08 February 2000

Intermediate New Generation Army Targetry System

(INGATS)

PERFORMANCE DESCRIPTION

INGATS Performance Description
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ACRONYM LIST

Acronym	Definition
3-D	Three Dimensional
ATHIL	Armor Target Hit Indicator Lamp
ATKS	Armor Target Kill Simulator (See GUFS)
AWG	American Wire Gage
BES	Battlefield Effects Simulator
CCS	Central Control System
CHS	Contact Hit Sensor
cm	Centimeters
CO	Contracting Official
COC	Certificate of Conformance
dBs	Decibels
DSIT	Double Stationary Infantry Target
FCC	Federal Communications Commission
GFM	Government Furnished Material
GUFS	GUnFire Simulator (See ATKS)
HHC	Hand Held Controller
HDD	Hit Detection Device
HW	Hardwired
IAW	In Accordance With
IMC	International Morse Code
INGATS	Intermediate New Generation Army Targetry System
IPT	Integrated Product Team
Km	Kilometers
Kph	Kilometers Per Hour
MAT	Moving Armor Target
MFS	Muzzle Flash Simulator
MHz	Megahertz
MILES	Multiple Integrated Laser Engagement System
MIT	Moving Infantry Target
MOUT	Military Operations of Urbanized Terrain
MSD	MILES Shootback Devices
NET	New Equipment Training
NGATS	New Generation Army Targetry System
NHS	Non-contact Hit Sensor
PS	Power Source
RCS	Range Control System
RETS	Remoted Engaged Target System
RF	Radio Frequency
RFCCS	Radio Frequency Central Control System
RFMAT	Radio Frequency Moving Armor Target
RFMIT	Radio Frequency Moving Infantry Target
RFS	Rifle Fire Simulator
RFSAT	Radio Frequency Stationary Armor Target
RFSIT	Radio Frequency Stationary Infantry Target
SAT	Stationary Armor Target
SES	Sound Effects Simulator
SINCGARS	Single Channel Ground and Airborne Radio Systems
SIT	Stationary Infantry Target

SMTE	Special Measuring Test Equipment
SPL	Sound Pressure Levels
TL	Target Lifter
TM	Target Mechanism
TWGSS/PGS	Tank Weapon Gunnery Simulation System/ Precision Gunnery System
UPS	Uninterrupted Power Source

PERFORMANCE DESCRIPTION

08 February 2000

Performance Description
for
Intermediate New Generation Army Targetry System (INGATS), Military Standard Combat Training Ranges

SECTION 1 - Scope

1.1. Description. This requirement represents an enhancement of existing targetry and simulator devices utilized for multi-purpose gunnery at military training ranges. Satisfaction of these requirements shall enhance realism and replace obsolete and otherwise inadequate hardware/software.

1.2. Objective. The objective of this performance description is to describe requirements for the INGATS system. The INGATS system shall have two separate range types, one hardwired (HW) (commercial power supplied by the range), and one system that is completely self-contained and radio-controlled (i.e., uses 12 VDC batteries, generators, solar panels etc.) using a hand-held controller or a Radio Frequency (RF) controlled computer system, depending on range configuration. This system utilized on military training ranges shall portray and replicate battlefield visual and audio events and operate with or without commercial power. This system may operate for extended time periods, 24 hours per day, seven (7) days per week, 240 days per year.

1.3. Scope. This Performance Description establishes the requirements for delivery of new hardware, installation and support of new ranges. Both infantry ranges and armor ranges are included. The result of this effort shall be fully automated ranges capable of control with an RF link, by hand-held controllers and stationary control centers or by hardwire linked stationary control centers.

SECTION 2 - Applicable Documents - None

SECTION 3 - Requirements

3.1. Item Description. The training systems shall be a mix of infantry and armor, fixed and moving target lifting devices and simulator equipment that are controlled by a HW Central Control System (CCS), Radio Frequency Central Control System (RFCCS) or a Hand-held Controller (HHC) depending on the range configuration. The INGATS consists of the following major subsystems: Stationary Infantry Target (SIT), Double Target Arm SIT (DSIT), Moving Infantry Target (MIT), Moving Armor Target (MAT), Moving Armor Target - Vertical (MAT-V), Stationary Armor Target (SAT), Range Control System (RCS); and the following secondary subsystems: Sound Effects Simulator (SES), Muzzle Flash Simulator (MFS), Hit Detection Device (HDD), MILES Shootback Device (MSD), Battle Effects Simulator (BES) and Recharging Devices. The subsystems shall be compatible with the GUnFire Simulator (GUFS) and MILES hit detection devices.

3.2. General Requirements. The application of the requirements as listed in para 3.2 shall be applied mandatory on all the subsystems of the INGATS except as noted in this document:

a. **Frequency.** All RF controlled equipment shall be capable of operating in both the 138 to 160 MHz and 406 to 420 MHz bands. The channel frequency shall be such that the tuners are selectable. The HHC, RFCCS and all RF down range receivers/transmitters shall be tunable through each band by range support personnel without changing internal components to select tunable

frequency ranges. It is the contractor's responsibility that the INGATS equipment meets all Federal Communications Commission (FCC) requirements projected for the next five years. All radio transmitters and receivers shall utilize narrow bandwidth technology, and have a bandwidth of 12.5 kHz or less for all transceivers, IAW the National Telecommunications and Information Administration (NTIA) requirements to be met by 1 January 2008.

b. **Communication Distance.** All RF INGATS subsystems shall have a communication range of at least five Km. Each range is unique and may not have line-of-sight. Contractor is responsible for ensuring complete communication to all lifters on the range. (line-of-sight is the base of the transmitter antenna to the base of the receiver antenna straight line with no obstruction which shall block radio transmissions). Power output of the transmitters shall be continuously or incrementally adjustable to achieve a one (1) through five (5) Km range, as required by range personnel. HW INGATS ranges shall be able to communicate with targets up to a minimum of five (5) Km from the RCS.

*c. **Status.** All target devices must provide an operational status feedback to the RCS. The status on the screen shall immediately show a target in-transit state immediately after a command is given by any RCS. On RF broadcasting ranges, the actual status presented on screen shall be updated less than 15 seconds after a status change occurs in a target mechanism. An example of a status change is when the mechanism activates a limit switch. (i.e., a lifting mechanism receives an up command within 15 seconds after the mechanism reaches and activates the up limit switch, a signal is received by the RFCCS and the status change appears on the screen). For HW ranges status changes shall be displayed on the CCS in less than five (5) seconds after each occurrence.

d. **Target-single Group.** For scenario recording purposes all infantry and armor target devices shall be designed so a designated group (a group can consist of 1-12 targets) can be assembled and act as an individual target. When receiving the designated "N" hits (N = 1-10 selectable minimum), the group will go down and score accordingly while still maintaining the capability of acting independently IAW the scenario. This should not be confused with slaving four (4) targets together off of a master target.

e. **Control**. All down range hardware shall be capable of control by RF from the RFCCS and the HHC or by wired range connections from the CCS. The configuration of each range shall determine if it is to be HW or RF.

f. **Power Interrupt.** Each target device shall include a mechanism to interrupt power to prevent accidental activation while being serviced.

g. **Polarity Marking.** If batteries are used, all battery connecting cables shall be permanently identified and marked as positive or negative.

h. **Install/Repair Ease.** Training devices, subsystems and components shall allow for easy installation and repair.

i. **Availability.** The equipment shall be designed to provide 90 percent availability for continuous operation on military ranges operating 24 hours per day, seven (7) days per week and a minimum of 240 days per year.

j. **Durability.** Down range hardware shall be capable of withstanding loose transport in the rear bed of a tactical vehicle over rough terrain. The HHC shall be manufactured IAW with current commercial standards for durability.

k. **Ground.** All electrical circuitry shall be installed and grounded IAW applicable local and national electrical codes.

l. **Buried Cable.** All buried cables shall be designed so that there shall be no joints, splices, or other electrical connections at or below ground level and be IAW applicable local and national electrical codes.

m. **Reverse Polarity.** All equipment shall be protected from damage by reverse polarity.

n. **Cold/Hot Weather Kit.** Kits shall be available to operate all range equipment IAW 3.2.6.

o. **Watertight/Rustproof.** INGATS down range equipment shall be watertight and rustproof. All equipment, except the MAT and HHC, shall be capable of being submerged for a minimum of four (4) hours, dried off, and have a less than ten percent (10%) failure due to moisture intrusion. The HHC shall be capable of being submerged for a short period (i.e. when dropped into a creek bed or puddle) and operate with no failure due to moisture intrusion. The MAT shall be rainproof and resist water intrusion that may damage the mechanism.

p. **Service Life.** Each device shall include a minimum service life of ten (10) years.

q. **Operability Test.** A testing capability at each down range target device to check operability is required.

r. **Addresses.** There shall be at least 0-511 addresses for each target mechanism (TM) (512 addresses minimum) and addresses shall be changeable by the operator without requiring any special tools.

*s. **Hit detector**. All armor targets shall operate with a hit detection and impact location system (as required) (IAW 3.2.3) which is insensitive to precipitation and scattered debris. Every sensory system shall collect and report hits to the controller which will be displayed within five (5) seconds for H.W. and within 15 seconds for R.F. range.

t. Not used.

u. **Low Battery Indicator**. All equipment that uses a battery shall have an indicator that alerts the operator when the battery is low and needs charging or replacement. The low battery indicator shall be activated before the battery power is so low that the mechanism ceases operation.

v. **Not used.**

w. **Regeneration Devices.** Any regeneration devices needed to operate the equipment within the designated parameters shall be included in the cost of the individual piece of equipment. If a battery is used, a self-powered recharging unit must be provided to maintain battery charge, and have features that protect against overcharging and overheating.

x. **Special Tools.** Any special tool(s) required to perform maintenance or set up of the equipment shall be included with the range installation.

y. **Maintenance Test Equipment.** Any maintenance test equipment or

calibration devices shall be included with the range installation.

z. **Lightning Protection.** All equipment shall be protected against lightning that passes over the range or strikes near the range.

aa. **Deployment**. All hardware shall be safely capable of surviving normal air and surface transport conditions.

3.2.1. Target Mechanisms.

3.2.1.1. Stationary Infantry Target Mechanism (SIT). The SIT shall be operated in two configurations; one using commercially available power for HW ranges, the other using self-supporting power (i.e., batteries, generator, etc.). The HW version shall come complete with all necessary cables and interfacing devices to be compatible with the commercial power and signal cables available as part of the target area configurations IAW Appendix B. The SIT shall include all equipment necessary to provide the following characteristics:

a. **Target Lifting.** As a minimum, be capable of raising or lowering 3-D, E and F targets, as described in Appendix A, in one (1) second or less with no wind. When in a 35-mph wind perpendicular to the target, the mechanism shall raise or lower a target in less than two (2) seconds. As a minimum, the target device shall be capable of simultaneously initiating all combinations of any two of the simulators described in paragraph 3.2.2.

b. **Target Command.** As a minimum, the SIT shall perform the following presentations (as directed by the RCS): target up on command, target down on command, target down when hit, target up then down when hit “N” times (N=1-10 selectable), and the target bob (up, down, then up) when hit.

c. **Operational Status.** The SIT shall transmit operational status to the RCS. Target status shall include at least the following: The target has reached the up limit (target up), the target has reached the down limit (target down), the target has failed to reach the limit as commanded (target failure), and the hit detector is disconnected. Status updates shall be sent to the RCS and displayed on the screen within five (5) seconds for HW ranges and 15 seconds for RF ranges. The mechanism shall not respond in any manner if commanded to any position that it is already in.

*d. **Weight**. The SIT shall weigh less than 85 pounds, not including the power source. The RF version with power source shall weigh less than 100 pounds.

e. **Portability**. The RFSIT shall be completely portable (i.e., RFSIT shall not require commercial power) and include its own power source. Both versions of the SIT shall be stackable and easily lifted by two (2) people into a standard cargo truck.

f. **Operation Capability.** The RFSIT shall be capable of being operated with its own power source (PS), which shall be provided with the unit. When self powered the mechanism shall be capable of raising and lowering the target 1000 times or more in a 24-hour period at 72 $\pm$10 degrees Fahrenheit without recharging.

g. **Interfacing.** The SIT shall be capable of registering the hit signal from a MILES hit detector and transferring the hit signal to the RCS IAW Appendix D.

h. **Triggering.** The SIT shall be capable of synchronizing the MSD, SES, and MFS within 0.5 seconds of signal activation.

i. **Presentation.** The target lifting device shall be capable of presenting a target above a berm 16″high with no part of the lifting device exposed to direct fire.

j. **Obstacle Encounter**. If motion is impeded, the SIT shall fail safe.

k. **Master/Slave Combination**. The RFSIT shall be capable of operating in a master/slave configuration. As a minimum, the configuration shall be capable of activating and displaying one (1) to four (4) targets slaved off of one master RFSIT. The combination of master/slave targets will be determined by the configuration of the range. All cables needed to connect the slaves shall be included. Each target shall have an individual address and be capable of reacting to commands and rounds as a group or individually, depending on the scenario.

3.2.1.2. Double Target Arm SIT (DSIT). The DSIT shall operate identically to the SIT except it shall raise or lower double targets simultaneously, and a hit on one target shall cause both targets to go to the down position.

3.2.1.3. Moving Infantry Target Mechanism (MIT). The MIT shall be capable of operating on both the HW and RF ranges. The RF version shall include self-supporting power (i.e., batteries, generator, etc). If applicable, the HW version shall come complete with all necessary cables and/or interfacing devices to be compatible with the commercial power and signal cables available as part of the target area configurations IAW Appendix B. The MIT shall provide the means to raise, lower and move forward and backward a 3-D, E and F silhouette as described in Appendix A. The MIT shall have the characteristics of the SIT, except that the weight in paragraph 3.2.1.1.d shall apply only to the SIT and not the MIT. In addition, the MIT shall have the following characteristics:

a. **Movement.** The MIT shall cause a Target Lifter (TL) to traverse a minimum distance of 30 meters in both the “attack” and “retreat” directions.

b. **Target Command.** As a minimum, the target shall perform the following presentations: target up on command, target down on command, target down when hit, target up then down when hit “N” times (N=1-10 selectable minimum), the target bob (up, down, then up) when hit, target move forward, target move backward, target pause with target up, and target stop. As a minimum, the target device shall be capable of simultaneously initiating all combinations of any two of the simulators described in paragraph 3.2.2.

c. **Speeds.** The MIT shall attain a minimum of three distinct speeds that replicate an individual walking, jogging, and running on flat terrain. (As an example, an average man walks at approximately 3 MPH, Jogs at 5 MPH, and Runs at 8 MPH.)

d. **Starting/Stopping**. The MIT shall be capable of reaching these speeds within two (2) meters and stopping within two (2) meters after receiving a command from the RCS signal or the end limit.

e. **End Limits.** The MIT shall automatically stop moving as it approaches the end limit, but shall not be permanently damaged should it fail and exceed the limit.

f. **Control.** Selection of speed and direction of the MIT shall be controlled by the RCS.

g. **Functions.** The TL shall perform, as a minimum, the functions of the SIT while stationary or moving. These functions shall be selectable by the RCS.

h. **Movement Layout.** The target shall be presented to the shooter facing the direction of travel.

i. **Presentation**. Target lifting device shall be capable of presenting a target above a 26'' high berm with no part of the lifting device exposed.

j. **Operational Status**. The MIT shall transmit operational status to the RCS. Target status shall include, but not be limited to: the target is in transit (this status shall be seen instantaneously on the computer display), the target has reached the up limit (target up), the target has reached the down limit (target down), the target has failed to reach the limit as commanded (target failure), the hit detector is disconnected, target moving forward, target moving backward, target has reached an end limit, target has reached the forward limit, target stopped, and MIT fails to move as commanded. This information shall be sent to the RCS and displayed on the screen within five (5) seconds for HW ranges and 15 seconds for RF ranges. The mechanism shall not respond in any manner if commanded to any position that it is already in.

k. **Obstacle Encounters.** If motion is impeded, the MIT shall fail safe.

