ARI Research Note 89-44

Bradley Unit Conduct of Fire Trainer Instructor/Operator Procedures: A Videotape

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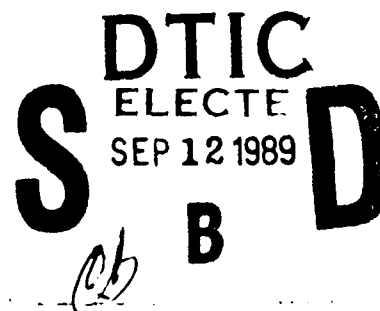
Margaret S. Salter
U.S. Army Research Institute

for

Field Unit at Fort Benning, Georgia
Seward Smith, Chief

Training Research Laboratory
Jack H. Hiller, Director

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Technical review by

Arnold Dale Bowman
Jean L. Dyer
Charles O. Gregory
Michael J. Harris

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The videotape described in this report was designed to be used during Bradley Fighting Vehicle (BFV) Conduct of Fire Trainer (COFT) Instructor/Operator (IO) and Senior IO training at Fort Benning, GA. The tape highlights procedural differences in the Institutional COFT (I-COFT) at Fort Benning and the Unit COFT (U-COFT) found in Army units worldwide. This report details the rationale for and contents of the videotape and provides a copy of the script.

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UNCLASSIFIED

This report provides the rationale for and contents of a videotape created for institutional Bradley Fighting Vehicle gunnery training. The project is part of an overall mission to assess instructional strategies and technologies to improve weapon system training. Sponsorship for Bradley research has been provided under a 1983 Memorandum of Understanding between the Training Technology Agency at TRADOC, the U.S. Army Infantry School, and the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI).

The videotape was designed to be used as introductory material for students receiving Bradley training before hands-on instruction on the Conduct of Fire Trainer (COFT). The COFT is a computer-driven high fidelity precision gunnery training device used in Bradley units worldwide. The importance of the device, the computer-generated graphics, and the unique scoring system justify development of standardized pretraining materials. The videotape was developed in close coordination with Bradley COFT instructor/operators and trainers and has been provided to the 29th Infantry Regiment, Bradley Instructor Detachment, for use in institutional training.

ACKNOWLEDGMENTS

BRADLEY UNIT CONDUCT OF FIRE TRAINER INSTRUCTOR/OPERATOR
PROCEDURES: A VIDEOTAPE

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BRADLEY UNIT CONDUCT OF FIRE TRAINER
INSTRUCTOR/OPERATOR PROCEDURES: A VIDEOTAPE

INTRODUCTION

The Conduct of Fire Trainer, the COFT, is a sophisticated training device. It is a computer driven, high fidelity precision gunnery trainer developed for the Army by General Electric's Simulation and Control Systems Department. The COFT is available for the M1 and M60A3 series tanks and for the M2/M3 Bradley Fighting Vehicle (BFV).

The Unit Conduct of Fire Trainer (U-COFT) is found in units world-wide. It provides basic gunnery skill training for novices or transition and cross training for personnel with some related prior experience. The U-COFT is primarily used as a home station sustainment trainer. It is used for diagnostics or to ensure that a crew has achieved minimum proficiency before live fire. It can be used in preparation for a gunnery density or to complement other training to insure that gunnery skills do not deteriorate through lack of practice.

In addition to the U-COFT, there are two other versions of the COFT. The Mobile Conduct of Fire Trainer (M-COFT) is used by National Guard units. It is a self-contained U-COFT housed in a trailer. When transported, the M-COFT becomes a mobile gunnery training center. The Institutional Conduct of Fire Trainer (I-COFT) is used for gunnery training at the Armor and Infantry Schools. It has tutorial and practice exercises for the novice, and provides a self-paced program of instruction (POI) for basic gunnery. Specific skills are taught by the device and a trained instructor/operator (IO). The I-COFT is used primarily for basic or transition training, although it can be used in a U-COFT mode for experienced crews. Although the I-COFT is similar to the U-COFT in many aspects, there are certain major differences. These vary from the method of instruction to differences in the physical layout of the trainer itself and procedures to be followed in placing the trainer in operation.

