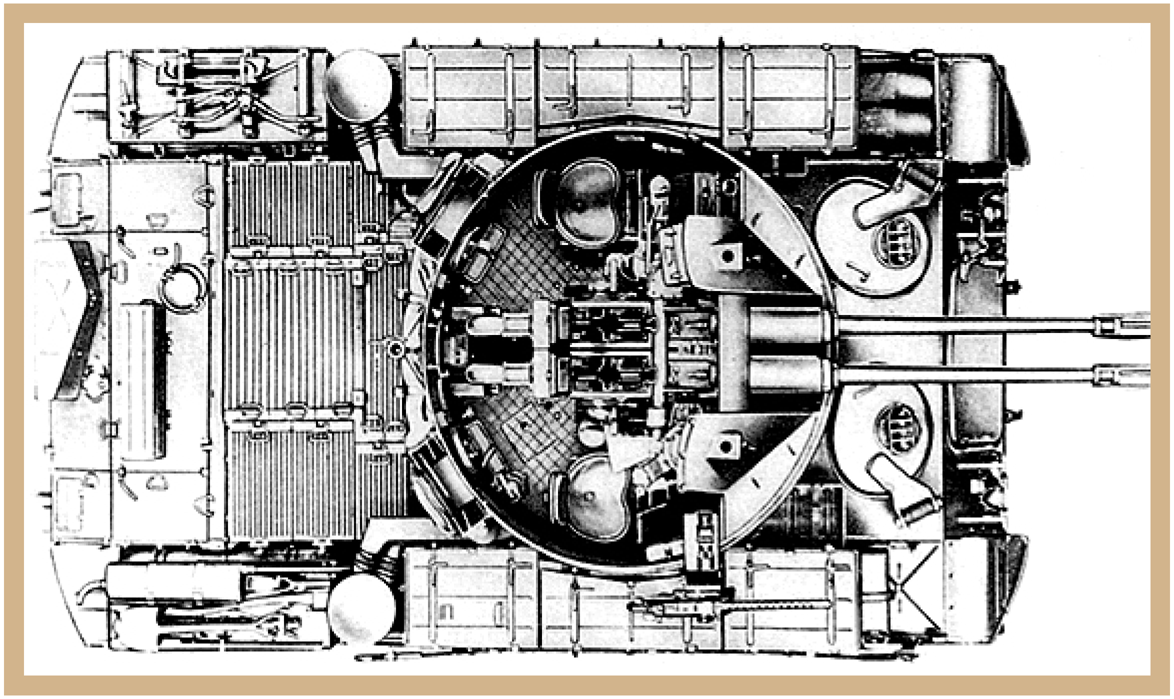
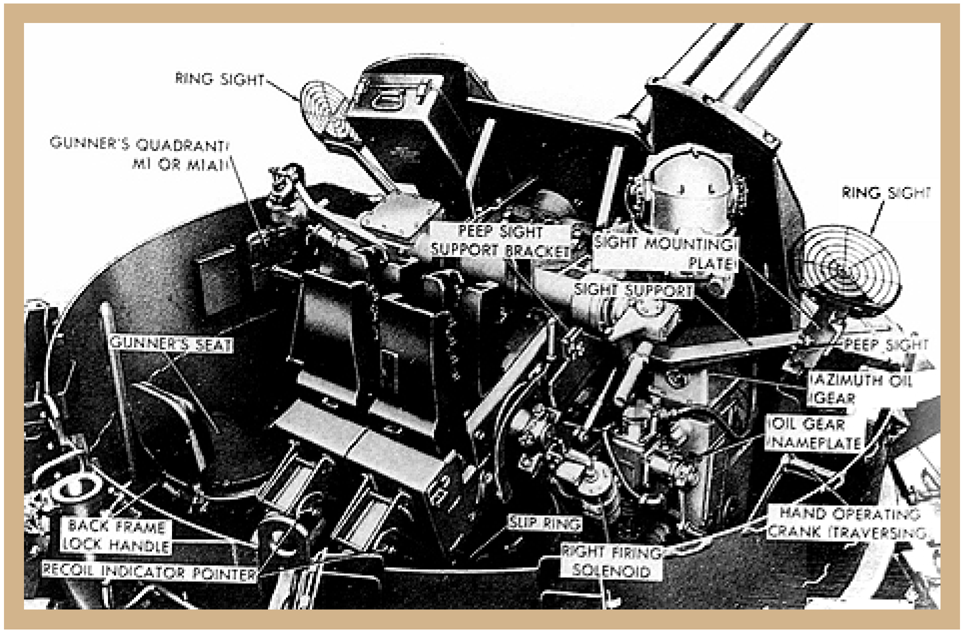
US M42 "Duster", Part 2



Picture 1:
The over-head view of a later built Duster shows some details of the top of the vehicle and the general configuration inside the turret. The ribbed boxes on each fender contain many of the 40mm rounds stowed on the vehicle (more were stored inside the hull behind the driver and radio operator) but there are also small boxes on the back of the turret for a couple of additional 4-round clips. Notice also the two pintle mounts for the MG on the turret wall, one on the right side and one on the rear. On the back engine deck, actually over the transmission access hatches, are the two storage boxes for the rocket launcher (bazooka) and rockets, which were rarely, if ever, seen in Vietnam on these AFVs. The engine air cleaners are the large cans to either side of the engine deck louvers, behind the ammo bins. Notice that this is a later produced vehicle as there is no connecting hatch between the driver and commander's hatches.

Inside the turret, the twin M2A1 40mm guns are mounted side by side in their M4E1 mount. The Gunner's seat is at the left and the Sight Setter's is to the right. In this case, the .30cal Browning MG is mounted on the right pintle mount but radio antennas have not been attached to their bases on the front gun shields (the shields sometimes were called "rabbit ears" by crews).

