

TM 4750-15/1

U.S. MARINE CORPS TECHNICAL MANUAL

**PAINTING AND REGISTRATION MARKING
FOR
MARINE CORPS COMBAT AND TACTICAL EQUIPMENT**



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AND ARE DENOTED BY A BAR (■) SYMBOL

DEPARTMENT OF THE NAVY
Headquarters, U.S. Marine Corps
Washington, D.C. 20380-0001

31 October 1986

1. This Manual, effective upon receipt, establishes policies and assigns responsibilities for painting, camouflage pattern painting, and registration marking, and specifies identification requirements for Marine Corps ground combat and tactical equipment to include aviation ground support equipment. Any intermediate maintenance activity paint shop within the Force Service Support Group (FSSG) may obtain blueprints of patterns from the Commanding General, Marine Corps Logistics Base, (Code 856), Albany, Georgia 31704-5000 upon request.
2. Technical Manual TM 4750-15/2 contains patterns for specific items of equipment and will be used in conjunction with this Manual.
3. Notice of discrepancies and suggestions for improvements should be directed to the Commandant of the Marine Corps, Code LME, Washington, D.C. 20380-0001.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS



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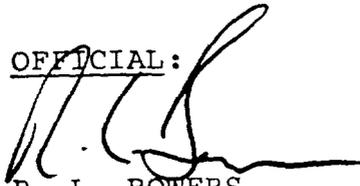
DEPARTMENT OF THE NAVY
Headquarters, U.S. Marine Corps
Washington, D.C. 20380-0001

10 July 1989

1. Purpose. To transmit pen change to the basic Manual for the Painting and Registration Marking for Combat and Tactical Equipment.
2. Action. Page A-4: Delete "TM-5-200" from list of referenced Government documents.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

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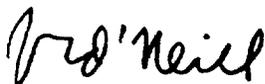
DEPARTMENT OF THE NAVY
Headquarters , U.S. Marine Corps
Washington, D.C. 20380-0001

30 June 1987

1. Purpose. To direct pen changes to the basic Manual.
2. Action.
 - a. Page 2-49 item 14: Delete "(TBD)"
 - b. Appendix A, page A-2, under Orders: Delete "MCO 4750.3C, Painting, Camouflage Pattern Painting Registration Marking, and Identification Requirement for Marine Corps Tactical Equipment.
 - c. Appendix A, page A-4: Delete "Pamphlet, PCN 500 00200000, U.S. Army Belvoir Research Development and Engineering Center Pamphlet "Guidelines for Inspecting the Application of U.S.3-Color Camouflage Paint Patterns".

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SAFETY SUMMARY

The following **WARNINGS** and **CAUTIONS** appear on the page referenced and are listed here for emphasis:

WARNING

THE SOLVENT CELLOSOLVE ACETATE (2-ETHOXYETHYL ACETATE) HAS BEEN LINKED TO A FAMILY OF GLYCOL ETHERS HAVING THE POTENTIAL TO CAUSE ADVERSE REPRODUCTIVE EFFECTS IN MALE AND FEMALE WORKERS. THEREFORE, ALL USERS ARE ADVISED TO FOLLOW ALL APPROPRIATE SAFETY AND HEALTH PRECAUTIONS IN ORDER TO MINIMIZE EXPOSURE. PRECAUTIONS INCLUDE THE USE OF SILICONE RUBBER GLOVES, BARRIER CREAMS, COVERALLS, HEAD COVERINGS, AND AN AIRLINE RESPIRATOR. (Page 1-5.)

WARNING

DO NOT USE SOLVENTS TO REMOVE PAINT/COATING FROM SKIN. THEIR DEFATTING ACTION WILL CAUSE INJURY TO PERSONNEL. (Page 1-9)

WARNING

WHEN SETTING UP FACILITIES FOR FORCED AIR RESPIRATORS, ENSURE THAT SEPARATE AIR SUPPLIES AND DIFFERENT AIR HOSE CONNECTORS ARE USED TO PRECLUDE A POTENTIAL HOOKUP OF AIR MASKS TO AIR SOURCES FOR MECHANICAL EQUIPMENT. (Page 2-11)

WARNING

SAFETY GOGGLES OR A FULL FACESHIELD AND DUST RESPIRATORS WILL BE WORN WHEN SANDING TO PREVENT INJURY. (Page 2-22)

WARNING

PERSONS USING RAGS WET WITH MIL-T-81772 THINNER MUST WEAR SILICONE OR RUBBER GLOVES TO PRECLUDE ABSORPTION AND USE BARRIER CREAM TO PRECLUDE DEFATTING OF THE HANDS. (Page 2-22)

WARNING

PERSONS USING MIL-T-81772 THINNER MUST WEAR EYE PROTECTION, SAFETY GLASSES, SPLASH GOGGLES OR FACE SHIELDS TO PREVENT INJURY. (Page 2-22)

WARNING

CONDUCT MIXING OPERATIONS IN WELL VENTILATED AREAS AWAY FROM OPEN FLAME, WELDING TORCHES AND COMBUSTION HEATERS. VAPORS FROM THE VARIOUS MATERIALS CAN EASILY IGNITE AND RESULT IN DEATH OR INJURY TO PERSONNEL. (Page 2-24)

WARNING

USE OF AN ELECTRIC DRILL MAY PRESENT AN IGNITION HAZARD. (THE FLASHPOINT OF CARC IS 38°F/4°C.) USE AN EXPLOSION/SPARK PROOF DRILL OR A PROPERLY GROUNDED PNEUMATIC MIXER WHEN EXPLOSIVE SOLVENT VAPORS ARE PRESENT TO PREVENT INJURY TO PERSONNEL. (Page 2-24)

CAUTION

FAILURE TO CLEAN EQUIPMENT ADEQUATELY AFTER CARC SPRAY APPLICATION WILL RESULT IN DAMAGED UNSERVICEABLE EQUIPMENT. (Page 2-26)

CAUTION

WHEN PLURAL COMPONENT PAINT EQUIPMENT IS USED, SEPARATE LINES FOR CATALYSTS MUST BE USED IN ORDER TO PREVENT EQUIPMENT DAMAGE. ALSO, PAINT SUPPLY LINES USED FOR PUP CANNOT BE USED FOR EPP OR EP AND VICE VERSA. (Page 2-27)

CAUTION

DETERMINE IF THE MANUFACTURER HAS FORMULATED PRIMERS AND TOPCOATS FOR ELECTROSTATIC APPLICATION TO PREVENT DAMAGING EQUIPMENT. (Page 2-28)

CAUTION

SPECIAL CARE MUST BE TAKEN WITH COMMUNICATION-ELECTRONICS EQUIPMENT TO ENSURE THAT ONLY NON-LEAD, NON-ALUMINUM, AND NON-CHROMATE PAINTS ARE USED ON ANY ELECTRICALLY/ELECTRONICALLY CONDUCTIVE SURFACES AND ANY OTHER RADIATING ELEMENTS. CAREFULLY RESEARCH MANUALS AND DIRECTIVES ON EQUIPMENT BEFORE PAINTING. BE PARTICULARLY CAREFUL IN APPLYING PAINT TO RADIO CASES AND ASSOCIATED EQUIPMENT. QUESTIONS CONCERNING THIS CAUTION ARE TO BE REFERRED TO COMMANDANT OF THE MARINE CORPS, CODES LME AND LMC. (Page 3-7)

CHAPTER 1

GENERAL INFORMATION

Section I. INTRODUCTION

1-1. PURPOSE. This manual establishes policies and assigns responsibilities for painting, camouflage pattern painting, and registration marking, and specifies identification requirements for Marine Corps ground combat and tactical equipment to include aviation ground support equipment. Appendix A contains a list of applicable references and Appendix B lists the descriptions of acronyms identified in this manual.

1-2. SCOPE. This manual describes procedures to be followed in applying Chemical Agent Resistant Coating (CARC) and the equipment needed for its application. This manual also prescribes colors to be used for painting Marine Corps ground combat and tactical equipment and provides a uniform system for registration marking and identification requirements of equipment. Conversion to CARC is taking place as required, i.e., as operationally directed by the force commander and as funds and facilities permit. This conversion will take place through a combination of three methods:

- Upgraded paint facilities within intermediate maintenance activity (IMA)
- Through local depots
- Through commercial contractors.

Appendix C lists potential Government Depot Maintenance Activities which can execute the requirements of this manual. Appendix D shows arrangement and location of registration and identification markings. ONLY BRUSH PAINTING WILL BE AUTHORIZED AT FIRST AND SECOND ECHELON MAINTENANCE LEVELS. SPRAY PAINTING IS AUTHORIZED ONLY AT THE IMA, THE DEPOT MAINTENANCE ACTIVITY (DMA), OR OTHER ACTIVITIES OUTSIDE THE MARINE CORPS AS INDICATED ABOVE. Patterns for painting specific items of equipment are contained in TM 4750-15/2, Camouflage Paint Patterns.

a. Background. The transition from alkyd enamels and lacquers to CARC is being made for several important reasons. CARC is significantly more durable than alkyd paints which last approximately two years depending on the environment. CARC is chemical and biological agent resistant, and it will not absorb these agents. The time to decontaminate is significantly reduced and the flexibility of, decontaminating operations is increased when using CARC. Units using alkyd paints were required to use Decontamination Solution #2 (DS2) which stripped the paint from the surface of the vehicle or equipment. With CARC however, units can decontaminate using either DS2 or steam and soapy water, or by letting the equipment “weather” (i.e., allowing the agents to evaporate naturally), none of these choices adversely effects the CARC finish. Because of the increased durability/service life of CARC, units will realize reduced operating costs over the life cycle of the equipment due to the following characteristics:

- (1) Less touch up painting will be required.
- (2) Equipment will not require repainting after decontaminating operations.

(3) PAINTING WITH CARC FOR COSMETIC PURPOSES (e.g., inspections or parades) IS NOT AUTHORIZED.

CARC coatings can withstand chemical and biological agents that may be used in combat. They inhibit absorption of harmful substances into the paint and subsequently into human bodies. The decontamination procedure/process is simplified and decontamination time is also reduced. CARC can be applied with conventional equipment and will survive corrosive environments, humidity and salt air common to military operations. Moreover, CARC prolongs service life and surface of equipment when compared with alkyd topcoats, thus reducing downtime. CARC is currently being used on combat and tactical equipment in camouflage patterns. Although they are now being used for coating metal substrates, CARC topcoats work equally well with fiberglass-reinforced materials.

b. Military Specifications for CARC. A variety of military specifications for CARC paints and primers are included in this manual in order to meet various requirements of the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA). The following listed military specs identify the paints that have CARC characteristics.

<u>Military Specification</u>		<u>Application</u>
MIL-C-46168	Polyurethane Paint	Exteriors
MIL-C-53039 <u>1</u> / <u>3</u> /	Polyurethane Paint	Exteriors
MIL-C-22750 <u>1</u> /	Epoxy Polyamide Paint	Interiors
MIL-P-23377 Type 1 <u>2</u> /	Epoxy Primer	Non-ferrous surfaces
MIL-P-52192	Epoxy Primer	Ferrous surfaces
MIL-P-53022 <u>1</u> /	Epoxy Primer	Ferrous and non-ferrous surfaces
MIL-P-53030 <u>1</u> / <u>3</u> / <u>4</u> /	Epoxy Primer	Ferrous and non-ferrous surfaces
MIL-P-85582 <u>3</u> / <u>4</u> /	Epoxy Primer	Non-ferrous surfaces, an alternative to MIL-P-53030

1/ Lead and chromate free

2/ Lead free

3/ Volatile Organic Compound (VOC) Compliant

4/ Water reducible.

c. Identification. Items painted with CARC should have a notation to that effect in the Vehicle or Equipment Record Jacket or NAVMC 696. The notation shall say, "Painted with CARC 21 May 1986," for example, and shall be placed in the remarks section. If the notation does not appear, or if the record jacket is not available, then a field expedient method may be used to identify a CARC rather than an alkyd painted surface. Wet a rag thoroughly with acetone (e.g., methyl ethyl ketone (MEK) or fingernail polish remover) and briskly rub the painted surface for twenty seconds. Evidence of actual paint removal from painted surface onto rag indicates a non-CARC surface.

Section II. SAFETY PROCEDURES

1-3. GENERAL. Leaders and managers must be aware that because this is an operation with potential for hazardous exposure, it must be monitored frequently to determine kinds of protective clothing and equipment required.

a. Hazardous Component. The CARC paint system has one hazardous component which is not in systems previously used for camouflage painting. This is hexamethylene diisocyanate (HDI), a sensitizer contained in component B (MIL-C-46168) of polyurethane

paint (PUP) and (MIL-C-53039). HDI is of particular interest because of its potential to evoke an allergic response in sensitive individuals. Once sensitized, an asthmatic condition may develop which can be initiated from very small subsequent exposures. Since not all personnel are sensitive to HDI and those who are have varying levels of sensitivity, it is difficult to establish a level that can be considered generally safe for routine exposures. Statistics vary according to which document is read. For instance, OSHA has no standard for HDI but does have a ceiling level established for its close relative, toluene diisocyanate (TDI). The American Conference of Government Industrial Hygienists (ACGIH) lists an allowable 8 hour time weighted average (TWA) of 40 micrograms/cubic meter and short time exposure limit (STEL) of 150 micrograms/cubic meter but no ceiling value. The Commander, Naval Medical Command has adopted National Institute of Occupational Safety and Health (NIOSH) criteria. The information below shows some figures. There are also hazards because of use of lead and chromate pigments. However, among the CARC coating specifications there are several which are lead and chromate free and do not contain cellosolve acetate (i.e., see the listing on page 1-3).

<u>ORGANIZATION</u>	<u>SUBSTANCE</u>	<u>8 HOUR TWA-TLV</u>	<u>MAXIMUM CEILING LEVEL</u>	<u>STEL</u>
OSHA	TDI		140 micrograms/ cubic meter (0.14 milligrams/ cubic meter)	
ACGIH Thres- hold Limit Values (TLV) Booklet	TDI	40 micrograms/ cubic meter (0.04 milligrams/ cubic meter)		150 micrograms/ cubic meter (.15 milligrams/ cubic meter)
NIOSH Criteria Document	HDI	35 micrograms/ cubic meter	140 micrograms/ cubic meter	
ACGIH TLV Booklet	Cellosolve Acetate	5 ppm	from 25 ppm	

The solvent cellosolve acetate (2-ethoxyethyl acetate) is no longer used in MIL-T-81772, thinner. However, supplies of MIL-T-81772, thinner, which were manufactured before January 1986 may still exist and these supplies contain cellosolve acetate. Although there is no longer a requirement for cellosolve acetate for coatings or solvents, supplies may still exist and users should be aware of potential hazards. The information contained in the WARNING statement following pertains to these supplies:

WARNING

THE SOLVENT CELLOSOLVE ACETATE (2-ETHOXYETHYL ACETATE) HAS BEEN LINKED TO A FAMILY OF GL YCOL ETHERS HAVING THE POTENTIAL TO CAUSE ADVERSE REPRODUCTIVE EFFECTS IN MALE AND FEMALE WORKERS. THEREFORE, ALL USERS ARE ADVISED TO FOLLOW ALL APPROPRIATE SAFETY AND HEALTH PRECAUTIONS IN ORDER TO MINIMIZE EXPOSURE. PRECAUTIONS INCLUDE THE USE OF SILICONE RUBBER GLOVES, BARRIER CREAMS, COVERALLS, HEAD COVERINGS AND AN AIRLINE RESPIRATOR.

b. Requirements for Medical Surveillance. In general, medical surveillance is essential, regardless of the type of paint used (i.e., CARC, ALKYD or oil base paints), for anyone who works more than 30 days (longer than 4 hours/day) per year in either paint spraying operations or brush or roller application when respiratory protection is required. However, all individuals exposed above one half of the permissible exposure limit must be included in a medical surveillance program, and all individuals who wear respirators must be included in a respirator physical program. Unit maintenance by either vehicle/equipment operator or unit maintenance section personnel will probably not perform brush touch-up painting in sufficient quantities to require medical surveillance. Personnel involved in painting at third, fourth, or fifth echelon maintenance will, however, require surveillance. Specific guidelines for potential exposure to various solvents and pigments are found in DODI 6055.5M, Occupational Health Surveillance Manual and NAVMEDCOMINST 6260.10, Isocyanates Measures for Health Hazards (under development).

(1) Replacement procedures for individuals requiring medical surveillance.

(a) Take Medical History with attention to previous exposure to HDI, allergies, respiratory disease, and smoking.

(b) Give physical exam with attention to the respiratory system, blood test, etc. (See NAVMEDCOMINST 6260.10.)

(c) Make clinical and laboratory tests consisting of chest x-ray 14" x 17" posterior/anterior and pulmonary function to include Forced Expiratory Volume (FEV), Forced Vital Capacity (FVC), and a combination of the two (FEV/FVC).

(2) Periodical follow-up for these individuals will require:

- (a) Annual follow-up physical
- (b) Clinical and laboratory tests as during preplacement except the x-rays.

(3) Other Requirements. Pre- and Post-shift pulmonary tests will be useful to document any respiratory sensitization. Those workers required to wear respiratory protective equipment (respirators) will be evaluated to determine if they are physically able to perform the work while using the equipment.

(4) Medical effects resulting from exposure to HDI. Medical effects, symptoms, first aid procedures, decontamination solutions, storage data and waste disposal methods are identified below:

(a) Acute Effects. (That is, usually immediate upon exposure, brief, possibly severe, disappear when individual is removed from affected environment.)

- 1 Burning and watering of eyes
- 2 Burning sensation in the nose and throat
- 3 Sore throat
- 4 Coughing
- 5 Reddening and itching of skin.

(b) Chronic Effects. (Usually resulting from long term exposure, long duration effect, may remain after removal from environment.) Some results are:

- 1 Decrease in pulmonary function
- 2 Pulmonary edema
- 3 Liver abnormality
- 4 Central nervous system disorders
- 5 Blood protein abnormality.

(c) Sensitization. (May be systemic response and not limited to area of contact.)

- 1 Coughing (asthma type)
- 2 Wheezing
- 3 Tightness of chest
- 4 Shortness of breath.
- 5 See NAVMEDCOMINST 6260.10 for more detailed information.

c. Emergency and First Aid Procedures. Follow the procedures outlined below:

(1) If substance containing HDI comes in contact with eyes, flush with clean, lukewarm water (low pressure) for at least 15 minutes, occasionally lifting eyelids. Obtain immediate medical attention.

(2) Skin Contact. Remove contaminated clothing, wash affected skin areas thoroughly with soap and water. **DO NOT USE SOLVENTS!** Wash contaminated clothing thoroughly before reusing.

(3) Inhalation. Move to an area free from risk of further exposure. Give oxygen or artificial respiration as needed. Obtain medical attention.

(4) Ingestion. Consult physician.

d. Spill or Leakage Procedures. The following procedures apply:

(1) Evacuate non-essential personnel.

(2) Remove all sources of ignition.

(3) Ventilate area.

(4) Provide clean-up crew with appropriate protective equipment i.e., complete skin protection (to include silicone gloves or rubber gloves) and faceshield. For spills greater than one gallon, use respiratory equipment in immediate area of the spill. Dispose as hazardous waste.

(5) Dike or contain spilled material and control further spillage if feasible.

(6) Notify appropriate authorities if necessary.

(7) Cover spill with sawdust, vermiculite, fuller's earth or other absorbent material.

(8) Pour liquid decontaminant over spillage, allow it to react at least 10 minutes.

(9) Collect material in open containers, add more decontamination solution.

(10) Remove containers to safe place, cover loosely.

(11) Wash area down with liquid decontaminant and flush spill area with water.

e. Decontamination Solutions. Ammonium hydroxide (0-10%) detergent (2-596) water) or solution of Union Carbide's Tergitol TMN-10 (20%) and water (80%).

f. Waste Disposal Method. Waste material, to include material spilled or leaked and all material used to clean up must be disposed of in accordance with federal, state and local environmental control regulations (see MCO P11000.8). Empty containers must be handled carefully because of residue and flammable solvent vapors. Decontaminate containers before disposing of them.

WARNING

DO NOT HEAT OR CUT EMPTY CONTAINER WITH ELECTRIC OR GAS TORCH.

g. Special Precautions and Storage Data. Apply the following procedures:

(1) Handling and Storage. Keep CARC components away from heat, sparks, and open flame. Store in tightly closed containers and protect from moisture and foreign materials. At maximum storage temperatures noted below, material may slowly undergo chemical changes without hazard and may result in components not being usable. Although ideal storage range is 70-75°F(21-24°C), normal storage temperature (min/max) is 32-122°F(0-50°C). CARC components which are stored at temperatures below the minimum cited above are not degraded, but they must be returned to useable temperature (60-90°F/16-33°C) before using. Guaranteed shelf life is 12 months from date of manufacture at 77°F (25°C), however, shelf life can be extended by several years by using tightly closed storage containers at temperatures below 122°F(50°C).

NOTE

IF CARC IS RECEIVED FROM GSA OR THROUGH SUPPLY SYSTEM WITH AN EXPIRED DATE, DO NOT ACCEPT IT. IF A UNIT ACCEPTS CARC THAT IS EXPIRED IT MUST SUBMIT A QUALITY DEFICIENCY REPORT (QDR) TO THE APPROPRIATE AGENCY IMMEDIATELY.

(2) Heat, Light, Moisture. If container of material is exposed to heat, it can pressurize and burst. If moisture enters container, pressure can build up and produce carbon dioxide which can cause sealed container to pressurize and burst. Do not reseal if contamination is suspected. If paint reaches minimum temperatures, it will harden, however, upon thawing it is usable. The temperature range specified (68-90°F/20-32°C) must be attained throughout the paint before mixing and applying.

(3) Lead and Chromate Pigments. Several paint and primer specifications allow or require use of lead or chromate pigments. CARC primers and topcoats, however, are also available in specifications which do not permit the use of lead or chromate (see paragraph 1-2b). Both of these pigments are toxic and can accumulate in the body. Precautions must be taken to limit skin contact and vapor inhalation. Surveillance should be based upon actual air sampling to determine airborne concentrations. Every employee need not be evaluated if enough data is available to identify typical exposure levels for any one type of operation.

WARNING

DO NOT USE SOLVENTS TO REMOVE PAINT/COATING FROM SKIN. THEIR DEFATTING ACTION WILL CAUSE INJURY TO PERSONNEL.

h. Personal Protection. Coatings, both CARC and conventional, require the use of personal protection. Personal protection requirements for conventional paint systems include cloth gloves, cloth overalls, eye protection and head coverings. The protection required by CARC systems are as follows:

(1) Chemical Agent Resistant Coating (CARC). When CARC is mixed, paint-impervious rubber or silicone rubber gloves and an inline air respirator must be worn. When spray painting, painters cotton gloves are acceptable. (See Appendix E for NSN.) Touch up painting outside, as defined in this manual, does not require the use of inline air respirators. PUP thinners may contain cellosolve acetate, which can be absorbed through skin. PUP is very difficult to clean from butyl rubber, therefore silicone gloves are recommended. Barrier creams are used with impervious gloves, not in place of them. Barrier creams, e.g., petroleum jelly, help prevent paint sticking to skin and combat dryness associated with defatting action of most solvents. These creams are obtained locally from commercial sources. By preventing the adherence of paint to skin, the practice of using solvents to remove paint should be eliminated. Solvents must never be used to remove paint/coating from skin.

(2) Monitoring and Examinations. Personnel monitoring and routine physical examinations indicate that protective clothing and equipment listed below, when worn by the painters, is adequate to prevent harmful exposure. CARC has been used and monitored for more than two years. However, when personnel using CARC are properly protected, no adverse health effects such as rashes or sensitivities have been detected.

(3) Protective Equipment. It is important that users of new protective equipment be informed of the reasons for requiring it. Formal training sessions should help overcome any resistance to change. One important factor is a switch from butyl rubber respirator facepieces to facepieces made from silicone. This change has two advantages: (1) Paint will not cling to silicone, therefore, cleaning is easier, and (2) the silicone facepiece is more comfortable to wear. A full facepiece should be provided where respirators are required at third, fourth, or fifth echelon maintenance because of irritating properties of the solvents.

Solvent resistant barrier cream, e.g., petroleum jelly, for use on skin is provided to make personal clean-up easier, to prevent solvent exposure through penetration of skin, and to prevent defatting of skin. Protective items include:

- (a) Full face mask respirator with inline air respirator or air supplied hood whichever is preferred
- (b) Organic vapor cartridges with paint prefilters (not to be used during any spray painting operations; to be used for sanding or similar operations).
- (c) Coveralls (preferably disposable)
- (d) Gloves, silicone rubber or household rubber
- (e) Headgear
- (f) Barrier cream
- (g) Defogging compound for respirator facepieces
- (h) Clear peel-off lens covers
- (i) Prescription spectacle inserts (if required)
- (j) Safety boots
- (k) Hearing protection.

i. Potential Health Hazards After Painting. These health hazards exist after painting with conventional paints as well as CARC:

NOTE

HEXAMETHYLENE DIISOCYANATE DOES NOT PRESENT A HEALTH HAZARD AFTER PAINT HAS CURED.

(1) Solvents, including cellosolve acetate, prereleased during drying. Solvent vapors are irritating to eyes and have unpleasant odors. Drying should be done in areas that are well ventilated to prevent buildup of solvent vapors. If excessive solvent vapors are concentrated in drying area, evacuate personnel and contact local preventive medicine/industrial hygiene representatives.

(2) Welding. Welding of CARC-painted surfaces will require abrading CARC down to substrate in the immediate area to be welded, that is, remove paint four inches surrounding area to be welded. Failure to comply may result in toxic poisoning during welding operations. If a CARC-painted surface is on backside of weld spot, it must also be abraded to the substrate before welding. After welding is complete, all crazed surfaces should be abraded to

ensure condensation formed on and below surface of substrate is eliminated before epoxy repriming and PUP overcoating.

(3) Sanding or grinding on painted surfaces may release large numbers of particles into the atmosphere. Care must be taken to prevent inhaling these particles as sanding debris may contain lead and chromate substances just as alkyd paints do (see paragraph 1-2a). A dust respirator approved by local health and safety authorities must be worn (as lead and chromate substances are hazardous to humans).

(4) All work places associated with painting operations are required to be reevaluated at least annually or more frequently as dictated by the nature and degree of the hazard present. Additional monitoring is required whenever there has been a production process or control method change, or if there is any other reason to suspect a change which may result in new or additional exposure. (See table 1-1, Spray Paint Ventilation Rates.)

j. Respiratory Protection. The following information is provided for your guidance:

(1) Spray Painting Indoors. An approved airline respirator shall be used when spraying paint. Alternatives shall be permitted when statistically valid samplings document personal exposure levels. All respirators must be approved by NIOSH/OSHA. (See figures 1-1 and 1-2 and table 1-2, Airline Respiratory Systems Examples.)

(2) Brush or Roller Paint Indoors or Outdoors.

(a) When using 1 quart of paint or less, in an open space, no respiratory protection is required.

(b) When using more than 1 quart, in an open space, an organic vapor respirator is required.

(c) When painting in a confined space, an approved airline respirator is required unless exposure levels determined by local health and safety office indicate otherwise.

NOTE

APPROVED RESPIRATORS WHICH PROVIDE EQUAL OR MORE PROTECTION THAN THE RECOMMENDED DEVICE MAY BE SUBSTITUTED.

