

OPERATOR'S MANUAL



HOWITZER, MEDIUM SELF-PROPELLED 155MM, M109A6 (ARMA2-159-SA-NOU-RUK) Version 1.1

Distribution Statement : Highly classified, limited distribution due to levels of awesomeness within.

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RADIOACTIVE MATERIAL (S)



Tritium gas is an ionizing radiation hazard. The beta radiation emitted by tritium is an internal hazard and considered carcinogenic. Tritium can enter the body through inhalation, ingestion or skin absorption.

• If a tritium lamp is broken, tritium gas will oxidize resulting in contamination of the device, virtual personnel and surrounding game areas. Ventilate area immediately with outside air and contact the Local Radiation Safety Officer (LRSO) to determine the extent of contamination to personnel and work areas.

• Prior to maintenance (or if equipment is damaged), check for illumination of the device in a dark room environment. If illumination is not present, notify LRSO. Do not attempt to repair the device.

• Refer to the Safety, Care and Handling section for further guidance.

SAFETY, CARE AND HANDLING PROCEDURES FOR TRITIUM FIRE CONTROL DEVICES WITH RADIOACTIVE TRITIUM GAS (3H2)

1. Purpose and Scope: This procedure implements mandatory license requirements for use and maintenance of tritium radioluminous fire control devices used on howitzers, mortars, tanks, and rifles. Control of Nuclear Regulatory Commission (NRC) licensed radioactive material is mandated by interweb law. This procedure is applicable to all virtual personnel working with tritium devices.

2. Emergency procedures: In the event the radioluminous source is broken, cracked, or there is no illumination, immediately run like fuck to the nearest bunker and call mummy.

a. If a tritium source breaks, keep quiet and inform your local cover up agency who will dispose of bodies and any other potential evidence material. Mentioning said event to your family may result in measures being taken to prevent them speaking.

b. Personnel handling the tritium device should wear oversized inflatable penguin costumes.

c. Personnel who may have been exposed to the broken tritium device should be baked at 400F for approximately 2-3 hours until their juices run clear.

d. Broken tritium sources indoors may result in oversized genitalia and increased sex drive.

WARNING

• DO NOT chamber ammunition until immediately before firing.

Ammunition left too long in a hot weapon may result in hazardous conditions. Fire or remove ammunition within 5 minutes of chambering.

• For each new issue, overhauled, inspected or repaired cannon or mount received, fire first round using 50--ft lanyard.

• The firing of a field artillery round without a fuze or with an unauthorized fuze is strictly prohibited. Only authorized fuzes will be used with the authorized projectiles and propelling charges, or an in--bore premature explosion will result.

• Do not fire charges 1 and 2, Green Bag, M3A1. The fire control solution to fire these charges in the M109A6 Howitzer is not available and you will catch fire.

• Keep all propelling charges containerized until the breech is opened from the previous round. Unused powder increments can be snorted or placed back into powder container on the howitzer until time permits burning. Severe highs may result from accidental inhalation of excess powder increments.

• Do not stand directly behind the breech opening while loading.

• The firing of animals is strictly prohibited.

• High intensity noise hearing protection required. Decibel levels of engine during operation exceed safe levels for virtual hearing. Failure to wear hearing protection could result in hearing impairment and broken limbs.

• Hearing can be **PERMANENTLY DAMAGED** if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Virtual personnel exposed to high noise levels shall participate in a hearing conversation program in accordance with PAM 40--501. Hearing loss occurs gradually but becomes permanent over time.

• Use care when manually unlocking travel lock. If jaw is not fully unclamped, crowbar will snap back. Injury to personnel could result as well as loss of fingers from your right hand.

• Do not open doors in an NBC environment. LEAD filter shall be used during Fire Missions and during suspected NBC environment, to prevent exposure to carbon monoxide gas. If NBC exposure is suspected, all air filter media will be handled by personnel wearing full NBC protective equipment who will then be burned and their families informed. Consult your unit NBC officer or NBC NCO for appropriate handling or disposition instructions.

• Remain at least 2 feet from radiating antennas of vehicle mounted radios. Antennas can radiate harmful levels of radio frequency which may cause brain death or internal cooking.

