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TEST EVALUATION PLAN (TEP)

FOR THE

CONCEPT EVALUATION PROGRAM (CEP)

OF THE

POCKET RADIAC (AN/UDR-13)

March 1991

By

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CHAPTER 1 INTRODUCTION

1.1 Purpose

To assess the operational suitability and technical effectiveness of the Pocket RADIAC (AN/UDR-13). Data derived from this Concept Evaluation Program (CEP) will be used as input to support the TRADOC position at the Milestone I/II In Process Review (IPR) for a decision on continued development. The CEP will provide the user with an early look, hands-on evaluation of the PR system. The CEP will utilize personnel, equipment, facilities, and training and current and emerging doctrine to provide data and information on the operational suitability of the PR system. The CEP will be used to help identify enhancements in MANPRINT (doctrine, training, and organization) that may assist in improving and extending the operational effectiveness and efficiency of personnel when operating in a nuclear environment. The CEP will also be used to have an early look at the degradation of personnel effectiveness, when dressed in MOPP4, in relation to mission performance when operating in a nuclear environment.

1.2 Scope

1.2.1 The Materiel Branch, Test and Evaluation Division, Directorate of Combat Developments, U.S. Army Chemical School, Fort McClellan, Alabama will direct this CEP at Fort McClellan, Alabama, during the period of 8 - 12 April 1991, using personnel assigned to units at Fort McClellan, AL. Test players will be of the type and qualifications of those expected to operate and maintain the system when deployed.

1.2.2 The PR operational concept calls for three major missions; pre-nuclear weapons employment, nuclear weapons employment, and dosimetry. Pre-nuclear and nuclear weapons employment missions are characterized by two tasks; ground survey and radiation monitoring. Nuclear dosimeters are the only continuously active component(s) for missions with the PR. The maximum mission duration shall be 168 hours for wartime and 72 hours for peacetime.

1.2.3 The PR will be deployed as a replacement for, or augmentation to, the currently fielded Pocket Dosimeter (IM-93) with Dosimeter Charger (PP-1578/UD) and other point source and area monitoring radiological survey meters. The mission essential functions of the PR are to detect and measure neutron and gamma radiation dose, and radioactive contamination and ambient dose rate. In addition, the PR shall alarm and alert the

user at one dose level and one dose rate level; a preset 1 cGy/hour default level which can be reset by the operator and a user selected total dose level. The PR shall also function as a dosimetry instrument. Mission duration and system functioning will be dependent upon mission to be performed.

1.2.4 The CEP will consist of a receipt inspection, preoperational inspection, player training, pilot testing, and record testing to provide information regarding operational issues concerning personnel training requirements and operational performance, limited reliability, availability, and maintainability (RAM), and limited logistics supportability of the PR.

1.3 Background

1.3.1 The Combat Support Nuclear, Biological, and Chemical Mission Area Development Plan Update (U), (CSNBCMADP), SECRET, Oct 84, Chapter 1, identified several deficiencies in detection of radiation from nuclear weapons, deficiencies which severely impact on the survivability and mobility of ground forces. The PR is expected to meet the majority of stated requirements while minimizing equipment size and weight burden to the soldier. The PR may greatly improve a unit's ability to survive and sustain effective combat operations in a nuclear environment.

1.3.2 Subsequently, the approved PR program strategy was to type classify (TC) an item out of advanced development (AD). This was to be followed by a preplanned product improvement (P^3I) program. The TC decision was scheduled for fourth quarter FY 91 and the P^3I was scheduled to be completed in FY 93. Technical issues identified in the Critical Design Review (CDR), 14 Jul 89, indicated an incompatibility with continuing all necessary work while at the same time trying to complete a competitive technical data package (TDP) required to TC a PR in accordance with this schedule. The Special In Process Review (SIPR) conducted 28 Sep 89, indicated that the production funding for the PR has been moved to FY 94. If TC of the PR were to occur, and an item was available for production in FY 92, it could not be produced.

1.3.3 A new two-phase strategy was proposed at the SIPR to alleviate these programmatic problems. The new strategy calls for a Concept Evaluation Program (CEP) to be conducted in second quarter FY 91 (2QFY91) and the Advanced Development (AD) phase to be completed with an In Process Review Milestone (MS) I/II in fourth quarter FY 91 (4QFY91).

a. During the AD phase, technical issues identified in the CDR will be resolved. The AD phase will be followed by a full scale development (FSD) phase.

b. During FSD, the design was to be finalized (to include the P3I requirements), formal testing was to have been completed, and a competitive TDP prepared. (The requirement for the P3I has subsequently been deleted from the acquisition process).

1.3.4 The MS III/TC is scheduled for first quarter FY 95 (1QFY95).

1.3.5 The authority for the conduct of this CEP, the Resume Sheet, is contained in Appendix A.

1.3.6 The USACMLS Critical Operational Issues and Criteria (COIC) establishing the issues and criteria to be used in the conduct of this CEP were approved and distributed 8 February 1990.

1.4 System Description

The pocket RADIAC (PR) consists of nuclear sensors in a small, compact, lightweight unit that will detect and measure initial radiation in terms of total dose (both neutron and gamma radiation) resulting from a nuclear detonation.* It will also measure both total dose and dose rate from neutron induced gamma radiation at and immediately adjacent to ground zero, and total dose and dose rate gamma radiation resulting from nuclear fallout. The data obtained in the initial radiation, the

neutron induced radiation, and the fallout will be provided on demand in a digital display. A visual and an optional audible alarm will alert the user at a default dose rate level of 1 cGy/hour. This alarm is resettable by the operator at a higher default dose rate level when desired. When the PR is turned off and turned on again, the default dose rate automatically returns to the PR preset default dose rate level of 1 cGy. The device will be approximately 15 cu inches and will weigh no more than 400 grams (14.08 oz/.88 lbs). The PR will be designed with a microprocessor and on-board memory. Some of the features will include a self test mode, temperature compensation, statistical calculations, and many other software capabilities including overrange indicator, visual and audible alarms. The PR will be small in size and light enough to be carried in the chest pocket of the Army Battle Dress Uniform (BDU) or elsewhere on personnel that allows for hands free operation. The PR shall be powered by an internal battery which is readily accessible for easy replacement via a removable screw-out cap by the lowest level of maintenance. The PR component that will supply the power will be standard Army battery(ies) in accordance with AMC Reg 700-83. The PR will replace or complement the IM-93/PD tactical personnel dosimeter and PP-1578/UD charger and will complement existing standard U.S. Army tactical ground survey and monitoring instruments. The PR will be electromagnetically compatible with sensitive electronic equipment with which it may be collocated on the battlefield. The PR will be capable of operating in all

types of weather and terrain, to include the extremely cold environment found in the northern latitudes, and in U.S. Army aircraft at altitudes the aircraft will be expected to operate without cabin pressurization. The PR will be utilized by squad leaders, vehicle operators, aircrew members, and others for determining dose and dose rate measurements.

NOTE: (*) Initial nuclear radiation is defined as that radiation which is emitted from a nuclear detonation and will continue to be emitted for up to one minute following detonation. Radiation of interest will be limited to neutron and gamma from the initial nuclear detonation.

1.5 Critical Operational Issues and Criteria (COIC). COIC have been extracted from approved Memorandum, USACMLS, ATZN-CM-CT, Subject: Approved Critical Operational Issues and Criteria (COIC) for the Pocket RADIAC (PR), 8 February 1990.

1.5.1 Issue. Does the Pocket RADIAC (PR) satisfy its nuclear radiation detection mission when operated by user personnel in an operational environment?

1.5.1.1 Criteria.

1.5.1.1.1 The PR will detect and measure gamma and neutron radiation, (within specified levels and within specified energy ranges).

1.5.1.1.2 The PR will be able to detect and measure gamma dose from 1 cGy to 1000 cGy and dose rate from nuclear fallout, from 0.1 cGy/hour to 1000 cGy/hour.

1.5.1.1.3 The PR will detect and measure gamma dose and neutron dose from nuclear bursts, from 1 cGy to 1000 cGy, (2000 cGy is desirable).

1.5.1.1.4 The PR will be able to respond and rapidly record/display changes in radiation dose and/or dose rates.

1.5.1.1.5 The PR will be capable of storage, transportation, and operation in climatic categories severe cold through hot as defined in AR 70-38 and specified in the requirement documents.

1.5.2 Issue. Is the PR survivable/vulnerable when operating in the threat environment?

1.5.2.1 Criteria.

1.5.2.1.1 The PR will remain fully operational after exposure to high altitude electromagnetic pulse (HAEMP) and nuclear weapons effects (NWE).

1.5.2.1.2 The PR detection and measuring capabilities will not be degraded by electromagnetic interference (EMI) caused by friendly/enemy communication transmissions.

1.5.2.1.3 The PR will be NBC contamination survivable, as defined in AR 70-71 and the USANCA implementing letter, Feb 89.

1.5.2.1.4 The PR will remain fully operational after exposure to levels of initial nuclear radiation, air blast, and thermal radiation that personnel are expected to survive.

1.5.3 Issue. Is the PR operationally suitable for support of field operations (monitoring and surveys) when employing existing Doctrine, MANPRINT, and Logistics Support Concepts?

1.5.3.1 Criteria.

1.5.3.1.1 The operational wartime availability of the PR will be at least 89 percent.

1.5.3.1.2 The PR will demonstrate the following operational RAM requirements at the 90 percent lower confidence level:

a. RELIABILITY - 510 Hours MTBOMF

b. MAINTAINABILITY - .004 MMH/Operating Hour

c. MAINTENANCE RATIO - (Intermediate/General Support)

1.5.3.1.3 The PR will perform all of it's operational missions in any mode (ground, vehicle, aircraft) when operated under current and developmental tactics and doctrine.

1.5.3.1.4 The PR will not pose any uncontrolled safety or health hazard to the operator and/or maintainer.

1.5.3.1.5 The PR will not require additional manpower or equipment authorization be added to the current force structure.

1.5.4 Issue. Can the present Logistics System support the PR?

1.5.4.1 Criteria.

1.5.4.1.1 The PR will be modular in design to ease removal/replacement of parts by maintenance personnel.

1.5.4.1.2 No special tools, not commonly available in any maintenance or repair facilities, shall be required for disassembly or assembly of the system.

1.5.4.1.3 Checking the calibration of the system shall be accomplished using the AN/UDM-2 RADIAC check source, (or other standard RADIAC calibrator, UDM-1A, etc).

1.5.4.1.4 The PR shall be capable of being maintained/repaired at all support levels without requiring additional personnel or personnel with special skills.

1.5.4.1.5 The PR will be logistically supportable by existing maintenance and supply systems.

1.6 Projected Threat

The Soviet forces reflect the Soviet leadership's belief that they can fight and win a war waged under conditions that include the employment of nuclear weapons. Accordingly, a variety of nuclear delivery systems are organic to Soviet forces, even at the division level, improving their capability for waging theater nuclear warfare. In addition, other countries are seeking a nuclear capability; within the next 10 - 15 years some third world countries may adopt doctrine, training, and equipment similar to the Soviets. Nuclear delivery systems available include aircraft, surface-to-surface guided missiles, free-flight rockets, and artillery howitzers, and guns. The initial nuclear strike will be accomplished suddenly throughout the depth of the enemy's combat deployment and in coordination with non-nuclear fires. Nuclear fires will be employed to support the main attack while other fire support means support secondary or supporting attacks. The threat to the Pocket RADIAC will be direct and indirect fires and Radio Electronic Combat (REC) affecting the

operational capability of the system. The direct fire threat will be minimal due to the size and location of the system on the battlefield. Enemy forces have, and plan to use an abundance of artillery, multiple rocket launchers, air-to-surface and surface-to-surface missile systems which will enhance the threat. If in a vehicle, damage or destruction of the vehicle may render the PR inoperable as well. Any solid state electronic components are subject to the effects of electromagnetic pulse (EMP). The PR is not expected to cause the Soviets to alter their nuclear warfare doctrine, training, or equipment. Detailed information can be found in the RDI STAR dated 1 March 1990. Information cutoff date is 15 May 1990.

1.7 Proponent concerns and additional issues for test.

1.7.1 Proponent Concerns

a. The Draft ROC expresses a desire that the PR be developed to be a throw away item if not cost prohibitive. A determination on the concept of repairability versus throw away design will be based upon the final analysis of the Level of Repair Analysis (LORA). The PR to be evaluated during the CEP was not designed to be maintainable. Further development of the PR in the ED phase may produce the desired non-maintainable, throw away item.

b. The PR does not readily lend itself to operational testing in all modes for which it is designed. Since the PR will

not be subjected to radiation sources in a field environment during the CEP test, monitoring and survey readings will be conducted in a laboratory environment and dosimeter readings (total dose) will be by laboratory simulation during the CEP. Operator and PR interface during the CEP will be operationally restricted to physically monitoring low level radiation in a laboratory environment, monitoring higher levels of radiation through television or binocular assistance from radiation safe distances, and reading of pre-dosed dosimeter readings when outside the laboratory.

1.7.2 Additional Issues for the Test.

1.7.2.1 Does the PR pose any operator or equipment compatability restrictions when carried in the breast pocket of the Battle Dress Uniform (BDU) or Chemical Protective Overgarment (CPO) and employed by user personnel in an operational environment?

1.8 Test and Evaluation Milestones

ACTIVITY	SOURCE	MILESTONE DATE
Critical Operational Issues and Criteria (COIC) Approved	USACMLS	Jan 90
Test and Evaluation Master Plan (TEMP) Approved	PMNBCDS	Jul 90
Concept Evaluation Program (CEP) Resume Sheet Submitted to TRADOC	USACMLS	Jul 90
Concept Evaluation Program (CEP) Resume Sheet Approved by TRADOC	USATRADOC	Sep 90
Draft Required Operational Capability (ROC) Submitted	USACMLS	Nov 90
Required Operational Capability (ROC) Approved	USATRADOC	Jan 91
Test Evaluation Plan (TEP) (Draft) Submitted	USACMLS	Jan 91
Doctrinal and Organizational and Threat Test Support Package (TSP)(Draft) Submitted	USACMLS	Jan 91
Training Test Support Package (TTSP) Submitted (Draft)	USACECOM/ USACMLS	Feb 91
Doctrinal and Organizational and Threat Test Support Package (TSP) Approved	USACMLS	Feb 91
Training Test Support Package (TTSP) Approved	USACECOM/ USACMLS	Feb 91
Test Evaluation Plan (TEP) Approved	TEXCOM	Feb 91
Test Items Due	USACECOM	Feb 91
Safety Release Received	USATECOM	Feb 91
Readiness For Test Review (RFTR) (Fort McClellan Assets Only)	USACMLS	Mar 91
CEP Initiated	USACMLS	Apr 91
CEP Completed	USACMLS	Apr 91

1.8 Test and Evaluation Milestones (Continued)

ACTIVITY	SOURCE	MILESTONE DATE
Final Test Report Approved	USACMLS	May 91
Proponent Evaluation Approved	USACMLS	Jul 91
In Process Review (IPR) MS I/II		Sep 91

CHAPTER 2 TEST DESIGN

2.1 Test Concept

2.1.1 Introduction

2.1.1.1 The USACMLS test directorate will perform a preoperational inspection of the test items, the system support package, the various test support packages, and the materiel developer's (MATDEV) operational test readiness statement (OTRS). When all the inspected items are judged to be satisfactory, record testing may be initiated. If items to be tested are judged to be unsatisfactory, record testing will be suspended until corrective actions eliminate any unsatisfactory items or conditions. If record testing has commenced and unsatisfactory items or conditions surface which cannot be corrected, record testing will cease and the CEP will be terminated. Data to date will be consolidated, analysis will be conducted, reports will be written, and cause(s) for CEP termination will be fully addressed.

