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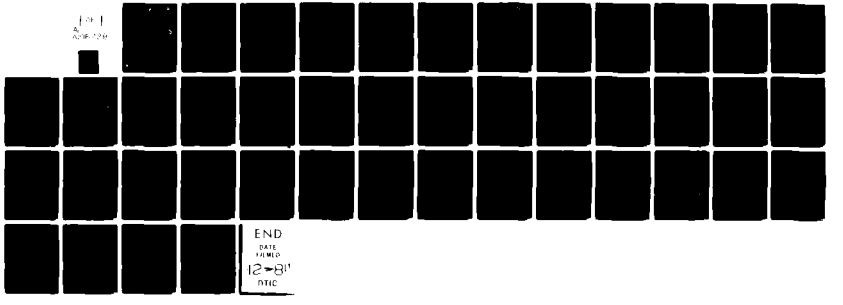

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6 A CONCEPT FOR TRAINING RESERVE COMPONENT MECHANICS TO SUPPORT THE M1.

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10 Edward D. Simms, Jr.
Thomas A. White

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LOGISTICS MANAGEMENT INSTITUTE
4701 Sangamore Road
P. O. Box 9489
Washington, D.C. 20016

PREFACE

The ongoing Army force modernization program has a profound effect on the Reserve Component (RC). Much of the Army's combat service support capability, particularly nondivisional maintenance, resides in the National Guard (ARNG) and Reserve (USAR). Under the "Total Force" concept and current Army doctrine, the introduction of new equipment into the Active Army establishes a requirement for RC nondivisional maintenance units to support that equipment.

The Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics), ASD(MRA&L), has expressed concern about Army planning to develop the new equipment maintenance skills in the Reserve Component. Using the M1 Abrams tank as a case study, we find that the ASD(MRA&L)'s concern is justified. To aid in relieving it, we propose a concept for training National Guard and Reserve mechanics to support the M1. This report describes that concept.

EXECUTIVE SUMMARY

The U.S. Army is embarked on the most ambitious force modernization program in its history. Numerous new systems containing state-of-the-art technology will enter the Army inventory throughout the 1980s. They will bring with them the need for dramatic changes in maintenance. The M1 Abrams tank, leading the "bow wave," exemplifies the maintenance hardware revolution and its associated maintenance challenge.

Even though the M1 is not planned for assignment to the Army National Guard (ARNG) or Army Reserve (USAR), many nondivisional maintenance companies in the ARNG and USAR have wartime maintenance missions which include M1 support. Current doctrine calls for nondivisional maintenance units to support equipment in the communication zone and corps area, provide backup to divisional units and, under the fix-forward concept, repair front line combat equipment in division and brigade areas.

Many ARNG and USAR (referred to jointly as Reserve Components (RC)) nondivisional maintenance units have early deployment assignments. Consequently, they will not have time after mobilization to acquire M1 maintenance capability; they must already be fully trained. For units supporting operations in Europe, the M1 training requirement is in excess of 5,000 guardsmen and reservists, beginning in the mid-1980s. At the present time there is no Army plan or program to provide the required training. We propose a concept for training RC mechanics to support the M1. It is designed to provide RC mechanics with the required technical skills and familiarity, using a minimum of additional resources by taking advantage of those available at RC unit home stations and Active Component installations and schools. The concept reflects

the sophisticated technology of the M1, requiring new maintenance skills and frequent exposure to operational tanks and training simulators to sustain those skills.

Under the proposed concept, each unit will dedicate several weekend drill periods and a two-week annual training period to acquiring the essential skills. During weekend drills, the unit will validate current skill levels, using assets normally available. Next, a Mobile Training Team will visit to introduce special training for the M1. During annual training, tank mechanics will attend a specially designed M1 maintenance course at the Ordnance Center and School, Aberdeen Proving Ground, Maryland. That course will provide hands-on experience with the M1 system, including its tools and test equipment. The final phase of skill acquisition will focus on M1 troubleshooting tasks. They will be taught during weekend training periods at Regional Training Centers, using an M1 system and training simulators.

To sustain the maintenance skills of the RC mechanics, a two-part training program will be executed during weekend training periods. Low cost extension materials will be used at home station to minimize skill decay. Periodically, the mechanics will attend an intense, hands-on program at a Regional Training Center.

The Regional Training Centers, established for troubleshooting introduction and skill sustainment, will be staffed with highly trained M1 mechanics. They will be equipped with troubleshooting trainers and maintenance simulators, test equipment, tools, and spare parts. Some will be collocated with Active Component units and therefore able to borrow an M1 system. Others will not be located near M1 systems and therefore will each have to procure a dedicated tank as well as the other necessary equipment.

Each Regional Training Center will have Mobile Training Team personnel to supplement its core of instructors.

Although the costs of establishing and using such a training capability would be miniscule relative to cost of the M1 system itself, they must be specially provided for. Of greatest cost significance, in amount and time, are the setting up of Mobile Training Teams, the development of RC M1 maintenance courses and extension training materials, and the establishment and operation of Regional Training Centers.

The magnitude of the training problem and the schedule for M1 deployment suggest that some Regional Training Center must be operational by the mid-1980s. Planning for the Centers, development of courses and materials, and initiating procurement of simulators and training devices would have to start well in advance of that time. It becomes essential then that the Army make such actions possible by 1) deciding the number of RC units to be M1 capable by each fiscal year and 2) selecting the individual units to meet that requirement.

The M1 tank is just one of many new systems which ARNG and USAR units must support. Other systems include the Division Air Defense Gun, the Infantry Fighting Vehicle/Cavalry Fighting Vehicle, and the Improved TOW Vehicle. The proposed M1 training concept has application to those systems and therefore could be the foundation for RC technical training in the future.

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This report presents a proposed concept for training reserve component (RC) nondivisional direct and general support units to maintain the M1 tank and its components. Key elements of the concept are that (1) special courses and training aids be developed to support RC training, (2) maximum opportunity for weekend training on Active Army M1 tanks be taken, and (3) a limited number of Regional Training Centers (RTC) be established to support RC units which will not otherwise have weekend access to the M1 system. Major recommendations toward implementing the proposed concept are that firm training requirements be established, the →

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20. ABSTRACT (Cont'd)

number of RTCs and their locations be determined and that immediate work begin on developing the special RC courses. The problems faced by RC units due to the M1 system are not unique but typical of those faced with most new systems. The proposed M1 concept can be used as a prototype for other new systems.

1. BACKGROUND

HISTORY AND MISSION[1]

Army Reserve

The USAR began as an organized component of the U.S. military forces in 1908 when Congress established the Army Medical Reserve Corps. Further legislation in 1912 provided for an Enlisted Army Reserve Corps, and the National Defense Act of 1916 created an Officer Reserve Corps.

Following World War I, Congress established the Organized Reserve Corps which consolidated the Enlisted and Officer Reserve Corps. The Reserve Forces Act of 1955 bolstered the USAR by prescribing an enlistment for 6 months of active training, followed by duty in a USAR unit to complete the military obligation.

In 1963, Congress authorized the Ready Enlistment Program (REP) establishing a 6-year Ready Reserve obligation upon enlistment in the USAR and ARNG, with a minimum active duty training of four months. The REP was responsible for keeping the USAR manned at desired levels throughout the Vietnam War. The REP ended with the abolition of the draft.

The mission of the USAR is to provide trained units and qualified individuals for active duty in the Army in time of war or national emergency.

Army National Guard

The ARNG traces its roots to local militia organizations in colonial times and to the militiamen who responded to General George Washington's call for troops to fight the British in 1776.

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[1]"Overview of the Reserve Components of the United States Armed Forces," A Staff Information Paper for the Defense Manpower Commission, October 1975.