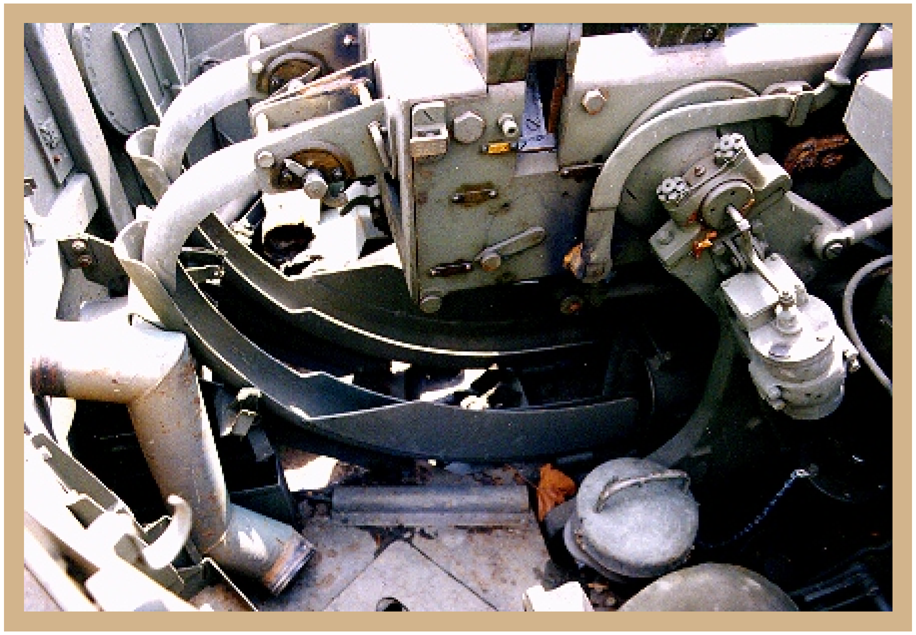


Picture 2:
Here is the view of the right side of the M42 gun turret using the picture from the TM. The gun turret mounted on the M42 was a modified version of the one used in the earlier M19 AFV. This is the Sight Setter's side of the gun, this cannoneer responsible for manually adjusting the M38 Computing Sight for correct lead on target during powered operation. He also traversed the turret with a hand crank when the turret was manually operated, the hand crank seen directly in front of his seat. Also of interest in this TM image is the Gunner's quadrant M1A1 in its stowage location at the far left. The Gunner was also equipped with an Azimuth Indicator M27, and when combined with the Quadrant he was able to aim the guns for indirect fire, as with any artillery piece.

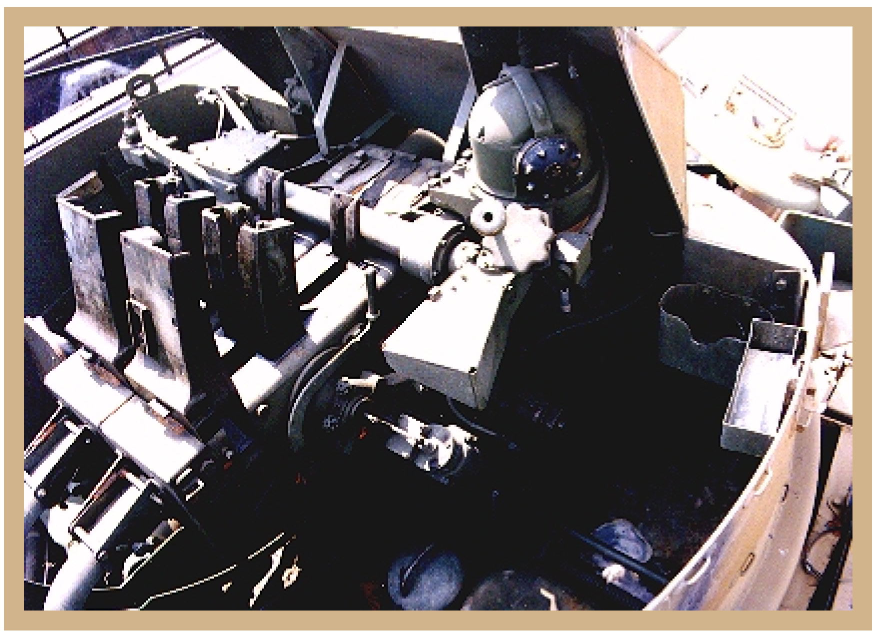
Since the Duster did not mount any type of radar, it was only effective in its intended defensive anti-aircraft role against low level, prop-driven aircraft. With the later Soviet introduction of jet attack aircraft, the Duster was gradually relegated to Reserve and National Guard units in the US and to the MAP program for foreign military sales. It was replaced in front line service by the M163 Vulcan in the late 1960's, but as I mentioned before, three battalions of the discarded Dusters were cobbled together from these same Reserve and National Guard units and shipped to Vietnam for active service once again. Most photos of Dusters in Nam not only show the three piece flash suppressors removed from the gun barrels, but also an M60 7.62 machine gun replacing the original .30cal Browning on the turret mount. Other weapons inside the vehicle included racks for at least one .45cal SMG M3A1 ("Grease Gun"), five .30cal M2 Carbines, and in the early days one 3.5in bazooka M20 stowed on the rear engine deck, as we saw earlier.

Picture 3:
We are up in the turret of the preserved M42A1 now, viewing the right rear of the twin 40mm Bofors guns (M2A1) and mount. There are separate cartridge deflector chutes on each gun to direct spent brass down and away from the rear of the receivers. To the right in the picture is the metallic, cylindrical, electrical firing solenoid for this gun, and just above that is the pivot (trunion) attachment hardware for the gun mount. The firing pin is seen as the small pin in the center of the trunion, the electric solenoid merely pushes in this pin via the lever you see here in order to make the gun fire. An interesting component of these Bofors guns is visible here--the small mechanical recoil indicator which is located on the bracket where the cartridge case deflector tubes bolt to the rear cover of the gun. These small recoil indicator arrows swing back and forth during recoil and provide the crew with a general indication of how far back the guns move after each shot. Also visible on the side of the gun is the curved manual hand operating breech lever that is used only when the auto load system has failed.