2.1.1.2 The USACMLS will present training to operators of the Pocket RADIAC. Prior to the start of training, the test directorate will receive, review, and disseminate the TECOM safety release. At the conclusion of training, the USACMLS will issue, a trainer's Operational Test Readinesss Statement (OTRS).

2.1.1.3 The test directorate will direct pilot tests, as necessary, following training to ensure that test players understand the operational use of the PR and that data collectors can gather the required data.

2.1.1.4 Record testing will consist of soldiers using the PR to verify that the soldier is able to properly operate and read the PR functions while dressed in mission oriented protective posture (MOPP) up to and including MOPP4 and to successfully translate that information on to data collection forms and/or pass that information correctly via FONECON or radio transmission.

2.1.1.5 The PR will be located at squad level and operated by a military occupational specialty (MOS) immaterial assigned operator. The Chemical Operations Specialist (MOS 54B) will be responsible for supervising and teaching the use of the PR within a company, rather than the operation of the PR. Because of an increasing workload on the 54B, the various geographically separated locations, and immediacy of information that the PR will deliver for the commander's real time use, the PR will be assigned to a squad member who will be responsible for its operation and reporting and recording of information. The unit standing operations procedures (SOP) will dictate how the information regarding dose rate(s) and total dose (accumulated) is maintained.

2.1.1.6 Only one system design (manufacturer) will be evaluated during this CEP. The PR performance will be compared to standards established in the Required Operational Capability (ROC). Operational suitability and effectiveness will be evaluated using the issues and criteria extracted from the USACMLS approved COIC. PR mission employment requirements will be in consonance with the current and emerging monitoring and survey doctrine contained in the approved Doctrinal and Organizational and Threat Test Support Package (TSP). Subsequent paragraphs contain methodologies, data requirements, and data reduction and analysis procedures for the issues and criteria grouped into the following areas: Training, Operational Performance, limited RAM, and limited Logistics Supportability.

2.1.1.7 The environmental and energy impacts of this CEP are not considered to be significant.

2.1.2 Tactical context

2.1.2.1 Scenario. Test players will respond to fragmentary orders (FRAGO) to simulated survey and monitoring requirements. The PR will be previously "dosed" by the USACMLS Radiation Laboratory to depict that the wearer has actually entered a radiological hazard environment (survey) or has been exposed to the initial effects of a nuclear detonation (monitoring). All radiation exposure will be confined to the

interior limits of the USACMLS Radiation Laboratory located in Sibert Hall, Building 1081. The PR radiation exposure (dose and/or dose rate) reading will be read by the PR monitor and passed by the PR monitor at the time and location and by the means designated in the FRAGO.

2.1.2.2 Environment. The environment will be that of Fort McClellan, Alabama in April. The terrain consists of low rolling hills, sparse grassy conditions, with medium growth pine trees and hardwood trees. Temperature will be in the moderate range. from 35° Fahrenheit - 70° Fahrenheit. Historically, precipitation is light during March.

2.1.2.3 Threat. Enemy nuclear threat will be inferred by the radiation dose rate/dose encountered during the simulation. No simulated contact enemy threat will be depicted as part of the CEP scenario.

2.1.2.4 Tactics and doctrine. The CEP test scenario will not require a physical force-on-force tactical situation. Simulated PR nuclear and radiological monitoring and survey operations will be conducted in accordance with current doctrine which describes responsibilities, personnel, procedures, equipment, and material requirements. Monitoring and survey operations of field locations will be under simulated nuclear and radiological conditions. Monitoring and survey operations using radiation emitting sources will be conducted within the confines

of an approved, established Fort McClellan, Alabama radiation test facility. Only the PR will be exposed to the radiation source during Radiation Laboratory examination during this CEP. Exposure of the PR to the radiation source will be to examine the PR response to dose rate and total dose accumulation. There will be no exposure to any radiation source of USACMLS Radiation Laboratory personnel or to any CEP test player during the operational training phase. Currently approved radiation safe exposure limits and individual personnel safety procedures will govern all operations in which actual radiation sources are to be used.

2.1.3 Test phases

2.1.3.1 Training Phase. The training phase will be the first phase to occur. During this phase, Test players and data collectors will receive training. Test players will receive training on the PR by an instructor from the U.S. Army Chemical School, Fort McClellan, AL. Player training will consist of in-class instruction, hands-on training, and a Go/No Go test utilizing the PR training test support package (TTSP). Training of the test players will be certified by the USACMLS. Data collectors will receive training on data collection procedures and data collection forms. Data collection training will be conducted by the test directorate. All player training and data collector training will be completed in three days.

2.1.3.2 Pilot Test Phase. This phase will be an eight hour test in which the PR will be used by the test players. The test will include the response of test players conducting a simulated monitoring and survey of a specified site with a PR. This test will be conducted during daylight (normal duty) hours. The pilot test will be conducted once in MOPP ZERO and once in MOPP4. When worn, MOPP4 will be in effect for the entire operation beyond the identified initial point (IP).

2.1.3.3 Scenario Phase. This phase will consist of trials during day and night (night operations will be simulated). The scenario for each trial will be of the same type but may be varied from the Pilot Test.

2.1.4 Test Unit Configuration. The CEP test unit configuration will consist of a Test Directorate which will consist of personnel in grades and MOS and will be supported by equipment requirements listed in paragraph 2.1.4.1 below. CEP test player personnel will consist of 3 Chemical Operations noncommissioned officers, Grade E6/E7, Military Occupational Specialist (MOS) 54B and 15 Team Members, Grade E2/E4, MOS Immaterial. Since the appropriate number of test player personnel in MOS 54B may not be available during the CEP, test players in grade E6/E7, MOS Immaterial may be substituted. The test players will be separated into three test player groups of six test players each. Each test player group will consist of one NCO grade E6/E7 and five enlisted in grade E2/E4. Two of the

player groups will receive all necessary and designated player training to be presented by the USACMLS. The third player group will act as a Control Group. The purpose of the Control Group will be to provide a basis which may assist in determining the degree of complexity of operation that the PR may pose to the user in the field and to assist the MATDEV in providing user friendly data plate information on the operability of the PR. The Control Group will also provide the MATDEV with information on which the PR Operators Guide and other Technical Publications may be revised. The Control Group will not receive player training, but will rely on the individual test player's ability to gain operational capability with the PR through data plate information supplied and/or associated technical publication references.

2.1.4.1 Test Directorate (Control Section) Personnel and Equipment Requirements.

a. Personnel Requirements.

POSITION	GRADE	MOS	QTY	INCL DATES	SOURCE
Project Officer	Civ	NA	2	T-180/T+100	USACMLS
Project NCOIC	E7/E8	54B	1	T-15/T+90	USACMLS
ORSA/Analyst	GS12/13		1	T-5/T+100	USACMLS
Clerk Typist	GS03/04		1	T-5/T+90	USACMLS
Data Reducer	CIV		1	T-5/T+60	USACMLS
Data Collector	CIV		6	T-5/T+20	USACMLS
Instrumentation/Photo	CIV		1	T-5/T+20	Ft McClellan
Independent Eval	CIV		1	T-30/T+20	USACMLS
Medic	E3/E4	91B	1	T-0/T+15	Ft McClellan
Driver*	E3/E4	IMM	2	T-0/T+15	Ft McClellan

NOTE: Licensed for vehicles in 2.1.4.1b below.

b. Equipment Requirements:

TYPE	QTY	INCL DATES	SOURCE
Pocket RADIAC	15	T-15/T+20	EW/RSTA, CECOM
BA-5372/U Lithium Sulpher Dioxide Battery	45	T-15/T+20	EW/RSTA, CECOM
Binoculars	2	T-5/T-20	Ft McClellan
Stopwatches	6	T-0/T+20	Ft McClellan
Still Camera, 35MM	1	T-0/T+20	Ft McClellan
Video Camera & Monitor	1	T-0/T-20	Ft McClellan
Thermometer	1	T-0/T-20	Ft McClellan
Trk 2 1/2 T M35A2	1	T-0/T+20	Ft McClellan
Trk Cargo M1008A2	2	T-0/T+20	Ft McClellan

c. Facilities:

TYPE	INCL DATES	LOCATION
Radiation Laboratory	T-5/T+30	Ft McClellan

d. Ranges and Training Areas:

DESIGNATION	LOCATION (AREA/GRID COORDINATES)
To Be Determined	

2.1.4.2 Test Players

a. Personnel Requirements.

POSITION	GRADE	MOS	QTY	INCL DATES	SOURCE
Chemical NCO*	E6/E7	54B	3	T-0/T+20	USACMLS
Team Members	E2 E4	IMM	15	T-0/T+20	USACMLS

NOTE: Chemical NCO, E6/E7, MOS 54B may be substituted by MOS IMM if MOS 54B is not available.

b. Equipment Requirements.

TOE/CTA equipment for soldiers test players. This will include TA 50 to be worn or carried as may be directed by the test directorate and as may be required in accordance with local standing operating procedures (SOP) and safety regulations.

2.1.5 Test factors, conditions, and events

2.1.5.1 Factors and conditions

Factors	Control	Conditions
Light Conditions	Systematically varied	Day/Night (Simulated)
Nuclear Radiation	Systematically varied (None with personnel)	Laboratory MOPP ZERO thru MOPP4
Personnel	1 Cntl Gp/2 Test Gp	5th - 95th Percentile
Organization	As Described	Survey/Monitoring Tm
Doctrine	As Described	IAW TC, FM, and SOP
Logistics Support	As Required	Test Directorate/Post
Weather	Uncontrolled	As May Occur

2.1.5.2 Test events (matrices, number of events, sequencing)

2.1.5.2.1 Training.

a. Purpose.

(1) New Equipment Training. The New Equipment Training (NET) will be the first event to occur. The NET will be presented to USACMLS instructor key personnel (IKP) by the MATDEV (CECOM). The purpose of IKP training is to ensure that USACMLS personnel have the appropriate knowledge to train test players

(excluding the control group) in the proper operation and limited maintenance of the PR.

(2) Test Players. The purpose of training is to ensure that all test players (excluding the control group) are equipped with the skills and knowledge to properly care for, use, and operate the PR, locate radiological monitoring and survey locations through the use of contour maps and Military Grid Reference System, and read and report PR readings via telephonic communications or radio transmission.

(3) Data Collectors. The purpose of training of data collectors is to insure that data is collected systematically and uniformly throughout the CEP.

b. Events Matrix. None. IKP training will be conducted in accordance (IAW) with CECOM lesson plan and technical reference material. Test player training will be conducted IAW approved USACMLS TTSP and PR technical reference publication. Data collector training will be conducted by the test directorate and to the level determined to be necessary to assure the systematic and uniform collection of CEP data.

2.1.5.2.2 Pilot Test.

a. Purpose. The purpose of the pilot test is to verify the quality of training presented to the test players and test player

training retention. The pilot test will also be used to validate the data collection procedures, review safety considerations, and detect needed corrective action.

b. Methodology. A pilot test will be conducted prior to the start of the test. One day will be needed to validate the data collection procedures, to review any safety considerations, and to detect needed corrective action. A minimum of one trial in MOPP ZERO and one trial in MOPP4 will be completed during the pilot test. Any problems or discrepancies during the pilot test concerning data collection forms, publications, or equipment malfunctions will be corrected, if required, before testing.

c. Event Matrix. None. The pilot test will be IAW FRAGO directed and initiated by the test directorate.

d. Control Concepts. To ensure that required test events occur in situations that as realistically as possible depict tactical radiological survey and monitor missions. No force-on-force scenarios will be conducted, night evaluation will be simulated through operation within darkened areas, and field operations will be simulated.

e. Data Requirements. See Table 2-1-5. Pilot Test Data Requirements.

f. Data collection, Reduction and Analysis

(1) Data Collection. To collect data to assess the criterion of this paragraph, data collectors will complete all data collection forms and use all instrumentation which will be used in the operational performance portion of this test.

(2) Data Reduction. Problems will be noted and analyzed to determine adverse effects on test procedures. Required corrective action will be made before test initiation.

(3) Data Analysis. If no specific incidents or findings are observed during the pilot test which directly relate to the assessment of the PR, then the results or findings of this subtest will not be included in the test report.

2.1.5.2.3 Operational Performance.

a. Purpose. The purpose of this test is to determine if the using soldier can perform a monitoring and survey mission with the PR in a simulated nuclear environment while dressed in MOPP ZERO thru MOPP4.

b. Event Matrix. None. The using soldier will conduct monitoring and survey missions with the PR using approved and emerging doctrine, tactics, and techniques, as directed or required by FRAGO from the test directorate.

2.1.5.2.4 Reliability, Availability, and Maintainability (RAM).

a. Purpose. Limited RAM data will be collected for the PR in this abbreviated, simulated performance CEP. Data will be provided for information on PR performance rather than the PR failure to meet, to meet, or to exceed established ROC RAM requirements.

b. Events Matrix. None. Information regarding limited RAM will be collected as a data collection function of the CEP.

2.1.5.2.5 Logistics.

a. Purpose. The purpose of this test is to provide limited data which will assist in an evaluation to determine if the logistics concept is appropriate for the operational and MANPRINT concerns for use of the PR. Although only limited logistics information will be collected during this CEP, MANPRINT concerns which impact on operator use of the PR while operator is dressed in environmental clothing and MOPP up to and including MOPP4 will be fully addressed.

b. Events Matrix. None. The PR to be evaluated during this CEP has been designed to preclude a maintainability requirement. Data will be collected regarding operator maintenance required on the PR. Operator maintenance will be limited to battery

replacement and care and cleaning. Data will also be collected which reflects real time logistical requirements for the PR (PR failure, battery failure, etc.). Since the PR engineering design requires no maintenance actions, calibration is accomplished at the time of manufacture. Verification of calibration is accomplished using the AN/UDM-2 check source, (or other standard RADIAC calibrator, AN/UDM-1A, or other approved calibration source set). A special device which assures compatibility of the PR with the standard RADIAC calibrator has been manufactured for use during technical testing. Verification of PR calibration will be accomplished during technical testing and will not be a part of this CEP.