Physical Description of the U-COFT

The U-COFT is a stand alone shelter for individual crew gunnery training. It has several functionally distinct components. One section contains computers that provide exercise scenarios and store and manage data. A briefing area provides remote monitors so crews awaiting training can watch others fire. An individual crew station replicates the commander and gunner's positions, and with a very few exceptions, is identical in appearance and function to the BFV turret. The IO sits at an instructor/operator station (the IOS or IO station) to

conduct training. The IOS has two color monitors which replicate what the commander and gunner see in their sights and a situation monitor which indicates upcoming targets and locations. A keyboard and terminal printer enable access to the system and data entry.

Physical Description of the I-COFT

The I-COFT is a set of four unsheltered U-COFTs linked together. I-COFTs are housed inside of buildings especially configured to maximize I-COFT training efficiency. The four I-COFT crew stations and IO stations can be separated from each other by curtains; a large computer area is located at each end of the training area. The I-COFT has no remote viewing area; students monitoring I-COFT training watch the IO's monitors, and listen through headsets attached to his console. A crew command input device (CCID) driver control panel simulates limited driving activity. Additionally, student help and student response buttons are located in the turret to facilitate basic gunnery training. The I-COFT, unlike the U-COFT, has a voice generating system (VGS) which permits the computer to serve as synthetic commander in some POIs. Although each I-COFT can operate independently of the other three, there are mechanisms by which two or more I-COFTs can be connected.

Critical Differences Between U-COFTs and I-COFTs

Because of the variance in physical construction between the two systems, some of the major differences between the U-COFT and I-COFT impact on the IO and the procedures he follows during daily operations. For example, there are critical procedural differences in the before-operation preconditioning checks. The U-COFT's three major sections are connected by air bags which insure the integrity of the climate controlled system. Each day the IO must check the externally located U-COFT air bags to insure that they are intact and without damage. He must also insure that the five air conditioning units located in each U-COFT are in operation. Each individual air conditioner must be checked for temperature setting, function, air flow, and water level. None of these procedures is necessary in the I-COFT since it is housed inside of a climate controlled building with central air conditioning.

In readying the U-COFT for daily training, the IO must check to insure that shelter lightning rods are in place, that exterior power cables are connected, etc. Before training he must insure all four of the shelter doors are unlocked to provide access and emergency exit. These procedures are not necessary in the I-COFT. Power up and power down procedures differ, as do the procedures to be followed in recovery training capability after a catastrophic power failure.

The Problem

The Bradley Instructor Detachment (BID) at Fort Benning, the primary trainer for BFV personnel, not only trains students to be gunners and commanders, but through the COFT Branch, trains COFT IOs and senior instructor operators (SIOs). The IO operates and maintains the COFT, and provides training for his unit. The SIO is responsible for a unit's overall COFT program, and for the training and monitoring of other IOs. Initial IO training is provided by a 46 hour exportable package at Fort Benning, in units, or as a part of a unit's new equipment training (NET). Master gunner students, already IO qualified, receive SIO training as a part of their POI.

In the past, IO and SIO training were provided at Fort Benning using both the I-COFT and U-COFT. In 1988, however, the 29th Infantry Regiment, of which the BID and COFT Branch are a part, moved to a new location. The U-COFTs are no longer available, as all institutional COFT training has been transferred to 24 I-COFT stations. Gunnery training is unaffected because the I-COFT can be used in a U-COFT mode. However, loss of the U-COFT impacts on the ability to provide adequate IO and SIO training.

Since IO students who train on the I-COFT at Fort Benning will be using the U-COFT to train gunners when they return to their units, they need to become familiar with U-COFT-specific procedures. The physical differences between the two trainers, the procedural changes and the unavailability of the U-COFT have made some documentation of these differences necessary.