At the upper left of the picture is the folded left ammo handler's seat on the back turret wall. At the lower left is the hook used to hang headphones for the radio system; the radio intercom box would be mounted directly below to provide connections for both the Sight Setter and his Loader. Cyclic rate of fire for each barrel of the 40mm weapon was around 120 rounds per minute and maximum anti-aircraft range was 5000m, with ground range being



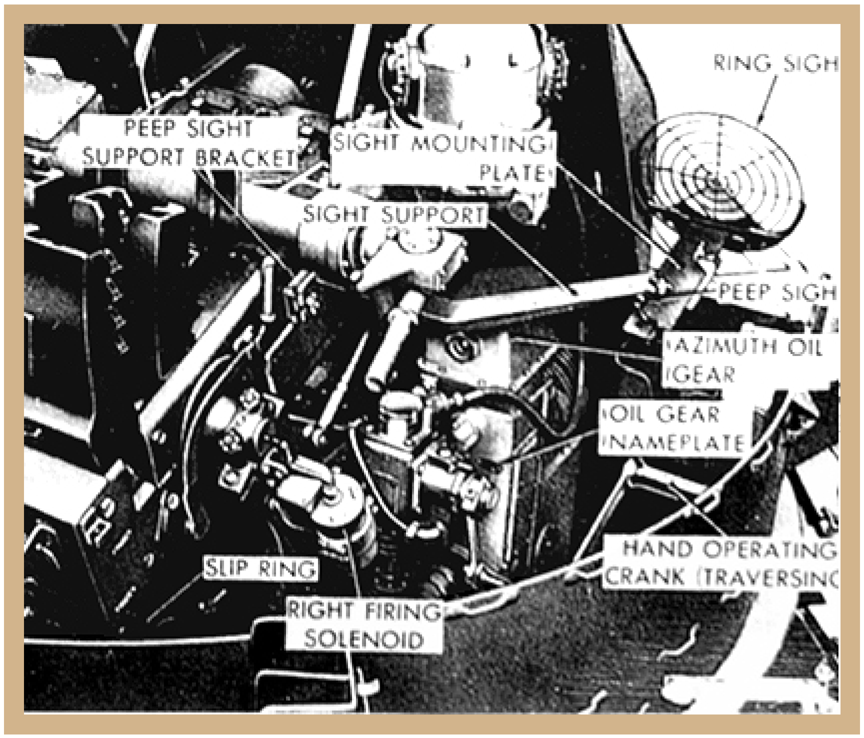
much further, perhaps out to 9500m. Together with their accompanying M55 Quad .50cal gun vehicles, ADA battalions in Vietnam could lay down a frightening amount of clearing fire when necessary.



Picture 4:
This is a view further up on the right side of the turret. The Sight Setter's azimuth hand crank is missing from this vehicle (it was removed during power operation), but if attached it would extend across the right side of the turret, just in front of the operator's seat. Part of his seat cushion is visible at the extreme bottom of the photo. Visible just behind the right gun shield is the azimuth indicator assembly for the gun turret, called an M38 Computing Sight. This was a collection of mechanical dials and indicators mechanically linked to the Gunner's sight on the other side of the turret.

Computing sights are common on light anti-aircraft guns. When the Sight Setter crewman dials in correct values for the target's course, altitude and speed, the correct angle and lead are automatically set into the Gunner's sight graticule on his side of the guns. When a target is designated, the Sight Setter must estimate the speed, direction of flight, and angle of dive or climb of the target and set the Speed Knob, Direction of Flight Pointer, and the Dive and Climb bail of the computer accordingly. This is not an easy task. The Speed Knob is graduated in 20mph increments from 0 to 700mph. The direction of flight pointer may be rotated manually through the entire 360degree arc. The dive and climb bail may be positioned from an 85degree dive to a 60degree climb. It is marked in 5degree increments but the adjustment is infinitely variable. When these numbers have been estimated and dialed into the computer, the Gunner can then align the target in his Reflex Sight M24C (using the power controls of the Drive Controller) and fire his 40mm guns. The Sight Setter watches the tracers and adjusts his sight computer to adjust the stream of tracers onto the target while the Gunner keeps it aligned in his sight. In this way it is the Sight Setter that makes the fine adjustments to kill the target, not the Gunner.

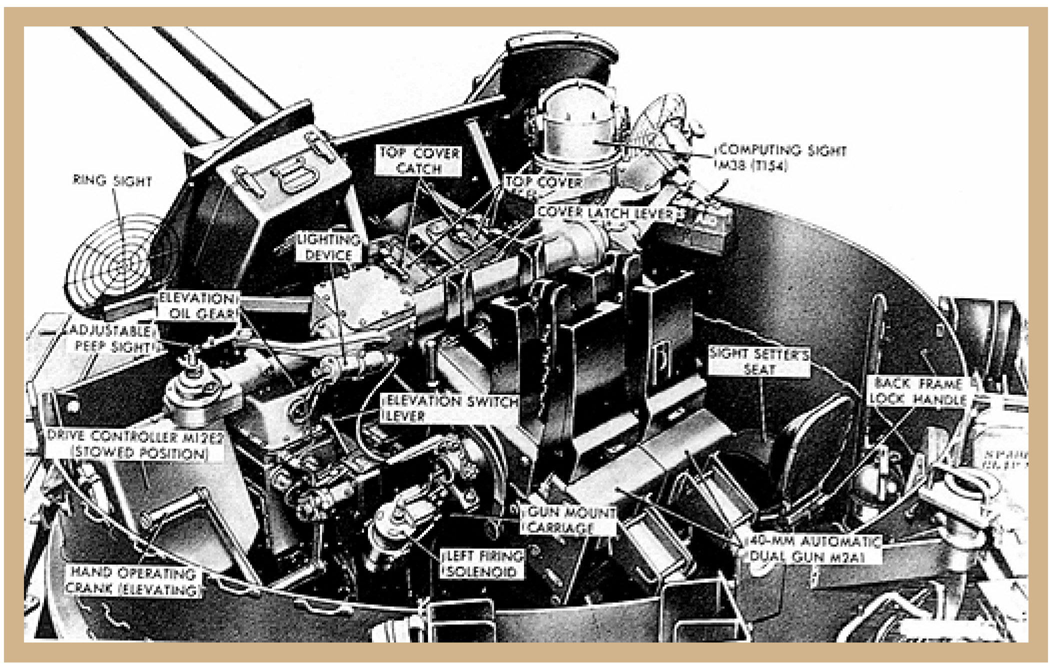
When the guns are operated manually with no power, the Gunner and Sight Setter install the manual hand cranks and the speed ring sights with peep sights. If a speed ring sight was mounted on this side, it would be off to the right of the tube that crosses just in front of the automatic loading feed chutes. When not in use, the speed rings and reflex sights were typically stored in the large box mounted up behind the left gun shield. Directly under the computing sight are boxes that house the hydraulic azimuth oil gear, but it is mostly lost in the shadows here. The Sight Setter's or Commander's binocular case would stow in the bracket you see on the back side of the turret front. A first aid box was held in the bin on the turret wall, to the right of the binoculars, at the lower right corner of the photo.



