TM 37-250

WAR DEPARTMENT TECHNICAL MANUAL

BASIC MAINTENANCE MANUAL

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WAR DEPARTMENT • NOVEMBER 1944

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WAR DEPARTMENT TECHNICAL MANUAL

TM 37–250

This manual supersedes TM 38–250, August 1943

BASIC MAINTENANCE MANUAL

WAR DEPARTMENT • NOVEMBER 1944

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 25 November 1944

TM 37–250, Basic Maintenance Manual, is published for the information and guidance of all concerned.

[AG 300.7 (2 Jun 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

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For explanation of symbols, see FM 21–6.

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FOREWORD

"I call on each man and woman serving with the Army of the United States to unite in a campaign . . . to abolish the menace of mechanical failures . . . this is your responsibility . . ."

Henry L. Stimson

Secretary of War.

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CHAPTER 1

INTRODUCTION AND DESCRIPTION OF ECHELONS

Section I. INTRODUCTION

1. MODERN WARFARE. Modern war is a mechanical war. Never before in history have the lives of individuals, the success of armies and the existence of nations been so dependent on the proper functioning of mechanical equipment.

2. RESPONSIBILITY FOR MAINTENANCE. Every member of the military forces has a definite maintenance responsibility. Maintenance responsibilities vary from preventive maintenance operations through highly specialized repair and reconditioning techniques to the supervision and inspection necessary to insure that equipment is actually ready for use. Ultimate victory depends equally on the efforts of all.

3. PURPOSE. This manual does not supersede the various technical manuals and other technical publications applicable to the particular items of Army equipment, Army regulations or War Department circulars, but is published:

a. To prescribe the basic principles of maintenance and to familiarize all members of the Army with these principles.

b. To prescribe the channels of maintenance support and maintenance supply for both personnel and equipment.

c. To impress on the individual the necessity of knowing his equipment and of reporting promptly malfunctions affecting repair.

d. To establish the standardized maintenance policies and procedures.

4. THEATERS OF OPERATION. Instructions in this manual concerning channels and procedures will be considered in theaters of operations as guiding principles only, except as they may be specifically prescribed by competent authority.

Section II. ECHELONS OF MAINTENANCE DEFINED

5. ECHELONS OF MAINTENANCE. Complete maintenance service will be performed under what is termed the "Four Echelon System" for *Army Air Forces* procured items and the "Five Echelon System" for *Army Service Forces* procured items as described below:

a. Maintenance functions are divided into two broad groups—

(1) Organizational maintenance consists of first and second echelons.

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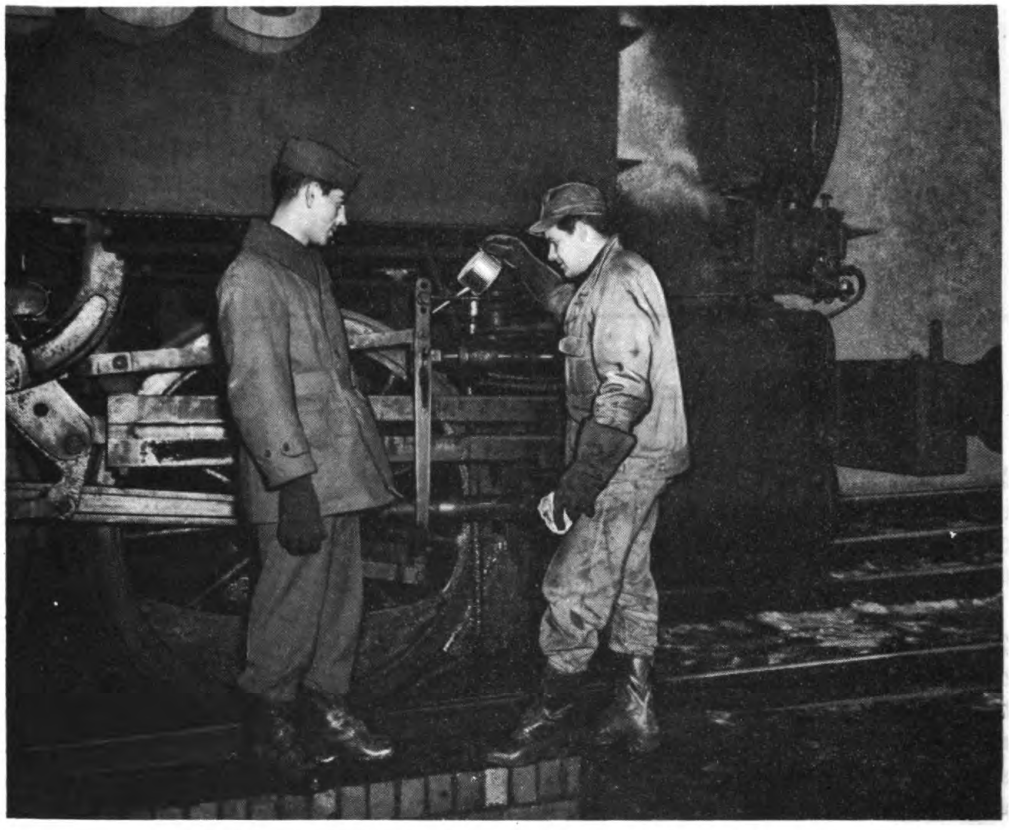
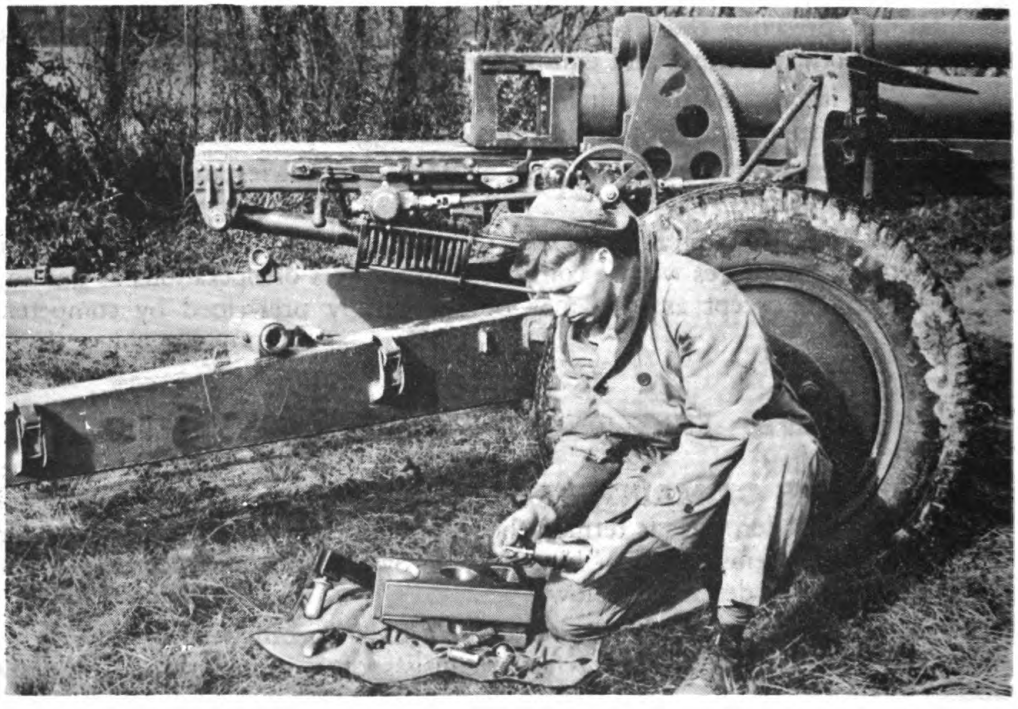


Figure 1. First echelon—operator oiling his locomotive.

Figure 2. Second echelon—battery mechanic replacing worn sear in firing mechanism of 105-mm howitzer.



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(*a*) *First echelon* (fig. 1). Preventive maintenance operations performed by the user, wearer, or operator of the equipment, regardless of location. This includes the proper care, use, operation, cleaning, preservation, lubrication and inspection of matériel, and such adjustment, minor repair and parts replacement as are authorized.

(*b*) *Second echelon* (fig. 2). The additional maintenance operations performed by specially trained personnel of the using organization—company, battalion, squadron, regiment, or combination thereof. This includes additional preventive maintenance, technical advice, technical supervision, technical assistance and command inspections. It furnishes the necessary tools, parts, supplies and skilled personnel authorized to perform work within its scope which is beyond the capabilities and facilities of the first echelon. First echelon personnel will normally participate in these operations. Second echelon personnel act upon reports of malfunctioning made by the first echelon.

(2) Service maintenance consists of third, fourth, and (except for Army Air Forces procured items) fifth echelons in support of organizational maintenance; for example, mobile third, semimobile fourth echelon organizations, and fixed third, fourth, and fifth echelon shops.

(*a*) *Third echelon* (fig. 3). Service maintenance performed by main-



Figure 3. Third echelon—a medium maintenance company technician adjusting elevating mechanism on 105-mm howitzer.

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Figure 4. Fourth echelon—repair of radio sets in fourth echelon shop.

tenance and supply organizations in close support of using troops, and in special cases, by maintenance groups within the using organization. Third echelon organizations repair and replace specified sub-assemblies, and repair the overflow from the lower echelons. They also support the lower echelons by contact repair parties and, in some cases, by supply of repair parts.

(*b*) *Fourth echelon* (fig. 4). Service maintenance performed by an established pool of variable numbers and types of maintenance units formed as a semi-fixed, or fixed shop serving troops within a geographical area. It serves all forward echelons with a higher degree of skill and is authorized a larger assortment of parts, sub-assemblies and assemblies. It may send forward contact parties or reinforcing elements when required. Its main function is the rebuilding of major items using serviceable assemblies and sub-assemblies in stock or obtained from unserviceable major items.

(*c*) *Fifth echelon* (fig. 5). Service maintenance performed in rear areas utilizing fixed installations to completely recondition matériel and incorporating reclamation and limited manufacture. Fifth echelon as described herein does not apply to the Army Air Forces procured items since these functions are performed in fourth echelon for this equipment.

6. APPLICATION OF ECHELONS. All organizations perform first and second echelon maintenance on the equipment assigned to them, even though they may also be responsible for third, fourth, or fifth echelon maintenance on the same or other equipment submitted to them. For example, the engineer maintenance company performs only first and second echelon maintenance on

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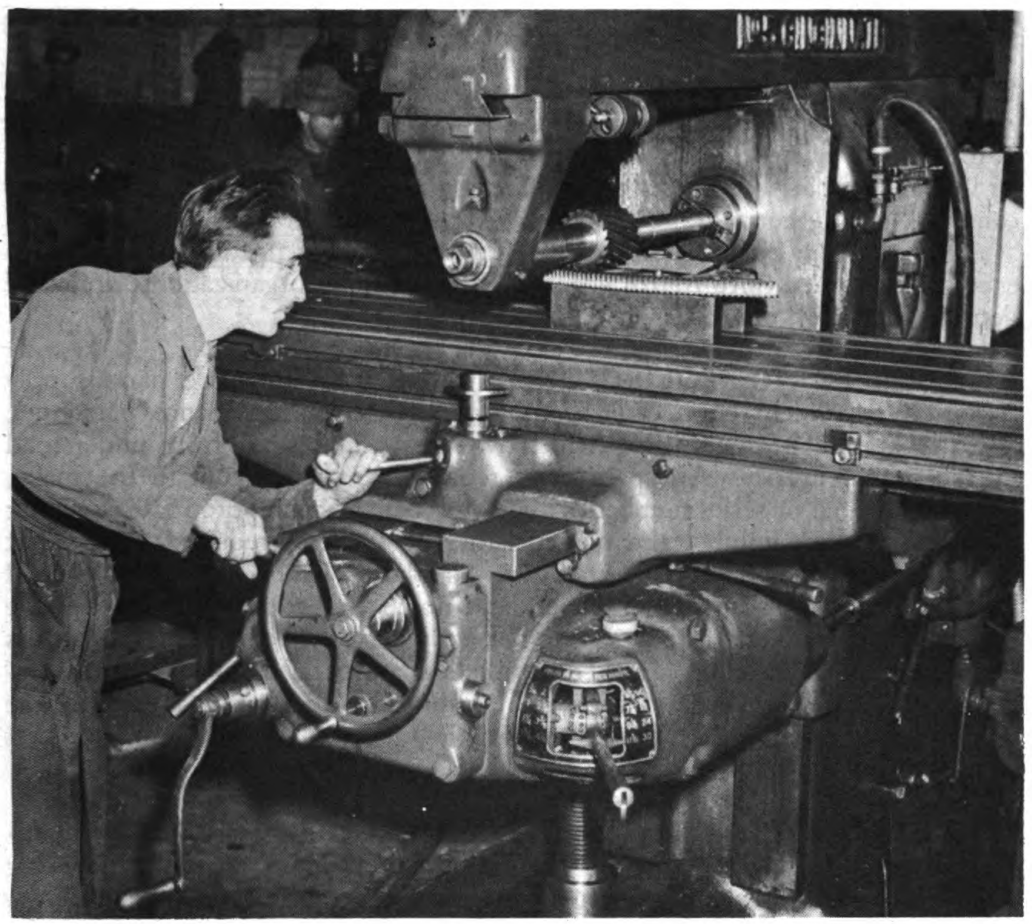


Figure 5. Fifth echelon—machine operations being performed in a repair depot.

ordnance vehicles assigned to it, but it performs third or fourth echelon maintenance as well as first and second echelon maintenance on engineer equipment assigned to it or submitted to it for repair or storage. Within their capabilities, service maintenance organizations may perform work other than that assigned. In emergencies, the nearest facilities should be utilized regardless of the normal responsibility for maintenance.

