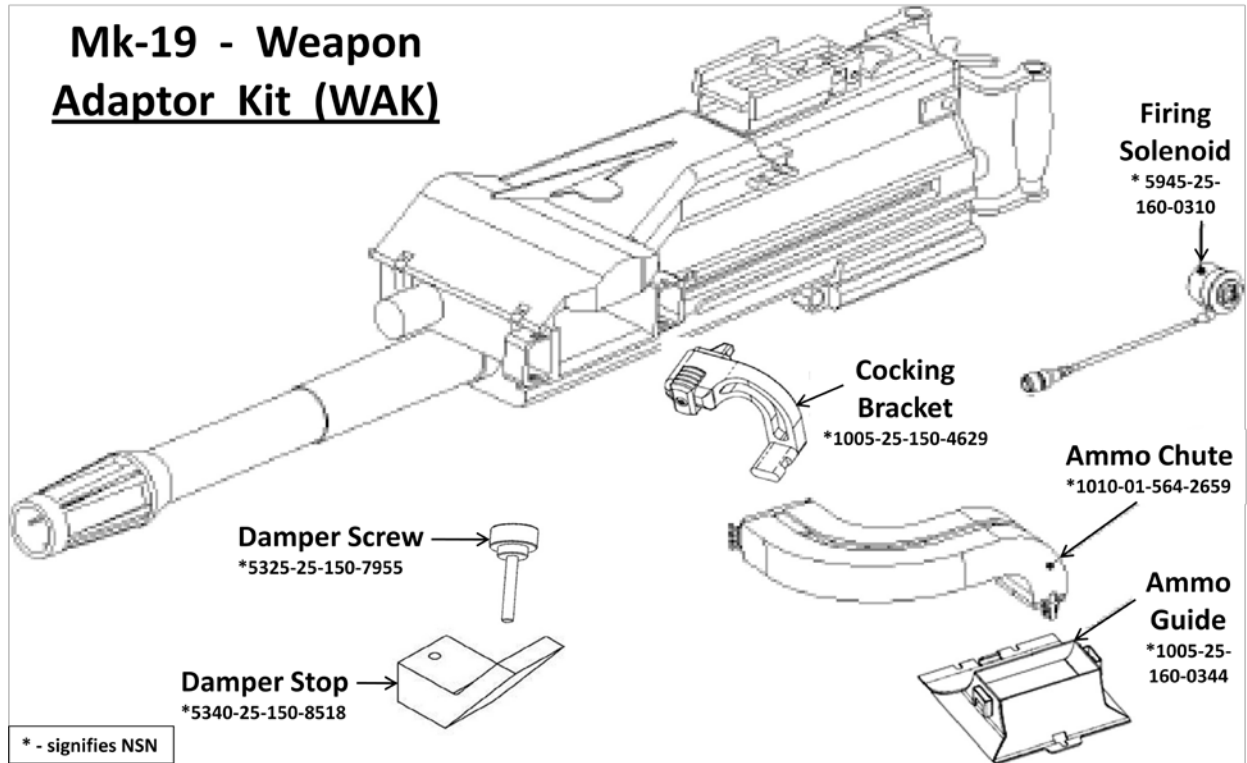
If both the VIM and LRF are within the acceptable limits of alignment to the TIM, the verification procedure is complete, proceed to boresighting procedures.

If one or both of the sensors are outside the limitations of the verification poster, the WS is dead-lined until the necessary adjustments have been completed by a CROWS FSR.