3.2.1.4. Stationary Armor Target Mechanism (SAT). The SAT shall provide the means to raise and lower all full-scale frontal targets as described in Appendix A. The device shall include provisions for mounting and interfacing with the hit detection system. The SAT device shall be HW for data and signal communication when used for CCS ranges and RF controlled when used with the RFCCS or HHC ranges. The RF controlled version shall come complete with PS for operation. The HW version shall come complete with all necessary cables and interfacing devices to be compatible with the commercial power and signal cables available at the target locations. This device shall also have the following characteristics:

*a. **Lifting Ability.** As a minimum, the SAT shall be capable of lifting a 150 lb. target of the T-72 tank frontal configuration in ten (10) seconds or less and lower it in eight (8) seconds or less against a perpendicular 35 mph wind and shall remain stable without tipping. The vertical and horizontal positions shall be adjustable a minimum of $\pm$15 degrees. The SAT shall operate without damage to the mechanism under wind loads up to 35 mph and fail safe in higher wind speeds.

*b. **Weight.** The SAT shall weigh 300 lbs. or less, not including the power source (PS), unless the PS is permanently attached to the unit for the RF version in which case the unit shall weigh less than 320 lbs.

c. **Portability**. The RF version shall be completely portable. Both versions shall be stackable and have carrying handles for four (4) persons to carry and load into a cargo truck. The SAT shall be stable when stacked four (4) high on a level surface.

d. **Target Commands.** As a minimum, the SAT shall perform the following presentations as directed by the RCS: target up on command, target down on

command, target down when hit, target up then down when hit "N" times (N=1-10 selectable), the target bob (up, down, then up) when hit. As a minimum, the target device shall be capable of simultaneously initiating all combinations of any two of the simulators described in paragraph 3.2.2.

e. **MILES.** The SAT shall accept a signal from the MILES laser detector and report it as a hit to the RCS, trigger simulators and make the target go down A cable will be included with the SAT that connects to the female connector of Appendix D and allows the MILES connector to be at least six (6) feet left, right or rear of the SAT.

f. **Operational Status.** The SAT shall transmit operational status to the RCS. Target status shall include the target has reached the up limit (target up), the target has reached the down limit (target down), the target has failed to reach the limit as commanded (target failure), and the hit detector is disconnected. Status updates shall be sent to the RCS and displayed on the screen within five (5) seconds for HW ranges and 15 seconds for RF ranges. The mechanism shall not respond in any manner if commanded to any position that it is already in.

*g. **Operational Capability.** The lifter shall be capable of raising and lowering the target a minimum of 450 cycles during a 24 hours period at 72 $\pm$ ten (10) degrees Fahrenheit. If a battery is used it shall be fully rechargeable in less than eight (8) hours.

h. **Interfacing.** The SAT shall be capable of operating/interfacing with the Sound Effects Simulator (SES) IAW 3.2.2.1, the MILES Shootback Device (MSD) IAW 3.2.2.2, Battle Effects Simulator (BES) IAW 3.2.2.4 and the GUnFire Simulator (GUFS) (IAW Appendix C) and synchronize the presentations for realistic portrayal of the threat.

i. **Presentation.** Berm and pit dimensions are described in Appendix B, including the concrete overhang of figures C-09 and C-10. Variations from those dimensions will occur; however, the berm height will be no less than 53 inches. The SAT shall be installed such that the TM is protected by the berm and a minimum of 90 percent of the target is exposed.

j. **Recharging.** If recharging is required, the recharging of the PS shall be at a rate suitable of maintaining the usage rate IAW 3.2.1.4.g. The PS(s) shall be protected against overcharging and overheating.

k. **Lifting Arms.** The target lifting arms shall provide adjustable brackets, each able to securely clamp a target support with a 4" x 4" cross-section. The lifting arms shall be able to mount and lift each of the frontal armor targets listed in Appendix A.

l. Not used.

m. **Hit Detector.** The SAT shall be capable of using a hit detector IAW 3.2.3.

n. **Obstacle Encounters**. If motion is impeded, the SAT shall fail-safe.

o. **Hit Detection**. Target mechanism shall be capable of scoring a hit from the moment it is activated until it returns to the full down position.

3.2.1.5. Moving Armor Target Mechanism (MAT). The MAT simulates a tank or other vehicle for training and qualification programs. It provides training in detecting, identifying and firing upon moving tank targets under

simulated combat conditions and shall include a target lifting device capable of lifting all full-scale flank target as listed in appendix A and capable of mounting a GUFS, BES, SES and MSD. The RF controlled version shall come complete with PS for operation. If applicable, the HW version shall come complete with all necessary cables and interfacing devices to be compatible with the commercial power and signal cables, IAW Appendix B, available in the target area. This device shall also have the following characteristics:

a. **Control.** An RF version shall be controlled by both the HHC and the RFCCS. The HW version shall be controlled by the CCS.

b. **Target Commands.** As a minimum, the target shall perform the following presentations: target up on command, target down on command, target down when hit, target up then down when hit "N" times (N=1-10 selectable), the target bob (up, down, then up) when hit, target move forward, target move reverse, target pause with target up, target stop. As a minimum, the target device shall be capable of simultaneously initiating all combinations of any two of the simulators described in paragraph 3.2.2.

*c. **Movement.** The MAT shall accelerate from 0 to 30 Kph and present a full scale flank target for a full 45 seconds at 30 Kph and decelerate to 0 on a total course length not to exceed 500 meters on a flat terrain. Speed selection shall be controllable by the RCS. The mover shall provide the capability for evasive movement, which shall include the ability to start, stop, lower the target, raise the target, change speeds and change direction, as commanded by the RCS, while traversing between the two ends of the course. Once the required hits to kill are achieved the mover shall react to the kill in accordance with the program. The mover shall be capable of a minimum of four (4) speeds including 30 Kph. The mover shall maintain the selectable speeds within ten percent (10%) when climbing or descending a grade of five percent (5%). The mover shall be capable of positive braking which shall hold the mover motionless on a ten percent (10%) grade. The mover shall stop within 20 meters, after receiving a stop command from the RCS, from a safety feature, from a limit switch, loss of communication, or loss of power to the mover. The guidance system for the MAT shall be capable of controlling the vehicle within one (1) meter of a designated course.

d. **Lifting.** The MAT shall **r**aise and lower a 300 lb. target of the T-72 tank flank configuration, as listed in Appendix A, against a perpendicular 35 mph wind in less than 12 seconds up and ten (10) seconds down. The MAT shall fail safe without damage to the mechanism under wind gusts above 35 mph such as accompanies thunderstorms.

e. **Stability.** The MAT shall remain stable in winds up to 35 mph, perpendicular to the target. The MAT shall maintain this stability when stationary or moving at its maximum speed along a course with minimum curve radii of 150 meters. The MAT shall be protected from being damaged by wind gusts higher than 35 mph such as occur in thunderstorms.

*f. **Portability**. The MAT shall be constructed so that four (4) or fewer people using a lifting device (crane or forklift) within six (6) hours can relocate it. Reinstallation will require four (4) people or less using a lifting device within six (6) hours, not including reinstallation of track.

*g. **Continuous Operation.** The RF version shall be self-propelled by an internal combustion engine or by self-contained rechargeable power. All internal combustion engines shall use a heavy fuel (i.e. diesel, JP8 etc.) and be capable of continuous operation for 24 hours without refueling. Any recharging equipment needed to operate equipment within the parameters of this

performance description shall be provided with each unit. The power supply shall be capable of being replaced and/or refueled using no special tools in 20 minutes or less. The HW version can use power supplied by the range. The MAT mechanism shall be capable of operating at least one cycle every seven (7) minutes. A cycle is defined as a target performing all of the following:

1) Raising the target

2) Travel at any speed from one end of the course to the other

3) Lowering the target

4) Return at any selected speed to the starting position

Attempts to operate more frequently shall not cause damage to the equipment.

h. **Command Reaction.** The mover shall stop or pause and raise or lower on command on any portion of the course, then be restarted in either direction on command by the RCS. Once the mover has triggered an end of course limit, the mover shall not accept a command to continue moving in the same direction.

i. **Operational Status**. The MAT shall transmit operational status to the RCS. Target status shall include, but not be limited to, the target has reached the up limit (target up), the target has reached the down limit (target down), the target has failed to reach the limit as commanded (target failure), the hit detector is disconnected, target moving forward, target moving reverse, target has reached the reverse limit, target has reached the forward limit, target stopped, and MAT fails to move as commanded. This information shall be displayed by the RCS within five (5) seconds for HW ranges and 15 seconds for RF ranges. The mechanism shall not respond in any manner if commanded to any position that it is already in.

j. **End Limits**. The MAT shall automatically stop moving at either end of the course if a stop command is not received from the RCS. The course shall contain a method for physically preventing the MAT from traveling beyond the end of course as per paragraph 3.2.1.5.t.

k. **Hit detector.** Be capable of using hit detector IAW 3.2.3.

l. **MILES.** The MAT shall accept a MILES sensor/detector device. A signal from the MILES will be reported as a hit to the RCS, trigger simulators, and make the target go down. The MAT will include a cable which interfaces with the female connector of Appendix D.

m. **Target Presentation.** Berm height is dimensioned in Appendix B. Some variations from these dimensions will occur, but the berm height will be at least 60 inches. The MAT shall present the target with the TM totally protected and a minimum of 90 percent of the target exposed.

n. **Stop Safety.** The MAT shall have an integral fail safe mechanism to safely and quickly stop to prevent damage in the event of lifting device malfunction, a loss of power, a loss of communication, a loss of end of course detection, vehicle is off course, and/or if motion is impeded due to an obstacle on the course.

o. **Cut-off Switch.** The MAT shall be able to be manually disabled during maintenance.

p. **Lifting Arms.** The target lifting arms shall provide a minimum of

four (4) adjustable fasteners each able to secure wooden target support with a 4″x 4″ cross-section

q. Not used.

r. **Parking Brake.** The MAT shall be equipped with an automatic parking brake to hold the carrier in place when stopped. The MAT shall have a manual override of the brake to permit the carrier to be moved manually.

s. **Warning Indicator.** A move warning indicator (audible) shall signal impending movement of the mover. Signal shall start a minimum of five (5) seconds prior to the MAT moving, lasting for a minimum duration of ten (10) seconds and audible at a distance of 20 meters, over any noise the MAT operating equipment may have present (i.e. generator, motor etc).

t. **End of Course Barrier.** The MAT course shall provide for an end of course barrier that shall be installed to prevent the carrier from continuing to move forward should the carrier not be stopped either by command or automatically. The barrier shall protect the vehicle from being permanently damaged.

u. Not used.

v. **Interfacing.** The MAT shall be capable of interfacing and operating with the Sound Effects Simulator (SES) IAW 3.2.2.1, the MILES Shootback Device (MSD) IAW 3.2.2.2, the Battlefield Effect Simulator (BES) IAW 3.2.2.4, and the GUnFire Simulator (GUFS) IAW Appendix C.

w. **Hit Detection**. Target mechanism shall be able to score a hit from the moment it is activated until it returns to the full down position.

3.2.1.6. Moving Armor Target Mechanism - Vertical (MAT-V). The MAT-V simulates a tank or other vehicle for training and qualification programs. It provides training in detecting, identifying and firing upon moving tank targets under simulated combat conditions and shall hold all full-scale flank targets in the up position as found in appendix A and be capable of mounting a GUFS, BES, SES and MSD. The MAT-V shall come complete with PS for operation. This device shall also have the following characteristics:

a. **Control.** Shall be controlled by the HHC.

b. **Target Commands.** As a minimum, the MAT-V shall perform the following presentations: target move forward, target move reverse, target pause, target stop. As a minimum, the target device shall be capable of simultaneously initiating all combinations of any two of the simulators described in paragraph 3.2.2.

c. **Movement.** The MAT-V shall accelerate from 0 to 30 Kph and present a full scale flank target for a full 45 seconds at 30 Kph and decelerate to 0 on a total course length not to exceed 500 meters on a flat terrain. The mover shall be capable of traveling at four speeds including 30 Kph. Speed selection shall be controllable by the HHC. The mover shall maintain the selectable speeds within ten percent (10%) when climbing or descending a grade of five percent (5%). The mover shall be capable of positive braking which shall hold the mover motionless on a ten percent (10%) grade. The mover shall stop within 20 meters, after receiving a stop command from the HHC, from a safety feature, from a limit switch, loss of communication, or loss of power to the mover. The guidance system for the MAT-V shall be capable of controlling the vehicle within one (1) meter of a designated course.

d. **Stability.** The MAT-V shall remain stable in winds up to 35 mph, perpendicular to the target. The MAT-V shall maintain this stability when stationary or moving at its maximum speed along a course with minimum curve radii of 150 meters. The MAT-V shall be protected from being damaged by wind gusts higher than 35 mph such as occur in thunderstorms.

e. **Portability**. The MAT-V shall be constructed so that four (4) or fewer people using a lifting device (crane or forklift) within six (6) hours can relocate it. Reinstallation will require four (4) people or less using a lifting device within six (6) hours, not including reinstallation of track.

f. **Continuous Operation.** The MAT-V shall be self-propelled by an internal combustion engine or by self-contained rechargeable power. All internal combustion engines shall use a heavy fuel (i.e. diesel, JP8 etc.) and be capable of continuous operation for 24 hours without refueling. Any recharging equipment needed to operate equipment within the parameters of this performance description shall be provided with each unit. The power supply shall be capable of being replaced and/or refueled using no special tools in 20 minutes or less. The MAT-V mechanism shall be capable of operating at least one cycle every seven (7) minutes. A cycle is defined as a target performing all of the following:

1) Travel at any speed from one end of the course to the other

2) Return at any selected speed to the starting position

Attempts to operate more frequently shall not cause damage to the equipment.

g. **Command Reaction.** The mover shall stop or pause on command at any portion on the course, then be restarted in either direction on command by the RCS. Once the mover has triggered an end of course limit, the mover shall not accept a command to continue moving in the same direction.

h. **Operational Status**. The MAT-V shall transmit operational status to the RCS. Target status shall include, but not be limited to, the hit detector is disconnected, target moving forward, target moving reverse, target has reached the reverse limit, target has reached the forward limit, target stopped, and MAT-V fails to move as commanded. This information shall be displayed by the RCS within 15 seconds. The mechanism shall not respond in any manner if commanded to any position that it is already in.

i. **End Limits**. The MAT-V shall automatically stop moving at either end of the course if a stop command is not received from the RCS. The course shall contain a method for physically preventing the MAT-V from traveling beyond the end of course as per paragraph 3.2.1.6.r.

j. **Hit Detector.** Be capable of using hit detector IAW 3.2.3.

k. **MILES.** The MAT-V shall accept a MILES sensor/detector device. A signal from the MILES will be reported as a hit to the RCS and trigger simulators. A cable will be included with the MAT-V which interfaces with the MILES connector such as the female connector of Appendix D.

l. **Target Presentation.** Berm height is dimensioned in Appendix B. Some variations from these dimensions will occur, but the berm height will be at least 72 inches. The MAT shall present the target with the TM totally protected and a minimum of 90 percent of the target exposed.

m. **Stop Safety.** The MAT-V shall have an integral fail safe mechanism to safely and quickly stop to prevent damage in the event of a loss of power, a loss of communication, a loss of end of course detection, vehicle is off course, and/or if motion is impeded due to an obstacle on the course.

n. **Cut-off Switch.** The MAT-V shall be able to be manually disabled during maintenance.

o. **Target Arms.** The target arms shall provide a minimum of four (4) adjustable fasteners, each able to secure wooden target support with a 4″x 4″cross-section.

p. **Parking Brake.** The MAT-V shall be equipped with an automatic parking brake to hold the carrier in place when stopped. The MAT-V shall have a manual override of the brake to permit the carrier to be moved manually.

q. **Warning Indicator.** A move warning indicator (audible) shall signal impending movement of the mover. Signal shall start a minimum of five (5) seconds prior to the MAT-V moving, lasting for a minimum duration of ten (10) seconds and audible at a distance of 20 meters, over any noise the MAT-V's operating equipment may have present (i.e. generator, motor etc).

r. **End of Course Barrier.** The MAT-V course shall provide for an end of course barrier that shall be installed to prevent the carrier from continuing to move forward should the carrier not be stopped either by command or automatically. The barrier shall protect the vehicle from being permanently damaged.

s. **Interfacing.** The MAT-V shall be capable of interfacing and operating with the Sound Effects Simulator (SES) IAW 3.2.2.1, the MILES Shootback Device (MSD) IAW 3.2.2.2, the Battlefield Effect Simulator (BES) IAW 3.2.2.4, and the GUnFire Simulator (GUFS) IAW Appendix C.

t. **Hit Detection**. Target mechanism shall be able to score a hit from the moment it is activated until it is deactivated either by a command from the RCS or by the end of track sensor.