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1.1 - Requirements / Prerequisites

- Arma 2 OA

- 1.59 Patch or higher (may work with lower versions but untested)

1.2 - Installing the modification

As always, modications should be installed in their own @Modfolders and ran via the"**-mod**" command switch or via an add-on management tool.

1.2.1 - To install the modification, copy the @SNR folder from the distribution into your Arma 2 root directory (C:\Program Files\Bohemia Interactive\Arma 2).

1.2.2 - Add the @SNR to your modline or via your favourite mod management tool, should command line should look as follows:

"C:\Program Files\Bohemia Interactive\ArmA 2\arma2 oa.exe" -mod=@SAM109A6

Additional information on how to install add-ons and manage add-ons can be found here - http://community.bistudio.com/wiki/Biki2.0:Installing_Addons



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2.1 - Where to find the M109A6 in the editor

The Paladin can be found under BLUFOR > US > ARMORED > M109A6 (D)

Side: BLUFOR Faction: US Army Class: Armored Unit: M109A6 (D) Control: Player as commander Info age: Unknown Vehicle lock: Default Default Skill: Initialization: Excription: Fuel Ammunition Probability of presence: Condition of presence: Placement radius: O	Insert unit			
Faction: US Army Rank: Private Class: Armored Unit: M109A6 (D) Control: Player as commander Special: In Formation Info age: Unknown Name: Special: In Formation Vehicle lock: Default Skill: Skill: Skill: Description:	Side:	BLUFOR		
Class: Armored Unit: M109A6 (D) Control: Player as commander Special: In Formation Info age: Unknown Name: Secial: In Formation Vehicle lock: Default Skill: Skill: Skill: Description:	Faction:	US Army	Rank:	Private
Control: Player as commander Special: In Formation Info age: Unknown Name: Name: Vehicle lock: Default Skill: Skill: Initialization:	Class:	Armored 🗸	Unit:	M109A6 (D)
Info age: Unknown Name: Name: Vehicle lock: Default Skill: Initialization: Description: Health/armor Fuel Ammunition Probability of presence: Condition of presence: Placement radius: 0	Control:	Player as commander 🖂	Special:	In Formation
Vehicle lock: Default Initialization: Description: Health/armor Fuel Ammunition Probability of presence: Condition of presence: true Placement radius: 0	Info age:	Unknown 🗸	Name:	
Initialization: Description: Health/armor Fuel < Ammunition < Azimut: O Probability of presence: Condition of presence: True Placement radius: O	Vehicle lock:	Default 🗸 🗸	Skill:	
Description: Health/armor < Fuel < Ammunition < Probability of presence: < Condition of presence: Placement radius: 0	Initialization:	an tau an an tai ta		
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Health/armor Fuel Fuel > Ammunition > Probability of presence: > Condition of presence: True > Placement radius: 0	Description.	L		
Fuel Image: Condition of presence: Condition of presence: Image: Condition of presence: Placement radius: Image: Condition of presence:	Health/armor			Azimut:
Ammunition Probability of presence: Condition of presence: True Placement radius:	Fuel			
Probability of presence: < > Condition of presence: true Placement radius: 0	Ammunition			
Condition of presence: true Placement radius: 0		Probability of presence:	<	
Placement radius: 0		Condition of presence:	true	
Placement radius: 0				
Placement radius: U		Discount and and		
		Placement radius:		
OK Cancel			и ок	Cancel

2.2 - Where to find the FAPPs (Field Artillery Projectile Pallet)

	Insert unit			
	Side:	Empty 🗸		
	Faction:		Rank:	
FAPP ammo pallets can be found under	Class:	Ammo 🗸 🗸	Unit:	- 🗸
FMPTY AMMO and lists /	Control:	Non Playable 🔍	Special:	155mm M483A1 DPICM FAPP
EIVIT I I > AIVITVIO and lists 4	Info age:	Unknown	Name:	155mm M485 ILLUM FAPP
variations:	Vehicle lock:	Default	Skill:	155mm M825 WP FAPP
	Initialization:			
	Description:			
M483A1 DPICM (Dual-Purpose				
Improved Conventional Munition)	Health/armor	<	>	,
MARS II I IIM (Illumination)	Fuel	<	2	k /
	Ammunición	8	inter and international second	
M795 HE (High Explosive)		Probability of presence:	<	
M825 WP (White Phosphorus)		Condition of presence:	true	
		Placement radius:	0	
			A OK	Cancel

SECTION 2 CONTINUED MODEL

2.3 - Positions of the M109A6

2.3.1 - Driver seat

The driver is responsible for the driving of the vehicle and deployment of the spade stabilisation system which converts the vehicle into a static firing position until disengaged.