2.1.5.2.6 Human Factors.

a. Purpose. This test will be used to obtain information to assess the PR potential to meet human factors engineering standards for ease of use; efficient, effective operations; and limited maintainability in environmental conditions specified for the PR.

b. Events Matrix. None. Data will be collected during the training and operational phases of the PR CEP in each of the human factor areas of interest. Test data collected will be evaluated and will be used for information purposes to affirm the independent assessment of the PR.

2.1.5.2.7 Test Objectives.

2.1.5.2.7.1 Objective 1. To service, inspect, and verify the condition of the test item and completeness of the system support package (SSP).

2.1.5.2.7.1.1 Method.

a. Upon receipt, test items will be inspected according to the "SERVICE UPON RECEIPT OF MATERIEL" section contained in CECOM Draft PR guidance. The test items will be inspected for any damage incurred during shipment, the items will be compared to the packing slip to determine whether the shipment is complete, and the system will be inspected to determine any discrepancies from the system descriptions. Any items found to be missing will be recorded and any needed replacements will be obtained prior to start of test. Any physical damage noted will be photographed, recorded, and the damaged items repaired or replaced. Any discrepancies identified will be noted.

b. The Materiel Developer (MATDEV) operational test readiness statements (OTRS) will be obtained and reviewed and any discrepancies between this document and the test items and system support packages (SSP) will be recorded. The MATDEV OTRS should include the following: (a) The system and its components properly represent the size, shape, weight, transportability and functional characteristics of the system at this stage of

development, (b) That developmental testing objectives have been met and all failures and deficiencies have been corrected, (c) The availability of any special instrumentation, (d) The maintenance and logistics support requirements were based upon maintenance and logistics concepts developed for this system and that the SSP is available and complete, (e) The system is ready to permit ordinary operations under field conditions, and (f) The safety release has been provided.

c. The safety release will be obtained from USATECOM, APG, MD and reviewed. Any safety restrictions stated as potential hazards will be noted and disseminated to all test personnel. All test activities will be conducted in accordance with the requirements of the safety release.

d. The PR will be marked for identification for use throughout the test. The test directorate will establish a log for each of the PR to document information.

2.1.5.2.7.1.2 Data Required.

a. A record of any discrepancies between the system support package listing and the system support package as delivered for test.

b. A record of any damage noted in test items and their components during inventory/inspection and any corrective actions taken.

c. A record of any missing items and any action taken to correct the problem(s).

d. A record of any modifications and adequacy thereof.

e. A record of the safety release and OTRS.

f. A record of the verification of calibration on each of the test items.

2.1.5.2.7.1.3 Data Reduction and Analysis. The initial inspection will be used to ensure that the test items, their components, if any, and the system support package are complete, free of damage and ready for operational testing.

2.1.5.2.7.2 Objective 2: To ensure that the physical and functional characteristics of the test items meet the appropriate requirements prior to test start.

2.1.5.2.7.2.1 Method.

a. After the pretest inspection is complete, each of the test items will be put through a series of physical and functional checks to verify that the physical and functional characteristics of the test items meet the requirements specified in the approved criteria. In addition, these same items will be

monitored throughout the test to identify which functional capabilities are degraded through use.

b. The PR will be inspected to determine availability of dose and dose rate modes. The range and the units (scales) which can be identified with the PR will be recorded. Inspection will determine the elapsed time required for the PR to function.

c. The PR will be inspected to determine if they have both visual and audible alarm system as part of the PR and if the alarms are independent of other PR function(s). The alarm(s) will be activated and the alarm setting and the dose at which the alarm(s) are activated will be recorded. Once the alarm(s) have been activated, it will be determined if either of the alarms are adjustable in terms of volume and brightness and whether either one can be nullified (silenced) quickly and completely.

d. The PR will be inspected for some type of information plate. The location of this plate will be identified, photographed, and all instructions provided on the plate will be recorded.

e. It will be determined if the PR has a visual display which can be quickly and easily read directly by the operator, whether dials/controls necessary to operate the PR are integral with the unit, and whether the system has a built in check for workability. The PR will be operated in a darkened area to

determine if LCD display is lighted or luminous and can be read in a darkened operational environment.

f. If technical testing has not already been accomplished to provide data, each PR, with components if any, will be weighed to determine the weight of the entire system. Each PR will be individually weighed and externally measured. All weights and measurements will be recorded and any irregularities will be identified for some type of identifying marking or number which identifies a particular component and whether these markings or any instruction are sufficiently attached and cannot be obliterated by painting or abrasion. These requirements will not be duplicated if appropriate technical test data is available.

g. Each PR will be stored in its individual carrying case, if provided with the system.

2.1.5.2.7.2.2 Data Required.

a. A record of any discrepancies between the system physical and functional check will be recorded.

b. A record of PR modes, range(s), and units (scales) which are part of the PR function will be recorded. The elapsed time required for PR modes to function will be recorded.

c. The PR will be examined for visual and audible alarm system, and if the alarms are independent of other PR function(s). The alarm(s) will be activated and the alarm setting and the dose at which the alarm(s) are activated will be recorded. A record will be made as to whether alarms are adjustable in terms of volume and brightness and whether either one can be nullified (silenced) quickly and completely.

d. A record of the PR information data plate location will be identified, photographed, and all instructions provided on the plate will be recorded.

e. Information will be recorded as to the ease/difficulty that the operator has in reading the visual display directly, whether dials/controls necessary to operate the PR are integral with the unit, whether the system has a built in check for workability, and the operability of the PR in a darkened area to determine if LCD display is lighted or luminous in a darkened operational environment.

f. A record of PR components, if any, permanence of markings and instruction plates, and PR weights and measurements (externally) will be recorded. (These requirements will not be duplicated if appropriate technical test data is available).

g. A record will be made of PR components to include individual carrying case, if provided with the system.

2.1.5.2.7.2.3 Data Reduction and Analysis.

a. The data collected will be used to assess the objectives and the critical operational issues and criteria. These data will be primarily collected during this phase of the test, however, the physical and functional characteristics of the PR will be monitored throughout the entire test period.

b. The data collected during this phase will be summarized and presented in tables depicting characteristics such as weights and measurements for each PR, type(s) of alarm(s) and whether they are dependent/independent of each other, controllable, distinguishable, and extinguishable; whether scales are lighted or luminous; and at what dose/dose rate alarm(s) is/are activated.

2.1.5.2.7.2.3 Data collected will be provided to support approved operational issues and criteria. (NOTE: Those portions of criteria underlined will not be tested as part of this CEP).

2.5.2.7.3 Objective 3. To determine early the RAM (reliability, availability, and maintainability) of the PR.

2.1.5.2.7.3.1 Method. Each of the test items will be put through a series of physical and functional operational trials to verify operational suitability and effectiveness of the test

items meet the requirements specified in the approved criteria. In addition, these same items will be monitored throughout the test to identify which functional capabilities are degraded through use.

2.1.5.2.7.3.2 Data Required. Only limited RAM data will be collected during this CEP.

2.1.5.2.7.3.3 Data Reduction and Analysis. None. Limited RAM will be presented in raw numbers through operational analysis.

2.5.2.7.4 Objective 4. To determine if the PR is operationally suitable for support of unit operations within existing doctrine, manpower, personnel integration (MANPRINT), and logistic support concepts.

2.1.5.2.7.4.1 Method. Each PR will be used during operational events to assess the operational suitability and effectiveness of the system when employed in accordance with current and emerging doctrine. The PR will be further assessed to evaluate manpower requirements, system integration, and support requirements.

2.1.5.2.7.4.2 Data Required. Data will be collected regarding how effective the PR is when used by the soldier wearing MOPP up to and including MOPP4. Data collected will include user operation, maintenance, and maintenance support requirements.

2.1.5.2.7.4.3 Data Reduction and Analysis. The data collected will be used to assess the objective requirement and the critical operational issues and criteria. These data will be collected, summarized and presented in tables depicting operational characteristics, operational suitability, and operational effectiveness.

2.5.2.7.5 Objective 5. To determine if the PR can satisfy the mission requirements when operated by user personnnel in an operational/training environment.

2.1.5.2.7.5.1 Method. Data will be collected regarding how effective the PR is when used by the soldier wearing MOPP up to and including MOPP4. Data collected will include user operation, maintenance, and maintenance support requirements.

2.1.5.2.7.5.2 Data Required. Subjective and objective data will be collected on the operational suitability of the PR when used by the soldier in a simulated tactical radiological environment and any degration noted when the operator is in MOPP4. Data will include user capability to operate and maintain the PR.

2.1.5.2.7.5.3 Data Reduction and Analysis. The data collected will be used to assess the objective requirement and the critical operational issues and criteria. These data will be collected, summarized and presented in tables depicting operational characteristics, operational suitability, and operational effectiveness.

2.5.2.7.6 Objective 6. To determine if the training program and documentation is accurate and comprehensive to allow personnel (MOS 54B) to train personnel to operate the PR.

2.1.5.2.7.6.1 Method. Training will be presented by the MATDEV in a New Equipment Training (NET) format.

2.1.5.2.7.6.2 Data Required. NET will provide the USACMLS personnel with appropriate documentation and formal training to train player personnel.

2.1.5.2.7.6.3 Data Reduction and Analysis. None. USACMLS will assess documentation available and training presented during NET for suitability.

2.1.5.2.7.7 Objective 7. To determine the degradation of personnel, when dressed to MOPP4 while performing monitoring and survey missions.

2.1.5.2.7.7.1 Method. Operational performance of personnel wearing MOPP4 will be assessed during simulated tactical radiological scenarios. Data will be collected to subjectively assess the delta in performance degradation of personnel while performing simulated monitoring and survey missions.

2.1.5.2.7.7.2 Data Required. Data will be collected regarding to what degree MOPP4 degrades the operational effectiveness of the PR operator in a simulated tactical radiological environment. Data collected will include user capability to operate and maintain the PR.

2.1.5.2.7.7.3 Data Reduction and Analysis. USACMLS will review data collected to subjectively and objectively assess operational degradation imposed on the operator when wearing MOPP4.

2.1.6 Training. Training is required for test players and data collectors. Training of USACMLS instructors and key personnel (IKP) will be conducted at Fort McClellan, AL by the contractor or Communications - Electronic Command (CECOM), Fort Monmouth, NJ. USACMLS trained instructors will train test players. The CEP test directorate will train data collectors.

2.1.6.1 Training of test players. Instructors from the Directorate of Training (DOT), USACMLS, Fort McClellan, AL will train the test players on operational performance and individual maintenance aspects of the PR. DOT instructors will also train test players in the employment of RADIAC devices, radiological intelligence doctrine, as well as specifics on radiological operations, monitoring, and survey techniques as described in TC 3-15. Limited map reading refresher training, if required, will be conducted IAW FM 21-26 as a part of the CEP.

.2.1.6.2 Training of test organization. Training of the data collectors will be conducted by the test directorate. Training will include test directorate organization, responsibilities, purpose and objectives of the CEP, data collection forms, data collection techniques, and data analysis requirements.

2.1.7 Overall methodology. The PR CEP will be conducted during Apr 91 at Fort McClellan, AL using Fort McClellan, AL personnel, equipment, facilities, and ranges. The CEP will provide the USACMLS, as proponent and tester, with an early look, hands-on evaluation of the PR system. The CEP will utilize approved training concepts, and approved and emerging doctrine to provide data and information as to the operational suitability of the PR system. The CEP will help determine ways of extending the operational effectiveness of personnel when operating in a nuclear environment. The CEP will be used to assist in identifying enhancements in MANPRINT (doctrine, training and organization) that may assist in improving the effectiveness and efficiency of personnel when operating in a nuclear environment. The CEP will also be used to have an early look at the degradation of personnel effectiveness, when dressed in MOPP4, in relation to mission performance when operating in a nuclear environment. The test directorate will examine the quality, quantity, and suitability of all available data, prior to using it in the test report (TR) and proponent independent evaluation (PIE) to insure that it is relevant and answers the criterion

which addresses each issue. Direct observation of the PR and user operational performance during the CEP, and assessment of the test results will determine the suitability of use for the findings contained in the test documentation. Testing will employ typical user personnel under simulated nuclear operational conditions to assess the operational utility, effectiveness, and suitability of the PR to support a Milestone I/II decision review.

2.1.8 Instrumentation. Instrumentation required for this CEP will include clocks, stopwatches, thermometer(s), 35MM still camera, video camera, video camera/monitor, and IM-93/PD personnel dosimeter with PP-1578/UD charger.

2.1.8.1 Video Instrumentation and Still Camera. Video instrumentation will be required for overall test documentation and assist in the viewing of specific operational test scenarios. Still camera photography will be used to document moments which are considered to be of specific test interest.

2.1.8.2 Video Monitor. Video monitor will be required to remotely monitor PR radiation dose and dose rate exposure in the radiation laboratory beyond the levels at which individuals may be exposed in a peacetime environment.

2.1.8.3 Existing Instrumentation Systems To Be Used. Clock(s) and stopwatches will be required to measure operational

times. Thermometer(s) will be used to measure temperature spans at the time of the operational test.

2.1.8.4 New or Modified Instrumentation. This CEP will not include the design and construction or modification of existing instrumentation devices and systems.

2.1.9 Targets and simulators. Targets and simulators will not be utilized for this CEP. Live fire exercises, pyrotechnic demonstrations, force-on-force, day and night field exercises employing smoke, flame or pyrotechnic devices will not be conducted as part of this CEP.

2.1.10 Test limitations. Due to safety concerns and the lack of an active nuclear environment, operational testing of the PR and related software through the full detection range will be limited during the CEP. There are no known constraints imposed by software maturity of the PR. It is not feasible to create a similar operational environment to the wartime environment in which the PR will be used. Therefore, field and operational testing will require separate test methodologies. Laboratory testing, where the radioactive source to check the accuracy and operability of the RADIAC is available; and field testing, where the operational suitability, durability and reliability are evaluated in a nonradioactive environment.

2.2 Test Details. Data collected will be provided to support approved operational issues and criteria. No test player will be exposed in any way to radiation source(s). Only the PR will be exposed to radiation source(s) and this will occur only within the confines of the USACMLS Radiation Laboratory, under the control and supervision of USACMLS Radiation Laboratory assigned technicians. USACMLS Radiation Laboratory technicians will not be exposed to radiation source(s) during the conduct of this CEP. USACMLS Radiation Laboratory technicians will wear currently approved and authorized radiation exposure systems, such as film badges, etc., which will be read in accordance with currently approved Fort McClellan, Alabama radiation safety procedures. (NOTE: Those portions of criterion underlined will not be tested as part of this CEP).

a. General. The PR will be operationally examined through the following sequence of test events.