3.2.2. Simulators

3.2.2.1. Sound Effect Simulator (SES). The SES shall replicate sounds and be controlled by the scenario programming. The intent of the SES is to provide representative sound for training of the individual soldier. The SES shall be mounted adjacent to the mechanism but protected from live fire. The protection shall not prevent the SES from rendering realistic battlefield sounds. The SES must also meet the following requirements:

a. **Decibels**. Under no circumstance should a person be exposed to more than 115 decibels at distances less than ten (10) feet under normal operations using standard safety precautions.

b. **Sound Capability**. Selectable for a minimum of twelve prerecorded different sounds. Typical examples are provided in paragraph 3.2.2.1.i.

c. **Commands**. Accept commands to start and stop individually or in multiple units from the scenario programming and be capable of repeating sounds a number of times.

d. **Volume**. Command controlled for volume, at the speaker.

e. **Interface**. Capable of operating common outdoor audio equipment and serve as a public address system operational locally or from the RCS.

f. **Recording**. Contain common outdoor audio equipment to record sound effects and phrases, using no special equipment.

g. **Weight**. Weigh less than 50 pounds not including the battery and battery box and fit in a 3’ X 3’ X 3’ space.

h. **Speakers**. As a minimum, accommodate up to five speakers per SES.

i. **Playback**. As a minimum, be capable of recording and playing back the sound of radio transmissions, human speech, animals, vehicles, weapons and Morse Code. The SES shall have the capability to record the following sounds: The AKMS Rifle, 7.62; PKM Machine Gun, 7.62 (6-9 round burst); Sniper Rifle, Dragunou, 7.62; Makarov 9mm pistol; 81mm mortar firing; and the vehicle sounds of a BRDM and a UAZ-69 (2 1/2 ton truck) by the operator requiring no special tools.

j. **Power**. Power for the SES shall be self-contained.

k. **Self-sustainment**. The SES shall be capable of being used on an RF range without power from an external source.

3.2.2.2 MILES Shootback Device (MSD). MSD shall be capable of mounting various MILES transmitters as defined in Appendix D and sluing the MILES beam to previously determined locations. The MSD shall be controlled by the RCS as determined by range configuration. The system must also meet the following requirements:

a. **Transmitter Mounting.** The MSD shall be capable of mounting Army standard M16, M60, M249, and 50 caliber machine gun MILES transmitters.

b. **Operation.** The MSD shall be operable in two modes, fixed and sluing, selectable at the device. The sluing mode shall provide a repeating and adjustable slue rate of three to five seconds per cycle over a 45 degree horizontal arc. The elevation must be adjustable (preset before operation). The MSD shall be mounted between 3’ and 5’ on either side of the target mechanism at a location with a line of sight equivalent to that of the target center.

c. **Weight.** The MSD shall weigh less than ten (10) pounds.

d. **Power Supplies and Cables.** The MSD shall include all power supplies and cables necessary to operate the RF version. HW version must include all necessary cable and interfacing devices to be connected to existing power/signal at the target area IAW Appendix B.

3.2.2.3. Muzzle Flash Simulator (MFS). The MFS shall be capable of being added to the MIT and SIT, with no modifications to either mechanism. The MFS shall provide for night muzzle flash of small arms weapons. The MFS shall operate in either a single shot or automatic shot (controlled by the RCS through the scenario) with a rate of fire of 600 rounds per minute. The MFS shall receive power and commands from the MIT or SIT. The night muzzle flash simulation shall realistically provide a simulation of a threat weapon muzzle flash.

3.2.2.4. Battlefield Effects Simulator (BES). The BES shall simulate realistic battlefield effects providing gun crews with feedback indicative of positive target identification and target engagement. The preferable method of BES operation is to use a non-pyrotechnic solution to avoid the lengthy certification procedure and eliminate some of the transporting and handling risk involved with the current pyrotechnics. The following subparagraphs describe the minimum required performance and physical characteristics of the BES.

a. **Audio/Visual Cue.** The BES is a multi-capacity device the produces both visual and audio cues. The minimum simulation shall be hostile vehicle direct fire, vehicle hit and vehicle kill. The simulation shall exhibit the audible (noise) and visual (flash, smoke, and/or stars) characteristics detailed in this performance description. The cues shall replicate, as closely as possible, the real battlefield signatures produced. The cues shall be visible and audible, under day, night and limited visibility conditions. During the day the cues shall be capable of being observed by the unaided eye and heard by the unprotected ear for not less than 1500 meters. During both day and night limited visibility conditions the cues must be capable of being observed through thermal sights and at night through passive sights (both high and low magnification).

b. **Actuation.** The BES actuation shall be a function of the target hit/kill and also respond to commands from the RCS. The BES shall be protected from accidental actuation under all operating conditions and when undergoing maintenance.

c. **Sequencing**. The device shall sequence from position one (1) and continue through the last position. The sequence shall automatically reset to position one (1) when the last position has been actuated. Each actuation signal may cause the BES to actuate up three times before the next actuation signal. The number of actuations for each activation signal shall be adjustable IAW the demands of the scenario. The device shall also be capable of partitioning a section of the cartridges to allow for a separate signal from the CCS that can command a separate kill or hostile fire for specialized training needs. The reset capability shall be protected from accidental actuation.

d. **Capacity**. The BES shall fire a minimum of 20 consecutive audio/visual cue simulations and the functioning rate shall not be greater than four (4) seconds between each cue.

e. **Fragmentation**. The BES shall not discharge hazardous fragments/debris, generate sufficient heat/radiation that could ignite nearby foliage, damage nearby equipment, or cause skin breakage, burns, or eye injury to personnel, when used IAW established procedures.

f. **Operating Voltages**. The BES shall utilize the system power when on an HW range. When used on an RF range, the BES shall use a self-contained PS.

g. **Power On/Off Condition**. In the event the BES power is lost or turned off, the device shall retain the last active position and, when the system power is restored, begin from that position.

h. **Safety Interlock**. The BES shall have a fail-safe shut-off. All power shall be removed from the actuation component of the BES when the safety interlock is in the safe position. The safety interlock shall preclude inadvertent actuation during loading and unloading operations. Not less than

two intentional procedures shall be required to arm the actuation component. The firing device shall have an automatic time delay set in, so that when armed, adequate delay will be provided to allow personnel to reach a safe distance from the BES.

i. **Interfacing.** The BES shall be capable of interfacing with the GUFS simulator output of both stationary and moving armor targets as specified in 3.2.1.4.h, 3.2.1.5.v. and 3.2.1.6.s.

3.2.3. Hit Detection Devices (HDD). All target mechanisms shall include a method for detecting when the target plane is penetrated by a fired projectile and providing this information to the RCS for data collection (see paragraph 3.2.3.4). When a round is detected it shall actuate the target-hit response, resulting in the lowering of the target (except for MAT-V) within five (5) seconds after the target kill requirement is reached or actual occurrence IAW the requirements of the scenario. Two possible types of hit sensors to be used are defined as:

3.2.3.a. Contact Hit Sensor: A sensor or set of multiple sensors, which are physically attached to any part of the physical target or target lifting device. A contact sensor usually derives its stimulus from the physical impact of the round on the target. A contact sensor shall detect and record the presence of a “hit”, and may, but is not required to, measure the coordinates of the hit location. As a minimum all infantry target mechanisms shall have a contact hit sensor.

3.2.3.b. Non-Contact Hit Sensor (NCHS): Any sensor or system of sensors that detects the projectile and is not dependent upon an impact with the physical target. Any non-contact sensor system shall be capable of recording and measuring the actual “hit coordinates” of the round striking the physical target to the accuracy specified below. As a minimum all armor target mechanisms shall have a non-contact hit sensor.

3.2.3.1. Hit Sensing. The hit detection device may contain one or more contact and non-contact sensors, and/or a combination of both. If a contact sensor is present, detected impact signals will count as a hit detection. Any non-contact sensor shall be used to record the position of the center of the bullet as it crosses the target plane (Cartesian or Polar coordinates are acceptable but Cartesian coordinates are preferred). All hit sensing devices shall accurately detect (and locate if applicable) the hit or miss of the round at least 97% of the time. If only non-contact sensors are present, they will also be used to determine a hit or miss as scored by the usage algorithm given below. Acceptance criterion for non-contact hit sensors is described below.

The acceptance criterion defines how close sensor performance must be to actual round penetration of the physical target. The usage algorithm then shows how the output of the scoring system is used in practice.

For the MIT and SIT, the hit detection accuracy shall be greater then 97 percent for all rounds penetrating the target (round location is not required). As a minimum, the SIT and MIT shall be capable of detecting the penetration of the target by 5.56mm and larger projectiles.

A capability of detecting individual hits at a rate up to a minimum of 600 rounds per minute is required along with a buffer which assures that data shall not be lost for all HDDs.

The SAT, MAT, and MAT-V shall minimally detect projectiles from 5.56mm and

larger plus anti-armor missiles. Projectiles shall be grouped into three sensitivity levels by size: 5.56mm and larger, 25mm and larger, and 105mm and larger. The detection systems shall be able to discriminate between fired projectile hits and hits from assorted debris.

3.2.3.2. Hit Locating. The reported hit coordinates (Cartesian coordinate system) shall be accurate to a circular tolerance of 120mm, or less, within the area of the physical target (the preferred tolerance within the area of the physical target is 60mm). The penetration point of the round is the center of the hole in the target. The center should be estimated by measuring the width of the hole in the horizontal and vertical direction and determining the intersection point of the two diameters at the center of the hole. The distance between the penetration point or hole in the physical target and the hole indicated by the coordinates from the hit sensor, will be mathematically calculated and is considered the radial distance between the center of the two holes.

The calculated location and hit detection accuracy of the hits for the SAT, MAT, and MAT-V shall be accurate 97% of the time, to within a minimum acceptable parameter of 120mm (or within a preferred acceptable parameter of 60mm) of where the round actually penetrated the plane of the target. This error tolerance shall remain consistent for rounds penetrating the target at angles up to 15 degrees to the left and right of the target centerline and up to three (3) degrees above and below the horizontal plane of the target. For the MIT and SIT the hit detection accuracy shall be greater than 97% for all rounds penetrating the target (round location is not required).

3.2.3.3. Usage Algorithm for Non-Contact Sensor. The algorithm shall be used whenever the non-contact sensor(s) is present. A hit or miss determination is made by comparing the theoretical outline of the target and the location of the penetration point as calculated by the non-contact hit sensor.

The system shall determine and record the theoretical coordinates of the center of the projectile’s penetration of the target plane. The coordinates will be considered a true depiction of the round penetration location. The theoretical outline of the target shall be geometrically defined by the location of n points (x_i, y_i, i = 1 to n) around the target (defined by the dimensions found in TC 25-8) forming a closed figure. This constitutes the edge of the target and should be directly related to the target as defined in TC 25-8.

The Government evaluation of the ability of the non-contact hit sensor to accurately detect the actual penetration of the round on the physical target will be in accordance with the attached INGATS, MAT and SAT, Live Fire Accuracy Evaluation Plan (See Appendix E).

3.2.3.4. Data Collection. All hit detection systems installed on target mechanisms along with the RCS shall be capable of generating and collecting hit detection data. This data shall include time tagging (in seconds) of each hit based on the time the target is first exposed, the target identifier, the number of hits required to kill the target, the time in seconds the target was killed, the total exposure time of the target, and the number of times the target is presented in the given scenario. The data collected from the SAT, MAT, and MAT-V shall additionally include the location of all supersonic rounds penetrating the target plane, for both hits and near misses. Near misses are defined as rounds missing the physical target but within a minimum of 2 feet outside the target edge. Data collected along with

the round location information shall be capable of being presented for data review along with a display of the outer limits of the target for use in the data review IAW paragraph 3.2.4.1.k.

3.2.3.5. Round Identification. For the SAT, MAT, and MAT-V, the round detection method shall also have the capacity to discriminate between projectile types as listed below and shall report this information to the CCS. The round identification shall have the capability to identify projectile types and report the type of round fired with a minimum 95% accuracy. These may be reported in lethality groupings by kill capability:

5.56mm Ball and Tracer
7.62mm Ball and Tracer
9mm Ball and Tracer
.50 cal Ball and Tracer
25mm TPDS-T
25mm TPD
30mm Training TP-T
40mm Practice Tracer
105mm TPT TPCSDS-T
105mm HEAT-TP-T
120mm TPCSDS-T
120mm HEAT-TO-T
MK19 40mm M385A1
M203 40mm Practice
TOW

Round identification for sub-sonic rounds is not required. Detection of sub-sonic rounds is required as delineated in paragraph 3.2.3.1.

3.2.3.6. Setup and Alignment. The hit detection system used on the target mechanisms shall not require a three man crew to take more than 30 minutes to set up and calibrate the system. Any realignment to maintain detector accuracy shall not be required more frequently than once every 24 hours.

3.2.3.7. Target Depiction. As a target is raised, it will become exposed to the firing position before it is raised to the full up position. The hit detection system shall be activated during the time the target is first exposed to the time it is fully exposed. During this time only that area of the target exposed to the firing position shall be capable of registering a hit and reporting a hit back to the RCS and stating target is in an in-transit state (this is required for all targets). For the SAT, MAT and MAT-V actual location of hits and near misses need be reported only when the target is in the full upright position. The target detection system shall not be activated when the target is in the down position.