The modern history of the ARNG began in 1903 when Congress legislated the Regular Army to play a direct role in organizing, training, and equipping ARNG units. The ARNG became a component of the organized peacetime military establishment in 1916 with the National Defense Act which provided that the ARNG become part of the Active Army when called into federal service. Congress made the ARNG part of the Ready Reserve in 1956 and part of the Selected Reserve in 1967.

The ARNG has a dual federal-state mission. In its federal mission, it provides trained units and qualified individuals for active duty in the Army in time of war or national emergency. In its state mission, it provides a force for the internal protection of life and property and the preservation of peace, order and public safety.

DEPENDENCE ON THE RESERVE COMPONENT

The "Total Force" concept is commonly referred to in discussions of Army strength and capability. The term expresses the view that Active and Reserve Components working together form a single Army. Each is highly dependent on the other. This is particularly true in the area of nondivisional maintenance. If we consider only units which support combat vehicles, then the ARNG and USAR have approximately 70 percent of the Army's nondivisional maintenance capability (Table 1-1).

TABLE 1-1. NONDIVISIONAL MAINTENANCE COMPANIES SUPPORTING COMBAT VEHICLES BY COMPONENT

Force Component	Total Companies	Percent
Active Army	49	30
Army Reserve	27	16
National Guard	88	54
TOTAL	164	100

Army force level requirements for RC maintenance units are driven primarily by U.S. Army, Europe planners. The initial burden for maintenance support, under various wartime scenarios, is placed on Active Army units. But the burden shifts rapidly to RC units because of the Army's heavy dependence upon the ARNG and USAR for combat service support.

According to Army doctrine, nondivisional maintenance units are required to support equipment within the corps boundaries and to supplement divisional direct support capability. The need to supplement divisional support could be caused by surges in maintenance load in the division area or a corps commander's decision to concentrate maintenance assets to support tactical schemes. Additionally, the maintenance philosophy of "fix-forward", which emphasizes the movement of the maintenance capability to the combat system instead of moving the system rearward, requires general support maintenance assets to be present in the forward deployed division and brigade areas to diagnose and repair front line equipment. The mission to support division equipment in forward areas is also defined in the Army Training and Evaluation Program, which lists specific requirements for nondivisional maintenance units to repair tank turrets and to provide on-site repair of automotive equipment.

THE PROBLEM

The U.S. Army has initiated an extensive force modernization program. The program's objective is to upgrade Active Component (AC) combat capability substantially through the use of technically advanced equipment. Yet, use of state-of-the-art technology creates significant training problems for RC nondivisional maintenance units. These units, which comprise approximately 70 percent of the Army's nondivisional maintenance assets, have limited time for maintenance training and limited access to modern equipment. Many units also

are scheduled to deploy early, so few post-mobilization training opportunities exist.

The more advanced the new equipment, the greater the challenge of generating the required maintenance capability in RC units. The M1 Abrams tank, as the leading edge of the modernization "bow wave," exemplifies the maintenance training challenge for RC units. Even though the M1 is just entering the inventory, the Army has neither programmed for the training of RC mechanics to support the M1 nor developed a training concept for generating the required maintenance capability. The purpose of this report is to assist the Army in alleviating the latter deficiency by presenting such a concept.

2. RC TRAINING ENVIRONMENT

Three factors exert a dominant influence on the ability of an RC unit to develop and sustain maintenance skills during peace:

- time available for technical training
- location of the unit home station
- the number of full-time support personnel in the unit.

TIME AVAILABLE FOR TRAINING

Personnel in RC units are required to attend 48 drills each year. These drills, referred to as inactive duty training (IDT), are generally held on weekends. A weekend IDT period typically lasts 16 hours (four 4-hour drills); drills are held monthly and total 192 hours each year. Each member also participates in an annual training (AT) program. This training is usually performed during the summer and totals 88 hours, exclusive of travel, set up, etc. In total, RC members have 280 hours per year which potentially are available for training. Additional training periods can be authorized but are seldom used because of the impact on the member's civilian occupation.

Not all training time can be used to enhance the military occupational specialty (MOS) skills of each member. There are also requirements for training in such areas as the tactical mission of the unit, marksmanship, first aid, and in nuclear, biological and chemical warfare. The amount of technical training each member receives is difficult to estimate, but a 1979 LMI report stated that the equivalent of seven IDT weekends are actually available each year for this purpose.[1]

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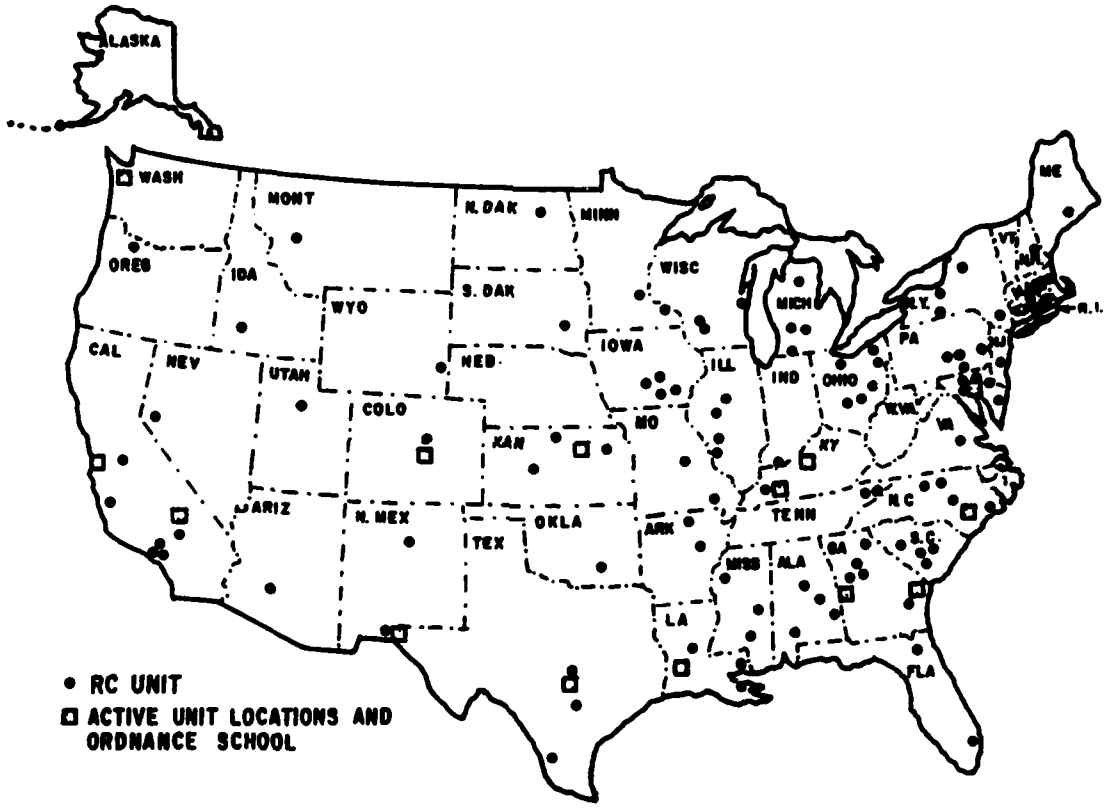
[1] Logistics Management Institute, Combat and Tactical Vehicle Maintenance in the Army, June 1979.

LOCATION OF RC UNITS

Unit location is an important factor in maintenance training because it determines the unit's accessibility to equipment for hands-on training during IDT periods. Figure 2-1 shows the relative locations of RC nondivisional maintenance companies and major concentrations of AC combat equipment.

