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MAIN BATTLE TANK CREW TASK ANALYSIS

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Main Battle Tank Crew Task Analysis (Unclassified)

Current trends in tank development require a reduction in the number of crew members necessary to fight and maintain the vehicle for extended periods of time. Doctrinally, the capabilities and mission profiles of future tanks remain independent of crew size or configuration. This four-man analysis establishes a baseline by enumerating the tasks necessary to operate the current ABRAMS system. Its intent is to facilitate alignment of the MAMP technologies with the required crew operational tasks, so that the reduced crew can maintain the same level of performance as a four-man tank.
Summary

Results are presented of a TACOM in-house initiative detailing the duties and responsibilities of each crewmember in a four-man tank. The Abrams series main battle tank was used as a baseline for operational tasks. Typical SOP's and personal experience were then applied to tactical doctrine to complete the analysis.

Acknowledgments

Special thanks to CPT Robert Morris and Karl Van Der Waerden for their assistance in compiling and organizing the material presented in this report.
Introduction

SUBJECT: This report is a compendium of the tasks, duties, and responsibilities each crewmember in an Abrams series tank is expected to perform.

PURPOSE: The study was conducted as part of an in-house crew reduction effort at TACOM. Its purpose is to establish an operational baseline of the required tasks each crewmember must perform in order to effectively operate a tank in a combat environment.

The results presented are intended for use as a tool to evaluate emerging technologies as they apply to crew work load reduction.

SCOPE: The scope of this study lists the individual technical and tactical duties performed by the Loader, Driver, Gunner, Tank Commander, and a composite of the Platoon Leader and Platoon Sergeant.

Each section covers a specific crew member starting with the lowest ranking (the Loader) and ending with the Platoon Leader/Sergeant. The sections are further organized by grouping the tasks into operational families which can be found under every crewmember who takes part in the operation.

It is important to note however, that although crew tasks are arranged according to duty positions, each crewmember must be able to perform the required tasks of all his subordinates.
<table>
<thead>
<tr>
<th>Section</th>
<th>Task List</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0.</td>
<td>Loader Task List</td>
<td>9</td>
</tr>
<tr>
<td>1.1.</td>
<td>Operational Tasks</td>
<td>9</td>
</tr>
<tr>
<td>1.2.</td>
<td>Main Weapon Firing Tasks</td>
<td>10</td>
</tr>
<tr>
<td>1.3.</td>
<td>Secondary Armament</td>
<td>11</td>
</tr>
<tr>
<td>1.4.</td>
<td>Ammunition Handling Tasks</td>
<td>11</td>
</tr>
<tr>
<td>1.5.</td>
<td>Maintenance Tasks</td>
<td>12</td>
</tr>
<tr>
<td>1.6.</td>
<td>Tactical Tasks</td>
<td>12</td>
</tr>
<tr>
<td>1.7.</td>
<td>Observation</td>
<td>12</td>
</tr>
<tr>
<td>1.8.</td>
<td>Communication</td>
<td>13</td>
</tr>
<tr>
<td>1.9.</td>
<td>Security</td>
<td>13</td>
</tr>
<tr>
<td>1.10.</td>
<td>Additional Duties</td>
<td>13</td>
</tr>
<tr>
<td>2.0.</td>
<td>Driver's Task List</td>
<td>14</td>
</tr>
<tr>
<td>2.1.</td>
<td>Operational Tasks</td>
<td>14</td>
</tr>
<tr>
<td>2.2.</td>
<td>Ammunition Handling Tasks</td>
<td>16</td>
</tr>
<tr>
<td>2.3.</td>
<td>Maintenance Tasks</td>
<td>16</td>
</tr>
<tr>
<td>2.4.</td>
<td>Tactical Tasks</td>
<td>17</td>
</tr>
<tr>
<td>2.5.</td>
<td>Observation</td>
<td>18</td>
</tr>
<tr>
<td>2.6.</td>
<td>Communication Tasks</td>
<td>18</td>
</tr>
<tr>
<td>2.7.</td>
<td>Security</td>
<td>18</td>
</tr>
<tr>
<td>2.8.</td>
<td>Additional Duties</td>
<td>18</td>
</tr>
<tr>
<td>3.0.</td>
<td>Gunner's Task List</td>
<td>19</td>
</tr>
<tr>
<td>3.1.</td>
<td>Operational Tasks</td>
<td>19</td>
</tr>
<tr>
<td>3.2.</td>
<td>Main Weapon Tasks</td>
<td>23</td>
</tr>
<tr>
<td>3.3.</td>
<td>Secondary Armament Tasks</td>
<td>24</td>
</tr>
<tr>
<td>3.4.</td>
<td>Ammunition Handling Tasks</td>
<td>24</td>
</tr>
<tr>
<td>3.5.</td>
<td>Fire Control</td>
<td>24</td>
</tr>
<tr>
<td>3.6.</td>
<td>Maintenance Tasks</td>
<td>24</td>
</tr>
<tr>
<td>3.7.</td>
<td>Tactical Tasks</td>
<td>25</td>
</tr>
<tr>
<td>3.8.</td>
<td>Engagement Tasks</td>
<td>25</td>
</tr>
<tr>
<td>3.9.</td>
<td>Observation Tasks</td>
<td>26</td>
</tr>
<tr>
<td>3.10.</td>
<td>Communication Tasks</td>
<td>26</td>
</tr>
<tr>
<td>3.11.</td>
<td>Security</td>
<td>26</td>
</tr>
<tr>
<td>3.12.</td>
<td>Additional Duties</td>
<td>26</td>
</tr>
<tr>
<td>4.0.</td>
<td>Tank Commander</td>
<td>27</td>
</tr>
<tr>
<td>4.1.</td>
<td>Operational Tasks</td>
<td>27</td>
</tr>
<tr>
<td>4.2.</td>
<td>Main Weapon Tasks</td>
<td>27</td>
</tr>
<tr>
<td>4.3.</td>
<td>Secondary Armament Tasks</td>
<td>27</td>
</tr>
<tr>
<td>4.4.</td>
<td>Ammunition Handling Tasks</td>
<td>27</td>
</tr>
<tr>
<td>4.5.</td>
<td>Fire Control Tasks</td>
<td>28</td>
</tr>
<tr>
<td>4.6.</td>
<td>Maintenance Functions</td>
<td>28</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>4.7. Tactical Tasks</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>4.8. Engagement Tasks</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>4.9. Navigation Tasks</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>4.10. Observation Tasks</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>4.11. Communication Tasks (Command and Control)</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>4.12. Security</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>4.13. Additional Duties</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>5.0. Platoon Leader/Platoon SGT</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>5.1. Operational Tasks</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>5.2. Main Weapon Tasks</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>5.3. Secondary Armament Tasks</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>5.4. Ammunition Handling Tasks</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>5.5. Fire Control Tasks</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>5.6. Maintenance Functions</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>5.6.1. Check</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>5.6.2. Perform</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>5.7. Tactical Tasks</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>5.7.1. Offense</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>5.7.2. Defense</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>5.8. Special Combat Operations</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>5.9. Engagement Tasks</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>5.10. Navigation Tasks</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>5.11. Observation Tasks</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>5.12. Communication Tasks (Command and Control)</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>5.13. Security</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Selected Bibliography</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>List of References</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>Distribution List</td>
<td>Dist-1</td>
<td></td>
</tr>
</tbody>
</table>
1.0. LOADER TASK LIST