2.3.2 - Commander seat

The commander is responsible for the operation of the AFCS (Automatic Fire Control System) which enables the operator to calculate fire missions and select the appropriate round type to send.

2.3.3 - Gunner Seat

The gunner controls all loading, unloading and firing of munitions for the M109A6 platform.

2.4 - Default load-out of the M109A6

Round Type	Quantity	Classname
DPICM	20	"SA_155mm_m483a1"
(M483A1)		
HIGH EXPLOSIVE	10	"SA_155mm_m795"
(M795)		
WHITE PHOSPHORUS	3	"SA_155mm_m825a1"
(M825A1)		
ILLUMINATION	2	"SA_155mm_m485"
(M485)		
DPICM BASE BURN	2	"SA_155mm_m864"
(M864)		
EXCALIBUR BLOCK I	2	"SA_155mm_m982"

SECTION 3 AMMUNITION - FAPP / AMMUNITION TYPES AND FUZING

3.1 - FAPP(s)

3.1.1 - FAPP models

The FAPP is a NBC decontaminable, non--flammable, reusable metal pallet. It allows for easy repalletization in the field with no special tools required. The FAPP consists of a steel pallet base, steel pallet cover and two adjustable rods that hold the cover to the base. The two adjustable rods hold securely the FAPP without any banding needed. There are plastic spacers under the base of the projectile and on top of the lifting plug to prevent abrasion. The FAPP holds up to eight 155MM projectiles with a minimum of two projectiles and it accommodates both the plastic grommet and the flexible rotating band cover (FRBC) for rotating band protection. Before loading the FAPP with projectiles, the latch rods must be assembled to the pallet base. The center of the pallet is loaded first to avoid tipping over. Once the FAPP is loaded, the pallet cover with the handles in open position is placed over the projectiles. The pallet cover is then closed by pushing the handles down into the lock position.



FAPP - Pallet Types - Page 1

8 x M483A1 DPCIM 155MM



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Soul Assassin, Noubers and Rexehuk



8 x M485 Illumination 155MM



SECTION 3 CONTINUED AMMUNITION - AMMUNITION TYPES

3.2 - AMMO types

M483A1 - Dual -Purpose Improved Conventional Munition

This is a dual--purpose ICM projectile. It is effective against personnel and light material targets. These base-ejection type projectiles consist of a steel body with aluminum base and ogive containing an expelling charge and 88 shaped--charge grenades. This projectile weighs approximately 103 lb (46.76 kg) and is fitted with a yellow, fusible lifting plug. This projectile uses the M577 series MTSQ or the M726 ET fuze. It can be used in the fire--for--effect or self--registration modes.



M483A1 PROJECTILE

M795 - High Explosive

This high--explosive, shallow cavity projectile is used as a registration round for the M483A1 family of cargo munitions. It is also used for Harassment and Interdiction (H&I), fragmentation, mining, and blast effect. The M795 projectile consists of 23.8 pounds of TNT explosive loaded into a 78.1 lb (35.46 kg) body assembly. A welded rotating band encircles the high fragmentation steel HF--1 body near its base.



SECTION 3 CONTINUED AMMUNITION - AMMUNITION TYPES

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M825/M825A1 - Smoke / WP

The M825/M825A1 projectile consists of a modified M483A1 projectile carrier with a payload of white phosphorus impregnated felt wedges. In--flight fuze functioning ejects a canister. A burster inside the canister scatters burning wedges over the target area, producing obscuring smoke. This projectile uses the MTSQ M577 or the M762 ET series fuze. The M825A1 contains an improved payload and a new base which have corrected the M825 flight instability. The restrictions imposed on the M825 do not apply to the M825A1. The M825A1 has a weight of 102 lbs (46.3 kg) or 2--6 square.