FIGURE 2-1. RC UNITS AND AC EQUIPMENT CONCENTRATIONS



FORSCOM Regulation 350-2 states that total travel time for IDT should not exceed 25 percent of the training time. This guidance translates into a maximum of two hours travel time one way assuming a training weekend of four IDT drill periods. Analysis of RC and AC unit locations reveals that the majority of the RC maintenance units are beyond the 2-hour travel threshold

recommended by FORSCOM. Thus the majority of nondivisional maintenance units either train on older equipment belonging to a RC combat unit or attempt to train and maintain skills without any combat equipment, using items organic to the unit. Even units collocated with AC units frequently find that the equipment is not available for RC training because of competing requirements.

FULL TIME UNIT SUPPORT PERSONNEL

Full-time unit support personnel are members of the Selected Reserve who provide technical support to a unit on a full-time basis and, as members of the unit, will also mobilize with their unit. They may be guardsmen or reservists on full-time duty (called Active Guard/Reserve) or federally employed civilians (Military Technicians).

These full-time personnel represent a core of highly experienced technicians, principally because their full-time and RC positions are complementary. Consequently they frequently train other members of the unit on the technical aspects of the military job. Table 2-1 shows the number of units that have full-time unit support personnel with MOSs responsible for supporting combat vehicles. To illustrate, 65 of the 115 units have full-time unit support personnel with MOS 63H, Track Vehicle Repairer, whereas only 14 units have full-time technicians with a MOS 63G, Fuel and Electrical Systems Repairer.

TABLE 2-1. NUMBER OF RC UNITS WITH FULL-TIME UNIT SUPPORT PERSONNEL BY MOS

Unit Description	Total Number of Companies	MOS						
		*41C	34G/ 45G	45K	63G	63H	421A	630A
Heavy Equipment Maintenance Company	44	12		18	8	32	15	25
Maintenance Company, Forward, Direct Support	40	1		10	2	22	9	11
Maintenance Company, Rear, Direct Support	7					2	3	3
Maintenance Company, Direct Support (Communications Zone)	18			1	4	9	2	9
Maintenance Company, Nondivisional, Direct Support	2							
Service Company (Classification and Collection)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	115	13		29	14	65	29	48

* 41C - Fire Control Instrument Repairer
45G/34G - Fire Control Computer Repairer
45K - Tank Turret Repairer
63G - Fuel and Electrical Systems Repairer
63H - Track Vehicle Repairer

3. TRAINING OF M1 MECHANICS

OVERVIEW OF THE M1

The M1 Abrams main battle tank is a fully tracked, 60-ton armored fighting vehicle. It has a fully integrated day/night, shoot-on-the-move fire control system that is used to engage targets with its 105 mm main gun (a 120mm gun will be introduced in FY 85) and coaxially mounted 7.62 mm M240 machinegun. Two additional machineguns are mounted atop the turret. Its 1500 horsepower gas turbine engine and advanced torsion bar suspension system gives the M1 better mobility than presently fielded tanks. The M1 has been designed to take maximum advantage of state-of-the-art technology and relies extensively on sophisticated electronics and electrical integration of subsystems.

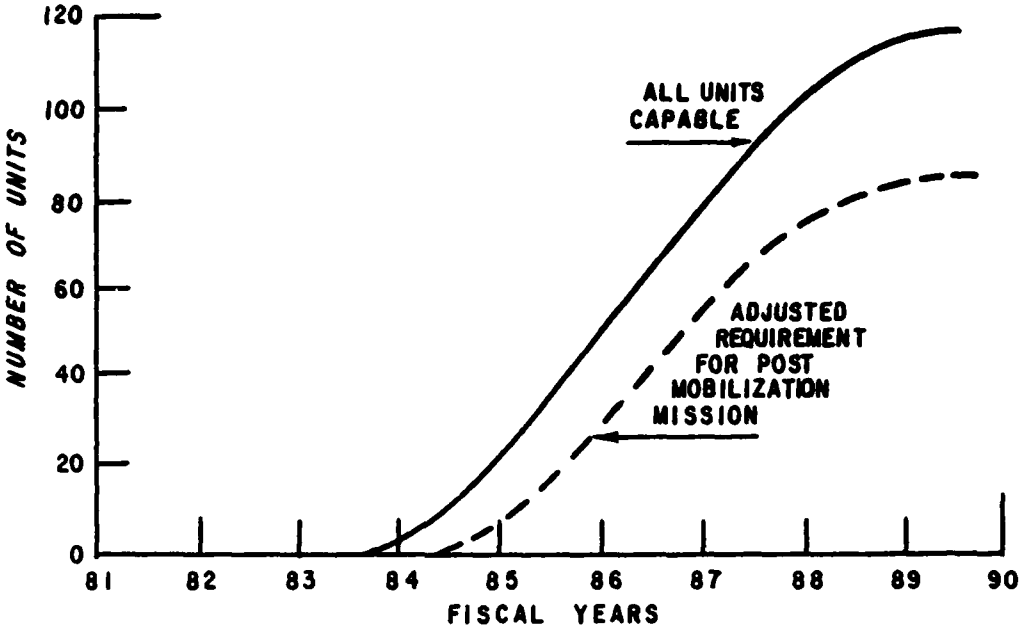
M1 TRAINING REQUIREMENT

Timing of the Requirement

Many nondivisional maintenance units will deploy early during mobilization and must be capable of maintaining weapon systems found in the theater. As a result of their early deployment, these units will not have time to train after mobilization.

Since the M1 will be phased into the Active Army inventory through 1989, the timing of a requirement for M1 capable units in the RC is not firm. Figure 3-1 shows two estimates of the potential time-phased requirement for M1 capable RC maintenance companies. The solid curve represents an unconstrained

FIGURE 3-1. CUMULATIVE REQUIREMENT FOR M1 TRAINED RC UNITS



estimate. It is based on the distribution schedule of the M1 and key assumptions derived from Army doctrine and likely unit employment concepts. The assumptions are:

- The percentage of M1 capable maintenance units will be consistent with the proportion of tank battalions assigned the M1.
- AC maintenance units will be used to satisfy M1 requirements before M1 maintenance tasks will be assigned to RC units.

The planned post mobilization support mission for RC units allows some reduction in the number of RC units to be M1 capable (represented by the dashed curve). Under one possible scenario, approximately 30 percent of the RC units will either not deploy or will deploy with missions that do not include supporting the M1. The key point of these estimates is that in the mid-1980's some RC units must be trained to maintain the M1. Furthermore, the

requirement to supplement current RC capability with M1 skills will grow steadily throughout the late 80's, establishing a significant training requirement.

Number and Type of Mechanics

Five maintenance MOSs are significantly affected by the M1. Two Warrant Office career fields also are affected because the personnel in those positions provide technical supervision to M1 mechanics. Table 3-1 shows the affected MOSs and the number of authorizations, by MOS, in all RC non-divisional maintenance companies. Since the training requirement is expressed in number of authorizations, Table 3-1 provides an upper bound on the training impact of the M1.

TABLE 3-1. POTENTIAL RC TRAINING REQUIREMENT FOR THE M1

MOS	Description	Total Requirement
41C	Fire Control Instrument Repairer	362
45G/34G	Fire Control Computer Repairer	87
45K	Tank Turret Repairer	633
63G	Fuel and Electrical Systems Repairer	838
63H	Track Vehicle Repairer	6516
421A	Armament Repair Technician	113
639A	Automotive Repair Technician	189
TOTAL		8738

ACTIVE COMPONENT TRAINING PROGRAM

Amount of Training

The technology changes incorporated into the M1 system require that M1 mechanics receive a sustantial amount of additional training, over and

above the training they have already received on the M60/M48 tanks. Table 3-2 shows the number of M1 tasks, by MOS, in which each M1 mechanic will be required to be proficient.