1.1. OPERATIONAL TASKS

- Reset circuit breakers in turret networks box
- Operate NBC system/turret blower motor
- Operate emergency engine shutoff
- Ground guide vehicle
- Assist refueling tank
- Operate elevation uncouple
- Assist in boresight operations
- Prepare loader's station for operation¹
  - Open/lock loader's hatch
  - Erect crosswind sensor
  - Install loader's machinegun
  - Install antennas
  - Prepare ammunition door knee switch
  - Clear ammunition door tracks
  - Place main gun Safe/Arm handle in the Safe position
  - Verify that main gun breech is closed
  - Ensure that all other crewmembers have entered their stations
- Unlock turret traverse lock
- Place loader's guards in desired position
- Report ready for power operation to tank commander
- Wait for commander to turn on turret power
- Turn on/adjust dome-light
- Ensure main gun status safe light is lit
- Turret blower switch off
- Ensure Gun turret drive switch manual light lit
- Turn on amplifier, AM 1780/VRC
- Main power switch on normal mode
- Power circuit breaker switch on
- INT ACCENT switch on
- Set RADIO TRANS switch to desired location
- Put on and connect CVC helmet
- Set intercom select to INT ONLY
- Adjust seat
- Adjust hatch
- Install night vision viewer if required
- Ready Report to Tank Commander

Power down and secure loader's station¹
- Stow loader's guards
- Remove night vision viewer (if installed)
- Wait until main gun has been traversed to rear
- Lock turret traverse lock
Verify main gun is clear
Verify main gun has been safed
Close breech
Ensure gun turret drive is in manual mode
Verify turret blower is off
Ensure main gun status SAFE light is lit
Close semi-ready ammunition door
Close ready ammunition door
Close hull ammunition door
Stow coaxial ammunition belt
Turn off amplifier switch
Remove and disconnect CVC helmet
Turn off dome-light
Remove loader's machinegun
Stow crosswind sensor
Remove and stow antennas
Close and lock loader's hatch

1.2. MAIN WEAPON FIRING TASKS

Loader's pre-fire operations¹
Ensure Main Gun is out of travel lock
Ensure Turret Lock is unlocked
Have Gun traversed over front fender
Lock Turret Lock
Remove Main Gun Muzzle Plug from end of tube
Unlock Turret Lock
Ensure gun turret drive is powered up
Check replenisher fluid level
Add/delete FRH as required
Open breech
Return Breech Operating Handle to upright position
Perform a function check on the Breech
Assist in performing a firing circuit test
Clear main gun
Emplace Loader's guards
Place stub base catcher in position for firing
Ensure Commander's foot guard is in place for firing

Loader's firing operations
Receive the fire command
Open Ammo compartment door
Identify ammunition
Retrieve desired round from ammo rack
Close Ammo compartment door
Ensure Tube is clear
Load main gun
Arm main gun
Ensure main gun status ARMED light is lit
Ensure turret blower switch is ON
Announce UP over intercom
Brace and ready another round for loading

**Loader's Misfire Procedures**

1. Receive the Misfire announcement
2. Ensure Main Gun is Armed
3. Ensure main gun status ARMED light is lit
4. On order, open Breech
5. Examine Primer for firing pin indentation
   - If not indented, examine firing pin
   - If indented do next procedure
6. Rotate round 180 degrees
7. Spit on primer
8. Reload round
9. Arm main gun
   - Ensure main gun status ARMED light is lit
10. Ensure turret blower switch is ON
11. Announce UP over intercom
12. Brace for recoil
13. On Order, extract round
14. Dispose of IAW unit SOP

**Loader's post fire operations**

1. Place SAFE/ARMED handle in safe position
2. Ensure main gun status Safe light is lit
3. Clear main gun
4. Turn off turret blower
5. Stow ammunition door knee switch
6. Stow loader's guards and stub base catcher
7. Ensure commander's footguard is stowed
8. Remove spent stub casings
9. Close turret bustle ammunition doors
10. Close hull ammunition door
11. Dispose of spent casings

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### 1.3. SECONDARY ARMAMENT

- Assemble Loader's weapon
- Disassemble Loader's weapon
- Perform a function check on Loader's weapon
- Mount, and Maintain loader's weapon
- Operate 7.62mm Loader's weapon
- Correct stoppages on loader's weapon
- Change barrels on loader's weapon
- Dispose of spent links and casings
- Load, Clear and maintain Grenade Launchers
- Engagement Targets with 7.62mm Weapon

### 1.4. AMMUNITION HANDLING TASKS

- Know and load Ammo Stowage Plan
- Inspect and maintain Ammo Stowage Compartments
- Stow, Inspect, and Maintain all Ammunition
Assist in ammunition breakdown
Recognize ammunition and uses

1.5. MAINTENANCE TASKS

Inspect Turret hydraulics
Inspect hydraulic system reservoir
Help inspect and maintain Track and Suspension system
Check fire bottle pressure gauges
Clean all fire sensor lenses
Check engine and transmission fluid levels
Inspect tools and BII
Inspect and maintain ammo stowage compartments
Inspect and maintain loader's station
Assist other crewmen as required

1.6. TACTICAL TASKS

Cuts and mounts camouflage
Probes minefields
Assists in NBC operations
  Takes radiac readings
  Uses M-8 alarm paper
  Conducts local decontamination
  Administers NBC antidotes as required
Assists in consolidation and reorganization (wounded, ammo, fuel)
Reassigns to replace casualties as necessary
Deliberate occupation recon and security team leader
Emplaces/retrieves concertina wire
Assists in construction of fighting positions
  Clears fields of fire
  Assists in emplacement/retrieval of minefields
  Improves fighting positions
Assists in quartering party activities
  Recon for opfor
  NBC recon
  Locates and marks obstacles and booby traps
  Marks entrances, exits, and internal routes
  Locate and mark vehicle position
Assists in vehicle recovery operations
Assists in processing of EPW's
Assists in vehicle abandonment procedures
Conducts local dismounted recons: fords, obstacles, etc.
Distributes range cards
Assists in demolition operations