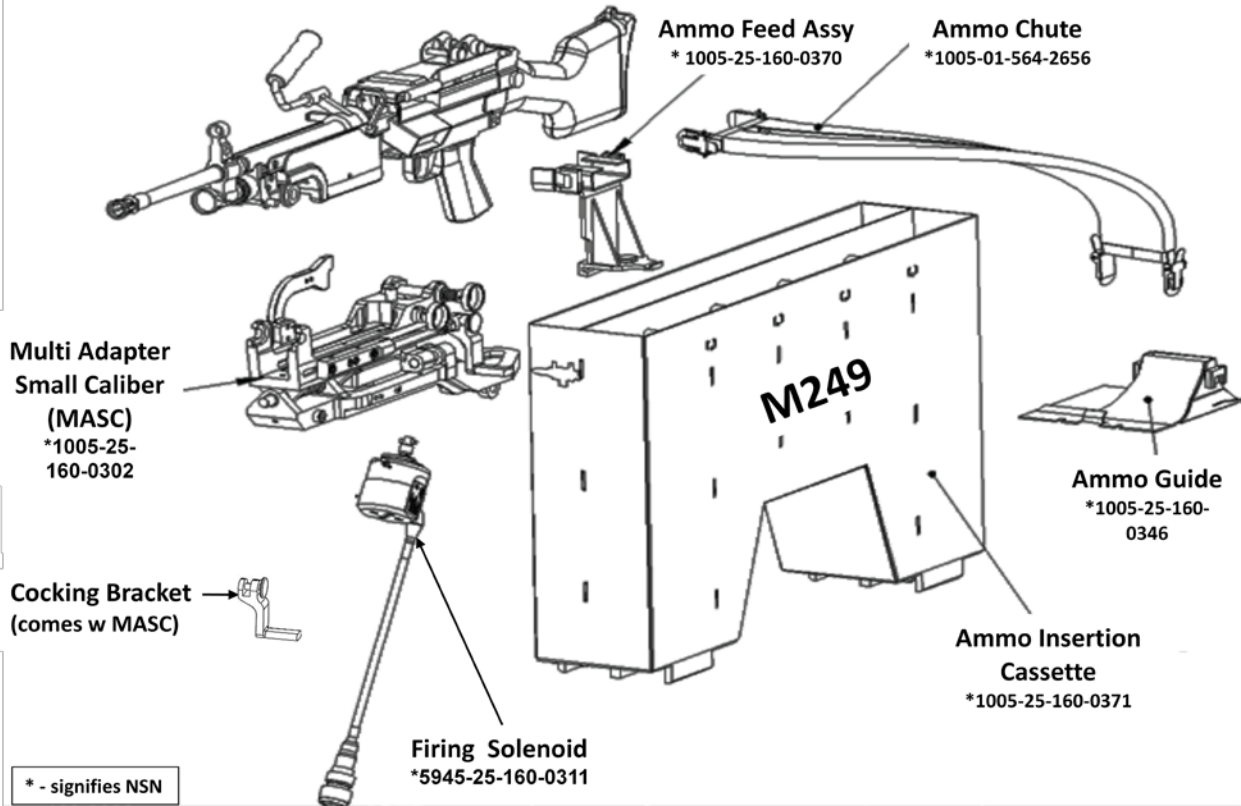
M2 - Weapon Adaptor Kit (WAK)