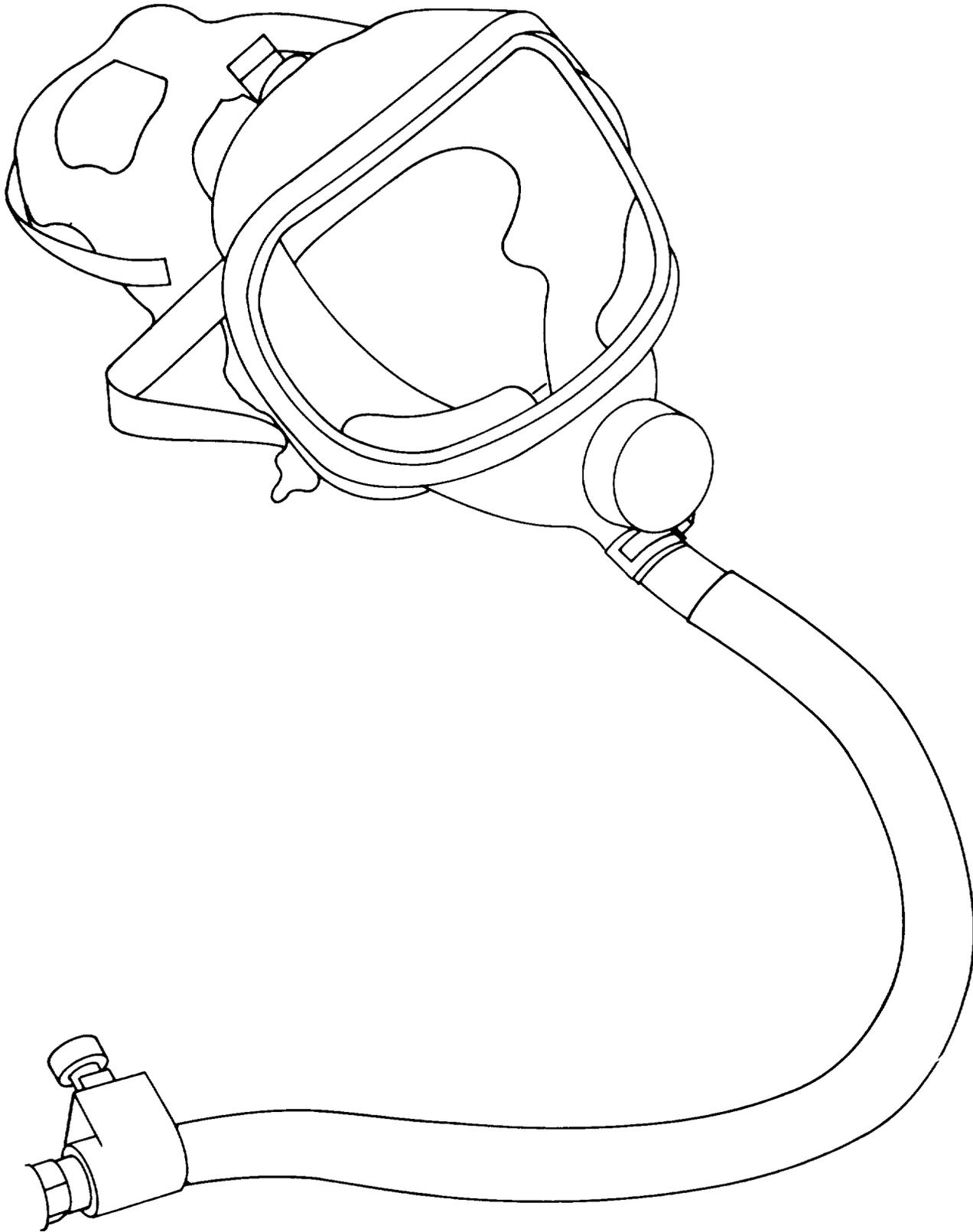
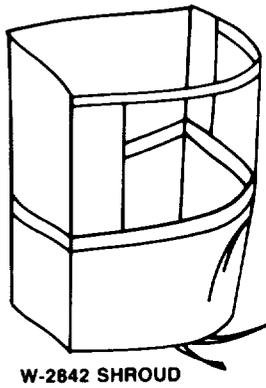
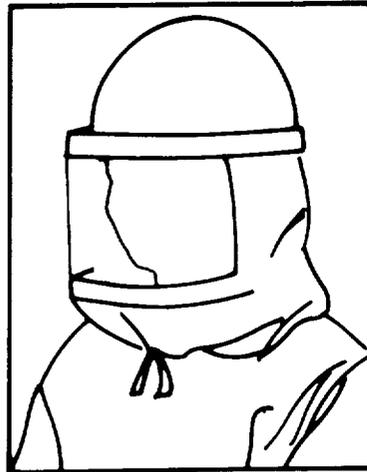


Figure 1-1. Full Facepiece Airline Respirator.

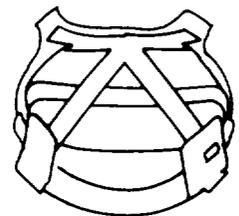


W-2842 SHROUD

W-2877 BELT-TO-HARDCAP ASSEMBLY



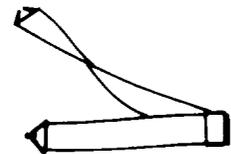
W-2884 BREATHING TUBE



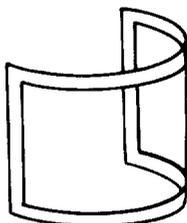
W-2878 HEAD SUSPENSION



W-2848 CLAMP



W-2913 CHIN STRAP



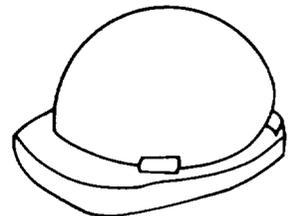
W-9410 POLYESTER WINDOW COVERS



W-2847 CONNECTOR



W-2844 WEB BELT



W-2917-5 HARDCAP

Figure 1-2. Typical Accessories for Protective Equipment.

NOTE

ONE QUART REFERS TO ONE QUART PER DAY PER PAINTER AND THERE SHALL BE NO MORE THAN ONE PAINTER PAINTING A VEHICLE/ITEM AT ANY GIVEN TIME.

NOTE

A CONFINED SPACE, FOR THE PURPOSE OF DETERMINING RESPIRATORY PROTECTION REQUIRED DURING PAINTING AND CLEANING OPERATIONS, IS DEFINED AS:

o GENERAL.

oo ANY AREA WHERE DILUTION VENTILATION CANNOT TAKE PLACE OR AIR FLOW IS OBSTRUCTED SUCH AS UNDER OR IN VEHICLES/EQUIPMENT.

o INDOORS - NOT IN SPRAY PAINT BOOTHS.

oo LESS THAN 10,000 CUBIC FEET IN AREA; OR

oo CEILING HEIGHT LESS THAN 16 FEET; OR

oo TOUCH UP PAINT AREA CONTAINING PARTITIONS, BALCONIES OR OTHER STRUCTURAL BARRIERS TO THE EXTENT THAT THEY OBSTRUCT CROSS VENTILATION; OR

oo OUTSIDE AIR NOT MECHANICALLY DISTRIBUTED AT A MINIMUM RATE OF 3.5 CFM PER SQUARE FOOT OF THE BAY/ROOM/AREA WHERE TOUCH UP PAINTING TAKES PLACE.

o OUTDOORS.

oo WHERE TWO OR MORE SIDES ARE BLOCKED BY BUILDINGS, PARTITIONS, OR BARRIERS; OR

oo UNDER A CANOPY OR ROOFLESS THAN 16 FEET IN HEIGHT.

k. Flammability of Paints. As with other paints, solvents in CARC are flammable. CARC has a flash point of 38°F/3°C; normal precautions to ensure safe operation must be taken. These precautions include preventing open flame sources, prohibiting smoking, grounding all energized electrical equipment, and proper disposing of paint dust and booth filters.

1-4. ENVIRONMENTAL CONSIDERATIONS. This document will discuss only federal requirements because state and local requirements are too varied to be given adequate consideration in a document of this scope.

NOTE

BEFORE INITIATING CARC SPRAY APPLICATION OPERATIONS, FOR THE FIRST TIME AT A GIVEN LOCATION, CONTACT THE LOCAL ENVIRONMENTAL COORDINATOR.

a. Federal Clean Air Requirements. Federal clean air requirements follow:

(1) Most volatile organic compound (VOC) emissions for paint and coating applications arise from solvent evaporation of initial spray, overspray, and the final coating film as it dries/cures. Careful choice of application equipment can minimize the emissions of a paint facility.

(2) Federal VOC restrictions for all air dry camouflage paint is .42 kg/liter or 3.5 lbs/gal but state and other local VOC restrictions may be more stringent. Consult local regulations.

(3) Many states provide exemptions; however, some states require VOC compliance and emissions reduction which may require vapor recovery systems and incinerators.

b. Federal Waste Requirements. Federal waste requirements follow:

(1) The EPA has designated a number of materials as hazardous. Among those so designated are paint solvent constituents including the following paint solvents:

- (a) xylene
- (b) toluene
- (c) methyl ethyl ketone
- (d) methyl isobutyl ketone
- (e) 1, 1, 1-trichloroethane.

(2) These solvents are found in uncured paints including overspray, and may be present in sludge in the sump of water wash spray booths. Paint curing proceeds with loss of solvent so that dried paint is essentially free of hazardous materials.

(3) All waste products from paints containing lead and chromate are hazardous waste.

(4) Actual handling and disposal procedures must be redetermined in conjunction with MCO P11000.8, MCO 4570.24, the local environmental coordinator, and the director for facilities engineers.

Table 1-1. Spray Paint Ventilation Rates

Item	Air Spray		Airless Spray	
	Design No.	Operating Range	Design No.	Operating Range
		Flow Rates (cfm/sq ft face area)		
Spray Cabinet*				
4 sq ft face	200	175 - 225	125	100 - 150
4 sq ft face	150	125 - 175	100	75 - 125
Booth				
Vehicular	100	75 - 125	75	75 - 100
Walk-in	150	125 - 175	100	75 - 125

*Cabinet located above floor, usually at waist level. Worker's face does not enter the cabinet.

Table 1-2. Airline Respiratory Systems Examples

NOTE: THESE ARE EXAMPLES THAT ARE IDENTIFIED AS ACCEPTABLE TO MOST HEALTH AND SAFETY OFFICES. HOWEVER, LOCALLY OBTAINED EQUIPMENT MAY BE USED IF THEY MEET STANDARDS SET BY USMC BASE/STATION HEALTH, SAFETY, AND ENVIRONMENTAL OFFICES.

Equipment	Catalogue No
I. Scott 801548 series, pressure demand, type C, full facepiece NIOSH approval No. TC-19C-74	
Scottoramic facepiece with Hansen connectors	801548-00
with Schrader connectors (both include harness)	801548-0 (26025-01)
Disposal lens covers (package of 25)	10003619
NOTE: DISPOSABLE LENS COVERS ARE REQUIRED WITH CARC PAINT.	
Scott-O-Vista facepiece with Hansen connectors	801547-06
with Schrader connectors	801548-6
NOTE: SCOTTORAMIC FOR A WIDER VISION.	
100 ft length of hose with Hansen connectors	30010-100 (specify)
with Schrader connectors	(specify)
50 ft length of hose with Hansen connectors	30010-050 (specify)
with Schrader connectors	(specify)
NOTE: MAXIMUM APPROVED LENGTH OF HOSE IS 250 FEET.	
Electric Compressor (2 person maximum)	605042-00
Handtruck	66893-01

Table 1-2. Airline Respiratory Systems Examples (Continued)

Equipment	Catalogue No
II. Scott Zephyrair 60500 series, constant flow, type C, full facepiece NIOSH approval No. TC-19C-72	
Scottoramic facepiece	801450-40
Filter body assembly with belt clip, cartridge, control valve, Wiggins quick connect for 1/2" ID hose	605012-01
50 ft length hose	605020-50
NOTE: MAXIMUM APPROVED LENGTH OF HOSE IS 250 FEET.	
Electric Compressor (3 person maximum)	605041-00
Electric Compressor, explosion proof (3 person maximum)	605041-01
Air Driven Compression (needs 40 cfm at 40 psig) (3 person maximum)	605041-02
NOTE: THE FOLLOWING MUST BE USED ON ALL THREE COMPRESSORS.	
Filter	66814-00
Regulator	66815-00
Lubricator	66816-000
Handtruck	66893-00

Table 1-2. Airline Respiratory Systems Examples (Continued)

Equipment	Catalogue No
III. Bullard, CC-20 series, positive pressure, type C, head/helmet NIOSH approval No. TC-19C-154	
Hood (12 Tyvek hoods per carton)	20-T
Air entry system	690-2
NOTE: MUST USE THIS MODEL WITH BULLARD COMPRESSORS.	
50 ft length hose	V-20-50-ST
100 ft length hose (both hose include connectors)	V-20-100-ST
NOTE: MAXIMUM APPROVED LENGTH OF HOSE IS 100 FEET.	
Electric compressor (2 person maximum)	EDP-2-TE-A
Air drive compressor (needs 60 cfm at 60 psig) (2 person maximum)	ADP-2-A
Belt	46-12
Nylon lens covers (25 per package)	20-LC

Table 1-2. Airline Respiratory Systems Examples (Continued)

Equipment	Catalogue No
IV. Bullard, 999 series, continuous flow, type C, hood/helmet NIOSH approval No. TC-19C-102	
Hood (cape, hard hat, air entry systems, replaceable inner lens, disposable cover lens (3 installed and a pkg of 12)	999-3
50 ft length hose	V-20-50-ST
100 ft length hose	V-20-100-ST
NOTE: MAXIMUM APPROVED LENGTH OF HOSE IS 100 FEET.	
Electric compressor (2 person maximum)	EDP-2-TE-A
Air driven compressor (needs 60 cfm at 60 psig) (2 person maximum)	ADP-2-A
Optional hot/cold vortex tube	1300-1

CHAPTER 2

APPLICATION PROCEDURES

Section I. PREPARATION FOR APPLICATION OF CARC

2-1. GENERAL. This chapter provides guidance for application of CARC. It is oriented towards use by third, fourth, and fifth echelon maintenance personnel.

2-2. THE CARC SYSTEM. PUP, epoxy polyamide paint (EPP), and epoxy primer (EP) are each supplied as two component systems. There is also a single component moisture-cured PUP. When components of a coating are combined, a terminal chemical reaction begins. This reaction causes components to crosslink and form a tough, virtually impermeable coating. PUP will provide a service life at least twice that of alkyd coatings and will provide additional corrosion protection under a broad array of environmental conditions. PUP and EPP both provide superior resistance to toxic chemical agent penetration and greatly simplify decontamination. For external surface applications, aliphatic polyurethane paint is applied over an EP. For internal surface applications, EPP is applied over an EP. National Stock Numbers (NSNs) for paints and some equipment in this manual are listed in Appendix E.

a. Primers (EPs). There are five types of EPs for CARC use, each with its own military specification. Tables 2-1 through 2-7 contain recommendations for choices of primers and top coats. They also prescribe the placement of paint on various kinds of equipment.

NOTE

NATIONAL STOCK NUMBERS FOR THE FOLLOWING ITEMS ARE LISTED IN APPENDIX E.

(1) MIL-P-53022 - This primer is strongly recommended. It is lead and chromate free, rust inhibiting, and can be applied to ferrous and non-ferrous surfaces.

(2) MIL-P-53030 - This Volatile Organic Compound (VOC) compliant primer was developed to meet strict emission requirements of certain states. It is water reducible, lead and chromate free, and can be applied to ferrous or non-ferrous surfaces.

(3) MIL-P-52192 - A lead and chromate formulation rust inhibiting primer for use on ferrous surfaces.

(4) MIL-P-23377, Type I - A lead free primer containing chromate for use on non-ferrous surfaces.

(5) MIL-P-85582 -This VOC compliant primer is for use on non-ferrous surfaces, and is an alternative to MIL-P-53030.

b. Polyurethane Paint (PUP). There are two military specifications for camouflage PUP. Tables 2-1 through 2-7 contain recommendations for choices of PUP and primers as well as the recommended placement on various kinds of equipment.

NOTE

DUE TO THE MORE ABRASIVE NATURE/MAKE-UP OF THESE TWO MILITARY SPECIFICATION PAINTS, FACILITIES AUTHORIZED TO SPRAY PAINT SHOULD SELECT TUNGSTEN RATHER THAN STEEL SPRAY GUN NEEDLES AND TIPS. (TUNGSTEN WEARS BETTER AND LASTS LONGER THAN STEEL WHEN APPLYING PUP.)

(1) MIL-C-46168 - This two component coating is used in nearly all situations. This differs from commercial PUP because it contains additional pigment intended to deceive infrared and/or ultraviolet (IR/UV) detector devices by reducing IR/UV contrast between the CARC-painted item and its surroundings. The current specification encompasses three types:

(a) Type II - A lead and chromate free formulation.

(b) Type III - A lead and chromate free formulation which uses 1, 1, 1-trichloroethane as a solvent. It meets current VOC solvent emission requirements.

(c) Type IV - High solids lead and chromate free formulation. It meets current VOC solvent emission requirements.

(2) MIL-C-53039 - One component polyurethane coating. MIL-C-53039 is an alternative to the dual-component polyurethane coating, MIL-C-46 168. This coating is to be used as a topcoat for exterior surface application and is to be applied over epoxy primer. It may also be applied over dual-component PUP and "well cured" alkyd which is free of all contamination such as absorbed diesel fuel, hydraulic and brake fluids, and antifreeze.

(a) Its unique design features offer the following advantages over two component PUP:

1 Eliminates mixing of two components; therefore, reducing labor, storage and clean-up.

- 2 Has a much longer pot life, reducing the amount of waste generated.
- 3 Will cure at temperatures below 60°F(15°C).
- 4 Meets stringent VOC restrictions being imposed by some states; that is formulated/packaged at 3.5 pounds VOC and useable without reduction.

(b) Disadvantages in comparison to two component PUP are the following:

1 Formulation is higher in solids; thus increasing the viscosity. In application this translates to faster buildup on the surface being painted. This may increase the probability of error on the part of an inexperienced/unsupervised painter. Application of too much of either the one or two component PUP may cause runs or sags and a much slower cure-through time.

2 The more abrasive nature of higher solids paint causes greater spray equipment wear. Tungsten rather than steel spray gun needles and tips are highly recommended.

3 One component PUP chemically cures in reaction with moisture from the atmosphere. Once a container is opened the curing process begins. Material left in partially filled re-closed containers will skin. Within a period of a few days the skin can be removed and the material used after re-stirring. If the material of a partially used and closed container is not used within 7-14 days, then the skin or gelling process may progress to a depth that the material cannot be used. Containers must be tightly capped when not in use or contents placed under a nitrogen blanket. Containers should be stored in a cool, dry location to negate the buildup of condensation inside the can over prolonged periods.

(c) Characteristics of the single component PUP are as follows:

1 Storage Life. One year; however, shelf life may decrease considerably given temperatures below or in excess of the recommended storage range and presence of moisture during storage.

2 Storage Temperature. Recommended storage range is 32-90°F(0-33°C). However, both one and two component PUP are freeze stable.

3 Agitation. Thorough stirring and/or shaking or rolling of the paint containers before use is a necessity due to the high solids nature of the formulation. In spray application, pressure pots/cup guns will require constant agitation.

4 Solvent/Thinner Reduction. Thin only if necessary using thinner, MIL-T-81772, Type I. Do not use alcohol or petroleum-based thinners.

5 Temperature Sensitivity. Will cure/dry at temperatures down to freezing; however, the lower the temperature, the greater the dry/cure time. No PUP should be applied to a substrate in excess of 120°F(49°C). One component PUP should be room temperature to apply; cold PUP is the consistency of molasses.

6 Approximate Dry/Cure Times. The following schedule can be expected at ambient conditions of 77°F(25°C) and a relative humidity of 35 percent:

NOTE

AT AMBIENT CONDITIONS ABOVE THOSE LISTED, THE DRYING TIMES WILL **BE** REDUCED. AIR MOVEMENT AND FORCE DRYING WILL ALSO REDUCE DRYING TIMES.

Set Time	15-30 minutes
Dry to Handle	2-3 hours
Dry Hard	3-4 hours
Excellent Acetone Resistance	70 hours

7 Moisture Sensitivity. Moisture contamination must be avoided; for example:

a Epoxy primer must be free of moisture from dew or other condensation.

b Water reducible epoxy primer, MIL-P-53030, must be completely dry prior to PUP application.

c In spray application, air compressors must be equipped with a water separator and/or desiccant filter.

8 Flammability/Ingnitability Flash point is 67°F(20°C) due to ketone solvent in the formulation.

9 Safety and Health. The same health and safety guidance for the application of the dual-component PUP applies to the single component PUP.

(d) The following are usage recommendations which are based upon evaluation of the paint's characteristics and an informal survey of the using/non-using depots within the U.S. Army Depot Systems Command (DESCOM):

1 The one component PUP should be used to accomplish touch up painting at the organizational and direct support maintenance levels because it is easier to use and can be applied in a wider degree of ambient conditions than the two component PUP.

2 One component PUP should be utilized by production line painting facilities only after the above mentioned disadvantages are overcome and moisture is precluded from the spray feeder line system. Note that local, regional or state environmental requirements may necessitate its utilization (or, the new Type IV high solids two component PUP).

c. Epoxy Polyamide Paint (EPP). MIL-C-22750 is the only EPP specification. It is lead and chromate free in the colors normally used.

d. Thinners. Different coatings require several different thinners. Tables 2-1 through 2-7 contain recommendations for choices of thinners.

(1) MIL-T-81772 - This thinner specification is used for most CARC coatings. It has the following types:

(a) Type 1 is used to thin:

- 1 MIL-C-46168, Type II
- 2 MIL-C-53039 (in areas not requiring VOC compliance)
- 3 All epoxy coatings included in (b) if Type 11 is not available.

(b) Type II, when available, is used to thin:

- 1 MIL-P-53022
- 2 MIL-P-52192
- 3 MIL-P-23377, Type I
- 4 MIL-C-22750
- 5 MIL-P-85582.

(2) Water is used to thin MIL-P-53030.

(3) 1,1, 1-trichloroethane (DOW Chlorothane SM or equivalent) is used to thin:

- (a) MIL-C-46168, Type III
- (b) MIL-C-53039.

NOTE

BEFORE USING 1, 1, 1-TRICHLOROETHANE, ENSURE COMPLIANCE WITH LOCAL AND STATE ENVIRONMENTAL RESTRICTIONS AND THAT EQUIPMENT IS CERTIFIED FOR ITS USE. **NO ALUMINUM COMPONENTS SHOULD BE PRESENT.**

2-3. CARC CHARACTERISTICS. The characteristics peculiar to chemical agent resistant coatings are discussed below.

a. General. PUP and epoxy coatings, unlike other paints, do not cure solely because of evaporating solvents. All are chemical reactant coatings and form chemical crosslinks. Crosslinking begins to occur as soon as two components are mixed. Since this crosslinking is chemical in nature, environmental conditions, such as temperature, humidity, and the presence of contaminants, will affect pot life, curing, and adhesion.

b. Pot Life. Once mixed, CARCS have temperature variable pot lives. Pot life of each coating decreases as temperatures and humidity increase.

(1) PUP has a pot life of about eight hours at 70-75°F/22-24°C.

(2) The epoxy coatings have pot lives of about 15 hours at 70-75°F/22-24°C. However, the higher the environmental temperature, the shorter the pot life. At temperatures approaching 100°F/38°C the average pot life of PUP is approximately two hours and the average pot life of EPP is approximately six hours. Epoxy primer has a guaranteed maximum pot life of eight hours. It is essential to plan the use of these coatings carefully to avoid waste.

c. Curing. curing is temperature and humidity dependent with pup being more humidity-sensitive than epoxy coatings. Curing times are as follows:

(1) Epoxy primers need not be fully cured before application of a topcoat. Primers need only be set to touch before applying a topcoat. Generally, 30 minutes to 1 hour, depending on the primer and the conditions is all the time required.

(2) Epoxy paints/primers set to touch in approximately 30 minutes; dry hard in 4 hours, and completely cure within 7 days.

(3) Curing time of PUP/EPP/EP increases with lower temperatures or lower humidity. At temperatures of 70°F/22°C and above, PUP will dry within specification

requirements: it sets to touch in approximately 15 minutes; dries tack-free in 90 minutes; dries hard in 4 hours; and achieves a complete cure within 7 days. Lower temperatures require more drying time. At 60°F/15°C, PUP requires twice as long to cure as at 70°F/22°C. At surface temperatures below 50°F/10°C, PUP does not cure.

d. Adhesion. Adhesion is affected by presence of contaminants, high humidity, and very high or low temperatures. PUP is more sensitive than epoxy coatings and thus more likely to have adhesion failures.

(1) Contaminants. The surface must be free of sanding grit, corrosion, debris, carbon deposits, grease, wax, fluid, water, and finger prints. Many paint failures will result if the surface is not adequately cleaned before painting.

(2) Humidity. Isocyanate catalyst (Component B) in PUP will bind with water. High humidity therefore, often results in moisture on the surface of equipment that can result in paint failure.

(3) Temperature. Low temperatures (below 50°F/10°C) allow newly applied PUP more time to bind with moisture in the air, resulting in paint failure. High temperatures (above 100°F/38°C) allow PUP and epoxy coatings to air dry before reaching the surface being painted.

e. Effects of Moisture. Moisture is an important factor in the use of these coatings as detailed below.

(1) Serviceable Component B (Isocyanate), of pup, should be a pale yellow to clear liquid. If Component B appears gelled in consistency and has crystals, then it has become contaminated with moisture and must be processed for disposal as a hazardous waste.

(2) Use of non-urethane grade solvents can introduce quantities of moisture into the coating. Isocyanate will react, resulting in viscosity increase, carbon dioxide formation, paint failures, and damaged application equipment.

f. Storage Life. Temperature and humidity will not seriously affect stability of components of PUP or epoxy coatings stored in full, tightly sealed, but separate containers. All have a minimum shelf life of one year when stored below 122°F/50°C, but this can be extended several years by observing these precautions. Shelf life is an important consideration when determining stocking levels, however, procedures exist to extend the shelf life if the coating is still serviceable. PUP and epoxy coatings which are no longer useable will require disposal as hazardous wastes.

g. Resistance to Corrosion and Fungus. The following information is provided.

(1) Resistance to Corrosion. CARC paint provides better protection because it is less permeable to oxidation agents. However, if substrate is already corroded, CARC coatings will not prevent spread of further corrosion.

(2) Resistance to Fungus. Fungus resistance characteristics of CARC are better than for other camouflage coatings; however, CARC does not contain fungicides to discourage fungus growth on any dust or sand which may cling to the painted surfaces. Therefore, although the painted surface is resistant to fungus, any foreign matter on the painted surface is vulnerable to fungus.

h. Quality Assurance. Inspect the paint finish to verify that the paint system meets the established minimum requirements as stated in the applicable military specifications.

(1) Paint Thickness. Apply paint according to MIL-STD-193 with the following exceptions/additions: The coating film thickness for MIL-P-53022 and MIL-P-53030 is 1.0 to 1.5 mils. Follow manufacturer's painting instructions.

(2) Color/Gloss. Inspect the color of the finish against a manufacturer's paint chip to ensure proper color and gloss.

(3) Brushing/Spraying Properties. Inspect the paint surface to ensure it is smooth and even, free from runs, sags, streaks, or other defects which would interfere with adhesion of next coat.

(4) OVERSPRAY. OVERSPRAY SHALL BE HELD TO A MINIMUM TOLERANCE OF PLUS OR MINUS 1 INCH ON THE THREE COLOR CAMOUFLAGE PATTERN. NO OVERSPRAY IS PERMITTED ON GLASS, RUBBER, CANVAS, DATA PLATES OR OTHER COMPONENTS WHICH ARE NOT NORMALLY PAINTED.

(5) Alignment of the Pattern. Clearly identify reference points and inspect to ensure correct pattern alignment.

(6) Tape Test (Paint Adhesion Test) for all finishes. (See figure 2-1.) Test paint adhesion on two production units per lot. Do not use test panels instead of actual production units. Test the surface after the paint finish has cured on an out of the way place acceptable to quality assurance representatives as follows:

(a) Make a V-shaped scratch through the paint finish with a sharp metal blade. Make the scratch approximately two (2) inches long and one half (1/2) inch between edges at the widest point.

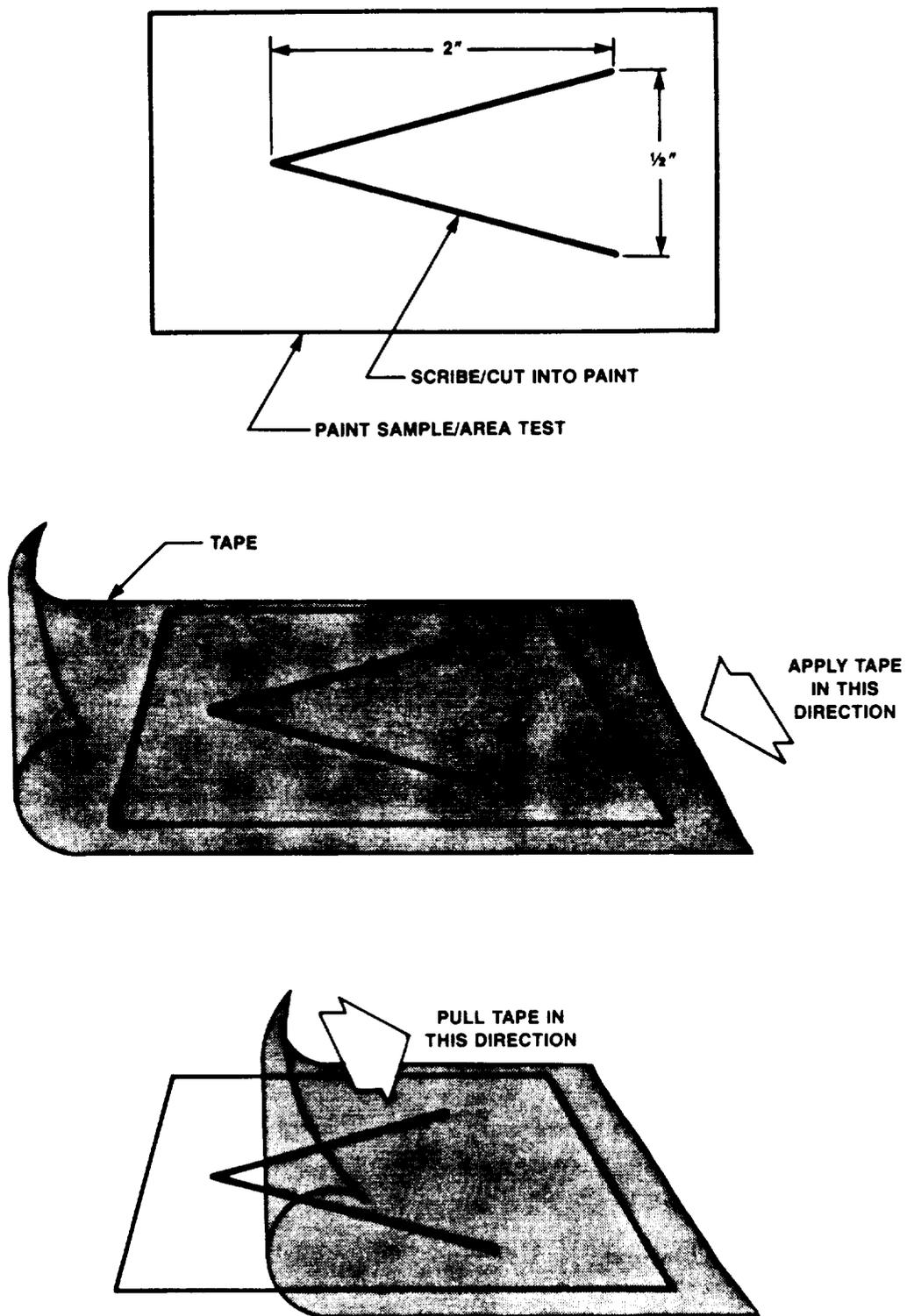


Figure 2-1. Tape Test.