Picture 5:
An enlargement from the earlier TM image gives us a little better understanding of the jumble of equipment on the Sight Setter's side of the turret. The manual traverse hand crank is to the right of the image, connected to the control at the front of the oil gear azimuth boxes. The right firing solenoid is directly behind. To properly use a Speed Ring Sight requires a peep sight slightly closer to the Gunner, and the peep is identified at the middle right of this image. The Gunner lines the peep up with the center of the Ring Sight to direct his fire. Notice how the peep sight support bracket attaches to the right side of the gun support, right under the power traverse clutch handle. As you can imagine, it takes a lot of practice and routine drill for both soldiers to synchronize their elevation and traverse hand cranking in order to keep the target centered in their ring sights.

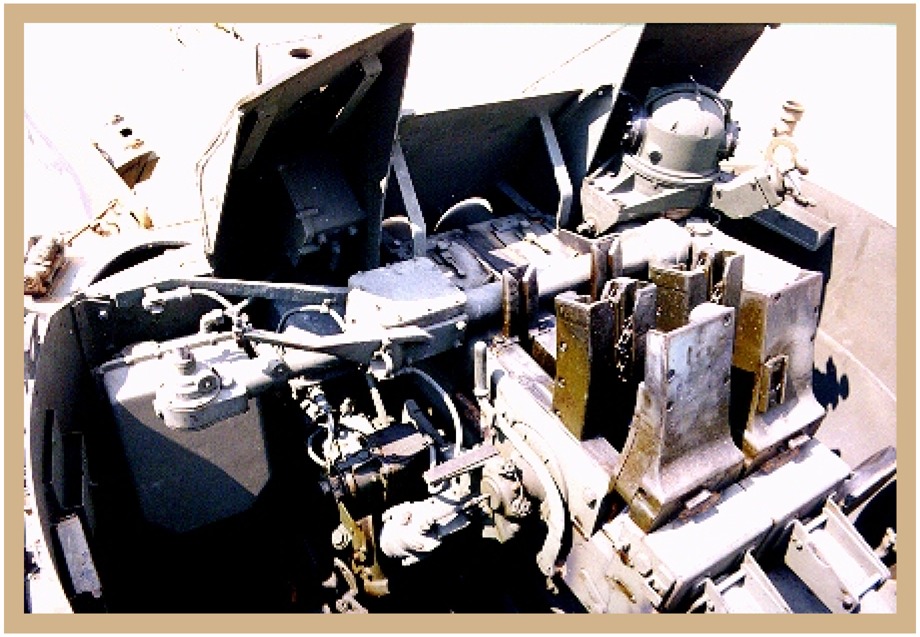
Picture 6:
The view looking straight down into the right Gunner's seat of the preserved M42A1 provides us with some detail of this area. The seat is adjustable both in elevation and forward/back and the elevation spring assembly and handle are located just in front of the seat. The manual cranking handle is not mounted on this vehicle (as if the gun was in power mode), but it would attach to the socket you see at the upper right, directly in front of the

Gunner. Also clearly visible is the large electrical firing solenoid for this left gun, as well as some detail of the spent shell chutes curving under the gun mount. The OD green boxes directly in front of the hand crank socket are the oil gear power traverse equipment that we saw last frame.



Picture 7:
Here is the view from the technical manual of the left side of the turret and the Gunner's equipment over here. Notice the detail around the ammo feed chutes and the oil gear control boxes under the adjustable peep sight. The manual hand crank for elevation is clearly visible now at the lower left of the image. From this angle you can see into the right rear of the turret where a fire extinguisher is just visible at the lower right. Also over there is the pintle mount for the .30cal Browning carried for ground protection in early vehicles.

To operate the gun mount under power requires setting a couple of switches. The Control Selector Switch located on the left gun shield (and just barely seen here) is moved to the LOCAL position. It can be left in this position at all times except when the gun mount is tracking from off carriage controls. The Gunner then turns the Master Switch ON and starts Little Joe (aux. engine/generator). The Elevation switch lever on this left side of the gun mount, to the rear of the oil gear, controls gun mount power in both elevation and azimuth. Pulling back on the switch lever does several things in sequence. First, it mechanically engages the slewing clutches in the oil gear. After the slewing clutches are engaged, a switch is closed to start the elevation oil gear, azimuth oil gear, and the Inverter. Finally, the Gunner turns ON the rate switch, which is located behind the control handle of the drive control. Unless the rate switch is on, the gun mount or guns will only move a few degrees. Now the guns can be power elevated and traversed by the Gunner to keep the target in the reflex sight while the Sight Setter inputs his estimation data into the sight computer.

