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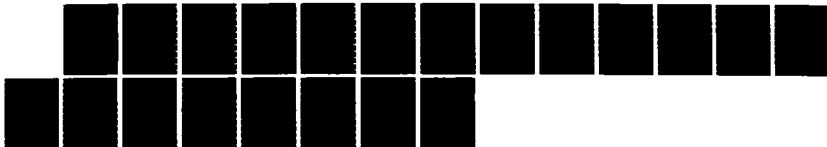
REQUIRED OPERATIONAL CAPABILITY (ROC) NUMBER INS 21131 1/1
FOR THE MEDIUM ASSAULT/ANTITANK WEAPON (MAAW) M47

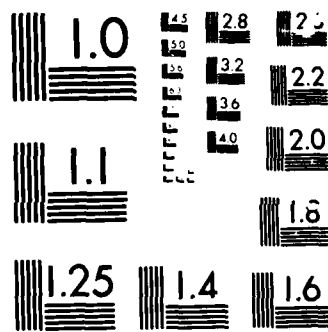
DRAGON(U) MARINE CORPS WASHINGTON DC 14 MAY 86

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HEADQUARTERS UNITED STATES MARINE CORPS
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From: Commandant of the Marine Corps
Subj: REQUIRED OPERATIONAL CAPABILITY (ROC) NO. INS 211.3.1 FOR
THE MEDIUM ASSAULT/ANTITANK WEAPON (MAAW) M47 DRAGON
Ref: (a) MCO 3900.4C
Encl: (1) ROC No. INS 211.3.1

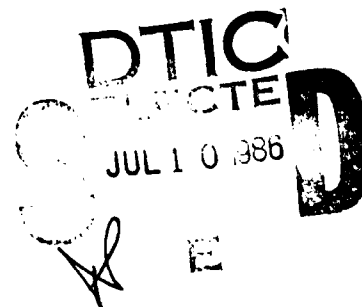
1. In accordance with the procedures set forth in the reference, ROC No. INS 211.3.1 for the Medium Assault/Antitank Weapon (MAAW) M47 Dragon is hereby established and promulgated.

2. The Commanding General, Marine Corps Development and Education Command (Director, Development Center), Quantico, Virginia 22134-5001 is the Marine Corps point of contact for any questions pertaining to this ROC and any development efforts pertaining thereto.


F. X. CHAMBERS, JR.
Colonel U. S. Marine Corps
Acting Deputy Chief of Staff for RD&S

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REQUIRED OPERATIONAL CAPABILITY
FOR PRODUCT IMPROVEMENT OF THE
MEDIUM ASSAULT/ANTI TANK WEAPON (MAAW) M47 DRAGON
ROC NO. INS 211.3.1

1. STATEMENT OF REQUIREMENT. A product improvement program (PIP) of the current M47 Dragon system is required to provide a viable Medium Assault/Anti Tank Weapon (MAAW) capability until the projected fielding of a follow-on system in the mid-1990's.

~~a.~~ Improvement of the present system is needed in the following areas:

- (1) Warhead for increased penetration,
- (2) Tracker for increased countermeasure protection, day/night capability, increased hit probability, and reduced training requirements, *and*
- (3) Missile improvements including, but not limited to, acquisition at longer ranges and decreased time of flight to maximum range.

b. The anticipated initial operational capabilities (IOC's) are:

- (1) Improved Warhead: 2nd Qtr FY88.
- (2) Improved Tracker: 3rd Qtr FY90.
- (3) Improved Missile: 3rd Qtr FY90.

The anticipated full operational capabilities (FOC's) are one year after the individual IOC's.

2. THREAT AND/OR OPERATIONAL DEFICIENCY. Because of improvements in the threat armor technology since fielding of the Dragon in 1972, the current warhead is no longer as effective as it was against threat armor. The requirement for frontal penetration has been outlined in the Marine Corps Mid-Range Objectives Plan of 8 November 1984 and Marine Corps Long Range Plan of May 1982. The improvements in the threat technology have made it infeasible to rely on the 1960's generation of countermeasures to protect the system from neutralization. The proliferation of threat armor also requires the faster target acquisition and more accurate firing of missiles. Increased tracking capability for operation in all weather environments, day and night, and in present man-made battlefield obscurants is required. Presently the high firing signature and need to remain locked on an exact spot on the target throughout the missile's slow flight preclude the firing of multiple rounds from the same position without detection. The present inventory of missiles is

being depleted rapidly both through training expenditures and expiration of shelf life. Because the follow-on system is not expected to be fielded until the mid-1990's an interim solution is necessary.