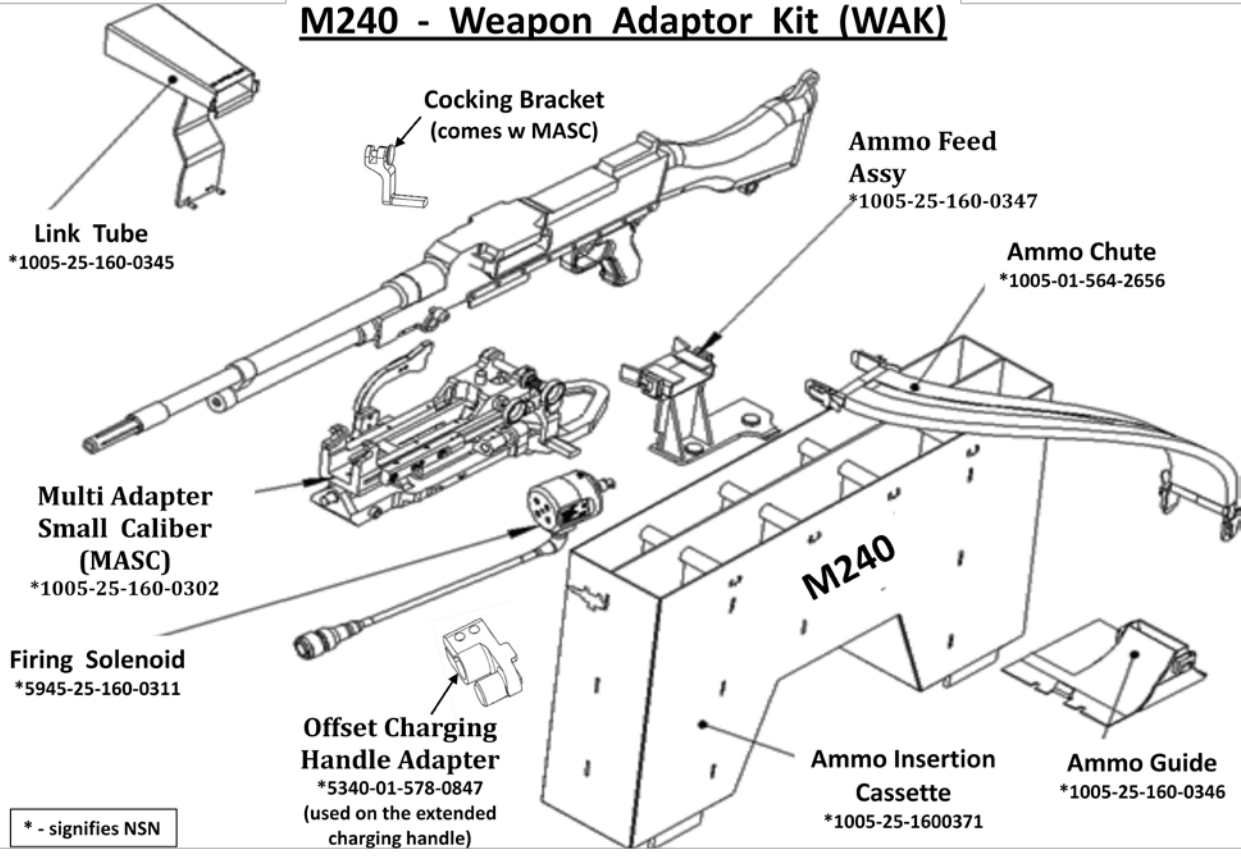
Mk-19 - Weapon Adaptor Kit (WAK)



M249 - Weapon Adaptor Kit (WAK)



M240 - Weapon Adaptor Kit (WAK)



* - signifies NSN

M153 CROWS - M2 MG CLEARING PROCEDURES

For Training Use Only - (Refer to TM 9-1090-219-10)

1. Orientate weapon in a safe direction and adjust weapon speed to 2%.
2. Ensure the ARMED switch and the Red Safety cover (1) on the FCU / DCP / WSCP are in the down position. Orientate the weapon in a safe direction. The TC instructs the gunner to put the CROWS into remote safe (By flipping the Remote Safe switch up then returned to the down position). Once the system is in the Remote Safe, **BOTH gunner and TC verify** that the DISABLED LED (2) and the ARMED LED (3) is not lit in the Remote Safe field and Remote Safe is displayed on the lower right of the FCU/DCP. Physically inspect the weapon station to ensure that the bolt on the weapon is being electronically held to the rear.

WARNING:

Always treat weapon as loaded with live ammunition and stand clear of muzzle.

Always keep clear from weapon station when any command is given to the gunner.