TABLE 3-2. NUMBER OF M1 TASKS BY MOS

MOS	Description	M1 Tasks
41C	Fire Control Instrument Repairer	9
45G/34G	Fire Control Computer Repairer	45
45K	Tank Turret Repairer	120
63G	Fuel and Electrical Systems Repairer	144
63H	Track Vehicle Repairer	176

The magnitude of the effort associated with the initial skill training is represented by the formal New Equipment Training (NET) programmed to transition active Army mechanics from the M60/M48 tanks to the M1. Table 3-3 displays the length of M1 NET for active mechanics stationed in CONUS. After the formal M1 NET is completed, additional skills will be developed during on-the-job training conducted in the unit environment.

TABLE 3-3. ACTIVE COMPONENT NEW EQUIPMENT TRAINING LENGTH

MOS	Weeks of Training
41C	0.4
45G/34G	3.0
45K	6.0
63G	4.0
63H	6.0

Skill Development

New accessions into MOSs supporting the M1 are trained in conjunction with their Advanced Individual Training (AIT) at the U.S. Army Ordnance Center and School, Aberdeen Proving Ground, Maryland. At present, this training is an addition to the normal AIT and is given only to selected individuals

because of the low density of M1s in the inventory. The M1 curriculum is planned to be fully integrated into AIT courses by January 1983. Thereafter, all accessions will be trained to support the M1 as part of AIT.

Transition training for mechanics in the AC will be accomplished through the NET program. The NET is an intense training program lasting up to 6 weeks for certain MOSs as shown in Table 3-3. Direct and general support mechanics stationed in CONUS and Europe will receive the M1 NET at the Ordnance Center and School, and the 7th Army Training Center at Grafenwohr, Germany, respectively. The M1 NET will be conducted by a training cadre from the Training and Doctrine Command (TRADOC), making extensive use of the tanks, simulators, and other training devices already located at those sites to support resident training.

Sustainment Training

Sustainment training is directed at maintaining proficiency above an identified level. The AC sustainment training strategy is built around the day-to-day mission of the maintenance units to support the M1. Extension training materials in the form of lessons, training literature products, and audiovisual products are being developed to support refresher training in units, but the mechanic's frequent exposure to repairing M1s is deemed adequate to sustain skills. New tasks also are being incorporated into the Soldier's Manual and career progression training programs.

RESERVE COMPONENT TRAINING PROGRAM

Initial Skill Development

Non-prior service accessions into the ARNG and USAR receive the same Initial Entry Training as their active counterparts. However, accessions to the RC are not programmed to receive the M1 supplemental AIT. RC non-prior

service accessions will receive M1 training when it is integrated into the normal AIT.

Transition training on the M1 has recently been identified as a requirement for the RC. The U.S. Army Forces Command (FORSCOM) and TRADOC will begin training one RC maintenance company per year starting in 1983. This training will be conducted at the Ordnance Center and School during the unit's 2-week annual training period. The training program for this one RC unit per year has not been developed.

Sustainment Training

A training program to sustain M1 technical skills in RC units has not been developed. The only sources for M1 training are the Affiliation Program--which establishes a formal training relationship between Active Army and RC units--and an AT mission of supporting a unit equipped with M1s. No specific plans have been developed to ensure periodic hands-on training for RC mechanics.

LOCATION OF M1

The relative locations of supported equipment and RC maintenance units are a key factor to sustaining mechanic skills in the RC. Since not all Active Army divisions in CONUS will receive the M1, the equipment accessibility problem is more acute than previously displayed in Figure 2-1.

In Table 3-4 we categorize the RC nondivisional maintenance units by their proximity to CONUS installations programmed to receive the M1. Units classified as collocated are within the suggested 2-hour travel time radius of an Active Army installation that is programmed to receive the M1. Units outside the 2-hour radius are classified as remote. The term remote refers only to a unit's proximity to an active unit with an M1; it does not indicate location relative to metropolitan area or major military facility.

TABLE 3-4. RC UNITS COLLOCATED AND REMOTE
(Reference Year FY 89)

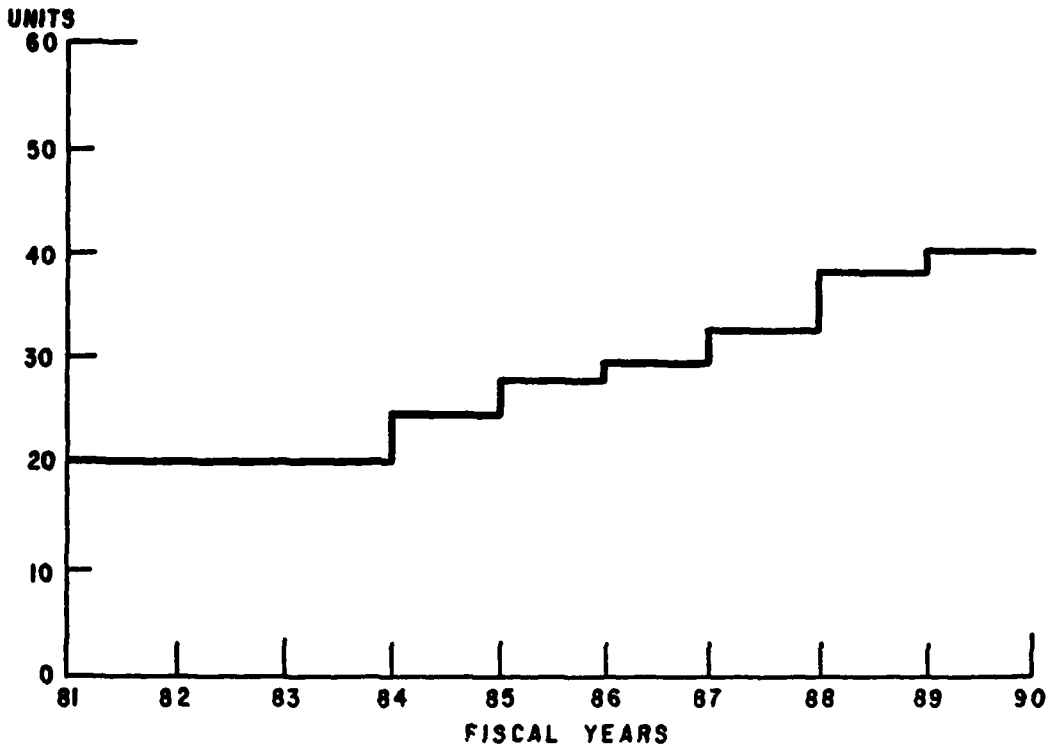
Unit Description	Number of Companies		
	Collocated	Remote	TOTAL
Heavy Equipment Maintenance Company, General Support	16	28	44
Maintenance Company, Forward, Direct Support	12	28	40
Maintenance Company, Rear, Direct Support	3	4	7
Maintenance Company, Direct Support (Communications Zone)	8	10	18
Maintenance Company, Nondivisional, Direct Support	0	2	2
Service Company (Classification and Collection)	1	3	4
TOTAL	40	75	115

The number of collocated RC units will increase as the M1 is distributed to more active units. At present, only the Ordnance Center and School, Fort Knox, and Fort Hood have the M1. Consequently, only RC units located near these activities can be categorized as collocated. Figure 3-2 shows the buildup of collocated units through the entire M1 production schedule. Twenty units already are collocated; an additional 20 will be classified as collocated as additional M1s enter the inventory. As shown in Table 3-5, 15 of the RC units currently collocated are within a 2-hour travel time of the Ordnance Center and School; three are collocated with Fort Knox and two are collocated with Fort Hood.