7. DETERMINATION OF ECHELONS OF MAINTENANCE. **a.** Efficient maintenance dictates that the various maintenance operations which must be performed on each item of matériel be allocated normally to certain personnel in pre-established places.

b. The echelon in which any given operation is performed is determined by the tactical situation, nature of repairs, time available, skill of personnel, availability of tools and parts, and the need for mobility.

c. The echelon system requires that all maintenance personnel and all organizations receive sufficient technical training to perform their prescribed maintenance operations and that all echelons be provided with sufficient personnel, tools, equipment, supplies, and parts. No echelon will perform the work of a higher echelon at the expense of neglecting its own properly assigned functions.

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Section III. MAINTENANCE SUPPLY OF SPARE PARTS AND TOOLS

8. SPARE PARTS LISTS. Spare parts lists for equipment supplied by Army Service Forces, under the Army supply program are published in the Army Service Forces Supply Catalog.

a. Army Service Forces Supply Catalog lists for first and second echelons constitute the authorized allowances for using organizations.

b. Army Service Forces Supply Catalog lists for third echelon, fourth echelon, combined third-fourth echelon, tactical supply organizations, and base depots constitute guide lists for initial stockage.

9. SPARE PARTS REQUISITIONS. Effectiveness of spare parts supply is largely dependent upon careful study of needs by maintenance personnel, and preparation of requisitions which will be accurate and fully understood by the supply agency. All spare parts requisitions should contain the make, model and serial or series number of the equipment, when appropriate, together with official stock number and nomenclature of all items required. The latest Army Service Forces Supply Catalog or Standard Nomenclature List should be used to obtain spare parts numbers and nomenclature, and reference made thereto on the face of the requisition for each item. When technical manuals or manufacturers' catalogs are used to obtain spare parts numbers and nomenclature, the title and date of such publications should be stated on the face of the requisition for guidance of the supply agency in determining the exact spare parts desired.

10. NON-STOCK PARTS. In the program of spare parts supply for equipment furnished by Army Service Forces, emphasis has been placed on limiting spare parts stocks to items subject to normal wear or breakage under military operating conditions. Infrequently used parts and other items which can be repaired or readily made in the field using bulk material are not listed in supply catalogs as authorized issue items. Prior to requisitioning such non-stock parts, which are subject to special procurement action and production delays, every effort should be made to repair the unserviceable part, obtain the required part from an unserviceable assembly or item of equipment, fabricate the part from bulk material, or substitute a stocked spare part. When repair cannot be made by using these means, and it has been determined that a non-stock spare part must be requisitioned, a separate requisition, listing only the spare part required and clearly explaining the need for such part, should be prepared and submitted for supply action. Requisitioning a non-stock part by separate requisition will materially assist in prompt and correct supply of such items.

11. COMPLETE INFORMATION NECESSARY. Using and maintenance personnel should be ever mindful that they, alone, know from first hand knowledge exactly what is required to repair equipment which they maintain. Supply of the spare parts necessary to accomplish their maintenance mission can be only as good as the information conveyed in requisitions to cover those needs.

12. TOOL AND EQUIPMENT GROUPS. Tools and tool equipment are generally considered as being divided into two groups, common and special.

a. Common tools and tool equipment are generally non-expendable and are applicable to a relatively large range of repair operations. These items are

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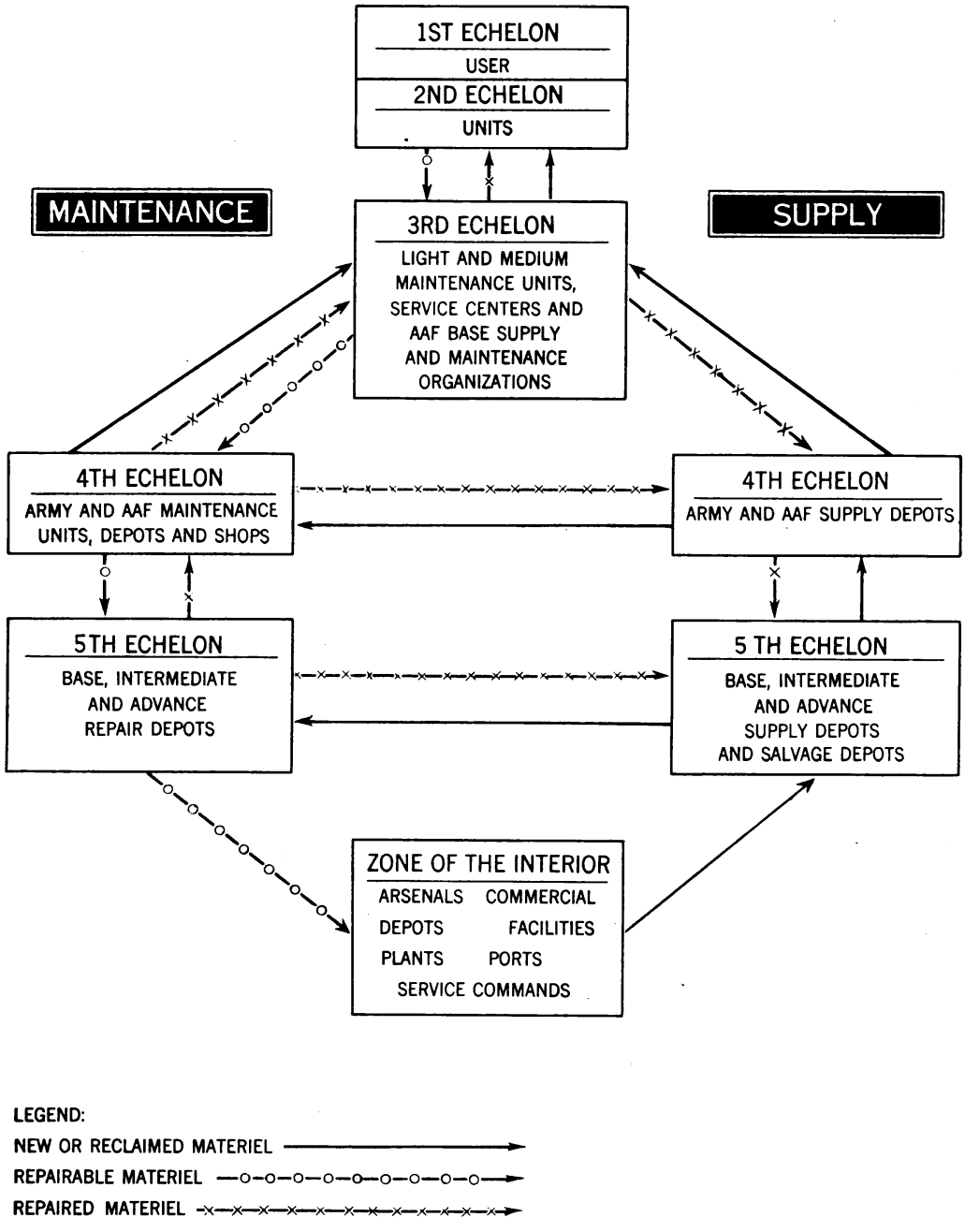


Figure 6. Standard flow chart for maintenance and maintenance supply.

in most cases grouped in sets which are standardized, the authorization for supply being indicated in tables of equipment. Such standardized sets will be utilized in lieu of non-standard equipment so far as possible.

b. Special tools and tool equipment are peculiar to a particular major item. They are normally listed in the Army Service Forces supply catalogs and Army Air Forces technical orders and stock lists pertaining to the major item. The basis of issue of special tools and equipment is usually briefly indicated in the table of equipment and fully indicated in the supply catalog section to which reference is made.

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13. TOOL LISTS IN SUPPLY CATALOG. In certain cases indication of allowances of tools for using organizations is made in the supply catalog section listing the components. This method is used where irregularity of basis of issue makes it impractical to indicate the details in the table of equipment.

14. TOOL ALLOCATION TO THE ECHELONS OF MAINTENANCE. Tools are supplied to the various echelons of maintenance in accordance with the authorized maintenance functions and spare parts supplied, and are usually as follows:

a. First echelon tools, used by the operator of the equipment, are normally supplied with the major item.

b. Second echelon tools are those normally issued to an organization for limited maintenance of the equipment operated by the organization.

c. Third echelon tools are those normally issued to maintenance organizations authorized to perform third echelon work. These tools usually permit the removal and replacement of complete assemblies and sub-assemblies, repair operations not involving major machining and fitting operations, and testing of components and assemblies when such testing can be performed adequately on a mobile basis.

d. Fourth echelon tools are similar to those supplied to third echelon organizations but with the addition of items required for heavier operations and more complete testing and rebuilding of major items from serviceable assemblies or parts on hand.

e. Fifth echelon tools are selected for complete rebuilding operations in fixed base shops and may consist of heavy machine tools, production line equipment, and tools and testing devices required for complex repairs and rebuilding functions.

15. SUPPLIES REQUIRED FOR USE WITH TOOLS. Expendable supplies required for use with tools are in some instances indicated in supplemental lists to standard tool sets. Small sets and kits may include a limited amount of expendable supplies when these items are important for initial operation of the tools involved. Other expendable supplies and common hardware items are indicated in the appropriate section of the Army Service Forces supply catalogs as published by the various technical services.

Section IV. PROCEDURES AND PRACTICES

16. PREPARATION OF MATERIEL FOR OVERSEA SHIPMENT. Equipment to be shipped overseas will be prepared and processed in accordance with current directives. Port commanders are responsible that only properly packed and marked equipment is loaded for shipment. Chiefs of technical services will prepare items destined for oversea shipment at the depots or commercial plants wherever possible. A certificate from the representative of the chief of technical service that the contents or equipment have been properly processed will be accepted by the port commander without inspection of contents, except for indications of damage in transit. In the case of issued organizational equipment, the commanding officer concerned will prepare the items for shipment, calling upon service command agencies for assistance. Special care will be exercised in packaging and transport to guard against pilferage.

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17. LOCALIZED SHIPMENT. In case it is necessary to ship overseas major items that are not built to standardized specifications, every effort will be made to group definite models and types in the same oversea localities regardless of the technical services involved. Where more than one model or type has been standardized, particular models and types will be confined to certain localities wherever practicable.