(1) The CEP will consist of three separate test areas:

(a) The Test Directorate which will control the conduct of the CEP.

(b) Test Players who will function the PR in the different test modes. Test Players will be dressed in MOPP ZERO and MOPP4 as required by test scenario.

(c) USACMLS Radiation Laboratory Technicians who will function the PR in radiation fields within the laboratory.

(2) The PR will be received and thoroughly examined by the Test Directorate for operability and defects. PR which are determined to have defects will be identified, marked, set aside, and will not be used during the CEP.

(3) The PR operators will be broken into three groups of five test players each. Two groups will receive all player training on the PR. The third group will act as a control group and will not receive player training but will rely on individual player apptitude to gain operational information of the PR from PR data plate information and operator technical publications.

(4) PR operators will cycle the PR through a series of PR modes both inside the classroom and in simulated field location. PR will be rotated between operators on a daily basis.

(5) USACMLS Radiation Laboratory Technicians will place the PR in known radiation source environment and dose PR for further CEP evaluation.

(6) The PR will be examined alternately by the operator and the USACMLS Radiation Laboratory, i.e., day one, operator-Radiation Laboratory; day two, operator-Radiation Laboratory; etc., to determine if operational use, transportation, and handling affect the PR readings.

b. USACMLS Radiation Laboratory. The USACMLS Radiation Laboratory will conduct three series of tests which expose the PR to precalculated dose rates and dose of gamma radiation. These three series of tests will be to operationally verify that the operator has successfully placed the PR in the "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points. These tests will also be used to verify that the PR operator is able to call up "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points following radiation exposure and correctly report the "MDOS" received and the "TDOS" received by the PR as well as any effect radiation exposure may have had on other PR MODE set points. Additionally, a limited Technical Test will be conducted by the USACMLS Radiation Laboratory technicians to provide data to the MATDEV and Program Manager, Nuclear, Biological, and Chemical Defense Systems (NBCDS) regarding the effect "low battery" may have on PR readings. The Test Directorate will verify by voltmeter that the PR battery (BA-5372/U Lithium Sulpher Dioxide) is below the 4.2 VDC requirement for PR operation. The PR operator will place the PR in "BAT%" and verify low battery output in accordance with the PR Operator Training Plan. Following low battery "BAT%" verification the PR operator will place the PR in the "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points. This fourth through sixth series of tests will examine PR battery VDC output, PR response times, accuracy of data presented by the PR from precalculated distances from the radiation source and will provide a limited test delta

by which the MATDEV and PMNBCDS may evaluate operation of the PR over time and battery life. These tests will also be used to verify that the PR operator is able to call up "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points following radiation exposure and correctly report the "MDOS" received and the "TDOS" received by the PR as well as any effect radiation exposure may have had on other PR MODE set points.

(1) Only personnel assigned to the USACMLS Radiation Laboratory will work with radiation sources during the conduct of this CEP. USACMLS Radiation Laboratory personnel will wear approved radiation exposure detection devices such as film badges, etc., and will perform all Radiation Laboratory functions in accordance with approved radiation source handling techniques and safety procedures.

(2) The USACMLS Radiation Laboratory will evaluate the PR dose and/or dose rate response through three series of tests which will expose the PR (only) to preselected dose rates and a precalculated dose of gamma radiation. The PR will not be exposed to neutron radiation during this CEP. Each PR will be exposed to radiation at five preselected distances from the source at which the dose/dose rates have been mathematically precalculated by the USACMLS Radiation Laboratory technicians. The three series of tests will provide five data points each per PR for a total of fifteen data points per PR. The data points will provide a delta by which the PR response to radiation can be

compared to the Required Operational Capability (ROC). The fourth through sixth series of tests will provide information for the MATDEV and PMNBCDS regarding battery life and low battery response. These series of tests will also provide five data points per PR for a total of fifteen data points per PR. The data points will provide a delta by which the PR low battery response to radiation can be compared to the ROC.

c. Test Players. Test players will operationally place the PR in the various operational modes. Data collectors will verify that the operator has successfully placed the PR in the "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points. The PR will be given to the USACMLS Radiation Laboratory technicians who will run the PR through the series of predetermined radiation source checks. These tests will also be used to verify that the PR operator is able to call up "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points following radiation exposure and correctly report the "MDOS" received and the "TDOS" received by the PR as well as any effect radiation exposure may have had on other PR MODE set points.

(1) The Test Directorate will verify by voltmeter that the PR battery (BA-5372/U Lithium Sulpher Dioxide) is below the 4.2 VDC requirement for PR operation. The PR operator will then place the PR in "BAT%" and verify low battery output in accordance with the PR Operator Training Plan. Following low battery "BAT%" verification the PR operator will place the PR in

the "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points. This fourth through sixth series of tests will examine PR battery VDC output, PR response times, accuracy of data presented by the PR from precalculated distances from the radiation source and will provide a limited test delta by which the MATDEV and PMNBCDS may evaluate operation of the PR over time and battery life.

(2) These low battery tests will also be used to provide additional data points to verify that the PR operator is able to call up "RATE", "MDOS", and "TDOS", "RTAL", and "MDAL" MODE set points following radiation exposure and correctly report the "MDOS" received and the "TDOS" received by the PR as well as any effect radiation exposure may have had on other PR MODE set points.

2.2.1 Operational Issue 1. Does the Pocket RADIAC (PR) satisfy its nuclear radiation detection mission when operated by user personnel in an operational environment?

2.2.1.1 Criterion. <u>The PR will detect and measure gamma and neutron radiation (within specified levels and within specified energy ranges)</u>.

2.2.1.2 Criterion. <u>The PR will be able to detect and measure gamma dose from 1 cGy to 1000 cGy and dose rate from nuclear fallout, from 0.1 cGy/hour to 1000 cGy hour</u>.

2.2.1.3 Criterion. The PR will detect and measure gamma dose and neutron dose from nuclear bursts, from 1 cGy to 1000 cGy (2000 cGy is desirable).

2.2.1.4 Criterion. The PR will be able to respond and rapidly record/display changes in radiation dose and/or dose rates.

2.2.1.4.1 Methodology. Test Players will sequence the PR for "BAT%", "RATE", "VFAC", "MDOS", "TDOS","RTAL", "MDAL", "ALM ON", and "AUD ON" and provide the PR to the USACMLS Radiation Laboratory. The USACMLS Radiation Laboratory will evaluate the PR dose and/or dose rate response through a series of tests which expose the PR to preselected dose rates and a precalculated dose of gamma radaiation. The PR will not be exposed to neutron radiation during this CEP. Each PR will be exposed to radiation at five preselected distances from the radiation source, at which the dose/dose rates have been predetermined (calculated) by the USACMLS Radiation Laboratory from a known source through instrumentation and mathematical calculation. This will provide five data points for each series the PR is subjected to. A total of three series will be run by the USACMLS Radiation Laboratory, one series each day. A fourth through sixth series will be conducted using the previous format of five data points to determine PR battery life and the affect low battery power may have on the accuracy (+/- X dose and dose rate or +/- X

percentage of dose and dose rate) of the dose and dose rate display. This series will be a limited technical excursion examination of the PR response and accuracy in the "BAT%", "RATE", "MDOS", "TDOS","RTAL", "MDAL", "ALM ON", and "AUD ON" mode when the low battery indicator is illuminated and to what degree the reading and PR response may be effected by low battery power. This examination was requested by the MATDEV and PMNBCDS as a limited technical test since the data was not conducted as a part of the Technical Testing (TT) performed by the Electronic Proving Ground (EPG), Fort Huachuca, AZ. The PR will be subjected to six separate series of exposures in accordance with the format described. The fourth through sixth series of tests will provide three additional series of data points by which the PR operator can be examined. Each exposure will precede and follow Test Player sequencing, and handling of the PR and setting the PR to "BAT%", "RATE", "MDOS", "TDOS","RTAL", "MDAL", "ALM ON", and "AUD ON". Test Player and USACMLS Radiation Laboratory functioning of the PR will be daily depending upon Radiation Laboratory availability.

a. Events. No events or matrix is specified.

b. Control concepts. To ensure that the PR radiation exposure in each series is the same, USACMLS Radiation Laboratory personnel will preevaluate dose and dose rates at five preselected distance intervals from a known radiation source. If the delta is within the established dose/dose rate percentile,

this will present a high level of operational acceptance of the PR. The low battery power excursion series will provide an indication of the duration that a PR battery might be expected to last during operational conditions and to what degree of accuracy the PR will function when the low battery indicator is illuminated. The dose rate and total dose readings recorded by the USACMLS Radiation Laboratory will be used by the test directorate to verify that test players are performing the correct procedure to read total dose/mission dose on the PR. If the test player, in a field environment, reads dose to within the prescribed accuracy, then the data will be recorded. If the test player reads total/mission dose which does not correspond to the control value, then the test player will repeat the dose reading steps while the data collector records the steps performed.

2.2.1.4.2 Data requirements. See Table 2-2-1-4.

Table 2-2-1-4. PR Dose and Dose Rate Data Requirements.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Objective Dose Rate Reading at each test distance (New Battery)	Exact	Rad Lab Tech	R-1
2	Objective Dose Rate Reading at each test distance (After Low Battery Indication)	Exact	Rad Lab Tech	R-1
3	Objective Dose Reading after each series (New Battery)	Exact	Test Player	R-1
4	Objective Dose Reading after each series (After Low Battery Indication)	Exact	Test Player	R-1
5	Voltage reading and time battery installed	Exact	Test Officer	R-1
6	Voltage reading and time PR low battery indicator first displayed	Exact	Test Officer	R-1
7	Time PR fails to respond PR after low battery indicator displayed	Exact	Test Officer	R-1
8	Total number of chargeable failures (include time, date)	Exact	Test Dir	RAM-1

* Each data number is preceded with a paragraph prefix of "2.2.1.4.2".

2.2.1.4.3 Data collection, reduction, and analysis

a. Data collection. To collect the data necessary to assess the criterion of this paragraph, the data collector will manually

record PR dose and dose rates and PR response time. PR response time for dose and dose rate will be reported. Elapsed times from start to end of test will be reported. Data collector will also keep a record of all incidents which occur during this test.

b. Data reduction. Information collected to assess the criteria of this paragraph will be objective. The objective data will be in the form of actual dose and dose rates recorded on the PR at five separate data points for each series of tests. Record of incidents will be transferred to Test Incident Report (TIR), and any failure incident will be reported.

c. Data analysis. The actual dose and dose rate reading recorded on the PR will be compared with the projected dose and dose rate reading at each of the test intervals. The delta formed at each test interval will be compared for accuracy with the ROC requirement of +/- 20 percent or 15 cGy of total dose and within +/- 20 percent for dose rate.

2.2.1.5 The PR will be capable of storage, transportation, and operation in climatic categories severe cold through hot as defined in AR 70-38 and specified in the requirements documents.

2.2.1.5.1 Methodology. Transportation of the PR during this CEP will be limited to physical transportation by PR operators during operation scenarios. Test Players will sequence the PR for "BAT%", "RATE", "VFAC", "MDOS", "TDOS","RTAL", "MDAL", "ALM

ON", and "AUD ON". Test Players will carry the PR in the breast pocket of the BDO/CPO as required. Storage will be limited to climatic design types Basic and only for the duration of the CEP.

a. Events. No events or matrix is specified.

b. Control concepts. PR will be physically inspected before issue to PR operator and will be reinspected when turned in by the operator. PR will be issued and turned in on a daily basis.

2.2.1.5.2 Data requirements. See Table 2-2-1-5.

Table 2-2-1-5. Transportation Data Requirements.

Data No.*	Data Description: Data Item	Data Description: Data Accuracy	Data Description: Data Source	Data Collection Form
1	Subjective assessment of the PR being able to perform its operational mission following transportation	Finding	Test Player	Q-1
2	Record of failure of the PR to perform its operational mission following transportation	Finding	Data Collector	R-2
3	Total number of chargeable failures (include time, date)	Exact	Test Dir	RAM-1

* Each data number is preceded with a paragraph prefix of "2.2.1.5.2".

2.2.1.5.3 Data collection, reduction, and analysis

a. Data collection. The method of transportation by individual operator will be recorded along with temperature at start and end time. Data will be collected by questionnaire provided to the operator following each test period. Operator will subjectively evaluate operator/equipment/PR interface.

b. Data reduction. Data from questionnaires, based on subjective evaluation by the PR operator, will be collected and consolidated.

c. Data analysis. Data will be compiled from questionnaire data sheets and summarized according to responses provided.

2.2.1.6 Operational Issue analytical summary. Responses to criterion will be adjudged according to data received and reported as favorable or unfavorable to issue statement.

2.2.2 Operational Issue 2. Is the PR survivable/ vulnerable when operating in the threat environment?

2.2.2.1 Criterion. The PR will remain fully operational after exposure to high altitude electromagnetic pulse (HAEMP) and nuclear weapons effects (NWE).

2.2.2.2 The PR detection and measuring capabilities will not be degraded by electromagnetic interference (EMI) caused by friendly/enemy communication transmissions.

2.2.2.2.1 Methodology. Evaluation will be limited to collocated friendly field radios at Fort McClellan, AL available during the CEP. This examination will be conducted in a structured environment utilizing as many friendly radios as may be available during the CEP. The Test Play will perform PR functions during radio transmissions.

a. Events. No events or matrix is specified.

b. Control concepts. Radio transmissions made in close proximity with PR will provide limited operational realism as to EMI interference with the PR.

2.2.2.2.2 Data requirements. Limited operational data regarding friendly radio EMI with PR. See Table 2-2-2-2.

Table 2-2-2-2. EMI Data Requirements.

Data No.*	Data Description: Data Item	Data Description: Data Accuracy	Data Description: Data Source	Data Collection Form
1	Subjective assessment of the PR being able to perform its operational mission following EMI	Finding	Test Player	Q-1
2	Record of failure of the PR to perform its operational mission following EMI	Finding	Test Player	Q-1
3	Total number of chargeable failures (include time, date)	Exact	Test Dir	RAM-1

* Each data number is preceded with a paragraph prefix of "2.2.2.2.2".

2.2.2.2.3 Data collection, reduction, and analysis

a. Data collection. Data collector will manually collect information on type of radio used, time, transmission time, and approximate distance between antenna and PR. Data collector will observe PR during radio transmission(s) and report any experienced EMI.

b. Data reduction. Information collected to assess the criterion of this paragraph will be objective data in the form of PR dose/dose rate deviation in any PR "MODE" during radio transmission and observation by PR operator and data collector.