Accordingly, the COFT Branch requested that the Army Research Institute (ARI) create a videotape highlighting U-COFT procedures for IO and SIO students who receive their training on I-COFTs. Newly certified IOs and SIOs returning to their units and U-COFTs can then practice and be tested on the actual procedures with which they were only familiarized during their institutional training.

PROCEDURE

A preliminary videotape outline was written, based on the correct U-COFT procedures as detailed in the U-COFT Operator's Manual, TM 9-6920-737-10 (Department of the Army, 1985, 1987). (See Appendix A for the procedures.) Over the course of a week, ARI and BID COFT personnel used two video cameras to film specific U-COFT procedures both outside and within one of the old U-COFT shelters. Taping was done with COFT IOs performing the correct procedures and another IO monitored all filming to insure correct sequences. Filming was done on a real time basis, although the final tape was slightly edited. Based on the

outline, a narration was written to go along with the visual scenes. (See Appendix B for the actual script.)

RESULTS AND DISCUSSION

The finished product, "U-COFT Procedures" consists of three short videotape segments: "Preconditioning Checks", "Power Up/Power Down" and "Recovery from Catastrophic Power Failure." The films have been provided to the Bradley COFT Branch for use in IO and SIO training. They provide a short, systematic and standardized introduction to some U-COFT procedures in the absence of the actual device. Intended to supplement the existing written I-COFT training materials, the tape was designed in segments with three natural stopping points for teaching specific techniques according to their place in the POI.

The narration describes the visually pictured computer shelter, the crew briefing/monitoring area, and the instructor operator station, delineating operator functions and daily procedures. Exterior shots walk the viewer around the outside of a U-COFT shelter, with the narration describing the IO's behavior as he performs each of the required daily checks before entering the shelter. Interior shots of the U-COFT show the locations and servicing of the air conditioners, and show the equipment which the IO must operate. The computer area and switches are shown in detail, along with the procedures for putting them into operation or shutting them down. In sum, the film documents the IO procedures which are required in the U-COFT but absent from the I-COFT.

CONCLUSIONS

Although a videotape cannot substitute for hands on experience with the U-COFT, and IOs must be thoroughly checked out on U-COFT procedures when they return to their units, the tape serves a useful purpose within Bradley training. First, it enables the institution to make use of a no longer available resource, the U-COFT. Second, it provides a standardized familiarization lesson to prepare novice IOs for what to expect when they arrive at their units and are ready to work with the U-COFT. The videotape presentation medium reduces potential errors, the quality of instruction is maintained, and BFV IOs will be better prepared to use their most valuable gunnery device, the Conduct of Fire Trainer.

REFERENCE

Department of the Army. (1985, October, with Change 1, January, 1987). Operator's manual Trainer, Unit Conduct of Fire (U-COFT) M2/M3 Fighting Vehicles (sheltered) (Technical Manual 9-6920-737-10). Washington, DC: Author.

APPENDIX A

VIDEOTAPE OUTLINE
BASED ON U-COFT OPERATOR'S MANUAL, TM9-6920-737-10

PRECONDITION CHECKS

OUTSIDE THE SHELTER

1. Walk around the shelter and ensure that the lightning rods
are not broken or touching the shelter, and are grounded.

2. Check to ensure that air conditioner maintenance switches are
set to the ON position. Check airflow bags and check power
cables from the source to the shelter.

3. Open the trainer shelter door vent.

4. Check all shelter doors to make sure they are not locked from
the outside; unlock as necessary.

5. Open door and without entering, locate fire protection panel
inside and make sure that the AC ON indicator lamp is green, and
that the four remaining indicators are off. If the green lamp is
not lit, or any other lamp is on, do not enter the shelter;
notify organizational maintenance.

INSIDE THE SHELTER

1. Enter shelter and turn on light in integration shelter.

2. Remove pin from integration shelter door and turn on light at
computer shelter. (Turn on other lights and remove pins from
other doors as needed.) In the computer shelter at the AC power
line protection panel observe that the three green indicator
lamps are lit. If any one of the lamps is off, leave the shelter
and notify organizational maintenance.