3. While the weapon is oriented in a safe direction both the TC and the gunner are to follow the unloading procedures IAW FM 3-22.65 for the M2 MG:
 - 1) To unload the machine gun, first ensure that the weapon is in the single-shot mode.
 - 2) The cover is then lifted, remove the ammunition belt from the feedway.
 - 3) Examine the chamber and T-slot to ensure that they are not holding rounds. In darkness, this must be done by feeling the areas. The weapon is now clear.
4. Return the remote Safe to the charge position and close the cover, maintain rearward pressure on the Charging handle, press the bolt catch release and ease the bolt forward.
5. The TC then instructs the gunner to power down the CROWS by pressing the power button ONLY.

NOTE:

The TC is to make sure that the gunner is NOT to return the Remote Safe to the down position before the system is powered OFF because this action will lock the bolt to the rear position once the system is powered OFF.

6. Once the system is powered OFF then the Remote Safe switch is returned to the down position.

M153 CROWS - MK-19 GMG CLEARING PROCEDURES

For Training Use Only - (Refer to TM 9-1090-219-10)

1. Ensure the ARMED switch and the Red Safety Cover on the FCU/DCP/WSCP is in the down position.
2. Orientate the weapon in a safe direction, the TC instructs the gunner to put the weapon station at 2% speed & CROWS into Remote Safe by flipping the Remote Safe switch up, then returning it to the down position. Once the system is in the Remote Safe, **BOTH gunner and TC verify** that the DISABLED LED (2) and the ARMED LED (3) is not lit in the Remote Switch field, and Remote Safe is displayed on the lower right of the FCU. Physically inspect the weapon station to ensure that the bolt on the weapon is being electronically held to the rear.
WARNING:
Always keep clear from weapon station when any command is given to the gunner.
3. Once Remote Safe is verified, either the gunner or the TC then follows the clearing procedures IAW FM 3-22.27 for the MK-19 GMG:
 - ▶ (1) Move the safety switch to S (SAFE).
 - (2) Open the top cover assembly. If all the ammunition has NOT been fired, the bolt is to the rear and a round is on the bolt face. If the bolt is forward, lock it to the rear.
 - (3) Take the ammunition from the feed tray by reaching beneath the feed tray and pressing the primary and secondary positioning pawls. While pressing the position pawls, slide the linked rounds out of the MK-19 through the ammo chute.
 - (4) Insert a section of the cleaning rod or bayonet through either side of the receiver rail. Place it on top of the live round or cartridge case, as close to the bolt face as possible, and push down. This action forces the round out of the MK 19.
 - (5) Lower and pull both charger handles to the rear. (Only right side handle installed on weapon.)
 - (6) Inspect the chamber and bolt face to ensure that no live rounds are in the weapon.
 - (7) Place the safety switch on F (FIRE). **(TC instructs gunner to disable the Remote Safe by returning Remote Safe switch to upward position in order to perform next clearing task)**
 - (8) Maintain rearward pressure on the charging handle, press the trigger and ease the bolt forward.
4. After all ammo is cleared from the weapon and the barrel, then close the Feed Tray Cover.
5. Make sure the secondary guide drive is to the right and close feed tray cover. TC then instructs the gunner to power down the CROWS by pressing the power button ONLY.
NOTE:
The TC is to make sure that the gunner is NOT to return the Remote Safe to the down position before the system is powered OFF because this action will lock the bolt to the rear position before the system is powered OFF.
6. Once the system is powered OFF then Remote Safe switch and switch guard are returned to down pos.

M153 CROWS - CLEARING PROCEDURES FOR M249 / M240B MG

For Training Use Only - (Refer to TM 9-1090-219-10)

WARNINGS:

Always treat weapon as loaded with live ammunition and stand clear of muzzle.