M864 - BB DPICM

This is an extended range dual purpose, ICM projectile used in the M284 or M185 cannon. The M864 is modelled after the M483A1 projectile with the addition of a base burner unit at the projectile's base. The propellant in the base burner ignites upon firing of the projectile, producing gases, which reduces the drag on the projectile and extends its range. This is a base ejection type projectile with a steel body. The expulsion charge contains 105 grams of M10 propellant. There are 72 shaped charge grenades, 48 are M42 grenades and 24 are M46 grenades. They are effective against personnel and light materiel targets. The projectile weighs approximately 102 lb (46.3 kg) or 2--6 square and uses the M577 series MTSQ fuze or the M762 ET fuze. It can be used in the fire--for--effect mode or the registration mode.



SECTION 3 CONTINUED AMMUNITION - AMMUNITION TYPES

M485 - Illumination

These projectiles are used for battlefield illumination. The projectile has a hollow steel body containing a primary expelling charge, a canister assembly, and a drogue parachute. The canister assembly contains a secondary expelling charge, a delay holder, a light producing chemical, and the main parachute.



XM982 Excalibur - Unitary Warhead - BLOCK I & BLOCK II

The Excalibur 155mm Precision Guided Extended Range Artillery Projectile. The XM982 Block 1 has been designed with long range penetration accuracy against a variety of soft and hardened targets. The XM982 Block II features a DPICM warhead for area affect requirements. Featuring GPS assisted INS navigation and in-flight guidance ability, it is one of the most advanced warheads available to the M109A6 paladin.



M731 - ADAM-S (Area Denial Artillery Munition)

The M731 ADAM-S is a variant of the M692 ADAM munition, but features shorter self-destruct times for the dispersed sub munitions. The projectile expels munitions from the rear subject to the predetermined ejection time dictated by the fuse. Once triggered, 36 sub-munition anti-personnel mines eject from the base, arming after hitting the ground; self-destructing after their set time has ended.



SECTION 3 CONTINUED AMMUNITION - FUZING

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3.3 - Ammo fuses

AMMO TYPE	FUZE	POINT DET ONATE	TIME	PROXIMITY	DELAY
M483A1 - DPICIM	M782		Х		
M795 - HE	M782	Х	Х	Х	Х
M825A1 - WP SMOKE	M782		Х		
M864 - BB DPICM	M782		Х		
M485 - Illumination	M782		Х		
M982 - GPS Excalibur Block I	N/A	Х		Х	Х
M982 - GPS Excalibur Block II	N/A			Х	

** Note **

While some of the rounds share the MOFA fuse, for the initial release of the add-on <u>we have not added</u> the modes to all of the rounds using the MOFA fuse in order to cut down on the amount of coding.

3.3.1 - Fuse information

M782 (MOFA) - Fuse, Artillery, Multi-Option

These fuzes are intended for use with fragmentation (HE loaded) and burster--type projectiles. They are automatically remote set prior to launch via an inductive communication link. There are four functional modes on these fuzes, point detonating (PD), delay (DLY), variable time (VT), and time (TIME). An electronic subassembly containing integrated circuits provides control and logic for 199.9 seconds electronic timing, and transmits a fire pulse signal for time and proximity functions.



MULTI-OPTION FUZE ARTILLERY (MOFA), M782

SECTION 3 CONTINUED AMMUNITION - FUZING

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MOFA utilizes a standard M739 Safety and Arming (S&A) mechanism that is housed in a retaining cup just below the detonator block. Both setback and spin locks are used to prevent accidental arming of the S&A prior to firing.

This S&A mechanism provides a safe separation distance of at least 400 calibers of projectile travel when fired.

These fuzes are set remotely by a weapon equipped with auto--set fire control system or by a Portable Inductive Artillery Fuze Setter (TM 9--1290--210--12&P). The setting can be changed as many times as required.

This fuze is not sensitive to rain.

SECTION 3 AMMUNITION - PROPELLING CHARGES

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3.4 - Propelling Charges

3.4.1 - M231 - Charge 1-2

The M231 propelling charge is comprised of a green-colored, coated, nitrocellulose--based combustible case with black markings and black bands. This charge is bi--directional (can be loaded in either direction). The M231 is fired in increments of 1 or 2 for charges 1 and 2.



3.4.2 - M232 - Charge 3-5

The M232 propelling charge is comprised of a tan-colored, coated, nitrocellulose--based combustible case with black markings. This charge is bi--directional (can be loaded in either direction). Each end has four raised 1/8--inch bumps. The M232 is fired in increments of 3 through 5 for charges 3 through 5.