1.7. OBSERVATION

Observe target area of responsibility (approximately 180 degree
Acquire I.D. and prioritize targets
Use night vision equipment for target acquisition (pvs-2,5 etc.)
Identify U.S. and foreign equipment

1.8. COMMUNICATION

Radio watch and monitor additional net on command tanks
Places hot loop in/out
Operate and perform operator maintenance on receiver and
receiver-transmitter, t/sec wiring harness, and amplifier 1780
Communicate using visual signals

1.9. SECURITY

Emplace and retrieve mines
Sagger guard
Air guard
LP/OP
Local security
Assists in providing 360 degree security during tactical
operations

1.10 ADDITIONAL DUTIES

Assist in land navigation
Assist vehicle commander as necessary
Provide driver relief as necessary
Runner/messenger
Assists in messing activities
2.0. DRIVER'S TASK LIST

2.1. OPERATIONAL TASKS

Prepare driver's station for operation¹
Set parking brake
Inspect fire extinguisher handles
Ensure personnel heater is off
Ensure night periscope switch is off
Bilge pump switch off
Smoke generator off
Light switch off
HI beam off
Tactical idle off
Fuel tank selector switch set to right or left front
Fuel gauge 1/4 minimum
Low fuel level light off
Set fuel tank selector switch to rear
Ensure fire extinguisher 2nd shot cover is closed
Make sure gauges all read to the leftmost position
Dome-light off
Announce "Power"
Turn on vehicle master power
Ensure master power light is lit
Circuit breakers on
Fire light off
Personnel heater light off
Night periscope light off
Bilge pump light off
Smoke generator light off
HI beam light off
Parking/service brake light on
Press panel lights test button
Check electrical gauge reads 23 to 29 volts
Cable disconnected light off
Circuit breaker open light off
Turret seal pressure zero
Connect CVC helmet
Set intercom selector switch to INT only
Adjust driver's seat
Adjust periscopes
Close and lock driver's hatch
Adjust T bar
Close drain valves
Ready report to tank commander
Engine starts and checks

Set transmission control to neutral
Have loader turn amplifier (1780) off
Announce "Fire in the hole"
Press engine push to start button
Engine started light, lit momentarily, then turns off
Warning and caution lights off
Have commander turn NBC main system off
Parking brake system pressure gauge 1,000-1,700 psi
Press service pedal
Release parking brake
Place transmission control in D position
Twist throttle handles slowly rearward RPM 1,450-1,550
Tank should not move
Twist throttle control forward, place tank in neutral
Press and let go parking break pedal
Press and hold service brake pedal
Place transmission in drive
Steer left, right, center, and listen for clunking sound
Place transmission in neutral
Release service brake
Report all ready to commander

Place Tank in motion
Press and hold service brake
Release parking brake
Set transmission control to needed speed range
Release service brake
Ensure parking/service brake light is not lit
Move out

Engine shutdown operations

Twist throttle control forward
Press and hold service brake pedal
Set transmission to neutral
Ensure parking brake system pressure is between 1000-1700 psi
Press and let go parking brake
Release service brake
Ensure parking/service brake light is lit
Ensure NBC main system is off
Tactical idle switch off
Bilge pump switch/light off
Smoke generator switch/light off
All other auxiliary systems switches/lights off
Lights switch off
Engine, transmission, and fire warning lights off
Master caution and maintenance monitor lights off
Allow engine 2 minutes to cool down
Set engine shutoff switch to shutoff
Stow steer control

Power down and secure driver's station

1
Personnel heater switch/light off
Night periscope switch/light off
Bilge pump switch/light off
Smoke generator switch/light off
Lights switch off
High beam off
Tactical idle switch off
Set fuel tank selector switch to rear
Open drain valves
Record odometer reading
Record engine hours reading
Turn vehicle master power switch off
Place driver's seat in closed hatch position
Close and lock driver's hatch
Verify turret traverse lock is locked
Remove/disconnect CVC helmet
Lower driver's seat back
Raise driver's headrest
Exit station

2.2. AMMUNITION HANDLING TASKS

Know and load Ammo Stowage Plan
Inspect and maintain Ammo Stowage Compartments
Stow, Inspect, and Maintain all Ammunition
Assist in ammunition breakdown
Recognize ammunition and uses

2.3. MAINTENANCE TASKS

Perform daily PMCS
   Maintain operator's part of equipment record folder
Look for leaks
   Fuel
   Oil
   Hydraulic fluid
Identify class of leaks: I, II, III
   Take appropriate action
Examine vehicle for signs of tampering
Examine for damaged or missing parts
Maintain track and suspension
   Adjusting link assembly
   Track tension
   Roadwheels
   Compensating idlers
   Hubs
   Shock absorbers
   Torsion bars
   Skirts
Support roller assemblies
Sprocket assemblies
Track assembly
  Track blocks
  End connectors
  Center guides
  Pins
Final drive plugs and housings
Muzzle reference sensor
Batteries
Precleaners
Transmission oil
Engine oil level
Engine compartment fire extinguisher lenses
Engine hydraulics and heat exchanger
Fire extinguisher system
Parking brake system hydraulic pressure
Driver's hatch
Personnel heater
NBC Main system
Driver's NBC equipment
Inspect tools and BII
Perform other maintenance as required

2.4. TACTICAL TASKS

Cut and mount camouflage
Probe minefields with vehicle
Assist in construction of fighting positions with w/out plow
Assist in vehicle recovery operations
Assist in vehicle abandonment procedures
Evade an ATGM
Protect against nuclear attack with w/out warning
Participate in a tactical road march
Conduct proper terrain driving
Swim/ford a water obstacle
Cross a bridge or a raft
Create smoke
Operate buttoned up
Ascend and descend a steep grade
Cross a vertical obstacle
Cross a ditch
Move in smoke
Move during darkness
Take action on contact
Enter/leave an overwatch position
Drive in Traveling formation
Drive in Traveling Overwatch formation
Drive in Bounding Overwatch formation
Prepare vehicle for operations
Assist in conduct of Fire and Maneuver
React to indirect fire
Occupy battle positions
Remove an injured crewman from the vehicle
Provide first aid as required
Provide buddy aid to an NBC casualty
Give the alarm for an NBC hazard
Detect NBC contamination and conduct local decon
Move under direct fire
Select temporary fighting positions
Assist in processing of EPW's
Apply customs and laws of war
Occupy hull down and turret down positions in primary, alternate, and supplemental fighting positions