Data will be consolidated from data collection sheets regarding any EMI experienced by PR when operated near friendly field radios.

c. Data analysis. Analysis will be limited to reporting information regarding type of radio, time of day, deviation experienced, and approximate distance from radio to PR.

2.2.2.3 Criterion. The PR will be NBC contamination survivable, as defined in AR 70-71 and the U.S. Army Nuclear and Chemical Agency (USANCA) implementing letter, Feb 89.

2.2.2.4 Criterion. The PR will remain fully operational after exposure to levels of initial nuclear radiation, air blast, and thermal radiation that personnel are expected to survive.

2.2.2.2.4 Operational Issue analytical summary. Responses to criterion will be adjudged according to data received and reported as favorable or unfavorable to issue statement.

2.2.3 Operational Issue 3. Is the PR operationally suitable for support of field operations (monitoring and surveys) when employing existing Doctrine, MANPRINT, and Logistics Support Concepts?

2.2.3.1 Criterion. The operational wartime availability of the PR will be at least 89 percent.

2.2.3.2 Criterion. The PR will demonstrate the following operational RAM requirements at the 90 percent lower confidence level:

a. RELIABILITY - 510 Hours MTBOMF

b. MAINTAINABILITY - .004 MMH/Operating Hour

c. MAINTENANCE RATIO - (Intermediate/General Support)

2.2.3.3 Criterion. The PR will perform all of it's operational missions in any mode (ground, vehicle, aircraft) when operated under current and developmental tactics and doctrine.

2.2.3.3.1 Methodology. Transportation of the PR during this CEP will be limited to physical transportation by PR operators during operation scenarios in the ground and vehicle mode. Limited non-pressurized aircraft excursion may be conducted based upon availability of aircraft during the CEP period.

a. Events. No events or matrix is specified.

b. Control concepts. PR will be physically inspected before issue to PR operator and will be reinspected when turned in by the operator. PR will be issued and turned in on a daily basis.

2.2.3.3.2 Data requirements. PR operator will carry the PR as specified in CEP training program and will conduct simulated

radiological monitoring and survey operations in accordance with current and emerging doctrine.

2.2.3.3.3 Data collection, reduction, and analysis

a. Data collection. Data will be collected during simulated radiological monitoring and survey missions. Start and end time, temperature, and method of transportation by individual operator will be recorded by the data collector. Additional data will be collected by questionnaire provided to the operator following each test period. Operator will subjectively evaluate operator/equipment/PR interface.

b. Data reduction. Data from data collection forms and data from questionnaires, based on subjective evaluation by the PR operator, will be collected and consolidated.

c. Data analysis. Data will be compiled from questionnaire data sheets and summarized according to responses provided.

2.2.3.4 Criterion. The PR will not pose any uncontrolled safety or health hazard to the operator and/or maintainer.

2.2.3.4.1 Methodology. To obtain data to assess this criterion, a data collector will record any health or safety incidents associated with the PR. A questionnaire will be administered to obtain PR operator comments about any health

hazards or safety considerations associated with the PR technology.

a. Events. No events or matrix is specified.

b. Control concepts. To ensure that required test events occur in situations that depict as realistically as possible the tactical (simulated) context in which the PR will be employed, three separate test groups will participate in the CEP and use the PR.

2.2.3.4.2 Data requirements. See Table 2-2-3-4.

Table 2-2-3-4. Health and Safety Data Requirements.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Record of health hazards occurring as a result of the PR technology	Exact	Test Dir	R-2
2	Subjective assessment of health hazards occurring as a result of the PR technology	Finding	Test Player	Q-1
3	Record of safety considerations occurring as a result of the PR technology	Exact	Test Dir	R-2
4	Subjective assessment of safety considerations as a result of the PR technology	Finding	Test Player	Q-1

* Each data number is preceded with a paragraph prefix of "2.2.3.4.2".

2.2.3.4.3 Data collection, reduction, and analysis

a. Data collection. To collect data to assess the criterion of this paragraph, a data collector will record any incidents of health hazards or safety considerations. A questionnaire will be administered to obtain test player opinion of the health hazards or safety considerations associated with the PR.

b. Data reduction. Information collected to assess the criterion of this paragraph will be both objective and subjective. The objective data will be in the form of a record of safety or health incidents. The subjective data will be in the form of test player comments about safety considerations or health hazards associated with the PR. Pertinent comments will be tabulated in the final report.

c. Data analysis. If there are no health hazards or safety considerations incidents, and subjective data indicates that there are no health hazards or safety considerations associated with the PR, then the criterion of this paragraph will be answered favorably.

2.2.3.5 Criterion. The PR will not require additional manpower or equipment authorization be added to the current force structure.

2.2.3.5.1 Methodology. To obtain data to assess this criterion, a data collector will record any events which impact manpower or equipment. Data will be collected subjectively and objectively of each groups operational effectiveness in operating the PR in the dose and dose rate modes. A questionnaire will be administered to obtain test player comments about training in operation of the PR and operator maintainability requirements.

a. Events. No events or matrix is specified.

b. Control concepts. Since the PR to be evaluated during this CEP has been designed to be non-maintainable other than operator maintenance requiring care and cleaning and battery replacement, data collection will be limited in the area of operator maintainability. PR operator training will be conducted on two of three test groups. The third group will be a control group and will rely on data plate information and publications for PR operations requirements.

2.2.3.5.2 Data requirements. Table 2-2-3-5.

Table 2-2-3-5. Manpower and Equipment Data Requirements.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Subjective assessment of the system design to be supported by existing MOS	Finding	Test Dir	R-2
2	Subjective assessment of the system design to be supported by existing manpower and equipment	Finding	Test Dir	R-2

*Each data number is preceded with a paragraph prefix of "2.2.3.5.2".

2.2.3.5.3 Data collection, reduction, and analysis

a. Data collection. To collect data to assess the criterion of this paragraph, a data collector will record any incidents which impact the areas of manpower and equipment authorization. A questionnaire will be administered to obtain test player opinion of the training and maintainability of the PR.

b. Data reduction. Information collected to assess the criterion of this paragraph will be both objective and subjective. The objective data will be in the form of a record of training and maintainability at the operator level. The subjective data will be in the form of test player comments about training and maintenance of the PR. Pertinent comments will be tabulated in the final report.

c. Data analysis. If there are no incidents, and subjective data indicates that there are no training and manpower considerations associated with the PR, then the criterion of this paragraph will be answered favorably.

2.2.3.5.4 Operational Issue analytical summary. Responses to criterion will be adjudged according to data received and reported as favorable or unfavorable to issue statement.

2.2.4 Operational Issue 4. Can the present Logistics System support the PR?

2.2.4.1 Criterion. The PR will be modular in design to ease removal/replacement of parts by maintenance personnel.

2.2.4.1.1 Methodology. To obtain data to assess this criterion, a data collector will record any events which impact on the ease of removal and replacement of PR battery. Data will be collected subjectively and objectively of each groups operational effectiveness in maintaining the PR in an operational mode through removal and replacement of authorized parts. A questionnaire will be administered to obtain test player comments about training in operation of the PR and operator maintainability requirements.

a. Events. No events or matrix is specified.

b. Control concepts. Since the PR to be evaluated during this CEP has been designed to be non-maintainable other than operator maintenance requiring care and cleaning and battery replacement, data collection will be limited in the area of operator maintainability. PR operator training will be conducted of two of three test groups. The third group will be a control group and will rely on data plate information and publications for PR operations requirements.

2.2.4.1.2 Data requirements. Table 2-2-4-1.

Table 2-2-4-1. Logistical Support Data Requirements.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Subjective assessment of the system design supporting optimum operator performance	Finding	Test Player	Q-1
2	Subjective assessment of the system design supporting optimum maintainer performance	Finding	Test Player	Q-1

*Each data number is preceded with a paragraph prefix of "2.2.4.1.2".

2.2.4.1.3 Data collection, reduction, and analysis

a. Data collection. To collect data to assess the criterion of this paragraph, a data collector will record any incidents which impact the area of battery removal and replacement. A questionnaire will be administered to obtain test player opinion of the ease of removal and replacement of parts of the PR.

b. Data reduction. Information collected to assess the criterion of this paragraph will be both objective and subjective. The objective data will be in the form of a record of training and maintainability at the operator level. The subjective data will be in the form of test player comments about the ease of removal and replacement of battery of the PR. Pertinent comments will be tabulated in the final report.

c. Data analysis. If there are no incidents, and subjective data indicates that there are no training and manpower considerations associated with the PR, then the criterion of this paragraph will be answered favorably.

2.2.4.2 Criterion. No special tools, not commonly available in any maintenance or repair facilities, shall be required for disassembly or assembly of the system.

2.2.4.2.1 Methodology. To obtain data to assess this criterion, a data collector will record any events which impact on the ease of approved assembly and disassembly of the PR. Data will be collected subjectively and objectively of each groups

operational effectiveness in maintaining the PR in an operational mode through removal and replacement of authorized parts. A questionnaire will be administered to obtain test player comments about training in operation of the PR and operator maintainability requirements.

a. Events. No events or matrix is specified.

b. Control concepts. Since the PR to be evaluated during this CEP has been designed to be non-maintainable other than operator maintenance requiring care and cleaning and battery replacement, data collection will be limited in the area of tools required for the operator to remove and install batteries. PR operator training will be conducted on two of three test groups. The third group will be a control group and will rely on data plate information and publications for PR operations requirements.

2.2.4.2.2 Data requirements. Table 2-2-4-2.

Table 2-2-4-2. Special Tool Data Requirement.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Subjective assessment of the system design supporting optimum operator performance	Finding	Test Player	Q-1
2	Subjective assessment of the system design supporting optimum maintainer performance	Finding	Test Player	Q-1
3	Record of common tools required	Exact	Test Dir	R-2
4	Record of availability of common tools	Exact	Test Dir	R-2
5	Record of common tools not being adequate	Exact	Test Dir	R-2
6	Subjective assessment of the adequacy of the common tools	Finding	Test Player	Q-1
7	Record of the technical manuals required	Exact	Test Dir	R-2
8	Record of availability of technical manuals	Exact	Test Dir	R-2
9	Subjective assessment of the adequacy of technical manuals	Finding	Test Player	Q-1
10	Subjective assessment of the adequacy of the maintenance allocation chart	Finding	Test Player	Q-1

*Each data number is preceded with a paragraph prefix of "2.2.4.2.2".

2.2.4.2.3 Data collection, reduction, and analysis

a. Data collection. To collect data to assess the criterion of this paragraph, a data collector will record any incidents which impact the area of battery removal and replacement. A questionnaire will be administered to obtain test play opinion of the ease of removal and replacement of parts of the PR.

b. Data reduction. Information collected to assess the criterion of this paragraph will be both objective and subjective. The objective data will be in the form of a record of training and maintainability at the operator level. The subjective data will be in the form of test player comments about the ease of removal and replacement of the battery of the PR. Pertinent comments will be tabulated in the final report.

c. Data analysis. If there are no incidents, and subjective data indicates that there are no unique tool requirements or special considerations associated with the PR, then the criterion of this paragraph will be answered favorably.

2.2.4.3 Criterion. Checking the calibration of the system shall be accomplished using the AN/UDM-2 RADIAC check source, (or other standard RADIAC calibrator, AN/UDM-1A, or other approved calibration source set).

2.2.4.4 Criterion. The PR shall be capable of being maintained/repaired at all support levels without requiring additional personnel or personnel with special skills.

2.2.4.4.1 Methodology. To obtain data to assess this criterion, a data collector will record any events which impact manpower, training, or equipment. Data will be collected subjectively and objectively of each groups operational effectiveness in operating the PR in the dose and dose rate modes. A questionnaire will be administered to obtain test player comments about training in operation of the PR and operator maintainability requirements.

a. Events. No events or matrix is specified.

b. Control concepts. Since the PR to be evaluated during this CEP has been designed to be non-maintainable other than operator maintenance requiring care and cleaning and battery replacement, data collection will be limited in the area of operator maintainability. PR operator training will be conducted on two of three test groups. The third group will be a control group and will rely on data plate information and publications for PR operations requirements.

2.2.4.4.2 Data requirements. Table 2-2-4-4.

Table 2-2-4-4. Support Level Maintenance Data Requirement.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Subjective assessment of the system design supporting optimum support level maintenance/repairability performance	Finding	Test Dir	R-2
2	Record of the batteries required	Exact	Test Dir	R-2
3	Record of availability of batteries	Exact	Test Dir	R-2
4	Subjective assessment of the adequacy of batteries	Finding	Test Player	Q-1

*Each data number is preceded with a paragraph prefix of "2.2.4.4.2".

2.2.3.4.3 Data collection, reduction, and analysis

a. Data collection. To collect data to assess the criterion of this paragraph, a data collector will record any incidents which impact the areas of operator maintainability. A questionnaire will be administered to obtain test play opinion of the operational maintainability of the PR.

b. Data reduction. Information collected to assess the criterion of this paragraph will be both objective and subjective. The objective data will be in the form of a record of maintainability at the operator level. The subjective data

will be in the form of test player comments about maintainability of the PR at the operator level. Pertinent comments will be tabulated in the final report.

c. Data analysis. If there are no incidents, and subjective data indicates that there are no operator maintainability considerations associated with the PR, then the criterion of this paragraph will be answered favorably.

2.2.4.5 Criterion. The PR will be logistically supportable by existing maintenance and supply systems.

2.2.5 Operational Issue 5. Does the PR pose any operator or equipment compatability restrictions when carried in the breast pocket of the Battle Dress Uniform (BDU) or Chemical Protective Overgarment (CPO) and employed by user personnel in an operational environment?

2.2.5.1 Criterion. The PR will be able to be carried in the breast pocket of the BDU or CPO, withdrawn, read, and reinstalled in the pocket while in MOPP up to and including MOPP4.

2.2.5.5.1 Methodology. To obtain data to assess this criterion, a data collector will record any events which impact compatibility with operator equipment and the operator's ability to easily withdraw and replace the PR in the carry pocket. Data

will be collected subjectively and objectively of each groups operational effectiveness in carrying the PR. A questionnaire will be administered to obtain test player comments regarding equipment compatibility and ease or difficulty which occurred when the PR was withdrawn and replaced in the carry pocket while wearing different levels of protective posture.

a. Events. No events or matrix is specified.

b. Control concepts. Data will be collected on the ease or difficulty encountered by each PR operator when withdrawing and replacing the PR in the carry pocket and on obvious equipment compatibility problems while carrying the PR. Each PR cperator will complete a questionnaire subjectively rating the ease or difficulty encountered and compatibility problems noted.