ANALYSIS OF PLANNED RC TRAINING

Existing training plans to develop and sustain M1 skills in the ARNG and USAR are inadequate. While the M1 skill training planned for non-prior service accessions will be sufficient when the M1 is integrated into AIT (scheduled for January 1983), the transition training for current unit personnel

FIGURE 3-2. COLLOCATED RC UNITS BY FISCAL YEAR



is deficient for two reasons. First, based on the training required to transition AC mechanics onto the M1, a 2-week period is not sufficient time to train reservists. The AC New Equipment Training requires up to six weeks to train mechanics who are already proficient on the M60 series tank. Second, the rate of training RC units at one per year will not keep pace with the number of RC units required to be M1 capable. The planned sustainment training is also inadequate because of a lack of periodic exposure to the M1 for hands-on training. To sustain the highly technical skills required by the M1, RC mechanics will require frequent access to M1 tanks and use of sophisticated maintenance simulators in a systematically developed training program. The lack of a formal program to assure access to the M1 and the distances involved

in moving reserve units to active installation will not allow RC mechanics to gain the needed hands-on experience.

TABLE 3-5. COLLOCATED UNIT SUMMARY
(Reference Year FY 81)

Unit Description	Location			TOTAL
	APG*	Fort Knox	Fort Hood	
Heavy Equipment Maintenance Company, General Support	6	1	2	9
Maintenance Company, Forward, Direct Support	5			5
Maintenance Company, Rear, Direct Support	1	1		2
Maintenance Company, Direct Support (Communication Zone)	2	1		3
Service Company, (Classification and Collection)	1			1
TOTAL	15	3	1	20

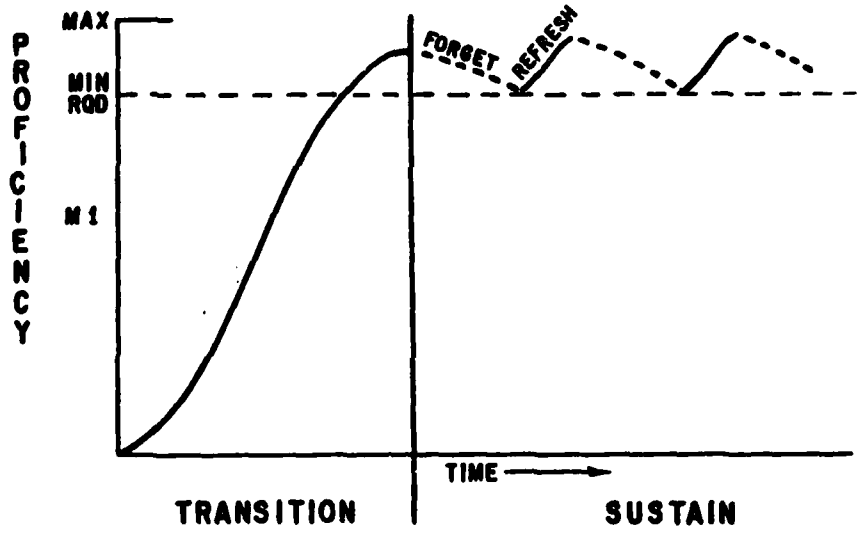
*Ordnance Center and School, Aberdeen Proving Ground

4. PROPOSED TRAINING CONCEPT

TRAINING MODEL

The M1 training problem facing the ARNG and USAR can be divided into two distinct parts--transition and skill sustainment. Figure 4-1 is a heuristic model portraying the relationship between transition and sustainment. The objective of an M1 transition program is training an already proficient mechanic to repair and maintain the M1 system. Transition training is a compact, intense, one-time training program focused on training a mechanic to achieve the minimum required proficiency level on the M1 tasks. The objective of skill sustainment training is to sustain the mechanic's M1 skills above a required minimum level of proficiency. Skill sustainment training is a continuous program that occurs in the unit training environment. It is primarily directed at slowing the "forgetting" of skills learned previously and refreshing mechanic skills when they are diagnosed as approaching minimum levels.

FIGURE 4-1. TRAINING MODEL



INITIAL SKILL DEVELOPMENT

Initial development of M1 maintenance skills in RC units encompasses validating required mechanic skills, introducing RC mechanics to the M1, and training RC mechanics to maintain and troubleshoot the M1 system.

M60/M48 Skill Validation

The proficiency of each tank mechanic to perform the required critical tasks in support of the M60/M48 systems will be initially validated at home station. The skill validation will be accomplished during IDT, using either unit assets or training assets available to the unit. All deficiencies will be eliminated prior to the mechanics receiving introductory training on the M1.

M1 Introductory Training

Upon completing skill validation, RC mechanics will receive an introduction to the M1 at their home stations. Mobile Training Teams will instruct in unit maintenance procedures, basic skills, and other tasks not requiring the M1 system or expensive simulators. Extension training materials, including correspondence courses and manuals, will support this introductory training. All introductory training on the M1 will be conducted during IDT periods. Most of the classroom training for the M1 will be accomplished during this phase. When introductory training is completed, the tank mechanics will be prepared to receive hands-on M1 training.

M1 Hands-On Training

The purpose of this phase of initial skill development is to train mechanics to perform tasks which require the use of an M1 system or simulators/devices not practical for export in great numbers. Mechanics with M1 support responsibilities will attend a specially designed RC New Equipment Training program conducted at the Ordnance School and Center. The emphasis of

this program will be on providing RC mechanics with the required hands-on training experience. Classroom instruction will be held to a minimum. At the conclusion, the RC mechanics will be proficient on all remove and replace tasks, and many troubleshooting tasks.

Troubleshooting Training

While some RC mechanics (41C, 45G, and 63G MOS) will complete the entire New Equipment Training program during one AT period, others (45K and 63H) will not. RC mechanics requiring additional training will travel to a Regional Training Center--an installation with the resources, such as tanks, simulators, training devices, and instructors, to train M1 mechanics--for follow-up training during IDT periods. Since troubleshooting skills are time-consuming and the most difficult to master, this training will focus on fault diagnosis and isolation tasks.

SUSTAINMENT TRAINING

The training required to sustain M1 skills will be accomplished during both IDT and AT periods.

Inactive Duty Training

During IDT periods, RC mechanics will receive frequent refresher training at home station and periodic exposure to the M1 system. The home station training will use extension training materials and M1 expertise present in the unit. Periodically, the M1 mechanics will travel to a Regional Training Center (detailed in next section) for intensive hands-on refresher/ reinforcement training and recertification of their M1 proficiency. The frequency of this training will be determined by the Ordnance Center and School based on the "forgetting curves" associated with M1 skills.

Annual Training

During AT, RC nondivisional maintenance units will support Active Army units assigned the M1. The emphasis will be on training tasks and skills associated with the RC unit's wartime mission, not on reducing the maintenance backlog of the active unit.

REGIONAL TRAINING CENTERS

A critical component in the proposed training concept is the Regional Training Center (RTC). RTCs will be used to complete the troubleshooting training and to refresh/reinforce maintenance skills previously taught RC mechanics. To support this mission, the typical RTC will be assigned:

- an M1 system, including tools and test equipment
- troubleshooting training devices
- turret trainers
- skilled instructors.

Because of limited training time during IDT (usually 16 hours) and FORSCOM's travel time guidelines, RTCs must be conveniently located to RC units. Ideally, RTCs will be established at installations which have M1 tanks, thereby eliminating the requirement for dedicated M1 systems--the required M1s could be borrowed from either the Active Army unit or maintenance float.

The purpose of the RTC is to train individual technical maintenance skills, not unit or individual tactical skills. Consequently, the land and facility requirements of the RTCs will be minimal.

NEW ACCESSIONS AND FULL-TIME UNIT SUPPORT PERSONNEL

The proposed training concept for RC M1 mechanics is directed toward the typical mechanic already assigned to the unit. New accessions and full-time support personnel will be separately trained.

New Accessions

If the M1 training requirements are integrated into AIT as scheduled, then all nonprior-service accessions will be trained to support the M1 during Initial Entry Training. If that schedule is not met, however, new accessions should attend the M1 supplemental training at the Ordnance Center and School immediately following AIT. Since AIT does not include all critical tasks, the new accessions will also require the additional troubleshooting training available through the RTCs.