18. MAINTENANCE IN STORAGE AND IN TRANSIT. a. The protective packing and other processing to prevent deterioration of Army equipment is augmented by preventive maintenance care in storage, in transit, and in the hands of troops to assure serviceability when each item is required for actual use. Matériel placed in storage (temporary or permanent) will be properly maintained to prevent deterioration or damage according to procedures established by Army Service Forces, and by Army Air Forces technical orders. All spare parts will be furnished in plainly marked packages or tagged to provide positive, durable identification and will be protected to prevent damage in transit and deterioration from climatic conditions and unnecessary examination.

b. Items prepared for shipment by all agencies will be packed in such a way that damage will not occur in transit.

(1) Agencies preparing matériel for shipment will segregate matériel by types for packing.

(2) Like items will be packed together.

(3) Items of a fragile nature will be cushioned by wrapping or individual boxing and blocking securely in containers. Containers will be packed so that contents which might be damaged by shifting cannot shift within the container.

(4) Items subject to deterioration by corrosion will be treated with approval rust-preventive materials, unless such treatment would be harmful to the item itself.

(5) Durable items will not be packed with fragile items. Where it is necessary to pack heavy items and relatively lighter items in one container, the heavy items will be separated by sufficient dunnage to prevent contact between the two types of items. Dunnage will be sufficiently strong and securely blocked to prevent shifting within the container.

(6) Reusable containers will be used in shipment of matériel included in the following general classifications:

(*a*) Engines and major unit assemblies for mechanical and electrical equipment.

(*b*) All other major items normally packed in unit containers and/or in standard field containers wherein a specified number of like items are packed, such as communications, small arms, and fire control equipment.

(7) Field agencies involved will requisition desired specifications for use in building reusable containers from chiefs of technical services.

19. MAINTENANCE PUBLICATIONS TO ACCOMPANY EQUIPMENT. Whenever an operator's technical manual, or War Department lubrication order, is published pertaining to an item of equipment, a copy of the same will be listed as an accessory to that item and issued therewith. Each issuing agency is responsible for the concurrent issue of operators' technical manuals and War Department lubrication orders, with the respective item of equipment.

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20. PREVENTIVE MAINTENANCE SERVICE. **a.** Commanders are responsible that instructions and procedures for preventive maintenance operations which are published in current technical manuals, technical regulations, bulletins, War Department lubrication orders, and other pertinent publications are strictly complied with by all personnel under their control, and that authorized lubricants, parts, tools, and supplies are made available at all times for the proper performance of preventive maintenance operations. Commanders are also responsible that each individual user, wearer, or operator of equipment within their command is trained in the proper preventive maintenance of such equipment and that sufficient time is allotted for proper application.

b. It is the responsibility of the appropriate commanding officer to prevent the abuse of matériel under his control. Evidence of abuse will be investigated and appropriate action taken thereon. Some common abuses are:

(1) Improper, careless, or negligent use or operation of matériel.

(2) Lack of lubrication, overlubrication, or use of unauthorized lubricants.

(3) Lack of inspections.

(4) Deferred maintenance, including lack of proper servicing and adjustments.

(5) The attempting of repairs by unqualified personnel or by use of improper or inadequate tools and equipment.

21. DEPOT MAINTENANCE. The Commanding General, Army Air Forces, the Commanding General, Army Service Forces, and the commanding generals of theaters and departments will prescribe the repair and maintenance activities to be performed at depots under their respective control.

22. ESTABLISHMENT OF MAINTENANCE FACILITIES (Except class IV installations). **a.** Within the continental limits of the United States, the Commanding Generals of the Army Air Forces, the Army Service Forces and the defense commands will provide required maintenance facilities at posts, camps and stations and ports of embarkation under their respective control. In order to eliminate duplication, the maintenance facilities will be organized under a designated officer who will be charged with all maintenance activities pertaining to the post, camp or station or port of embarkation, other than the responsibilities as established in AR 100–80 and AR 170–10 or other pertinent directives. The facilities so established will be used jointly by all technical services for the repair and modification of all Army equipment regardless of the service normally charged with the maintenance of such equipment. Provisions will be made for the necessary shop supply through a single agency.

b. The maintenance facilities so established will be financed from applicable appropriations regardless of the equipment repaired or modified, except that all spare parts, sub-assemblies and unit assemblies which are not available in stock, will be requisitioned from the technical service which normally stocks such parts. No reimbursement or transfer of funds will be made except for major conversions and modifications as specified in the directive in each case.

c. In the discharge of responsibilities, post engineers will make maximum utilization of the maintenance facilities referred to above and will not establish or operate shops or sections of shops duplicating these facilities. Conversely, maintenance not within the scope of the above-mentioned facilities, which can be accomplished in shops operated by the post engineer, will be performed there without reimbursement.

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23. TACTICAL MAINTENANCE ORGANIZATIONS. Tactical commanders are authorized to integrate maintenance activities within their commands and to form composite functional units whenever maintenance efficiency can thereby be improved. Tables of Organization and Equipment for composite units will be prepared by the Commanding Generals, Army Ground Forces, Army Air Forces, and Army Service Forces, as appropriate in accordance with provisions in AR 310–60.

24. UTILIZATION OF FACILITIES. When the maintenance facilities of the various services are so located that their use by any of the arms and services makes possible the more prompt and effective maintenance of matériel, such facilities may be utilized and repairs accomplished according to priorities established by higher commanders, regardless of the procuring or issuing agency or the normal channels of procedure. Due to the fact that certain items of equipment issued by a particular service do not exist in sufficient number to warrant assignment of special mechanics, it will be necessary for the other technical services to furnish maintenance support.

25. EVACUATION OF UNSERVICEABLE MATÉRIEL. In general, matériel which is beyond the maintenance scope of any organization, or which cannot be repaired within the time available, will be evacuated to another maintenance organization on the same level or to the next higher echelon of maintenance, whichever is the more practicable.

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CHAPTER 2

MODIFICATION OF MATÉRIEL

26. DEFINITION. A modification is a specific change, major or minor, in the design or assembly of an adopted item of matériel.

27. PURPOSE. A modification of matériel may be found necessary when it:

a. Is essential to the safety of personnel;
b. Improves substantially combat effectiveness;
c. Increases materially the efficiency of manufacture;
d. Will result in more expeditious delivery of such equipment or supplies to using troops.

28. UNSATISFACTORY EQUIPMENT REPORT. When an item appears to be unsatisfactory in design or material, WD AGO Form 468, Unsatisfactory Equipment Report, is submitted by using or service organizations. For reporting manufacturing, design, or operational defects in equipment used by the Army Air Forces, Army Air Forces Form 54, Unsatisfactory Report, supplied by the Area Air Service Command, Publication Distribution Section, is used. These forms will also be used for reporting complaints on the application or effect of prescribed petroleum fuels, lubricants, and preserving materials, and when so used will contain identifying details on both the products and the associated equipment.

29. MODIFICATION WORK ORDERS (Listed in FM 21–6). **a.** If a modification is deemed necessary or desirable after the receipt and study of unsatisfactory equipment reports, WD AGO Form 468, or unsatisfactory reports, Army Air Forces Form No. 54, the desired modification is prepared by the chief of the technical service concerned and issued direct or by The Adjutant General as a War Department Modification Work Order or published by the Army Air Forces, as a Technical Order. The designation of the technical service issuing the modification work order will be incorporated in the numbering system by one of the following abbreviations placed between MWO and the number: ORD, SIG, MED, QM, TC, CWS, ENG. *Example*: MWO–SIG–1645. The subject matter and its arrangement within a modification work order are as follows:

(1) *Major item affected.* Standard nomenclature for item; stock number; reference to pertinent TM, instruction book or ASF Catalog section. When the major item is a part of a major combination, the major combination will be shown directly under the major item.

(2) *Part modified.* Standard nomenclature for unit, section or assembly; drawing number; drawing date; stock number. Reference includes superseded drawings with their dates.

(3) *Purpose of modification.*

(4) *Drawings required to apply modification.* Drawing number, with date and source from which drawings are obtained; whenever practicable, such drawings will be contained in the MWO.

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WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR	TECHNICAL SERVICE: MATÉRIEL	DATE
FROM	ORGANIZATION	STATION
TO	NEXT SUPERIOR HEADQUARTERS / STATION	TECHNICAL SERVICE

COMPLETE MAJOR ITEM

NOMENCLATURE	TYPE	MODEL	
MANUFACTURER	U. S. A. REG. No.	SERIAL No.	DATE RECEIVED
EQUIPMENT WITH WHICH USED (*If applicable*)			

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE

PART No.	TYPE	MANUFACTURER	DATE INSTALLED
DESCRIPTION OF FAILURE AND PROBABLE CAUSE (*If additional space is required, use back of form*)			

DATE OF INITIAL TROUBLE	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS

BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN

TRAINING OR SKILL OF USING PERSONNEL			RECOMMENDATIONS (*If additional space is required, use back of form*)
POOR	FAIR	GOOD	

ORIGINATING OFFICER

TYPED NAME, GRADE, AND ORGANIZATION	SIGNATURE

FIRST ENDORSEMENT

TO CHIEF	TECHNICAL SERVICE	OFFICE	
NAME, GRADE, AND STATION		STATION	DATE

Instructions

1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (change No. 3).
5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.
8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
30 August 1944

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1942, which may be used until existing stocks are exhausted.

U. S. GOVERNMENT PRINTING OFFICE 16—41840-1

Figure 7. WD AGO Form 468, Unsatisfactory Equipment Report.

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(5) *Parts affected by modification.*

(*a*) *New parts required.* Name, stock number or part number, quantity.

(*b*) *Discarded parts.* Name, stock number or part number, quantity.

(*c*) *Modified parts.* Name, stock number or part number, quantity.

(*d*) *Supply of parts required.*

1. *Source of supply.* Name and location of issuing agency, and whether parts are to be obtained on requisition or are to be furnished without requisition.
2. *Date available.*

Note. Parts listed under (5) (*b*) above are disposed of in accordance with instructions contained in (7) (*f*) of the work order.

(6) *Special tools, test equipment, jigs and fixtures.* (Standard nomenclature, stock number and quantity.) Normally only special tools for the modification are listed, but general tools may be listed for information with a statement that they are to be drawn from local stock.

(7) *Special instructions.*

(*a*) *Applied by. Example*: Unit Mechanic and echelon of maintenance.

(*b*) Time required.

(*c*) *Procedure of operation.* Complete description of how the modification is accomplished, including disassembly and assembly, part numbers, and references to illustrations where applicable. Reference may be made to pertinent manuals for data which thereupon need not be repeated in the work order.

(*d*) *Operation to be performed by.* Field units or fixed installations.

(*e*) Comments with reference to other MWO's.

(*f*) Disposal of discarded parts:

1. Parts removed from the major item.
2. Depot stocks of items to be discarded, including quantities under procurement

(*g*) *Classification.* Urgent or normal, or color system if in use.

(*h*) *Serial number required on status report.* Yes or no.

(*i*) *Report required.* Yes or no, date, and agency to whom report is to be made.