(b) Press a piece of pressure sensitive tape firmly over the V. Press out air pockets.

(c) Wait at least ten seconds, then quickly pull the tape away.

(d) Interpret test results as follows:

1 If no paint comes off the taped area on either test unit, the lot is acceptable. (Removal of overspray is not a test failure.)

2 If the topcoat, primer or pretreatment on either unit is removed by the tape, then the lot has failed the test and is rejected.

3 After the test, repair the scratched area by feathering-in with appropriate coating as explained in paragraph 2-5j(3)(b).

i. Removal of CARC. CARC paints are extremely difficult to remove using conventional blasting or solvent means. A new removal procedure has been developed by Hill AFB using plastic media blasting (PMB) at approximately 40 psi. Plastic media advantages include:

(1) Durability

(2) Reusability

(3) Consistency in size and hardness

(4) Elimination of liquid chemical waste disposal

(5) Speed

(6) There are no known limitations as to the type of materials from which CARC can be removed, however, PMB will not achieve the "white metal" finish.

NOTE

CARC COATINGS ARE NOT FOR USE ON ITEMS SUBJECT TO TEMPERATURES IN EXCESS OF 400°F/204°C OR FOR COMPONENTS WHICH ARE DESIGNED FOR HEAT TRANSFER CHARACTERISTICS. MANIFOLDS, EXHAUST PIPES, TURBO CHARGERS, MUFFLERS, AND SIMILAR ITEMS SHOULD BE PAINTED WITH PAINT CONFORMING TO MIL-P-14105, TT-P-28, OR OTHER SPECIFIED HEAT TOLERANT PAINT. CARC COATINGS WERE NOT DESIGNED FOR USE ON RUBBER COMPONENTS DUE TO THE OBVIOUS ABILITY OF THE RUBBER BASE PRODUCTS TO FLEX, STRETCH, OR BEND.

2-4. PREPARATIONS FOR PAINTING. Consider the following when preparing to paint:

a. Planning. Careful planning is necessary for a successful painting operation and must begin early. Planning factors for dedicated facilities must be interrelated.

WARNING

WHEN SETTING UP FACILITIES FOR FORCED AIR RESPIRATORS, ENSURE THAT SEPARATE AIR SUPPLIES AND DIFFERENT AIR HOSE CONNECTORS ARE USED TO PRECLUDE A POTENTIAL HOOKUP OF AIR MASKS TO AIR SOURCES FOR MECHANICAL EQUIPMENT.

(1) Facilities. Facilities must meet OSHA/EPA requirements and workload needs. Facility requirements will be dependent upon particular state/local environmental requirements, MIL-SPEC coatings used (VOC or non-VOC coating compounds), and level of maintenance performed.

(2) Workload. Types, quantities, and initial condition of items to be painted must be known in order to determine facility and paint equipment requirements.

(3) Equipment. Optimum application equipment mix is determined by items to be painted, personnel available, and funding.

(4) Personnel. The number and training of personnel is based on workload, equipment, and facilities.

(5) Identification. Check the record jacket of the vehicle or equipment to be painted to determine if previous coating is CARC. If no record exists, use the field expedient method on several places over the entire surface. That is, rub the coated surface briskly with a rag saturated with acetone (i.e., methyl ethyl ketone (MEK) or fingernail polish remover), for twenty seconds. If coating rubs off, it is not CARC.

b. Preparation of Ferrous, Non-Ferrous, Plastics, Wood, and Fiberglass Surfaces. Prepare surfaces as outlined below:

NOTE

CARC IS NOT TO BE APPLIED TO RUBBER PRODUCTS, CANVAS, OTHER CLOTH MATERIAL, OR GLASS. CARC WILL NOT ADHERE TO THESE MATERIALS.

(1) Previously Painted Metal Surfaces.

(a) Apply CARC directly over existing alkyd painted surfaces providing the coating is sound and no corrosion exists. CARC will adhere only to a scuff sanded, properly cleaned, adequately cured (90 days) alkyd surface, which has not previously absorbed contaminants such as petroleum products, synthetic hydraulic/transmission fluids, and antifreeze. Sand scuff or strip alkyd surfaces with these contaminants before applying CARC.

(b) Apply CARC over CARC that has been properly cleaned and scuff sanded.

(c) Any coating showing corrosion, cracking, blistering, or flaking must be sanded down to bare substrate then cleaned and treated as bare metal.

(d) Cleaning - Solvent clean any area that contains oil, grease, or other contaminants with MIL-T-81772. Then, using high pressure washer water temperature maximum 160°F/72°C, water pressure in excess of 600 psi, at approximately 12-15 gallons per minute, clean entire surface to remove dirt, dust, mud, or any other materials that could contaminate surface. To insure proper cleanliness, employ test procedures given in paragraph 2-4c below. Before painting, allow surface to dry completely.

(e) Stripping - Certain situations (i.e., poor topcoat condition or the presence of lacquer) will require that surfaces be stripped prior to painting with CARC. See paragraph 2-5(j)(5)(b)5, page 2-26. Strip by using chemical stripping agents in accordance with MIL-T-704, sand blasting, peridot blasting, steelshot blasting (ferrous surfaces only) or plastic media blasting. The situation, paint type and substrate material will determine the best stripping method. The following procedures generally apply:

1 Ferrous Substrate. Blast to remove existing coating until substrate is clean and near white in accordance with Steel Surface Painting Council (SSPC) standards SSPC-VIS-1-67T for preparation of painting steel structures (near white implies that SSPC-10 be followed). The blasting medium selected must not grossly affect substrate and must be free from oil, grease, dirt, or any other material that could contaminate surface. After cleaning, all surfaces should be kept free from dirt, finger marks, dust and other contaminants until painted. Do not blast machined parts or sheet metal thinner than .0625 inch (16 gage US standard). These situations require techniques specific to the type of part. Test surfaces blast cleaned for cleanliness, (see paragraph 2-4c below), and then given a prime coat, as soon as possible after cleaning, and in no case more than four hours after cleaning.

2 Aluminum Substrate. When mechanical removal methods cannot be used, remove existing coatings with a paint remover conforming to MIL-R-46073 or another suitable

stripper. Clean with a solvent conforming to MIL-T-81772. Thoroughly clean and treat the entire surface in accordance with MIL-T-704, and then test for cleanliness. See paragraph 2-4c below.

3 Lacquer Painted Surfaces. Strip all lacquered items since CARC cannot be applied over lacquer. Currently, all components are chemically stripped using MIL-R-46073 or another suitable stripper. After stripping, clean item thoroughly per MIL-T-704 and test for cleanliness. See paragraph 2-4c below.

4 PUP Painted Surfaces. Items painted with MIL-C-46168 do not usually require stripping. However, the best technique currently used to remove PUP is plastic media blasting. Although plastic media blasting is a relatively new technique, precise procedures have been developed as follows. The coated surface must be cleaned to remove any oils, grease, or dirt. Mask any surfaces or components which would be damaged by the blast media. Paint is then removed by blasting at a pressure of 25 to 30 psig (maximum) with an impingement angle of 10 to 15 degrees perpendicular to the surface and a stand-off distance of 24 to 36 inches. Blasting is done long enough to remove only the paint film and leave the skin clean. Plastic media blasting is non-polluting, and unlike chemical strippers is not a source of corrosion. Other blasting media must not be mixed with the plastic media. Workers must protect themselves from dust inhalation by wearing a fitted approved respirator at all times when blasting. Plastic blast media and associated dust generated from paint removal and general cleaning will be disposed of as a solid hazardous waste. After stripping item, clean thoroughly in accordance with MIL-T-704 and test for cleanliness. See paragraph 2-4c below.

5 Wood Surfaces. Clean wood surfaces to be painted of all dirt, oil, grease and other foreign substances with an aliphatic hydrocarbon solvent. Surface must be clean and dry. Wood must be pressure treated (see MIL-T-704).

6 Fiberglass Surfaces. Fiberglass surfaces to be painted must be free of all dirt, oil, grease and other foreign substances. The surface should be buffed or abraded before applying CARC so that the coating will adhere.

(2) Bare Metal

(a) Cleaning. Clean surface thoroughly of all oils, grease, and other contaminants as specified in MIL-T-704 or other applicable finishing document. Thorough cleaning before painting is required because a clean surface is necessary to obtain a satisfactory paint finish. Before pretreatment, check surface for cleanliness.

(b) Pretreatment. MIL-T-704 and other applicable finishing documents provide direction for surface preparation.

1 Steel Surfaces. The pretreatment is zinc phosphate or wash primer (DOD-P-15328) applied to a dry film thickness of .0003 to .0005 inches. Allow to dry for 30 minutes before priming.

2 Aluminum. Pretreat in accordance with MIL-T-704, Type G, or by using either MIL-C-5541 or wash primer.

c. Cleanliness Tests. The cleanliness tests outlined below are essential to the proper use of CARC:

(1) Apply CARC paint to a completely clean surface, or the new coating may peel, crack, or scale. Therefore, after cleaning, test item as described here.

(2) The water break test is the primary test for cleanliness. It tests to see if the surface can support an unbroken film. Spray a mist of distilled water (using any convenient, small atomizing device) on the test surface.

(a) If water gathers into discrete drops within 25 seconds (i.e., if surface shows a water break), then surface has failed test.

(b) If water forms a continuous film by flashing out suddenly over a large area, surface has failed test. Flashing out indicates the presence of impurity, such as free alkali, residual detergent, on surface.

(c) If water droplets join into a continuous film of water without sudden flashout and form a lens, the surface has passed test.

(d) Reclean and retest failures.

(e) Remove all moisture and blow clean (water and oil free) forced air over entire item to ensure a clean, dry surface for painting.

(f) An alternate test is the red litmus test. It tests to ensure that surface registers a neutral or slightly acid reaction. Red litmus paper when moistened with distilled water and applied to surface must not turn blue. If paper does turn blue, a 0.20 to 0.25 percent chromic acid solution can be applied, allowed to remain for two to five minutes, thoroughly rinsed with water, and surface wiped dry with clean, lint-free cloths. If chromic acid is not available, surface should be recleaned, rinsed and dried.

(g) Welding, especially of cold rolled steel, can cause microscopic surface cracks in surrounding area. As area cools, condensation forms. If area is not sanded, corrosion results. Flat or reverse side of T welds are most likely to be affected, therefore, clean and sand all new welds and resulting crazed surfaces before painting.

Section II. APPLICATION PROCEDURES

2-5. APPLICATION. CARC like other paints, contains solvents and other chemicals the presence of which require that fire and safety precautions be taken. Precautions for CARC are not substantially different than those now required for alkyd paint.

NOTE

DO NOT MIX DIFFERENT MANUFACTURER'S COMPONENTS FOR ANY CARC PAINT!

a. Primer Mixing. In general, follow the directions on containers.

(1) Lead and chromate free primers (MIL-P-53022 or MIL-P-53030) low VOC must be used if possible. Check with local health, safety, and environmental offices to determine which primer is acceptable. These primers have the following advantages:

- (a) Usable on both ferrous and non-ferrous metals.
- (b) Require less drying time - approximately 30 minutes for dry to touch.
- (c) Decrease total primer stockage since only one is needed.
- (d) Eliminate requirement to meet OSHA safety requirements for lead and chromate.

(2) MIL-P-23377, Type I is only used on non-ferrous substrates.

(3) MIL-P-52192 is only used on ferrous substrates.

b. Mixing of Epoxy Primer. Follow the procedures outlined below:

(1) Upon opening container, ensure that catalyst (Component B) is clear. Thickness or gelling with crystal indicate that catalyst is not usable. Because of high solids content, epoxy resin (Component A) must be checked for settling. Stirring will re-suspend Component A. Component B must be slowly stirred into Component A.

(2) MIL-P-53022 and MIL-P-52192 are mixed four parts by volume Component A with one part by volume Component B (catalyst component).

(3) MIL-P-53030 is mixed in volume ratio specified by the manufacturer usually three to one by volume.

(4) MIL-P-23377 is mixed one part by volume Component A with one part by volume Component Band thinned.

c. Epoxy Primer Application. Apply as outlined below:

(1) Before applying, epoxy primers require a 30 minute waiting period after mixing the two components. Plural component spray equipment is not recommended for this application, however, if plural equipment is used, drying time required before top coat application will increase depending on the primer and weather conditions.

(2) All primers are applied in a single coat to a dry film thickness of .001 to .0015 inches. Primers must be dry to touch before topcoating.

(3) All paint application equipment must be thoroughly solvent-cleaned upon work completion. Spray lines used for epoxy must not be used for PUP.

d. Mixing of Polyurethane Components. Follow the procedures outlined below and those on the container:

(1) Pigments of Component A, PUP, have a tendency to settle and cake due to high solids content. These solids must be thoroughly mixed in solution before addition of catalyst. Failure to re-suspend solids could affect IR and color matching characteristics. Mixing can be accomplished in three ways: Small quantities of Component A can be agitated on a mechanical shaker for 30 to 60 minutes, 55 gallon drums can be rolled for one to six hours, and large quantities can be mechanically stirred for one to six hours.

(2) Catalyst, Component B, must be clear to pale yellow liquid and free of crystals. A cloudy, crystalline gel indicates that catalyst is contaminated and should not be used.

(3) Accurate mixing of Components A and B in strict accordance with instructions provided with kits is crucial. Components A and B must be from the same manufacturer. Cross mixing different manufacturers will produce unsatisfactory results. Component B must be slowly stirred into Component A.

(4) MIL-C-46168. Mix four parts by volume Component A (polyester component) with one part by volume Component B (catalyst component) and thin using MIL-T-81772, Type I, only if necessary.

(5) MIL-C-53039 may be applied without further reduction in order to meet VOC requirements. Manufacturer's recommended application and handling procedures must be closely followed.

e. Polyurethane Application. Proceed as directed below:

(1) PUP is applied to a minimum dry film thickness of .0018 to .0022 inches, usually in two coats.

(2) Additional spray coats may be applied immediately. Paint being applied by brush or roller must be dry to touch before a second coat is applied.

(3) Once the original container of catalyst, Component B, has been opened, it must be used the same day or else stored in a vat under a nitrogen or argon blanket or in a sealed dry air/airless container.

(4) Clean all paint application equipment thoroughly with solvent upon work completion. Spray lines used for PUP must not be used for epoxy.

f. Mixing of Epoxy Polyamide Paint (EPP). Use epoxy paint (MIL-C-22750) on interior of vehicles. Interior surfaces, which become exterior surfaces upon opening (hatches, ramps, etc.), will be painted with PUP. Follow the directions on the containers and those below:

(1) As with epoxy primers, catalyst must be clear and Component A must be checked for settling. It will usually be necessary to stir Component A thoroughly for up to 30 minutes. Component B must be slowly stirred into Component A.

(2) MIL-C-22750. Mix one part by volume Component A (epoxy resin) to one part by volume Component B (catalyst) and thin using MIL-T-81 772, Type II, if needed.

(3) Component A and Component B must be from the same manufacturer to ensure satisfactory results.

(4) Epoxy paints require a 30 minute waiting period after mixing two components before using. Plural component spray equipment is not recommended for this application.

g. Application of Epoxy Polyamide Paint (EPP). Follow the procedures below:

(1) Epoxy is usually applied to a minimum dry film thickness of .0018 to .0022 inches in two coats.

(2) Additional spray coats may be applied immediately.

(3) Clean all paint application equipment thoroughly upon work completion. Spray lines used for epoxy must not be used for PUP.

h. Paint Application to Non-Metal Surfaces.

(1) Plastic Not Softened by Methyl Ethyl Ketone (MEK).

(a) Scuff-sand all uncoated parts before cleaning. This provides a surface for paint adhesion.

(b) Solvent clean plastic parts with appropriate petroleum aliphatic solvent.

(c) Prime all surfaces with EP to a total dry film thickness of .001 to .0015 inches.

(d) Topcoat all surfaces then with PUP/EPP to a total minimum dry film thickness of .0018 to .0022 inches.

(2) Paint Application to Wood.

(a) Instructions for wood are the same as for surfaces that have been previously painted.

(b) All areas must be solvent cleaned with appropriate petroleum aliphatic solvent. External surfaces must then be cleaned when remainder of equipment is cleaned with a high pressure washer.

(c) Prime all surfaces with EP to a total dry film thickness of .001 to .0015 inches.

(d) PUP/EPP must be applied to total minimum dry thickness of .0018 to .0022 inches.

i. Spray Paint Application. This paragraph, while dealing with spray paint application, is not intended to provide precise instructions because spray painting is an art, not an exact science. In any painting operation, the experience of the painter is the key to success. (See figure 2-2.) CARC can readily be adapted to spray application. The spray gun orifice, if too large, will allow paint to come out too quickly and the paint will run. If the orifice on the chosen tip is too small, the solids will cause it to clog. This is especially true of black CARC. (See figure 2-3.) The use of spray equipment is authorized only at a permanent intermediate maintenance activity (IMA) spray facility or at the depot maintenance activity (DMA). Spray painting shall only be authorized upon certification that the facility has met all NIOSH, EPA, and other local health, safety, and environmental requirements. Section III below contains information on the equipment used in spray painting.

j. Touch Up Painting. Touch up painting is the only method used at first and second echelon maintenance facilities. Spot painting is not permitted for cosmetic purposes, e.g.

inspections or parades. (See figure 2-4 for types of brushes and rollers.) Refer to paragraph 2-10 for information on painting with CARC and follow the procedures detailed below.

(1) Planning Considerations. Because of the nature of CARC, touch-up or spot painting must be conducted as a well supervised, planned event. Factors which influence the scheduling of touch-ups or spot painting include:

(a) Occupational Health Requirements. The volume of work for one painter, using brush or roller indoors, well ventilated, or outdoors, cannot exceed one quart per day per vehicle/item of equipment. This is to prevent over exposure of any individual to potentially toxic situations.

(b) Availability. An initial delay of 60 days may be experienced when requesting CARC through normal supply channels.

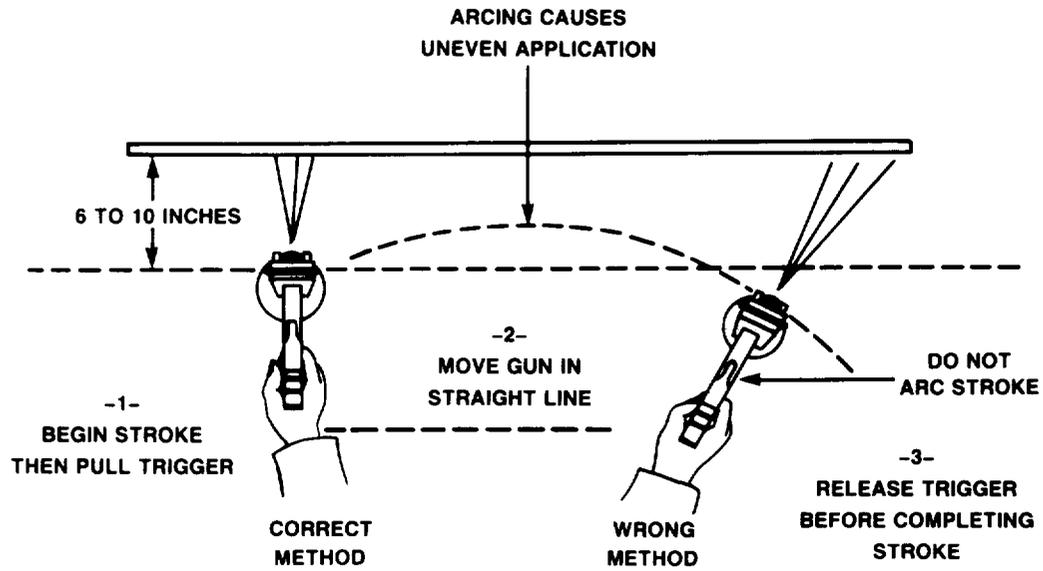
(2) Military Specification Numbers. NSNs for the following items are listed in Appendix E.

(a) PUP Topcoat, Specification MIL-C-46168, Quart Kit, green (383), brown (383), and black. These colors comprise the woodland, three color camouflage pattern (3-CCP), any one vehicle will be approximately 44% green 383, 41% black and 15% brown 383. (See Chapter 3.)

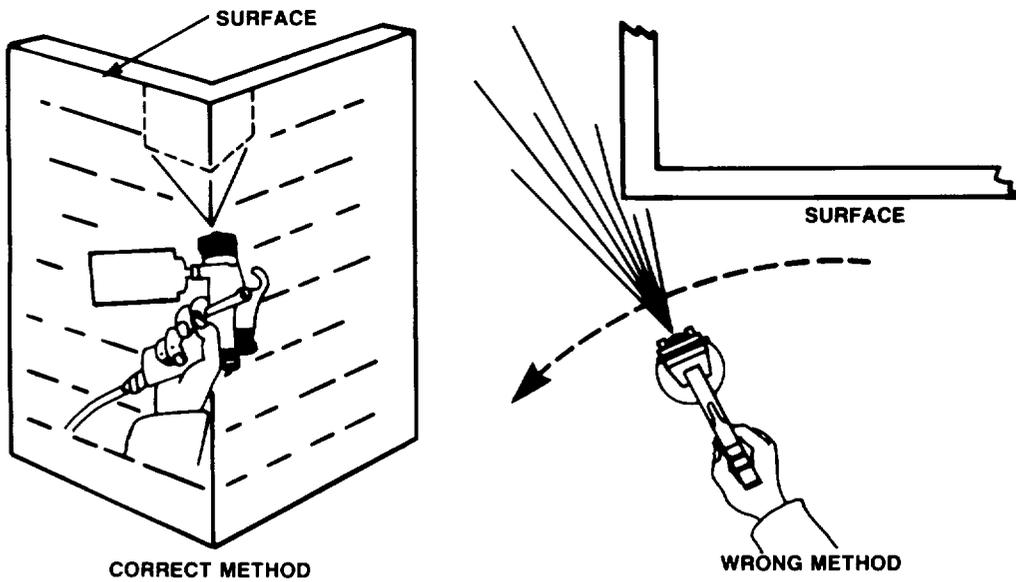
(b) Epoxy Primer, Ferrous and Non-Ferrous Surfaces, Specification MIL-P-53022 (Kit).

(c) Epoxy Polyamide Paint Interior Application, Specification MIL-C-22750, light green (1 Quart Kit), white (2 Quart Kit).

(d) Thinner Specification MIL-T-81772. Type I (PUP), One and Five Gallon. Type II (Epoxy), One and Five Gallon. Substitute MIL-T-81772, Type I when Type II is unavailable. A mixed gallon kit of PUP topcoat or epoxy polyamide paint (EPP) will cover in brush application approximately 400 square feet; a mixed quart will coat approximately 100 square feet.



SHOWING PROPER METHOD OF MAKING SPRAY GUN STROKE



SPRAY PAINTING CORNERS

Figure 2-2. Proper Method of Making Spray Gun Stroke.

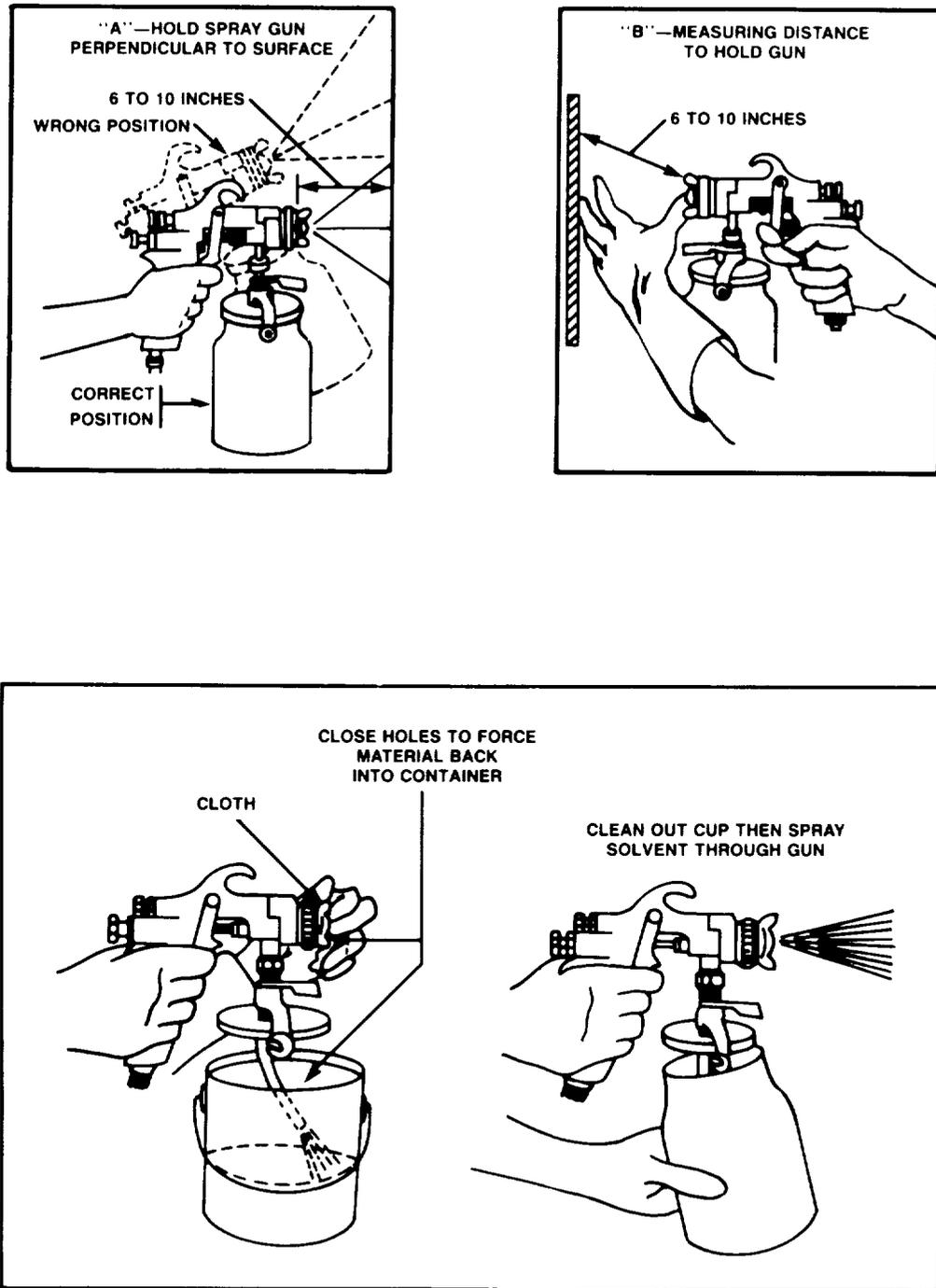


Figure 2-3. Spray Gun Cleaning and Painting Techniques.

(3) Surface Preparation.

WARNING

SAFETY GOGGLES OR A FULL FACESHIELD AND A DUST RESPIRATOR WILL BE WORN WHEN SANDING TO PREVENT INJURY.

(a) scratches or other light damage to PUP topcoat will require buff sanding at immediate blemished area.

WARNING

PERSONS USING RAGS WET WITH MIL-T-81772 THINNER MUST WEAR SILICONE OR RUBBER GLOVES TO PRECLUDE ABSORPTION AND USE BARRIER CREAM TO PRECLUDE DEFATTING OF THE HANDS, WRISTS AND FOREARMS.

(b) Damage or corrosion extending to substrate will require sanding and repriming. All traces of corrosion must be abraded from substrate. The surface immediately surrounding exposed substrate should then be sanded, using feathering-in technique. That is, sand away paint film (primer and topcoat) so that thickness of film is smoothly tapered from bare metal/substrate to top of paint film.

WARNING

PERSONS USING MIL-T-81772 THINNER MUST WEAR EYE PROTECTION, SAFETY GLASSES, SPLASH GOGGLES OR FACE SHIELDS TO PREVENT INJURY.

(c) Sanding of any type is followed by wiping down exposed area to be painted using a clean rag wet with MIL-T-81772 thinner to remove all loose sanding debris, mill scale, grease, oil (including fingerprints), and diesel/gasoline residue. Do not use other petroleum or alcohol-based thinners or cleaning agents of any kind. The surface to be spot painted is then wiped down with a clean and dry rag to ensure removal of all moisture.