3. OPERATIONAL AND ORGANIZATIONAL CONCEPTS. Improved penetration of the warhead will allow engagement of most threat armor from the front instead of requiring a flanking or rear shot. The improved tracker will be fielded as a one-for-one replacement for the present inventory in the infantry battalion. The improved tracker will provide an all weather, day/night capability in one sight, vice the current two, and allow functioning in countermeasure environments. The improvements in the missile will enhance gunner survivability by decreasing time of flight and increasing the range.

4. ESSENTIAL CHARACTERISTICS. The following capabilities of the present system must be improved to the standards delineated below. All system capabilities not specifically defined below shall meet or exceed current Dragon system performance requirements.

a. Warhead

(1) Increased penetration by at least 80 percent (95 percent desired) over the present warhead against rolled homogeneous armor (RHA) from minimum range to at least 1,500 meters.

(2) Proper fuze functioning at oblique angles of 0° to 80°, from minimum range out to at least 1,500 meters.

b. Tracker

(1) Tracker must not exceed 16 lbs. (13 lbs. or less desired) in a ready-to-fire mode.

(2) Tracker must have a combination day/night capability.

(3) Tracker must be capable of acquiring, recognizing, and tracking a stationary target from minimum range to 1,500 meters.

(4) Tracker must be capable of acquiring, recognizing, and tracking a target moving with a crossing velocity up to 20 kph from minimum range to 1,500 meters.

(5) A tracker without an external cooling apparatus is desired.

c. Overall Characteristics. All improvements shall, when fielded, meet or exceed the appropriate military standard requirements in the following areas:

(1) Range. The system must be able to attain the hit capability levels defined in paragraph 4c(2) from a minimum range of 65 meters (25 meters desired) to a maximum range of 1,500 meters. The warhead shall be armed at ranges of 65 meters (25 meters desired) consistent with gunner safety. The improved warhead, when retrofitted on the existing missile, will result in a degradation of no more than 75 meters in range.

(2) Probability of Hit. The system must be able to hit a fully exposed standard NATO target (2.3m wide x 2.3m high x 4.6m long) stationary or moving (crossing velocity of 20 kph) at all ranges from 65 meters to maximum range with at least a 0.90 probability of hit. Hit probabilities are specified for 7km visibility day/night in benign countermeasure environments.

(3) Portability. The system shall be capable of being transported by one combat-loaded Marine without any degradation of combat effectiveness as compared with the present system. The weight of one complete system (including launcher, one round, day/night sight, carrying equipment, and consumables for at least 4 hours of operation) shall be 45 pounds (or less). The carry-length of the longest system component shall not exceed 45.5 inches.

(4) Nuclear, Chemical, and Insensitive Munitions. The system is essential to mission accomplishment; therefore, nuclear survivability is required. The round, while in the shipping container, must be high altitude electromagnetic phase (HAEMP) survivable. Once removed from the shipping container, the round is not required to be HAEMP survivable. The sight/fire control unit must be HAEMP survivable when unpackaged. The system is essential to mission accomplishment, and NBC contamination survivability is required for all components of the system. In accordance with NAVSEAINST 8010.5 the system must utilize the least sensitive explosive that will satisfy the requirement in subparagraph 4a above.

(5) Dirty Battlefield/Countermeasures. Dragon must be hardened to be operationally effective in the presence of enemy countermeasures which include obscurants, signature suppression, lethality suppression, electro-optical jammers, directed energy systems, flares, counterfire, and maneuver environments. As a minimum, screening smoke, searchlights, flares, simple modulated jammers, and low energy lasers must not degrade target acquisition, missile guidance, target lethality, or operator survivability.

(6) Survivability. Employment time from the unassembled carry configuration in the stand-by mode, to the ready-to-fire mode shall be less than one minute. The system should minimize gunner exposure. The firing signature effects (noise, flash, smoke, and backblast) shall be minimal and must not exceed the

signature effects of the present system. The system must have a reload and fire capability of at least one round in 30 seconds or less in a tactical environment. A reduction in the detectability of the gunner's exact position when firing at a target at ranges up to 1,500 meters is desired.