3. Locate the three emergency lights (one in each shelter) and
make sure the toggle switch on each light is set to the ON
position, and the red indicator lamp is on. If the red
indicator lamp is not on, notify organizational maintenance.

4. Press the PUSH-TO-TEST button on each light and ensure that
the emergency lights go on while the button is held.

5. Locate each of the five air conditioners and ensure that each
is set to 72 degrees. Set the air conditioner mode select switch
according to the chart on page 2-121 in the -10. Feel to make

sure air is blowing from the upper louvers on the air
conditioner. If air is not blowing, notify organizational
maintenance. Check humidifier tank water level windows to ensure
tanks are full. If any are not full, fill at this time.

POWER-UP PROCEDURES

1. Check temperature/humidity indicator in computer shelter.

2. In trainer shelter, at terminal printer set ON/OFF rocker switch to ON and observe that ON-LINE indicator lamp lights above keyboard. If lamp does not light, press LINE LOCAL key.

3. In computer shelter at GPC main cabinet control panel set keyswitch to LOCAL position. Observe POWER indicator lamp lights green and ATTN indicator lamp lights red.

4. In trainer shelter at terminal printer observe printed message ending with prompt ">>>".

5. At terminal printer press "H" key on keyboard and observe that H appears after prompt. Press RETURN key on keyboard and observe printed message.

6. At terminal printer press "I" key on keyboard and observe that I is printed. Press RETURN key and observe printed message.

7. At terminal printer press "U" key on keyboard and observe that U is printed. Press RETURN key and observe no new message.

8. In computer shelter at disk drive control panel, make sure that only the A pushbutton indicator is depressed, then press and release RUN/STOP pushbutton indicator.

9. Observe that RUN/STOP pushbutton indicator lights, and after a short (1 minute) delay, READY indicator lamp lights. If lamps do not light or if FAULT pushbutton indicator lights, notify organizational maintenance.

10. In trainer shelter, at terminal printer, press B key and observe that B is printed. Press the RETURN key and observe printed message. Wait for four beeps (about 2 minutes).

11. In computer shelter at GPC main cabinet control panel press AUTO RESTART rocker switch to ON position.

12. Set keyswitch to LOCAL DISABLE position.

13. At SPC power management panel make sure that 208 VAC AVAILABLE indicator lamp is lit.

14. Set AC main power circuit breaker to ON and observe AC MAIN POWER INDICATOR lamp lights. Make sure that ten DC POWER SUPPLIES ON indicator lamps light.

15. In trainer shelter at IOS power panel make sure the six SPC DC POWER SUPPLIES ON indicator lamps light.

16. Make sure that main power 208 VAC AVAILABLE indicator lamp is lit.

17. Set main power circuit breaker to ON and make sure that AC ON indicator lamp and nine DC POWER SUPPLIES ON indicator lamps light.

18. Set crew station auxiliary equipment circuit breaker to ON and make sure that the AC ON indicator lamp and four DC POWER SUPPLIES ON indicator lamps light.

19. Set CFP/ISUW circuit breaker to ON and make sure AC ON indicator lamp lights.

20. At commander's and gunner's 19-inch color monitors press both power pushbutton switches and observe background color on the screens after a brief warmup. If screens do not light up, notify organizational maintenance. Adjust contrast or brightness as necessary; clean screens as necessary.

21. At commander's and gunner's color monitors press in each DEGAUSS button and hold for 10 seconds.

22. At the top front of crew station locate DEGAUSS levers. Pull each lever and hold for 10 seconds.

23. At communication panel make sure that monitor assignment switch is set to NORMAL position.

24. In integration shelter at remote monitor station cabinet note that the POWER AC AVAILABLE indicator is lit.

25. Position the power ON-OFF circuit breaker to the ON position and observe that the POWER ON indicator lights.

26. At the commander's and gunner's 19-inch color monitors press the power ON-OFF switch and observe that background color appears following a brief warm up.