SECTION 3 AMMUNITION - PRIMER

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3.5 - Primer M82

WARNING

The M82 is the only primer authorized for firing in the M284 cannon.

The primer, which is loaded separately from the projectile, is inserted into the primer chamber. When the cannon is fired, the firing p in strikes the primer which in turn ignites the charge, propelling the projectile forward.



M82 PRIMER

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4.1 - Commander UI

16	M109A6 P TGT GRIC TGT ALT AVAILABI 20 M48 10 M79 3 M825 2 M864 2 M485 5 M485 5 M485 5 M485 5 M485 S	Paladin AF LE AMMO 3A1 DPICM 5 HE A1 WP SMO BB DPICM ILLUM CDC UE M483A1 Platform	KE 3 DPICM 4	.0 1 2 0 5 waiting	G: 034903 SOLUTION CD: 3117 MD: IDLE OT Dir.: Left/Right: Add/Drop: Up/Down: mission.	350 A: 19.4 IDLI CE: 0059 MD: IDLE	6 7	
ASTING ORTHI	NG			+	MAX QE MIN QE CHARGE	4	1	3
		Q)	Ø			
	D. RAINI.		2 3		12	GUI		
		4	5 6 8 9		13		53 (1) 22 (1)	51
	OF	8	I ENT		LOAD	10 10	11	
								1 and the second

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4.1.1 - Commander UI - Key

Diagram Reference	USE
	TARGET GRID INPUT FIELD - Format: XXXYYY (024022).
1	The AFCS will accept up to a ten digit GRID if you require further accuracy, just enter in the desired format XXXXYYYY or XXXXYYYYY to use a different grid accuracy.
2	TARGET ALT ITUDE INPUT FIELD - Format: METERS.
3	AMMO TYPES AND AVAILABILITY.
4	CURRENTLY SELECTED AMMUNITION TYPE FOR MISSION.
5	NUMBER OF ROUNDS FOR MISSION.
6	SOLUTION READBACK G - Paladins current GRID. A- Paladins current azimuth. Solution - X / X value representing available number of solutions. CNT - Number of rounds required for mission. CD - Current Barrel Orientation. MD - Calculated Barrel Orientation for fire mission. Round Type - Round type for fire mission. Charge Type - Charge type for round type and fire mission. TOF - Time of flight. TTI - Time till impact.
7	FIRE ADJUSTMENT CONTROL OT DIR - Direction of the target from observer in MILS. LEFT/RIGHT - A left or Right shift perpendicular to the observer target line. ADD/DROP - A increase or decrease in OT distance. UP/DOWN - Increase or decrease in target or burst altitude.
8	CLEAR - Clears mission and empties data fields.
9	CALCULATE FIRE MISSION BASED ON INPUTTED VALUES.
10	ELEVATE AND AZIMUTH BARREL TO CALCULATED COORDINATES.
11	STOW BARREL IN TRAVEL LOCK FOR TRANSPORTATION.
12	SELECT NEXT FIRING SOLUTION +
13	SELECT LAST FIRING SELECTION -
14	GUN SERVO - Activates when gun is traversing.
15	FAULT LIGHT - When flashing indicates fault with firing solution.
16	GUN STATUS - Displays important information and fault reasons.

4.2 - Gunner UI

20 M483A1 DPICM 10 M795 HE 3 M825A1 WP SMOKE 2 M864 BB DPICM 1	Prepare M48 Charge: M23	3A1 DPICM 2 1 MACS Zone 1 3 CHARGE + 4 CHARGE - 5
2 M485 ILLUM 2 M982 GPS HE	Fuze:	Time 6
	lime:	LOAD 8
	Gun Status:	EMPTY 9
		FIRE 10

4.2.1 -Gunner UI - Key

Diagram Reference	USE
1	CURRENT ROUND STORES AND TYPES.
2	CURRENTLY SELECTED ROUND BEING USED.
3	CURRENTLY SELECTED CHARGE NUMBER.
4	CHARGE UP (INCREASE POWER).
5	CHARGE DOWN (DECREASE POWER).
6	FUZE TYPE FOR THE ROUND - Varies depending on round selected.
7	FUZE SETTINGS - Time
8	LOAD SELECTED ROUND CONFIGURATION.
9	GUN STATUS - Updated live.
10	FIRE ROUND - Active once gun is ready to fire.