3.2.3.8. Energy Conservation. Power consumption by the detection system shall not degrade the power requirements of the target system.

3.2.4. Range Control System (RCS). The RCS can consist of one or more of the following:

3.2.4.1. Central Control System (CCS). The CCS shall operate all targets and simulators on the range from an RCS and shall be capable of operating target mechanisms at a linear distance of up to five (5) Km. CCS shall consist of the following:

a. **CCS Storage Capacity**. The CCS shall store a minimum of 20 scenarios

of at least 250 lines each; store at least one year's scoring record - (based on 40 scenarios per day and 240 days per year); and have sufficient storage capacity so that all required software plus the scoring records shall occupy less than 30% of the total capacity. Removal of scoring records shall require a positive action by the range operator.

b. **Memory**. The CCS shall possess non-volatile memory so as to retain and recall all program data and operational settings for six (6) months after primary power source is turned off or interrupted.

c. **Operating Temperature**. The CCS shall be able to operate in a controlled temperature range of 50 F to 100 F.

d. **Graphics**. The computer screen shall at all times show a graphical pictorial of the range. A separate computer/monitor that operates in conjunction with the main computer is acceptable. These graphical depictions shall look similar to the layout of the range but do not have to be to scale.

e. **Printer**. As a minimum, the printer shall be capable of printing four (4) sheets of 8-1/2 x 11 inch paper of scoring data per minute. The printer shall be suitable for operation in dusty and humid environments. A cover shall be provided to protect the printer from dust and debris when the range is idle. The capacity of the printer shall be such that the range computer does not have to remain idle for more than two (2) minutes between the execution of each scenario.

f. **Computer Grounding**. The computer shall be grounded and shielded so that the operations shall not be hindered by or interfere with the use of radio equipment in the RCS (similar to the transmissions from single channel ground and airborne radio systems (SINCGARS), hand held radios as used by range personnel) and electronic equipment/generators.

g. **Computer System**. The minimum requirements of the computer shall be an IBM compatible PENTIUM computer with the most current version of Microsoft Windows, a 3-1/2" floppy drive, a CD ROM player, 56 KB internal FAX/MODEM with communication software, 102 button keyboard, Pointing device, 17" SVGA color monitor capable of at least 256 colors. A cover shall be provided to protect the computer and keyboard from dusty environment, when the range is idle.

h. **Backup Computer Power**. The CCS shall have an uninterrupted power source (UPS) capable of sustaining operations after loss of power for a minimum of ten (10) minutes. The capacity of the UPS shall provide sufficient CCS running time for range personnel to save data and shut down the computer with no information loss. The UPS shall also have a failure warning to indicate when the storage battery is unable to provide back up capabilities.

i. **Hit Sensitivity**. The CCS shall allow remote hit sensitivity adjustment to the hit detectors for various types of ammunition fired at the target.

j. **Synchronization.** The CCS shall be capable of synchronizing battlefield effects to occur within 0.5 seconds of an activation command by the CCS/RFCCS operator or computer (i.e., in reaction to a hostile fire, kill or hit battlefield effects request).

k. **Data Recall.** The CCS shall have adequate capability to allow range personnel to collect data from the hit detection system (paragraph 3.2.3) for the development of after action reviews for the individuals or crews using the range. All data collected in paragraph 3.2.3 for each firing exercise shall

be available for the after action review immediately after the completion of the exercise and be stored for transfer to an after action computer or a permanent portable storage medium. The minimum data to be collected for the Armor after action review shall include:

Type of Target displayed
Type of round fired
Location of hit with respect to the target
Number of hits on the target
Firing order
Time of day
Target address
Crew identifier
Type of round
Time of kill
Reaction by simulators

This data collection shall not interfere with or delay the training. The capability shall also be provided to allow for a daily print out of the total target activations each day at each target, and the total number of hits taken by that target that day.

3.2.4.2. Radio Frequency Central Control System (RFCCS). The RFCCS shall be identical to the CCS IAW 3.2.4.1 but is radio controlled. The transmitter/receiver antenna shall be located outside the RCS building and out of the way of normal range operations. The transmitter shall meet the requirements of 3.2.4.3.h

3.2.4.3. Hand Held Controller (HHC). The HHC shall be a programmable device used to operate target mechanisms and simulators. The HHC shall meet the following requirements:

*a. **Weight**. The HHC shall be supported by a carrying strap and shall weigh less than ten (10) pounds, including internal power source, and weigh less than a total of 15 pounds with an external power source. If an external power source is required, an additional carrying strap shall support it. The HHC shall be capable of one hand operations while being supported by the other hand.

b. **Power Source.** The power source (PS) shall be 100% rechargeable within eight (8) hours and have a low battery warning indicator. Sufficient PS units shall be included such that the HHC can be operated 24 hours per day allowing for PS charging time.

*c. **Operations**. The HHC shall be capable of performing a minimum of 2000 commands over eight (8) hours, and shall be provided with a rechargeable/replaceable PS to provide operational capability for 24 hours (eight (8) hours without replacing the PS). If rechargeable/replaceable PS are required, the PS shall be replaceable within one (1) minute with no special tools, and capable of providing a minimum eight (8) hour operation on one recharge. When rechargeable/replaceable PS are used, recharging capabilities shall ensure that all batteries not in use are being recharged and are fully charged before the batteries in use are discharged. No data shall be lost when replacing the PS. PS chargers shall operate using existing power at the installed range (120V, 60HZ 240V, 50HZ). Additional input power options (i.e., 50/60 Hz) are acceptable.

d. **Hit Sensitivity**. The HHC shall allow capability for remote hit adjustment of hit sensitivity of hit detectors for various types of ammunition

fired at the target.

e. **Storage**. The HHC shall be capable of storing a minimum of five (5) scenarios.

f. **Night Visibility**. The HHC shall have controls and an information display that is visible to the operator in full daylight and full darkness without inhibiting night vision.

g. **Scenario Transferring**. The HHC shall be capable of transferring the operational programs to another HHC, RFCCS or CCS or an IBM compatible computer. The HHC shall include all required cables, hardware and software required to transfer the data between computers.

h. **Range**. The HHC shall be capable of operating targetry devices, at an RF line of sight minimum tunable between one (1) to five (5) Km.

i. **Target Addresses.** The HHC shall be capable of operating a minimum of 256 individually addressed targetry devices.

j. **Control**. The HHC shall have the capability for both manual and automatic (preprogrammed) control of individual targets, groups of targets or all targets.

k. **Data Retention.** The HHC shall retain/recall all program data and operational settings for six (6) months after the primary PS is turned off or interrupted.

l. **Synchronization.** The HHC shall be capable of synchronizing battlefield affects to occur within 0.5 seconds of an activation command by the HHC operator or scenario (i.e., in reaction to a hostile fire, kill or hit battlefield effects request).

m. **Printing.** All scoring data shall be able to be downloaded to another computer for printout.

n. **Gloves**. The HHC must be operable with standard gloves.

3.2.4.4. Target Application Software. A complete set of application software including a disk(s) that graphically depict actual target arrays and all information pertaining to the range graphics shall be provided with each range upon installation. This software shall be used to reprogram the computer in the event of a computer failure. The software application shall fully facilitate the training for Bradley, M1 series vehicles, and Aviation. The software application shall also support qualification training for all small arms weapons.

3.2.4.4.1. General. Software shall be adequate to operate both armor and infantry ranges. In the following, a single keystroke can be interpreted to be a key on a computer keyboard, a button on a keypad, or a pointing device click on an icon. The general requirements are:

a. **Automatic Mode.** Software shall operate in an automatic mode and run a preprogrammed, time-driven scenario. A scenario is a sequence of target presentations and simulator effects synchronized to achieve specific training objectives that are defined by the weapon system operator qualification requirements. The scenario gives commands to the targetry mechanisms, exposure time of targets, number of hits to kill a target, and how the target

is to react when hit. Software shall direct targets to perform sequential time driven actions required in the document.

b. **Manual Task**. A task is defined as a collection or series of actions relating to the training event. As a minimum the range operator shall be able to go into a manual mode, at any time during a scenario, and build two or more tasks which can address any target on the range individually or by group and then reenter the scenario wherever and whenever desired. The manually entered task shall have its score and address listed on the score printout.

c. **Quick Manual Action.** The range operator shall be able to use a pointing device to select any graphically depicted target or group of targets and activate them IAW this document.

d. **Scenario Storage**. The scenarios shall be stored in the RCS's hard drive and be capable of transfer to a disk at a later time.

e. **Operating Commands.** All software on the RFCCS and CCS shall be menu driven and pointing device activated.

f. **Manual Override.** When the RCS is in the automatic (scenario driven) mode the operator shall have the ability to manually stop, override, individually control all or any range device at a particular site and reenter the scenario at the point interrupted.

g. **Scenario Writing**. Scenarios shall be written as actions separated into tasks or groups of tasks. Scenarios shall be written to have an option for the operator to place a HOLD statement between each task or to have the scenario continue running until all tasks have been completed.

h. **Task Loading**. Range operator shall have the option of loading all tasks of a scenario or designated individual tasks. The sequence of the tasks can be varied. A printout shall record only tasks that are run.

i. **Task Operation**. The range operator shall be able to run multiple tasks of a scenario simultaneously.

j. **Attrition Capability.** When writing a scenario an attrition option shall be available to show attacking and retreating of forces. A group of targets shall be designated as an attrition group along with the number of kills the attrition group must take to be killed. Once the required number of kills is met the remaining targets shall not be exposed during the task. The hits on the targets in the group shall be cumulative until the required kill is reached. Once the required hits on the target group are met no other targets in that group shall come up.

k. **Trigger Capability.** When writing a scenario, a timed triggered option shall allow for the automatic activation of another task if the defined stimulus occurs within a specific time period. The stimulus can be hits, up limits, down limits, forward limits or reverse limits.

l. **Synchronization with Simulators**. Software shall be capable of synchronizing targets with battlefield effects (i.e., SES, GUFS, MSD, BES and MFS) within 0.5 seconds.

m. **MILES Interface**. The software shall be able to send commands to activate the MSD and MILES transmitters during a scenario and in the manual mode.

n. **Simulator Interface**. The software shall be able to send commands to activate the SES, MFS, BES, and GUFS during a scenario and in the manual mode.

o. **RCS Display**. The RCS display shall show the name of the current scenario being run, the scenario task or tasks that are active, the date, current time, and the elapsed time in the current scenario. Each task shall show a time that it shall last, start to finish, and count (up or down) as the task is being activated.

p. **Hit Status**. The RCS display shall automatically show target hit count within five (5) seconds after occurrence of actual hit for HW ranges and 15 seconds after occurrence for RF ranges.

q. **Active Target Display**. No action will be required by range operator to differentiate the active targets on the range.

r. **Scenario Pause**. With a single keystroke the range operator shall be able to pause a scenario and maintain the current target position and time in the scenario, then resume the scenario at the exact place that the pause occurred.

s. **Scenario Abort**. Range operator shall be able to abort a portion of the scenario and restart at the beginning of the active task, without losing scores. The targets that are in use shall stop operating, but remain in the same position that they were in prior to the abort action. During this time all active targets shall be able to score a hit.

t. **Emergency Stop**. Range operator shall be able to perform an emergency stop that returns all targets to a down position without affecting scores.

u. **Scoresheet Data Saving**. Scoresheets and the scoring data shall be saved in a date-time labeled file in ASCII format when printed and require a positive action by the operator for deletion. If a deletion command occurs, the computer shall query the operator as to whether the operator really intends to delete the scoring data file. Scoring data must have the option to save to a 3.5″ disk in a delimited ASCII format.

v. **Printing Scores**. The range operator shall have the choice of printing scores at any time in the scenario. Printing scores from within a scenario shall not disrupt the scenario. A scoresheet style shall be selectable from a menu manually both before or from within a scenario.

w. **Target Malfunction**. A target malfunction shall be displayed on the RFCCS and CCS screen. The indication shall be such that the operator readily notices the malfunction. The range operator with a single keystroke shall be able to obtain a printed report of the malfunction and clear it from the RFCCS/CCS.

3.2.4.4.2. Armor Range Software. The Armor range software shall contain all of the requirements of 3.2.4.4.1 plus the following:

a. **RFCCS and CCS Target Display**. The computer display shall show all targets in the scenario plus alternates (when the alternate target is activated) IAW 3.2.4.4.2.d. All changes in the status of downrange target equipment shall be automatically updated in the CCS within five (5) seconds of occurrence for HW and 15 seconds for the RFCCS; the computer display shall

also indicate the status of the MAT and, if applicable, the motors or generator as operating or failed.

b. **RFCCS and CCS Graphics**. The computer display shall at all times show a graphical pictorial of the range (this can be done with a separate computer/monitor that operates in conjunction with the main computer if necessary). This graphical depiction shall look similar to the layout of the range but does not have to be to scale. Target status (as stated in 3.2.1.5.i) shall be shown on this graphics map at all times. When a target or simulator activates and is not in the current scenario a WARNING MESSAGE shall appear that tells the operator that a target or simulator not in the current scenario has activated without being commanded through the scenario (the warning message shall enable the operator to be aware of any potential safety danger). The contractor shall do a starting graphic of the existing range. This graphic shall be capable of being modified by the range operator. Range graphics shall be able to show all firing points and range safety fans as assigned by the operator. The graphic pictorial shall designate targets in a manner that the range operator can differentiate visually each type of target. As a minimum, range graphics shall be able to show the target addresses for all targets on the range with a single keystroke.

c. **CCS Display**. The CCS shall maintain a continuous display of the active portion of the scenario. The target location code shall be operator changeable.

d. **Alternate Targets**. Target groups shall be able to be programmed into primary and secondary (alternate) target sets or groups. Primary groups of targets are those that shall be exposed during a task. An alternate target shall be automatically exposed when a primary target malfunctions. When activated, an alternate target shall have the full exposure time of the primary target regardless of the amount of time the primary target had been exposed prior to the failure. At any time after activation of the alternate target, the alternate target may be disabled and the primary target re-enabled by an operator action.

e. **Printout Scoresheet**. The scoresheet printout shall be adjustable and changeable by the operator. A group of base scoresheets shall be available in the program. The operators shall be able to adjust the scoresheet and make their own scoresheet style and save it to the hard drive under a separate name. There shall be at least three base scoresheets, which shall have a minimum of the following information:

1) Scoresheet information shall include the name of the scenario program, weapon operator identification, the date and time the scenario was operated, number of exposures per target and hit count per target. The scores shall be provided by lane. Printout shall show when the simulator was activated, and when (in seconds) each hit occurred.

2) The name of the scenario program, weapon operator identification, the date and time the scenario was operated, number of exposures per target and raw hit count per target.

3) Whenever attrition is used, the printout shall be given per kill group and provide for each target in seconds of scenario time, the time the simulator was activated, first hit, target kill, target removal, and a total exposure time for the kill group. The data is listed by target address in chronological order of exposure; therefore, a target may appear multiple times. The printout should also include: scenario name, date, weapon operator identification, and time.