2.5. OBSERVATION

Observe target area of responsibility (approximately 120 degree front)
Acquire, identify, and prioritize targets
Use night vision equipment
Identify U.S. and foreign equipment

2.6. COMMUNICATION TASKS

Pull radio watch
Communicate using visual signaling techniques
Send a radio message
Set up a hot loop

2.7. SECURITY

Emplace and retrieve mines
LP/OP
Assist in providing 360 degree security during tactical operations
Assist providing local security

2.8. ADDITIONAL DUTIES

Recognize ammunition and its uses
Dispose of spent links and casings
Assist vehicle commander as necessary
Train, supervise, and inspect subordinates
3.0. GUNNER'S TASK LIST

3.1. OPERATIONAL TASKS

Place the turret into manual operation
Perform a manual elevation check
Place the turret into power operation
Perform a zero pressure check
Manually operate gun/turret drive
Assist in refueling tank
Assist in vehicle recovery operations
Assist in evacuation of wounded crewman
Operate gunner's power control handles
Operate GPS ballistic doors
Power up gunner's station
Operate GPS/GAS/TIS
Install/remove laser safety guard
Operate laser rangefinder
Place main gun in travel lock

Prepare gunner's station for operation
Verify that gun/turret drive switch is on manual
Ensure loader has safed main gun
Install coax machinegun
Verify installation of laser safety guard
Report ready for power operation to TC
Wait for tank commander to power up turret
Turn on and adjust dome-light
Put on and connect CVC helmet
Set intercom select lever to desired setting
Set fire control mode to manual
Unlock main gun travel lock
Adjust seat
Adjust browpads
Adjust chestrest
Conduct a GPS/TIS panel lights test
Ensure hydraulic pressure gage is between 1,500 and 1,700 psi
Ensure computer power switch is on
Conduct a computer panel lights test
Close and latch computer cover
Set thermal mode switch to standby
Verify turret traverse lock is unlocked
Verify gun/turret drive lights at loader's station are powered
GPS functional check
Check defroster switch mode
Set gun select switches to desired settings
Set ammunition select switch to desired setting
Open GPS ballistic doors
Set FLIR/CLEAR/SHTR switch to CLEAR

Adjust GPS
Adjust reticle knob
Set fire control mode switch to NORMAL
Focus GPS eyepiece
Adjust NORMAL MODE DRIFT knobs

Computer self test
Ensure computer power switch is on
Squeeze and hold gunner's power control handles
Press and release test push button
Ensure display says pass

Computer data check
Press/release AMMO TEMP key
Press/release ENTER key
Press/release BARO PRESS key
Press/release ENTER key
Press/release AIR TEMP key
Press/release ENTER key
Press in MRS switch and ensure light is lit
Press/release boresight key
Press/release ENTER key
Ensure MRS switch is out and the light off
Press/release boresight key
Press/release ENTER key
Set gun select switch to coax and ensure light is lit
Press/release AMMO SUBDES key
Press/release ENTER key
Press/release BS ADJUST key
Press/release ENTER key
Press/release ZERO key
Press/release ENTER key
Set gun select switch to main and ensure light is lit
Set AMMO SELECT switch to SABOT and ensure light is lit
Press/release AMMO SUBDES key
Press/release ENTER key
Press/release BS ADJUST key
Press/release ENTER key
Press/release ZERO key
Press/release ENTER key
Set AMMO SELECT switch to HEAT and ensure light is lit
Press/release AMMO SUBDES key
Press/release ENTER key
Press/release BS ADJUST key
Press/release ENTER key
Press/release ZERO key
Press/release ENTER key

20
Close and latch computer cover

Checkout TIS

Set FLTR/CLEAR/SHTR switch to SHTR
Set POLARITY switch to white hot
Set thermal magnification lever to 3x
Set unit test pattern switch to PCU - fault light off
Ensure no test patterns visible in image display
Set unit test pattern switch to ICU - fault light off
Ensure upper right hand corner of display is dark and no symbols displayed
Set unit test pattern switch to EU - fault light off
Set THERMAL MODE SWITCH to ON
Ensure displayed fault light goes off within 5 sec.
Ensure corner markers and symbols displayed in image
Set thermal magnification lever to 10x
Ensure moving reticle and symbols visible
Check that TRU ready light is ON
Set unit test pattern switch to TRU
Ensure fault light goes out within 5 sections
Verify image has reticle in center, vertical bar, and symbols visible
Turn and verify CONTRAST knob function
Turn and verify SENSITIVITY knob function
Turn and verify RETICLE knob function
Flip POLARITY switch from WHITE HOT to BLACK HOT and verify function
Lay on a target at least 1,000 meters away
Adjust CONTRAST knob
Adjust SENSITIVITY knob
Adjust FOCUS knob
Manually enter 2680 into computer
Adjust SYMBOLS knob
Set thermal magnification lever to 3x
Place THERMAL MODE switch to desired setting
Place thermal ballistic door in desired position
Set FLTR/CLEAR/SHTR switch to CLEAR

Adjust Gunner's Auxiliary Sight (GAS)
Turn on reticle brightness knob if required
Lay on a target
Adjust focusing ring
Set filter knob to desired position
Set reticle select knob to desired position

Check lead system
Verify that fire control switch is in normal mode
Verify that GUN SELECT switch is set to MAIN
Set AMMUNITION SELECT switch to HEAT
Verify magnification lever is set to 10x
Verify FLTR/CLEAR/SHTR switch is set to CLEAR
Squeeze and hold gunner's power control handles
Manually enter 2,000 meter range into computer
Rotate gunner's power control handles left & right
Verify that reticle moves
Rotate gunner's power control handles back to center
Ensure turret moves when handles are centered

Check firing circuits
Have loader set GUN/TURRET DRIVE switch to MANUAL
Have loader close the breech
Install firing circuit tester
Have loader place SAFE/ARMED handle in ARMED position
Ensure GUN SELECT switch MAIN light is lit
Operate master blaster and observe circuit tester flash
Press trigger on manual elevation crank and observe flash on circuit tester
Have loader turn on power to gun/turret drive
Have loader verify FIRE CONTROL switch is set to NORMAL
Press triggers on gunner's power control handles and observe flash on circuit tester
Lock turret traverse lock
Press triggers on gunner's power control handles
Observe that light on circuit tester does not flash
Unlock turret traverse lock
Lock main gun elevation travel lock
Press triggers on gunner's power control handles
Observe that light on circuit tester does not flash
Unlock main gun elevation travel lock
Place GUN SELECT switch in TRIGGER SAFE position
Press triggers on gunner's power control handles
Observe that light on circuit tester does not flash
Place GUN SELECT switch in MAIN position
Place GUN/TURRET DRIVE in MANUAL position
Press triggers on gunner's power control handles
Observe flash on circuit tester
Stow circuit tester
Have loader place SAFE/ARMED handle in SAFE position