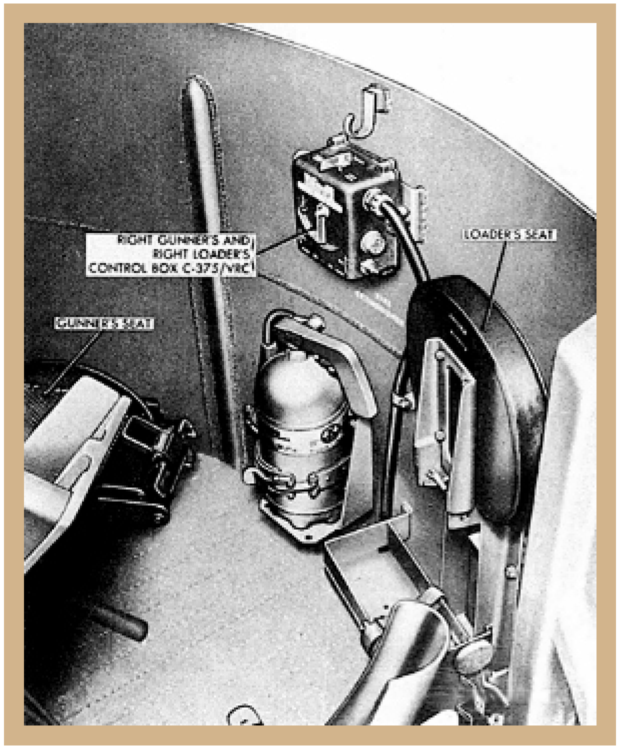


Picture 8:
A view of the left of the twin 40mm license-built Bofors guns from the preserved vehicle provides some additional details. Visible at the bottom is the Gunner's seat responsible for elevation of the guns in manual mode and both elevation and traverse in powered mode. Again, the hand crank is not mounted, but it would attach to the elevating mechanism behind the left gun's firing solenoid, in the center of the picture. Visible on this side of the gun is the hand operating lever, as well as the gun trunion, firing solenoid and firing pin. The mounting bracket for the Gunner's sight is toward the left in the picture with the rear peep sight seen on its extension arm just to the right of the sight mount. None of the sights are mounted on this vehicle. This is also a good chance to examine the auto feed mechanism and ammo chutes. The rear chute is large to accept the end of the shell while the front guide only handles the point of the projectile. The actual feed mechanism is the middle feed guide, called the Feed Pawl. Inside the pawl are the catches that automatically lower the next round into the gun after each shot.

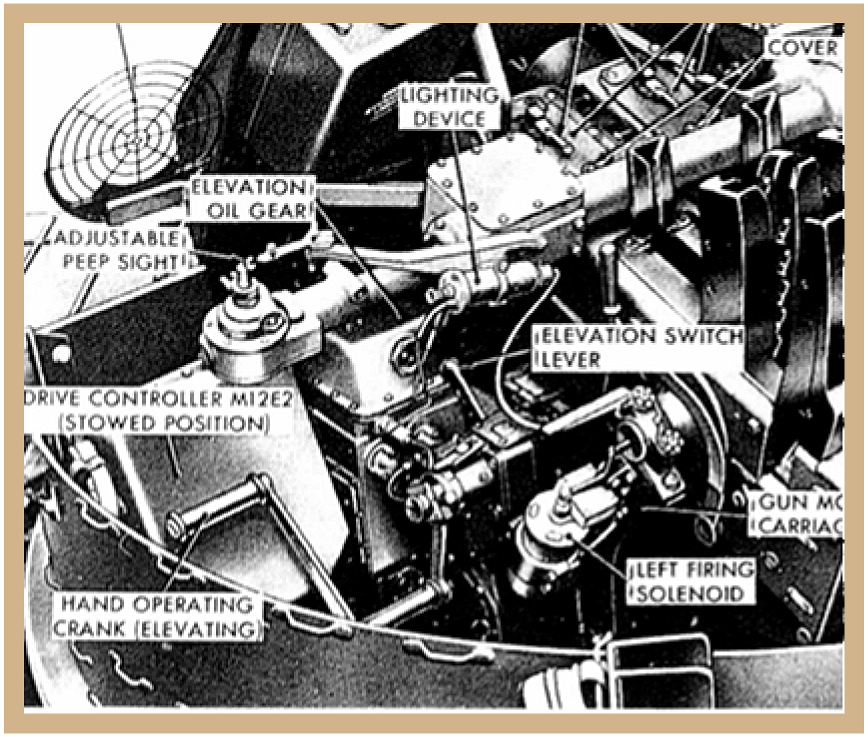
The interior of open turrets in the US arsenal were generally painted the exterior base color. The feed chutes are dark from grease and oil, and the seat cushions are black. The bulk of the Bofors guns would be black or painted the same as the rest of the interior of the turret. The M4E1 gun mount would be painted the same color as the rest of the turret interior and vehicle exterior.

Picture 9:
Here is the right rear corner of the turret we just mentioned. The portable red fire extinguisher is of the CO2 type with typical manual lever operation. The right ammo handler's seat is folded at the far right (both these seats are non-adjustable) and above the extinguisher is this side's crew radio intercom box. Part of the right Sight Setter's seat is at the far left.

The M42 was supplied to a number of other countries including Austria, Germany, Japan, Jordan, and Lebanon. Vietnam saw the only combat use of the vehicle by the US Army; the Duster was used particularly effectively in the role of air base protection and convoy support. In fact, Dusters of Battery C, 1/44th Artillery led the task force of Operation Pegasus that broke the siege of Khe Sanh in April of 1968.