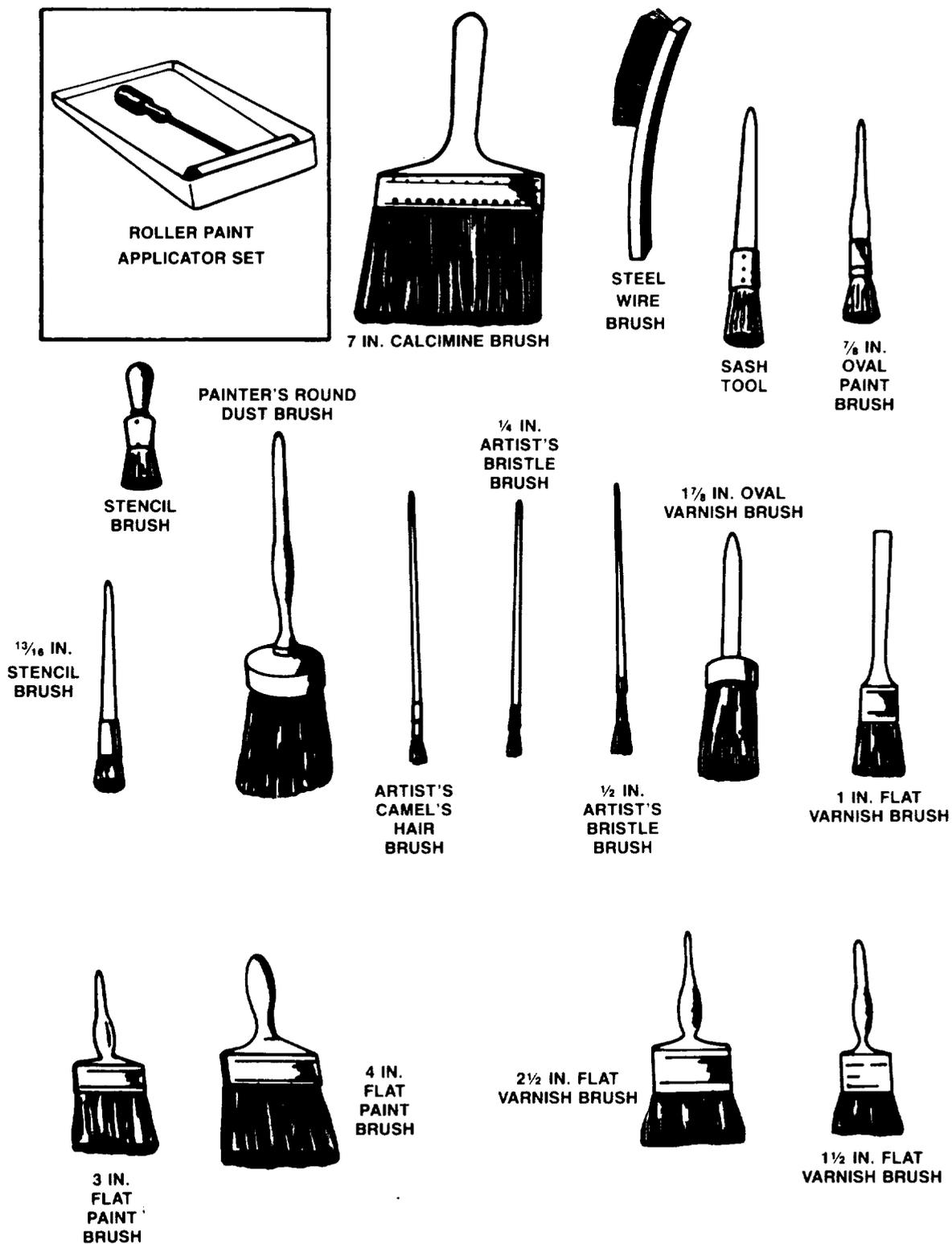


Figure 2-4. Types of Brushes and Rollers.

- (4) Mixing.

WARNING

CONDUCT MIXING OPERATIONS IN WELL VENTILATED AREAS AWAY FROM OPEN FLAME, WELDING TORCHES AND COMBUSTION HEATERS. VAPORS FROM THE VARIOUS MATERIALS CAN EASILY IGNITE AND RESULT IN DEATH OR INJURY TO PERSONNEL.

WARNING

PERSONNEL MIXING THESE SUBSTANCES MUST WEAR INLINE AIR RESPIRATORS, EYE PROTECTION, SAFETY GLASSES, SPLASH GOGGLES, OR FACE SHIELDS TO PREVENT INJURY.

WARNING

PERSONNEL MIXING THESE SUBSTANCES MUST WEAR PROTECTIVE CLOTHING WHICH PROVIDES FULL SKIN COVERAGE ESPECIALLY GLOVES. DROPLETS OF MIXED PUP AND EPP HARDEN QUICKLY ON SKIN AND ARE DIFFICULT TO REMOVE.

(a) Stir Component A of the EPP to ensure even distribution of all ingredients. Agitate Component A of two component CARC thoroughly by shaking or stirring for up to 30 minutes to ensure solids which have settled to the bottom of the container are again mixed. If mechanical paint shakers are not available, a paint stirring accessory for three-eighths inch drill will be used.

WARNING

USE OF AN ELECTRIC DRILL MAY PRESENT AN IGNITION HAZARD. (THE FLASHPOINT OF CARC IS 38°F/4°C.) USE AN EXPLOSION/SPARK PROOF DRILL OR A PROPERLY GROUNDED PNEUMATIC MIXER WHEN EXPLOSIVE SOLVENT VAPORS ARE PRESENT TO PREVENT INJURY TO PERSONNEL. SEE APPENDIX E FOR NATIONAL STOCK NUMBERS.

(b) Mix Components A and B, EP, EPP and PUP, together in strict accordance with instructions provided with the kit. Containers used for mixing must be clean and dry. Recommend the following plastic disposable pails:

1 For mixing a one-quart kit - Pail, Five Pint. See Appendix E for NSN Listing.

2 For mixing a one-gallon kit - Pail, Five Quart. See Appendix E for NSN Listing.

(c) Stir component B slowly into Component A in mixing either EP or EPP or PUP. Stir blended contents about 15 minutes until mixed contents form a smooth homogeneous liquid. EP, EPP or PUP mixture should be thinned only if necessary, with MIL-T-81772 thinner to a viscosity permitting smooth brush application. DO NOT USE ANY OTHER THINNER. EPP and EP mixture should then be allowed to stand 30 minutes before using; PUP mixture 15 minutes.

(d) Immediate clean-up of mixing and painting accessories using MIL-T-81772 thinner is necessary to prevent future mixtures from being contaminated.

WARNING

INDIVIDUALS CLEANING THESE ACCESSORIES MUST WEAR INLINE AIR RESPIRATORS AND EYE PROTECTION TO PREVENT EYE INJURY, AND IMPERVIOUS RUBBER GLOVES TO PREVENT ABSORPTION AND DEFATTING OF HANDS CAUSED BY THINNER.

(5) Application. Spot painters applying either EP or EPP or PUP by brush or roller must wear clothing and gloves affording full skin coverage.

(a) Epoxy Primer (EP). Apply evenly in one coat over exposed substrate; apply over portions of exposed original primer coat utilizing feathering-in technique, i.e., tapering off quantity applied to a fine edge. After application, immediately clean up all equipment.

(b) Polyurethane Paint (PUP).

1 General. Ensure surface over which PUP is applied is DRY and CLEAN; that is, free of ALL contaminants such as water or petroleum residue and granular debris of any kind. The surface to be painted should be no less than 60°F/16°C and no more than 90°F/32°C during application and for at least four (4) hours, but preferably six (6) hours after

painting. At 60°F/16°C, PUP takes twice as long to cure and at temperatures below 50°F/10°C, PUP does not cure. Temperatures in the 95-100°F/35-38°C range will result in paint drying before contact or too quickly for proper cure/adhesion. Apply evenly to ensure conformance with the original coat surrounding the painted area using the feathering-in technique. Too much PUP may inhibit proper drying/curing of the PUP coat and the underlying epoxy primer.

2 Application over Epoxy Primer (EP). Allow the primer coat to air dry a minimum of 30 minutes or until dry to touch before topcoating with PUP. EP, which has been allowed to dry more than 24 hours (especially when “baked” by hot sun) may require light scuff sanding to ensure proper PUP adherence.

3 Application over PUP. Recoating may be performed when original coating is tacky. Once the original PUP coat has cured for 14 days or more (especially when “baked” by hot sun), light scuff sanding may be required to ensure proper adherence.

4 Spot Painting over Alkyd. PUP can be applied over a scuff-sanded, well cured (i.e., 90 days) alkyd paint. The alkyd coating must be sound (i.e., no corrosion, no substrate showing) and free of absorbed or deposited carbon, salt, diesel, fuel, gasoline, oils, hydraulic/transmission fluids, solvents, dirty fingerprints, or wax.

5 Application over Lacquer. PUP cannot be applied over lacquer coatings or vinyl. Lacquer must be completely removed and repainted with epoxy primer and an application of PUP topcoat.

6 CARC. CARC should not be spot painted over surfaces such as exhausts, mufflers, and turbo-chargers which will be subjected to temperatures in excess of 400°F/204°C. Heat resistant paint must be used.

k. Cleanup of Application Equipment. This provides essential information for cleanup of application equipment.

CAUTION

FAILURE TO CLEAN EQUIPMENT ADEQUATELY AFTER CARC APPLICATION WILL RESULT IN UNSERVICEABLE EQUIPMENT.

If PUP dries in spray lines or in spray guns, equipment must be replaced. Solvents have little effect on dried PUP. PUP and epoxy cannot use the same spray lines. Catalyst, Component B, of the epoxies, and catalyst for PUP rapidly react when mixed, and form a soft plastic.

CAUTION

WHEN PLURAL COMPONENT PAINT EQUIPMENT IS USED, SEPARATE LINES FOR CATALYSTS MUST BE USED IN ORDER TO PREVENT EQUIPMENT DAMAGE. ALSO, PAINT SUPPLY LINES USED FOR PUP CANNOT BE USED FOR EPP OR EP AND VICE VERSA.

Spray equipment is cleaned by running solvent through the lines. This procedure is the same as that used for other paints, but care must be taken to ensure that all paint is cleaned from equipment. Cleaning of polyurethane application equipment cannot be overemphasized. Application equipment must be thoroughly cleaned immediately after use in accordance with manufacturer's instructions for use, and before any prolonged storage. Failure to clean equipment properly will result in loss of that equipment use.

1. Disposal. Dispose of waste material, including material spilled or leaked, and all material used in cleanup procedures that will not be used again, in accordance with federal, state, and local environmental control regulations. Empty containers must be handled carefully because of residue and flammable solvent vapors. Decontaminate containers before disposing of them. See paragraphs 1-3d through 1-3f and 1-4.

Section III. EQUIPMENT

2-6. GENERAL. Information provided in this section is designed to provide an equipment overview. Types of equipment include atomizing equipment and application equipment.

NOTE

COMPONENT B WILL ABSORB MOISTURE FROM THE AIR. AIR COMPRESSORS PROVIDING AIR PRESSURE FOR PAINT SPRAY EQUIPMENT MUST BE EQUIPPED WITH MOISTURE SEPARATORS.

2-7. **ATOMIZING EQUIPMENT.** This equipment provides means of atomizing liquid paint. Each of these methods can be electrified for greater transfer efficiency. The method of atomization used must be determined by analyzing various factors including ease of use, efficiency and speed.

CAUTION

DETERMINE IF THE MANUFACTURER HAS FORMULATED PRIMERS AND TOPCOATS FOR ELECTROSTATIC APPLICATION TO PREVENT DAMAGING EQUIPMENT.

a. Atomizers. Following are types of atomizers recommended for use:

- (1) Airspray (sometimes called conventional spray) (See figure 2-5.)
- (2) Airless spray/electrostatic spray (See figure 2-6.)
- (3) Air assisted airless spray (See figure 2-7.)

b. Physical Characteristics of Atomizers.

(1) Air Spray. Air Spray is the use of compressed air to break materials up into small droplets while giving them direction toward a surface. This is accomplished through the use of a spray gun. Both air and paint enter the gun through separate channels and are mixed and ejected at the air cap in a controlled spray pattern. Recommended air spray atomizers and pumping systems are identified below:

- (a) Cup gun - 1 quart
- (b) Remote cup gun - 2 quarts
- (c) Pressurized pot and air spray gun - 5 gallons, 10 gallons, 15 gallons
- (d) Air powered pumping system:

- 1 gallon container
- 5 gallon container
- 15 gallon container
- 30 gallon container
- 55 gallon container.

(2) Airless Spray/Electrostatic Spray. Paint flows from a central supply source through a supply line to an airless spray gun. The paint is forced through a small orifice under high pressure atomizing the liquid as it is discharged from the gun. The airless spray/electrostatic spray atomizer consists of the following:

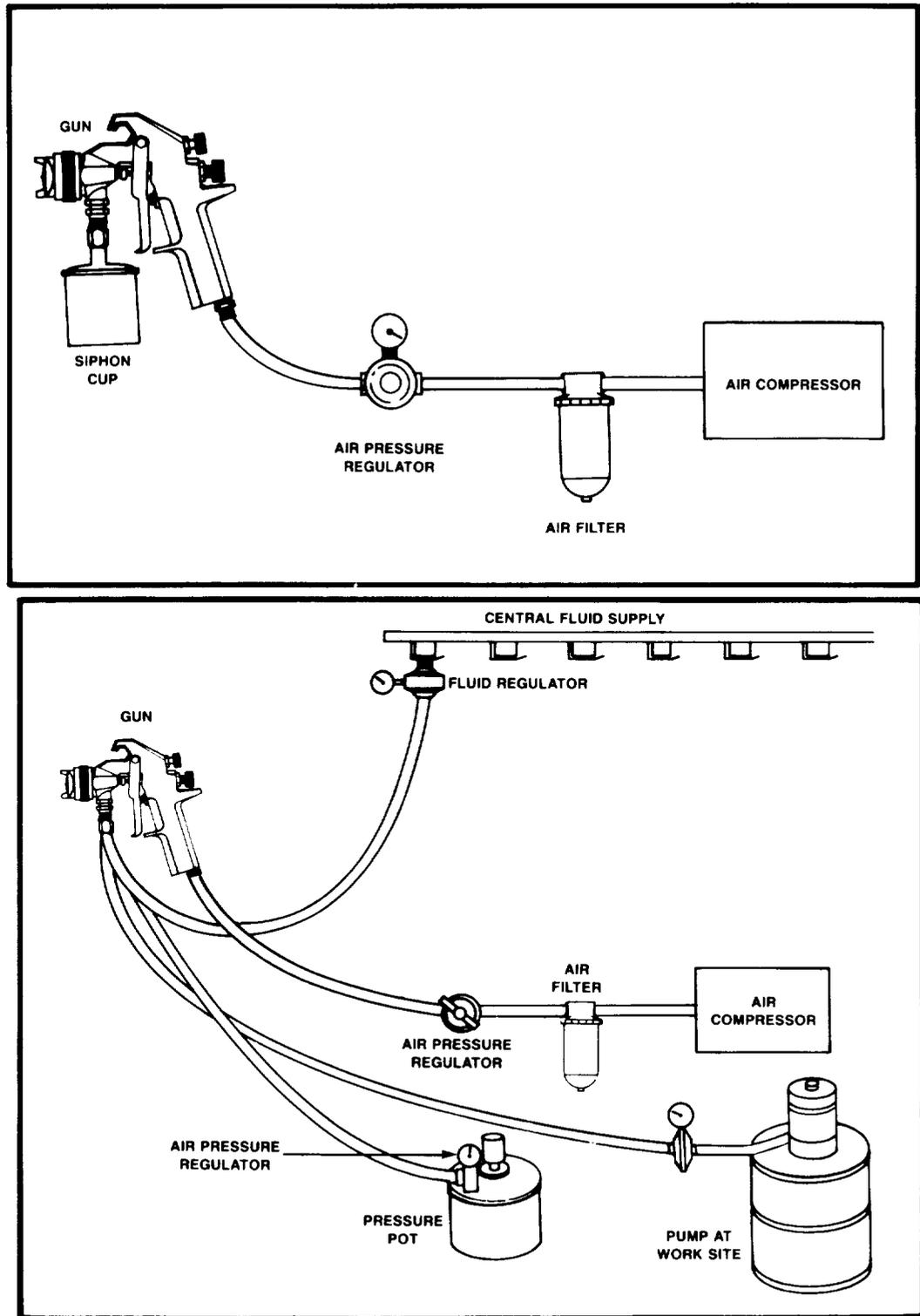


Figure 2-5. Air Spray - Two Systems.

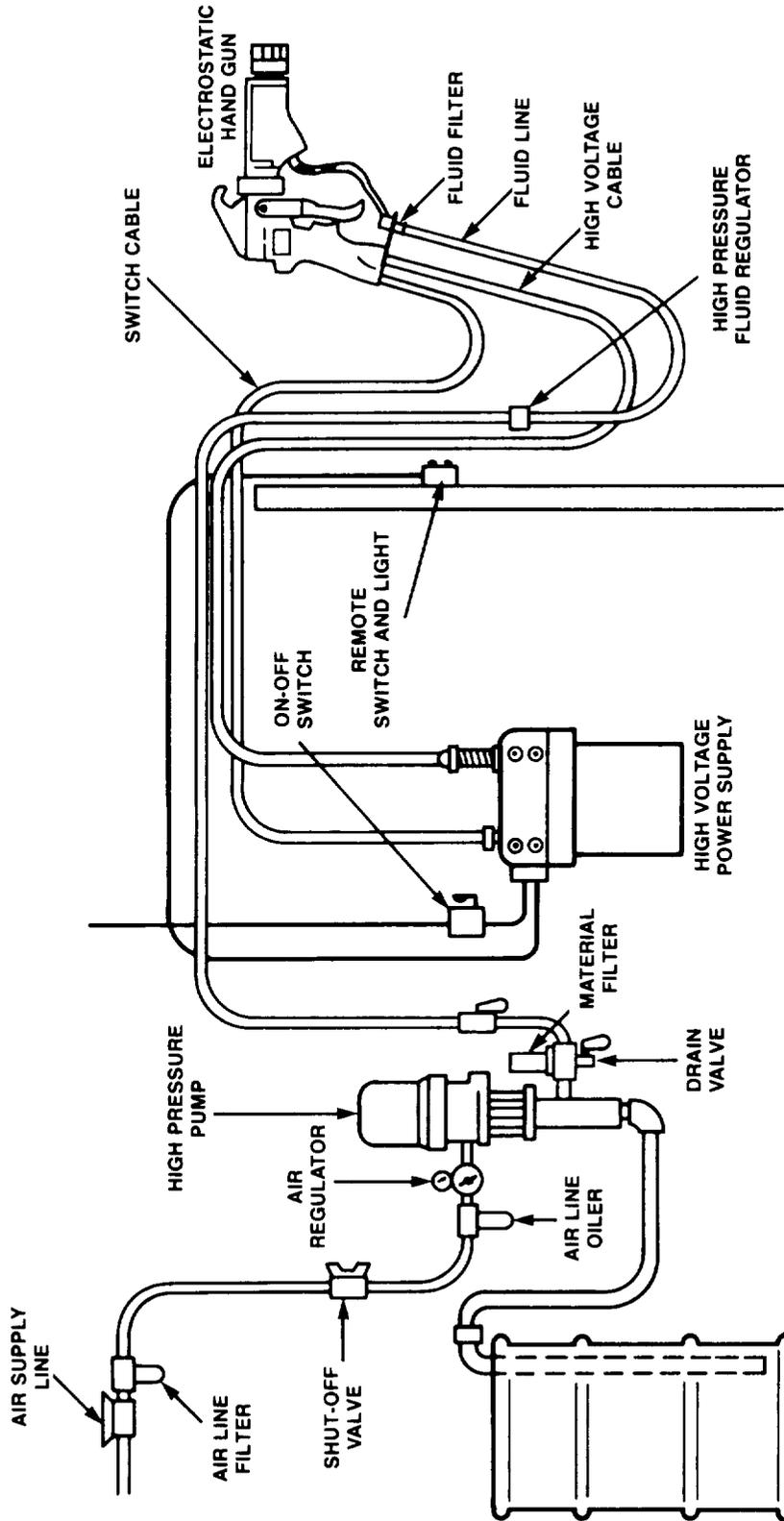


Figure 2-6. Airless Spray/Electrostatic Spray System.

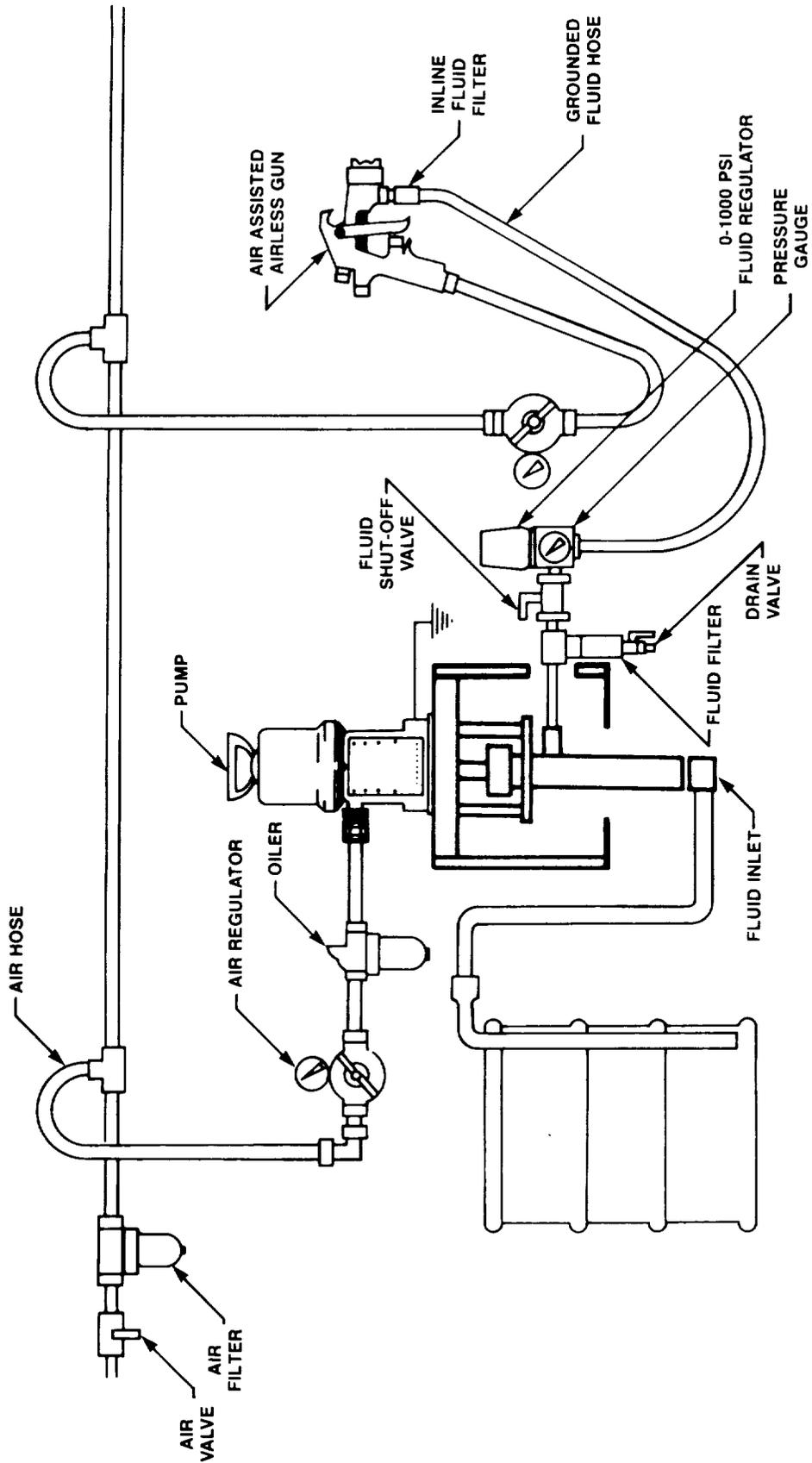


Figure 2-7. Air Assisted Airless Spray System

- (a) Airless cup gun
- (b) Air Powered pumping system:

- 1 gallon container
- 5 gallon container
- 15 gallon container
- 30 gallon container
- 55 gallon container.

- (c) Plural component meter mixing equipment:

- 5 gallon container
- 10 gallon container
- 30 gallon container
- 55 gallon container.

(3) Air Assisted Airless Spray. Air assisted airless spray operates at pressures under 950 pounds per square inch (psi) (compared to airless spray/electrostatic spray which operates at 1,500 to 2,500 psi). Low pressure (10 to 30) psi compressed air is added to the spray by an air cap. Thus materials can be atomized with full spray patterns at low pressure increasing efficiency and ease of handling. Components of the air assisted airless spray are:

- (a) Air powered pumping system
- (b) Plural component meter mixing equipment.

c. Comparison of Atomization Procedures. Comparison of the Air Spray, Airless Spray/Electrostatic Spray, and Air Assisted Airless Spray atomization procedures is illustrated in table 2-8.

2-8. APPLICATION EQUIPMENT. Following is a discussion of application equipment:

a. General. Paints and coatings can be applied by several methods including: hand spraying, semiautomatic spraying and automatic spraying. Choice of equipment and spray method depends on the number of objects to be coated in a day and size and configuration of these objects. If only one or two pieces are to be sprayed in a day, and only one or two gallons of material are to be expended, then air spray method by remote cup is preferred for applying

CARC coatings to using a hand mixing method. If large flat objects are to be sprayed, airless is the best method. If there are many objects, air assisted airless, or automated air assisted airless is the best method to use.

b. Mixing. CARC can be mixed by two methods: by hand or by plural component meter mixing.

(1) Hand Mixing. The operator measures two components in proper ratio and pours the two materials together into a common container, mixes them and adds a reducing solvent.

(2) Plural Component Meter Mixing. The operator pours contents of two containers into metered supply containers.

(3) The following factors influence choice of application method:

- (a) When using CARC, consider size and configuration of object to be painted.
- (b) Material (epoxy or PUP) to be used.
- (c) Volume of material that can be used in allotted time frame.
- (d) Before coating, object must be clean and grease free.
- (e) Environmental factors, including temperature and humidity of surrounding area.
- (f) Viscosity of material and coverage to be achieved.
- (g) Skill of operator.

c. Meter Mixing. Meter mixing equipment for air spray - two systems (figure 2-5), airless/electro-static spray (figure 2-6), and air assisted airless spray (figure 2-7) is most costly but the most efficient method that can be used. There is little or no waste of material, and mixing and metering is not left to the operator but is done by this system. The equipment can pump greater distances; is cleaned up quickly, and material can be left in it for extended periods without contamination. The system can be mobile or fixed in place. It can be fed from remote drums in a mix room or from containers at the meter mixing equipment, and must be used when automation methods such as robots are employed because of the viscosity control it has.

2-9. FACILITIES. The paint booth is the major facility consideration in painting, as it is needed whenever anything more than touch up painting is planned. There are several types ranging in size from several cubic feet to large structures which are free standing booths. This section will discuss basic types of booths. Size and location of a particular paint booth will depend on the particular situation.

a. Spray Paint Booth. Because of OSHA and EPA requirements, any large scale (more than touch up) painting of CARC must be done in a paint booth.

(1) Spray booths can be classified into two basic designs based on direction of airflow:

(a) Sidedraft booths have horizontal airflow. These booths take advantage of momentum of spray mist and can be used when painting small to medium articles.

(b) Downdraft booths have vertical airflow. These booths permit greater protection while allowing more freedom of movement for the painter.

(2) Spray booths range in size from small bench models to chambers capable of holding a large airplane. Size of a spray paint booth is determined by the requirement for adequate space to permit painters easy access to top and sides of the object. If the object is transported by conveyor, the booth must be sufficiently long to allow coating within time the object remains inside the booth.

(3) Booth exhaust air filters must be replaced by plant environmental control personnel. The spray booth can be equipped with filter doors or fresh air inlets to reduce dust. Air should enter the booth at low velocity (200 fpm or less) and in the same direction as it is being exhausted to avoid unnecessary turbulence.

(4) The booth air cleaning section not only removes paint mist from exhaust air but acts as a means of air distribution within the booth. There are several types:

(a) Baffle Type. An arrangement of metal baffles is simplest and provides a constant flow of air. Mist removal and clean-up difficulties limit its use to low production applications.

(b) Dry-Filter. These booths combine low cost with highly efficient paint mist removal, but have the disadvantage of variable airflow. Airflow continuously decreases to a point where filters require replacement. Dry filters must be disposed of carefully or a fire hazard will be created.