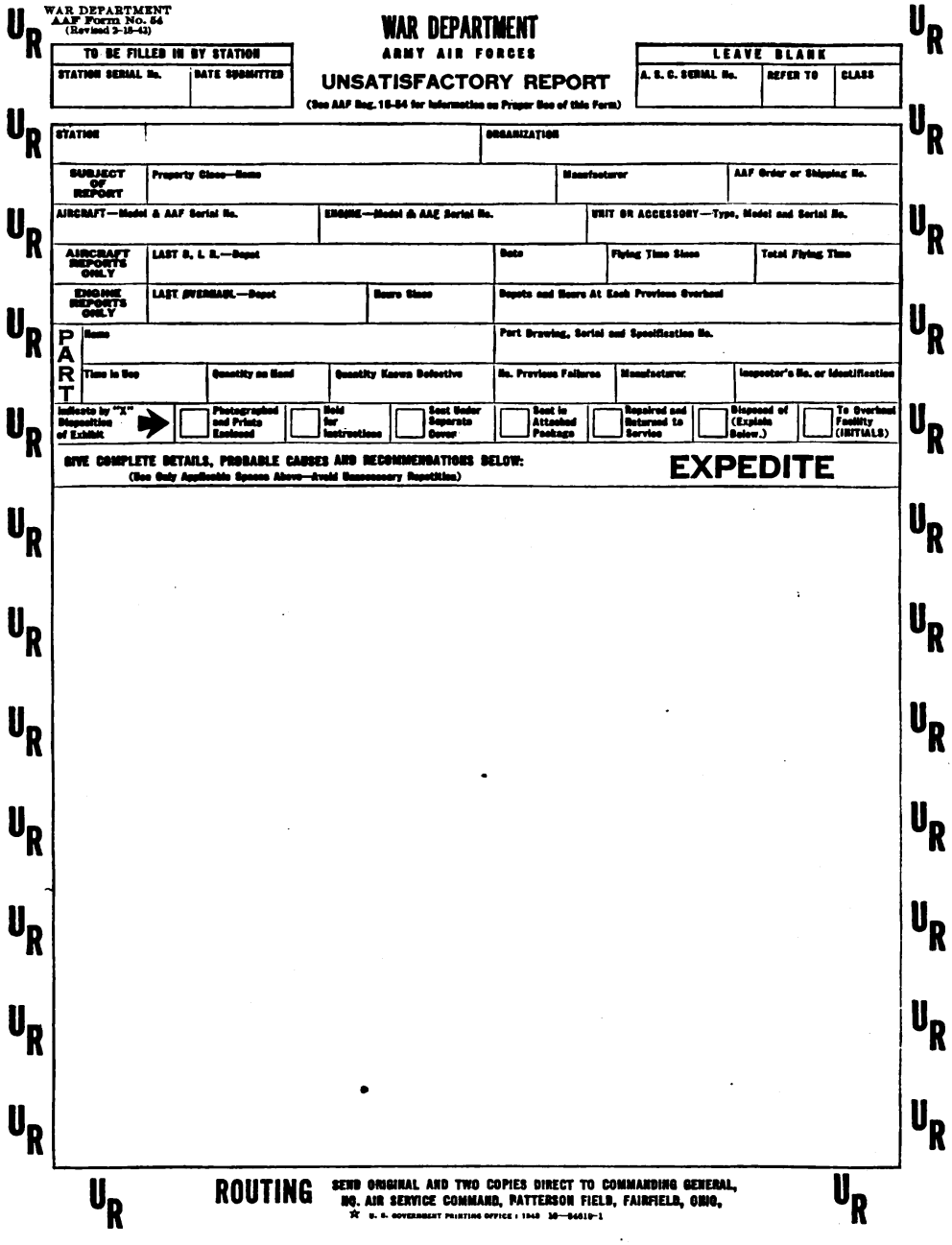
(8) *Remarks.* Special information—serial number ranges involved, etc.

(9) *Date approved for application.* Approval date may be other than publication date.

30. RESTRICTION ON MODIFICATION OF MATÉRIEL. No modification which will affect the working parts of matériel will be made without the prior approval of the responsible technical agency under the control of the Commanding General, Army Air Forces, or the Commanding General, Army Service Forces, except that modifications when vital to safety, may be made in departments or within theaters of operations with the approval of the respective senior technical service officer in each department or theater of operations. A complete report covering such modifications will be made immediately to the respective technical agency.

31. CHANGES TO MODIFICATION WORK ORDERS. Whenever it becomes necessary to issue additional instructions pertaining to the modification of matériel already covered by a modification work order, a change will be issued containing such instructions. The change will be given the same designation as the original modification work order, except that it will have the letter "C" and number of change suffixed.

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WAR DEPARTMENT
AAF Form No. 54
(Revised 3-18-43)

WAR DEPARTMENT
ARMY AIR FORCES
UNSATISFACTORY REPORT
(See AAF Reg. 15-54 for Information on Proper Use of this Form)

TO BE FILLED IN BY STATION		LEAVE BLANK		
STATION SERIAL No.	DATE SUBMITTED	A. S. C. SERIAL No.	REFER TO	CLASS

STATION		ORGANIZATION	
SUBJECT OF REPORT	Property Class—Name	Manufacturer	AAF Order or Shipping No.
AIRCRAFT—Model & AAF Serial No.	ENGINE—Model & AAF Serial No.	UNIT OR ACCESSORY—Type, Model and Serial No.	
AIRCRAFT REPORTS ONLY	LAST S. I. R.—Depot	Date	Flying Time Since / Total Flying Time
ENGINE REPORTS ONLY	LAST OVERHAUL—Depot / Hours Since	Depots and Hours At Each Previous Overhaul	
PART	Name	Part Drawing, Serial and Specification No.	
	Time in Use / Quantity on Hand / Quantity Known Defective	No. Previous Failures / Manufacturer / Inspector's No. or Identification	

Indicate by "X" Disposition of Exhibit → ☐ Photographed and Prints Enclosed ☐ Held for Instructions ☐ Sent Under Separate Cover ☐ Sent in Attached Package ☐ Repaired and Returned to Service ☐ Disposed of (Explain Below.) ☐ To Overhaul Facility (INITIALS)

GIVE COMPLETE DETAILS, PROBABLE CAUSES AND RECOMMENDATIONS BELOW:
(Use Only Applicable Spaces Above—Avoid Unnecessary Repetition)

EXPEDITE

ROUTING SEND ORIGINAL AND TWO COPIES DIRECT TO COMMANDING GENERAL, HQ. AIR SERVICE COMMAND, PATTERSON FIELD, FAIRFIELD, OHIO.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1943 16—84618-1

Figure 8. Army Air Forces Form 54, Unsatisfactory Report.

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32. PROCESSING OF MODIFICATIONS. Any individual, arm, service or branch of any arm or service may submit suggestions for modification. Reports received from the field are analyzed and if a modification is justified the details of the modification, including its application, are developed. The necessary parts, tools, jigs, and fixtures are then placed under procurement. The publication and distribution of the order is coordinated with the production of parts, tools, etc.

33. SYSTEM OF CLASSIFICATION. In order to insure that the more urgent modifications are applied first, a system of classification will be utilized to enable the organizations in the field to schedule the modication work according to the urgency of each project.

34. MODIFICATION PROGRESS REPORTS. A system for analyzing progress will be initiated and operated to the extent necessary to complete the modifications directed by the War Department. No reports will be submitted unless so requested in the modification work order.

35. PROCEDURE FOR HANDLING CAPTURED ENEMY MATÉRIEL. In order fully to exploit enemy matériel captured in large quantities, it is frequently necessary to modify such matériel. The same procedure as described above for modification of United States Army matériel applies to the modification of captured enemy matériel, except that the modification work order for such matériel will bear the identifying letter (E) in parentheses suffixed to the number.

Example: MWO–SIG–1645–(E).

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CHAPTER 3

MAINTENANCE OF TIRES, TUBES, RUBBER TRACKS AND BOGIE WHEEL TIRES

36. GENERAL DISCUSSION. Because the supply of tires and tracks presents special problems which occur in virtually all arms and services, it has been found necessary to set up special procedures and flow-channels applicable in all areas for the care and maintenance of tires and tracks. These special rules of procedure must be adhered to strictly by each arm and service using matériel equipped with tires and tracks.

37. DEFINITIONS: To help all to understand fully the procedures, the following definitions have been established:

a. Unserviceable. Applies to all types of unusable tires, tubes and flaps including those requiring repairing and recapping.

b. Used. Applies to tires, tubes and flaps which have been previously mounted.

c. Reconditioned. Applies to items which have been put into proper condition for reissue to a using service.

d. Replacement tires and tubes. This term means replacement new, serviceable used, and reconditioned solid and pneumatic tires and tubes for all wheeled vehicles and combined wheeled and track-laying vehicles (including materials handling equipment but excluding aircraft) required by all arms, the technical services, and the Army Air Forces. This term also includes parts and materials for repairs and reconditioning.

e. Second tires and tubes. This term applies to tires and tubes rejected as first class by factory and Ordnance inspectors because of minor imperfections which will not materially shorten the life of the tire. Second tires and tubes are for use within the continental limits of the United States *only*.

f. Scrap. Applies to tires and tracks reclassified as unfit for further military service as tires and tracks.

g. Additional definitions: Zone of Interior. In addition to the above definitions, tires are further classified in the *Zone of the Interior* as follows:

(1) *Class C–1.* Tires which can be reconditioned for non-military service.

(2) *Class C–2.* Tires which are unfit for further use as such.

h. Tire repair plant. An oversea Army tire and tube repair and tire recapping plant operated by a tire repair company and equipped to inspect, classify and process unserviceable and used tires, tubes and flaps.

i. Tire definitions, Army Air Forces. (1) *Serviceable.* Acceptable for immediate use. (This term applies either to a new item or an item which has been satisfactorily repaired.)

(2) *Repairable.* Not acceptable for use but obviously capable of being restored to a serviceable condition by repair.

(3) *Condemned.* Not capable of being economically repaired.

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38. ECHELONS OF MAINTENANCE FOR TIRES. The five-echelon system as applied to the maintenance of tires and tracks is as follows (fig. 9):

a. First echelon. The operator of a vehicle will exercise every precaution to avoid unnecessary wear or damage to tires and rubber tracks TM 31–200, Maintenance and Care of Pneumatic Tires and Rubber Treads.

b. Second echelon. Commanders and unit mechanics assist in training personnel in the correct use and care of tires and tracks. They must inspect and perform minor tire and tube repairs to the extent that organizational equipment will permit, and in the case of bogie wheel tires and rubber tracks determine the status of these items and supervise their repair, adjustment, reversal or replacement. This unit has a few spare tires, tubes, flaps and track blocks in its organizational spares.

c. Third echelon. Third echelon maintenance units are provided with small stocks of replacement tires and tracks to make replacements on the matériel which they regularly service.

d. Fourth echelon. The semi-permanent shop in the fourth echelon carries limited stocks of tires and tracks of suitable sizes and types. This stock is supplemented by the supply depots.

e. Fifth echelon. The supply depots in the fifth echelon stock the bulk supply of tires and tracks for ground vehicles.

f. Exceptions. The Army Air Forces have a four echelon system (par. 5). Fourth Echelon AAF Supply Depots stock the bulk of airplane tires.

39. FIXED TIRE REPAIR PLANTS. Fixed tire repair plants are normally located in the communication zone.

40. PROCEDURE OF EVACUATION. As indicated in paragraph 38, tires and tracks may be replaced in all echelons. A definite procedure has been established for evacuating old or damaged tires and tracks through proper channels as follows:

a. Tires replaced by the vehicle operator or gunner while away from his unit will be exchanged at his unit supply point immediately upon his return to his unit bivouac.

b. Tires or tracks collected by the second echelon are evacuated to the third echelon and exchanged for serviceable tires or tracks at that point. When immediate exchange cannot be made, a credit memo is taken for the matériel evacuated and this credit memo will be accepted at appropriate supply depots.

c. Tires collected in the third and fourth echelon are evacuated directly to the tire repair plant.

d. Tires collected in the fourth echelon which are found to be beyond repair or reconditioning and scrap rubber are evacuated to the quartermaster salvage depot. (In the continental United States evacuation of these items is accomplished from tire collection centers, where they are classified, to the quartermaster salvage depot.)

e. Ordnance supply depots stock the bulk of tires, tubes and tracks.

f. Tracks are exchanged by troops at higher echelon ordnance maintenance units where a stock of replacements is maintained. All unserviceable tracks and track components are evacuated by the ordnance supply depot to the United States.

Note. The Army Air Forces are responsible for the repair of tires and tubes used on all aircraft and Army Air Forces special equipment, special purpose and plant vehicles as defined by AR 850–15. All other tires used by the Army Air Forces will be evacuated through normal ground channels.