3.2.4.4.3. Small Arms Qualification Ranges. The small arms qualification range software shall contain all of the requirements of 3.2.4.4.1 plus a minimum of the following:

a. **Operating Screen**. The operating screen shall show a range pictorial by lane and row of all target positions and total score per firing lane.

b. **Alibi Firing**. The software must include the ability for the soldier to alibi fire. Alibi fire is when a target malfunction occurs, the scoresheets shall be saved up to this point in such event the weapon operator shall be able to return and complete the scoresheet at the point where the malfunction occurred.

c. **Printout Scoresheet**. The scoresheet printout shall be adjustable and changeable by the operator. A group of blank scoresheets shall be available in the program. The operator shall be able to adjust the scoresheet and make their own scoresheet style and save it to the hard drive under a separate name (type information to be added location of hit, type of round fired, type of target hit, etc.). There shall be at least three base scoresheets, which shall have a minimum of the following information:

1) The name of the scenario program, the firing order number and identification to identify the using unit, the date and time the scenario was operated, number of exposures per target, and hit count per target. The scores shall be provided by lane. The names and social security number of each weapon operator shall be able to be input to this scoresheet by the operator.

2) The name of the scenario program, the firing order number, identification to identify the using unit, the date and time the scenario was operated. This scoresheet shall print subtotaled scores for each task and a total of all tasks. The scoresheet shall show every target that came up in chronological order by lane and a hit count of each target. The names and social security number of each weapon operator shall be able to be input to this scoresheet by the operator.

3) This printout shall include all information in paragraph 3.2.4.4.3.c(2) above and shall include weapon operator’s qualifications for M16 Record fire qualification. A copy of the record fire scorecard is found in Appendix E. The qualifications shall be able to be changed by the operator to create other scoresheets.

3.2.4.4.4 Application Software. After the INGATS application software has been successfully tested, a copy of the executable disks shall be delivered to the contracting officer. A copy of all upgrades to the software during the life of the contract shall be provided in executable disk format to the contracting officer.

3.2.5. Power Source Regeneration. The RF versions of the SIT, SAT, MIT, and all simulator equipment require a lightweight portable power supply that is not dependent on a fixed regeneration source. Any regenerator supplied shall be located near the PS at the target location on the range and protected from weapons fire. The source shall not be audible to the human ear 15 feet away. A method of protecting the PS from overheating or overcharging during the regeneration cycle shall also be provided. The regenerator shall be of the proper rating and capacity to provide enough power to ensure that the target mechanism is operable for a full 24 hours, 240 days per year at the

usage rates stated for the mechanism.

3.2.6. Environmental Extremes. Cold weather and hot weather kits are intended to be used for the occasional range which can be installed where ambient temperatures exceed the requirements of paragraph 3.5. The basic unit without cold or hot weather kits must be designed to operate at least in the temperature band 0 to 120 degrees Fahrenheit.

3.2.6.1. Cold Weather Kits. A cold weather kit shall be available which allows the target mechanism, including all associated systems, to operate at temperatures as low as -40 degrees Fahrenheit without degrading the target mechanism performance. The target mechanism shall provide power for the cold weather kit. The kit shall be contained within the existing target mechanism, shall work in both the HW and RF versions, shall not require more than ten (10) minutes of additional set-up time and not exceed the power capacity of the HW and RF versions.

3.2.6.2. Hot Weather Kits. A hot weather kit shall be offered which allows the target mechanism, including all associated systems, to operate when ambient or solar heating raises the operating temperature to 140 degrees Fahrenheit. The target mechanism shall provide power for the hot weather kit. The kit shall work in both the HW and RF versions shall not require more than ten (10) minutes of additional set-up time and not exceed the power capacity of the HW and RF versions.

3.3. Support.

3.3.1. Training Requirements. Training shall be provided for each range installation. Up to 24 classes may be required per year. Classes shall be tailored to the equipment on each specific range. There are three different types of training courses, INGATS Small Arms Range (this includes all infantry targetry and infantry related equipment), All INGATS equipment except the MAT, and all INGATS equipment. Each course shall include all applicable manual, materials, and training as described in paragraph 3.3.1.1, 3.3.1.2, and 3.3.1.3.

3.3.1.1. Operator Training. The contractor shall provide New Equipment Training (NET), for ten (10) personnel. This training shall include classroom instruction and a functional walk-through of the site. The duration shall be sufficient to allow the students to effectively operate all aspects of the range being trained upon. This shall include all aspects of the Hand Held Controller if applicable. The students shall also be trained on running a self-test on the entire range to check for any malfunctions. The contractor shall design and develop a training course to train operators. The course shall consist of a detailed set of courseware suitable for use by Government personnel.

3.3.1.2. Scenario Training. The contractor shall provide the NET, for ten (10) personnel. This training shall include classroom instruction and RCS operation orientation The duration shall be sufficient to allow the students to effectively write, edit, print, download to disk, test, troubleshoot for scenario errors, and input a scenario into the RCS (to include the Hand Held Controller if applicable). The contractor shall design and develop a training course to train operators in writing and troubleshooting scenarios. The course shall consist of a detailed set of courseware suitable for use by Government personnel.

3.3.1.3. Maintenance Training: The contractor shall provide one maintenance training session as part of the NET. This training shall consist

of preventive maintenance training, direct support repair training, and complete training on set-up, alignment, troubleshooting, testing, repairing, and theory of the Hand Held Controller (if required). All of this shall be provided to approximately 20 personnel. Direct support repair training shall include schematic diagram exposure, fault isolation, troubleshooting to the lowest repairable assembly, parts identification, details on parts requisition, procedures for warranty claim submission, and theory of operation to include individual equipment relationships and interoperability. The duration of this training shall be sufficient to ensure all maintenance personnel are capable of full DS/GS repair of the entire range. The course shall include the provision of a detailed set of courseware suitable for use by government personnel.

3.3.1.4. Sustainment Training. The contractor shall provide a sustainment training package that includes video aids for use by each range to train additional operator and maintenance personnel. The sustainment course must be delivered to each range official at the time of NET training and is subject to Government approval before training is accepted as complete.

3.3.2. Manuals. The contractor shall provide the most current copies of the commercially available operator and maintenance manuals for all devices included in this document. The manuals shall contain sufficient information to allow for operation and maintenance for each mechanism. One set of the operation and technical manuals shall be provided for each NET student. The manuals for the operation and repair of the range shall also include schematics depicting the power, data and control busses. The manuals shall contain logical fault detection and operational methods, and as a minimum, sufficient data for operations, scenario writing, all maintenance/repair actions and parts lists (the parts list and repair actions shall be cross-referenced for ease of use). The manuals may be incorporated into a single manual, providing it is easy to understand. In addition, the manual shall contain complete parts listings of repair parts that are commonly available from other manufacturers. The parts lists shall include the common repair parts with the original manufacturer’s code and stock number, and adequate information for the maintenance personnel to obtain the part directly from the original manufacturer or a local supplier. Whenever possible, multiple alternate sources for common parts shall be provided. Each manual shall contain a section listing recommended spare parts required to be on hand for the range to maintain 90% availability. Contractor format for the manuals is acceptable. A set of the final version of the manuals with inserts shall be provided to the contracting officer for approval by the Government. One copy of all applicable manuals shall be delivered to the range at the time of installation. Additional manuals on a per student basis shall be delivered at the time of NET training.

3.3.3 Installation The contractor shall deliver, construct, assemble, and install all items in accordance with the terms of this contract and specifically as follows:

a. The contractor shall have 30 calendar days for ranges which do not have any MATs/MAT-Vs and 40 calendar days for any range with a MAT(s)/MAT-V after beginning the installation of the hardware to have the range installed and accepted by the Government. The installation and setup of all targetry and related equipment is the responsibility of the contractor. This is to include, but is not limited to, interfacing with the GFE on hardwired (HW) ranges and installing RF controlled hardware on RF ranges.

b. For the MAT and MIT, the Government will complete the basic track bed, as described in Appendix B, with no ballast, ties or rails installed. Sufficient ballast to stabilize the rail bed, as required, will be provided by the Government at the site of each MAT installation. If an improved roadbed (anything other than what the government describes in Appendix B) or track is required, the contractor is responsible for installing the ballast and supplying the ties and rails and/or preparing the roadbed for his mover.

c. The Government will provide a level concrete slab at all SIT and SAT locations. For all target mechanisms, the hardware shall be installed so that at least 90% of the target is exposed above the berm when the target is in the raised position.

d. For HW installations, the Government will provide the range control tower, all berm construction, tank trails, firing points, track beds, target pads as described in appendix B, including the power and data cables from the tower to breakout boxes and installation sites. The contractor shall interface his hardware with each target position to include attaching to and utilizing the installed power plus transmit and receive data using the installed HW connections. The contractor shall install the CCS in the tower, using the power supplied and the data transmission connections as described in appendix B. The contractor shall supply hardware and any other equipment required to make an operational range and is responsible for restoring the range to its original condition, including the removal of all debris generated during the installation. The contractor shall supply and install 3-D targets on all down range infantry target lifting devices. The infantry targets to be installed on the ranges shall be manufactured IAW the 3-D target found in appendix A. The contractor shall install GFE targets on the SAT, MAT and MAT-V, including all alignment and setup of the HDD.

e. For RF installations, the Government will supply the range control tower, all berm construction, tank trails, firing points, track bed, and target pads as described in appendix B. Power and data cables between the tower and target positions are not required for RF ranges. The contractor is required to install his hardware at each target pit, using his own power and RF transceiver. When a tower is to be used on the range to house the RCS, the contractor shall install all required transceivers and antennas and any other devices required for transmission to the target positions. All antennas shall be located outside the tower and away from operations personnel movement. The contractor shall supply all interface hardware and is responsible for restoring the range to its original condition, including the removal of all debris generated during installation. The contractor shall supply and install 3-D targets on all SITs, MITs, and DSITs. The infantry targets to be installed on all ranges shall be manufactured IAW appendix A. The contractor shall install GFE targets on the SAT, MAT, and MAT-V, including all required alignment and set up of the HDD.

f. The Government will be responsible for insuring that the range personnel are properly informed and the range is ready for the installation.. After receipt of Delivery Order, the contractor shall contact the range official to coordinate and schedule the installation schedule for each range. The contractor shall prepare a target interface (TI) checklist based on the interfaces of his hardware with the GFE. Prior to start of installation, the Government and contractor will conduct a TI inspection of the prepared range to assure the range is IAW appendix B. The contractor is responsible for scheduling the TI inspection with the Government far enough in advance of the start of installation to allow both parties to correct any deficiencies found.

h . The contractor shall notify the PCO in writing 7 days prior to completion of installation so acceptance inspection can be scheduled. The

contractor shall be responsible for insuring that the range is operating IAW Section 3 and the contractor's part of Section 4 of the Performance Description before the acceptance team arrives, to allow the acceptance to be completed in a timely manner.

i. Upon completion of the range the contractor shall supply the range with a layout identifying the target address of each position for the RF range. For the HW range, this layout shall also include wiring diagrams showing how the power and data cables are wired to the installed hardware.

j. Installation shall include a contractor developed scenario loaded on the computer that addresses and tests all hardware.

k. One complete sets of manuals and all software shall be left in the tower or with a designated representative prior to the acceptance of the range.

3.4. Workmanship and Materials.

3.4.1. Workmanship. Workmanship shall be of a quality consistent with the operational and environmental requirements of this document. All surfaces, including threads, shall be free of burrs and sharp edges. All material shall be sound, of uniform quality and condition, and free from seams, cracks, and other defects that may adversely affect the strength, endurance, wear and corrosion resistance of the part. Adhesives shall be carefully applied where required to assure proper sealing and bonding and shall meet commercial standards for use outdoors. Material shall not be treated in any manner to conceal defects. Wires and cables shall be positioned or protected to avoid contact with rough or irregular surfaces and sharp edges to avoid damage to conductors. All interior parts and surfaces shall be thoroughly cleaned and dried, and shall be free of dust, burrs, chips, grinding compound, mold release agents, or other debris. Grinding compounds that may impregnate or adversely affect the specified finish shall not be used. Parts shall be cleaned after fabrication and assembly IAW good commercial practice. Corrosion shall be removed completely before parts are finished (including new undercoat) or assembled. Electronic and electrical assemblies shall be free from solder particles, residual flux and other foreign material.

3.4.2. Materials/Commercial Components. The materials of construction shall use commercial or military standard components, parts, and assemblies of reliable construction. Every attempt shall be made to use components which have a long term commercial availability and, whenever possible, multiple commercial supply sources. Commercial products, processes, and practices shall be used to the maximum extent possible to reduce development, production, and operational support costs.

3.4.3. Attachment Hardware. Where practical, all removable covers shall use easily released latches requiring no tools to remove.

3.5. Environmental Requirements. All exposed surfaces shall be constructed of a corrosion resistant material IAW the environmental requirements. Each INGATS unit shall operate under the following minimum environmental conditions without damage or loss of performance:

a. **Storage**. After storage at -40 to 140 degrees Fahrenheit.

*b. **Operating Temperature**. At ambient temperatures between 0 and 120 degrees Fahrenheit.

c. **Humidity**. In humid conditions up to 100%, 120 degrees Fahrenheit.

d. **Sea Coast**. In seacoast meteorological (salt atmospheric) conditions.

e. **Fungus, Rot, or Mildew**. Conditions that expose it to tropical fungus, rot, or mildew.

f. **Desert Conditions**. After exposure to dusty desert conditions.

g. **Snow and Ice**. After exposure to snow and ice.

h. **Sunlight**. When exposed to direct sunlight 12 hours per day, 240 days per year.

3.5.1. Vermin and Tamper Resistant. Lifting device, simulators, carriers, power sources and exposed cables shall have built-in features that preclude damage by range wildlife and that discourage pilferage and vandalism.

3.6. Environmentally Preferred Materials. No components that include contaminants or toxins capable of being released to the environment shall be used. Hydraulic fluids, if used, must be environmentally safe or contained to prevent accidental release to the environment.

3.7. Identification and Marking. The INGATS subsystems shall have a data plate attached to an external surface that contains as a minimum, the manufacturer, the model number, the serial number, and the date of assembly. Standard commercial data plates are acceptable.

SECTION 4 – **Quality Assurance**

4.1. Functional Demonstration. A functional demonstration shall be completed to demonstrate the manufacture's ability to assemble and perform IAW requirements of this contract. This functional demonstration shall be performed utilizing one (1) of each production representative unit and or a combination of related units as specified in the contract. The functional demonstration shall be performed IAW the approved test plan(s) as provided under this solicitation and or contract. Each offeror is required to review and propose changes or modifications to these enclosed test plans as necessary to ensure that each offerors equipment, as submitted in the Technical proposals is fully tested in accordance with the contract requirements. Any such failure to modify the test plans by each offeror to adequately perform this does not relieve the successful contractor from fully demonstrating the acceptability of their equipment in accordance with the contract requirements. Any suggested modifications to the test plan(s) shall be reviewed and approved by the Government prior to inclusion in the functional demonstration. The contractor shall provide a Functional Demostation Plan IAW Table I delineating how they will accomplish all testing requirements. Testing will be conducted at the functional demonstation range as designed in the contract.