Crosswind sensor check
Have loader erect/cover crosswind sensor
Manually enter 5 degree cant into the computer
Press and release CROSSWIND key
Verify that computer shows less than 3 mph
Close and latch computer cover
Have loader uncover crosswind sensor
Give ready report to tank commander

Gunner's pre-fire operations
Set GUN SELECT switch to TRIGGER SAFE
Ensure TRIGGER SAFE light is lit
Set AMMUNITION SELECT switch to proper setting
Ensure proper ammunition light is lit
Enter computer manual inputs
Update MRS
Load coax
Place chestrest in firing position

Gunner's main gun firing operations
Set GUN SELECT switch to MAIN
Ensure MAIN light is lit
Verify that proper AMMUNITION SELECT light is lit
Remove laser safety guard
Arm 1ST RTN/LAST RTN laser RANGE switch
Identify and track target
Depress laser range button
Announce "on the way!" and squeeze trigger

Gunner's coax firing operations
Place machinegun manual safety in "F" position
Set GUN SELECT switch to COAX
Ensure GUN SELECT light is lit
Identify and track targets
Announce "on the way!" and squeeze trigger

Gunner's post fire operations
Check that GUN SELECT switch is in TRIGGER SAFE position
Ensure that the TRIGGER SAFE light is lit
Ensure that laser RANGE switch is SAFE
Install laser safety guard
Clear coaxial machinegun
Stow chestrest

Power down and secure gunner's station
Remove coax
Close and latch computer cover
Turn THERMAL MODE switch to OFF position
Set GUN SELECT switch to TRIGGER SAFE position
SAFE laser RANGE switch
Install laser safety guard
Close GPS ballistic doors
Stow chestrest
Lock main gun elevation travel lock
Disconnect and remove CVC helmet
Turn off dome-light
Verify turret traverse lock has been locked
Verify main gun has been safed

3.2. MAIN WEAPON TASKS
Safe/Arm main armament
Boresight and Zero main gun
Apply misfire procedures
Assemble, disassemble, and perform a function check on main gun
Inspect the replenisher system
Inspect and clean the bore
Inspect and clean the bore evacuator
Drop, inspect and clean the breech
Fire main gun

3.3. SECONDARY ARMAMENT TASKS

Assemble, disassemble, and perform a function check on coax
Install/remove coaxial machinegun
Zero coaxial machinegun
Manually operate coax
Correct stoppages on coax
Change barrels on coax
Dispose of spent links and casings

3.4. AMMUNITION HANDLING TASKS

Know and load ammunition storage plan
Stow, inspect, and maintain all ammunition
Assist in ammunition breakdown
Recognize ammunition and uses

3.5. FIRE CONTROL

Inspect the ballistic computer
Inspect the ballistic drive
Inspect the periscope and the infinity sight
Inspect the telescope
Boresight all sights
Conduct firing circuit test
Crosswind sensor computer check
Update MRS
Perform a cant unit check
Perform a superelevation check
Perform a lead accuracy check
Test fire control system

3.6. MAINTENANCE TASKS

Replace thrown track
Adjust track
Inspect roadwheels and support rollers
Inspect sprocket and track assembly
Inspect muzzle reference sensor
Inspect turret traverse and gun elevation locks
Inspect gunner's power control handles
Inspect gun turret traverse and elevation servos
Check accumulator pressure and hydraulic system reservoir
Check auxiliary hydraulic pump
Inspect main gun mount and recoil system
Clean optics
Perform a TIS check
Perform computer self tests
Perform computer data checks
Perform laser rangefinder tests
Perform GPS functional check
Perform GAS functional check
Inspect gunner's station dome light
Maintain gunner's part of equipment record folder

3.7 TACTICAL TASKS

Assist in consolidation and reorganization (wounded, ammo, fuel)
Assigned to replace casualties as necessary
Assists in processing of EPW's
Makes up range cards
Assists in demolition operations
Assists in vehicle abandonment procedures
Assist in vehicle preparation for nuclear strike
React to nuclear burst
Determine location using a military map
Install/retrieve mines
Administer nerve agent antidote to another crewman
Operate an M8 chemical detection alarm/paper
Conduct partial decontamination
Select temporary fighting positions
Apply customs/laws of war governing forbidden targets, tactics etc.
Call for and adjust indirect fire
Operate TSEC speech security equipment
Prepare tank for fording

3.8 ENGAGEMENT TASKS

Index ammunition type into computer
Laser range to target
  Single returns
  Multiple returns
Know and employ the frontal fire pattern
Know and employ the cross fire pattern
Know and employ the depth fire pattern
Identify and prioritize targets using all sights
Know and react to fire commands

25
Engage targets using battlesight gunnery techniques
Engage targets with precision gunnery techniques
Engage targets from range card data
Estimate range
Engage a moving target(s) from a stationary tank
Engage a moving target(s) from a moving tank
Engage troops with coax
Engage multiple targets with main gun and coax
Move from a hide to a hull down position and engage targets
Perform immediate action on a misfire main gun round
Employ correct actions on contact

3.9. OBSERVATION TASKS

Observe target area of responsibility
Assist in clearing of fields of fire
Acquire, identify, and prioritize targets
Identify U.S. and foreign equipment
Operate thermal sight
Operate daylight channel
Identify minefield markers
Collect and report information
Operate GAS

3.10. COMMUNICATION TASKS

Perform radio watch
Operate intercom/radio system
Send radio messages
Mount and perform operator PMCS on radio sets
Use CEOI

3.11. SECURITY

Assists in providing 360 degree security during tactical operations
Provide local security
Scan from an overwatch position
Use thermal channel during periods of limited visibility

3.12. ADDITIONAL DUTIES

Acting vehicle commander in TC's absence
Perform Loader duties as necessary
Apply first aid as required
Perform driver's duties as necessary
Train, supervise, and inspect subordinates
4.0. TANK COMMANDER

4.1. OPERATIONAL TASKS

Continuous operations
Enforce sleep plan
Perform stand to
All equipment is loaded and stowed
Complete precombat checks
All personnel are manning battle positions
Simultaneously start engines
Vehicles are ready to move out
Report status to commander
Operate during periods of limited visibility
Rain
Smoke
Fog
Darkness
Use night vision devices
Operate on all types of terrain
Desert
Arctic
Mountain
Forest and jungle