(c) Water Wash. These incorporate various combinations of water curtains and sprays to scrub paint mist from exhaust air. They have advantages of constant airflow, inherent fire protection, and high mist removal. This is the most efficient system, but requires a greater cost. Maintenance requirements can be reduced if:

- 1 Booth is lined with strippable coating.
- 2 Air filters are disposable.
- 3 Glass shields over booth lights are cleaned and coated with light layer of white petroleum grease. (See figure 2-8.)

b. Blast Booth. CARC paints are extremely difficult to remove using conventional blasting or solvent means. A new procedure to remove CARC using plastic media blasting at 40 psi has been developed. Any facility that will need to strip CARC painted equipment on a regular basis should consider this procedure for increased efficiency and decreased waste.

c. Robotics. Facilities where large volumes of identical equipment will be painted should consider the use of robotics. Robotics produce exact and precise results, repeatedly. Also robots remove people from the possibly hazardous paint booth environment.

d. Drying Ovens. In cooler climates, drying ovens may be required to speed CARC curing process. Care must be taken to prevent overbaking, since this can interfere with adhesion of any subsequent coats of paint.

e. Preheat Booth/Cool Down Booth. In locations where temperatures can drop below 60°F(16°C), preheat booths should be available to raise the temperature on the equipment surface to the ideal temperature range (60-90°F/16-32°C) or to prevent condensation on vehicles during transition before applying CARC. Likewise, in areas where temperatures rise above 900 F(32°C) cool down booths should be available to reduce the surface temperature to the ideal range.

2-10. CAPABILITIES AND LIMITATIONS. CARC is a system that has great value to the military, and can be used safely and efficiently if proper safeguards are observed. All users must be aware of its capabilities and limitations. The following information is intended as a convenient guide for the user of this manual and represents a concise listing of practical information to assist in the use of CARC.

- a. Mix CARC thoroughly. 55 gallon drums must be put on a drum tumbler for at least six hours before use.
- b. Keep moisture away from Component B either by using dry air (-32 degrees dew point dryer), a desiccant air dryer on airline, or a nitrogen blanket.
- c. Use separate equipment for epoxy primer and for urethane topcoat.
- d. Clean equipment thoroughly and in accordance with manufacturer's instructions for use and before prolonged storage.
- e. Rotate inventory of material; first in, first out.

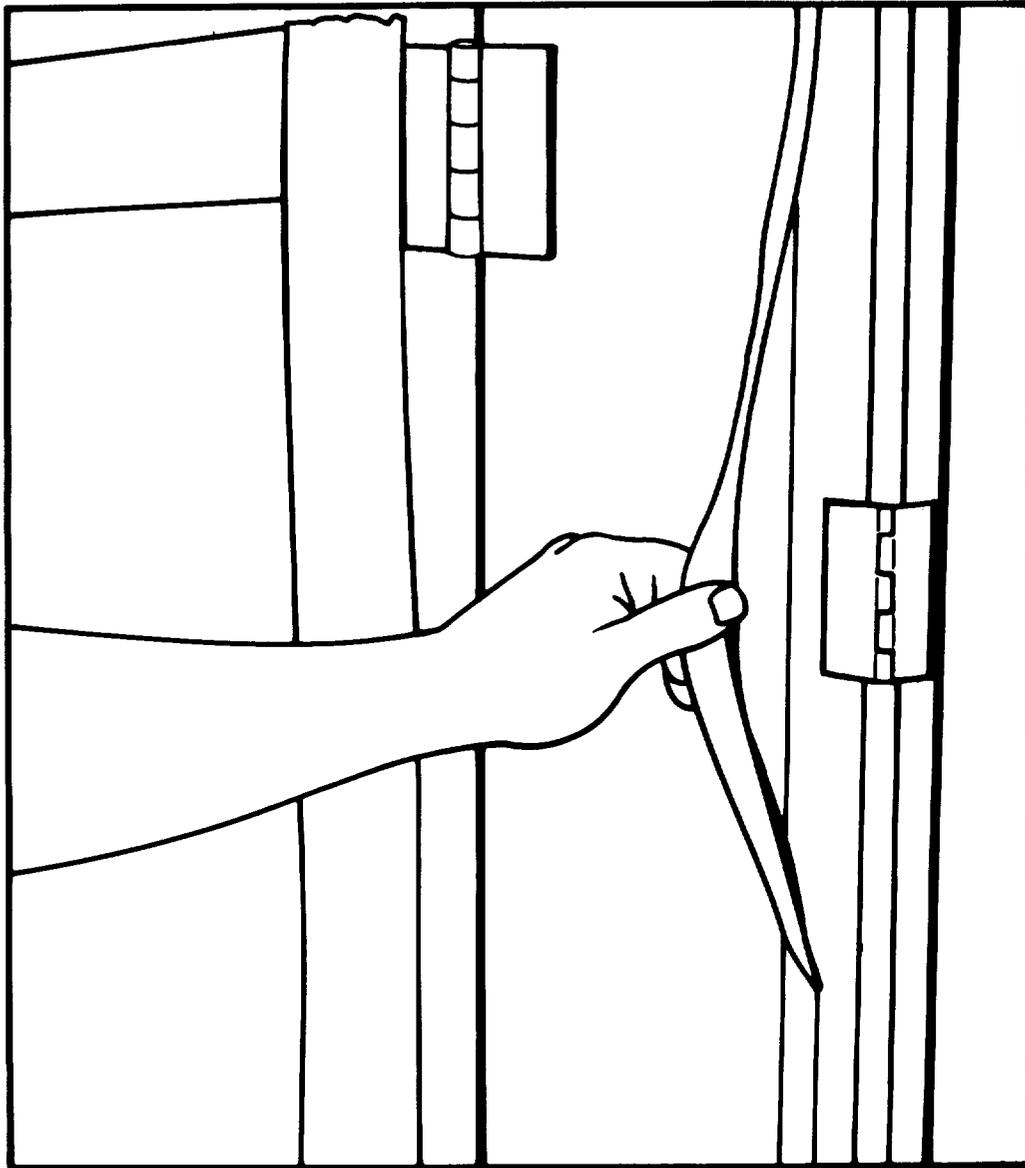


Figure 2-8. Spray Booth with Strippable Filter.

- f. Remove all thinner from coiled hoses before storage. Leave thinner in pumping system.
- g. When using chlorinated hydrocarbon solvents, be sure that equipment is certified for its use.
- h. When using automated equipment, such as robots, use meter mixing equipment to obtain strict viscosity control, material quality control and total system supervision control.
- i. Store material in clean, dry, temperature controlled OSHA approved storage facility.
- j. Ensure that operators of equipment are trained in operation, maintenance, and storage.
- k. Store airless or air-assisted-airless tips in solvent after using to keep them clean and free from material blockage.
 - l. Use tip protectors on airless spray guns.
- m. Maintain a continuous electrical ground on all equipment to prevent static buildup which could produce a spark and ignite material.
- n. Maintain clean, dry air to the air motor on air-operated equipment.
- o. When spray guns are not being used, for instance during lunch or break time, place tip only of spray gun into a solvent bath.
- p. Locate material filters on outbound side of pressure pots and pumps.
- q. All air-operated equipment must have air regulators.
- r. Use ball valves between systems components so that components can be serviced without material leaking on floor.
- s. Use filters that allow for drainage into waste containers so that filters can be cleaned and serviced properly.
- t. Clean material filters on scheduled basis.
- u. Filter as close to spray gun as possible.
- v. Provide swivel unions between system components such as spray guns, hoses, filters and pumps for ease of disconnect.
- w. Keep spray pattern 90 degrees to surface to be sprayed.
- x. Move spray gun at a constant speed, maintaining a constant distance and angle to the work place to achieve an even coating.
- y. File all manufacturer's service and spare parts list breakdowns for future reference and for ordering spare parts.
- z. Place catalyst pumps in down position to prevent crystallization.
- aa. Remove thinner from material hoses. Do not allow it to stand. Epoxy and urethane material residue will react and block mixed material hoses even though thinner or solvent is present.

bb. Do not unplug airless/electrostatic or air assisted airless tips with sharp objects. They are brittle and will distort spray pattern.

cc. Remove Components A and B of urethane topcoat promptly from air-operated pumps.

dd. Remove mixed material from hoses, cups, and pumps within 2 hours when not in use.

ee. Do not use quick disconnects on material lines. They will become inoperable because of material hardener.

ff. Do not restrict air flow to air operated equipment.

gg. Use high pressure plumbing on high pressure systems.

hh. Use manufacturer's recommended paint and air hose on paint systems.

ii. Agitate and thoroughly mix CARC. Component A in particular settles out rapidly when allowed to rest.

jj. Use only fluid pressure and air pressure necessary to atomize material. Excessive pressures cause excessive overspray and waste.

kk. When spray painting, avoid waving spray gun back and forth in an arc. This method causes excessive paint buildup in center of arc and thin edges on outer reaches.

ll. Wear proper and approved breathing apparatus when spray painting.

mm. Do not spray in unventilated areas or outdoors. Use EPA and OSHA approved spray booths.

nn. Do not spray CARC on a dirty surface. Remove all surface rust, oil, dirt, and loose paint before applying CARC.

oo. Do not direct spray device at anything other than object to be sprayed.

pp. Do not remove spray guns, hose, filters, and/or systems components while under pressure. Be sure that all components are at atmosphere pressure when disconnecting them from the system.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment

Equipment	Color	Placement
NOTE		
WHERE MIL-C-46168 IS REFERENCED, AN ACCEPTABLE ALTERNATIVE IS MIL-C-53039; WHERE MIL-P-53022 IS REFERENCED, MIL-P-23377, MIL-P-53030 OR MIL-P-52192 MAY BE ACCEPTABLE ALTERNATIVES. MIL-P-85582, MIL-C-53039 and MIL-P-53030 SHOULD BE USED WHEN REQUIRED BY EPA REGULATIONS TO MEET VOC EMISSION RESTRICTIONS (3.5 lbs/gal).		
1. All ground combat and tactical vehicles and construction equipment, unless otherwise indicated below.	Paint in appropriate pattern from TM 4750-15/2.	Exterior surfaces.
	Prime with MIL-P-53022, coat with MIL-C-46168 green 383.	Interior surfaces.
	*White Nonslip Deck Covering Compound, 1 gallon (MIL-D-23003); and green 383 (MIL-C-46168).	Walking areas (catwalks, walkways, platforms, cabs, fenders frames, guards, foot-operated control, mounting steps, ladders tops of bumpers, slope and deck plates, turret floors, crew compartments, ramps, van floors, cranes and shovels.
2. Materials handling equipment, including fuel and oil dispensing equipment used in tactical areas.	Lusterless camouflage in appropriate pattern in TM 4750-15/2. Prime with MIL-P-53022, coat with MIL-C-46168.	Exterior surfaces.
	Green 383, prime with MIL-P-53022, coat with MIL-C-46168.	Interior surfaces.
3. Vehicles and equipment used in connection with approved research, development, and test projects of ground combat or tactical use.	Any color deemed appropriate by head of responsible activity. Prime with MIL-P-53022, coat with MIL-C-22750 or MIL-C-46168.	Exterior and interior surfaces.

*Paint walk areas with nonslip Deck Covering Compound and paint over with CARC using at least two coats.

¹ Gloss White, Number 17875, will be used on exterior surfaces only when prescribed by the force commander.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Equipment	Color	Placement
4. Calibration vans for tactical use.	Paint in appropriate pattern from TM 4750-15/2. Prime with MIL-P-53022, coat with MIL-C-22750.	Exterior surfaces Interior surfaces.
5. Calibration vans for nontactical use in CONUS and major overseas commands.	MIL-C-46168 semigloss green 383 or gloss white Number 17875.	Exterior surfaces.
6. Refrigerator vans in nontactical use in hot climates.	Green 383 MIL-C-46168 or MIL-E-46136 or MIL-E-46096. ² Prime with MIL-P-53022.	Exterior surfaces. NOTE: CARC is not to be used where surface temperature exceeds 400°F(204°C).
7. Water tank vehicle in nontactical use in hot climates.	Same as item 6.	Same as item 6.
8. Van type vehicles in nontactical use in hot climates assigned to MCLB's or schools for the purpose of training personnel in the operation of equipment installed therein.	Same as item 6.	Same as item 6.
9. Van type vehicles and shelters in nontactical use in hot climates in which installed equipment would be adversely affected, or personnel would not be able to accomplish assigned technical functions due to excessive heat from solar radiation.	Same as item 6.	Same as item 6.
10. Tracked combat vehicles and special purpose armored hull type vehicles. See item 11, following, for exception.	Gloss White, Number 17925 ¹ prime with MIL-P-53022, coat with MIL-C-22750.	Interior surfaces.

¹ Gloss White, Number 17875, will be used on exterior surfaces only when prescribed by the force commander.

² At temperatures in excess of 400°F/204°C, MIL-E-46096 or MIL-E-46136 is recommended. Chemical agents will be decontaminated at high temperatures.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Equipment	Color	Placement
	* White Nonslip Deck Covering Compound, 1 gallon (MIL-D-23003); or black conformable nonslip walkway matting (MIL-W-5044, Type IV).	Over primed and painted surface of crew compartment or turret floor.
	Green 383/sand/white as appropriate to the operational scenario. Prime with MIL-P-53022, coat with MIL-C-46168.	Surfaces such as doors and hatches which become exterior surfaces during operational use.
11. Amphibious Assault Vehicles (AAVs) personnel carrier family of vehicles and Light Armored Vehicles (LAVs).	Semigloss Green, Number 24533 prime with MIL-P-53022, coat with MIL-C-22750.	Interior surfaces.
	* Green 383/sand/white as appropriate to the operational scenario. Coat with Olive Drab Nonslip Deck Covering Compound, 1 gallon (MIL-D-23003); or black, conformable nonslip walkway matting (MIL-W-5044, Type IV).	Floors and ramps.
	Green 383/sand/white as appropriate to the operational scenario. Prime with MIL-P-53022, coat with MIL-C-46168.	Interior surfaces of doors and hatches which open to the outside during operational use.
12. Interior surfaces of van-type bodies equipped with interior lighting in which personnel are required to perform certain detail operations.	Prime with MIL-P-53022, coat with MIL-C-22750 gloss white.	Ceiling.
	Seafoam Green Number 24533.	Walls and fittings.

* Paint walk areas with nonslip Deck Covering Compound and paint over with CARC using at least two coats.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Equipment	Color	Placement
13. Ambulances in tactical use.	Green 383/sand/white as appropriate to operational scenario, prime with MIL-P-53022, coat with MIL-C-22750.	Interior surfaces of doors and hatches which open to outside during operational use.
	Lusterless Gray, Number 36118.	Floors and doors.
	Semigloss Green, Number 383.	Equipment cabinets of guided missile system vans.
	Semigloss Gray, Number 26492.	Panels.
	Similar to item 1. Prime with MIL-P-53022, coat with MIL-C-46168.	Exterior surface and cab interior.
	Green 383/sand/white as appropriate to the operational scenario. Prime with MIL-P-53022, coat with MIL-C-46168.	Interior of cab and interior surfaces and doors which open to the outside during operational use.
Green 383.	Interior of cab when vehicle is of commercial design and procured with standard color options.	
Seafoam Green, Number 24533 MIL-C-22750, or Gloss White, Number 17875.	Interior of hard top ambulances.	

Markings	Color	Placement
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1. Unit designation/identification, if considered necessary may be applied to the tactical marking. However, application/removal will be in accordance with procedures established by forces commands.	Lusterless Black, Number 37030.	NOTE: See paragraph 3-14 for general amplifying instructions.
		Markings must be in uniform Gothic style letters, the numeral to be largest size practical to use in the available space. Force commanders will specify letter/numeral size not to exceed 2 inches in height.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Markings	Color	Placement
2. "USMC" and USMC registration numbers are assigned in accordance with Appendix D.	Exterior--Black (#37030), per MIL-C-46168.	Normally, markings will appear on both front and rear of each item of equipment, usually on bumpers when so equipped. Where a more suitable surface is available, that surface may be used provided that its location is not in conflict with location of other prescribed markings. Where a suitable surface is not available on the front or rear of an item of equipment, markings shall be applied in an appropriate location on sides of item.
	Interior--other color, as appropriate.	Both sides and rear, in uniform Gothic letters no larger than 2 inches high. Any appropriate area which is accessible from outside a locked vehicle.
3. All vehicles and trailers.	For tactical equipment painted in gloss colors, use Gloss Yellow, Number 13538; Gloss Black, Number 17038; and Gloss Red, Number 11136 per MIL-C-22750. On combat and tactical vehicles, paint appropriate camouflage pattern. Follow guidance established in paragraph 3-10 and figure 3-3 using MIL-C-46168 paint.	Exterior surfaces.
4. Combination vehicles.	Black numerals on a yellow circular background 6 inches in diameter. The color numbers are the same as in item 3, preceding.	The gross weight classification of the prime mover and of the towed vehicle alone shall be marked on the right side of the respective vehicle.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Markings	Color	Placement
5. Safety:		
<p>a. Stripes (vehicles and equipment in non-tactical use which, because of size, construction, or function present a possible hazard).</p>	<p>Alternate stripes of Gloss Yellow, Number 13655, and Gloss Black, Number 17038 per MIL-C-22750.</p>	<p>Normally, stripes are applied only to the rear; but they may also be applied to the front and certain side surfaces when conditions warrant.</p>
<p>b. "FLAMMABLE" and "NO SMOKING WITHIN 50 FEET" (vehicles used for bulk transportation of gasoline, fuel oil or other flammable liquid). Each vehicle in a convoy must be individually marked.</p>	<p>For vehicles in tactical use, the color shall be Lusterless White Number 37875 MIL-C-46168. For vehicles commonly used on public highways in CONUS 48 C.F.R. section 177.823 requires 6-inch block letters for "FLAMMABLE" and 3-inch block letters for "NO SMOKING WITHIN 50 FEET." Lettering will be Gloss Red, Number 11105, or 11136; the back-ground, extending 1 inch beyond the lettering all around, will be Gloss White, Number 17875. If available, reflective markings should be used.</p>	<p>On both sides and rear of the body. "NO SMOKING WITHIN 50 FEET" should be placed centered under "FLAMMABLE". Vehicles used infrequently on public highways must employ removable or reversible signs which are securely fastened while in use. These safety markings shall be applied upon receipt by the using service.</p>
<p>c. "WATER" (tank trucks used for bulk transportation and storage of potable water).</p>	<p>Use Lusterless White Number 37875 6-inch block letters.</p>	<p>On both sides and rear of body.</p>
6. Placards (vehicles carrying explosives or other dangerous articles).		
<p>a. Over public highways.</p>		<p>Placards shall be used in accordance with applicable Department of Transportation (DOT) regulations.</p>
<p>b. Training areas.</p>		<p>Placards shall be used in accordance with applicable DOT regulations.</p>

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Markings	Color	Placement
7. Convoy markings. As prescribed by FM 55-30.	Serial letter or number may be black non-reflective.	As prescribed by FM 55-30.
8. Tactical markings (may consist of stripes geometrical figures, other simple designs, or naming of individual vehicle). Camouflage/non-camouflage equipment will be marked with approved command tactical marking of a geometric design. Application of tactical markings will be in accordance with procedures established by force commanders. Tactical markings may be used to provide a more visible means of identifying vehicles of tactical units by personnel of those units during tactical operations. They shall be of a suitable size to facilitate identification by ground observation. They shall be designed to be as nearly unintelligible as possible to enemy observation. Under no circumstances will they in any way represent the numerical designation or distinctive insignia of any unit. Under actual combat conditions, no written record shall be made or published on the system of tactical markings used.	Lusterless Black Paint, Number 37030.	As prescribed by unit commanders.

Table 2-1. Vehicles, Construction Equipment, and Materials Handling Equipment (Continued)

Markings	Color	Placement
<p>9. Priority signs. (They shall be authorized by the commander. They are valid only within the area under the commander's jurisdiction. Signs must not be displayed when vehicle is not actually being used for a priority mission and must be removed when no longer required for that mission.)</p>		<p>On front and rear of vehicle. They shall be fabricated and mounted on vehicles in accordance with TB 43-209. Vehicles under the jurisdiction of North Atlantic Treaty Organization shall comply with TB 34-9-249.</p>
<p>10. Red Cross Insignia</p>	<p>Gloss Red, Number 11136 MIL-C-22750 and Lusterless White, Number 37875 MIL-C-46168.</p>	<p>On both sides, rear and top. Will consist of a square white block 40 inches by 40 inches with a red cross composed of four squares (12 inches by 12 inches) bordering on a center square of the same size.</p>
<p>11. Tire Pressure Markings. The letters "TP" and the associated highway tire pressure (i.e., 55 psi) shall be identified on the vehicle (i.e., "TP-55").</p>	<p>Lusterless Black Paint, Number 37030.</p>	<p>The tire pressure markings shall be located horizontally in the area immediately above the tire. The tire pressure markings shall be 1/2 inch high, uniform Gothic style letters.</p>

Table 2-2. Missiles, Heavy Rockets, and Related Ground Support Equipment for Missile Systems

Equipment	Color	Placement
Missile and heavy rockets.	Lusterless camouflage in accordance with the applicable pattern in TM 4750-15/2, except where indicated otherwise. Repaint only in accordance with specific instructions contained in applicable technical publications.	Exterior surfaces.
Markings	Color	Placement
NOTE: Markings may be adhesive-backed markers or paint conforming to color requirements.		
Agency identification "USMC" on missiles and heavy rockets. (See Appendix D.)	Use Lusterless Black, Number 37038, except where lighter contrast markings are desirable. Lusterless White, Number 37875 or Semigloss White, Number 27875, may be used to obtain greater contrast with background colors.	Mark on at least two sides of missile or rocket. Identification will be along longitudinal axis so that, when missile is in horizontal position, letters will be vertical, unless otherwise specified in applicable publications.

Table 2-3. Towed Artillery, Multiple Rocket Launchers, TOW Launchers, and DRAGON Trackers

Equipment	Color	Placement
1. Towed artillery and multiple rocket launchers.	Lusterless camouflage pattern in accordance with camouflage pattern in TM 4750-15/2 and TB 43-0118.	Exterior surfaces.
2. TOW launchers, TOW night vision sights, DRAGON tracker, and DRAGON night tracker.		No camouflage painting authorized. Equipment will be maintained in original finish.

Table 2-4. Communication-Electronics Equipment

Equipment	Color	Placement
1. Photographic and audio-visual.	Green 383 or Lusterless Black, Number 37038, as appropriate.	Exterior surfaces.
2. Tactical communications.	Green 383.	Exterior surfaces.
3. Meteorological.	Green 383.	Exterior surfaces.
4. Radiac.	Green 383.	Exterior surfaces.
5. Armed Forces Radio and Television Network.	Lusterless Green 383 or Gray, MIL-C-22750 Number 36138.	Exterior surfaces.
6. Antenna radomes.	Green 383.	Exterior surfaces.
7. Automatic data processing.	Green 383 or Gray MIL-C-22750, Number 36118.	Exterior surfaces.
8. Tactical equipment authorized by NAVMC 1017 (Table of Authorized Materiel (TAM))/Table of Equipment (T/E).	Green 383, including wave guides and antenna reflectors.	Exterior surfaces.
9. Communications equipment installed at fixed facilities, such as radio station equipment and telephone control office sets.	Green 383 or Lusterless Gray, MIL-C-22750 Number 36118.	Exterior surfaces.
10. Electronics test equipment.	Gray, Number 26307 MIL-C-22750.	Exterior surfaces.
11. Communications security equipment (COMSEC) Federal Supply Class (FSC) 5810.	See TB 750-10.	See TB 750-10.
12. Antenna or radiating elements, antenna base insulators, or fiber-glass casing.		Will not be painted unless special approval is obtained from the Commandant of the Marine Corps (Code LMC).

Table 2-4. Communication-Electronics Equipment (Continued)

Equipment	Color	Placement
13. Electronic Communication shelters, not air conditioned.	Green 383/sand/white in appropriate camouflage pattern or Gloss White, Number 17875. ¹	
	Semigloss Green, Number 24533. Prime with MIL-P-53022, coat with MIL-C-22750.	Interior surfaces, walls, ceilings, and fittings.
	Semigloss Gray, Number 26307.	Floors and doors.
	Gloss White, Number 17875. Prime with MIL-P-53022, coat with MIL-C-22750.	Interior surfaces of other containers, cabinets, or shelters if painting is required.
14. Electronic-Communication shelters, air conditioned.	Lusterless camouflage pattern in accordance with the appropriate pattern in TM 4750-15/2. Prime with MIL-P-53022, coat with MIL-C-46168.	Exterior surfaces.
	Semigloss Green, Number 24533.	Interior surfaces, walls, ceilings, and fittings.
	Semigloss Gray, Number 26037. Prime with MIL-P-53022, coat with MIL-C-22750.	Floors and doors.
	Gloss White, Number 17925.	Interior surfaces of other containers, cabinets, or shelters if painting is required.

¹ Gloss White, Number 17875 will be used on exterior surfaces only when prescribed by the force commander.

Table 2-4. Communication-Electronics Equipment (Continued)

Markings	Color	Placement
NOTE: Markings may be stenciled in paint conforming to color requirements.		
Unit identification.	Lusterless Black, per MIL-C-46168.	As prescribed.
NOTE: Communication-electronics equipment already in use, or that purchased as a nonmilitary item directly from commercial stocks, need not be repainted in accordance with table if color does not adversely affect equipment operation or tactical situation. This will hold true particularly in the case of equipment which is housed in shelters and vehicles.		

Table 2-5. Other Materiel

Equipment	Color	Placement
1. Materiel intended for field use and not otherwise specified herein.	Lusterless camouflage pattern in accordance with the appropriate pattern in TM 4750-15/2. Prime with MIL-P-53022, coat with MIL-C-46168.	Exterior surfaces.
2. Fire-control materiel.	See MIL-STD-194.	Exterior surfaces.
3. Conventional and chemical ammunition.	See MIL-STD-709.	Marking shall be in accordance with applicable directives. NOTE: No painting/markings authorized for USMC units.
4. Chemical warfare.	Green 383, except equipment, mounted on vehicles which will be painted same color specified for vehicle in accordance with approved drawings.	Exterior surfaces.

Table 2-5. Other Materiel (Continued)

Equipment	Color	Placement
5. Fire extinguishers (regardless of types, size, or location on equipment).	Red in accordance with military or Federal specification under which they were procured. The color chip number is 21136. Commanders in theaters of operation are authorized to repaint extinguishers for camouflage purposes.	Exterior surfaces.
6. Reusable shipping transporters (CONEX/MILVAN containers), types I and II.	Prime with MIL-P-53022, coat with MIL-C-46168, Green 383.	Exterior surfaces.
7. Machine tools and associated shop equipment.	Gloss Gray, Number 16187. Exceptions are: at fixed facilities, such equipment may be painted Semigloss Green, Number 383; emergency stopping switches and bars on such equipment shall be painted Gloss Red, Number 11105 or 11136.	Exterior surfaces.
8. Commercial-type items originally non-standard colors.	Maintain in existing colors. When repainting becomes necessary, use appropriate standard colors.	Exterior surfaces.
9. Equipment used for instructional purposes.	Use standard colors, except when varied colors may add significantly to the effectiveness of instruction. When equipment is returned to stock, it shall be repainted and marked with authorized colors.	Exterior surfaces.

Table 2-5. Other Materiel (Continued)

Markings	Color	Placement
NOTE: Markings may be adhesive-backed markers or paint conforming to color requirements.		
1. Unit identification.		As prescribed.
2. Static training equipment.		Markings are not required on this equipment.

Table 2-6. Bridging Equipment

Equipment	Color
1. Certain parts of the aluminum footbridge structure as outlined in the item specification.	Gloss White, Number 17875. ¹
Walkway	* Antiskid Compound Brown 383 1 gallon (MIL-D-23003) or black conformable nonslip walkway matting (MIL-W-5044, Type IV).
2. All other bridging equipment.	Green 383.
* Paint walk areas with anti-skid compound, and paint over with CARC using at least two coats.	
¹ Gloss White Number 17875 will be used on exterior surfaces only when prescribed by the force commander.	
Markings	Color
NOTE: Markings will be stenciled in paint conforming to color requirements.	
Stenciling and identification.	Black, Number 37038.

Table 2-7. Amphibious Equipment

Equipment	Color
AAV P7 series.	Lusterless camouflage pattern in accordance with appropriate camouflage pattern in TM 4750-15/2 except for interior ferrous components which will be semigloss white with color range between Number 27875 and Number 27778. Prime exteriors with MIL-P-53022, coat with MIL-C-46168. Prime interiors with MIL-P-53022, coat with MIL-C-22750.
Markings	Color
<u>NOTE:</u> Markings will be stenciled in paint conforming to color requirements.	
Unit identification.	Black, Number 37038.

Table 2-8. Comparison of Atomization Procedures

Item	Atomization	Application Speed	Atomization Efficiency	Transfer Efficiency
Air Spray	Fine, with "Class A" finish.	Slow, but easily handled.	Large amounts of overspray.	30%
Airless/Electrostatic Spray	Deposits paint	Fast, but needs quickly. painter.	Less overspray. an experienced	55%
Air Assisted Airless Spray	Very efficient.	Medium, in speed and in control.	Little overspray.	65%

CHAPTER 3

CAMOUFLAGE PAINTING

Section I. INTRODUCTION

3-1. GENERAL. Except where indicated, this Chapter applies to all Marine Corps ground combat and tactical equipment which is camouflage painted. See Chapter Two for appropriate guidance for surface preparation and application of paint. Special painting and markings for vehicles in administrative use are included in MIL-STD-1223 or other applicable specifications or standards. Canvas items, tarpaulins, leather, plastic, and other materials not usually painted will be marked in accordance with applicable instructions. Electronic equipment and items will be marked in accordance with MIL-M-13231 (EL) and/or as prescribed by other specifications or standards. Equipment, painted in the new three color camouflage pattern (3-CCP) has been painted with CARC.