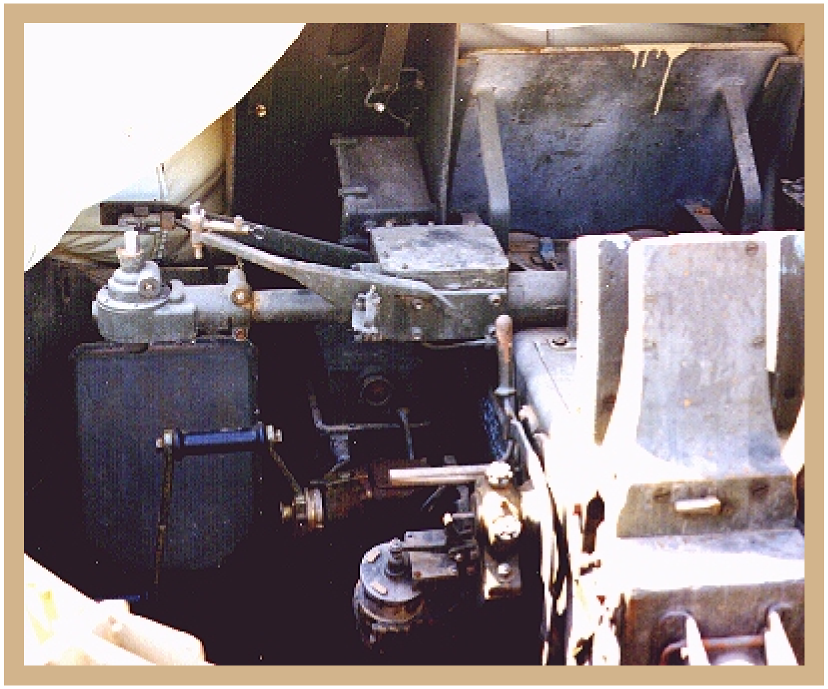
Picture 10:
A close up crop of the TM image allows some sorting out of the Gunner's equipment near his seat when the turret was set up for manual operation. The hand operating crank is clear, with both handholds now visible, as this was a two hand job. The power lever for elevation and traverse is identified in the picture just behind this side's gun trunion mount. The left gun's firing solenoid is in a similar position as the other side, and again there is a Peep Sight mounted on a bracket on this side of the Speed Ring Sight. The Lighting Device is a battery pack to provide electricity for a light bulb in the Gunner's reticle when the Reflex sight is mounted during power operation (which it is not in this picture). The large stowage box for the Speed Ring Sights, Reflex Sight, and Lighting Device is on the back of the left gun shield that you can see at the top of the picture.

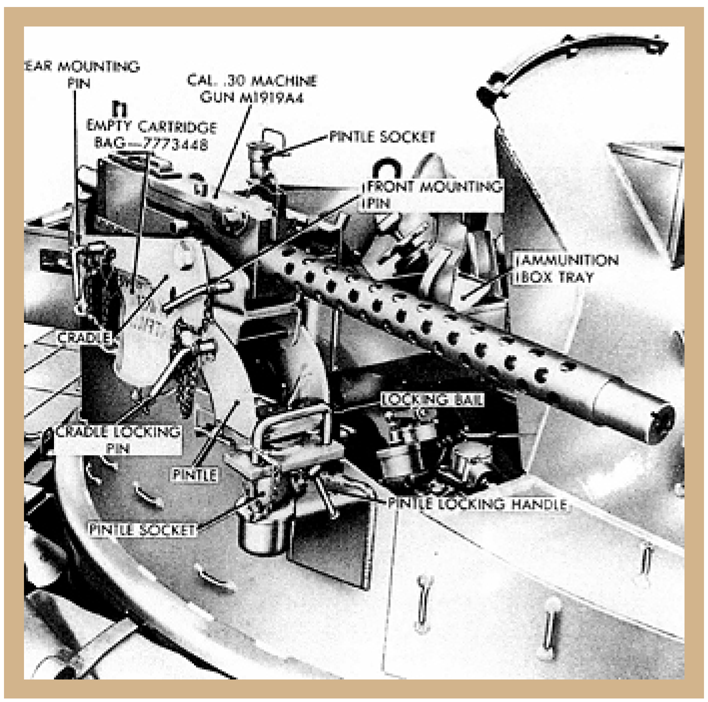


Picture 11:
Inside the turret of the Texas National Guard Duster we see a few familiar pieces of interior equipment. A tarp partially obscures some of the image, but the left Bofors gun's rear plate and spent cartridge case chute are at the right. On the left side of the gun is the trunion gun mount with its firing pin, and the firing solenoid, with its actuating lever resting on the firing pin, is also clearly seen at the bottom of the picture. Notice the long curved handle of the hand operating lever for manually loading the breech if the auto load feature malfunctions.

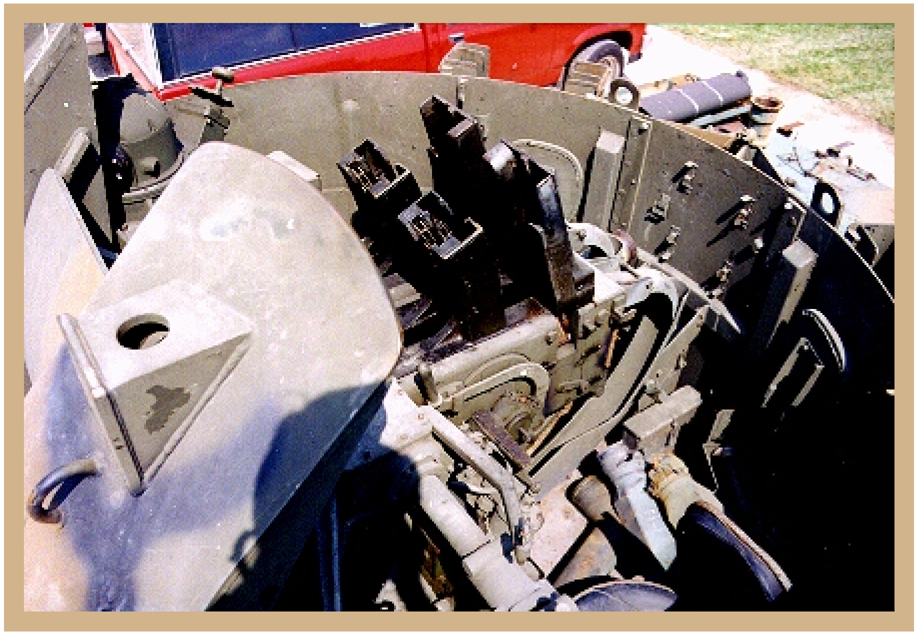
Here the manual elevating crank with black handles is intact at the left side of the image, and behind it is the flat M12E2 Drive Control in its stowed position. The Drive Control must be raised into operating position for power operation. To raise it you must turn the locking knob a quarter turn, lift up the controller, and be certain the knob is turned so the locking plunger re-engages. This puts the elevation, azimuth and firing controls right in the Gunner's lap.