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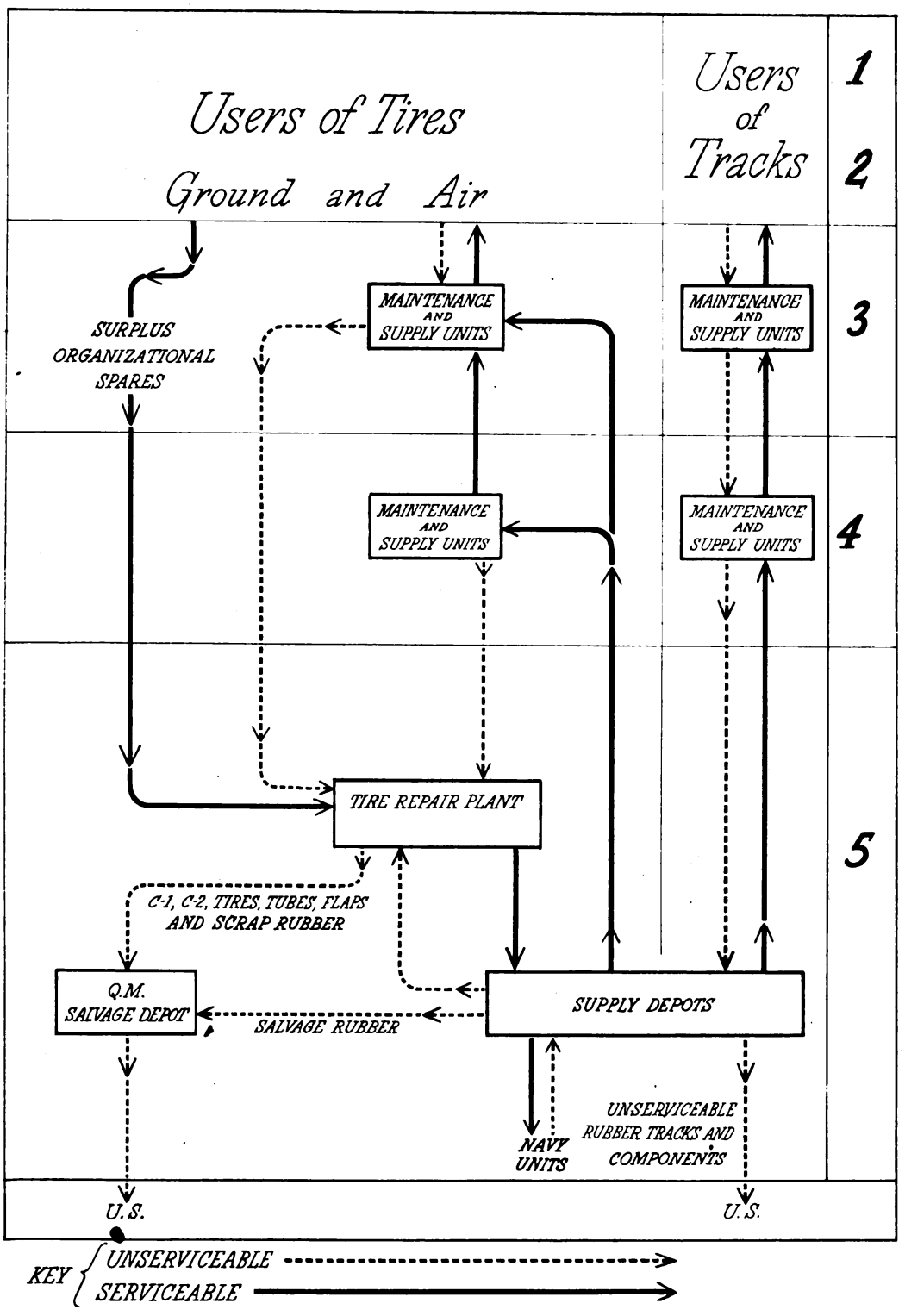


Figure 9. Flow chart for tires and rubber tracks in theaters of operation.

41. REFERENCES. Additional detailed information and instructions are available in TM 31–200, Maintenance and Care of Pneumatic Tires and Rubber Treads, and WD Memo W850–44, Preventive Tire Maintenance Program, 24 April 1944.

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CHAPTER 4

INSPECTIONS

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42. GENERAL. Inspections of Army matériel are conducted for the purpose of improving the efficiency of the matériel and detecting cases of neglect and malpractice which reduce the life and operating efficiency of the item.

43. FORMAL INSPECTIONS. There are two kinds of formal inspections, command and technical.

a. Command inspections are conducted by all commanders for the purpose of determining the condition and economical use of their equipment and supplies and insuring that subordinate commanders are complying with established procedures and regulations.

b. Technical inspections are performed in all echelons by technically qualified personnel of the third, fourth, and fifth echelon maintenance organizations under direct supervision of technically qualified officers. The Army Air Forces technical inspections may be conducted in first and second echelons. Technical inspections consist of:

(1) Complete examinations and tests of matériel to determine the serviceability, completeness, and readiness for intended use.

(2) Limited examinations to determine the extent of serviceability, and to classify vehicles as to general condition.

44. INFORMAL INSPECTIONS. In addition to formal inspections, there should be frequent informal inspections of matériel by the users or wearers as part of the daily or otherwise-scheduled preventive maintenance services.

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CHAPTER 5

SALVAGE AND RECLAMATION

45. DESCRIPTION OF SALVAGE. a. The noun "salvage" means condemned, discarded, abandoned, or captured property. The verb "to salvage" means the saving or rescuing of condemned, discarded, abandoned or captured property, and of materials contained therein for reuse, refabrication or scrapping.

b. The principles and policies on salvage and reclamation set forth in this chapter apply to theaters of operation. For policies and procedures relating to salvage in the Zone of Interior, see TM 38–505.

46. CLASSIFICATION OF SALVAGE. a. Salvage should be classified as promptly as possible as:

(1) Serviceable.
(2) Unserviceable and repairable.
(3) Unserviceable and beyond repair.

b. Salvage therefore consists of matériel which can be used for original purpose utility either with or without repair and matériel which can be converted to a substitute use, or which has value only as scrap for use as raw material. As soon as property is recovered, evacuated and classified, and is determined to be serviceable or repairable, it should be so designated and is therefore no longer salvage.

47. IMPORTANCE OF SALVAGE. a. General. The salvage of property, especially in battle areas, is important from more than an economic standpoint. In addition to the monetary savings, a good salvage operation makes available substantial quantities of arms, equipment and supplies for reissue. It conserves labor and raw materials at home. It affords relief to shipping and to rail and motor transportation at home and overseas.

b. Captured enemy matériel. The movement of captured enemy matériel into supply channels is important, not only for use in the theater or for return as scrap as indicated above, but also to meet substantial research and training requirements in theaters and in the Zone of Interior.

48. BATTLEFIELD RECOVERY. a. Battlefield recovery is the removal from the battlefield of disabled or abandoned matériel pertaining to both enemy and friendly troops. The initial movement may be to collecting points ordinarily at or near roadsides, or to maintenance or supply establishments for return to service or repair. Battlefield recovery by combat troops can be made a valuable supplement to salvage activities by service troops when the tactical situation precludes customary salvage operations by service personnel.

b. Evacuation in connection with salvage is the transportation of matériel from collecting points or other points in the combat zone to maintenance establishments or salvage dumps toward the rear, ordinarily in the communications zone, to insure the eventual return of this matériel for further

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service or its disposal or shipment to the Zone of the Interior. Evacuation is primarily the responsibility of service troops.

c. Recovery may be combined with evacuation as a single operation, since recovery and evacuation are both a part of the salvage problem.

49. SCOPE OF SALVAGE RESPONSIBILITY. It should be noted from the above that the responsibility for the collection of salvage does not rest entirely on service units. The conservation of property is the responsibility of every individual in the armed forces. This means that with proper salvage discipline established:

a. Unit commanders will be required, to the extent practicable, to direct the collection and the placing or piling in conspicuous places of salvage matériel. Wherever possible, these places will be at or near roadsides. Salvage collecting details should be designated for this purpose.

b. Trucks and other vehicles returning to the rear for any purpose will be required to be used to the maximum extent for the transport of salvage matériel.

50. FLOW OF SALVAGE. Salvage matériel should flow back over lines established by the theater commander. Normally, these lines represent channels of supply in reverse. The points at which collections are sorted should be established with due regard to practicability of shipment to responsible services for repair or reclamation.

51. EVACUATION AND INSPECTION BY SERVICE MAINTENANCE UNITS. Regularly organized third and fourth echelon maintenance units (as described in chapter 1) of all services will accomplish evacuation in connection with their own maintenance operations. They also will receive and inspect all items which fall within their responsibility recovered or evacuated by other units. After salvage has been collected, inspection will determine the degree of unserviceability and immediate steps, based upon the supply status and usefulness of the item, will be taken to:

a. Restore items to serviceable condition.

b. Evacuate serviceable items to the proper supply establishment.

c. Evacuate unserviceable repairable items to the proper maintenance echelon for repair.

d. Evacuate irrepairable but reclaimable items to the proper maintenance echelon for reclamation.

e. Evacuate scrap to designated depots or other collection points.

52. FULL USE OF MAINTENANCE FACILITIES. Theater commanders will use available maintenance facilities to the maximum extent practicable to restore serviceability of property required by the theater. When facilities are available beyond this requirement, excess or surplus class C property will be repaired in accordance with applicable War Department instructions or at the discretion of the theater commander, in such priorities as may be deemed to serve the best interests of the War Department and of the United States.

53. CLASSIFICATION BY REPRESENTATIVES OF TECHNICAL SERVICES. Whenever the personnel operating salvage dumps is not able or competent to accomplish the classification and evacuation of useable or repairable items to depots or repair establishments, the officers in charge of

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the dumps will notify the theater, zone, base or sector representative of the technical service concerned with such items to that effect. It will then become the responsibility of the technical service concerned, to cause the property to be inspected, classified, and the useable or repairable items evacuated to depots or repair establishments.

54. EXCEPTIONS. An exception to the procedure outlined above may occur in the case where a small arms center has been established to handle all small arms items in the forward area. In this case, many small arms can be reconditioned immediately or, when necessary, can be evacuated directly to the proper repair depot or salvage point.

55. CANNIBALIZATION. Cannibalization will not be employed in forward areas except in urgent cases where contact with a supporting unit cannot be quickly established. In all other cases, although a disabled or abandoned companion piece may be readily available, salvage and repair should follow the outlined procedure.

56. DESCRIPTION OF RECLAMATION. Reclamation is the process of restoring to usefulness condemned, discarded, abandoned or damaged matériel or parts or components thereof by repair, refabrication or renovation, and returning such items to supply channels.

57. EXAMPLE OF RECLAMATION. A large splined shaft, involving many machine operations in its original manufacture, is bent or scored, or its keyway is worn beyond standard key size. When received at a forward supply depot in exchange for a new one, the unserviceable shaft is passed back to the nearest maintenance unit having facilities available for its reclamation. The bent shaft is straightened, the scored shaft is rebuilt by metallizing, and the worn keyway is plugged by welding and a new keyway is milled. The shaft has thus been reclaimed and is again ready for service.

58. EXTENT OF RECLAMATION. The reclamation of any part, sub-assembly, assembly, or article of clothing and equipage will not be undertaken unless the reclaimed item will have a service expectancy of at least one normal wear-cycle. For example, a reclaimed valve must have sufficient wearing surface to last until the next valve grinding period; a reclaimed crankshaft must be capable of operating until the next normal rebuild of the engine.

59. RESPONSIBILITIES OF BASE SHOP RECLAMATION OFFICER. In base shops reclamation will be performed under the supervision of a reclamation officer, whose responsibilities include:

a. The coordination of reclamation activities within the base shop.

b. The prompt movement of salvage property, after inspection and classification, to stock, to repair shops, or to salvage dumps as scrap or property not economically repairable for further Army use.

c. The prompt return to stock of serviceable parts removed from unserviceable sub-assemblies or assemblies.

d. The determination of job priority based on urgency.

e. The preparation and submission of necessary records and reports.