3-2. EQUIPMENT PAINTING INSTRUCTIONS. Instructions for painting equipment reflect current USMC policy.

a. Painting Policy. The following provisions for implementing painting policy apply:

(1) Colors and markings prescribed in tables 2-1 through 2-7 apply for use on all specified equipment. Equipment shipped to Marine Corps requisitioners will be ready for pattern painting and marking in accordance with tables 2-1 through 2-7 unless otherwise specified. Waivers to basic color and pattern requirements based on geographical or other considerations, may be requested.

(2) Colors prescribed in this manual conform to FED-STD-595.

(3) All equipment, new and that being rebuilt or overhauled except prepositioned war reserve (PWR), and others exempt from camouflage painting, must be camouflage pattern painted unless sound materiel management procedures dictate otherwise. Headquarters Marine Corps and Marine Corps Logistics Base (MCLB), Albany, Georgia, will require manufacturers to use colors consistent with established criteria. Using units receiving equipment which has not been painted in camouflage patterns will evacuate to intermediate maintenance activity (IMA) to have patterns applied. PWR equipment and any other equipment held in stock awaiting issue shall be finished with green 383 base coat and a lightly applied dotted pattern in CARC. Upon request by the using unit for an item,

IMA or depot maintenance activity (DMA), whichever is responsible for issuing the item, will then apply the appropriate camouflage pattern as requested by the receiving unit. The receiving unit shall designate the appropriate camouflage pattern in its request. Should the correct pattern not be identified, the maintenance activity is responsible for contacting the receiving unit to determine the appropriate pattern and for applying the pattern before the equipment leaves the maintenance facility.

(4) Appendix C lists potential government activities which can execute the requirements of this manual. Touch up spot painting for preservation is the rule rather than the exception. Spot painting for cosmetic purposes (i.e., inspections or parades is not permitted).

(5) Style and size of registration numbers, markings, and identification markings prescribed in this manual as well as locally approved markings, are specified in table 2-1. The exact location is specified in Appendix D. NSNs are provided in Appendix E. Markings will be stenciled on with CARC paint following the procedures given (see paragraph 3-14).

(6) Mark technical data and information on equipment in accordance with applicable Marine Corps specifications. Where appropriate, this data and information will be placed on metal or plastic plates or decals.

(7) Do not decorate equipment with individual characteristic designs, such as caricatures, cartoons, or coats of arms.

(8) Under tactical conditions when requirements for concealment outweigh those for recognition, all conspicuous markings may be obscured or removed by the authority and at the discretion of the major organization commander present.

(9) Overseas commanders may deviate from this manual when host countries require special markings in accordance with international agreements.

(10) Remove or permanently obliterate identification markings when equipment is sold or permanently transferred from Marine Corps jurisdiction.

(11) In walkway areas which are required to have a nonslip surface, the standard covering referenced in table 2-1 will be used. At least two coats of CARC will be painted over nonslip coating. Because of the composition of nonslip coating, corners will break off and chemical agent resistance will be affected. It may be necessary, therefore, to test frequently for presence of chemical agents or to touch up these non-slip surfaces.

b. Application. Paint application is discussed in Chapter Two of this manual which provides complete information on painting methods, applications, and precautions.

c. Method of Application. Apply paint by spray, brush, or other methods which will ensure application of camouflage pattern as explained in Chapter Two.

Section II. CAMOUFLAGE PAINT

3-3. CAMOUFLAGE PAINT INFORMATION. All new items of ground combat and tactical equipment will be painted with three color camouflage patterns using the appropriate color scheme prescribed for the Marine Amphibious Force (MAF) to which equipment will be shipped. (See tables 3-1 and 3-2, List of Standard Camouflage Colors and Camouflage Pattern Painting Color Chart for Geographic and Climatic Changes respectively.) New items of ground combat and tactical equipment will be painted green 383 at the factory in accordance with MIL-T-704 or other applicable specifications as approved by Commandant of the Marine Corps, Code LIME. (See tables 3-1 and 3-2.) Paint specified as an exterior topcoat is MIL-C-46168 or MIL-C-53039. Apply all camouflage coatings to a total dry film thickness of 1.8 to 2.2 mils to obtain the required color and near infrared reflectance. Cleaning, pretreatment, and painting procedures will comply with procedures for and applications of CARC according to procedures outlined in Chapter Two of this manual. Camouflage paint specifications allow a range of acceptable shades of green. Appearance may change with angle of view.

3-4. ASSIGNMENT AND APPLICATION OF REGISTRATION NUMBERS. The following procedures apply:

Registration numbers are assigned to all wheeled or tracked, towed (less towed artillery), or self-propelled items of equipment by the Commandant of the Marine Corps, and establish positive, permanent identification. Registration numbers assigned to Marine Corps equipment will be applied to new items by the manufacturer, as a part of procurement contract. In the event that registration numbers have not been applied before delivery to the Marine Corps, they will be applied by MCLB's or receiving organization with CARC paint either MIL-C-46168 or MIL-C-53039. (See paragraph 3-14.) Registration numbers will be requested from the Commandant of the Marine Corps (Code LME). Markings for equipment not shown in Appendix D shall be applied in a location similar to that shown for comparable equipment.

3-5. SPECIAL PAINTING INSTRUCTIONS. The following special instructions apply:

a. Interior Surfaces. Paint as follows:

(1) After priming, paint interior surfaces with MIL-C-22750 epoxy polyamide paint (EPP) in gloss white or the color matching as closely as possible to the original color.

(2) Paint doors with lusterless green 383, in accordance with either MIL-C-46168 or MIL-C-53039.

(3) paint revolving superstructure cab interior and deck machinery of cranes and crane shrouds gloss gray, color #16473 of FED-STD-595. Do not paint radomes used with guided missile systems.

b. Other Surfaces. The following instructions apply to areas other than interiors:

(1) Do not use paint or primer materials which contain lead or other metallic substances that affect operational characteristics or electronic equipment.

(2) Repaint components of guided missiles and rocket system equipment with material of the same color and specification requirements as those of original finish.

(3) Repaint fire-control equipment, optical equipment, and communications equipment in accordance with instructions contained in pertinent technical publications or consult the procuring activity for the specific items.

(4) When necessary to paint ground combat or tactical equipment different than instructions in this manual, submit a request to the Commandant of the Marine Corps (Code LME), including the following information:

- (a) Purpose for which equipment is to be used
- (b) Complete justification for deviation
- (c) Any additional information which may be of value in reviewing request.

(5) In the event CARC is not available for touch up, a waiver/approval for the use of alkyd paint must be granted at force level. Waiver approval must be predicated on non-availability of required CARC paint and operationally required to preclude readiness degradation.

(6) While CARC can be applied over property cured alkyd paint with proper surface preparation (i.e., scuff sanded and clean surface), alkyd paint cannot be applied over CARC and still achieve the proper adherence. Regardless of surface preparation, alkyd paint will eventually chip or peel off the CARC finish when subjected to minimum friction. Additionally, the use of alkyd paint over CARC will degrade the chemical and biological agent resistant capabilities of a CARC finished item because alkyd paint absorbs those agents.

Section III. CAMOUFLAGE PATTERN PAINTING

3-6. GENERAL. This section describes how to camouflage Marine Corps equipment by pattern painting to confuse enemy observers and increase safety in the field. New patterns use only three colors which form a disruptive design, and differ for each model of vehicle and item of equipment. They are all-purpose patterns which can be adjusted to suit different seasons and terrains by changing only one, or at the most two, of three original colors. Reasons for pattern painting and description of new patterns are also given. Colors and kinds of paint to use under different conditions and instructions on how to paint patterns on equipment are furnished. More information on camouflage can be found in FM 5-20 (Camouflage) and TM 5-200 (Camouflage Materials). Until a suitable preservative coating for canvas has been developed, the program excludes vehicle tarps and tentage. A discussion of only the first pattern painting of existing solid-color vehicles and related equipment is included. Painting will be with the best color combination for the season or terrain in the area where equipment is to be used. The responsible commander will direct repainting for different seasons or terrains.

3-7. REQUIREMENTS FOR PATTERN PAINTING. The practice of deceiving enemy observers by blending personnel and equipment into the background terrain is one that has had wide use in military tactics and strategy. Military users borrowed the principal from nature where animals use protective coloration to evade the attention of predators. Military equipment however, has sharp edges and corners which will not readily blend. In the past, military camouflage consisted in part of painting vehicles and equipment in order to deceive observers at short range. New techniques and equipment permit opponents to operate at greater distances, and the colors and patterns used instead of concealing, did in fact reveal the whereabouts of the objects hidden.

A new system for painting has been devised by the armed forces of the Federal Republic of Germany in conjunction with the armed forces of the United States. This has resulted in adoption of the three color scheme of camouflage painting. This system analyzes the vehicle noting geometric shapes, such as corners, turrets, side view mirrors; and spreads patches of color over them thus blending them. Camouflage colors are applied in patches and in patterns that are determined by computer programs. The ratio of black, to green, to brown, must be precise and the pattern placed to afford maximum concealment. In the past, this required approximately five weeks of work to attain. Now by using computer aided techniques time has been cut to one week to design and draw new patterns. The computer operator enters

manufacturer's drawings and using drafting software, generates precise drawings and templates. Future plans call for the application of paint in camouflage patterns using robotics.

3-8. CAMOUFLAGE PATTERNS. The camouflage pattern is a system of contrasting color bands and patches applied over a base color (green 383) to disrupt the silhouette or outline of the vehicle or equipment item as seen from distances of 1,000 to 3,000 meters and beyond. These bands which disrupt or break up the outline are keyed to vehicle surface features; for example on a door handle, a door lock or a fender that are identifying features of that class or type of vehicle. For distances of less than 1,000 meters the identifying features blend with objects and shadows of the background.

Bands of colors must be placed within tolerances of ± 1 inch. (See figure 3-1.) That is, a black band, (the index point) may extend 1 inch beyond the area designated, or may fall one inch short of the border. (The vehicle or equipment has first been completely covered with a basic color). The distance between index points may be not less than 2 1/2 times the distance from the reference point. (See figures 3-1 and 3-2.) Reference points must be established before painting begins and paint patterns should be applied at the center and then worked front and back. Paint brown 383 areas first and then black, unless white is being applied to a verdant 3-CCP paint item for winter use, in which case, first paint white #3785 over the appropriate color (see table 3-2).

NOTE

INDIVIDUAL COLORS MUST NOT BE MIXED WITH ONE ANOTHER.

3-9. PREPARATION FOR PATTERN PAINTING. All vehicle surfaces must be cleaned carefully before pattern painting. Items required for pattern painting include: vehicle or other item of equipment, pattern-painting design for specific equipment or other item, spray guns, paint (CARC), thinners (MIL-T-81772), mixing buckets, paint brushes 1/2 inch, 1-inch, and 2-inch; paddles or sticks to mix paint, approved spray painting respirator, masking tape for masking small items, brown (kraft) paper for masking windshield or other glass, detergent to clean vehicles, chalk for marking paint area, steel wool or sandpaper, and rags. A compressed air source, water separators and fittings with pressure gauge and wrenches for spray guns are the final requirements. You must have a totally clean surface.

CAUTION

SPECIAL CARE MUST BE TAKEN WITH COMMUNICATION-ELECTRONICS EQUIPMENT TO ENSURE THAT ONLY NON-LEAD, NON-ALUMINUM, AND NON-CHROMATE PAINTS ARE USED ON ANY ELECTRICALLY/ELECTRONICALLY CONDUCTIVE SURFACES AND ANY OTHER RADIATING ELEMENTS. CAREFULLY RESEARCH MANUALS AND DIRECTIVES ON EQUIPMENT BEFORE PAINTING. BE PARTICULARLY CAREFUL IN APPLYING PAINT TO RADIO CASES AND ASSOCIATED EQUIPMENT. QUESTIONS CONCERNING THIS CAUTION ARE TO BE REFERRED TO COMMANDANT OF THE MARINE CORPS, CODES LME and LMC.

a. Cleaning. Follow procedures outlined below:

(1) Clean vehicle with detergent or solvent, and rinse thoroughly or steam clean. Remove all grease, oil, and dirt. Plastic letters, loose and scaling paint, and all touchup paint must be removed. Bring to metal substrate.

(2) Rusted areas should be sanded so new paint will stick better and last longer. When sanding down to bare metal, be sure to apply a CARC primer before applying CARC. The specification number for the CARC primer is MIL-P-53022 (see first note of table 2-1). See Appendix E for NSN.

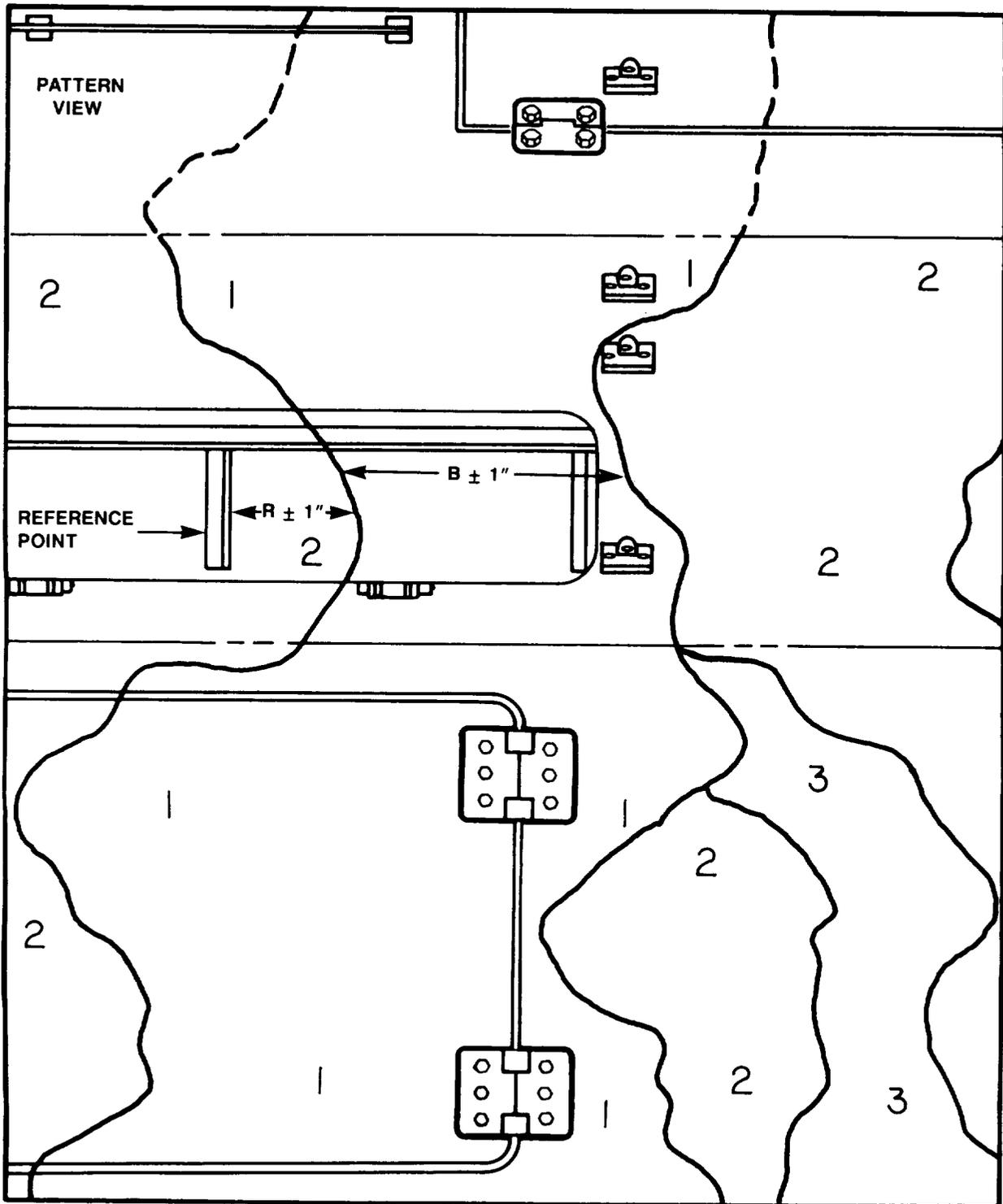
(3) Use masking tape and/or paper to cover all glass, grease fittings, and other items which can be damaged by paint.

NOTE

DO NOT USE GREASE FOR MASKING BECAUSE IT SMEARS ONTO OTHER PARTS OF VEHICLE AND PREVENTS PAINT FROM STICKING.

(4) Remove all white vehicle markings, including unit identification, instruction signs, and administrative markings. Sanding is the most effective way to do this.

b. Marking. After the vehicle is painted, apply only the following markings:



R = REFERENCE DISTANCE
B = BAND WIDTH

Figure 3-1. Definition of Tolerance.

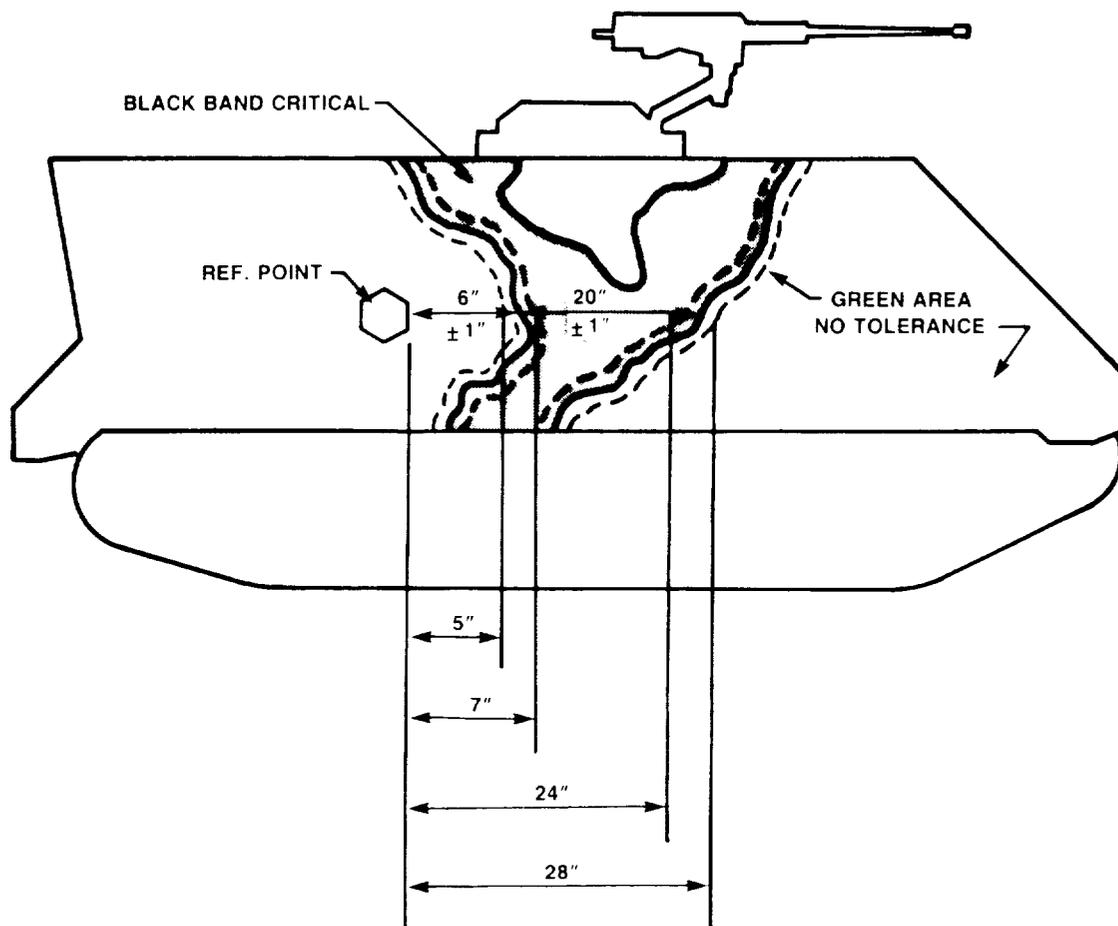


Figure 3-2. Effect of 1 Inch Band Tolerance.

(1) Unit Identification. Type of marking and location remain the same. Change color to lusterless camouflage black (MIL-C-46168 or MIL-C-53039).

(2) Agency and Registration Number. Apply registration and Marine Corps numbers to outside of vehicle. See Appendix D.

(3) Safety and Instructional Markings. Tire pressure, fuel type, and fill level markings must be in black letters no larger than 1 inch. Safety personnel must evaluate need for specific safety markings, such as wrecker boom capacity and danger zones.

3-10. MARKING THE PATTERN. After vehicle has been prepared, begin to apply pattern. Use only printed pattern designs in TM 4750-15/2. Outline pattern with chalk. (See figure 3-3.) Use reference points on vehicle to help keep correct shape for each color area. Perfect precision is not required, but you must mark shape and size of pattern so that it is within one inch of correct outline. Do not use straight, vertical, or horizontal lines. Mark pattern with numbers or letters which tell painter which colors to use so he can “paint by number.” (See figure 3-1.) After chalked pattern has been inspected for accuracy chalk should be replaced with CARC applied by a small “artist’s” brush, since CARC will not adhere to chalk,

3-11. PAINTING. Paints and thinners for pattern painting are ordered through normal supply channels. Within color, there is a variation of shades between manufacturers and batches. Each batch is approved by Fort Belvoir, Research, Development and Engineering Center, Fort Belvoir, VA. Units are not to be concerned with differences in shades. The paints listed below are required before beginning work. See Appendix E for NSNs.

a. Epoxy Primer, Ferrous and Non Ferrous Surfaces MIL-P-53022 (a kit).

b. PUP topcoat MIL-C-46168, one-quart kit, green (383), brown (383), and black. These comprise the woodland three color camouflage system. Any vehicle will be approximately 44% green 383, 41% black and 15% brown 383.

NOTE

NEW EQUIPMENT ARRIVING WITH GREEN 383 PAINT WILL BE TOUCHED UP WITH GREEN 383 PAINT UNLESS THE APPLICABLE THREE COLOR PATTERN HAS BEEN PUBLISHED. FOUR COLOR PATTERNS MUST NOT BE APPLIED TO NEW EQUIPMENT WHICH HAS A BASE CARC COAT. THREE COLOR CAMOUFLAGE PATTERNS ARE SYNONYMOUS WITH CARC PAINT.

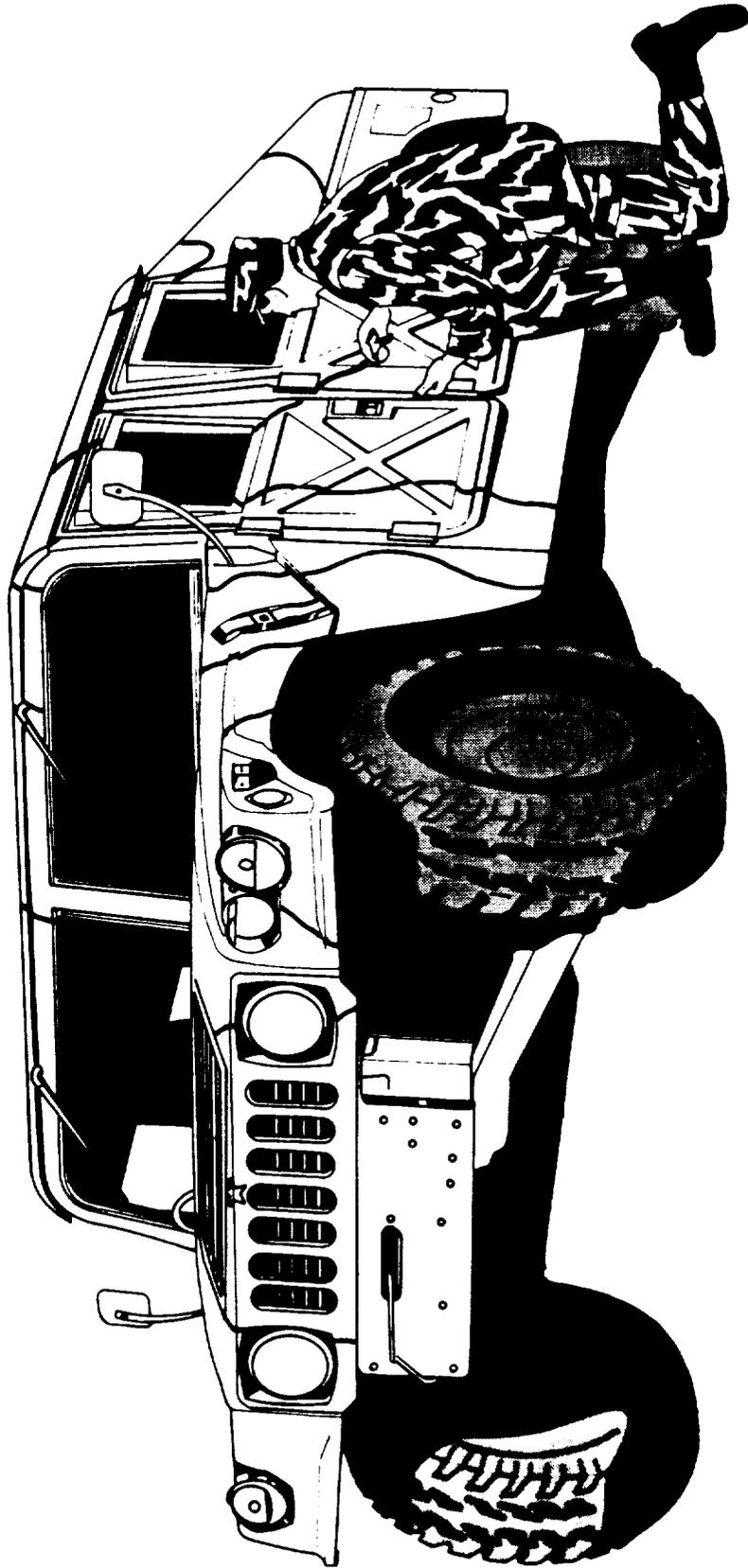


Figure 3-3. Marine Applying a Pattern With Chalk

- c. Epoxy polyamide paint, interior application, white MIL-C-22750, two quart kit.
- d. Thinner, MIL-T-81772, one gallon.

3-12. PAINT MIXING. Follow instructions in Chapter Two for paint mixing.

3-13. PAINTING TECHNIQUES. Follow these procedures outlined below:

a. Basic Painting Instructions. For basic painting instructions and maintenance of painting equipment, see appropriate sections within this manual.

b. Spray Painting. Spray painting is the most efficient and economical way to paint a vehicle.

c. Special Instructions. Fill in color areas with required color paint. For good adhesion and coverage, make sure newly painted surface looks wet upon application. Small black areas (see figure 3-4) should be filled in with a brush. More experienced spray painters may use a spray gun on these small areas.

d. Brush Painting. Only brush painting will be authorized at first and second echelon maintenance. (See figure 3-4.)

3-14. PAINTING OF “USMC” and USMC REGISTRATION NUMBERS AND OTHER SAFETY/IDENTIFYING MARKS. The “USMC” and the USMC registration numbers shall be applied by stenciling. For the “USMC” and the USMC registration numbers, the letters and numbers shall be 2.0 inches high except where the location dictates smaller size letters and numbers (either 1.5 inches or 1.0 inch), and in no case shall the letters and numbers be less than 1.0 inch (see table 2-1). For all other safety/identifying marks see table 2-1. The following information provides a user with details on stenciling techniques and paint markings.

a. Stenciling Techniques. Stencils permit individuals who are not trained as sign painters to apply letters and designs to material quickly and efficiently. A stencil is a paper or metal pattern which has the letters or design cut out, so that when the stencil is held in position over a surface and paint is applied to the cut out portions, the lettering or design will be accurately reproduced. When a large number of signs, identification marks or designs are to be reproduced, time is saved by stenciling. Follow the procedures outlined below.

(1) Identify the area to be marked. Draw a straight guide line for proper positioning of the letters, numbers or legend.

(2) Mask the areas between, above, and below the stencils using masking tape and paper (or canvas) to prevent overpainting.