Full-Time Unit Support Personnel

Full-time unit support personnel offer a unique opportunity to rapidly and effectively generate a core of M1 skills in a RC unit. To capitalize upon this opportunity, full-time support personnel will attend the full Active Army M1 NET course conducted at the Ordnance Center and School. Additionally, they will receive special instruction to prepare them to train drilling members of their units. This instructor training will reduce the requirement for Mobile Training Team personnel.

5. RESOURCE REQUIREMENTS

The resources to support the proposed training concept are based upon several factors: Army doctrine for employment of nondivisional maintenance units, M1 production schedule, planned distribution for the M1, and a generalized unit deployment schedule to support an emergency in Europe.

INITIAL SKILL DEVELOPMENT

Overall Training Load

Table 5-1 identifies the type of RC units, the number of these units in the RC, and the personnel within each unit that require M1 training. Warrant officers are included because they supervise all the maintenance

TABLE 5-1. M1 TRAINING REQUIREMENTS BY TYPE OF UNIT AND MOS

Type Unit	TOE	Number of RC Units	Military Occupational Specialty						
			Enlisted Personnel Per Unit					Warrant Officers Per Unit	
			41C	34G/ 45G	45K	63G	63H	421A	603A
Heavy Equipment Maintenance Company, General Support	29137	44	6	0	10	9	71	1	3
Maintenance Company, Forward, Direct Support	29207	40	2	2	4	6	47	1	1
Maintenance Company, Rear, Direct Support	29208	7	2	1	3	4	30	1	1
Maintenance Company, Nondivisional Direct Support	29209	2	0	0	0	3	30	0	1
Maintenance Company, Direct Support (Communication Zone)	29427	18	0	0	0	8	63	1	0
Service Company (Classification and Collection)	29139	4	1	0	3	6	27	1	2

actions performed by the unit.[1] The table shows personnel authorizations per unit. For example, each of the forty-four Heavy Equipment Maintenance Companies is authorized six 41C mechanics, ten 45K mechanics, nine 63G mechanics, and seventy-one 63H mechanics. The total M1 training requirement for enlisted personnel in this type unit is 96 guardsmen or reservists. Since there are 44 of these units, the total training requirement for Heavy Equipment Maintenance Companies exceeds 4,000.

Table 5-2 estimates the annual transition training requirement for each MOS. The estimates were developed using the M1 production schedule, the planned M1 distribution, and the percentage of nondivisional maintenance capability in the AC. To illustrate, if 50 percent of all combat units are programmed to receive the M1 by 1985, then 50 percent of all nondivisional maintenance units should be capable of supporting the M1 by that time, or 82 units. Since only 49 of these units are in the Active Army, the remaining 43

TABLE 5-2. RC TRANSITION TRAINING LOAD BY MOS AND FY

MOS	Fiscal Year						TOTAL
	83	84	85	86	87	88	
41C	7	58	72	109	72	44	362
45G/34G	2	14	17	26	17	11	87
45K	12	101	127	190	127	76	633
63G	17	134	168	251	168	100	838
63H	130	1043	1303	1955	1303	782	6516
421A	2	18	23	34	23	13	113
630A	4	30	38	56	38	23	189
TOTAL	174	1398	1748	2621	1748	1049	8738

NOTE: No allowances are made for attrition.

[1]Under the proposed training concept, armament repair technicians (421A) will receive the training required for the 45G/34G and 45K MOSs, while the automotive repair technicians (630A) will receive the training required for the 63G and 63H MOSs.

units must come from the RC. This requirement translates into approximately sixteen Heavy Equipment Maintenance Companies, each authorized seventy-one 63Hs. The total requirement of eleven hundred thirty-six 63Hs would then be included in the total FY 83-85 requirement shown in Table 5-2.

Under one mobilization scenario, approximately 30 percent of the RC nondivisional maintenance units are not required to support the M1. The post-mobilization missions for these units may be to receive additional training or to support combat units not equipped with the M1 equipment. Table 5-3 shows the training load by fiscal year and MOS under this scenario. Note that the total training requirement has dropped by 30 percent (from 8,738 to 6,116); it also has extended one year, until 1984, the date that trained RC units will be required.

TABLE 5-3. POTENTIAL M1 TRANSITION TRAINING LOAD: REDUCED POST-MOBILIZATION MISSION

MOS	Fiscal Year					TOTAL
	84	85	86	87	88	
41C	28	56	81	53	35	253
45G/34G	7	13	20	13	8	61
45K	49	97	142	93	62	443
63G	65	129	188	123	82	587
63H	502	1003	1460	958	638	4561
421A	9	17	25	17	11	79
630A	15	29	42	28	18	132
TOTAL	675	1344	1958	1285	854	6116

NOTE: No allowances are made for attrition.

Current Skill Validation

The validation of current mechanic skills will not require additional resources. Each RC unit will validate the skills of assigned mechanics and correct deficiences using either unit assets or normally available assets.

Introductory Training

Several Mobile Training Teams will be required to provide the introductory training on the M1 during IDT. Each team will consist of one instructor for every MOS requiring New Equipment Training (41C, 45G, 63G, and 63H).

Hands-On Training

The New Equipment Training courses for RC mechanics are a new requirement. The resources required depend upon the specific tasks to be taught, the complexity of the associated Programs of Instruction, and the number of mechanics to be trained each year. Tables 5-2 and 5-3 established upper bounds on the New Equipment Training requirement, based on authorizations. A lower bound on the requirement is available by considering actual RC strength by MOS. Table 5-4 shows the annual training load by MOS, given

TABLE 5-4. EXPECTED M1 TRAINING LOAD:
CURRENT STRENGTH AND REDUCED POST-MOBILIZATION MISSION

MOS	Fiscal Year					TOTAL
	84	85	86	87	88	
41C	16	32	46	30	20	144
45G/34G	2	4	6	4	2	18
45K	27	54	80	52	35	248
63G	36	71	103	68	45	323
63H	241	481	701	460	306	2189
421A	6	12	17	12	8	55
630A	14	24	39	26	16	122
TOTAL	342	681	992	652	432	3099

current unit fill-rates, the M1 production schedule, the planned distribution of the M1, and a reduced post-mobilization mission. Even though the actual training requirement is substantially lower than previous estimates, it still averages over 600 per year beginning in FY 84.

To support this resident training, additional instructor, tank and simulator hours will be required at the Ordnance Center and School. Also, since the majority of AT is accomplished during the summer months, the RC training load will represent a substantial surge during the summer.

Troubleshooting Training

The RTCs are the major resource consumer for this phase. Since RTC requirements are driven primarily by sustainment training, the resources for establishing RTC are discussed below.

SUSTAINMENT TRAINING

The resources required to implement the proposed sustainment training include extension training materials and RTCs. The unique RC training environment dictates that the extension training materials, such as correspondence courses and video based instruction, be tailored to RC requirements. Since the development and distribution of these courses takes approximately 30 months, immediate action is required.

RTC Resources

The RTC is the largest consumer of resources in the proposed training concept. Each RTC requires the complete M1 system or access to the system (including tools, test equipment, and repair parts), an array of simulators and other training devices, and a permanent cadre of instructors. Several programmable troubleshooting trainers are being tested at the Ordnance Center and School and are programmed for procurement to support resident training. If these trainers are effective, then a full set should be procured for each RTC.

The major factors in estimating the resources required to establish an RTC are (1) training equipment, (2) instructor billets, (3) transportation of RC mechanics to the RTC, and (4) administrative and operating support costs. Military construction costs are not included because they will depend on the availability of buildings at the installations selected.

To estimate the cost of the training equipment required at each RTC, we assumed that the simulators and trainers being procurred to support training at the Ordnance Center and School were appropriate for each RTC and that the M1 system could be provided through a redistribution. We also assumed that the training load at each RTC can be accommodated with one M1 system, one turret organizational maintenance simulator, and a complete set of troubleshooting trainers (six different trainers with computers).