Directly over the Drive Control is the mounting stud for the Reflex Sight and to the right of the mount stud is the base for the peep sight bracket. Notice that this peep sight has been swung over to the right and out of the way. In manual turret mode it would be aligned to the left, behind the Speed Ring Sight which would be mounted on the second support bracket just forward of the peep sight bracket. The peep sight was adjustable up and down at its bracket connection and from side to side in its own small mount via a set screw. Between the manual elevation crank handle and the base of the peep sight bracket you can just see the top of the oil gear box in the shadows. You might compare this picture with the previous TM illustration to get a better feel for the equipment on this side of the turret.

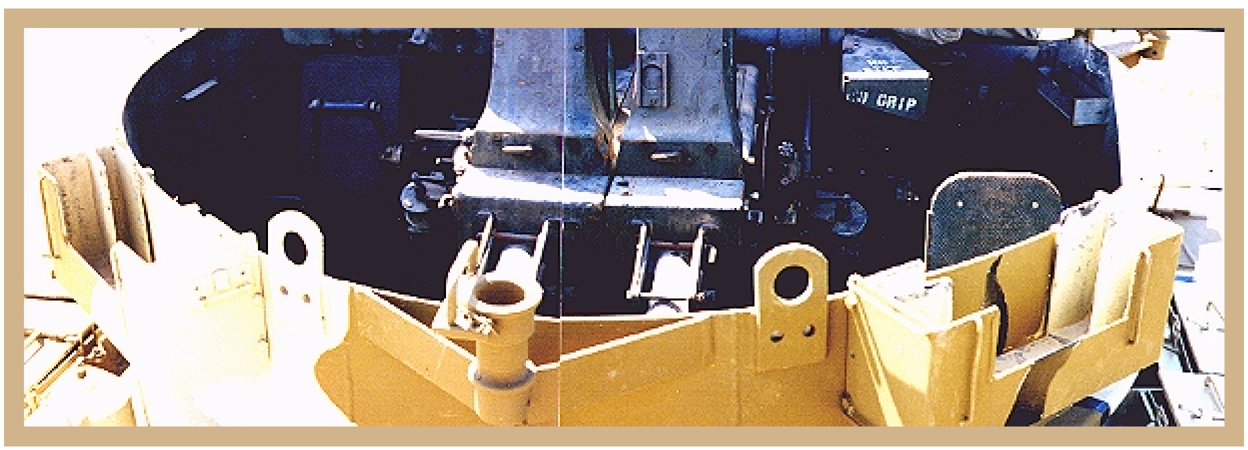




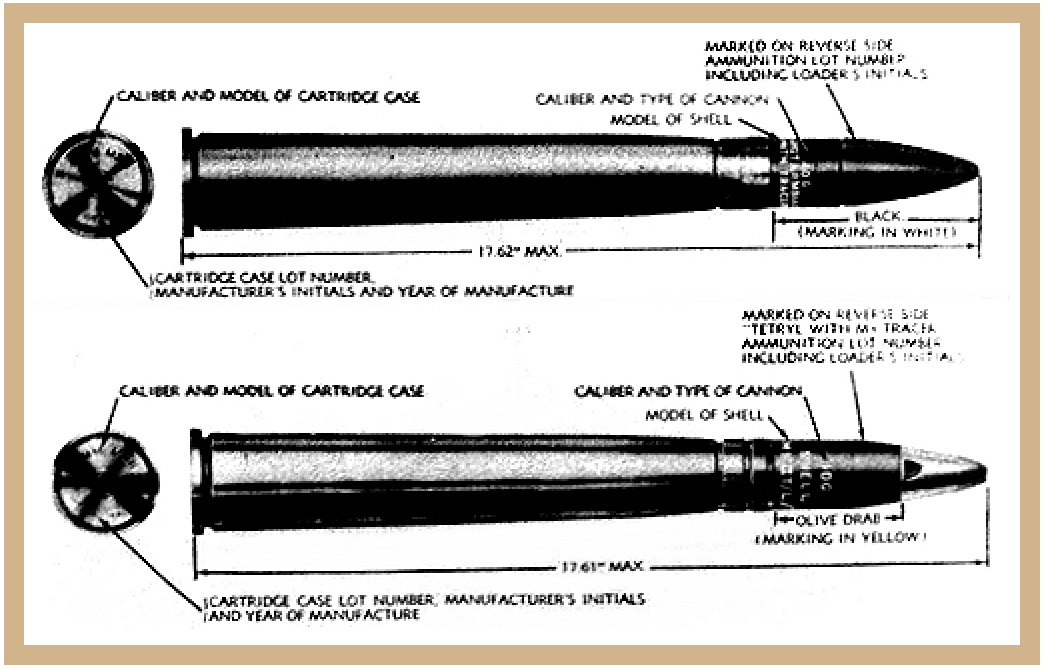
Picture 12:
The pintle mount for the machine gun is illustrated in this TM image. The base of the mount was welded to the right turret side but the gun could be fired from inside the turret as well as outside when standing on the surrounding deck. This is a typical pintle and cradle mount for a .30cal Browning seen in a number of other applications on US vehicles and includes the ammo box and support on the left side of the mount. Notice the radio antenna base mount at the upper right corner of the picture. When two radios were carried there was a second mount on the left gun shield in the same general position. Notice that there were a couple of pintle sockets welded on the turret at different locations. Typical ammo load included 480 rounds of 40mm (all in four round clips) and 1,750 of .30cal, stored in typical steel ammo boxes.