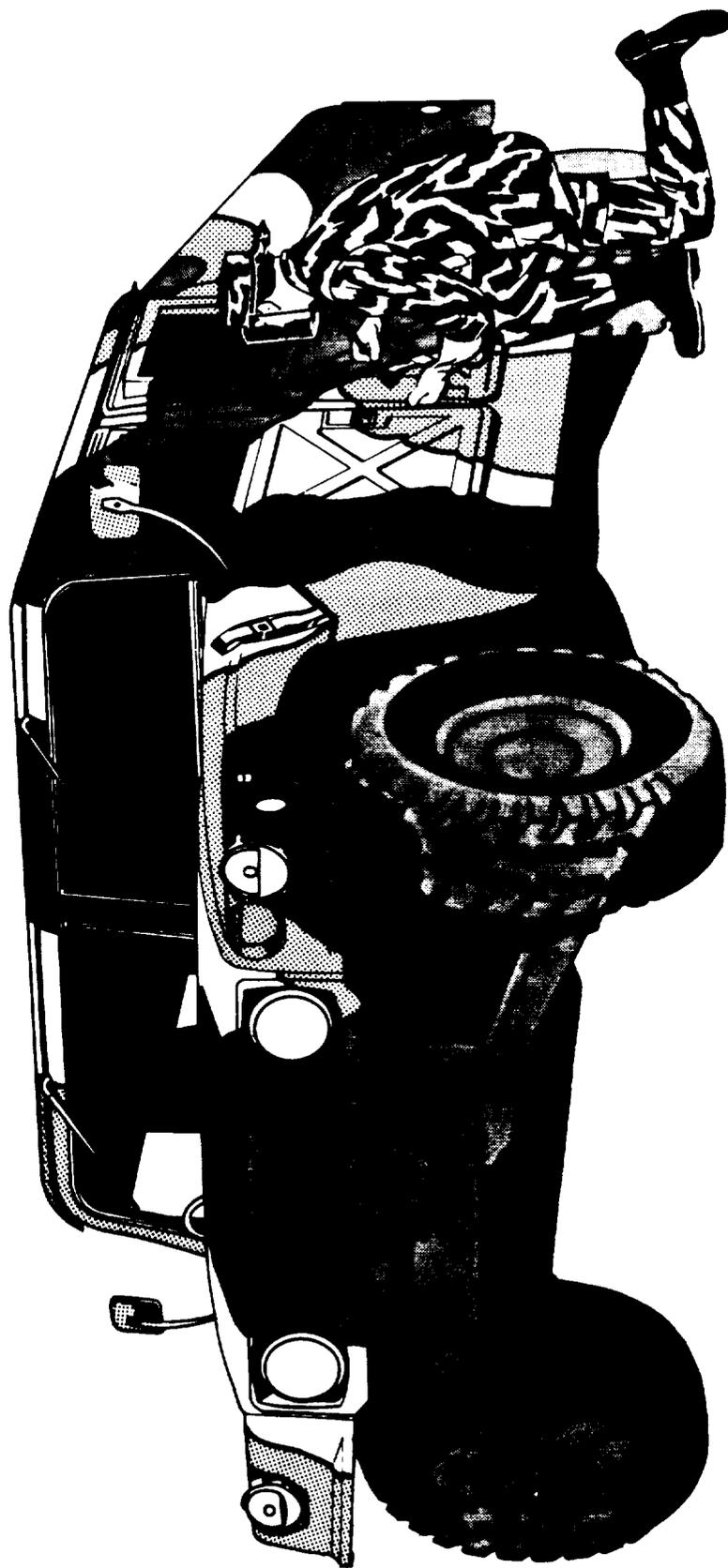


Figure 3-4. Touch Up Painting Techniques

(3) Apply paint to the stenciled area by spraying or by brushing. (See figure 3-5.) Spraying is preferred at IMA level and above. Use PUP black paint, or other appropriate camouflage colors (see figure 3-6), for applications requiring chemical agent resistant systems.

(4) Allow the paint to dry for approximately 15 minutes, then remove the stencils, taking care to avoid smudging the markings or the adjacent surface (see figure 3-5).

(5) Do not touch the painted marking until thoroughly dry; the timing of which is dependent upon temperature, kind of paint used, method of application, and thickness of application. Protect the marking from dust and dirt during the drying period.

(6) Carefully clean all paint overspraying and smudges as well as residue. Use mineral spirits, paint thinner and a cloth. Avoid contacting" the marking with thinner.

b. Paint Markings. When registration numbers fall over three colors of the camouflage pattern, they must be painted in a contrasting CARC color. That is, the portion of the registration number on green 383, brown 383 or sand shall be painted in black, the portion of the number on black shall be painted green 383. White surfaces shall have registration numbers painted in brown 383. (See figure 3-6.)

3-15. PAINTING ESTIMATES. Table 3-3 gives results of pattern painting field tests on selected vehicles. It can be used to estimate the amount of labor, paint, and thinner needed to paint a vehicle. Until painters gain experience, painting time required may be as much as double that shown. Epoxy primers dry to touch in 20 to 30 minutes and can be overcoated with PUP in 30 minutes. PUP topcoat dries to touch in 20 to 30 minutes and dries through in 4 to 6 hours. It is cured throughout in 7 to 14 days.

3-16. MAINTENANCE OF CAMOUFLAGE PATTERNS. Camouflage patterns may need some retouch painting for appearance and durability. When touching up use the same CARC color used in original pattern painting, and use a brush on small areas and a spray gun for larger areas. (Spray gun used by IMA and DMA only.) Some painting tips follow:

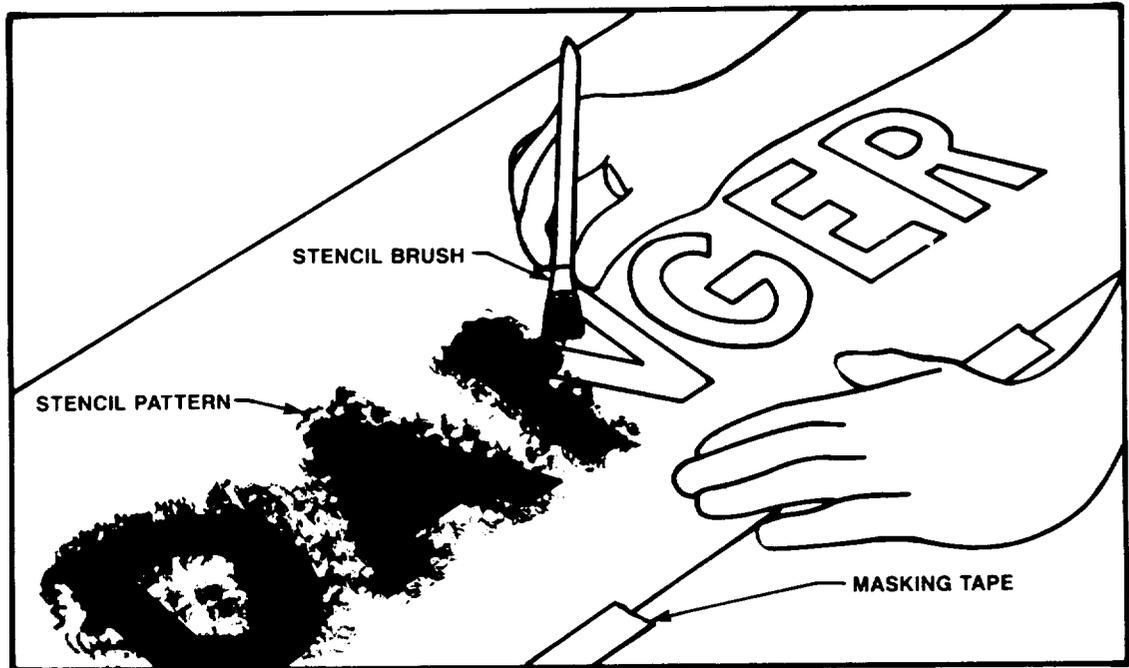
Make sure vehicles are clean of oil and dirt; otherwise, paint will not stick to surface. Test for cleanliness.

Remove and/or sand all loose or flaking paint.

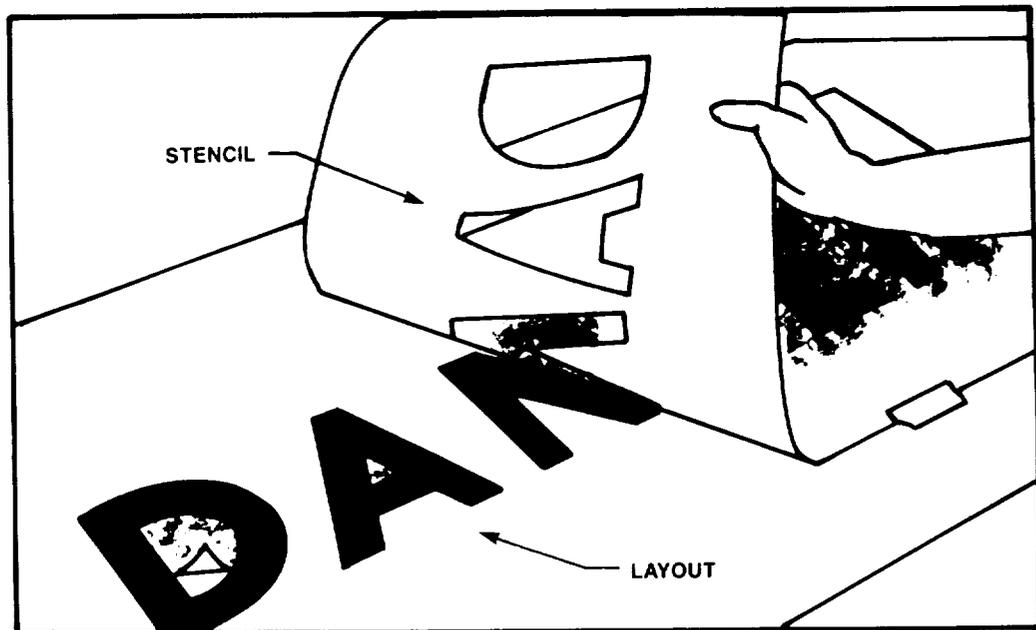
Completely remove all plastic letters and insignia. Clean surface with thinner or solvent to remove any remaining glue.

Cover all grease fittings to prevent fouling.

Thoroughly stir all new cans of paint before mixing.

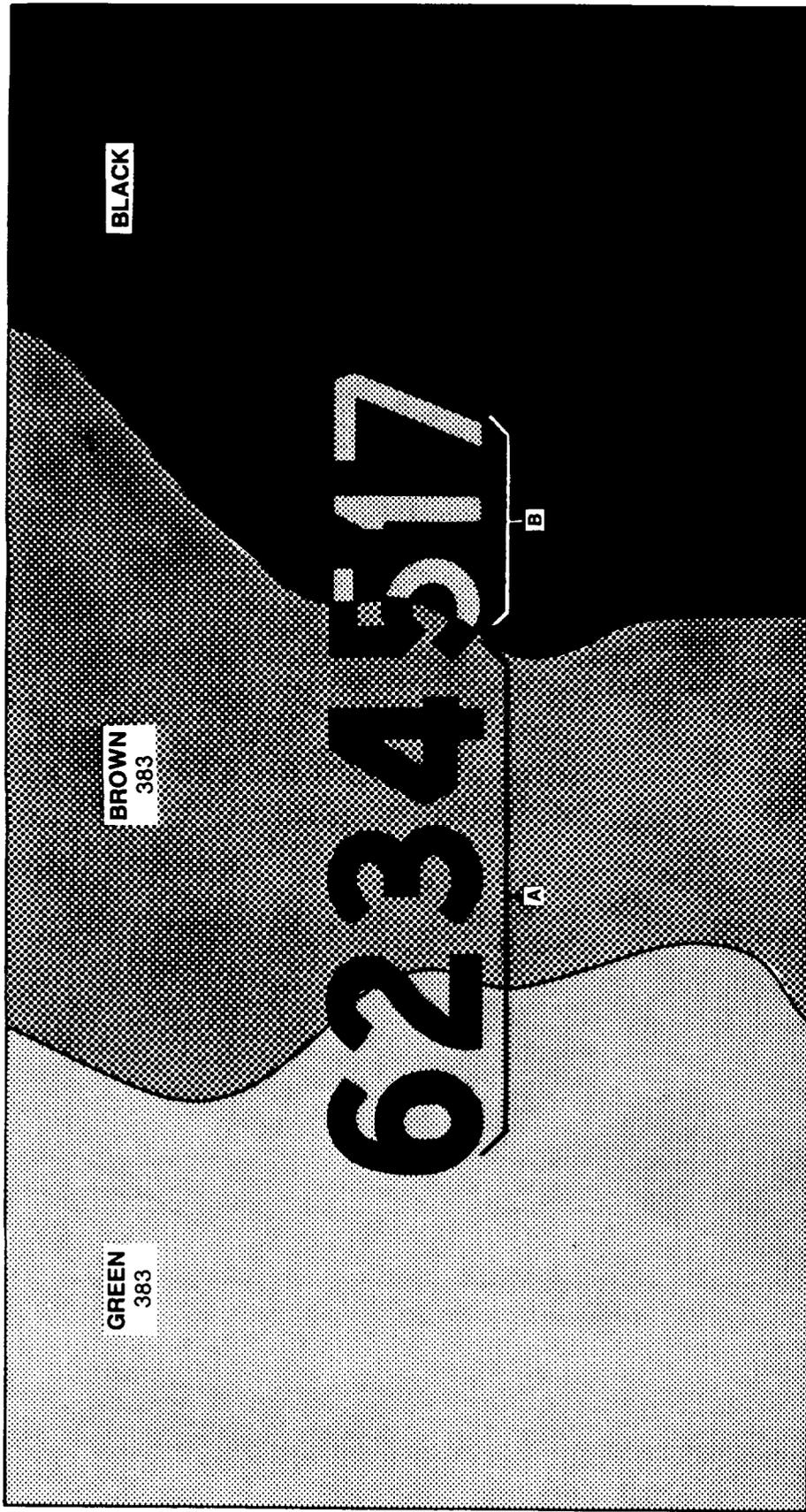


A . STENCILING A LETTERING PATTERN



B. REMOVING THE STENCIL

Figure 3-5. Stenciling Techniques.



A. STENCIL REGISTRATION NUMBERS IN BLACK ON GREEN OR BROWN SURFACES

B. STENCIL REGISTRATION NUMBERS IN GREEN 383 ON BLACK SURFACES.

NOTE: WHEN STENCILING REGISTRATION NUMBERS ON A WHITE SURFACE USE BROWN 383.

Figure 3-6. Application of Registration Numbers Over Three Color Camouflage Pattern

Mix paint in batches of 1 quart thoroughly before each spray cup is filled.

Use separate equipment for epoxy primer and for urethane topcoat.

Adjust paint gun to ensure proper paint and air mixture.

Hold spray gun close to work to prevent excessive overspray or a spray that is too dry.

Wipe chalk markings off vehicle as paint is applied.

Be sure new paint coating looks wet on application.

Do not walk over or touch coating while still tacky.

Clean all spray equipment and brushes thoroughly at the end of each day in accordance with manufacturer's instructions.

Keep spray guns clean. Run thinner through gun after use and before each filling or clean it if there are any signs of caking present.

Cover paint cans and pots to prevent a skin from forming on paint.

Maintain good housekeeping in and around paint mixing and filling area.

Drain water from compressors and water separators.

Section IV. THREE COLOR CAMOUFLAGE PATTERN PROGRAM (GUIDELINES FOR APPLICATION AND INSPECTION)

3-17. GUIDELINES FOR APPLICATION AND INSPECTION OF THE U.S. 3-COLOR CAMOUFLAGE PATTERNS (3-CCPs). The 3-Color Camouflage Patterns (3-CCPs) shall be applied so as to ensure full compliance with guidelines for inspection of the 3-CCP as set forth in the U.S. Army Belvoir Research, Development and Engineering Center (BRDEC) pamphlet titled "Guidelines for Inspecting the Application of U.S. 3-Color Camouflage Paint Patterns" of July 1986 (PCN 500 00200000). While the referenced Army pamphlet is to be used by IMA levels and above when applying 3-CCPS, using units (i.e., 1st and 2nd echelons) are encouraged to follow the principles of the pamphlet as they apply to the touch up/repair of existing 3-CCPS. (See paragraph 3-17b below.) In the event there are any discrepancies between this manual and the above U.S. Army Pamphlet, guidelines of this manual will take precedence.

a. Application of the 3-CCP. Since a 3-CCP can only be applied at IMA level or above, these activities shall apply the 3-CCP using only blueprint drawings developed by BRDEC. The “template pattern application method” as discussed in paragraph 4.3.2 of the referenced U.S. Army pamphlet is the recommended method for applying the 3-CCPS. This method offers the most economical means for achieving the best accuracy and repeatability of the pattern and is strongly recommended.

b. Touch Up of Existing 3-CCP. An end item which already has a 3-CCP applied can be touched up using the reduced drawings found in TM 4750-15/2 (see paragraph 3-16).

3-18. CAMOUFLAGE PATTERNS FOR DIFFERENT GEOGRAPHIC AND CLIMATIC CONDITIONS. Table 3-1 lists the standard colors which are to be used for camouflage painting of ground combat and tactical equipment. Table 3-2 defines the colors which are to be used in conjunction with the approved 3-CCP (see paragraph 3-17a) and according to geographic as well as climatic conditions where the piece of equipment will be employed.

a. Color of Sand Paint for Desert Environments. The exact color chip number (FED-STD-595) for sand for all desert environments has not been determined. In the interim, Sand No. 33303 is to be used. In using tables 2-1 through 2-7 for painting interior surfaces, if Green 383 is prescribed, then sand shall be used instead of Green 383 for equipment employed in the desert environment.

b. Type and Color of White Paint for Arctic (Winter) Conditions. The following information applies.

(1) Because of the complex and varying conditions for which white paint may be applied to ground combat and tactical equipment, the following types of white paint are available. Except for MIL-C-46168, No. 37875, there are no NSNs available.

- (a) MIL-C-46168 color aircraft white (FED-STD-595), color chip number 37875
- (b) White wash from local paint stores
- (c) MIL-P-52905, paint, arctic, camouflage, removable
- (d) MIL-P-13933, paint, temporary, lusterless, gasoline removable
- (e) MIL-P-6884, paint, camouflage or temporary identification, solvent removable
- (f) Other sources (such as European commercial suppliers) should be determined during international conferences.

(2) Some of the problems associated with each of the above paints are enumerated below:

(a) Aircraft White (No. 37875) is CARC and by definition the concept of removability is incompatible with CARC. A CARC requirement combined with a changing camouflage requirement would necessitate refinishing twice a year or more and result in a rapid build-up of painty on the substrate. This paint is recommended for equipment permanently located in the arctic (winter) environment. Aircraft white (No. 37875) has been available since May 1982.

(b) Whitewash From the Local Paint Stores. This is the cheapest solution, but the whitewashed vehicles should never be transported in aircraft. When the vehicles are transported, there is condensation and the water washes off the whitewash contaminating the aircraft. There is a potential that the contamination would affect the air worthiness of the aircraft, and thus it is most strongly advised that whitewash not be used. There is another problem in using water based paints, such as latex or whitewash, and that is that it cannot be applied at low temperatures. The paint would also be damaged, if it is allowed to freeze.

(c) MIL-P-52905, Paint, Arctic Camouflage, Removable. This paint was originally developed to help with the problems of camouflaging vehicles from visual and photographic detection in the ultraviolet (UV) portion of the spectrum. This is particularly good paint for camouflage. It can be washed off by ammonia water. It reflects UV light the same way snow does. It will, therefore, still show the disruptive pattern in photographs and be hard for photo interpreters to detect. However, it is expensive. It may cost \$40 to \$50 per gallon, if the UV pigments are in the paint. (Use of the UV pigments also requires that more paint must be used to get proper coverage.) If the UV pigments were omitted, the paint would be much cheaper. The final problem is that the specification had never been used and thus has been officially canceled. It would take some time to administratively re-issue the specification, and to convince some supplier to make the small amounts needed.

(d) MIL-P-13983, Paint, Temporary, Lusterless, Gasoline Removable. This is older technology paint, and there are environmental problems in using it.

(e) MIL-P-6884, Paint, Camouflage or Temporary Identification, Solvent Removable. This is older technology, does not have the UV camouflage feature, and has similar environmental problems due to the solvents needed to wash it off the vehicles.

(f) Other Sources (Such as European Commercial Suppliers), To Be Determined During International Conferences. Usually it takes several years before a consensus group would make any final recommendation. Since there will be no recommendation for some months it is not considered to be a possible source for any immediate selection of paint.

(3) Until official guidance regarding an approved white paint for camouflage purposes and NSNs are available, the force commander will decide which of the above types of paint will be used depending on the following:

- (a) The amount of snow coverage
- (b) Operational and training considerations
- (c) Costs
- (d) Ease of removing white paint required.

However, in all cases, a dull flat finish white paint shall be used (i.e., do not procure semigloss or gloss white latex paint from the local paint suppliers).

Table 3-1. List of Standard Camouflage Colors

<u>Abbreviation</u>	<u>Color</u>	<u>Color Chip No.</u> <u>(From FED-STD-595)</u>
W	White (Flat or dull finish)	*
S	Sand	**
B 383	Brown	30051
G 383	Green	34094
BLK	Black	37030

* Type of paint is to be determined by force commander (see paragraph 3-18 and table 3-2.)

** Color to be determined. In the interim, use Sand Chip No. 33303.

Table 3-2. Camouflage Pattern Painting Color Chart for Geographic and Climatic Changes

CONDITION	COLOR DISTRIBUTION		
	44%	15%	41%
US and Europe Verdant (US/GE 3-CCP)	G 383	B 383	BLK
Desert Environment (all desert conditions)	S	S	S
Arctic (Winter)			
Up to 15% snow cover, leave US/GE 3-CCP Intact	G 383	B 383	BLK
15% - 80% snow cover:			
For "turreted vehicles" *, paint the black portion of 3-CCP white.	G 383	B 383	W
For "boxy vehicles" or all other equipment, paint G 383 of 3-CCP white.	W	B 383	BLK
Above 80% snow cover, paint all white	W	W	W

NOTE: Painting to meet arctic conditions depends on the following, all of which will be determined by the force commander (see paragraph 3-18 for type of paint):

1. Amount of snow coverage
2. Operational/training considerations
3. Cost
4. Ease of removing white paint required

* "Turreted vehicles" are classified as the M60 and the M1A1 tanks.

Table 3-3. Pattern Painting Estimates

Type of Vehicle	Work-Hours ¹	Average Paint (gal)	Average Thinner (gal)
M923	15	2.00	.50
M51	17	3.00	1.00
M60A1	30	2.16	1.10
M88	19	1.50	.75
M109HOW	15	2.00	.50
M109VAN	18	2.00	.50
HMMWV	12	.50	.25

¹ Experienced troop labor.

CHAPTER 4

MAINTENANCE PROCEDURES

Section I. INTRODUCTION

4-1. MAINTENANCE PLAN. Because of the wide range of spray equipment, atomizing equipment and mixing equipment available for use with primers and coatings discussed in this manual, detailed maintenance instructions are not given. Follow manufacturers instructions provided in individual manuals.

Every user of equipment which mixes, meters, atomizes, or applies CARC must be constantly aware of the properties which result in damage unless cleaning is prompt and thorough. The high concentration of solids suspended in the coating result in highly desirable effects; for example, resistance to chemical agents, resistance to corrosion, and resistance to detection by infrared and ultraviolet devices. Although these are results which make CARC extremely valuable to military use, the same solids will clump together to form a mass which will clog equipment and which cannot be removed. The only solution is prevention. Equipment must be cleaned within six (6) hours of use. Your attention is directed to paragraph 2-3 which explains characteristics of CARC.

Section II. EQUIPMENT CLEANING

4-2. GENERAL. Equipment which in any way comes in contact with CARC must be thoroughly cleaned within six hours. A thinner, MIL-T-81772, will be flushed through equipment ensuring that all areas which have been in contact with CARC are reached.

4-3. SAFETY PRECAUTIONS. As with most highly volatile solvents, the thinner identified in MIL-T-81772 can be absorbed through the skin and, therefore, impermeable gloves must be worn. Barrier cream will be used in conjunction with gloves in order to counteract defatting action of the solvent. These are obtained locally from commercial sources and include Jergens and Marion brands. For painting with spray gun, painters cotton gloves may be worn. See Appendix E for NSNs. Additionally, when using thinner, the worker must wear cloth overalls, eye protection, and head covering. Cloth overalls must be removed and hygienic showers taken before changing into street clothing. It is very difficult to remove CARC from butyl rubber gloves, therefore, silicone rubber gloves or household rubber gloves, for instance Playtex, are

recommended. The solvent, in addition to being a hazard during painting is released during drying. If excessive vapors are concentrated in the drying area, leave the area immediately, and contact local preventive medicine/industrial hygiene personnel.

a. Cleaning of the Respirator. It is essential for your safety to clean your respirator as outlined below.

- (1) Remove filters, headbands, and valves from facepiece.
- (2) Immerse all parts, except filters, in a warm solution (140-160°F/60-72°C) of an antiseptic such as calcium hypochlorite See Appendix E for NSN Listing.
- (3) Scrub rubber parts of the mask gently, using a soft brush.
- (4) Rinse thoroughly in clean water and let dry.

b. Additional Respirator Information. The following points are important to your safety:

(1) Replace cartridge in your mask at first sign of paint odor while you are wearing it. Unscrew the cartridge to replace it. Be sure rubber gasket is evenly seated in filter holder.

(2) Replace prefilter when breathing becomes difficult. Remove prefilter retaining ring from the front of cartridge. Put prefilter in the retainer and replace entire assembly on cartridge front.

(3) Before storing your respirator make sure it is clean. Store it in a cool, dry area free from airborne contamination. Be sure to check your respirator again before using.

(4) Set up the compressor that supplies inline respirators where plenty (i.e., 19.5%-23.5% by volume) of oxygen is available. This can be checked by the base safety office or industrial hygiene branch. For example, do not set up compressors that supply respirators where they draw air that is toxic, to include carbon monoxide that can be generated by internal combustion engines or ozone generated by electrical generating devices.

(5) Leave area immediately if breathing become difficult, you get dizzy, or you taste or smell paint.

(6) Never alter or modify your respirator.

(7) Make sure your mask is properly fitted.

4-4. CLEANING/WASHING OF CARC SURFACES. In order to meet infrared reflectance requirements, PUP painted items have a much rougher surface than non-camouflage painted

items. This is especially true of items painted with aircraft colors. The rougher surface traps grease and oil. Naval Air and Development Center, Lakehurst, New Jersey has identified one cleaning agent for use on CARC. The cleaning agent has been field tested and action has been initiated to obtain stock numbers. This cleaning agent is identified in MIL-C-85570.

4-5. MAINTENANCE OF CAMOUFLAGE PATTERNS. Camouflage patterns may need some retouch painting for appearance and durability. Always use the same CARC used in original pattern painting. When retouching, use a brush on small areas and a spray gun at IMA and DMA only for larger areas. Some painting tips follow:

Make sure vehicles are clean of oil and dirt; otherwise, paint will not stick to surface. Test for cleanliness.

Remove and/or sand all loose or flaking paint.

Completely remove all plastic letters and insignia. Clean surface with thinner or solvent to remove any remaining glue.

Cover all grease fittings to prevent fouling.

Thoroughly stir all new cans of paint before mixing.

Mix paint in batches of 1 quart thoroughly before each spray cup is filled.

Use separate equipment for epoxy primer and for urethane topcoat.

Adjust paint gun to ensure proper paint and air mixture.

Hold spray gun close to work to prevent excessive overspray or a spray that is too dry.

Wipe chalk markings off vehicle as paint is applied.

Be sure new paint coating looks wet on application.

Do not walk over or touch coating while still tacky.

Clean all spray equipment and brushes thoroughly at the end of each day in accordance with manufacturer's instructions.

Keep spray guns clean. Run thinner through gun after use and before each filling or clean it if there are any signs of caking present.

Cover paint cans and pots to prevent a skin from forming on paint.

Maintain good housekeeping in and around paint mixing and filling area.

Drain water from compressors and water separators.

4-6. FEDERAL WASTE REQUIREMENTS. The EPA has designated certain solvent constituents as hazardous materials. These include xylene, toluene, methyl ethyl ketone, methyl isobutyl ketone, and 1,1,1,-trichloroethane which are contained in MIL-T-81772. All waste products of this thinner are hazardous waste. Actual handling and disposal procedures must be determined in conjunction with MCO P11000.8, the local environmental coordinator, and the director for facilities engineering.

APPENDIX A
REFERENCE DOCUMENTS

SPECIFICATIONS

FEDERAL

L-S-300	Sheeting and Tape, Reflective, Nonexposed Lens.
TT-C-490	Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings.
TT-P-28	Paint, Aluminum, Heat Resisting.
TT-P-664	Primer Coating, Synthetic, Rust-Inhibiting, Lacquer-Resisting.
TT-P-1757	Primer Coating, Zinc Chromate, Low Moisture Sensitivity.

MILITARY

MIL-T-704	Treatment and Painting of Materiel.
MIL-M-3171	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion On.
MIL-W-5044	Walkway Compound, Nonslip and Walkway Matting, Nonslip.
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys.
MIL-C-8514	Coating Compound, Metal Pretreatment, Resin-Acid.
MIL-M-13231	Marking of Electronic Items.
MIL-P-14105	Paint, Heat-Resistant for Steel Surfaces.
MIL-D-16791	Detergent, General Purpose, Liquid, Nonionic.
MIL-E-17970	Enamel, Nonflaming (Dry), Chlorinated Alkyd Resin, Soft White, Semigloss, Formula No. 124/58.
MIL-C-22750	Coating, Epoxy Polyamide.
MIL-D-23003	Deck Covering Compound, Nonslip, Rollable.
MIL-P-23377	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant.
MIL-R-46073	Remover, Paint, Organic, Solvent Type.
MIL-E-46096	Enamel, Lusterless, Quick Drying, Styrenated Alkyd Type, Solar Heat Reflecting.
MIL-E-46136	Enamel, Semigloss, Alkyd, Solar Heat Reflecting, Olive Drab.