Our manpower estimate is based upon the number of different MOSs supported at each RTC and a small command element with administrative staff. Since the RTC will be a tenant on an active installation, the overhead will be kept to a minimum.

Transportation resource requirements cannot be estimated until RTC locations are selected and the frequency of training is established. The number and location of RTCs should be determined through a cost-benefit analysis that includes transportation as a cost. We envisage that the distance between units and RTCs will be less than 150 miles, thus allowing organic transportation assets to be used.

Administrative and operating costs depend on RTC locations and the supported training load. At industrially funded depots which periodically train reservists, the Army has found that administrative costs are less than two dollars per day per reservist. If each RTC supports 800 mechanics and each mechanic trains 4 weekends per year at the RTC, the annual administrative

costs should be less than $15,000. Operating and maintenance costs for the training equipment are not available, but a range of $10-20,000 per RTC was deemed reasonable by the manufacturer. Costs associated with maintaining the M1 were not available.

An overall estimate of the cost associated with establishing an RTC is approximately $600,000 and 10 manpower billets (Table 5-5). Annual operating costs for a sustainment training program at each RTC will be approximately $50,000 excluding transportation and M1 maintenance costs.

TABLE 5-5. COST ESTIMATE PER RTC

New Training Equipment	
Tank	0
Turrent Simulator	$200,000
Troubleshooting Trainers	$355,000
Manpower	
Instructors	7
Command Element	3
Transportation (Annual)	Unknown
Administration and Operation (annual)	
Administration	$ 15,000
Maintenance-Training Equipment	$ 20,000
Maintenance-Tank	Unknown

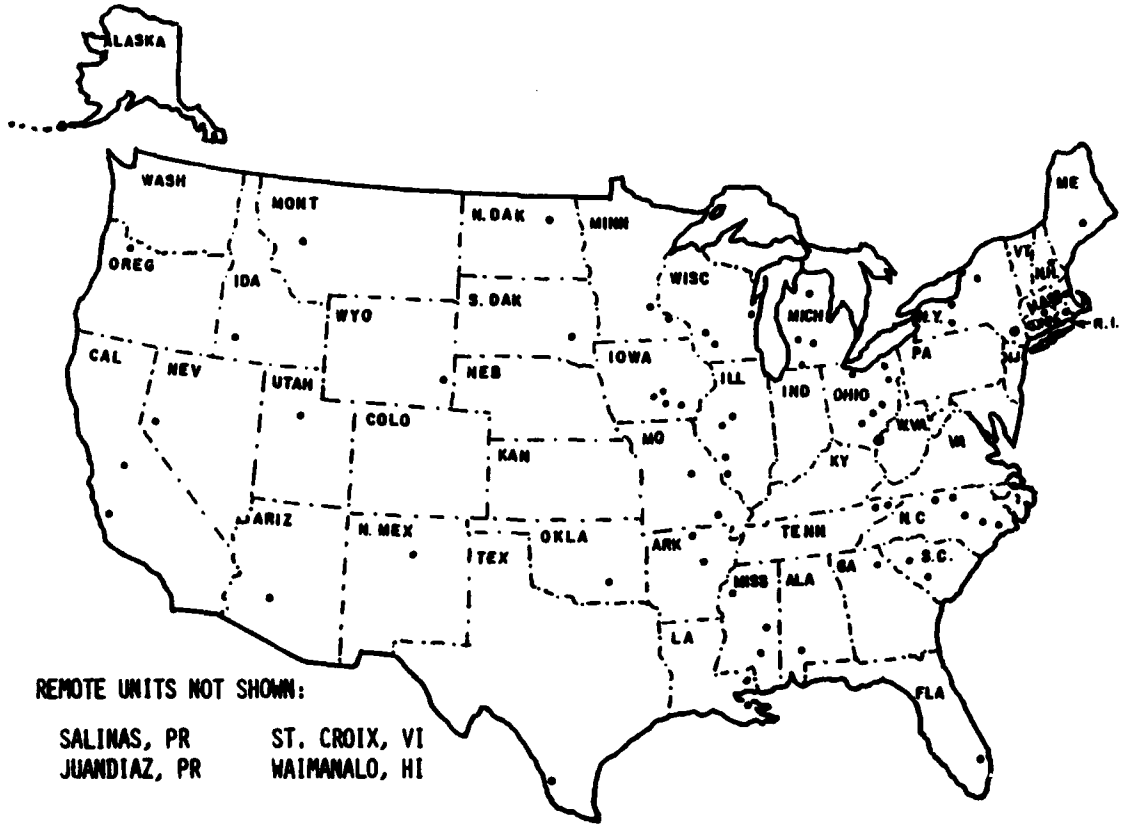
Number of RTCs

The number of RTCs required is primarily dependent upon the number and location of supported units. The schedule for establishing the RTCs is directly related to the distribution of M1 tanks to the active forces. Since the Ordnance Center and School at Aberdeen Proving Ground and the Armor School at Fort Knox currently have the full array of training devices, as well as the M1 system, they are logical candidates to become RTCs. Eighteen RC non-divisional maintenance units are located within a 2-hour travel time of these installations.

By the mid-1980s, however, the requirement for trained RC units will exceed the 18 which can be supported by these candidate RTCs. The low equipment procurement associated with establishing RTCs at Active Army installations which have the M1 make that strategy very desirable. However, few RC maintenance units are located near such installations and several Active Army units assigned to these installations will not receive the M1 until the late 1980s.

Figure 5-1 identifies all RC nondivisional maintenance units that are not located within a 2-hour travel time of an Active Army installation that is planned to receive the M1. Many of the units are widely scattered, frequently one per state. Nevertheless, the geographic clustering of some

FIGURE 5-1. LOCATIONS OF REMOTE RC UNITS



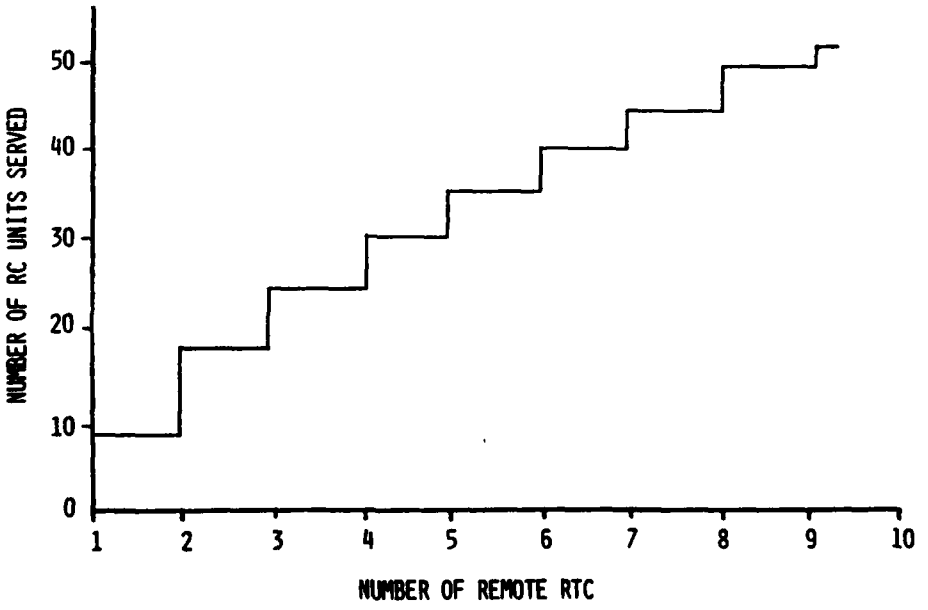
units suggests several locations for establishing RTCs. Table 5-6 identifies these locations and shows the number of RC units which could be supported by each RTC.