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4.3 - Driver UI

All driving controls are the same as default game vehicles, the driver does however control the spade deployment system.

4.3.1 - Deploying the spade system

The driver can ENGAGE or DISENGAGE the spade system by using his action menu. It is worth noting that this will remove ALL fuel from the vehicle.



What does the spade system do?

The spade system stabilises the vehicle against forces exerting on the frame from the firing the cannon. It is worth noting this system will NOT help against absorbing recoil when firing outside of an 35 degree frontal arc. It is advised that the spade system is not used when firing outside of the frontal arc, this is known to damage the spades by exerting sideward forces on the mount points.

Spade system in action



Soul Assassin, Noubers and Rexehuk

SECTION 5 EXECUTING FIRE MISSIONS

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5.1 Executing a fire mission

There are two main methods of executing artillery operations in the M109A6 Paladin. One method, if in a combat zone in hostile terrain would be "Shoot and Scoot", a method where rounds are laid and the vehicle continues moving after the shots are fired. The most used method is where spades are deployed from the rear, preventing the vehicle from moving, but providing a more stable gun platform for sustained firing of the artillery piece. For the majority of operations, spades would be used and the M109A6 will be operating as a stationery gun platform, unless the combat scenario dictates otherwise.

No.	Activity	Actions	User
1	Spade Deployment	Commander decides if spades should be deployed for fire mission, if so informs his driver to deploy spade system .	COMMANDER DRIVER
2	Calculate Mission	Opens up his FCS from action menu	COMMANDER
2.1	Calculate Mission	Enters Grid Coordinates in top input box	COMMANDER
2.2	Calculate Mission	Enters Target Altitude into second input box	COMMANDER
2.3	Calculate Mission	Selects Munition Type for fire mission	COMMANDER
2.4	Calculate Mission	Enters Number of Rounds to send in fire mission	COMMANDER
2.5	Calculate Mission	Selects ENT to calculate fire mission	COMMANDER
2.6	Calculate Mission	Uses UP or DOWN arrows on GUI to select appropriate fire solution (low/high)	COMMANDER
2.7	Calculate Mission	Presses LAY control on FCS GUI to shift GUN to desired AZIMUTH and ELEVATION	COMMANDER
2.8	Calculate Mission	Relays ROUND TYPE , CHARGE and FUZING to Gunner	COMMANDER GUNNER
3	Configuring the Gun	Opens GUNNER interface from action menu	GUNNER
3.1	Configuring the Gun	Selects ROUND TYPE from left column.	GUNNER
3.2	Configuring the Gun	Selects relevant CHARGE for the munition	GUNNER
3.3	Configuring the Gun	Sets FUZING and TIME (if required)	GUNNER
3.4	Configuring the Gun	Presses LOAD option and waits until gun status shows READY	GUNNER

5.2 Fire Mission Quick sheet (from stationary)

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4	Firing the Gun	GUNNER relays READY to COMMANDER	GUNNER
4.1	Firing the Gun	COMMANDE R gives FIRE order	COMMANDER
4.2	Firing the Gun	GUNNER pulls lanyard to discharge the weapon	GUNNER
5	Waiting for Adjustments	WAIT for ADJUSTMENTS from forward observers, unless FFE is given	FO
5.1	Waiting for Adjustments	If adjustments are given, enter them into: OT DIR LEFT/RIGHT ADD/DROP UP/DOWN As needed, and proceed to step 2.5 until fire mission has been completed	COMMANDER
6	Moving off	COMMANDER instructs DRIVER to raise spade system	COMMANDER DRIVER

Full step by step continued on next page

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6.1 - Obtaining the GRID and ALTITUDE for fire mission

This is normally given by Forward Observers, for this step by step we will determine the coordinates for ourselves. This means obtaining the GRID position and ELEVATION data for the terrain we'll be firing upon.



Obtaining the GRID and Nearest relational altitude

6.2 - Inputting the data into the AFCS

The data is now ready, and we can begin the procedure to execute a fire mission. you can continue to open your FCS (Action menu as Commander > "Turn on FCS").

** Hint **

If you know you are going to be in the same area for an extended period you may want to deploy your spade system, controlled by the driver of the vehicle (see <u>Deploying Spade System</u>).