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60. RESPONSIBILITIES OF SALVAGE OFFICERS IN CHARGE OF SALVAGE DUMPS. Salvage officers in charge of salvage dumps will be responsible for the following:

a. Segregation and removal, to the extent practical, of repairable or serviceable items, to repair or supply establishments through use of the units located at or serving the dump and with the necessary aid of personnel and equipment of the service having issue responsibility for the particular items. For example, qualified ordnance personnel will be made available as promptly as possible for inspecting, classifying, and giving instructions for any necessary removal to ordnance establishments of weapons, ammunition, and vehicles located in a salvage dump operated by a service unit other than ordnance.

b. Reclamation for other uses of items remaining in salvage after adequate inspection as not repairable for original purpose use. For example, non-repairable items of the uniform as wiping rags; non-repairable five-gallon cans for sheet metal and modified container uses, etc.

c. Further evacuation or disposal of residual scrap.

d. Preparation and submission of necessary records and reports.

61. DISPOSITION OF OVERFLOW. Should the flow of matériel for reclamation tax the facilities of an installation to overflowing, the chief of the appropriate technical service or the designated technical service staff officer in the theater of operations will be advised immediately of the quantity and kind of such overflow which cannot be processed. He will then issue instructions as to its disposition.

62. DISPOSITION OF RECLAIMED PROPERTY. Reclaimed property, unless placed in service immediately, will be returned to supply channels.

63. SHIPMENT. Shipments of reclaimable, repairable, or serviceable property, and of ammunition and explosives, to the Zone of Interior will be made in accordance with existing War Department regulations.

Safety Note: Inclusion in scrap shipments of material of explosive nature has resulted in loss of life and property. Certain material such as ammunition, booby traps, bombs, mines (whether inert or not), sealed gas cylinders, drums, fuel cells and tanks, and other hollow sealed items, whether or not containing explosive elements, is explosive in nature when being melted or prepared for melting with a cutting torch, and will be eliminated from any shipment of scrap material. Salvage officers will furnish port transportation officers with certificates to the effect that scrap material delivered for shipment has been properly screened by competent personnel and does not contain any material of explosive nature.

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CHAPTER 6

STANDARD PUBLICATIONS

64. GENERAL. The maintenance of equipment used by the Army is covered by War Department technical manuals, and War Department lubrication orders (both of which are listed in the latest revision of FM 21–6, List of Publications for Training) and by War Department technical bulletins, Army-Navy publications and Army Air Forces technical orders. Replacement technical manuals and technical bulletins will be requisitioned from The Adjutant General; replacement lubrication orders will be requisitioned from the sources shown in FM 21–6 and on the individual orders; replacement technical orders will be requisitioned from the Commanding General, Fairfield Air Service Command, Patterson Field, Ohio.

65. TECHNICAL MANUALS. **a.** In general the information and instructions applicable to the various echelons of maintenance are published in technical manuals. The general policy is that the instructions on any given item of equipment are published in several different manuals as follows:

(1) *An operator's manual,* for use of the using arms and services. This covers only the operating instructions and such maintenance operations and procedures as are performed by the using organization (first and second echelon maintenance).

(2) *A service maintenance manual, for service units.* This covers all the operations and procedures which are performed by the technical services (third, fourth, and fifth echelon maintenance) and includes the technical information necessary for disassembly, re-assembly, and rebuilding of sub-assemblies, assemblies, and major items, and for their inspection and test.

b. Operator's manuals and maintenance manuals are sometimes published under one cover as combined operation and maintenance manuals.

c. The Army Air Forces operating instructions, maintenance operations and procedures are covered in Army Air Forces technical orders, as listed in Army Air Forces Technical Order 00–1 and Confidential Order 00–1.

66. TECHNICAL BULLETINS. New instructions and information regarding maintenance operations and procedures may appear as War Department technical bulletins prior to publication in a field manual, technical manual or change thereto.

67. LUBRICATION ORDERS. War Department lubrication orders, formerly known as War Department lubrication guides, are illustrated, numbered and dated cards or decalcomania labels which prescribe first and second echelon lubrication instructions for mechanical equipment issued by the technical services of Army Service Forces. They will be carried with, or attached to the equipment to which they pertain; instructions contained therein are mandatory.

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Unit commanders will be responsible for obtaining, installing and fully complying with all current War Department lubrication orders that are applicable to equipment within their commands. Reports of difficulties experienced in the performance of these responsibilities will be submitted, using WD AGO Form 468, Unsatisfactory Equipment Report, as outlined in paragraph 29.

68. SUPPLY BULLETINS. War Department supply bulletins disseminate instructions and information pertaining to supply matters, such as requisition and issue, storage, packing, marking, and shipping.

69. ARMY SERVICE FORCES CATALOGS. Maintenance personnel should familiarize themselves with the Army Service Forces Catalogs, which are a series of publications prepared by each technical service to assist in the procurement, purchase, requisitioning, storage and issue of material. Following is an explanation of the contents of the Army Service Forces catalogs:

a. A separate series of catalogs is published to cover the matériel normally handled by each technical service.

b. Each series is published in sections which often consist of many individual pamphlets. Contents of all sections in general are as follows:

(1) *Section 1: Introduction.* This is a guide to all sections of the catalog system of the originating service, with explanation of its content and use, requisitioning procedures, and other necessary general information.

(2) *Section 2: Index.* This contains the identifying number and alphabetical listing of titles of each publication comprising the catalog system for the originating service.

(3) *Section 3.* List of items for issue to troops, posts, camps and stations.

(4) *Section 4.* Allowance of expendable supplies.

(5) *Section 5.* Stock list of all items.

(6) *Section 6.* Sets of tools, equipment, etc.

(7) *Section 7.* Organizational spare parts.

(8) *Section 8.* Higher echelon spare parts.

(9) *Section 9.* List of all parts. (Not published on all equipment.)

(10) *Section 10 and up.* Miscellaneous; special data as required.

c. Sections of the several technical services which contain similar information are assigned similar basic numbers. *Example*: ENG 2; SIG 2. However, when more than one pamphlet is published by a technical service for a given catalog section, a further identifying sub-number is used. *Examples:* CW 4–2; CW 7–572160; ENG 7–D40–1; ORD 7 SNL A 47.

d. Catalogs of section 7 consist of a series of pamphlets listing for each important *major* item or major combination, the current authorized issue list (allowances) of spare parts for issue to first and second echelons; and a list of the tools, appendages, accessories, supplies, and similar matériel issued to first and second echelons as peculiar to the major item.

e. Catalogs of section 8 consist of a series of pamphlets which list, for each major item or major combination, the current authorized *guide quantities* of spare parts for *initial issue* to each of the third and higher echelons, maintenance organizations, tactical supply organizations (Army field depots) and base depots, together with the tools, appendages, accessories, supplies, and similar matériel issued to third and higher echelons as peculiar to the major item.

f. Catalogs of section 9 consist of a series of pamphlets which list, for each major item, all parts necessary to service one major item. This includes parts not normally stocked or issued. It is not a basis of issue.

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70. OTHER PUBLICATIONS. There are other publications which are general in nature rather than technical but which may effect maintenance procedures. These publications come under the following headings:

- **a.** Field manuals (FM).
- **b.** War Department training circulars (WDTC).
- **c.** Army regulations (AR).
- **d.** Tables of organization and equipment (T/O & E).
- **e.** Tables of allowances (T/A).

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CHAPTER 7

SPECIAL MAINTENANCE PROCEDURES BY ARMS AND SERVICES

Section I. ARMY AIR FORCES MAINTENANCE PROCEDURES

71. THEATER OF OPERATIONS AND ZONE OF INTERIOR. **a.** The Army Air Forces have four echelons of maintenance. The fourth echelon in Army Air Forces terminology for Army Air Forces procured equipment is analogous to the fourth and fifth echelons in the five-echelon system for Army Service Forces procured equipment.

b. First and second echelons of maintenance are performed by the various squadrons and other using organizations. The third echelon is performed by service centers or by station repair shops. The fourth echelon is performed by Air Forces general depots.

c. For items of equipment used by the Army Air Forces and common to other arms and services, third echelon maintenance is performed by service centers and by station repair shops. The installations and facilities of the Air Forces general depot are utilized for fourth echelon maintenance, except for items of clothing and equipage. Fifth echelon maintenance is normally performed by appropriate installations in the communications zone and in the Zone of Interior.

72. EXCEPTIONS IN THE ZONE OF INTERIOR. Fourth and fifth echelon maintenance of general purpose vehicles and the general purpose chassis of special equipment vehicles is the function of the Ordnance Department in the United States. (Except that responsibilities for performance of first, second, third and fourth echelons of maintenance for vehicles used by the Army Air Forces are assigned to the Army Air Forces.)

Section II.

CHEMICAL WARFARE SERVICE MAINTENANCE PROCEDURES

73. THEATER OF OPERATIONS AND ZONE OF INTERIOR. **a.** Maintenance procedure for Chemical Warfare Service equipment follows, in general, the five-echelon system described in chapter 1, except that third and fourth echelon maintenance are generally combined. In theaters of operations, Alaska, and the Northwest Service Command, all maintenance above the first and second echelons is performed by chemical maintenance companies. In the Zone of Interior, the facilities of chemical maintenance companies may be available from time to time for third and fourth echelon maintenance.

b. Unserviceable equipment beyond the repair facilities of a theater of operations will be inspected by the theater chemical officer for determining

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whether the equipment will be dismantled for recovery of spare parts or turned over to the salvage and reclamation officer for evacuation to the Zone of Interior.

c. The maintenance of non-essential and critical items is subject to provisions of WD SB 38–1.

74. EXCEPTIONS IN THE ZONE OF INTERIOR. **a.** Except where supplied in the Zone of Interior by chemical maintenance companies or by facilities under the control of the Chief, Chemical Warfare Service, third and fourth echelon repair of common Chemical Warfare Service matériel will be performed in one or more service command combined maintenance shops, as designated by the commanding general of the affected service command, or at Army Air Forces shops designated by the Commanding General, Army Air Forces for matériel issued to the Army Air Forces. Third and fourth echelon maintenance on specialized equipment will be performed in Chemical Warfare Service facilities. Common equipment requiring fifth echelon repair or which, due to the large quantities involved, is beyond the capacity of a combined maintenance shop or Army Air Forces shop will be evacuated to such facilities as the Chief of the Chemical Warfare Service will designate. However, no such evacuation will be effected without prior concurrence by the Chief of the Chemical Warfare Service, except as otherwise directed by him.

b. Replacement parts required for performance of maintenance responsibility will be requisitioned from the post supply officer directly who in turn replenishes such stock from the Indianapolis Chemical Warfare Depot by item requisitions.

c. New or serviceable used replacement parts in excess of those authorized for performance of the maintenance mission will be returned by the post supply officer directly to the Indianapolis Chemical Warfare Depot in accordance with prescribed procedure.

75. MOBILE CHEMICAL WARFARE EQUIPMENT. Responsibility for third and fourth echelon maintenance on chassis of mobile chemical warfare equipment is the responsibility of Ordnance. Service maintenance of special equipment mounted on the chassis is the responsibility of Chemical Warfare Service.

Section III. CORPS OF ENGINEERS MAINTENANCE PROCEDURES

76. THEATER OF OPERATIONS AND ZONE OF INTERIOR. **a.** Maintenance of Corps of Engineer equipment is based on the five-echelon system. Normally, however, third and fourth echelon maintenance are combined and performed by the engineer maintenance company, and fifth echelon maintenance is performed by the engineer heavy shop company.

b. To obtain the mobility necessary for combat, the lighter construction equipment is usually sent into forward areas, the heavier equipment remaining in the Army service areas and communication zones. The heavy maintenance requirements of all this equipment, as well as construction needs, call for the use of mobile repair shops at the job site.

c. Special Corps of Engineers organizations:

(1) Engineer aviation battalions and regiments are supplied with engineer mobile repair trucks, which perform limited third echelon maintenance.

(2) Armored engineer battalions have assigned to them general purpose

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shop trucks and are supported by the ordnance maintenance battalion of the armored division, which carries third echelon spare parts sets for engineer equipment used in the armored forces.

(3) Organizations which are issued special engineer equipment such as oxygen-, hydrogen-, and other gas-generating equipment, special construction machinery, etc., are sometimes supplied third echelon maintenance equipment when the nature of their location or operations makes it difficult to provide them with service by regular engineer maintenance units.