4.2. MAIN WEAPON TASKS

Fire main gun from commander's station
Apply misfire procedures
Supervise main gun maintenance
Keep track of equivalent rounds through tube/breech
Ensure main gun stays clear of obstacles
Verify presence of FRH in replenisher

4.3. SECONDARY ARMAMENT TASKS

Assemble, disassemble, and perform a function check on
Commander's weapon
Mount/dismount commander's weapon
Correct stoppages
Perform maintenance on cdr's weapon
Operate commander's weapon
Load/unload and clear Commander's weapon

4.4. AMMUNITION HANDLING TASKS

Know and load ammunition storage plan
Stow, inspect, and maintain all ammo
Assist in ammunition breakdown
Recognize ammunition
Know ammunition ranges and uses

4.5. FIRE CONTROL TASKS

Perform operator's portion of fire control system checkout
Boresight and zero all sights and weapons
Update MRS
Receive, interpret, and apply all fire control data

4.6. MAINTENANCE FUNCTIONS

Responsible for condition of entire vehicle
Inspect
  Visually inspect vehicle
  leaks
  Tampering
  Damage
  Missing parts
  Cleanliness
  Paint/rust
Common areas
  Skirts
  MRS
  Final drive housings and plugs
Pre-cleaners
Gunner's station
Loader's station
Driver's station
Fire extinguisher handles
Track
  Center guides
  End connectors
  Dead track

Check
Gunner's maintenance responsibilities
Loader's maintenance responsibilities
Driver's maintenance responsibilities
Frequent maintenance areas
Adjusting link assembly
Track tension
Roadwheels
Compensating idler
Roadarms
Shock absorbers
Torsion bars
Support roller assemblies
Hub and sprocket assemblies
Track assy
All fluid levels
   Engine
   Transmission
Replenisher
Precleaners
Main gun
Secondary armament
   Support roller assemblies
Perform
All maintenance as necessary
Operator's part of equipment folder
Verify operation
   Commander's seat
   Guards
   Hatch
   Commander's NBC system
   Commander's panel
   Commander's power control handle
   GPS extension
   Commander's weapon station
      Commander's weapon
      Commander's seat
   Subordinate crew stations

4.7. TACTICAL TASKS

Offense
   Drills
      Battle, Platoon, Company
   Action
      Left, Right, Front, Rear
      Contact
      Indirect fire
      Air attack
   Understand and employ wingman concept
   Know use and employment of basic formations
      Wedge
      Vee
      Echelon
      Line
      Column
      Coil
      Herringbone
   Understand and use the principles of cover and concealment
      Use proper terrain driving techniques
      Use hull down and turret down positions
      Camouflage personnel and equipment
   Ensure light, noise, and litter discipline are
Ensure proper security is maintained
LP/OP
Local security
Area security
Properly use 3 types of movement techniques
Traveling
Traveling overwatch
Bounding overwatch
  Alternatebounds
  Successive bounds
  Overwatch
  Vision check position security
  Occupy hull down fire position
  Assign areas of fire
  Orientate weapons
  Search for targets
  Visual/thermal

Movement
Select next position
Select routes
Determine likely enemy locations
Pre-plan actions on contact
Back down from fighting positions
Avoid skylining
Scan area for displaced features
Ensure entire movement is covered by overwatch element

Actions on contact
Return fire
Alert crew/unit
Report contact to commander

Defense
Receive the order
Commander's intent and concept of how battle will go
Element's role in units defense
Positions to be reconed, prepared, and occupied
Direct fire orientation
SOP's
Special instructions
Allocate time
Determine covered/concealed routes in/out of BP's
Determine likely enemy avenues of approach
Plan emplacement of obstacles
Locate battle/fighting positions
  Primary
  Alternate
  Supplementary
  Coordinate for construction of BP's
Perform pre-combat checks
Occupy battle positions

Deliberate Occupation
- Halt behind battle position
- Coil
- Conduct dismounted recon to select BP's
- Receive sectors of fire
- Move tank into hide position behind fighting position
- Clear fighting positions
- Establish security
- Prepare range cards
- Clear fields of fire
- Camouflage position
- Improve position
- Construct alternate/supplemental positions
- Establish wire communication
- Set up chemical alarms
- Emplace obstacles

Hasty Occupation
- Approach battle position from friendly side
- Receive individual fighting positions
- Move tank to hull down fighting position
- Receive TRP's
- Engagement areas
- Routes to subsequent battle positions
- Exit routes
- Prepare range cards
- Back tank down to turret down position
- Prepare to fight

Conduct the Defense
- SOP's
- Operation Order
- Fragmentary Orders

4.8. ENGAGEMENT TASKS

- Estimate range
- Engage troops with coax
- Engage multiple targets
- Control and distribute fires
- Issue fire commands
  - Alert
  - Weapon or ammo
  - Target description
  - Location
  - Method of control (optional)
  - execution
- Create fire plans
- Determine and engage most dangerous targets first
Suppress less dangerous targets
   Indirect and/or direct fire
Employ control techniques
   Frontal fire
   Cross fire
   Depth fire
Employ engagement priorities
   Command and control vehicles
   ADA weapons
   Engineer assets
   Tanks
   Other armored vehicles
   Dismounted infantry
Employ firing techniques
   Simultaneous fires
   Alternating fires
   Observed fires
   Surprise targets
   Battlesight gunnery
Assault fire
   Employ all weapons simultaneously
Support by fire
   Recon by fire direct/indirect
      Known/suspected enemy locations
      Dominate terrain overwatching choke points
      Dominate towns or villages
      Uncleared wooded areas
   Provide base of fire for the attack
   Suppressive fires
Call for indirect fire
I.D. of F.O. and Warning order
Target location
   Grid
   Shift
Target description method of engagement / control
Spotting and adjusting
   Determine OT factor
   Adjust range and deviation

4.9. NAVIGATION TASKS

Use a map
   Navigate by terrain association
   Locate a point using intersection
   Locate a point using resection
   Identify locations using 8 digit grid coordinates
   Identify likely avenues of approach
   Determine accessible routes
   Determine lines of sight
   Conduct a map recon
Identify terrain features
Identify and use graphic control measures
Reproduce and use map overlays
Navigate during periods of limited visibility
Use a compass

4.10. OBSERVATION TASKS

Observe target area of responsibility
Acquire, identify, and prioritize targets
Identify U.S. and foreign equipment
Maintain contact with wingman