2.2.5.5.2 Data requirements. Table 2-2-5-5.

Table 2-2-5-5. PR Compatibility Data Requirements.

Data No.*	Data Description: Data Item	Data Accuracy	Data Source	Data Collection Form
1	Record of the PR incompatibility with BDU	Exact	Test Dir	R-2
2	Record of the PR incompatibility with CPO	Exact	Test Dir	R-2
3	Subjective operator comments regarding PR interface with BDU	Finding	Test Player	Q-2
4	Subjective operator comments regarding PR interface with CPO	Finding	Test Player	Q-2
5	Subjective operator comments regarding PR interface with Load Carrying Equip-Equipment (LCE)	Finding	Test Player	Q-2

*Each data number is preceded with a paragraph prefix of "2.2.5.5.2".

2.2.5.5.3 Data collection, reduction, and analysis

a. Data collection. To collect data to assess the criterion of this paragraph, a data collector will record any incidents which impact the area of equipment compatibility at the operator level. A questionnaire will be administered to obtain test player opinion of the compatibility of the PR.

b. Data reduction. Information collected to assess the criterion of this paragraph will be both objective and subjective. The objective data will be in the form of a record of compatibility at the operator level. The subjective data will be in the form of test player comments about operator equipment compatibility of the PR. Pertinent comments will be tabulated in the final report.

c. Data analysis. If there are no incidents, and subjective data indicates that there are no equipment compatibility considerations associated with the PR, then the criterion of this paragraph will be answered favorably.

2.3 Overall analytical summary. This CEP will be limited to those criterion which can be tested locally. Only those criterion evaluated will be addressed as favorable or unfavorable in meeting the PR operational suitability and effectiveness requirements. It is not the intent of this CEP to fully address all issues or RAM in their totality, but rather surface information in these area on a limited basis as events occur. Criterion which have been underlined throughout the operational issues and criteria will not be addressed in this CEP.

APPENDICES

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APPENDIX A

OUTLINE TEST PLAN (OTP)

93-OT-ENBD-1305-1, 29 Aug 89

(Published and Distributed Separately)

By

TEXCOM ARMOR AND ENGINEER BOARD

FORT KNOX, KY 40121

93-OT-ENBD-1305-1, 29 Aug 89

APPENDIX B

POINTS OF CONTACT

ORGANIZATION	OFFICE SYMBOL	ACTION OFFICER	AUTOVON	FUNCTION
PM NBCDS, Aberdeen Proving Ground, MD 21010-5401				
	AMCPM-NN-TM	LTC Elkins	584-4251	Program Sponsor
	AMCPM-NN-TM	Mr. James Nealon	584-3888/2035	Project Officer
		Mr. Kevin Emery	584-4251	Project Officer
USACMLS (CBT DEV) Fort McClellan, AL 36205-5020				
DCD, TED	ATZN-CM-CT	Mr. Chuck Trull	865-5267/3100	Project Officer
DCD, TED	ATZN-CM-CT	Mr. Don Witt	865-5267/3100	Project Officer
DCD, PMO	ATZN-CM-C	Ms. Angela Robinson	865-5771	Program Analyist
DCD, MLSD	ATZN-CM-CS	Mr. Larry Daum	865-5569/3986	Project Officer
DOT	ATZN-CM-N		865-	Trainer
DOTD, New Systems Training Branch				
Unit Tng	ATZN-CM-FU	Mr. Jimmy Goss	865-5786	
Tng Devices	ATZN-CM-F	Mr. Tom Carroll	865-4779/5780	Training Developer
Radiation Lab	ATZN-CM-NR	SFC Castille	865-5024	
Radiation Lab	ATZN-CM-NR	Mr. Charles A. Sondhaus	865-5919	
USACECOM (MAT DEV) Fort Monmouth, NJ 07703-5303				
EW/RSTA	AMSEL-RD-EW-SS	Ms. Kim Black	995-4075/3203	Technical Developer
CED	AMSEL-PA-EE	Mr. (Dr.) John J. Soos	992-2918	Test & Evaluation
CED		Mr. Thomas Colegar	992-8461	Quality Tester
CSE		Mr. David Cruz	992-0700	Project Officer
CED		Mr. Harvey Lai	995-4709	Project Officer
LOG	AMSEL-LC-LO-E	Mr. William Hagelin	995-3126	Project Officer
	AMSEL-LC-LM-E	Ms. Patti Cushion	992-8428	Project Officer
	AMSEL-LC-LM-E	Ms. June Kahlert	992-4944	Project Officer
	AMSEL-RD-EW-SS	Mr. Bekir Osman	995-3206	Project Officer

APPENDIX B

POINTS OF CONTACT

ORGANIZATION	OFFICE SYMBOL	ACTION OFFICER	AUTOVON	FUNCTION
TEXCOM Armor and Engineer Board, Fort Knox, KY 40121-5470				
ARENBD	ATCT-AE	Mr. L. Hasty	464-8331	Opn Tester/Evaluator
CRDEC, Aberdeen Proving Ground (Edgewood Area), MD 21010-5423				
	SMCCR-FP			
	SMCCR-DD			
		Mr. (Dr.) Heimbach	584-	Project Engineer
U.S. Army TMDE Support Group, Redstone Arsenal, AL 35898-5400				
	AMXTM-SR			
	AMXTM-LMM			
OPTEC, Park Center IV, 4501 Ford Avenue, Alexandria, VA 22302-1458				
OEC	CSTE-CS	CPT Curtis Diggs	289-0363	OIE
		CPT Rob Sarini	289-0382	OIE
TRADOC, Fort Monroe, VA 23651-5000				
	ATCD-GB	CPT Ken Nelson	680-4412	Project Officer
USAAVNC, Fort Rucker, AL 36362-5000				
	ATZQ-CS	CPT Steven R. Gambrel	558-4576	
U.S. Army Laboratory Command, Aberdeen Proving Ground, MD 21005-5001				
USAHEL			298-5924	Project Officer
USAEPG, Fort Huachuca, AZ				
		Mr. George Broxton	821-8100	Project Officer
		Mr. Dick Sears	821-8100/8118	Project Officer

APPENDIX B

POINTS OF CONTACT

ORGANIZATION	OFFICE SYMBOL	ACTION OFFICER	AUTOVON	FUNCTION
USATECOM, Aberdeen Proving Ground, MD 21005-5000				
		Mr. William M. Roberts	298-4266	Tech Tester
		Mr. Wilfred R. Hoafat	298-5278	Tech Assessor
USATSC, Fort Eustis, VA 23604				
		Mr. John Childress	927-3653	Project Officer
USAMSAA, Aberdeen Proving Ground, MD 21005-5071				
			298-	Log Evaluator
HQ TEXCOM, Fort Hood, TX 76541 (FAX - (817) 288-1644				
	CSTE-OP	COL Sisson	738-1024	Chief, Operations
	CSTE-TMA	MAJ Waggoner	738-9409 738-1483	Methodology & Analysis
TEXCOM Field Artillery Board, Fort Sill, OK 73503				
FABD	ATCT-FA	Mr. Don Krejcarek	639-4400/6202/5909	Project Officer
Modern Technologies Corporation		Mr. Tom Poskaitis	(201)530-9026	

APPENDIX C

TEST ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL IMPACT STATEMENT

1. The environmental impact of this CEP is considered insignificant as no chemical simulants or radiological agents will be employed outside the USACMLS Radiological Laboratory.

2. The USACMLS Radiological Laboratory currently operates within guidelines and constraints specified by appropriate radiological control agencies, safety agencies, and environmental control agencies. USACMLS approval authority for use of radiation sources at the USACMLS are available for review at the USACMLS Radiation Laboratory, Sibert Hall, Building 1081, Fort McClellan, AL 36205-5020.

APPENDIX D

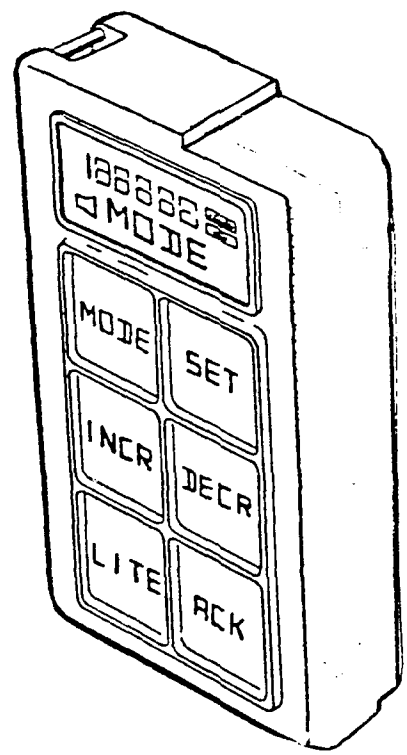
SYSTEM DESCRIPTION

POCKET RADIAC, AN/UDR-13

SYSTEM DESCRIPTION

1. The AN/UDR-13 Pocket RADIAC (PR) Advanced Development Model is a Pocket-sized, battery powered instrument designed to measure tactical levels of gamma radiation dose rate in units of centiGray/hour (cGy/hr) and the combined gamma and neutron dose in units of cGy. The range of the instrument is 0.1 to 999.9 cGy/hr for dose rate and 1 to 1999.9 cGy for dose.

Pocket RADIAC



2. Pocket RADIAC Key Operations. The PR has three states of operation: "ON", "SLEEP", and "OFF".

a. ON: In the "ON" state the PR is fully operational and can be used as described in the following instructions. To turn the PR "ON", depress the "MODE" key.

NOTE: In the "ON" state the PR draws typically 12mA of supply current from the battery.

b. SLEEP: To conserve battery power, the PR has a "SLEEP" state. In the "SLEEP" state, power to most of the circuitry is turned off and the microprocessor's clock is stopped. The "SLEEP" state reduces the PR power consumption to typically 90uA.

NOTE: The operator cannot put the PR into the 'SLEEP" state directly. "SLEEP" is controlled by the hardware/software in the following manner: When the PR is turned "ON", the PR will put itself to sleep after 5 minutes unless there is an alarm condition or one of the PR keys has been depressed. If there is an alarm condition, the PR will stay in the "ON" state until 5 minutes after the alarm condition no longer exists and has been acknowledged by depressing the "ACK" key. The PR will also stay in the "ON" state for 5 minutes if a key has been depressed. If multiple keys are depressed, the PR will remain on 5 minutes after the last key has been depressed. Once in the "SLEEP" state, the PR will stay in "SLEEP" for 64 seconds. The operator

can force the PR out of "SLEEP" by depressing the "MODE" key. Once the PR comes out of the "SLEEP" state on it's own, it will remain in the "ON" state for 10 seconds. After 10 seconds the PR will go back to "SLEEP" unless one of the conditions described occurs.

c. OFF: In the "OFF" state, power is removed from all but one circuit. This is the PR lowest power consumption state. In the "OFF" state power consumption is reduced to typically 100 nA. NOTE: The "OFF" state disables the PR from detecting the presence of radiation. To place the PR in the "OFF" state, advance the "SET" display to "PWR" and press either the "INCR" or the "DECR" key so that "PWR-" is displayed in the Liquid Crystal Display (LCD) window. Then depress either the "MODE" key or the "SET" key and the PR will turn off.

3. PR Key Pad Key Description and Purpose:

a. MODE.

(1) RATE: Dose Rate Display.

(2) VRAT: Vehicle Rate Display.

(3) MDOS: Mission Dose Display (Dosimeter).

(4) TDOS: Total Dose Display (Dosimeter).

(5) BAT%: Remaining Battery Voltage Percent Display.

b. SET.

(1) PWR: Select Power ON/OFF.

(2) RTAL: Set Rate Alarm Set Point.

(3) VFAC: Set Vehicle Protection Factor Set Point.

(4) MDAL: Set Mission Dose Alarm Set Point.

(5) MDR: Select Mission Dose Reset.

(6) ALM: Select Alarm ON/OFF.

(7) AUD: Select Audio Alarm ON/OFF.

(8) SAV: Select Save Option.

c. INCR: Increase (Numeric) or Toggle +/-.

d. DECR: Decrease (Numeric) or Toggle +/-.

e. LT: Turn On Backlight.

f. ACK: Acknowledge Alarms or Activate BIT.

4. Key Pad Functions. All functions of the PR are controlled and accessed from the Key Pad located on the front of the instrument. Description of these functions and other PR functions are further defined in Appendix I to this TEP.

APPENDIX E

INSTRUMENTATION, EQUIPMENT, FACILITIES, AND RANGES AND TRAINING AREAS

INSTRUMENT REQUIREMENTS

TYPE	QTY	INCL DATES	SOURCE
Pocket RADIAC	15	T-15/T+20	EW/RSTA, CECOM
Stopwatches	6	T-0/T+20	Ft McClellan
Still Camera, 35MM	1	T-0/T+20	Ft McClellan
Video Camera & Monitor	1	T-0/T-20	Ft McClellan

EQUIPMENT REQUIREMENTS

Binoculars	2	T-5/T-20	Ft McClellan
BA-5372/U Lithium Sulpher Dioxide Battery	45	T-15/T+20	EW/RSTA, CECOM
Voltmeter	1	T-15/T+5	Ft McClellan
Thermometer	1	T-0/T-20	Ft McClellan
Trk 2 1/2 T M35A2	1	T-0/T+20	Ft McClellan
Trk Cargo M1008A2	2	T-0/T+20	Ft McClellan

FACILITIES

TYPE	INCL DATES	LOCATION
Radiation Laboratory	T-5/T+30	Ft McClellan

RANGES AND TRAINING AREAS

DESIGNATION	LOCATION (AREA/GRID COORDINATES)
To Be Determined	

APPENDIX F

GLOSSARY

(To Be Published)

APPENDIX G

ABBREVIATIONS

AD	Advanced Development
AMC	United States Army Materiel Command
AR	Army Regulation
BDU	Battle Dress Uniform
CDR	Critical Design Review
CECOM	United States Army Communications-Electronic Command
CEP	Concept Evaluation Program
COIC	Critical Operational Issues and Criteria
cu	Cubic
cGy	Centigrey
CPO	Chemical Protective Overgarment
CTA	Common Table of Allowance
DOT	USACMLS Directorate of Training
ED	Engineering Design
EMI	Electromagnetic Interference
FONECON	Telephone Conversation
FRAGO	Fragmentation Order
FSD	Full Scale Development
FY	Fiscal Year
HAEMP	High Altitude Electromagnetic Pulse
IAW	In Accordance With
IER	Independent Evaluation Report
IKP	Instructor-Key Personnel
IM	Ionization Meter
IOA	Independent Operational Assessment
IP	Initial Point
IPR	In Process Review
MANPRINT	Materiel, Personnel Integration
MATDEV	Materiel Developer
MOPP	Mission Oriented Protective Posture
MOS	Military Occupational Specialty
MS	Milestone
MTBOMF	Mean Time Between Operational Mission Failure
NET	New Equipment Training
NBC	Nuclear, Biological, and Chemical
NWE	Nuclear Weapons Effects
OTP	Outline Test Plan
OTRR	Operational Test Readiness Review
OTRS	Operational Test Readiness Statement
oz	ounces
P^3I	Preplanned Product Improvement
PMNBCDS	Program Manager, Nuclear, Biological and Chemical Defense Systems
PR	Pocket RADIAC