(4) Engineer mobile searchlight maintenance units equipped with an electrical repair truck plus supplementary tools and equipment and third echelon spare parts sets support personnel of coast artillery anti-aircraft organizations and harbor defense installations for maintenance of searchlight and barrage balloon equipment.

(5) Engineer petroleum distribution companies often operate in areas remote from maintenance facilities. They are, therefore, equipped with shop trucks capable of third echelon maintenance.

(6) The engineer special brigade is supplied with an engineer boat maintenance battalion for third echelon maintenance. This battalion is part of the brigade and operates from a semi-fixed shop using both mobile and waterborne contact parties for its forward operations. The brigade also has an ordnance maintenance company and a signal company which perform third echelon maintenance on equipment supplied to the brigade by the Ordnance Department and the Signal Corps.

d. Special Corps of Engineer maintenance procedures:

(1) Limited second and third echelon facilities for repairs of instruments, cameras, and presses require evacuation of this equipment to fourth and fifth echelons of maintenance, which are supplemented by ordnance instrument repair facilities.

(2) Engineer topographic battalions and base topographic battalions are equipped with the necessary repair tools for second echelon maintenance.

(3) Engineer airborne organizations using special lightweight equipment are supplied with tools and supplies for more than normal second echelon maintenance. Replacements and evacuations are made by air until ground support is available.

(4) The Ordnance Department is charged with technical supervision of third and higher echelon maintenance of general purpose chassis of special equipment vehicles.

(5) The Corps of Engineers is charged with the construction and upkeep of buildings and the repair of utilities, including the technical supervision of maintenance on warehouse refrigerating units and cold storage plants.

77. EXCEPTIONS IN THE ZONE OF INTERIOR. Maintenance in the Zone of Interior is handled substantially the same as in the theater of operations with the following exceptions:

a. Maximum use is made of combined maintenance shops for repairs beyond the scope of the second echelon.

b. Civilian mechanics and technical advisors are available to assist the using organization.

c. If the foregoing facilities cannot effect repairs, the equipment is transported to repair shops operated under the supervision of the Corps of Engineers, usually located at an engineer depot, or is repaired by commercial facilities.

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Section IV.

MEDICAL DEPARTMENT MAINTENANCE PROCEDURES

78. THEATER OF OPERATIONS AND ZONE OF INTERIOR. Medical Department maintenance is based on the five-echelon system as described in chapter 1 except that the third and fourth echelons are normally combined. Medical Department items requiring maintenance beyond the scope of the using organizations will be referred to the nearest medical depot company. Third and fourth echelon maintenance by the medical depot company is performed by replacement of assemblies or sub-assemblies and by utilizing the facilities of the Ordnance Department and the Signal Corps or any other adequately equipped shop in the vicinity. In case repairs cannot be effected through these facilities, the items will be routed to the medical base depot for disposition and replacement.

79. EXCEPTIONS IN THE ZONE OF INTERIOR. Maintenance in the Medical Department in the Zone of Interior will be handled substantially the same as in the theaters of operations except that manufacturers, their local representatives, or local skilled artisans may be called upon for assistance in major repair. In the event such facilities and personnel are not available, equipment, when authorized, will be consigned to the nearest designated medical depot within the continental United States.

Section V.

ORDNANCE DEPARTMENT MAINTENANCE PROCEDURES

80. THEATER OF OPERATIONS AND ZONE OF INTERIOR. **a.** Maintenance procedures in the Ordnance Department follow the five-echelon system as described in chapter 1 except that railway artillery has no fixed maintenance channels. In general, railway artillery units will perform first and second echelon maintenance and call upon supporting services in the vicinity for higher echelon maintenance.

b. Civilian automotive advisors are available in both theaters of operations and the Zone of Interior to advise and instruct in organizational maintenance training.

81. EXCEPTIONS IN THE ZONE OF INTERIOR. In general, the procedure and channels of maintenance and supply as described in chapter 1 are followed in the Zone of Interior. The following exceptions should be noted:

a. In addition to third and fourth echelon maintenance organizations, technical service fixed shops and service command shops have been established.

b. Fifth echelon facilities in the United States are termed ordnance arsenals, depots, plants, service command base shops and commercial establishments.

c. Training in evacuation of heavy matériel, reclamation, refabrication, and salvage occurs in all areas in the normal routine of work. All operations at posts, camps, and stations are closely observed for improvements in the service to be rendered to troops and improvements and corrections of matériel.

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Section VI.
QUARTERMASTER CORPS MAINTENANCE PROCEDURES

82. THEATER OF OPERATIONS AND ZONE OF INTERIOR. Maintenance procedures for Quartermaster items of equipment, due to the nature of the matériel maintained, do not naturally follow the five-echelon system as described in chapter 1 of this manual. The echelons of maintenance have been established arbitrarily to fit the special needs, requirements, and facilities of the Quartermaster Corps. Special maintenance procedures for the principal categories of Quartermaster Corps equipment are as follows:

a. Clothing and equipage. (1) *Zone of Interior.* In the Zone of Interior there is no third echelon maintenance for clothing and equipage. Second echelon maintenance is accomplished within the organization. This applies particularly with reference to equipage items. Fourth echelon maintenance is accomplished by either service command installations or by commercial contract. Fifth echelon maintenance is accomplished either by quartermaster class IV installations or by commercial contract.

(2) *Theater of operations.* In the theater of operations there is no third echelon maintenance for clothing and equipage. Second echelon maintenance is accomplished within the organization. Fourth and occasional fifth echelon maintenance is accomplished by semi-mobile salvage repair companies.

b. Special purpose vehicles and equipment installed thereon. In both Zone of Interior and theater of operations third and higher echelon maintenance on the chassis and body of quartermaster special purpose vehicles is performed by ordnance organizations. Third and higher echelon maintenance on equipment installed on special purpose vehicles is performed by quartermaster facilities when such facilities are available, and when not available, such maintenance is performed by the facilities and personnel of any maintenance organization available.

c. Materials handling equipment. (1) *Zone of Interior.* In the Zone of Interior third and fourth echelon maintenance is performed by the using organization or the facilities and personnel of any Army Air Forces or Army Service Forces maintenance installations at posts, camps and stations. The Quartermaster General is responsible for fifth echelon maintenance on all materials handling equipment except cranes and shovels, full revolving (over 10,000 pounds capacity) with attachments, and locomotive cranes. The Chief of Engineers is responsible for fifth echelon maintenance on cranes and shovels, full revolving (10,000 pounds capacity and over) with attachments. The Chief of Transportation is responsible for fifth echelon maintenance on locomotive cranes.

(2) *Theater of operations.* In the theater of operations third, fourth and fifth echelon maintenance on all materials handling equipment except cranes and shovels, full revolving (over 10,000 pounds capacity) with attachments, and locomotive cranes is performed by the Army Air Forces or by ordnance maintenance organizations, or by installations designated by the commanding general of the theater. Engineer maintenance organizations, or installations designated by the commanding general of the theater, perform third and higher echelon maintenance on cranes and shovels, full revolving (over 10,000 pounds capacity) with attachments. Transportation maintenance organizations, or installations designated by the commanding general of the theater, perform third and higher echelon maintenance on locomotive cranes.

d. Ranges, field and outfits, cooking gasoline, and ovens, bake, field. (1) *Zone of Interior.* In the Zone of Interior first and second echelon

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maintenance is accomplished within the using organization. There is no third echelon of maintenance for these items. Fourth echelon maintenance is performed by service command combined maintenance shops. Fifth echelon maintenance is accomplished in quartermaster class IV installations.

(2) *Theater of operations.* In the theater of operations maintenance up to and including fourth echelon will be accomplished by the organization concerned or at the nearest available facility. Fifth echelon maintenance will be performed at a base general depot.

e. Gasoline dispensers (30 and 100 Gallons per minute capacity). (1) *Zone of Interior.* In the Zone of Interior first, second, and third echelon maintenance is performed by the using organization. Fourth echelon maintenance is performed by Quartermaster facilities when such facilities are available, and when not available, such maintenance is performed by the facilities and personnel of any maintenance installation at posts, camps and stations. Fifth echelon maintenance is accomplished by quartermaster class IV repair installations.

(2) *Theater of operations.* Third and higher echelon maintenance is performed by the Quartermaster Corps or by installations designated by the commanding general of the theater.

f. Typewriters and office appliances. (1) *Zone of Interior.* In the Zone of Interior first echelon maintenance is performed by the operator. Second echelon maintenance is performed by qualified repairmen at the place of operation. There is no third echelon maintenance. Fourth echelon maintenance is accomplished by either service command repair installations or by commercial contracts. Fifth echelon maintenance is performed by either quartermaster class IV repair installations or commercial contracts. Commercial contract for fifth echelon repairs may be used, if in the best interest of the Government, when approved by The Quartermaster General.

(2) *Theater of operations.* In the theater of operations first echelon maintenance is performed by the operator. Second echelon maintenance is performed by qualified repairmen at the place of operation. There is no third echelon maintenance. Fourth and fifth echelon maintenance is accomplished by quartermaster salvage repair companies (fixed), quartermaster base depots or installations designated by the commanding general of the theater of operations.

Section VII. SIGNAL CORPS MAINTENANCE PROCEDURES

83. THEATER OF OPERATIONS AND ZONE OF INTERIOR. **a.** The maintenance of Signal Corps equipment follows, in general, the five-echelon system as described in chapter 1 of this manual.

b. Normally, Signal Corps equipment used by Army Ground Forces units or Army Service Forces units is maintained in the third and higher echelons by Signal Corps maintenance organizations.

c. With limited exceptions as authorized by the War Department, third and fourth echelon maintenance on Signal Corps equipment used by Army Air Forces units is normally performed by Army Air Forces Signal maintenance organizations. Fifth echelon maintenance when required is normally performed by Signal Corps maintenance organizations.

d. Ordnance repair organizations perform third and higher echelon maintenance on Signal Corps vehicles exclusive of the Signal Corps equipment mounted thereon.

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Section VIII.

TRANSPORTATION CORPS MAINTENANCE PROCEDURES

84. THEATER OF OPERATIONS AND ZONE OF INTERIOR. So far as possible, maintenance operations in the Transportation Corps follow the five-echelon system as described in chapter 1 of this manual. Procedures peculiar to the Transportation Corps are discussed below.

a. Military Railway Service. In addition to its own maintenance operations, the Military Railway Service may utilize existing civilian personnel and equipment to the maximum. Maintenance procedures, therefore, conform closely to standard railroad practices. *Responsibility for the several echelons of maintenance of railroad equipment is assigned as follows*:

(1) *First echelon.* First echelon maintenance of railroad equipment is preventive maintenance performed by the operating crew. This includes not only the proper care, use, operation, cleaning, preservation and lubrication, but also inspection, adjustment and authorized minor repairs and parts replacement.

(2) *Second echelon.* Second echelon maintenance is equivalent to the operations of a railroad roundhouse and car repair track, and will include running repairs that may be made by the maintenance of equipment company of a railway operating battalion.

(3) *Third echelon.* Third echelon maintenance will include repairs necessary to restore damaged railroad equipment to operation on railroad right-of-way, for movement to fixed installations for proper repairs. Such repairs will normally be performed by a railway workshop (mobile).

(4) *Fourth echelon.* Fourth echelon maintenance is performed by a railway shop battalion at a fixed installation which is equivalent to the operation of a railroad backshop. It includes reconditioning, rebuilding, and classified repairs to motive power and all types of general and special rolling stock.

(5) *Fifth echelon.* Fifth echelon maintenance is confined to salvage and assignment for repair of equipment or sub-assemblies by the base depot. The base depot is accountable and responsible for requistioning, storage, distribution and salvage of organizational equipment, spare parts and supplies for servicing first to fourth echelon requirements.

(6) Procedures governing railway maintenance activities involving coordination with other arms and services are as follows:

(*a*) Railway artillery equipment will receive second and higher echelon maintenance in the repair shops of the Military Railway Service. In cases where this equipment has been damaged in such a manner as to preclude removal to a railroad repair shop, railway workshops (mobile) may be directed through the proper chain of command to make the necessary repairs in order that the damaged equipment may be moved to a fixed railroad repair shop.