Picture 13:
This photo was taken of the privately owned preserved vehicle turret looking back toward the rear wall. The ammo feed chutes are clear in this photo, as is the Gunner's seat at the bottom of the picture. You can see the folding seats of both Loaders at the rear of the turret, as well as the spent cartridge discharge chutes. Also clear here are some of the mechanisms of the feed pawls for both guns. Although not in view here, the Gunner had two levers on the floor near his right foot to unlock the elevation and traverse for the turret. Powered traverse could spin the turret at 40 degrees/second and the guns could be elevated or depressed at roughly 25 degrees/second. Maximum elevation for the M2A1 guns was around 85 degrees, and the weight of the entire vehicle was approximately 48000lbs. Around 3,700 various Dusters were manufactured by both Cadillac Motor Car Company and by American Car & Foundry until production ceased in 1957.



Picture 14:
Our last interior photo of the M42 Duster is of the Texas NG M42A1 again, this time a composite of the rear of the turret. Notice the rear pintle detail and the two ammo boxes on the back of the turret with the angled divider inside. This vehicle still has the Gunner's and Sight Setter's manual hand cranks and other details are also visible that we have examined previously.

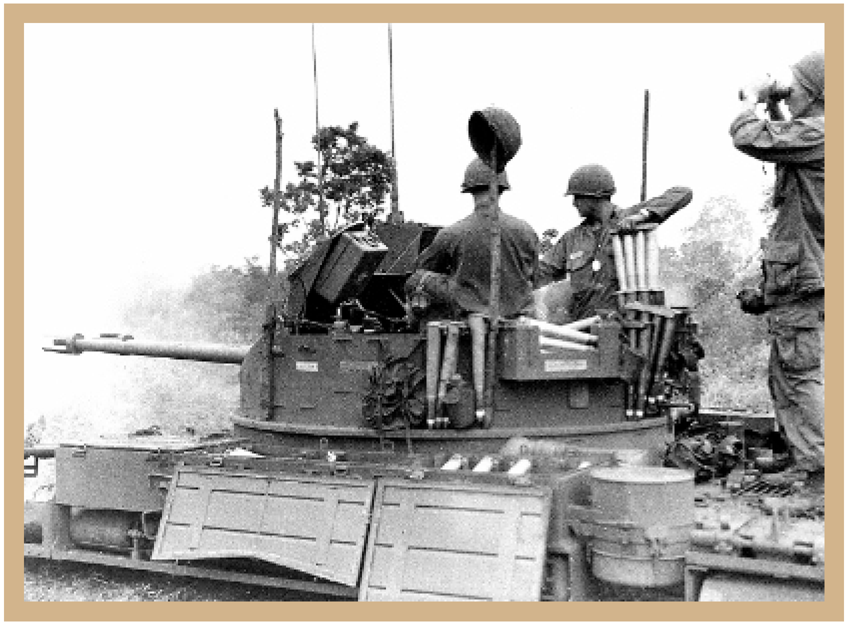


Picture 15:
The 40mm M2/M2A1 guns had a vertical sliding wedge semi-automatic breech design. The rounds were fixed and came packed in four-round clips, fed by hand into the guns via the seven round magazine on top. The rounds used percussion primers in the shell and the two major ammo types that were provided in Vietnam included both AP-T (M61A1) and HEI-T (MkII). Even though the HEI-T had a terrific blast and fragmentation effect, it also had a very sensitive fuse that reduced its effectiveness when firing through heavy underbrush. But at long ranges the 40mm projectile was very productive against many types of targets. This TM image shows the markings and colors of both rounds with the AP-T at the top. "T" in the names stands for "Tracer"; all rounds had tracers to help the Sight Setter and Gunner direct their fire visually.

Picture 16:
In combat there never seemed to be enough ammo around and this US Army picture illustrates the need for steel and brass. You will often also see rounds stored in the two boxes on the back of the turret (as we saw in an earlier picture) as well as four round clips hooked over the turret armor. Here the full turret crew is visible with the vehicle commander on the back deck with binoculars. This US Army photo shows another 60th Artillery Duster, this time near the Cambodian border, in August of '67. Notice the fender ammo bins on this side are open and filled with brass cased rounds. The vertical branches lashed to the turret armor provided support for a tarp to cover the open turret for protection from both the blistering heat of the sun and the periodic torrential rains that plagued Vietnam. Water caused a lot of problems for the mechanical equipment inside the turret. Notice that this Duster DOES have the flash suppressors on the end of the barrels (never say "never").

After the US pull out from Vietnam in the early 1970's, all the remaining M42s that were serviceable were returned to National Guard and Reserve Units that they had been commandeered from for the war. The M42 was removed from active service in even these units sometime in the late 1980's or early 1990's. However, the chassis of the Duster had proved so reliable, and the fire from the twin 40mm Bofors so devastating, that the vehicle was popular with a number of other armies. In some cases Dusters still provide protection in air defense artillery units in other countries, often upgraded with new powerpacks and even revised turrets/guns.

All in all, the Duster's main drawbacks were its lack of radar-guided ordnance, fire prone gasoline engine, and due to its age, lack of spare parts. On



the other hand, the vehicle's relatively simple construction and ease of maintenance was a plus, well appreciated by Duster crews. Also, the high ground clearance and excellent hull/suspension system provided vital land mine blast protection, something that would have been greatly appreciated had it been true with other US AFVs in Vietnam.

I wish to thank the men of the Texas National Guard for allowing me to photograph one of their exhibit vehicles one very hot summer day. I am also grateful to David Clarke of Inglewood, New Jersey, for supplying a copy of the 1955 edition of the Cadillac Motor Car Division, Cleveland Tank Plant booklet entitled "Your Date with the Duster". It is a small booklet written in simple language that describes basic operation of the M42 and when combined with the TM provides some fascinating insight into the roles of the Duster crew. The booklet was also very helpful in finally pinning down the differences between powered and manual operation of the gun turret. Thanks again David.

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