APPENDIX G

ABBREVIATIONS (CONTINUED)

RADIAC	Radioactivity, Detection, Indication, and Computation
RAM	Reliability, Availability, and Maintainability
ROC	Required Operational Capability
SIPR	Special In Process Review
SOP	Standing Operations Procedures
SSP	System Support Package
TC	Type Classification
TDP	Technical Data Package
TECOM	United States Army Test and Evaluation Command
TEMP	Test Evaluation Master Plan
TEP	Test Evaluation Plan
TEXCOM	Test and Experimentation Command
TIR	Test Incident Report
TOE	Table of Orginization and Equipment
TR	Test Report
TRADOC	United States Army Training and Doctrine Command
TTSP	Training Test Support Package
TSP	Doctrinal and Organizational, and Threat Support Package
USACMLS	United States Army Chemical School
USANCA	United States Army Nuclear-Chemical Agency
VDC	Voltage Direct Current

APPENDIX H

REFERENCES

AR 71-3, Force Development User Testing

AR 70-38, Research Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions

TRADOC Regulation 71-3, TRADOC Evaluation, Test, and Experimentation, 29 Aug 89

TRADOC Regulation 71-9, User Testing and Evaluation

Memorandum, ATCL-MRP, U.S. Army Logistics Center, Subject: RAM Rationale Report (RRR) for the Pocket RADIAC (PR), 8 May 87

Memorandum, ATZN-CM-CS, USACMLS, Subject: Redistribution of the Operational and Organizational (O&O) Plan for the Pocket RADIAC (PR), 21 Nov 88

Outline Test Plan (OTP), ATCT-AE-EN, 93-OT-ENBD-1305-1, Pocket RADIAC (PR), AN/UDR-13, Initial Operational Test & Evaluation, 29 Aug 89

Memorandum, ATZN-CM-CT, USACMLS, Subject: Approved Critical Operational Issues and Criteria (COIC) for Pocket RADIAC (PR), 8 Feb 90

Memorandum, USACMLS, ATZN-CM-CT, Subject: FY91 Concept Evaluation Program Schedule and Review Committee (CEPSARC), 5 Jul 90

Memorandum, ATCL-MES, U.S. Army Logistics Center and Fort Lee (Prov), Subject: RAM Rationale Report for Pocket RADIAC Trainer (PRT)

Memorandum, PM NBC Defense Systems, AMCPM-NN-TM, Subject: Test and Evaluation Master Plan (TEMP) for AN/UDR-13 Pocket RADIAC, 6 Aug 90

Message, TRADOC, ATCD-EP, 091500Z Sep 90, Subject: FY91 TRADOC Concept Evaluation Program Scheduling and Review Committee (CEPSARC) Results

APPENDIX H

REFERENCES (CONTINUED)

Memorandum, ATZN-CM-CS, USACMLS, Subject: Draft Required Operational Capability for the Pocket RADIAC (PR), AN/UDR-13, 6 Nov 90

Message, PM NBC Defense Systems, AMCPM-NN-TM, 091430Z Nov 90, Subject: AN/UDR-13 Pocket RADIAC Concept Exploration Program (CEP), 91-CEP-809

Memorandum, PM NBC Defense Systems, AMCPM-NN-TM, Subject: AN/UDR-13 Pocket RADIAC (PR) Concept Exploration Program (CEP) Schedule, 21 Nov 90

Message, PM NBC Defense Systems, AMCPM-NN-TM, 280345Z Nov 90, Subject: AN/UDR-13 Pocket RADIAC Concept Exploration Pogram (CEP), 91-CEP-809

APPENDIX I

TRAINING PLAN

APPENDIX I

TRAINING PLAN

FOR THE

ADVANCED DEVELOPMENT MODEL OF THE POCKET RADIAC (AN/UDR-13)

POCKET RADIAC OPERATING INSTRUCTIONS

SECTION I INTRODUCTION.

a. The AN/UDR-13 Pocket RADIAC (PR) Advanced Development Model is a Pocket-sized, battery powered instrument designed to measure tactical levels of gamma radiation dose rate in units of centiGray/hour (cGy/hr) and the combined gamma and neutron dose in units of cGy. The range of the instrument is 0.1 to 999.9 cGy/hr for dose rate and 1 to 1999.9 cGy for dose.

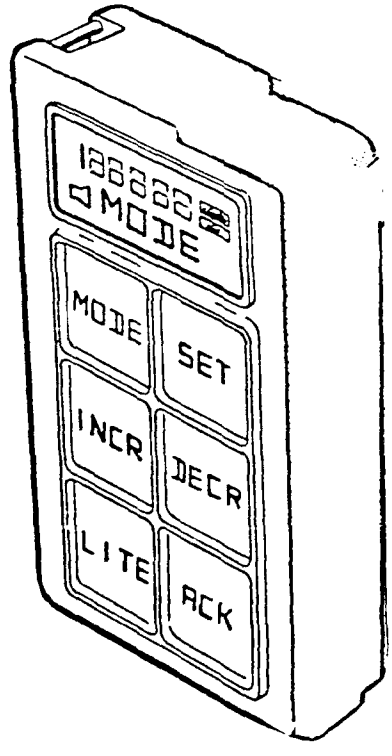
b. This Training Plan provides the necessary instructions to operate the Advanced Development Model of the PR. It is recommended that the user read through these instructions from start to finish to gain an understanding of the proper operation of the Advanced Development Model of the PR.

NOTE: If the operator runs into any problems, contact the Concept Evaluation Program (CEP) Test Officer for assistance.

SECTION II POCKET RADIAC (PR) OPERATION.

a. General. The best way to go through this section is with the Advanced Development Model of the PR in your hand so that you can operate the unit as you read/follow instructions. The PR has been designed for ease of use by the operator while still incorporating the latest developments in technical power. See Figure 1-1.

Figure 1-1. Pocket PADIAC.



b. Pocket RADIAC Key Operations. The PR has three states of operation: "ON", "SLEEP", and "OFF".

(1) ON: In the "ON" state the PR is fully operational and can be used as described in the following instructions. To turn the PR "ON", depress the "MODE" key.

NOTE: In the "ON" state the PR draws typically 12mA of supply current from the battery.

(2) SLEEP: To conserve battery power, the PR has a "SLEEP" state. In the "SLEEP" state, power to most of the circuitry is turned off and the microprocessor's clock is stopped. The "SLEEP" state reduces the PR power consumption to typically 90uA.

NOTE: The operator cannot put the PR into the 'SLEEP" state directly. "SLEEP" is controlled by the hardware/software in the following manner: When the PR is turned "ON", the PR will put itself to sleep after 5 minutes unless there is an alarm condition or one of the PR keys has been depressed. If there is an alarm condition, the PR will stay in the "ON" state until 5 minutes after the alarm condition no longer exists and has been acknowledged by depressing the "ACK" key. The PR will also stay in the "ON" state for 5 minutes if a key has been depressed. If multiple keys are depressed, the PR will remain on 5 minutes after the last key has been depressed. Once in the "SLEEP"

state, the PR will stay in "SLEEP" for 64 seconds. The operator can force the PR out of "SLEEP" by depressing the "MODE" key. Once the PR comes out of the "SLEEP" state on it's own, it will remain in the "ON" state for 10 seconds. After 10 seconds the PR will go back to "SLEEP" unless one of the conditions described occurs.

(3) OFF: In the "OFF" state, power is removed from all but one circuit. This is the PR lowest power consumption state. In the "OFF" state power consumption is reduced to typically 100 nA. NOTE: The "OFF" state disables the PR from detecting the presence of radiation. To place the PR in the "OFF" state, advance the "SET" display to "PWR" and press either the "INCR" or the "DECR" key so that "PWR-" is displayed in the Liquid Crystal Display (LCD) window. Then depress either the "MODE" key or the "SET" key and the PR will turn off.

c. PR Key Pad Key Description and Purpose:

(1) MODE.

(a) RATE: Dose Rate Display.

(b) VRAT: Vehicle Rate Display.

(c) MDOS: Mission Dose Display (Dosimeter).

(d) TDOS: Total Dose Display (Dosimeter).

(e) BAT%: Remaining Battery Voltage Percent Display.

(2) SET.

(a) PWR: Select Power ON/OFF.

(b) RTAL: Set Rate Alarm Set Point.

(c) VFAC: Set Vehicle Protection Factor Set Point.

(d) MDAL: Set Mission Dose Alarm Set Point.

(e) MDR: Select Mission Dose Reset.

(f) ALM: Select Alarm ON/OFF.

(g) AUD: Select Audio Alarm ON/OFF.

(h) SAV: Select Save Option.

(3) INCR: Increase (Numeric) or Toggle +/-.

(4) DECR: Decrease (Numeric) or Toggle +/-.

(5) LT: Turn On Backlight.

(6) ACK: Acknowledge Alarms or Activate BIT.

d. Key Pad Functions. All functions of the PR are controlled and accessed from the Key Pad located on the front of the instrument. These functions include: "MODE", "SET", "INCR", "DECR", "LT", and "ACK".

(1) MODE: The "MODE" key is used to choose the type of calculated data that is displayed in the LCD window. There are FIVE MODES: "RATE", "VRAT", "MDOS", "TDOS", and "BAT%". These MODES are accessed sequentially by depressing the "MODE" key.

These MODES can only be accessed in the FORWARD direction, i.e., if you miss the MODE you desire, continue depressing the MODE key until the desired MODE returns to the window. The function of these displayed MODES are as follows:

(a) RATE: Dose Rate Display: The "RATE" MODE displays the current radiation dose rate in cGy/hr. The displayed dose rate is updated every 2.5 seconds. A number is displayed on the first line of the display, "RATE" is displayed on the second line and a small flag at the right displays the units, "cGy/hr". If the PR is in a dose rate alarm condition, a radiation pinwheel "icon" symbol and the word ALARM appear on the right of the display. In addition the "cGy/hr" icon will flash.

(b) VRAT: Vehicle Rate Display: The "VRAT" MODE displays the dose rate described above multiplied by the vehicle protection factor (VFAC). A description of the "VFAC" is listed in SECTION II, paragraph d(2)(c) below.

(c) MDOS: Dosimeter Mission Dose Display: The "MDOS" MODE displays the total dose received since the last Mission Dose Reset (MDR). A description of "MDR" is listed in SECTION II, paragraph d(2)(e) below. The calculation is performed every eight seconds while in the "MDOS" or "TDOS" MODE with the display updated every 2.5 seconds. In other MODES, The "MDOS" calculation is performed once per minute. A number is displayed on the first line of the display, "MDOS" is displayed

on the second line and a small flag at the right displays the units, "cGy". If the unit is in a "MDOS" alarm condition, a radiation pinwheel "icon" symbol with the word ALARM directly below it will appear. In addition, the "cGy" icon will flash.

NOTE: The alarms are produced only for mission dose values (not total dose values).

(d) TDOS: Dosimeter Total Dose Display: The "TDOS" MODE displays the total dose that the Dosimeter has received. It is not resettable. The calculation is performed every eight seconds while in the "TDOS" or "MDOS" mode with the display updated every 2.5 seconds. In other modes, the "TDOS" calculation is performed once per minute. A number is displayed on the first line of the display, "TDOS" is displayed on the second line and a small flag at the right displays the units, "cGy". No alarms are produced for total dose.

(e) BAT%: Battery Voltage Percent Display: The "BAT%" MODE displays the battery voltage as a percentage of the PR usable range. The percentage displayed is based on a linear function between 4.5 volts and 6.2 volts. Values between 1 and 99% indicates that the battery is usable. A 0% value indicates that the battery voltage is less than 4.5 VDC and needs to be replaced. A 100% value indicates that the battery voltage is greater than 6.2 VDC and needs to be replaced.

(2) SET: The "SET" key is used to display and alter operator adjustable set points in conjunction with the "INCR" and "DECR" keys. There are currently 8 "SET" points supported on the PR. These "SET" points are "PWR', "RTAL", "VFAC", "MDAL", "MDR", "ALM", "AUD", and "SAV". There are two different types of set points; "Numeric" and "ON/OFF". The function of each of the set points and types of set points is as follows:

(a) PWR: Power ON/OFF: When using this "SET" MODE, the power to the PR can be turned "ON" or "OFF" by depressing the appropriate "INCR" or "DECR" key.

1. To turn the power "ON", advance the "SET" display to "PWR" and depress either the "INCR" or "DECR" key so that "PWR+" is displayed. Then depress either the "MODE" key or the "SET" key and the unit will turn "ON".

2. To turn the power "OFF", advance the "SET" display to "PWR" and depress either the "INCR" or "DECR" key so that "PWR-" is displayed. Then depress either the "MODE" key or the "SET" key and the unit will turn "OFF". The display is blank in the "OFF" state.

(b) RTAL: Rate Alarm Set Point: The "RTAL" set point is used to set the alarm threshold for the dose rate meter. If the radiation dose rate exceeds the set point, the PR will go into alarm and actuate the backlight and audio alarms if these

options are enabled (see "ALM" and "AUD" in paragraphs IId(2)(f) and (g) below). The dose rate alarm set point is increased and decreased by depressing the "INCR" or "DECR" key. The alarm can be acknowledged using the "ACK" key. Any change to "RTAL" after power up is retained during the "SLEEP" state.

NOTE: The "RTAL" dose rate alarm will always power up from the "OFF" state as 1 cGy/hr DEFAULT setting. The "SAV" function will not change this power up DEFAULT setting.

(c) VFAC: Vehicle Factor Set Point: The Vehicle factor is used to adjust the dose rate display for the shielding value of a vehicle that the PR may be installed or carried in. The vehicle factor "SET" point is increased or decreased by depressing either the "INCR" or "DECR" key.

NOTE: EXAMPLE: If the radiation level inside a vehicle or shelter is 10 times lower than the "outside" radiation level, a "VFAC" of 10 would be entered as the vehicle factor, and all subsequent PR readings would be automatically multiplied by 10 giving a reading representing the "outside" radiation level.