(7) Transportability. The system shall be transportable to and within the theater by highway, rail, marine, and air transport. It shall be capable of transport in tactical wheeled and tracked vehicles over rough terrain and be capable of airdrop in resupply bundles.

(8) Reliability, Availability, and Maintainability-Durability (RAM-D). The mean-time-to-repair the tracker shall be no more than 1.5 hours (minimum acceptable value) at the intermediate level. Built-in-tests (BIT's) shall be used to provide system self-test, fault detection, and fault isolation capability at the organizational and intermediate maintenance levels to the quick replaceable assembly (QRA). The QRA's shall be designed to facilitate use of the AN/USM-465 automatic test equipment. The system shall be designed to facilitate use of automatic test equipment. The RAM-D requirements over the life of the system are:

(a) Operational availability of the entire system shall meet or exceed .94, .98 desired, with anticipated operational averages of no less than 700 hours per 6-month period (4,380 hours).

(b) Mean-time-between-mission-critical-failure for the components of the system, minus the ammunition, shall be no less than 170 hours.

(c) Reliability of all aspects of a round functioning shall be no less than .92.

(9) Health, Safety, and System Design. The system shall prevent safety and health hazards to personnel to at least the same degree as the present system. All improvements shall meet or exceed applicable Navy shipboard handling requirements.

5. INTER/INTRAOPERABILITY AND STANDARDIZATION REQUIREMENTS. The system shall be inter/intraoperable and standardized to the same degree as the present Dragon.

6. RELATED EFFORT. The Marine Corps and the Army are participating in a joint development program for an Advanced Antitank Weapon System - Medium (AAWS-M), expressed in a proposed JSOR, for a follow-on system to the Dragon. The product improvements to the Dragon are being undertaken to provide a viable interim capability until AAWS-M is fielded.

7. TECHNICAL FEASIBILITY AND ENERGY/ENVIRONMENTAL IMPACTS. The technical feasibility of these improvements has been established. The improvements identified in this document are therefore considered to be low in technical risk. There shall be no energy/environmental impacts over that of the present Dragon system.
8. LIFE CYCLE COST FORECAST. See annex A to this document.
9. MANPOWER REQUIREMENT. There is no projected change to present manpower requirements.
10. TRAINING REQUIREMENTS. Additional operational requirements, including but not limited to night tracking capability, will be added to formal training with no resultant increase in total training time.
11. AMPHIBIOUS/STRATEGIC LIFT IMPACT. A reduction of approximately 50 percent in weight and size of the tracking apparatus is anticipated when compared to the present tracker due to fielding of a combination day/night tracker.

LIFE CYCLE COST FORECAST

FUNDING PROFILE

In Thousands of FY87 Constant Budget Dollars
(FYDP Dollars in Parentheses)
(1 Oct 85 Escalators)

16 YEAR LIFE CYCLE

	PRIOR YEARS	CURRENT YEAR	BUDGET YEAR	FY88	FY89	FY90	FY91	FY92	TO COMPL'Y	TOTAL PROGRAM
Major System										
RT&E	2,632	9,157	17,500	17,049	10,419	0	0	0	0	57,100
FYDP Dollars	(	8,800)	(17,500)	(17,700)	(11,200)	(0)	(0)	(0)		
PMC	0	0	0	9,466	89,248	77,932	77,739	0	531	254,317
FYDP Dollars	(	0)	(0)	(9,900)	(97,500)	(88,900)	(92,600)	(0)		
QTY'S FUNDED										
DRAGON WARHEAD										
	0	0	0	5,939	6,000	0	0	0	0	11,939
MISSILE	0	0	0	0	6,500	6,500	6,500	0	0	19,500
TRACKER	0	0	0	0	700	700	700	0	0	2,100
Support										
Support PMC	0	0	0	0	0	0	0	0	34,668	34,668
FYDP Dollars	(	0)	(0)	(0)	(0)	(0)	(0)	(0)		
MILCON	0	0	0	0	0	0	0	0	0	0
FYDP Dollars	(	0)	(0)	(0)	(0)	(0)	(0)	(0)		
GM&MC	0	0	0	8,851	8,620	25,211	24,574	23,949	345,699	436,904
FYDP Dollars	(	0)	(0)	(9,102)	(9,102)	(27,306)	(27,306)	(27,306)		
YPMC	0	0	0	10,154	10,117	30,242	30,133	30,022	378,532	489,170
FYDP Dollars	(	0)	(0)	(10,191)	(10,191)	(30,573)	(30,573)	(30,573)		
NAVY PROJ	0	0	0	0	0	0	0	0	0	0
TOTAL PROGRAM	2,632	9,157	17,500	45,520	118,404	133,385	132,447	53,971	759,744	1,272,759
FYDP Dollars	(	8,800)	(17,500)	(46,893)	(127,993)	(146,779)	(150,479)	(57,879)		