4.2. System Acceptance. Upon successful completion of the Functional Demonstration, acceptance of all future ranges will be IAW the following:

a. Contractor Final Inspection: After delivery and installation of the INGATS hardware, the contractor shall perform his own inspection and tests necessary to assure that all contract requirements have been met, prior to inspection and acceptance by the Government. The successful contractor is required to develop and submit to the PCO for review, (15 days prior to range

acceptance), a basic generic, 50 cycle software scenario test package that will be able to run all targetry Hardware on the range, and shall be utilized for all range inspections. The Contractor inspections and tests shall include as a minimum the completion of a 20-cycle test for hardwired ranges and a 10 cycle test for radio controlled ranges, utilizing the contractor developed software scenario(s). When all deficiencies found during the contractor's inspections have been corrected, the contractor will notify the PCO, or his authorized representative, (ARDEC, AMSTA-AR-QAW-C), in writing that the contractor hardware installation is complete and ready for final inspection and acceptance by the Government. This notification shall be provided at least seven working days prior to the date scheduled for initiation of range inspection. Adjustments/modifications to the inspection schedule may be made by telephonic notification to AMSTA-AR-QAW-C, provided such notification is made at least one day prior to departure of the Government Quality Representative for the designated range.

b. Government Final Inspection:

1. The final Government inspection will be IAW the Government Product Acceptance Test (PAT). The examinations and tests will be performed by the contractor and witnessed by the authorized representative of the PCO. The Government reserves the right to have the contractor perform any or all tests in the PAT, or any other inspections, as deemed necessary to assure compliance with all contract and specification requirements. As a minimum, range inspections will be conducted in accordance with the following requirements and instructions, utilizing the same contractor developed software scenarios as required above:

(a) An operational test, 50 cycle's hardwired and 20 cycle's radio controlled on the installed range, without failure.

(b) A visual inspection and functional test of the installed items (and associated equipment). The inspections shall include, but not limited to, workmanship, housekeeping (cleanup of the installed items and removal of residue/debris remaining from installation operation) and function. These inspections and tests will be to the following:

(1) MAT including track and other associated items shall be inspected 100%.

(2) All other installed targetry /Hardware (SIT, SAT, MIT, etc) will be sampled per the sampling plan provided below:

LOT SIZE	SAMPLE SIZE
2-8	2
9-15	3
16-25	5
26-50	8
51-90	13
91-150	20
151 and above	32

All sample sizes will reject on one deficiency

(c) Each range and type of targetry/Hardware on the range shall be considered as a separate lot. Acceptance of the range will require acceptance of all targetry hardware groups or lots that are installed on that range.

(d) The contractor shall not knowingly present any nonconforming items to the Government. Accordingly, the contractor prior to Government acceptance of the range shall correct all defects observed during the inspection of the range.

(e) If a defect is found to reject the range, the Government reserves the right to either stop inspection at that point and reject the range, or to complete inspection of the designated sample before cessation of inspection.

(f) If the range is rejected during initial and or any follow on inspection, the contractor shall be required to take corrective action and resubmit the range for inspection in accordance with the timeframes listed in paragraph 4.2 a. A written report of the corrective action(s) taken shall be prepared and submitted to the PCO to include action to prevent such recurrence. The Government reserves the right to require submission and approval of the corrective action report prior to conducting the reinspection.

(g) If the range is rejected by the Government after the time of the initial inspection, any time there after, or if the range is not ready for Government inspection at the time specified in the initial notification, the contractor may be held responsible for any and all additional costs incurred by the Government for re-inspection. These costs shall not be limited to any TDY charges, airfare, daily perdiem and or salaries for Government personnel which are related to the requirement for additional inspection(s).

(h) If a range is rejected by the Government, and is further rejected upon follow on inspection(s), the Government reserves the right to suspend all further inspection or to institute 100% inspection, on that and all subsequent ranges presented to the Government. Such action may remain in effect until the contractor has adequately demonstrated the effective corrective action has been taken to correct the problem and prevent recurrence. Further, the contractor may be held responsible and charged for any and all costs incurred by the Government in performing 100% inspection.

(i) If a range is rejected by the Government, the contractor shall remain responsible for the maintenance and satisfactory operation of any already installed items/equipment on the range. To include any items which have met acceptance requirements during initial inspection sampling, until such time as the complete range is accepted by the Government. As a part of reinspection, the contractor may be required to demonstrate satisfactory operation of the complete range.

3. Government Acceptance: Acceptance of the installed system shall occur when the PCO or authorized representative of the PCO has been assured that contract and specification requirements have been met and so indicated by the affixed signature on the applicable DD Form 250.

TABLE I. REQUIREMENTS/VERIFICATION CROSS REFERENCE MATRIX

METHODS OF VERIFICATION FOR DEMONSTRATION TEST

1. Contractor Certification (1C). The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of this performance document and conforms to the producer's

own drawings, specifications, standards and quality assurance practices. The government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be otherwise provided for under the provisions of the contract. Contractor certification for environmental weather kits as defined in paragraphs 3.2.6.1 and 3.2.6.2 and environmental conditions as defined in paragraphs 3.2.o, 3.5.a, 3.5.b, 3.5.c, 3.5.d, 3.5.e, 3.5.f, 3.5.g, and 3.5.h shall include contractor test data to substantiate that the INGATS system and components meet these requirements.

2. Demonstration (2D). Qualitative methods shall show the required feature or performance has been met or exceeded. Demonstrate to comply with the appropriate paragraph in section 3. Demonstration and procedures for the Functional Demonstration shall be established by the contractor and included in his written inspection plan. Each requirement shall be carefully analyzed and a determination made as to the method, procedures, equipment and sequence of demonstrations that will best insure acceptance of items that are to meet the requirement, and the unequivocal rejection of those which do not conform.

3. Examination (3E). Review of hardware, software, or documentation that show the required feature or performance has been met or exceeded. Inspect by means of Standard Measuring Equipment (SME) and/or visual/manual inspection techniques. The SME used for measuring or gauging shall be accurate to within ten percent (10%) of the specified tolerance for the related characteristics.

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.1	Item Description	X				
3.2	General Requirements	X				
3.2.a	Frequency		X			
3.2.b	Communication Distance		X	X		
3.2.c	Status			X		
3.2.d	Target-single Group			X		
3.2.e	Control			X	X	
3.2.f	Power Interrupt				X	
3.2.g	Polarity Marking				X	
3.2.h	Install/Repair Ease		X			
3.2.i	Availability		X			
3.2.j	Durability		X			
3.2.k	Ground				X	
3.2.l	Buried Cable				X	
3.2.m	Reverse Polarity			X		
3.2.n	Cold/Hot Weather Kit		X			
3.2.o	Water Tight/Rustproof		X			
3.2.p	Service Life		X			
3.2.q	Operability Test				X	
3.2.r	Addresses		X	X		
3.2.s	Hit Detector		X			
3.2.t	Not Used	X				
3.2.u	Low Battery Indicator			X		
3.2.v	Not Used	X				
3.2.w	Regeneration Devices		X		X	
3.2.x	Special Tools		X	X		
3.2.y	Maintenance Test Equipment		X			
3.2.z	Lightning Protection		X			
3.2.a.a	Deployment		X			
3.2.1	Target Mechanism	X				
3.2.1.1	Stationary Infantry Target			X		
3.2.1.1.a	Target Lifting		X	X		
3.2.1.1.b	Target Command			X		
3.2.1.1.c	Operational Status		X	X		
3.2.1.1.d	Weight		X			
3.2.1.1.e	Portability		X			
3.2.1.1.f	Operation Capability		X			
3.2.1.1.g	Interfacing		X	X		
3.2.1.1.h	Triggering		X	X		
3.2.1.1.i	Presentation				X	

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.2.1.1.j	Obstacle Encounter			X		
3.2.1.1.k	Master/Slave Combination			X		
3.2.1.2	Double Target Arm SIT (DSIT)			X		
3.2.1.3	Moving Infantry Target (MIT)	X				
3.2.1.3.a	Movement			X		
3.2.1.3.b	Target Command			X		
3.2.1.3.c	Speed			X		
3.2.1.3.d	Starting/Stopping			X		
3.2.1.3.e	End Limits			X		
3.2.1.3.f	Control			X		
3.2.1.3.g	Functions			X		
3.2.1.3.h	Movement Layout			X		
3.2.1.3.i	Presentation			X		
3.2.1.3.j	Operational Status			X		
3.2.1.3.k	Obstacle Encounter			X		
3.2.1.4	Stationary Armor Target (SAT)		X			
3.2.1.4.a	Lifting Ability		X			
3.2.1.4.b	Weight		X			
3.2.1.4.c	Portability		X			
3.2.1.4.d	Target Commands			X		
3.2.1.4.e	MILES		X	X		
3.2.1.4.f	Operation Status			X		
3.2.1.4.g	Operation Capability		X			
3.2.1.4.h	Interfacing			X		
3.2.1.4.i	Presentation			X		
3.2.1.4.j	Recharging		X	X		
3.2.1.4.k	Lifting Arms				X	
3.2.1.4.l	Not Used			X		
3.2.1.4.m	Hit Detector			X		
3.2.1.5.	Moving Armor Target (MAT)		X			
3.2.1.5.a	Control			X		
3.2.1.5.b	Target Commands			X		
3.2.1.5.c	Movement		X	X		
3.2.1.5.d	Lifting		X			
3.2.1.5.e	Stability		X			
3.2.1.5.f	Portability		X			
3.2.1.5.g	Continuous Operation		X			
3.2.1.5.h	Command Reaction			X		
3.2.1.5.i	Operational Status		X	X		
3.2.1.5.j	End Limits		X	X		
3.2.1.5.k	Hit Detector			X		

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.2.1.5.l	MILES		X	X		
3.2.1.5.m	Target Presentation			X		
3.2.1.5.n	Stop Safety		X	X		
3.2.1.5.o	Cut Off Switch			X		
3.2.1.5.p	Lifting Arms				X	
3.2.1.5.q	Not Used					
3.2.1.5.r	Parking Break			X		
3.2.1.5.s	Warning Indicator			X		
3.2.1.5.t	End of Course Barrier				X	
3.2.1.5.u	Not Used	X				
3.2.1.5.v	Interfacing		X	X		
3.2.1.5.w	Hit Detection		X			
3.2.1.6	MAT – Vertical (MAT-V)	X				
3.2.1.6.a	Control			X		
3.2.1.6.b	Target Commands			X		
3.2.1.6.c	Movement		X	X		
3.2.1.6.d	Stability		X			
3.2.1.6.e	Portability		X			
3.2.1.6.f	Continuous Operation		X			
3.2.1.6.g	Command Reaction			X		
3.2.1.6.h	Operational Status		X	X		
3.2.1.6.i	End Limits		X	X		
3.2.1.6.j	Hit Detector			X		
3.2.1.6.k	MILES		X	X		
3.2.1.6.l	Target Presentation			X		
3.2.1.6m	Stop Safety		X	X		
3.2.1.6.n	Cut-off Switch			X		
3.2.1.6.o	Target Arms				X	
3.2.1.6.p	Parking Brake			X		
3.2.1.6.q	Warning Indicator			X		
3.2.1.6.r	End of Course Barrier				X	
3.2.1.6.s	Interfacing			X		
3.2.1.6.t	Hit Detection		X	X		
3.2.2	Simulators	X				
3.2.2.1	Sound Effects Simulator (SES)			X		
3.2.2.1.a	Decibels		X			
3.2.2.1.b	Sound Capability		X	X		
3.2.2.1.c	Commands			X		
3.2.2.1.d	Volume			X		
3.2.2.1.e	Interface			X		
3.2.2.1.f	Recording			X		

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.2.2.1.g	Weight		X			
3.2.2.1.h	Speakers		X			
3.2.2.1.i	Playback			X		
3.2.2.1.j	Power		X			
3.2.2.1.k	Self Sustainment			X		
3.2.2.2	MILES Shootback Device (MSD)			X		
3.2.2.2.a	Transmitter Mounting			X		
3.2.2.2.b	Operation			X		
3.2.2.2.c	Weight		X			
3.2.2.2.d	Power Supplies and Cable			X		
3.2.2.3	Muzzle Flash Simulator (MFS)			X		
3.2.2.4	Battle Effect Simulator (BES)			X		
3.2.2.4.a	Audio/Visual Cue			X		
3.2.2.4.b	Actuation			X		
3.2.2.4.c	Sequencing			X		
3.2.2.4.d	Capacity		X		X	
3.2.2.4.e	Fragmentation		X	X		
3.2.2.4.f	Operating Voltage			X		
3.2.2.4.g	Power On/Off Condition		X	X		
3.2.2.4.h	Safety Interlock		X	X		
3.2.2.4.i	Interfacing		X	X		
3.2.3	Hit Detection Devices		X			
3.2.3.a	Contact Hit Sensor			X		
3.2.3.b	Non-Contact Hit Sensor (NCHS)			X		
3.2.3.1	Hit Sensing		X	X		
3.2.3.2	Hit Locating			X		
3.2.3.3	Usage Algorithm for NCHS		X	X		
3.2.3.4	Data Collection			X		
3.2.3.5	Round Identification		X	X		
3.2.3.6	Set-up and Alignment		X	X		
3.2.3.7	Target Depiction			X		
3.2.3.8	Energy Conservation		X	X		
3.2.4	Range Control System (RCS)	X				
3.2.4.1	Central Control System (CCS)		X	X		
3.2.4.1.a	CCS Storage Capacity		X			
3.2.4.1.b	Memory		X			
3.2.4.1.c	Operating Temperatures		X			
3.2.4.1.d	Graphics			X		
3.2.4.1.e	Printer		X	X		
3.2.4.1.f	Computer Grounding		X		X	
3.2.4.1.g	Computer System		X			

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.2.4.1.h	Backup Computer Power		X	X		
3.2.4.1.i	Hit Sensitivity			X		
3.2.4.1.j	Synchronization		X	X		
3.2.4.1.k	Data Recall			X		
3.2.4.2	RFCCS		X	X	X	
3.2.4.3	HHC	X				
3.2.4.3.a	Weight		X			
3.2.4.3.b	Power Source		X			
3.2.4.3.c	Operations		X			
3.2.4.3.d	Hit Sensitivity			X		
3.2.4.3.e	Storage		X			
3.2.4.3.f	Night Visibility		X	X		
3.2.4.3.g	Scenario Transferring			X		
3.2.4.3.h	Range		X	X		
3.2.4.3.i	Target Addresses		X			
3.2.4.3.j	Control			X		
3.2.4.3.k	Data Retention		X			
3.2.4.3.l	Synchronization		X	X		
3.2.4.3.m	Printing		X	X		
3.2.4.3.n	Gloves			X		
3.2.4.4	Target Application Software		X			
3.2.4.4.1	General	X				
3.2.4.4.1.a	Automatic Mode			X		
3.2.4.4.1.b	Manual Task			X		
3.2.4.4.1.c	Quick Manual Action			X		
3.2.4.4.1.d	Scenario Storage			X		
3.2.4.4.1.e	Operating Commands			X		
3.2.4.4.1.f	Manual Override			X		
3.2.4.4.1.g	Scenario Writing			X		
3.2.4.4.1.h	Task Loading			X		
3.2.4.4.1.i	Task Operation			X		
3.2.4.4.1.j	Attrition Capability			X		
3.2.4.4.1.k	Trigger Capability			X		
3.2.4.4.1.l	Synchronization w/Simulators			X		
3.2.4.4.1.m	MILES Interface			X		
3.2.4.4.1.n	Simulator Interface			X		
3.2.4.4.1.o	RCS Display			X		
3.2.4.4.1.p	Hit Status		X	X		
3.2.4.4.1.q	Active Target Display			X		
3.2.4.4.1.r	Scenario Pause			X		
3.2.4.4.1.s	Scenario Abort			X		

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.2.4.4.1.t	Emergency Stop			X		
3.2.4.4.1.u	Scoresheet Data Saving			X		
3.2.4.4.1.v	Printing Scores			X		
3.2.4.4.1.w	Target Malfunction			X		
3.2.4.4.2	Armor Range Software	X				
3.2.4.4.2.a	RFCCS and CCS Target Display			X		
3.2.4.4.2.b	RFCCS and CCS Graphics			X		
3.2.4.4.2.c	CCS Display			X		
3.2.4.4.2.d	Alternate Targets			X		
3.2.4.4.2.e	Printout Scoresheet			X		
3.2.4.4.3	Small Arms Qualification Ranges	X				
3.2.4.4.3.a	Operating Screen			X		
3.2.4.4.3.b	Alibi Firing			X		
3.2.4.4.3.c	Printout Scoresheet			X		
3.2.4.4.4	Application Software				X	
3.2.5	Power Source Regeneration		X	X		
3.2.6	Environmental Extremes	X				
3.2.6.1	Cold Weather Kits		X			
3.2.6.2	Hot Weather Kits		X			
3.3	Support	X				
3.3.1	Training Requirements	X				
3.3.1.1	Operator Training				X	
3.3.1.2	Scenario Training				X	
3.3.1.3	Maintenance Training				X	
3.3.1.4	Sustainment Training				X	
3.3.2	Manuals				X	
3.3.3	Installation			X	X	
3.4	Workmanship and Material		X			
3.4.1	Workmanship		X			
3.4.2	Materials/Commercial Components		X			
3.4.3	Attachment Hardware		X			
3.5	Environmental Requirements		X			
3.5.a	Storage		X			
3.5.b	Operating Temperature		X			
3.5.c	Humidity		X			
3.5.d	Sea Coast		X			
3.5.e	Fungus, Rot, or Mildew		X			
3.5.f	Desert Conditions		X			
3.5.g	Snow and Ice		X			
3.5.h	Sunlight		X			
3.5.i	Vermin and Temper Resistant		X			

Section 3 Requirement	Title	Verification Methods NA	1C	2D	3E	4T
3.6	Environmentally Preferred Material		X			
3.7	Identification and Marking		X			

Appendix A through Appendix D provided previously.