(d) MDAL: Mission Dose Alarm Set Point: The MDAL "SET" point is used to "SET" the alarm threshold for the dosimeter. If the mission dose exceeds this set point, the PR will go into alarm and actuate the audible alarm and visual alarm if these options are enable. The Mission Dose Alarm Set Point is

increased and decreased by depressing either the "INCR" or "DECR" key. The alarm can be acknowledged using the "ACK" key.

(e) MDR: Mission Dose Reset Set Point: The "MDR" set point is used to "SET" the Mission Dose to ZERO (0.0)(This can be likened to a resettable trip odometer on a car). Once a dosimeter has been reset it will read approximately zero in the "MDOS" mode until it is irradiated. "MDOS" will then read the amount of dose accumulated since the dosimeter was last reset. To reset the Mission Dose, depress either the "INCR" or "DECR" key until "MDR+" is displayed in the "LCD" window. The dosimeter reading will reset once either the "MODE" or the" SET" key is depressed.

NOTE: Observe that "WAIT" is displayed in the window while the reset is being implemented.

(f) ALM: Alarm ON/OFF: The Alarm ON/OFF set point is used to enable or disable the backlight and audio options for Dose Rate and Mission Dose alarms. When "OFF", the backlight and audio alarms are disabled. The "INCR" or "DECR" keys can be used to enable or disable this option. When "ON", a plus sign is displayed after 'ALM+'. When "OFF", a minus sign is displayed after 'ALM-'.

(g) AUD: Audio Alarm On/Off: The Audio Alarm "ON/OFF" set point is used to enable or disable "ONLY" the audio

portions for the Dose Rate and Mission Dose Alarms. When "OFF", audio alarm operation is disabled. The "INCR" or "DECR" keys can be used to enable or disable this option. When "ON", a plus sign is displayed after "AUD+". When "OFF", a minus sign is displayed after "AUD-".

NOTE: Both the "ALM" and "AUD" must be "ON" (+) for the audio alarm to sound during an alarm condition.

(h) SAV: Save: The Save set point allows the storage of the "VFAC" and "MDAL" as new power-up "DEFAULT" values. When "ON", the current values of "VFAC" and "MDAL" will be stored in non-volatile memory for use as the power-up "DEFAULTS".

(3) INCR/DECR: The "INCR" and "DECR" keys are used to alter the set points mentioned earlier. There are two different type of set points: "NUMERIC" and "ON/OFF". NUMERIC set points are adjustable numeric values that are displayed and can be incremented (Increased) or decremented (Decreased) by depressing the "INCR" or "DECR" keys. "ON/OFF (+/-)" set points can be toggled by pressing either the "INCR" or "DECR" keys.

NOTE: If the "INCR" or "DECR" key is held down for 1 second the set point will increase or decrease automatically. If the Key is held down still longer, the set point will automatically increase or decrease at a faster rate.

(4) LT: Backlight On/Off: The "LT" key is used to activate the display backlight when using the PR at night or low light situations. When the "LT" key is depressed, the backlight will come "ON" and remain lit for approximately 5 seconds.

(5) ACK: Alarm Acknowledge/Built in Test (BIT): The "ACK" key is used to acknowledge alarms. The alarm logic works as follows:

(a) When an alarm occurs, the alarm display icon turns "ON" and the backlight and audio alarms active, if enabled. Depressing the "ACK" key will deactivate the backlight and audio alarms but the alarm display icon will stay ON until the radiation level decreases below the alarm set point.

(b) The "ACK" key is also used to run the BIT function of the PR. To run the test, the PR must be in one of its' FIVE main MODES ("RATE", "VRAT", "MDOS", "TDOS", or "MAT%"). Once the PR is in one of these MODES, depress and hold the "ACK" key for at least 5 seconds. The PR will display "1888.8" on the top line of the display and "*****" on the bottom line. At the same time the icons will be turned "ON". The backlight and audio alarms will also be turned "ON", if enabled. The PR remains in this state for approximately 1 - 2 seconds. If there is a problem with the display, audio alarm or backlight, it can be observed at this time. The PR will then display "BIT" followed

by "RATE". At this point the PR exercises the Dose Rate meter portion of the circuitry. If the Dose Rate meter is not working properly, the upper display will be a small value. If the Dose Rate meter is working properly, a Dose Rate of greater than 100 CGy/Hr will be displayed. The actual number displayed is unimportant. If the PR displays more than 100 cGy/Hr, a "PASS" will be displayed and the PR will return to the MODE it was in when "BIT" was initiated.

d. Basic Operation.

(1) When the PR is placed into operation, "ON", the operator depresses the "MODE" key. The unit will then undergo a comprehensive "BIT" designed to give the operator direct feedback that the PR is operating properly. "TEST" is displayed as an indication that the comprehensive "BIT", is running. If a FAULT is detected, ONE of THREE error types will be displayed. These are, "BIT", "RTER", and "DSER". The numeric portion of the display will display #.E (# = Error Code Number). When this occurs, refer to the CEP Test Officer. If no FAULT is detected during this "BIT", the PR should go into the "RATE" monitor MODE.

(2) At this time, you can set your alarm check points (i.e., "MDAL", '"DR", "RTAL", etc.).

NOTE: As a minimum, you should check and verify these set points.

(3) After the alarms have been set to your satisfaction, place the unit in the correct monitor MODE by depressing the "MODE" key until the correct MODE is displayed.

NOTE: If a MODE selection is not made within 1 minute of depressing the last key, the unit will DEFAULT to the "RATE" monitor MODE.

(4) During normal "RATE" monitoring, the unit will continuously monitor the "RATE" for 5 minutes (after entering RATE MODE). At the end of the 5 minute period, if the radiation level does not exceed the alarm threshold, the PR will go into the "SLEEP" state. The PR will turn "ON" every minute and monitor the "RATE" for 5 seconds. If an alarm condition still does not exist, the PR will return to the "SLEEP" state and the process is recycled. If an alarm condition exists in either of the above situations, the PR will alarm (visual, audio or both, depending on the alarm settings) and remain "ON" until the alarm condition ceases to exist.

SECTION III BUILT IN TESTS (BIT).

a. The PR includes expanded "BIT" functions. These tests give the operator direct feedback that the unit is operating properly.

b. When the PR is placed into operation, "ON", the operator depresses the "MODE" key. The unit will then undergo a comprehensive "BIT" designed to give the operator direct feedback that the PR is operating properly. "TEST" is displayed as an indication that the comprehensive "BIT", is running. If a FAULT is detected, ONE of THREE error types will be displayed. These are, "BIT", "RTER", and "DSER". The numeric portion of the display will display #.E (# = Error Code Number). (NOTE: When this occurs, refer to unit to the CEP Test Officer). If no FAULT is detected during this "BIT", the PR should go into the "RATE" monitor MODE.

c. If "BIT" is displayed, this indicates an error which affects both the Dose Rate and Dose functions and means the PR cannot be used. At this point all functions of the PR are disabled and the PR can only be turned OFF.

d. If "RTER" is displayed, this indicates a problem in only the Dose Rate portion of the PR. The dosimeter portion can still be used. When "RTER" is displayed, all functions are locked out until the "ACK" key is depressed. Once the "ACK" key is depressed, the PR can be used as normal except #.E will be in "RATE" and "VRAT" modes.

e. If "DSER" is displayed, this indicates a problem in only the dosimeter portion of the PR. The Rate portion can still be used. When "DSER" is displayed, all functions are locked out

until the "ACK" key is depressed. Once the "ACK" key is depressed, the PR can be used as normal except #.E will be displayed in "MDOS" and "TDOS" MODES.

f. If an out of normal condition is sensed, ONE of THREE error types will be displayed. If any ONE of the THREE error types occur, contact the CEP Test Officer and report the condition.

g. The following is a listing of error numbers:

(1) BIT Errors:

(a) 0.E RAM test failure.

(b) 1.E Unable to measure reference voltages.

(c) 2.E EPROM checksum failure.

(d) 3.E EEPROM checksum failure.

(e) 4.E A microprocessor port pin is in a frozen state.

(f) 5.E VBIAS failure.

(g) 6.E The EEPROM cannot be written to.

(h) 7.E No response from the EEPROM.

(i) 8.E Calibration failure.

(i) 9.E Calibration failure.

(j) 10.E Calibration failure.

(k) 55.E RAM test failure.

(2) RTER Error:

0.E The Dose Rate meter did not count injected pulses.

(3) DSER Errors:

(a) 0.E A port pin is in a frozen state.

(b) 3.E Cannot read gamma dosimeter.

(c) 4.E Cannot read gamma dosimeter.

(d) 5.E Cannot read gamma dosimeter.

(e) Initial offset of gamma dosimeter too high.

(f) Conflicting information on gamma dosimeter read.

(g) Temperature greater than 700 C.

g. Comprehensive "BIT" tests are run on power up ("TEST" is displayed), when coming out of "SLEEP" ("TEST" is displayed) and when "BIT" is activated by the operator (as described in SECTION II, Paragraph IIb above). Also, certain "BIT" tests are run at various points in time during normal operation. If the PR passes the "BIT" tests the unit should operate as normal.

SECTION IV BATTERIES.

a. The PR is designed to use a military BA-5372/U Lithium Battery. This 6 volt battery is manufactured by Power Conversion Inc.

b. To install a new battery, place the PR in the 'OFF' state and remove the cap on the lower left hand side of the PR by turning it in a counter clockwise direction. Remove the battery to be replaced. Install the new battery with the flat (+ terminal) end of the battery going into the PR first. Replace

the cap. Observe that this + terminal on the flat end is different from most batteries.

```
**********************************************************************
* NOTE:  PERMANENT DAMAGE TO THE PR CAN OCCUR IF THE SUPPLY          *
* VOLTAGE EXCEEDS 6.2 VOLTS DC.  REPLACE ANY BATTERY WITH A          *
* BAT% READING OF 100%.                                              *
**********************************************************************
```

SECTION V CALIBRATION CHECK.

a. Calibration verification is not a normal operating mode and should only be used by qualified personnel. The PR has a special mode to check the operation of the Dose Rate meter using an AN/UDM-2 Calibration Set. To access this mode, depress the "SET" key until "SAV-" is displayed. Now depress the "LT" key. "CAL-" will appear on the "LCD" display. Depress "INCR" or "DECR" until "CAL+" is displayed. Depress the "MODE" key until you are in "VRAT". Now the PR is ready to verify calibration with the AN/UDM-2. (NOTE: The PR is now in a check Mode and should not be used as a Dose Rate meter.

b. The operator performing calibration verification must be familiar with the AN/UDM-2 Calibration Set radiation source prior to any calibration verification check on a PR.

c. To perform a calibration verification check, put the PR into the "VRAT" mode after "CAL+" and slide out the stainless steel shield (about one inch square) at the top back of the PR.

The Dose Rate meter detector is directly behind the center of this shield. The detector is close to the back of the PR with its center 1/4 inch in from the back housing surface.

NOTE: Refer to Figure 1-3 of the AN/UDM-2 Technical Manual (TM) 11-6665-227-12. Remove the Cover Plate from the TS-3494/UDM-2.

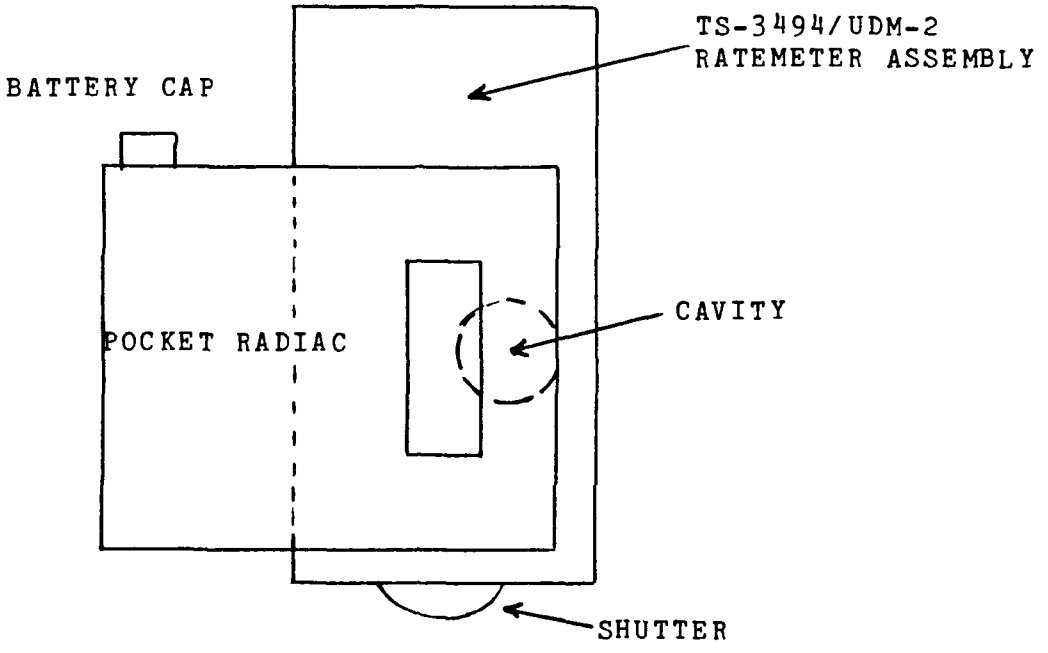
****
* THE OPERATOR MUST NOT PLACE ANY PORTION OF THE BODY ABOVE *
* THE AREA EXPOSED BY THE REMOVAL OF THE COVER PLATE. *
****

d. Slide the PR face up over the cavity exposed by removal of the Cover Plate such that the center of the PR shield slot is centered above the cavity opening. See the sketch at Figure 5-1. Support the battery end of the PR. This places the PR Dose Rate Meter detector directly above the AN/UDM-2 radiation source. Rotate the Shutter to the 100 position. Allow the PR to measure for 5 minutes. The "BRAT" reading will gradually rise and reach a reading generally between 18 and 26. This reading is the smoothed detector count rate in counts/second. The +/- 30 per cent acceptance criteria allows a PR to pass the verification check if its reading in this mode is between 15 and 29.

e. To resume normal operation, cycle to "CAL" and return it to "CAL-". An alternate method is to turn the PR to "OFF" and then to "ON".

****
* NOTE: REINSTALL THE STAINLESS SHIELD AFTER THE *
*CALIBRATION VERIFICATION CHECK. *
****

Figure 5-1. Pocket RADIAC Calibration Check Setup.



"Picture Not Drawn To Scale"

APPENDIX J

DISTRIBUTION

Commander
TRADOC
ATTN: ATCD-GB
Fort Monroe, VA 23651-5000

Commander
USATECOM
ATTN: AMSTE-TA-C (Mr Roberts)
APG, MD 21005-5055

Commander
USAOPTEC
ATTN: CSTE-CS (CPT Diggs)
4501 Ford Ave, Park Center IV
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