Major System: DRAGON MEDIUM ANTI-ARMOR WEAPON SYSTEM

Date: 04-02-1986

LIFE CYCLE COST ESTIMATE

(In Thousands of FY87 Constant Budget Dollars)

(1 Oct 85 Escalators)

16 YEAR LIFE CYCLE

PHASE/CATEGORY	SUBCATEGORY	CATEGORY	PHASE
I. RDT&E PHASE			57.100
II. INVESTMENT PHASE			256.095
1. SYSTEM PRODUCTION/PROCUREMENT			256.095
A. Major End Item (Contractor)	254.909		
B. Initial Provisioning/Spares, Repair Parts	5		
C. Government Furnished/Added Equipment	0		
D. Other Direct System Costs	1.181		
2. SUPPORT EQUIPMENT PROCUREMENT		0	
A. Ammunition	0		
B. Weapons and Tracked Combat Vehicles	0		
C. Guided Missiles	0		
D. Comm-Elec Equipment	0		
E. Support Vehicles	0		
F. Engineer and Other Equipment	0		
3. MILITARY CONSTRUCTION		0	
III. OPERATIONS AND SUPPORT PHASE			353.564
1. OPERATIONS		402.223	
A. Operator Personnel/Training	402.223		
B. Material Consumption	0		
C. Energy Consumption	0		
2. MAINTENANCE		493.533	
A. Organizational Maintenance	24.047		
1) Personnel/Training	527		
2) Maintenance Material	0		
3) Repair Material	23.520		
4) Other	0		
B. Intermediate Maintenance	160.757		
1) Personnel/Training	43.157		
2) Maintenance Material	0		
3) Repair Material	117.500		
4) Other	0		
C. Depot Repair	274.060		
D. Depot Overhaul	0		
E. Unprogrammed Losses	34.668		
F. Software Maintenance	0		
3. INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS		53.802	
A. Base Operations	15.033		
B. Other Overhead Costs	48.769		
4. SUPPORT EQUIPMENT O&S		0	
TOTAL LIFE CYCLE COSTS			1,272,759

LIFE CYCLE COST ESTIMATE INPUT DATA FOR DRAGON MEDIUM ANTI-ARMOR WEAPON SYSTEM, RUN ON 04-02-1986, USING 1 Oct 85 ESCALATION TABLES

Date: 04-02-1986

Reserve Funds: N

Name of Major System: DRAGON MEDIUM ANTI-ARMOR WEAPON SYSTEM

FUNDING PROFILE INPUT:

	Pre-FY85	FY 96	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	To Complete
Qtys for DRAGON WARHEAD:	0	0	0	5,939	6,000	0	0	0	0
Qtys for MISSILE:	0	0	0	0	6,500	6,500	6,500	0	0
Qtys for TRACKER:	0	0	0	0	700	700	700	0	0

END ITEM DOLLAR AMOUNTS:

RD&E FYDP% Prior Year: FY 85 :	2,426							
Curr Yr - FY92:	8,900	17,500	17,700	11,200	0	0	0	
PMC FYDP% Curr Yr - FY92:	0	0	9,900	97,500	88,900	92,600	0	

SUPPORT DOLLAR AMOUNTS:

Support PMC								
CB 87 \$	0	0	0	0	0	0	0	
MILCON CB 87 \$	0	0	0	0	0	0	0	
O&MMC FYDP% Prior Year: FY 87 :	0							
Curr Yr - FY92:	0	0	9,102	9,102	27,306	27,306	27,306	
MPMC FYDP% Prior Year: FY 87 :	0							
Curr Yr - FY92:	0	0	10,191	10,191	30,573	30,573	30,573	

RD&E (in THOUSANDS): 57100 Type of dollar: FYDP (87)

Unit price of DRAGON WARHEAD (in DOLLARS): 1500 Type of dollar: FYDP (87)

Unit price of MISSILE (in DOLLARS): 10000 Type of dollar: FYDP (87)