APPENDIX E

INGATS MAT AND SAT LIVE FIRE ACCURACY EVALUATION

Purpose: Verify the scoring capability of the Moving Armor Target (MAT) and Stationary Armor Target (SAT) using live ammunition as well along with the operational capability of the ATKS when used with the MAT and SAT for the intermediate New Generation Army Targetry System (INGATS). In addition evaluations will be run on the MAT and SAT to determine their capability to handle small medium and large caliber rounds.

Personnel Required:

Computer Operator for running the evaluation from the control tower, entering scenarios and printing data sent to the control tower.

Evaluation Coordinator/Spotter-recorder to record hit measurement data at the target and cordinate the evaluation plan with tower operator.

Data entry and accuracy checker to enter the data from the tower and the target measurement data to determine the compatibility of the readings to the performance description by calculating the difference between theoretical and actual hole measurements.

RFCCS data collector is the one who witnesses the data collection in the tower and provides the printout data from the computer to the accuracy checker for comparison.

Tools Required

Copy of TC 25-8
INGATS performance description
Range Map showing the target locations and range contours.
Metal measuring tape, metric
Calculator
Computer, portable with Excel loaded
Stakes for identifying boundaries and firing points
Binoculars or spotting scope for locating rounds.
Evaluation Plan

Staple Gun with staples or some other method of applying paper over the target area
Using paper and a marker, cover the target and divide it into 1ft. x 1ft or smaller squares. Number the squares.
Black Marker
5 witness panels to extend beyond the edge of the target up to 2 ft. to indicate the location of intentional miss rounds.
Tape, stickers or some method of covering over a hole after the measurements have been taken off the target surface.

Range Requirements
Full and open access to the INGATS range during the evaluation, confirmed prior to arrival.
Upon arrival, the team will confirm the location of firing points, and firing borders, along with the availability of personnel, ammunition, weapons, and the range required for the evaluation.

Identify the targets being fired on and the range to the target, and mark the 15-degree cone for firing at the target for both stationary and moving firing at the target.

Verify the target is IAW TC 25-8 and is mounted on the lifting device IAW the manual for the equipment being evaluated.

Verify that all targets are entered into the computer for use IAW TC 25-8.

All rounds must strike the target while traveling supersonic. Verify the firing positions are not outside the range for supersonic travel of the round when it strikes the target.

Confirm that the ATKS and ammo are available at the range.

The targets to be fired at shall be covered in 1X1-ft. squares and each square numbered.

All targets installed and scheduled for firing must be covered with paper and aligned with the HDD for accurate measurement of the holes in the target IAW the theoretical target.

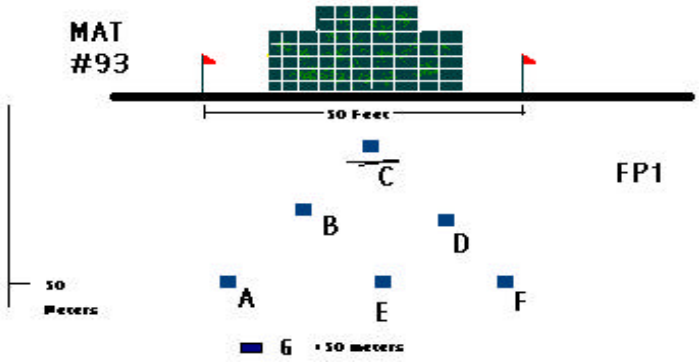
The accuracy evaluating will be accomplished with small caliber ammunition and then additional rounds using large caliber ammunition will be evaluated to verify the repeatability of the accuracy evaluation. This is done to reduce the evaluation cost and minimize the destruction of the target during evaluation

Performance Description References:

The evaluation will involve the MAT and SAT in conjunction with the CCS. The system will be evaluated for hit detection (3.2.3), hit sensing (3.2.3.1), hit location (3.2.3.2), usage algorithm for non-contact sensor (3.2.3.3), data collection (3.2.3.4), round identification (3.2.3.5), setup and alignment 3.2.3.6), target depiction (3.2.3.7), hit sensitivity (3.2.4.1.i) and data recall (3.2.4.1.k) along with scoring accuracy detection of small, medium and large caliber ammo. An evaluation will also be conducted to prove the compatibility of the hardware design with the ATKS.

SMALL CALIBER EVALUATION FIRING – MOVING ARMOR TARGET (MAT)

Stationary Firing Diagram (MAT & SAT)



RCS operator runs small caliber evaluation scenario. Target distance varies between 25 and 50 meters and 15 degrees right and left of the center of the target. There are two parts to this evaluation. Part One is fixed position firing evaluation (target is stationary). Part Two is variable speed firing evaluation (target is moving) for the MAT. The target is covered

and divided into a grid of approximately 1 ft by 1 ft squares, and 5 witness panels for spotting misses within 2 feet. Ensure that the target has a flat surface exposed to the shooter. Check for the proper sensitivity setting at the tower. The printout from the tower after each series of rounds should contain date of the firing, the step number, target identification number, number, location of each round, the type of round fired, and the time each round struck the target.
After each series of steps is completed and the difference between the actual and theoretical holes has been calculated, evaluate the accuracy of the measurements and recheck the measurements, if required, to confirm.

The following procedures are the same for the stationary MAT and the SAT and can be applied to either.

PART 1 (40 rounds)

Set the target at 5 hits to kill.

Step 1 – FP1a – raise the target and fire 5 rounds at stationaryMAT / SAT. Evaluation Coordinator (EC) calls 5 numbered panels to fire at taking care that the angle the round strikes the target does not exceed 15 degrees.

Step 2 – FP1b – raise the target and fire 5 rounds at stationary MAT/SAT. EC calls 5 numbered panels to fire at. Target conceals after 5 rounds are fired and the team measures and records the location (x,y coordinates) of the round and the number of the round on the spotters sheet. Tape over or cover over the measured and recorded hole and write the measured coordinates next to the hole for possible re-verification later.

Step 3 – FP1d – raise the target and fire 5 rounds at stationary MAT / SAT. EC calls 5 numbered panels to fire.

Step 4 – FP1f – raise the target and fire 5 rounds at stationary MAT / SAT. EC calls 5 numbered panels to fire. Target conceals after 5 hits. Repeat the measuring sequence for step 2.

Step 5 – FP1e – raise the target and fire 5 rounds at stationary MAT / SAT. EC calls 5 shots that shall be fired at all witness panels >6cm and <2 feet outside the target edge.

Step 6 – FP1e – raise the target and fire 5 rounds at stationary

MAT / SAT. EC calls 5 numbered panels to fire. Target conceals after 5 hits. Repeat the measuring sequence for step 2.

OBTAIN A PRINTOUT FROM CCS AND COMPARE WITH THE MEASURED HOLES IN THE TARGET FROM THE SPOTTER'S SHEET.

Change the Shooters position so that he fires from approximately 3 degrees above the target and shoot at squares which have a down angle of about 3 degrees.

Step 6a – FP1e – raise the target and fire 5 rounds at the stationary MAT / SAT. EC calls 5 numbered panels to fire. Target conceals after 5 hits. Repeat the measuring sequence for step 2.

Change the Shooters position so that he fires from approximately 3 degrees below the target and shoot at squares that have an up angle of about 3 degrees.

Step 6b – FP1e – raise the target and fire 5 rounds at the stationary MAT / SAT. EC calls 5 numbered panels to fire. Target conceals after 5 hits. Repeat the measuring sequence for step 2.

Steps 6a and 6b are to determine the capability of the hit sensor to locate rounds fired from ± 3 degrees above or below the target, with the assumption that the shooter is firing directly at the target. For some targets the stationary firing may be at a – 3 degrees, and then the evaluation for steps 6a and 6b should be at 0 degrees and + 3 degrees elevation.

OBTAIN A PRINTOUT FROM CCS AND COMPARE WITH THE MEASURED HOLES IN THE TARGET FROM THE SPOTTER'S SHEET.

All Shots (except step 5, which are only verified they are scored as misses) are verified from computer to measured location for accuracy and that each shot was measured and scored as a hit For the 5 rounds from step 5, confirm that the location for each round was recorded at the tower.

For the MAT evaluation stop firing at the stationary target and go on to Part 2. For the SAT evaluation, repeat steps 1 through 5 three more times (4 sequences total, 120 rounds fired).

PART 2 (96 rounds) MOVING MAT

Preparation for the moving evaluation includes establishing the point at which the MAT, moving along the track, is 15 degrees to the left and 15 degrees to the right of the firing position. Place a marker on the berm at each point so that the shooter is able to determine the earliest and latest point at which he should shoot at the moving target and stay within the 15 degree left and right requirement.

Before shooting at the moving MAT, the target should be covered with new paper, the squares are not required.

Set the target at 1 hit to kill.

Step 7 – FP1e – raise the target, MAT moves left to right at 3 KPH. When MAT is between flags a shooter fires 1 to 3 rounds.

FP1e – raise the target, MAT returns moving right to left at 3 KPH when target is between flags shooter fires 1 to 3 rounds.

Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.

Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

FP1e – raise the target, MAT moves left to right at 3 KPH. MAT is between flags a shooter fires 1 to 3 rounds.

FP1e – raise the target, MAT returns moving right to left at 3 KPH when target is between flags shooter fires 1 to 3 rounds.

Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.

Repeat the measuring sequence.

Step 8 – FP1e – – raise the target, MAT moves right to left at 5 KPH. When target is between flags, shooter fires 1 to 3 rounds.

FP1e – raise the target, MAT returns moving left to right at 5 KPH. When target is between flags, shooter fires 1 to 3 rounds

Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.

Repeat the measuring sequence from step 7.

FP1e – raise the target, MAT moves right to left at 5 KPH. When target is between flags, shooter fires 1 to 3 rounds.

FP1e – raise the target, MAT returns moving left to right at 5 KPH. When target is between flags, shooter fires 1 to 3 rounds.

Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.

Repeat the measuring sequence from step 7.

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET.

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper target if necessary.

Step 9 – FP1e – raise the target, MAT moves left to right at 7 KPH.

When the target is between flags, shooter fires 1 to 3 rounds.

FP1e – raise the target, MAT returns moving right to left at 7 KPH. When target is between flags, shooter fires 1 to 3 rounds.

.

Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.

Repeat the measuring sequence from step 7.

FP1e – raise the target, MAT returns moving right to left at 7 KPH. When target is between flags, shooter fires 1 to 3 rounds.

FP1e –raise the target, MAT moves left to right at 7 KPH. When target is between flags, shooter fires1 to 3 rounds. Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit

the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Repeat the measuring sequence from step 7.

Step 10– FP1e – raise the target, MAT moves right to left at 10 KPH. When target is between flags, shooter fires 1 to 3 rounds.
FP1e – raise the target, MAT returns moving left to right at 10 KPH. When target is between flags, shooter fires 1 to 3 rounds.
Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Repeat the measuring sequence from step 7.FP1e – raise the target, MAT moves right to left at 10 KPH. When target is between flags, shooter fires 1 to 3 rounds.
FP1e – raise the target, MAT returns moving left to right at 10 KPH when target is between flags shooter fires 1 to 3 rounds.
Determine the number of rounds that have hit the target and repeat the steps as required until 6 rounds have hit the target. Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Repeat the measuring sequence from step 7.
OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET (after each step).
All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper target if necessary.

Step 11 – Repeat step 7.

Step 12 – Repeat step 8.

Step 13 – Repeat step 9.

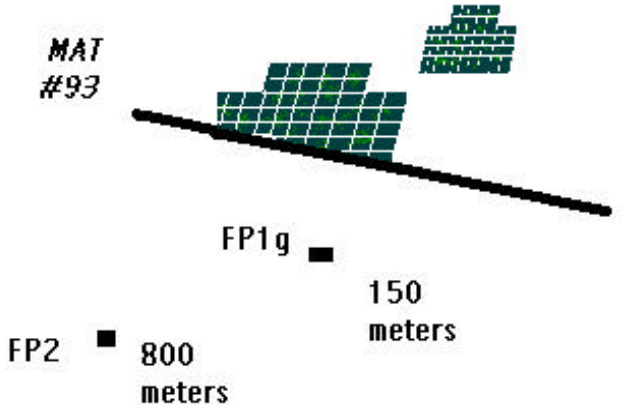
Step 14 – Repeat step 10.

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES.
All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper target.

ATKS evaluation

Set the target to 1 hit to kill.
Set the ATKS from the tower to fire a hostile fire signal, and then fire a second cartridge as the target is killed.
Send the MAT in motion at 3 KPH.
Have the tower raise the target and fire the ATKS from the tower.
As the target passes the shooting position, fire one round to kill the target.
As the target goes down a second cartridge should be activated automatically.

MEDIUM CALIBER EVALUATION FIRING – MOVING ARMOR TARGET (MAT)
AND
STATIONARY ARMOR TARGET (SAT)



RCS operator runs medium caliber evaluation scenario. Target distance varies between 150 meters and 800 meters with various angles. There are three parts to this evaluation. Part One is fixed position firing evaluation (MAT and SAT are stationary) at _____ meters. Part two is shot while the MAT is moving from a distance of _____ meters and Part three is shot from _____ meters while the MAT is moving and the SAT is stationary. Both targets are covered with paper to verify shots. Check for the proper sensitivity setting at the tower. Ensure that the target has a flat surface exposed to the shooter. The printout from the tower after each series of rounds should contain date of the firing, the step number, target identification number, number, location of each round, the type of round fired, and the time of each round struck the target. Check that the 15-degree cone of firing from each firing position has been staked out on the berm in front of the MAT. The distances for the blanks are determined by the range layout and will be different for each target.