27. At the 12-inch monochrome monitor set the ON-OFF rocker switch to ON and observe that screen brightens after a brief warm up.

28. Perform user log on procedures.

POWER DOWN PROCEDURES

1. Make sure user log off procedures have been performed.

2. In trainer shelter at instructor operator station display terminal keyboard press RETURN key and observe "username" prompt appears on the display. Using the keyboard, type shutdown and observe that it appears on the display after the "username" prompt.

3. Press RETURN key on keyboard and observe "password" prompt appears on the display. Type in your password, press RETURN key and observe message "Are you certain you wish to continue?" Press Y on keyboard and observe that Y appears after prompt. Press RETURN key and observe message on display.

4. At terminal printer wait for printer message.

5. In computer shelter at GPC control panel, set keyswitch to LOCAL position.

6. In trainer shelter at terminal printer keyboard while pressing and holding CRTL key, press "P" key; then release both keys and observe prompt ">>>" is printed.

7. Press H key, then RETURN key and observe printed message.

8. In computer shelter at GPC control panel observe that ATTN indicator lamp lights red and RUN indicator light goes off.

9. In trainer shelter at terminal printer, press "I" key and observe that I is printed. Press RETURN key and observe printed message.

10. In the trainer shelter at terminal printer set ON-OFF rocker switch to OFF.

11. At IOS commander's and gunner's color monitors, press both POWER pushbutton switches.

12. At IOS power panel set circuit breakers to OFF and turn ISU/CR/ASU keyswitch to off.

13. In computer shelter at disk drive, press and release RUN/STOP pushbutton indicator and observe READY indicator lamp goes off. Observe the RUN/STOP pushbutton indicator lamp goes out after about 30 seconds.

14. At the GPC control panel turn keyswitch to OFF position (fully counterclockwise) and observe that the panel lights go OFF.

15. Press AUTO RESTART rocker switch to OFF position.

16. At SPC power management panel set AC MAIN POWER circuit breaker to OFF.

17. In integration shelter at RMS commander's and gunner's monitors, press and release both POWER pushbutton switches.

18. At RMS 12-inch monitor set ON-OFF rocker switch to OFF.

19. At RMS audio/amp power panel set power circuit breaker to OFF.

20. At electronics power distribution panel set the seven subcircuit breakers to OFF and the MAIN circuit breaker to OFF.

RECOVERY FROM CATASTROPHIC POWER FAILURE

1. When power fails, exit the crew from the shelter.

2. When power is restored, ensure that three green indicator lamps are ON at AC power line protection panel in computer shelter.

3. In computer shelter at the utility power distribution panel set all ten subcircuit breakers to OFF position.

4. Reset main circuit breaker to ON by pulling down to OFF, then up to ON. Set all ten subcircuit breakers to the ON position one at a time. Close panel door.

5. In the integration shelter at the utility power distribution panel reset main circuit breaker by pulling down to OFF, then up to ON. Close panel door.

6. In the trainer shelter, ensure SYSTEM TROUBLE indicator and audible alarm are off. Ensure AC indicator light is green.

7. In the computer shelter at the electronic power distribution panel ensure all seven subcircuit breakers are set to OFF position. Ensure main circuit breaker is set to OFF position.

8. At the SPC, ensure AC main power switch is set to OFF.

9. At the GPC, ensure key is set to OFF position and AUTO RESTART switch is set to OFF position.

10. At the disk drive, ensure RUN/STOP switch is OFF.

11. In the integration shelter at the remote monitor station set main power switch to OFF and remote monitor power switches to OFF position.

12. In the integration shelter set the 12-inch monitor ON/OFF rocker switch to OFF position.

13. In the trainer shelter ensure terminal printer ON/OFF rocker switch is set to OFF position.

14. At the IOS panel ensure four circuit breakers and keyswitch are set to OFF position.

15. In the computer shelter at the electronic power distribution panel reset the main circuit breaker to ON and then the seven subcircuit breakers to the ON position one at a time.