Unit price of TRACKER (in DOLLARS): 20000 Type of dollar: FYDP (87)

Initial provisioning/spares/parts (in THOUSANDS): 4,879 Type of dollar: FYDP (87)

Gov't furn/added eqpt (in THOUSANDS): .298 Type of dollar: FYDP (87)

Other direct system costs (in THOUSANDS): 3.3 Type of dollar: FYDP (87)

1st & 2nd dest. transp. charges (in THOUSANDS): 1177.9 Type of dollar: FYDP (87)

PMC Ammunition (in THOUSANDS): 0 Type of dollar: FYDP (87)

W&TCV (in THOUSANDS): 0 Type of dollar: FYDP (87)

Guided Missiles (in THOUSANDS): 0 Type of dollar: FYDP (87)

Support Vehicles (in THOUSANDS): 0 Type of dollar: FYDP (87)

Engr & Other Eopt (in THOUSANDS): 0 Type of dollar: FYDP (87)

MilCon (in THOUSANDS): 0 Type of dollar: FYDP (87)

System's life cycle: 16 years.

SUBSYSTEM 1 : DRAGON WARHEAD

O&S PHASE for DRAGON WARHEAD

Operational end items: 10148

Operating hours per year per system: 1400

Dedicated operators.

Number of operators needed:	E-1 - E-5:	0
	E-6 - E-9:	0
	W-1 - O-3:	0
	O-4 up :	0

Material consumption per year per system (in DOLLARS): 0 Type of dollar: FYDP (87)

Training ammunition consumption (in DOLLARS): 0 Type of dollar: FYDP (87)

No energy consumption.

ORGANIZATIONAL MAINTENANCE for DRAGON WARHEAD

No organizational-level maintenance/repairs.

INTERMEDIATE MAINTENANCE for DRAGON WARHEAD

No intermediate level action for system failures.

No intermediate level preventive maintenance actions.

Other int. maint. costs (in DOLLARS): 0 Type of dollar: FYDP (87)

DEPOT-LEVEL REPAIRS for DRAGON WARHEAD

No depot repairs for the system.

OVERHAULS for DRAGON WARHEAD

No overhauls.

Weight of the system: 7 lbs.

Losses: 1 %

Cost per year for contracted software maintenance (in DOLLARS): No funds.

SUBSYSTEM 2 : MISSILE

OAS PHASE for MISSILE

Operational end items: 16575

Operating hours per year per system: 0

Dedicated operators.

Number of operators needed: E-1 - E-5: 0
E-6 - E-9: 0
W-1 - W-3: 0
Q-4 up : 0

Material consumption per year per system (in DOLLARS): 0 Type of dollar: FYDP (87)

Training ammunition consumption (in DOLLARS): 0 Type of dollar: FYDP (87)

No energy consumption.

ORGANIZATIONAL MAINTENANCE for MISSILE

No organizational-level maintenance/repairs.

INTERMEDIATE MAINTENANCE for MISSILE

No intermediate level action for system failures.

No intermediate level preventive maintenance actions.

Other int. maint. costs (in DOLLARS): 0 Type of dollar: FYDP (87)

DEPOT-LEVEL REPAIRS for MISSILE

No depot repairs for the system.

OVERHAULS for MISSILE

No overhauls.

Weight of the system: 27 lbs.

Losses: 1 %

Cost per year for contracted software maintenance (in DOLLARS): No funds.

No software maintenance for this system.

Storage: 7.1 cubic feet. Inside, unheated.

O&S PHASE for TRACKER

Operational end items: 1785

Operating hours per year per system: 1400

Dedicated operators.

Number of operators needed:	E-1 - E-5:	1296
	E-6 - E-9:	108
	W-1 - O-3:	27
	O-4 up :	0

Training for E-1 - E-5 operators: .43 weeks.

Training for E-6 - E-9 operators: 2 weeks.

Training for W-1 - O-3 operators: 0 weeks.

Enlisted operator turnover time: 3 years.

Officer operator turnover time: 1 years.

Material consumption per year per system (in DOLLARS): 0 Type of dollar: FYDP (87)

Training ammunition consumption (in DOLLARS): 0 Type of dollar: FYDP (87)

No energy consumption.

ORGANIZATIONAL MAINTENANCE for TRACKER

Dedicated personnel for organizational maintenance.