After each series of steps is completed and the difference between the actual and theoretical holes has been calculated, evaluate the accuracy of the measurements and remeasure or repeat the shot, as required and ammunition is available.

PART 1 (16 rounds at Stationary MAT) (4 rounds-SAT)

Set the target at 4 hits to kill as indicated. Check with the tower that the sensitivity is correct.
Position the MAT so it is in the center of the 15-degree firing cone for the firing point. Confirm that a SAT is selected which is within the 15 degree firing cone.

Step 1 – FP1g –Raise the target and fire 4 rounds at the stationary MAT with 4 hits to kill. Target is located at the left side of the track at an angle of approx. _____ approx. distance is _____.
Confirm that the target is killed after the 4th round.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 2 – FP1g –Raise the target and fire 4 rounds at the stationary MAT with 4 hits to kill. Target is located at the center of the track at an angle of approx. _____ approx. distance is _____. Confirm that the target is killed after the 4th round.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Repeat the measuring sequence from step 1.

Step 3 – FP1g – Raise the target and fire 4 rounds at the Stationary Armor Target (SAT) address number _____ with 4 hits to kill. Target should be located behind MAT distance is _____ and angle is _____.
Confirm that the target is killed after the 4th round.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Repeat the measuring sequence from step 1.

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN BOTH TARGETS. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper or tape over holes.

Step 4 – FP1g – Repeat step 1.

Step 5 – FP1g – Repeat step 2 .

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN BOTH TARGETS. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper or tape over holes.

Part 2 (12 rounds)(Moving)

Set the target at 3 hits to kill.

Step 6– FP1g – Raise the target and fire 3 rounds at moving MAT speed 3 KPH and set at 3 hits to kill. Angle of fire at any point on the track is no more than ____ degrees.
Confirm that the target is killed after the 3 rounds.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 7 – FP1g – Raise the target and fire 3 rounds at moving MAT speed 3 KPH and set at 3 hits to kill. Angle of fire at any point on the track is no more than ____ degrees.
Confirm that the target is killed after the 3 rounds.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Repeat the measuring sequence from step 6.

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper holes.

Step 8 – FP1g – Repeat step 6 at 5 KPH. Angle _____

Step 9 – FP1g – Repeat step 7 at 5 KPH. Angle _____

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN BOTH TARGETS. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper holes.

Part 3 (6 rounds at Moving MAT) (3 rounds – SAT)

Set the target at 3 hits to kill as indicated.
Relocate the shooter, if necessary, and confirm the markers for the 15 degree firing cone at the new position.

Step 10 – FP2 – Raise the target and fire3 rounds at moving MAT speed 5 KPH, angle of fire on the track is no more then 15 degrees. Distance is approx. _____.
Confirm that the target is killed after the 3 rounds.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 11 – FP2 – Raise the target and fire 3 rounds at moving MAT speed 3 KPH, angle of fire on the track is no more then 15 degrees. Distance is approx. _____.
Confirm that the target is killed after the 3 rounds.
Bring the MAT to a suitable location to take measurements and lower the target for measurements.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the

target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 12 – FP2 – Raise the target and fire 3 rounds (1 shot at a time) at Stationary Armor Target (SAT) address number ____ with 3 hits to kill. Target is located behind MAT distance is approx._____ and angle is no more than 15.Confirm that the target is killed after the 3 rounds.

Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper holes.

Sensitivity Evaluation (3 rounds MAT moving)

Set the target to 1 hit to kill for steps 13, 14, and 15.

Step 13 – FP2 – Set the sensitivity of the HDD at small round sensitivity. Raise the target and fire 1 round at moving MAT, speed 3 KPH, angle of fire at any point on the track is no more then 15 degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

Step 14 – FP2 - Set the sensitivity of the HDD at medium round sensitivity. Raise the target and fire 1 round at moving MAT, speed 3 KPH, angle of fire at any point on the track is no more then 15 degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

Step 15 – FP2 - Set the sensitivity of the HDD at large round sensitivity. Raise the target and fire 1 round at moving MAT, speed 3 KPH, angle of fire at any point on the track is no

more then 15 degrees. Distance is approx. _____.
Confirm that the target is not killed.
Measure and record the location of the holes and cover over coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. A round location should be given for step 15, but the target should not be killed. After all verifications are certified re-paper holes.

LARGE CALIBER EVALUATION FIRING – Moving Armor Target (MAT)
AND
STATIONARY ARMOR TARGET (SAT)

RCS operator runs large caliber evaluation scenario. There are three parts to this evaluation. Part One is fixed position, firing evaluation. Using FP2 target distance is _____. Part Two is while the target is moving using FP2 target distance is approx. _____. Part Three is while target is moving using FP2 and stationary firing at the SAT. The targets are covered with witness paper to verify shot location. The spotter will identify the location of the round for later measurement after each round is fired. Measurements will be taken as required to maintain continuity of the rounds fired and their location. If needed, the holes can be covered after each round. . Check for the proper sensitivity setting at the tower. Ensure that the target has a flat surface exposed to the shooter. The printout from the tower after each series of rounds should contain date of the firing, the step number, target identification number, number, location of each round, the type of round fired, and the time of each round struck the target. Check that the 15-degree cone of firing from each firing position has been staked out on the berm in front of the MAT. The distances for the blanks are determined by the range layout and will be different for each target.

After each series of steps is completed and the difference between the actual and theoretical holes has been calculated, evaluate the accuracy of the measurements and remeasure or repeat the shot, as required and ammunition is available.

PART 1 (15 rounds at a stationary MAT)
Set the target at 5 hits to kill.

Step 1 – FP2 – Raise the target and fire 5 rounds at stationary MAT with 5 hits to kill. Target is located at the center of the track at an angle of approx. ____ approx. distance is _____.
Confirm that the target is killed after the 5 rounds.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine

which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 2 – FP2 – Raise the target and fire 5 rounds at stationary MAT with 5 hits to kill. Target is located at the center of the track at an angle of approx. ____ approx. distance is _____.
Confirm that the target is killed after the 5 rounds.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 3 – FP2 – Raise the target and fire 5 rounds (1 shot at a time) at stationary MAT with 5 hits to kill. Target is located at the center of the track at an angle of approx. ____ approx. distance is _____.
Confirm that the target is killed after the 3 rounds.
Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper holes

PART 2 (5 rounds) MOVING MAT
Set the target at 1 hit to kill.
Relocate the shooter, if necessary, and confirm the markers for

the 15 degree firing cone at the new position.

Step 4 – FP2 – Raise the target and fire 1 round at moving MAT moving right to left at speed 3 KPH set at 1 hit to kill. Angle of fire at any point on the track is no more then ____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving left to right at speed 3 KPH set at 1 hit to kill. Angle of fire at any point on the track is no more then ____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving right to left at speed 3 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then ____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving left to right at speed 5 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then ____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving right to left at speed 5 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then ____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

Move the target to a convenient location and lower it to take measurements.

Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter’s sheet).

PART 3 (5 rounds at a MOVING MAT) (5 rounds at SAT)

Set the target at 1 or 5 hits to kill as indicated.

Step 8 – FP2 – Raise the target and fire 1 round at moving MAT moving left to right at speed 7 KPH set at 1 hit to kill. Angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving right to left at speed 7 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 - Raise the target and fire 1 round at moving MAT moving left to right at speed 7 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving right to left at speed 10 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____. Confirm that the target is killed after the 1 round.

FP2 – Raise the target and fire 1 round at moving MAT moving left to right at speed 10 KPH, set at 1 hit to kill. Angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____.

Confirm that the target is killed after the 1 round.

Move the MAT to a convenient location and lower it for measurements.

Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

Step 9 – FP2 – raise the target and fire 5 rounds (1 shot at a time) at Stationary Armor Target (SAT) address number _____ with 5 hits to kill. Target is located behind MAT. Target location number _____, distance is approx._____ and angle is _____.

Measure and record the location of the holes and cover over and annotate the coordinates as done earlier. After the coordinates are obtained get the coordinates of the tower

rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE TARGET. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. After all verifications are certified re-paper target if necessary.

Sensitivity Evaluation (3 rounds MAT moving)

Set the target at 1 hit to kill.

Set the target to 1 hit to kill for steps 10, 11, and 12.

Step 10 – FP2 – Set the sensitivity of the HDD at small round sensitivity. Raise the target and fire 1 round at moving MAT speed 3 KPH, angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____.

Step 11 – FP2 - Set the sensitivity of the HDD at medium round sensitivity. Raise the target and fire 1 rounds at moving MAT speed 3 KPH, angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____.

Step 12 – FP2 - Set the sensitivity of the HDD at large round sensitivity. Raise the target and fire 1 round at moving MAT speed 3 KPH, angle of fire at any point on the track is no more then _____ degrees. Distance is approx. _____.

Confirm that the targets all went down after one hit and the tower recorded coordinates for all hits.

Measure and record the location of the holes and cover over and annotate the coordinates as done earlier.

After the coordinates are obtained get the coordinates of the tower rounds along with the sequence of the firing. Determine which coordinate and round goes with the measured hole (this can be made easier if the hole sequence on the target can be determined prior to calling the tower, but this is difficult with multiple holes).

OBTAIN PRINTOUT FROM RCS AND MEASURE AND MARK HOLES IN THE

TARGET. (write the measured coordinates of the hole next to the hole after each measurement and record on the spotter's sheet).

All Shots are verified from computer to measured location for accuracy. Round should kill the target for all 3 steps.

APPENDIX F

PRODUCT ACCEPTANCE TEST

1.0 PURPOSE OF TEST

1.1 General

The Product Acceptance Test (PAT) provides a uniform system of procedures that an integrated system on INGATS equipment conforms to contract requirements. These requirements pertain to the inspections and tests necessary to substantiate individual components and overall system operability. Testing will be conducted in accordance with the procedures detailed herein.

1.2 Safety Considerations

All normal safety practices should be observed during operational/functional testing of the INGATS equipment. Test personnel must ensure that all personnel and equipment are clear of target areas, moving targets, and hostile fire simulators during equipment operation. High voltages may be present in electrical enclosures. Safety precautions for handling high voltage equipment must be followed. Death on contact may result if personnel fail to observe safety precautions. Before conducting tests, ensure that the ATKSs or BES are not loaded with charges.

1.3 Scope

The PAT involves a dual approach to equipment testing (1) system operational testing and (2) functional testing and visual

inspection of randomly selected downrange components. Operational testing involves all the range equipment as a whole system while functional testing is intended to verify that each type of downrange device performs all its required functions.

2.0 HARDWIRED SYSTEM TEST

2.1 Operational Test

This test is designed to ensure proper operation of all the range equipment as a whole system, and to ensure that each piece of equipment is exercised sufficiently to identify infant mortality failures. Commands will be reported by the RCS to each target on the range, and status will be reported by the targets to the RCS.

2.1.1 Test Scenario

A 50 cycle test scenario will be prepared and verified by the contractor prior to conducting the operational test. Since each range to be tested under this PAT varies in configuration, a test scenario diskette will be generated for each range installation. A hard copy printout of the test scenario will be given to the Government representative on site prior to the start of the PAT.

2.1.2 Pre-Test

2.1.2.1 Turn-on the RCS computer

2.1.2.2 Run 50 cycle test scenario

2.1.2.3 During the 50 cycle test perform the following operations:

2.1.2.3.1 Manual override – The operator will manually stop, override, individually control targets and reenter the 50 cycle scenario at the point interrupted.

2.1.2.3.2 RCS Display

2.1.2.3.2.1 RCS displays scenario being run

2.1.2.3.2.2 RCS displays scenario tasks that are active

2.1.2.3.2.3 RCS displays the date and time

2.1.2.3.2.4 RCS displays scenario elapsed time

2.1.2.3.2.5 RCS displays hit status

2.1.2.3.3 Scenario Pause – During 50 cycle scenario running the operator will execute a single key pause of the scenario and maintain current target position and time in the scenario. Scenario will be resumed at the exact place that the pause occurred.

2.1.2.3.4 Emergency Stop – During the last cycle of the 50 cycle scenario the operator will execute an emergency stop. All targets will go to the down position without loss of scoring data.

2.1.2.3.5 Malfunction Detection – Randomly selected several targets and turn power off to them. Activate the targets either manually or automatically, and verify that malfunctions are detected.

2.2 Functional Test

2.2.1 General

After completion of the Operational Test selected targets downrange will be examined. Each target will be exercised to establish that it and its associated simulators, if any, respond properly to RCS commands, and that status is reported correctly. In this manner proper operation of all intervening devices will also be established.

2.2.2 Sampling Plan

Sample size of the targets to be tested and examined will be established under Section 4 of the Performance Description. The actual targets to be examined will be determined by random selection at the choice of the Government representative. For the range itself to be accepted, each lot tested must be accepted.

2.2.3 Down Range Devices

Each target emplacement shall be assembled, constructed in a workmanlike manner. The area shall be neat, clean and free of debris Cables shall be arranged as neatly as possible. Specifically, as a minimum, the following items will be check:

2.2.3.1 All cables shall be secure and completely attached

2.2.3.2 Equipment covers shall be securely fastened

2.2.3.3 Equipment shall show no evidence of mistreatment such as dents, scratches, footprints, etc

2.2.4 Target Functional Test

Each target will demonstrate the following capabilities in the manual mode of operation

2.2.4.1 Stationary Infantry Target

2.2.4.1.1 Number of hits on target via live fire or tapping the hit sensor

2.2.4.1.2 Bob when hit

2.2.4.1.3 Hold when hit

2.2.4.1.4 Down when hit

2.2.4.1.5 MFS will light if applicable

2.2.4.1.6 SES will function, if applicable

2.2.4.1.7 Target raises

2.2.4.1.8 Target falls

2.2.4.2 Moving Infantry Target

2.2.4.2.1 Number of hits on target via live fire or tapping the hit sensor

2.2.4.2.2 Bob when hit

2.2.4.2.3 Hold when hit

2.2.4.2.4 Down when hit

2.2.4.2.5 MFS will light if applicable

2.2.4.2.6 SES will function, if applicable

2.2.4.2.7 Target raises

2.2.4.2.8 Target travels from one end of track to the other

2.2.4.2.9 Target lowers

2.2.4.3 Stationary Armor Target

2.2.4.3.1 Target raises and falls on command

2.2.4.3.2 Target falls after programmed number of hits

2.2.4.4 Moving Armor Target

2.2.4.4.1 Cycle MAT at the 4 selected speeds (one cycle per speed) the full length of the track. Verify top speed of 30 kph

2.2.4.4.2 Verify target raises and lowers

2.2.4.4.3 Target falls after receiving programmed hits via live fire or tapping the hit sensor.

2.2.4.4.4 Verify parking brake holds MAT after stopping

2.2.4.4.5 Verify operation of audible warning device

2.2.4.4.6 Verify placement of end of course barriers

2.2.4.4.7 Verify stopping within 20 meters after receiving the order

3.0 RADIO CONTROLLED SYSTEM TEST

System test for radio controlled ranges will be the same as hardwired with the following exceptions.

- In lieu of 50 cycles during the operational test only 20 cycles will be required

- Operational test will use the RFCCS and/or the HHC to run the cycle test scenario

- During functional testing the RFCCS and/or the HHC will be used for manual command of the test targets.