16. Perform power-up procedures.

APPENDIX B

I/O PROCEDURES FILM - SCRIPT

PRECONDITIONING CHECKS

The IO unlocks shelter door.

Checks air bags for proper flow of air. Checks lightening rods
for proper grounding. Ensures that all maintenance switches are
set to on. Opens trainer shelter door vent. Check power cables
for proper connection.

Open shelter door and make sure the fire protection panel green
light is lit.

Turn on all shelter lights. Check all emergency lights by
pushing the press to test button.

Check all five air conditioners. Set MODE SELECTOR on each air
conditioner control panel. Set TEMPERATURE CONTROL on air
conditioner to 72 degrees F. Feel to make sure air is blowing
from upper louvers. Check HUMIDIFIER TANK WATER LEVEL window and
fill if necessary.

Un-pins all shelter doors.

POWER UP

Observe the HYGROMETER/THERMOMETER in the computer shelter.

In the trainer shelter turn on terminal printer.

In the computer shelter set circuit breaker on SPC to ON position.

At GPC make sure AUTO RESTART is off, set key switch to LOCAL position and make sure ATTENTION indicator light is on.

At disk drive check that only the "A" push button is depressed. Press and release RUN/STOP push button. Make sure after one minute the READY indicator lamp lights.

In the trainer shelter at IOS power panel set main power to ON, the key switch, crew station, commander's forward periscope and ISU window to ON.

Press power switches on commander and gunner's 19" monitors, and wait for screens to warm up. After warm up, degauss for a period of 7 to 10 seconds.

Check that MONITOR ASSIGNMENT switch is set to NORMAL.

Degauss monitors on crew station for a period of 7 to 10 seconds and check that all power is on.

In the trainer shelter, at terminal printer, observe printed message. Press appropriate keys on printer keyboard. At IOS display terminal, observe message appears after 2 minutes.

Move to computer shelter. At the GPC, turn keyswitch to LOCAL DISABLE.

In the integration shelter at the remote monitor station turn on POWER. Turn commander's and gunner's 19" color monitors and remote monitor to ON. After warm up, degauss for 7 - 10 seconds.

POWER DOWN

In the computer shelter at the GPC, set keyswitch to LOCAL position.

In the trainer shelter at IOS display terminal keyboard, perform the usual log off procedures. At Terminal Printer press appropriate keys and observe printed messages. Turn printer to OFF.

At the IOS turn the commander and gunner color monitors to OFF. Turn off the crew station, the ISU commander relay, keyswitch, and main circuit breaker to OFF.

In the computer shelter at disk drive, push RUN/STOP button and observe READY light goes off.

At the GPC turn keyswitch to OFF.

At the SPC, set POWER panel main power circuit breaker to OFF.

In the integration shelter, turn off the remote monitor station, the commander's and gunner's 19" monitors and turn the remote audio power switch to OFF.

RECOVERY FROM CATASTROPHIC POWER FAILURE

If the power fails, the crew exits the shelter quickly.

The IO goes in the computer shelter and insures the green AC power protection panel lights are lit.

Opens the utility power panel and turns the ten switches to OFF and resets the main circuit breaker and the ten switches to ON.

In the integration shelter at the utility power panel resets main circuit breaker to ON.

In trainer shelter at the fire control panel, insure SYSTEM TROUBLE and audible alarm are off and AC lights green.

In the computer shelter opens door of electronic power distribution panel and makes sure main circuit breaker and seven circuit breakers are set to OFF.

At the SPC sets AC MAIN POWER circuit breaker to OFF.

At the GPC make sure the keyswitch and AUTO RESTART rocker switch are set to OFF.

At the disk drive, push the RUN/STOP power button to STOP.

Turn off audible power, commander, gunner and remote monitors.

In trainer shelter turn off terminal printer.

At the IOS power panel, set all circuit breakers, keyswitches and commander and gunner's monitors to OFF.

In computer shelter, at electronic power distribution panel set main circuit breaker to ON and sub circuit breakers to ON and perform POWER UP procedures.