(*b*) Ordinarily, all ordnance equipment other than rolling stock will receive necessary repairs at ordnance shops, but, in cases of emergency, jobs of welding and rough repairs may be accomplished at any available railway shop. This applies to heavy matériel such as gun mounts and related equipment.

(*c*) The Signal Corps is the supply agency upon which the Military Railway Service depends for signal equipment. There may be an emergency interchange of certain types of wire, insulators, etc., but for the most part this will be a matter of supply rather than maintenance, as the field installations of the Signal Corps may be quite remote from the telegraph lines of

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the Military Railway Service. Where the Signal Corps and the Military Railway Service use the same pole line, it is a responsibility of Signal Corps maintenance organizations to maintain all line wires. The Military Railway Service will maintain the lead-ins and operating equipment.

b. Water division. Due to the many different types of vessels that are in service, the accomplishment of maintenance and maintenance supply is complex. Usually the most expeditious means is applied to effect a temporary repair to enable the vessel to proceed to the nearest facility, whereupon permanent repairs are made. If the vessels become totally disabled, they are towed into a port and repair parts not obtainable locally are shipped from the United States at the first available opportunity. The vessels maintained by the Transportation Corps include all vessels owned or operated by the War Department except those especially assigned to the Corps of Engineers. Explanation of the maintenance procedures involved are as follows:

(1) First echelon maintenance is preventive maintenance and includes not only the proper care, use, operation, cleaning, preservation and lubrication, but also inspection, adjustment and authorized minor repairs and parts replacement as may be accomplished by the boat crew with the onboard tools.

(2) Second echelon maintenance is the additional maintenance performed by the using organization, which includes the boat crew, and personnel of a shore base. The scope of such maintenance includes replacement of minor assemblies, and emergency repairs and adjustments which do not involve the removal of the superstructure of deck.

(3) Third echelon maintenance will include removal and replacement of assemblies not requiring removal of deck or superstructure, also necessary minor repairs. Third echelon work will be accomplished through the use of a shore shop (either civilian or military) having the proper equipment and personnel, or by the personnel of a marine repair ship.

(4) Fourth echelon maintenance will include heavy repairs which will be accomplished by shore shops (either civilian or military) having proper equipment and personnel. All work requiring the use of a marine railway or drydock will be considered as fourth echelon. Fourth echelon maintenance will also include the rebuilding of minor unit assemblies and subassemblies.

(5) Fifth echelon maintenance will include the rebuilding of major assemblies, accessory unit assemblies and subassemblies, and may be accomplished at base depots or by the use of available local facilities, either military or civilian.

(6) Higher echelon maintenance of coast artillery vessels (mine planters, etc.) is provided by the Transportation Corps.

(7) The Transportation Corps provides higher echelon maintenance for amphibious equipment as required. In case Transportation Corps shops are not available, Ordnance shops are used.

c. Highway division. In the theater of operations cargo vehicles and buses are maintained by the using organizations and by Ordnance Department facilities, the same as other items of automotive equipment.

85. EXCEPTIONS IN THE ZONE OF INTERIOR. Maintenance procedures for Transportation Corps equipment in the Zone of Interior differ from those employed in the theater of operations as follows:

a. Rail division. (1) Operation of utility railroads serving various posts, camps and stations in the Zone of Interior and maintenance of railroad equipment assigned thereto are performed by either enlisted or civilian personnel. First and second echelon maintenance of railroad equipment,

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including all measures of preventive maintenance, is the responsibility of the commanding officer of the installation to which the equipment is assigned. Higher than second echelon maintenance is the responsibility of the Chief of Transportation for all railroad equipment except railway gun mounts and U. S. Army hospital cars as set forth below.

(2) Zone master mechanics, as representatives of the Chief of Transportation, exercise technical control over all echelons of maintenance of U. S. Army railroad equipment operated or domiciled at installations within the area of their respective zones. Necessary action will be taken by commanding officers of installations to comply with current maintenance instructions or with recommendations made by the zone master mechanic having jurisdiction.

(3) Operating control of first to fourth echelon maintenance of U. S. Army hospital cars is the responsibility of the commanding general of the service command to which the cars are assigned. The Chief of Transportation is responsible for the technical control of maintenance of hospital cars, exclusive of medical and kitchen equipment. Running gear and air brake equipment will be inspected in accordance with the Code of Rules for the Interchange of Traffic of the Mechanical Division, Association of American Railroads, by the railroads over whose lines the cars are operated. War Department-owned tank cars which operate over the lines of the general steam railroad system of the nation are maintained by the railroads in accordance with the foregoing code of rules.

(4) Troop sleepers and troop kitchen cars, which are used by the Army on a mileage basis, are the property of the Defense Plant Corporation and are operated and maintained by the Pullman Company under contract with the Defense Plant Corporation.

b. Water division. Normally, in the Zone of Interior all maintenance of Army-owned or chartered vessels, except first and second echelon, is accomplished at commercial shipyards, at War Department marine repair shops, or at Navy yards and ports of embarkation.

c. Highway division. The responsibility for the maintenance of Army buses used for transporting military and civilian personnel is as follows:

(1) For those assigned to posts, camps, stations, plants, and ports of embarkation the responsibility for maintenance rests with the commanding officers thereof, in accordance with existing regulations pertaining to motor vehicles.

(2) For those leased to public carriers the responsibility for maintenance rests with the carrier and the procedures follow the accepted standards of the motor bus industry. In this connection, the regulations prescribed by the Office of Defense Transportation will govern the policies of maintenance. In order to ascertain that proper maintenance is being performed on buses leased to public carriers, the following procedures will be applied:

(*a*) The responsible Army contracting officer will inform the commanding officer of the post, camp, station, plant, or port and, if appropriate, the commanding general of the service command, of the contracts, including information as to the number and type of buses.

(*b*) The commanding officers enumerated above will cause to be performed such technical inspections as are necessary to insure that proper maintenance is being performed.

(*c*) When inspections disclose that because of negligence on the part of the public carrier proper maintenance is not being provided, the contracting officer will be notified, and if necessary, he may initiate corrective

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action as provided for in Lease Form 101, article VII.

(*d*) When inspections disclose that proper maintenance is not provided due to the inability of the public carrier to obtain parts, tires, or labor, the contracting officer, with the approval of the commanding general of the appropriate service command and the Chief of Transportation, will enter into a supplemental contract with the public carrier to provide that the nearest service command maintenance facility will perform all third, fourth, and fifth echelon maintenance required at a rate per mile to be established by mutual agreement between the commanding general of the service command, the contracting officer, and the public carrier.

(3) The responsibility for the enforcement of preventive maintenance measures on Army vehicles (driveaways) between Army production or storage centers, while in the hands of commercial driveaway companies, is assigned to the Chief of Transportation; while in the hands of military personnel, responsibility is assigned to the officer in charge of the convoy and to the Ordnance Department.

Section IX. ADJUTANT GENERAL'S DEPARTMENT MAINTENANCE PROCEDURES

86. THEATER OF OPERATIONS. In general, the maintenance procedures in The Adjutant General's Department follow the five-echelon system as described in chapter 1 of this manual. The only units that present peculiar problems are the Army Postal Units and Machine Record Units.

a. Army Postal Units have mail bags and canceling machines in addition to equipment common to other arms and services. Mail bags are maintained in the same manner as other web equipment. The responsibility for higher echelon maintenance on canceling machines rests with the Ordnance Department.

b. Machine Record Units are provided with specially qualified mechanics and a supply of repair parts. In case the repairs are beyond the capabilities of the mechanic, the equipment is evacuated to the Zone of Interior.

87. EXCEPTIONS IN THE ZONE OF INTERIOR. Army Postal Units ordinarily operate only in theaters of operations. The United States Post Office Department handles the mail to and from military organizations in the United States. Machine record equipment is sent to commercial agencies for higher echelon repairs.

Section X. SPECIAL SERVICES AND MORALE SERVICES MAINTENANCE PROCEDURES

88. THEATERS OF OPERATION AND ZONE OF INTERIOR. Items of matériel of the Special Services and Morale Services Divisions, which generally require repair are motion picture projectors and other photographic and allied equipment pertaining to the U. S. Army Motion Picture Service, radio transmitters, public address systems, domestic-type receivers, musical instruments, typewriters and mimeograph equipment contained in publication kits, and athletic equipment.

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a. First and second echelon maintenance of the above equipment is a responsibility of personnel of the using organization.

b. Items in the category of Signal Corps equipment will be maintained by Signal Corps maintenance organizations in the third and higher echelons, except that all third and higher echelon maintenance of the U. S. Army Motion Picture Service equipment will be performed by that organization and maintenance of Ordnance purchased power generating equipment will be accomplished by Ordnance maintenance organizations.

c. Repair of musical instruments above that performed by using personnel will be accomplished by the Quartermaster Corps.

d. Maintenance of typewriters and mimeograph equipment contained in publication kits is carried out in accordance with the principles outlined in paragraph 83f.

e. Maintenance of athletic equipment is normally confined to that which can be accomplished by the using personnel and organization using the repair kits furnished with the equipment.

f. Spare parts for standard items of Special Services and Morale Services equipment will be stored and issued by the technical service charged with the item maintenance responsibility. Higher echelon spare parts for non-standard equipment will not be stocked, but will normally be obtained by using parts from damaged equipment. Where standard equipment spare parts are interchangeable with parts on non-standard equipment, such standard parts may be used to repair non-standard items provided the parts are available in sufficient quantity so their use for this purpose will not jeopardize repair of tactical equipment.

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CHAPTER 8
REFERENCES

89. DEFINITIONS. For definitions of terms used in this manual, refer to TM 20–205, Dictionary of United States Army Terms, 18 January 1944 and changes thereto.

90. ARMY AIR FORCES. **a.** Technical Orders.
b. Army Air Forces Regulations (65–Series)

91. CHEMICAL WARFARE SERVICE. **a.** Chemical Warfare Supply Catalog (ASF Catalog)
b. Chemical Warfare Service Storage Catalog.
c. Chemical Warfare Service Supply Letters.
d. Chemical Warfare Service Logistic Tables.

92. CORPS OF ENGINEERS. **a.** Engineer Supply Catalog (ASF Catalog).
b. Engineer Field Service Bulletins.
c. Engineer Maintenance Circulars.
d. Engineer Export Manuals.

93. MEDICAL DEPARTMENT. **a.** Medical Department Supply Catalog (ASF Catalog).
b. Medical Department Supply and Technical Bulletins.
c. Medical Department Memoranda.

94. ORDNANCE DEPARTMENT. **a.** Ordnance Supply Catalog (ASF Catalog).
b. Standard Nomenclature Lists. (ASF Cat. ORD SNL).....ASF Cat. ORD 2 *OPSI.*
c. Introduction to the Ordnance Catalog (ASF Cat. ORD 1 IOC).....———.
d. Ordnance Provision System Regulations (OPSR) (ASF Cat. ORD 2 *OPSI*).....———.
e. Ordnance Publications for Supply Index (ASF Cat. ORD 2 *OPSI*).....———.
f. Introduction to Ordnance Storage and Shipment Charts (IOSSC).....———.
g. Ordnance Storage and Shipment Charts (OSSC)....IOSSC
h. Ordnance Equipment Charts (OEC).....———.
i. Ordnance Field Service Bulletins (OFSB)....———.
j. Ordnance Field Service Circulars (OFSC)....———.
k. Technical Regulations (TR).....———.
Note. For distribution and use of Ordnance publications, see Ordnance Field Service Bulletin 1–8.

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95. QUARTERMASTER CORPS. **a.** Quartermaster Supply Catalog (ASF Catalog).

b. Nomenclature Guide, General Supplies.

96. SIGNAL CORPS. **a.** Signal Corps Supply Catalog (ASF Catalog).

b. Signal Corps Office Circulars.

97. TRANSPORTATION CORPS. **a.** Transportation Corps Supply Catalog (ASF Catalog).

b. Transportation Corps Supply Manual.

c. Transportation Corps Stock Catalog.

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