Number of maint. pers. needed:	E-1 - E-5:	2
	E-6 - E-9:	0
	W-1 - O-3:	0
	O-4 up :	0

MTBF(O): 170 hours.

MTBPM(O): N/A

Training for E-1 - E-5 organizational maintenance personnel: 3 weeks.

Enlisted org maint pers turnover time: 3 years.

Average material cost per org. prev. maint. action (in DOLLARS): No funds.

Avg mat cost per org. repair action (in DOLLARS): 100 Type of dollar: FYDP (87)

Other org. maint. costs per system per year (in DOLLARS): 0 Type of dollar: FYDP (87)

INTERMEDIATE MAINTENANCE for TRACKER

MTBF(I): 170 hours.

Mean time for an int. repair (man-hrs):	E-1 - E-5:	6
	E-6 - E-9:	4
	W-1 - O-3:	1
	O-4 up :	0

Training for E-1 - E-5 intermediate maintenance personnel: 3 weeks.

Training for E-6 - E-9 intermediate maintenance personnel: 0 weeks.

Training for W-1 - O-3 intermediate maintenance personnel: 0 weeks.

Enlisted int. maint. personnel turnover time: 3 years.

Officer int. maint. personnel turnover time: 3 years.

Avg mat. cost per int. repair action (in DOLLARS): 500 Type of dollar: FYDP (87)

Other int. maint. costs (in DOLLARS): 0 Type of dollar: FYDP (87)

DEPOT-LEVEL REPAIRS for TRACKER

Mean time between depot repairs: 170 hours.

Mean time to repair, depot level: 12 hours.

Material cost per repair, depot level (in DOLLARS): 500 Type of dollar: FYDP (87)

Weight of the system/subsystem: 14 lbs.

OVERHAULS for TRACKER

No overhauls.

Weight of the system: 14 lbs.

Losses: 1 %

Cost per year for contracted software maintenance (in DOLLARS): No funds.

No software maintenance for this system.

Storage: 1 cubic feet. Inside. heated.

1 .	O&S PHASE—DRAGON WARHEAD		2,451
1.	OPERATIONS	0	
	A. Operator Personnel/Training	0	
	B. Material Consumption	0	
	C. Energy Consumption	0	
2.	MAINTENANCE		2,436
	A. Organizational Maintenance	0	
	1) Personnel/Training	0	
	2) Maintenance Material	0	
	3) Repair Material	0	
	4) Other	0	
	B. Intermediate Maintenance	0	
	1) Personnel/Training	0	
	2) Maintenance Material	0	
	3) Repair Material	0	
	4) Other	0	
	C. Depot Repair	0	
	D. Depot Overhaul	0	
	E. Unprogrammed Losses	2,436	
	F. Software Maintenance	0	
3.	INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS		15
	A. Base Operations	15	
	B. Other Overhead Costs	0	

2. O&S PHASE—MISSILE		26,697
1. OPERATIONS		0
A. Operator Personnel/Training	0	
B. Material Consumption	0	
C. Energy Consumption	0	
2. MAINTENANCE		26,520
A. Organizational Maintenance	0	
1) Personnel/Training	0	
2) Maintenance Material	0	
3) Repair Material	0	
4) Other	0	
B. Intermediate Maintenance	0	
1) Personnel/Training	0	
2) Maintenance Material	0	
3) Repair Material	0	
4) Other	0	
C. Depot Repair	0	
D. Depot Overhaul	0	
E. Unprogrammed Losses	26,520	
F. Software Maintenance	0	
3. INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS		177
A. Base Operations	177	
B. Other Overhead Costs	0	

3. D&S PHASE—TRACKER		930,416
1. OPERATIONS		402,223
A. Operator Personnel/Training	402,223	
B. Material Consumption	0	
C. Energy Consumption	0	
2. MAINTENANCE		464,583
A. Organizational Maintenance	24,047	
1) Personnel/Training	527	
2) Maintenance Material	0	
3) Repair Material	23,520	
4) Other	0	
B. Intermediate Maintenance	160,757	
1) Personnel/Training	43,157	
2) Maintenance Material	0	
3) Repair Material	117,600	
4) Other	0	
C. Depot Repair	274,068	
D. Depot Overhaul	0	
E. Unprogrammed Losses	5,712	
F. Software Maintenance	0	
3. INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS		63,610
A. Base Operations	14,841	
B. Other Overhead Costs	48,769	

END

DT/C

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