4.11. COMMUNICATION TASKS (COMMAND AND CONTROL)

Know communications responsibilities
  Senior to subordinate
  Supporting to supported
  Lateral
  Restoration
Know use and employment of tactical commo
  Messenger
  Wire
  Visual
    Hand and arm signals
    Flags
    Lights
    Pyrotechnique
  Radio
    Know, use, and employ call signs
    Take action on jamming
      Disconnect antennae
      Continue to transmit
    Send a MIJI report
    Know and use proper RTO procedures

4.12. SECURITY

Assists in providing 360 degree security during tactical operations
Provide local security
Scan from an overwatch position
Use thermal channel during periods of limited visibility

4.13. ADDITIONAL DUTIES

Acting vehicle commander in TC's absence
Perform Loader duties as necessary
Apply first aid as required
Perform driver's duties as necessary
Train, supervise, and inspect subordinates
5.0. PLATOON LEADER/PLATOON SGT

5.1. OPERATIONAL TASKS

Continuous operations
   Enforce sleep plan
   Perform stand to
     All equipment is loaded and stowed
     Complete pre-combat checks
     Simultaneously start engines
     Vehicles are ready to move out
     Report status to commander
   Operate during periods of limited visibility
     Rain
     Smoke
     Fog
     Darkness
     Use night vision devices
   Operate on all types of terrain
     Desert
     Arctic
     Mountain
     Forest and jungle

5.2. MAIN WEAPON TASKS

   Fire main gun from commander's station
   Apply misfire procedures
   Supervise Main Gun maintenance
   Keep track of equivalent rounds through tube/breech
   Ensure Main Gun stays clear of obstacles
   Verify presence of FRH in replenisher

5.3. SECONDARY ARMAMENT TASKS

   Assemble, disassemble, and perform a function check on
     Commander's weapon
   Mount/dismount Commander's weapon
   Correct stoppages
   Perform maintenance on Commander's weapon
   Operate Commander's weapon
   Load/unload and clear Commander's weapon

5.4. AMMUNITION HANDLING TASKS

34
Know and load ammunition storage plan
Stow, inspect, and maintain all ammunition
Assist in ammunition breakdown
Recognize ammunition
Know ammunition ranges and uses

5.5. FIRE CONTROL TASKS

Perform operator's portion of fire control system checkout
Boresight and zero all sights and weapons
Update MRS
Receive, interpret, and apply all fire control data

5.6. MAINTENANCE FUNCTIONS

Responsible for condition of entire vehicle
Inspect
Visually inspect vehicle
leaks
Tampering
Damage
Missing parts
Cleanliness
Paint/rust
Common areas
Skirts
MRS
Final drive housings and plugs
Pre-cleaners
Gunner's station
Loader's station
Driver's station
Fire extinguisher handles
Track
Center guides
End connectors
Dead track

5.6.1. Check
Gunner's maintenance responsibilities
Loader's maintenance responsibilities
Driver's maintenance responsibilities
Frequent maintenance areas
Adjusting link assemblies
Track tension
Roadwheels
Compensating idler
Roadarms
5.6.2. Perform

All maintenance as necessary
Operator's part of equipment folder
Verify operation
Commander's seat
Guards
Hatch
Commander's NBC system
Commander's panel
Commander's power control handle
GPS extension
Commander's weapon station
Commander's weapon
Subordinate crew stations

5.7. TACTICAL TASKS

5.7.1. Offense

Drills
Battle, Platoon, Company
Action
Left, Right, Front, Rear
Contact
Indirect fire
Air attack
Understand and implement the fundamentals of offense
Concentrate overwhelming combat power
Surprise
Speed
Flexibility
Audacity
See the battlefield
Use weapon systems to best advantage
Shock, overwhelm, and destroy the enemy
Provide continuous mobile support
Be flexible
Understand and employ wingman concept
Know use and employment of basic formations
   Wedge
   Vee
   Echelon
   Line
   Column
   Coil
   Herringbone
Understand and use the principles of cover and concealment
   Use proper terrain driving techniques
   Use hull down and turret down positions
   Camouflage personnel and equipment
Ensure light, noise, and litter discipline are maintained
   Ensure proper security is maintained
   LP/OP
   Local security
   Area security
Properly use 3 types of offensive operations.
   Movement to contact
      Traveling
      Traveling overwatch
      Bounding overwatch
      Alternate bounds
      Successive bounds
   Overwatch
      Visually check position security
      Occupy hull down fire position
      Assign areas of fire
      Orientate weapons
      Search for targets
      Visual/thermal
   Movement
      Select next position
      Select routes
      Determine likely enemy locations
      Pre-plan actions on contact
      Back down from fighting positions
      Avoid skylining
      Scan area for displaced features
      Ensure entire movement is covered by overwatch element
   Actions on contact
      Return fire
      Alert crew/unit
      Report contact to commander
      Develop situation through fire and maneuver
Bypass
  Hasty attack
  Attack by fire
  Report encounter to commander

Hasty attack
  Determine size, location, and composition
  Position support element
  Considerations
    Mission
    Terrain
    Friendly capabilities
    Enemy capabilities
    Time

Position assault element
  Considerations
    Mission
    Terrain
    Friendly capabilities
    Enemy capabilities
    Time

Armor pure
  Maneuver to last covered and concealed position
  Suppress objective
  Assault objective/shift fires
    Fire all weapons
    Sweep the objective
    Halt on friendly side of objective
    Hull down
    Engage fleeing enemy/counter.
  Consolidation/reorganization
    Occupy hull down position
    Assign sectors of fire
    Estimate security
    Eliminate remaining resistance
    Secure EPW's
    Replace injured key persons
    Report status to CO
    Cross level supplies
    Evacuate casualties
    Reload/redistribute ammo
    Conduct essential maintenance
    Continue mission

Armor with mechanized infantry
  Maneuver to last covered and concealed position
  Suppress objective
  Assault objective/shift fires
    Fire all weapons
    Sweep the objective
Dismount infantry
Clear objective
Halt on enemy side of objective
Hull down
Engage fleeing enemy/counter attack
Consolidation/reorganization
  Occupy hull down position
  Assign sectors of fire
  Est. security
  Eliminate remaining resistance
  Secure EPW's
  Replace injured key persons
  Report status to CO
  Cross level supplies
  Evacuate casualties
  Reload/redistribute ammo
  Conduct essential maintenance
  Continue mission

Deliberate attack
  Strongpoints
    Breach element
      Breach required obstacles
    Assault element
      Assault objective through breachpoint
    Support element
      Support by fire breach/assault