1. Orientate weapon in a safe direction and adjust weapon speed to 2%.
2. Ensure the ARMED switch on the FCU/DCP/WSCP is in the down position and the Red Safety cover is down. **SYSTEM ARM/SAFE switch is set to SAFE.**
3. Ensure the Remote Safe switch is cycled to the Remote Safe position. Once the system is in the Remote Safe, both gunner and assistant gunner verify that the DISABLED LED (2) and the ARMED LED (3) are not lit in the Remote Safe and System field, and insure Remote Safe is displayed on the lower right of the FCU / DCP.
4. Physically inspect the weapon station to ensure that the bolt on the weapon is being electronically held to the rear. -
5. Once Remote Safe is verified, the assistant gunner then removes the black elastic band from around the charging handle.
6. Place weapon on safe by pushing the weapon safety switch to the right until the red ring is not visible.
7. Disengage the trigger bar.
8. Raise the cover and feed mechanism assembly, remove the ammo chute and all exposed rounds.

NOTES:

- **Always keep clear from weapon station when any command is given to the gunner.**
- **The gunner can only place the weapon on safe with the bolt locked to the rear.**

9. Conduct the five point safety check for brass, links, or ammunition.

Five Point Safety Check

1. Check the feed pawl assembly under the feed cover.
2. Check the feed tray assembly.
3. Lift the feed tray assembly and inspect the chamber.
4. Check the space between the bolt assembly and the chamber.
5. Insert two fingers of left hand into magazine well to extract ammunition or brass.

WARNING:

Always keep clear from Weapon Station when any command is given to the gunner.

10. Close the cover and feed mechanism assembly, and move the safety to the "F" position.
11. Return Remote Safe switch to the charged position.
12. Re-engage trigger bar.
13. Pull back on the trigger bar and at the same time ease the bolt forward by manually riding the cocking handle forward.
14. After all ammo is cleared from the weapon and the barrel and the bolt is in the forward position the TC then instructs the gunner to power down the CROWS by pressing the power button ONLY.
15. Return black elastic band to charging handle (only if weapon is staying mounted on weapon station).
16. Once the system is Powered Off, then Remote Safe switch is returned to the down pos.

NOTE:

The assistant gunner needs to make sure that the gunner does not to return the Remote Safe to the down position before the system is powered off, because this action will lock the bolt to the rear position once the system is powered Off.

M153 CROWS - BORESCOPE COLLIMATION PROCEDURES

For Training Use Only – (Refer to TM 9-1090-219-10)

1. Ensure the Weapon Station you are bore sighting is on level terrain as much as possible. Use either the 15 meter bore sighting target for this task or select a target between 700 and 1,000 m.
2. View target through eyepiece and adjust the eyepiece (+ - 4 diopter) for individual preference.
The target should be in sharp focus (**preferred positions: start with the eye piece at 3:00 o'clock and rotate clockwise 180 degrees to the 9:00 o'clock position (figure 1).**)
3. Direct gunner to your target (the target you will use to boresight).

NOTES:

- **Turn the bore scope using the knurled section of the mandrel only. Turn the mandrel within the barrel, do not turn the bore scope within the mandrel.**
 - **It is critical that the user not lean or pull on the gun tube or BTA as the slightest movement will result in poor and inaccurate readings.**
 - **Ensure the tapered mandrel is seated tightly inside the weapon bore (figure 2).**
4. Position the reticle crosshairs on the target (you are at the 3 o'clock position) figure 3.
 5. Rotate borescope 180 degrees clockwise to the 9 o'clock position.
 6. If the crosshairs moved off the original target. Use the adjustment knobs on the borescope (2 small knurled azimuth and elevation adjustment knobs) located just below the eye piece to move borescope reticle halfway back to the target. (Split ½ the difference between this position and the previous position).
 7. Move gun tube back to the target.
 8. Rotate borescope 180 degrees clockwise back to the 3:00 o'clock position. Adjust the reticle crosshairs if necessary (1/2 the distance).
 9. Repeat steps 4-8 until there seems to be very little or no movement from one position to the next (**should normally take 3-5 cycles.**)
 10. After task is complete, **Borescope is Collimated.**