TABLE 5-6. REMOTE RTC LOCATIONS AND UNITS SERVED

Approximate Location	RC Units Served	Cumulative Units Served
South/Central North Carolina	9	9
Border of Iowa, Illinois, & Missouri	9	18
North/Central Ohio	6	24
Southern New England	6	30
Southeast Mississippi	5	35
Central Wisconsin	5	40
Northeast Arkansas	4	44
Central Michigan	4	48
Western New York	3	57

Figure 5-2 portrays the relationship between the number of remote RTCs and number of units supported. As Figure 5-2 shows, the number of RC units which can train at each additional remote RTC decreases rapidly. A RTC

FIGURE 5-2. NUMBER OF RC UNITS SERVED BY REMOTE RTCs



serving fewer than five or six RC units probably is not justified. However, if all collocated RTCs are established as the M1 becomes available and five remote RTCs are established, then approximately 75 RC units will receive the M1 troubleshooting and sustainment training support--roughly the requirement for early deploying RC units under one mobilization plan. If deployment plans are altered to use RC units located near RTCs to meet early deployment requirements and later deploying RC units are assigned post-mobilization training missions, then the RC M1 training requirement will be satisfied.

NEW ACCESSIONS AND FULL-TIME UNIT SUPPORT PERSONNEL

If the M1 tasks are not integrated into AIT by January 1983 as planned, then new RC accessions who need M1 training by 1984 will attend the M1 supplement to AIT. The resources to support this action will be principally associated with extending the active duty time of new accessions and expanding the capacity of the M1 supplement course. Initially, the RC training load associated with deferral will be small because of the few RC units needed in 1984.

FULL-TIME UNIT SUPPORT PERSONNEL

Table 5-7 shows the time-phased requirements for full-time unit support personnel if all RC nondivisional units are to be M1 capable. Table 5-8 shows the requirements if adjustments are made for post mobilization missions. In either case, the Ordnance Center and School will require additional instructors for 63H personnel. The training requirement for the other MOSs can be absorbed into existing NET courses. Since there are as many as 40 full-time unit support personnel within a unit, some additional manpower or contractor support may be required to continue the unit's day-to-day activities when these personnel attend NET.

TABLE 5-7. FULL-TIME UNIT SUPPORT TRAINING LOAD: ALL UNITS

MOS	Fiscal Year						TOTAL
	83	84	85	86	87	88	
41C	0	3	3	5	3	2	16
45G/34G	0	0	0	0	0	0	0
45K	1	7	9	13	9	5	44
63G	0	4	4	7	4	3	22
63H	9	74	93	139	93	55	463
421A	0	4	6	9	6	3	20
630A	2	12	15	23	15	10	77
TOTAL	13	104	130	196	130	78	651

TABLE 5-8. FULL-TIME UNIT SUPPORT TRAINING LOAD: REDUCED POST-MOBILIZATION MISSION

MOS	Fiscal Year					TOTAL
	84	85	86	87	88	
41C	1	2	4	2	2	11
45G/34G	0	0	0	0	0	0
45K	3	7	10	7	4	31
63G	2	3	5	3	2	15
63H	36	71	104	68	45	324
421A	2	4	7	4	3	20
630A	6	12	17	11	8	54
TOTAL	50	99	147	95	64	455

6. IMPLEMENTING STRATEGY

This chapter identifies the actions required to translate the proposed training concept into a training program. It also identifies how Regional Training Centers can be used to train RC mechanics to support other new weapon systems.

ARMY ACTIONS

Establish Firm Training Requirements

The number of RC maintenance companies and personnel that require M1 training has not been established by the Army. If we assume that all units with mission statements which include M1 support are to be trained, then the total training requirement is 115 RC units. Even if we assume that not all RC units will deploy, the requirement still exceeds 70 units and more than 3,000 guardsmen and reservists.

Training RC nondivisional maintenance units to support the M1 requires substantial resources. It also cannot be accomplished in the short-term. To support the M1, an RC unit will require approximately one full year of dedicated M1 training, followed by several IDT periods each year thereafter.

The Army needs to establish firm, time-phased M1 training requirements for RC units. Only then will the Army be able to estimate the resources required to develop the desired M1 capability in the RC.

Identify M1 Capable Units

Once the time-phased requirement for M1 capable RC units is established, the units to meet this requirement need to be selected. Factors relevant to selecting a unit to support the M1 include its full-time unit

support personnel strength, overall personnel fill, proximity to the M1 system, and proximity to other potential M1 capable RC units. Collocated units with full-time unit support personnel are the best candidates to meet early deployment requirements, followed by collocated units without full-time support. Remote units should be considered last.

Determine Number, Location, and Resource Requirements of RTCs

Regional Training Centers are critical to the proposed RC training concept. They are also the major resource consumer in the proposed concept. As such, the number and locations of the RTCs need to be identified early, along with their requirements for equipment, facilities, and personnel. The funds to establish, equip, and staff the RTCs need to be programmed immediately by the Army because of the long procurement leadtimes.

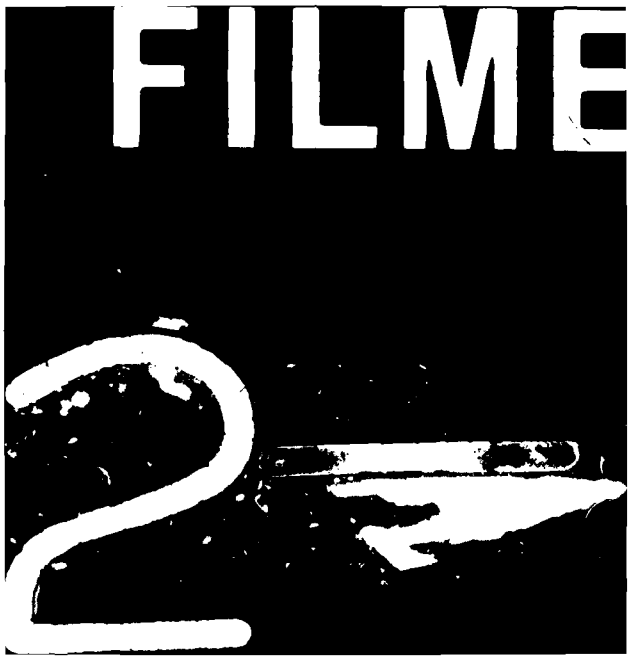
Even assuming that the first RC units selected for M1 training are collocated with the Ordnance Center and School, additional instructors, training devices, and simulators will be needed to support the RC transition training program.

Develop Special RC Training Materials and Courses

Under the proposed concept, special courses and related extension training materials are needed to support RC training on the M1. They include the 2-week New Equipment Training course, the course to train full-time unit support personnel as instructors, the correspondence courses for the introductory phase of initial skill training, and the troubleshooting courses suitable for multiple IDT periods. These course requirements are pressing because of a 30-month leadtime for their development and the requirement to begin training RC mechanics in the FY 84-85 timeframe. Consequently, the Army will need to initiate development of these special RC training courses soon.

APPLICATIONS TO OTHER SYSTEMS

The proposed concept focuses on the technical skills associated with the M1 tank, but it also is applicable to many other systems in the Army's force modernization program. The needs and problems encountered in preparing the RC to support a high technology tank will be present during the fielding of the Fighting Vehicle System, Division Air Defense Gun, and the other high density systems. For each of these systems, a formal RC transition training program needs to be developed and resourced with a priority commensurate to the weapon system. Additionally, a systematic skill sustainment program is required that affords each RC mechanic frequent opportunities to gain hands-on experience with the system. Regional Training Centers have the potential to support the skill sustainment requirements of RC mechanics on these new systems. In the future, the concept of frequently moving mechanics to RTCs for hands-on training during weekend drills could be the cornerstone of a RC technical training program.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