5.7.2. Defense
  Receive the order
    Commander's intent and concept of how battle will go
    Element's role in units defense
    Positions to be reconned, prepared, and occupied
    Direct fire orientation
    SOP's
    Special instructions
  Apply troop leading procedures
  Allocate time
  Issue a warning order
  Conduct a recon
    Determine covered/concealed routes in/out of BP's
    Request Engineer support if routes require
    Determine likely enemy avenues of approach
    Allocate direct/indirect fire zones
    Coordinate preplots & TRP's w/FSO/FIST
    Plan emplacement of obstacles
    Coordinates with engineers
  Locate battle/fighting positions
    Primary
    Alternate
    Supplementary
Coordinate for construction of BP's
Perform precombat checks
Occupy battle positions
Deliberate Occupation
   Halt unit behind battle position
   Coil
   Conduct dismounted recon to select BP's
   Assign sectors of fire
   Move tanks into hide position behind each
   fighting position
   Clear fighting positions
   Establish security
Prepare range cards/fire plan
   Company/Platoon sector
   Individual tank positions
   OP's
   TRP's and engagement areas
   Obstacles
   Indirect fire targets
   Final protective fires
   Unit information
   Engagement ledger
Clear fields of fire
Camouflage position
Improve position
   Construct alternate/supplemental
Coordinate with adjacent units
Location of
   Primary positions
   Secondary positions
   Alternate positions
   Sectors of fire
   Dead space between units
   How it will be covered
   Routes in and out of BP's
   OP's
   Obstacles
   CEOI information
Establish wire communication
Set up chemical alarms
Emplace obstacles
Hasty Occupation
Approach battle position from friendly side
Point out individual fighting positions
Move tanks to hull down fighting positions
Point out
   TRP's
   Engagement areas
   Routes to subsequent battle positions
Exit routes
Prepare range cards
Back tanks down to turret down positions
Prepare to fight
Conduct the defense
Initial battle
Employ all available fires to best advantage
Artillery/mortars first
Attack helicopters/tac air next
ATGM's
Direct fire
SOP's
Movement to alternate/supplementary BP's
Covered
By tanks
By section
Uncovered
By platoon
Request smoke
Movement to subsequent battle positions
Maximize firepower to suppress enemy
Use an obstacle to slow enemy advance
Back out of fighting positions
Keep a terrain feature between moving tanks and enemy
Keep main gun orientated in direction of enemy
Move quickly to next battle position
If move is covered
By another platoon/company
Move as a platoon/company
By another section
Move as a section
If move is uncovered
Move by platoon
Request smoke
Counter attack
Conduct a hasty attack
Conduct a deliberate attack
Attack by fire
Prepare for next attack
Reestablish security
Ensure positions are still mutually supporting
Replace wounded key personnel
Process wounded/dead
Cross level and resupply ammo
Improve positions
Replace obstacles if enemy has withdrawn
Defense under adverse conditions
Position vehicles closer to area of engagement
Mark routes and positions
Utilize night vision devices
Increase security
Enforce noise and light discipline
Ambush as often and far forward as possible

5.8. Special combat operations

Relief in place

Necessary coordination
- Exchange of liaison personnel
- Positions of weapons
- Exchange of sketch cards
- Exchange of fire plans
- Exchange of fire support elements
- Location of and transfer responsibility for obstacles
- Routes and guides
- Transfer excess ammo and supplies
- Communications
- Enemy situation and intelligence
- Sequence of relief
- Time of change of responsibility for area

Conduct of relief

Both units on common net
Relieving vehicles occupy hide positions while relieved unit backs down from BP
Exchange necessary information

Passage of lines

Conduct a recon to confirm
- Location of stationary force to be passed through
- Location of contact points
- Location of passage points
- Location of passage lanes
- Attack position location
- Assembly area location
- Initial location of passing unit's combat support

Coordinate

Supporting fires
Time of transfer of responsibility of sectors
Troop density
Traffic control
Communications
- CEOI data
- Recognition signals
Unit designations
Stationary unit's mission and battle plan
Enemy situation
Friendly situation
OP's and patrol routes
Obstacle locations and types
Traffic control points
Contaminated areas

5.9. ENGAGEMENT TASKS

Estimate range
Engage troops with coax
Engage multiple targets
Control and distribute fires
Issue fire commands
   Alert
   Weapon or ammo
   Target description
   Location
   Method of control (optional)
   execution
Create vehicle, platoon, and company fire plans
Determine and engage most dangerous targets first
Suppress less dangerous targets
   Indirect and/or direct fire
Employ control techniques
   Frontal fire
   Cross fire
   Depth fire
Employ engagement priorities
   Command and control vehicles
   ADA weapons
   Engineer assets
   Tanks
   Other armored vehicles
   Dismounted infantry
Employ firing techniques
   Simultaneous fires
   Alternating fires
   Observed fires
   Surprise targets
   Battlesight gunnery
Assault fire
   Employ all weapons simultaneously
Support by fire
   Recon by fire direct/indirect
      Known/suspected enemy locations
      Dominate terrain overwatching choke points
      Dominate towns or villages
      Uncleared wooded areas
   Provide base of fire for the attack
   Suppressive fires
Call for indirect fire
   I.D. of F.O. and Warning order
   Target location
Grid
Shift
Target description/Method of engagement/Method of control
Spotting and adjusting
Determine OT factor
Adjust range and deviation

5.10. NAVIGATION TASKS

Use a map
Navigate by terrain association
Locate a point using intersection
Locate a point using resection
Identify locations using 8 digit grid coordinates
Identify likely avenues of approach
Determine accessible routes
Determine lines of sight
Conduct a map recon
Identify terrain features
Identify and use graphic control measures
Reproduce and use map overlays
Navigate during periods of limited visibility
Use a compass

5.11. OBSERVATION TASKS

Observe target area of responsibility
Acquire, identify, and prioritize targets
Identify U.S. and foreign equipment
Maintain contact with wingman

5.12. COMMUNICATION TASKS (COMMAND AND CONTROL)

Know communications responsibilities
Senior to subordinate
Supporting to supported
Lateral
Restoration
Know use and employment of tactical commo
Messenger
Wire
Visual
Hand and arm signals
Flags
Lights
Pyrotechnique
Radio
Know, use, and employ call signs
Take action on jamming
Disconnect antennae
Continue to transmit
Send a MIJI report
Know and use proper RTO procedures

5.13. SECURITY

Assists in providing 360 degree security during tactical operations
Provide local security
Scan from an overwatch position
Use thermal channel during periods of limited visibility
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TC 17-15-11, "TANK CREW DRILLS"

FM 17-12-1, "TANK GUNNERY"

FM 71-1, "TANK AND MECH. INFANTRY COMPANY TEAM"
List of References

1 HQDA, "Crew Checklist for Tank, Combat, Full Tracked, M1A1," (TM 9-235002640-CL), AG Publication Center, Baltimore, Maryland
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