6.3 - The FCS and inputting DATA

6.3.1 - TGT GRID - Enter your desired GRID coordinates from your Forward Observer or step **5.1** into the input box using your keyboard.

6.3.2 - TGT ALT - Enter your ALTITUDE for the target area, again from your FO or step 4.3.1, using your numpad or keyboard numerical keys.

6.3.3 - **AMMO** - Select the ammo type you wish to calculate a solution for, note there must be at least **1** in availability.

6.3.4 - **ROUNDS** - Enter the number of rounds for the fire mission, if it was a 5 round fire mission (5 shells down range), you would enter 5 in this box.

TGT GRID	057114	SOLUTION	IDLE	
TGT ALT	2083	CD: 6268	CE: 0056	
AVAILABLE AMMO		MD: IDLE I	MD: IDLE MD: IDLE	
20 M483A1 DPI	CM 🛛 🖉	8		
10 M795 HE	- 12			
3 M825A1 WP 9	SMOKE			
2 M864 BB DPI	CM			
2 M485 ILLUM		OT Dir.:	0	
7 M987 6P5 HF		Left/Right:	0	
ROUND: M795	HE	Add/Drop:	0	
ROUNDS	1	Up/Down:	0	

If you are happy with the configuration, press the ENT key located at the bottom of the control system.



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6.4 - Checking the solution / Altering the solution and Moving the gun

If step 6.3 was successful, you should now see the right of the display populated with the values similar to below, if you have a FAULT light please see the section \underline{Fixing} a fault error:

Solution 1/7 (Solution 1 out of 7 possible) CNT: 1 (Number of rounds to send) CD: 6268 (Current direction of barrel) CE: 0056 (Current elevation of barrel) MD: 6182 (Mission direction of barrel) ME: 0089 (Mission elevation of barrel) M795 HE (Round type selected for mission) M232 MACS Zone 5 (The type of charge to propel the round) TOF: 16 (16 seconds flight time) TTI: 16 (16 seconds impact time)

FCS successful calculation



6.4.1 - Selecting from available solutions

For each calculated fire mission, you are given a number of choices ranging from the most direct (low) to least direct (high) solutions. The use of either should be dictated by the lay of the terrain between the gun and the impact point, high solutions will give a near vertical impact, but can take 3-4x longer than a low solution to reach its target.

To select different solutions, use the arrow keys on the GUI to either move UP (1) or DOWN (2) through the available solutions shown on the SOLUTION READBACK screen. You should see solution 1/7 move up to 2/7 and other SOLUTION READBACK information change in real time.



Select keys for scrolling through available solutions

If you have an appropriate solution selected, you are now ready to rotate and arc the main gun to match the desired trajectory of your fire mission. To prepare the gun for firing, you can use the LAY button to move the CD/CE (gun position) to match the MD/ME (mission position). The moving of the gun is fully automated, so needs no input from the gunner manually.





On pressing the LAY button you should begin to see the CD and CE values changing to match the MD and ME values. Once CD = MD and CD = ME you are ready to fire the weapon. You will need to pass the following information on to the gunner:

- AMMO TYPE
- CHARGE TYPE
- NUMBER OF ROUNDS

6.5 - Loading & Firing the weapon

The gunners operation in the M109A6 paladin is relatively simple, as a gunner you must first open the action menu item "Gunners Interface".

Once the screen is open, you should have something open similar to the GUNNER UI we covered in section 3.2.

6.5.1 - Weapon loading procedure

- 1. Select AMMO TYPE from left hand of the UI, you should receive this from your commander.
- 2. Select the correct **CHARGE INCREMENT**, again this should come from your commander who has calculated the solution.
- 3. Select the desired FUZE method.
- **4.** If necessary, enter a delay time (from launch of round to detonation), a optimal time should be acquired from the commanders TTI or TOF indexes.
- 5. Press LOAD and wait until GUN STATUS == GUN LOADED.
- 6. If authorised to FIRE, press the FIRE button on your UI screen to execute the mission.
- 7. If continuing to fire another round, check with commander that the gun is still on target, the M109A6 FCS does not auto adjust the gun on movement from recoil. Commander may need to re-lay the gun.

Note: In the event that your mission is cancelled, you are advised to unload the round to prevent potential cook-off, especially after several fire missions.

20 M483A1 DPICM 9 M795 HE 3 M825A1 WP SMOKE 2 M864 BB DPICM	Prepare M79 Charge: M23	Prepare M795 HE Charge: M231 MACS Zone 2 FHARGE ENARGE		
		Point Detonate		
		FIRE		

A ready to fire round

6.6 - Adjusting fire

Instead of re-computing an entirely new solution based on new grid coordinates, the Paladin comes fully equipped with the ability to adjust fire solutions based on a variety of shifts.

OT DIR - Direction of the target from observer in MILS.

LEFT/RIGHT - A left or Right shift perpendicular to the observer target line. Format: -500 or 500

ADD/DROP - A increase or decrease in OT distance. Format: -500 or 500

UP/DOWN - Increase or decrease in target or burst altitude. Format: -500 or 500

To readjust fire, enter your changes to the fire solution by using the above adjustment methods, then press **ENT** to recalculate the fire solution. You can now select the appropriate solution and press **LAY** to readjust the gun to the new position.

6.7 - Fixing a fault error

Faults can occur for a number of reasons depending on the type of round you are calculating for and the terrain in which the vehicle is situated. The paladin AFCS will take into account the slope that the vehicle is parked on, so to reach the maximum elevation of ME 1333 you will need to be parked on a flat surface.

Fixing a fault is simple, feedback is given on the **GUN STATUS** panel as to why a fault has occurred. Fixing a fault will not clear your current fire mission unless the **CLR** button has been pressed twice.

Steps to fix a fault:

- 1. Determine why the fault has occurred by reading the **GUN STATUS** panel.
- 2. Press the **CLR** button once.
- 3. If there were NO solutions available, you may wish to press the **CLR** button again to clear the solution, it is most likely that your target is too far or too close to the paladins current position.
- 4. If necessary, select a lower solution by pressing button 13 on the FCS.
- 5. Press LAY.
- 6. If no further fault error is incurred then your solution may now be viable.

SECTION 7 CLASSNAMES

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Vehicle Classname:

"sa_m109a6_des"

Ammo Classname(s):

These are added to the vehicle init by using the <u>addMagazineCargo</u> command. If adding in runtime you will need to use the <u>addMagazineCargoGlobal</u> command.

- "SA_155mm_m795" **HE**
- "SA_155mm_m483a1" DPICM
- "SA_155mm_m731" ADAM
- "SA_155mm_m898" **SADARM**
- "SA_155mm_m825a1" **WP**
- "SA_155mm_m485" Illumination
- "SA_155mm_m864" DPICM BB
- "SA_155mm_m982" EXCALIBUR BLOCK 1
- "SA_155mm_m982_DPICM" EXCALIBUR BLOCK II

FAPP Classname(s)

These are vehicle s and if created at runtime should be done by using the <u>CreateVehicle</u> command. These are available in the editor under **Empty > Ammo**.

- "sa_m109a6_M795_pallet"
- "sa_m109a6_M483a1_pallet"
- "sa_m109a6_M825A1_pallet"
- "sa_m109a6_M485_pallet"

SECTION 8 Credits

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This project took a very long time to complete, hopefully it is up to a standard where people will be happy, we've tried to focus on many different aspects while building this and tackled many issues.

Creators

Model - <u>Soul_Assassin</u>

Scripts and Systems - NouberNou

Sounds & Manual - Rexehuk

Thanks to testers:

Lincks	Ballistic09	Hellfire257	WA Lancer
wld427	Tankbuster	Ironwardog	Kassared
Impulse 9	Krause	Armyguy	Jackal
Azzwort			

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1.1 UPDATE - INFORMATION

Changes to CLR button functionality

In version 1.0, the CLR button removed your fire mission coordinates, altitude and round number, in 1.1 the CLR button does the following:

- 1. If CLR button is pressed once when fire mission has been calculated, the fire mission is cleared, but the COORDINATES / ALTITUDE / ROUND TYPE and ROUND NUMBER are kept.
- 2. On pressing the CLR button a second time, it will clear all fields and reset the FCS back to default.

Addition of manual laying

1.1 brings the ability to manually lay the M109A6 Paladin, the gunner has full control over the guns traversal and elevation.

1. Make sure the gun is unlocked from the TRAVEL LOCK (Gunner Action Menu).

2. Use the ARROW keys on your keyboard to control the turret