SPECIFICATIONS (Continued)

MIL-C-46168	Coating, Aliphatic Polyurethane, Chemical Agent Resistant.
MIL-P-52192	Primer Coating, Epoxy.
MIL-P-53022	Primer, Epoxy. Coating, Corrosion Inhibiting, Lead and Chromate Free.
MIL-P-53030	Primer Coating, Epoxy, Water Reducible, Lead and Chromate Free.
MIL-C-53039	Coating, Aliphatic Polyurethane, Single Component, Chemical Agent Resistant,
MIL-T-81772	Thinner, Aircraft Coating.
MIL-C-85570	Cleaning Compound, Aircraft, Exterior.
MIL-P-85582	Primer Coating: Epoxy, VOC Compliant, Chemical and Solvent Resistant

STANDARDS

FEDERAL

FED-STD-595 Colors for Ready Mixed Paints.

MILITARY

MIL-STD-129	Marking for Shipment and Storage.
MIL-STD-193	Painting Procedures and Marking for Vehicles, Construction Equipment and Materiel Handling Equipment.
MIL-STD-194	System for Painting and Finishing Fire-Control Materiel.
MIL-STD-642	Identification Marking of Combat and Tactical Transport Vehicles.
MIL-STD-709	Ammunition Color Coding.
MIL-STD-1223	Nontactical Wheeled Vehicles Treatment, Painting, Identification Marking and Data Plate Standards.

ORDERS

MCO 04570.24A Department of Defense Hazardous Material/Hazardous Waste Disposal Guidance.

DELETED

MCO P11000.8 Real Property Facilities Manual, Volume V, Environmental Management.

INSTRUCTIONS

- DODI 6055.5M Occupational Health Surveillance Manual.
- NAVMEDCOMINST
6260.10 Isocyanates Measures for Health Hazards (under development).

FIELD MANUALS

- FM 5-20 Camouflage.
- FM 5-36 Route Reconnaissance and Classification.
- FM 55-30 Army Motor Transport Units and Operations.

TECHNICAL BULLETINS

- TB 34-9-249 Marking of Military Vehicles.
- TB 43-0118 Field Instruction for Painting and Preserving Electronics Command Equipment, Including Camouflage Patterns, Painting of Electrical Equipment Shelters.
- TB 43-0209 Color, Marking and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment.
- TB 746-92-1 Painting and Marking of Guided Missiles and Rockets.
- TB 746-92-2 Color and Marking of Basic HAWK and Self-Propelled HAWK Guided Missile System Group Support Equipment (HAWK Air Defense Guided Missile System).
- TB 750-10 Painting, Replating, and Preserving Instructions for Communications Security Equipment.
- TB 750-260 Painting Instructions for Operator and Organizational Maintenance Personnel.

LETTERS

- Letter, DASG-PSP, Office of the Surgeon General, 22 Feb 85, Subject: Occupational Health Requirements in Support of Painting in the Army. (NOTAL)
- Letter, DASG-PSP, Office of the Surgeon General, 29 Apr 85, Subject: Personal Protective Equipment (PPE) for Painting Operations. (NOTAL)
- Letter, Commander, Naval Medical Command, 29 Nov 85, Subject: Chemical Agent Resistant Coating (CARC). (NOTAL)

OTHER GOVERNMENT DOCUMENTS

- AR 420-47 Solid and Hazardous Waste Management.
- C8000-IL Identification List, FSC Group 80, Brushes, paint, sealers, Adhesives.

OTHER GOVERNMENT DOCUMENTS (Continued)

CFR 1910.1025 Code of Federal Regulations Title 29 Labor Briefing, Anniston Army Depot, June 1985.

DOD-P-15328 Primer (Wash), Pretreatment (Formula #117) for Metals (Metric).
Material Safety Data Sheet MoBay Chemical Corp, June 1984.

ML-MC Marine Corps Management Data List

DELETED

PS Monthly November 1985.

Report Army Surgeon General, "Information/Discussion on Chemical Agent Resistant Coating (CARC)", 20 June 1985.

DELETED

TM 4750-15/2 Camouflage Patterns.

Video Cassette: Camouflage.

Video Cassette: U.S. 3-Color Camouflage Pattern Development Program Recommended Guidelines for Application and Inspection.

APPENDIX B
LIST OF ACRONYMS

<u>ACRONYM</u>	<u>DESCRIPTION</u>
AAV	Amphibious Assault Vehicle
ACGIH	American Conference of Governmental Industrial Hygienists
BRDEC	Belvoir Research, Development and Engineering Center
CARC	Chemical Agent Resistant Coating
CFM	Cubic Feet Per Minute
CO ₂	Carbon Dioxide
COMSEC	Communications Security
CONUS	Continental United States
DMA	Depot Maintenance Activity
DOT	Department of Transportation
DS2	Decontamination Solution #2
EP	Epoxy Primer
EPA	Environmental Protection Agency
EPP	Epoxy Polyamide Paint
FEV	Forced Expiratory Volume
FM	Field Manual
FPM	Feet Per Minute
FSC	Federal Supply Class
FSCM	Federal Supply Codes for Manufacturers
FVC	Forced Vital Capacity
GPM	Gallons Per Minute
HDI	Hexamethylene Diisocyanate
IMA	Intermediate Maintenance Activity
IR	Infrared
LAV	Light Armored Vehicle
MCLB	Marine Corps Logistics Base
MCO	Marine Corps Order
MEK	Methyl Ethyl Ketone
NAVAIR	Naval Air Systems Command

<u>ACRONYM</u>	<u>DESCRIPTION</u>
NIOSH	National Institute of Occupational Safety and Health
NSN	National Stock Number
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PMB	Plastic Media Blasting
PPE	Personal Protective Equipment
PPM	Parts Per Million
PSI	Pound Force Per Square Inch
PSIG	Pound Force Per Square Inch Gauge
PUP	Polyurethane Paint
PWR	Prepositioned War Reserves
QDR	Quality Deficiency Report
SSPC	Steel Surface Painting Council
STEL	Short Time Exposure Limit
TAM	Table of Authorized Material
TB	Technical Bulletin
TDI	Toluene Diisocyanate
T/E	Table of Equipment
TLV	Threshold Limit Values
TM	Technical Manual
TWA	Time Weight Average
UV	Ultraviolet
VOC	Volatile Organic Compound
3-CCP	Three Color Camouflage Pattern

APPENDIX C
DEPOT MAINTENANCE ACTIVITIES WHICH CAN APPLY CARC

THIS IS A LIST OF POTENTIAL DEPOT MAINTENANCE ACTIVITIES WHICH ARE CAPABLE OF APPLYING CARC. AS THESE ARE INDUSTRIAL FUNDED ACTIVITIES, COORDINATION BETWEEN THE MARINE CORPS INTERMEDIATE MAINTENANCE ACTIVITY AND THE DEPOT MAINTENANCE ACTIVITY MUST BE MADE BEFORE THE SHIPMENT OF EQUIPMENT FOR PAINTING.

U.S. Army Depots

<u>Depot</u>	<u>Autovon (AV)</u>	<u>Mailing Address</u>
ANAD	694-6263	Commander Anniston Army Depot ATTN: SDSAN-DM-PE Anniston, AL 36201
CCAD	861-3243	Commander Corpus Christi Army Depot ATTN: SDSCC-MPI Corpus Christi, TX 78419
LEAD	570-9506	Commander Letterkenny Army Depot ATTN: SDSLE-MME Chambersburg, PA 17201
MZAD	Commercial: 496131696418 (West Germany)	Commander Mainz Army Depot ATTN: SDSMZ-FMD-FF APO New York, NY 09185
NCAD	977-6332	Commander New Cumberland Army Depot ATTN: SDSNC-TP-P New Cumberland, PA 17070

U.S. Army Depots (Continued)

<u>Depot</u>	<u>Autovon (AV)</u>	<u>Mailing Address</u>
RRAD	829-3658	Commander Red River Army Depot ATTN: SDSRR-ME Texarkana, TX 75507
SAAD	839-3301	Commander Sacramento Army Depot ATTN: SDSSA-MPE-2 Sacramento, CA 95813
SEAD	489-8277	Commander Seneca Army Depot ATTN: SDSSE-NO Romulus, NY 14541
SHAD	462-2548	Commander Sharpe Army Depot ATTN: SDSSH-SPC Lathrop, CA 95331
SIAD	830-9117	Commander Sierra Army Depot ATTN: SDSSI-DSW Herlong, CA 96113
TOAD	795-7008	Commander Tobyhanna Army Depot ATTN: SDSTO-ME-E Tobyhanna, PA 18466

U.S. Army Depots (Continued)

<u>Depot</u>	<u>Autovon (AV)</u>	<u>Mailing Address</u>
TEAD	790-2918	Commander Tooele Army Depot ATTN: SDSTE-MAE-S Tooele, UT 84074
LBAD	745-3847	Commander Lexington-Blue Grass Army Depot ATTN: SDSLB-MA Lexington, KY 40507

U.S. Navy Facilities

- o Any Naval Air Rework Facility (NARF)
- o Any Ship Rework Facility (SRF)

APPENDIX D

ARRANGEMENT AND LOCATION OF REGISTRATION
AND IDENTIFICATION MARKINGS

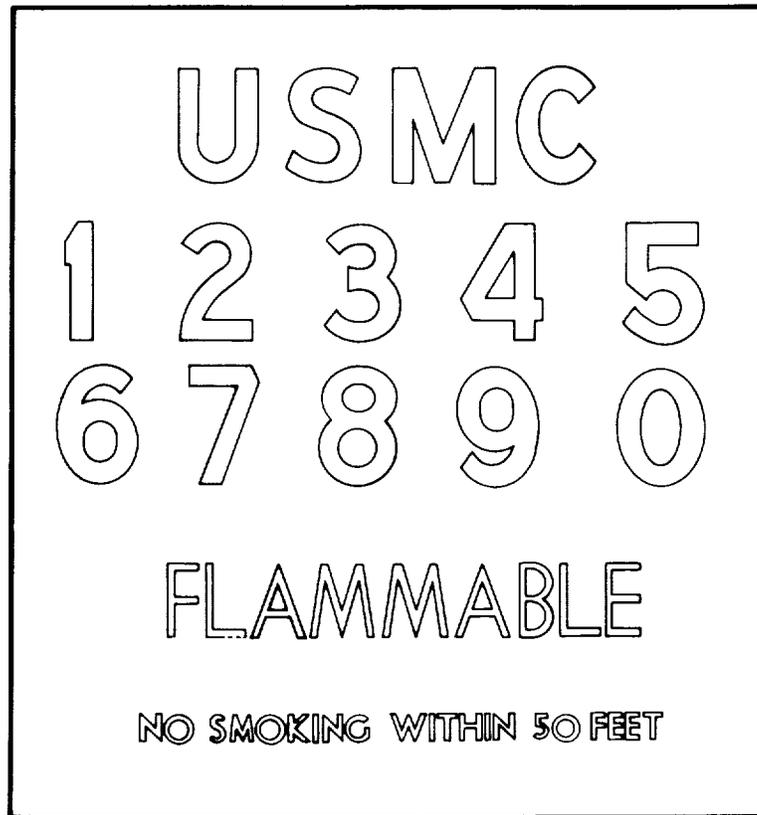


Figure D-1. Letters and Numbers

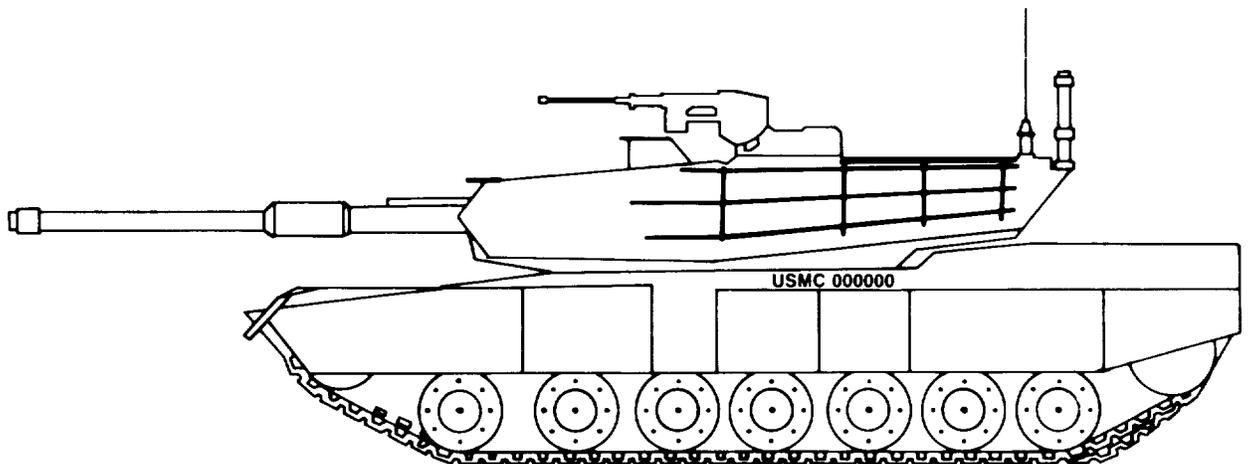


Figure D-2. Tank.

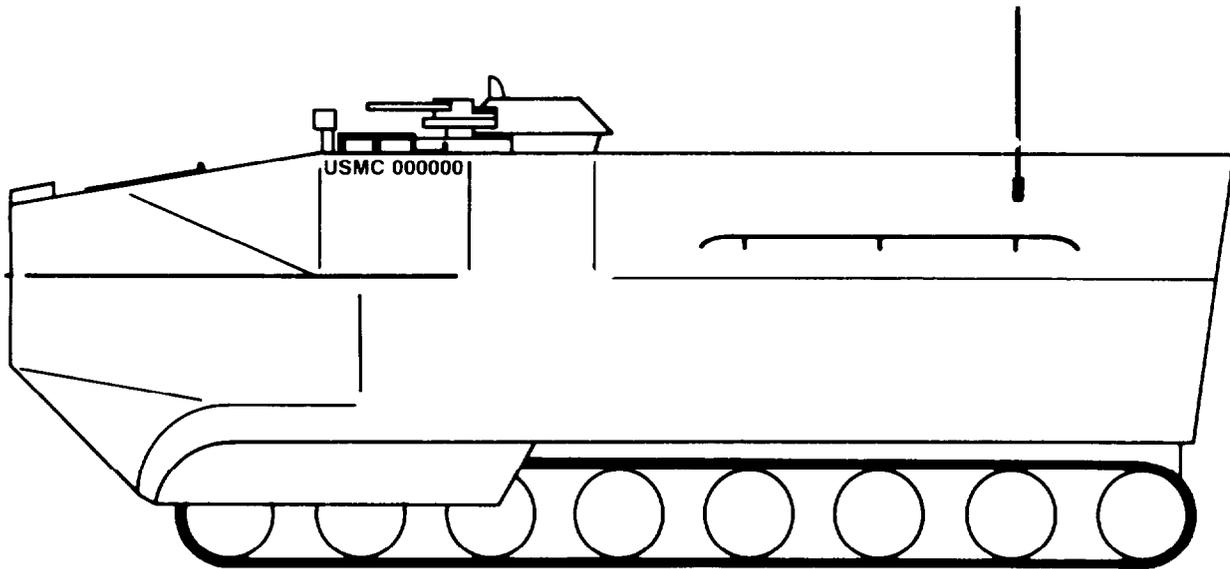


Figure D-3. AAV.

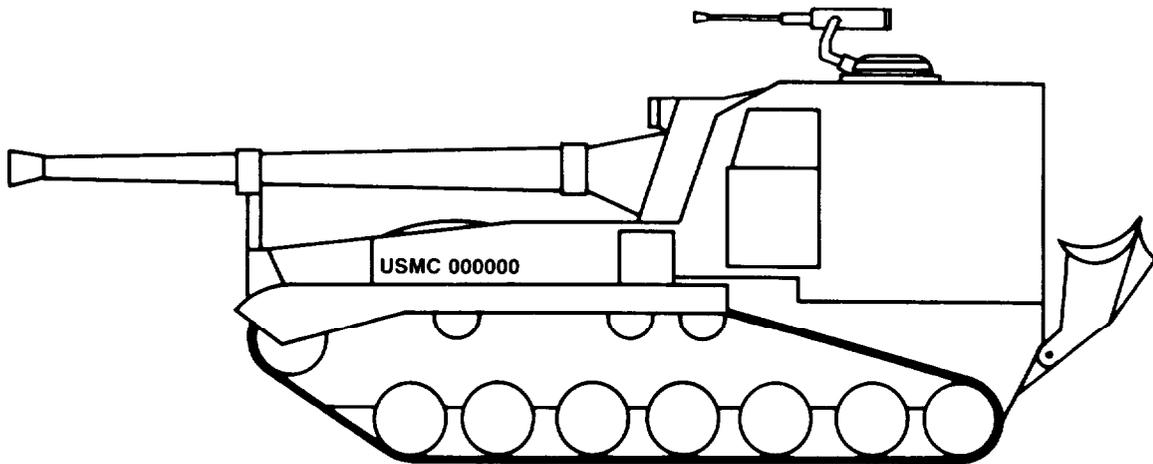


Figure D-4. Self Propelled Howitzers/Guns.

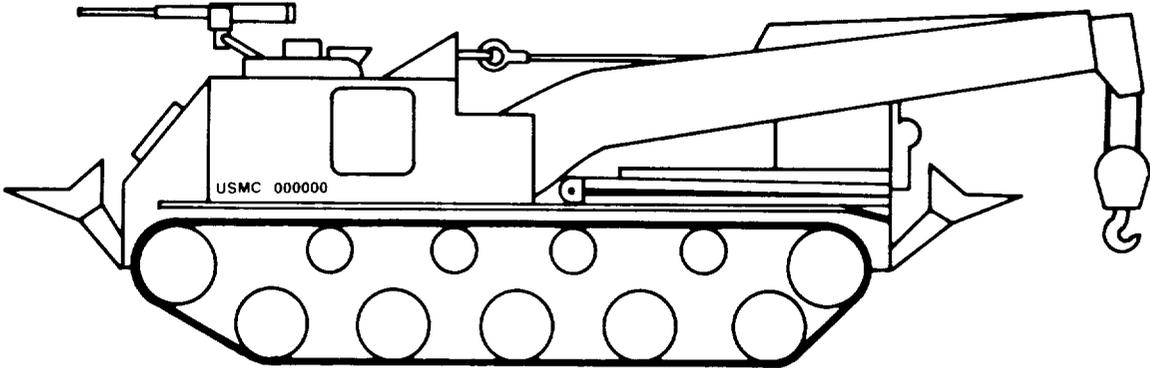


Figure D-5. Recovery Vehicle

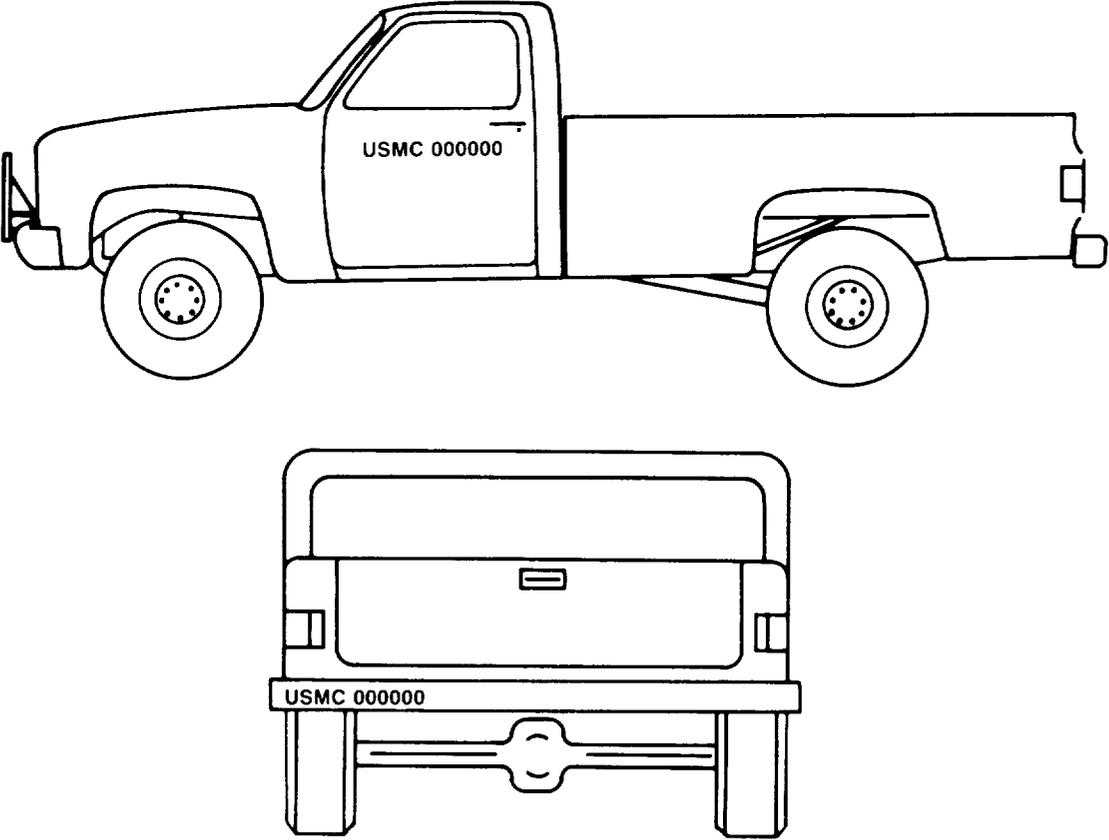


Figure D-6. Trucks.

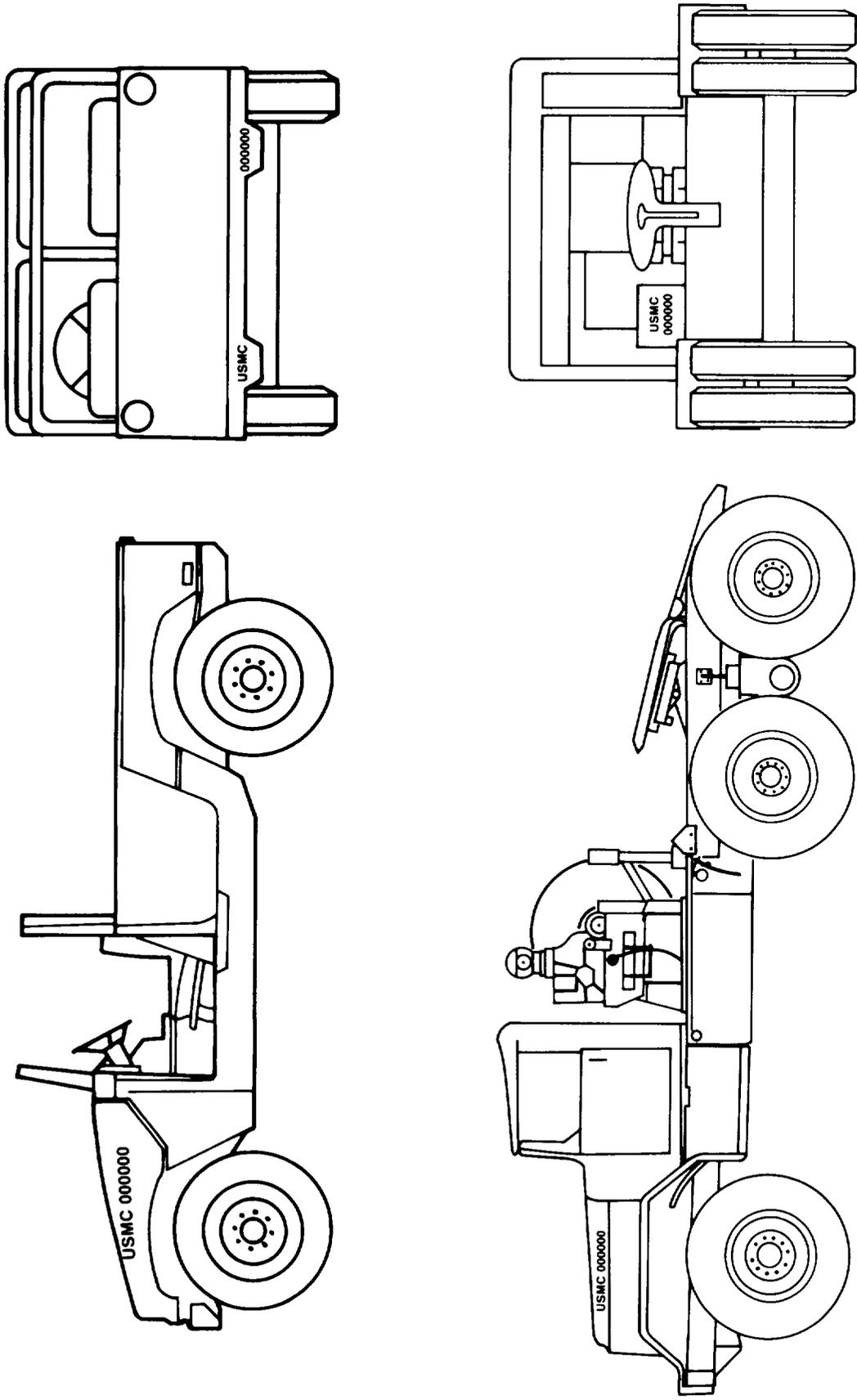


Figure D-7. Trucks

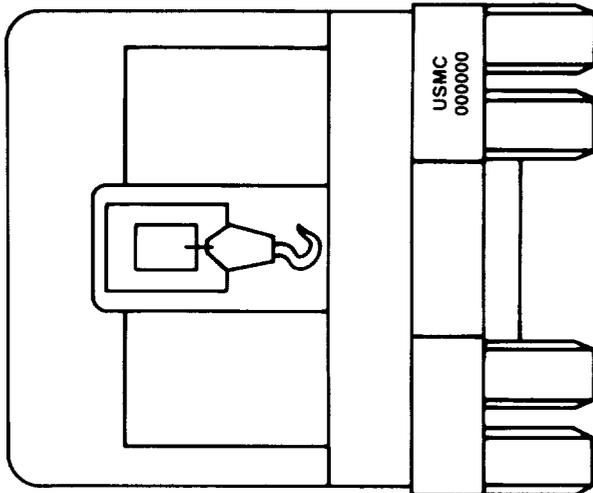
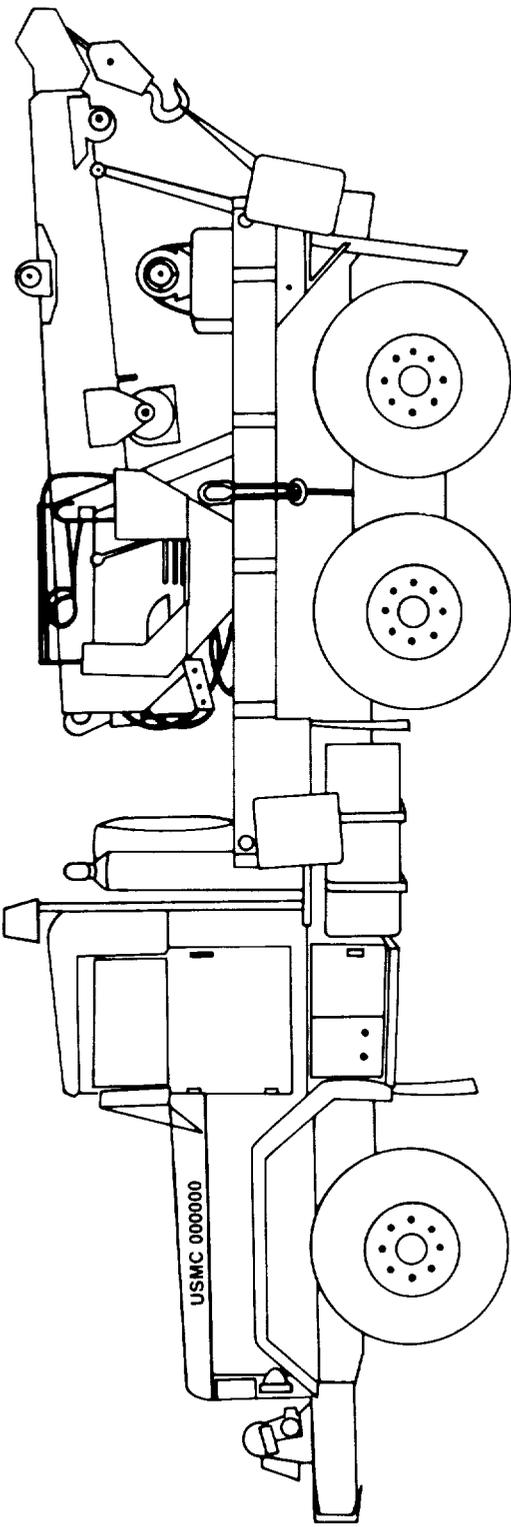


Figure D-8. Trucks

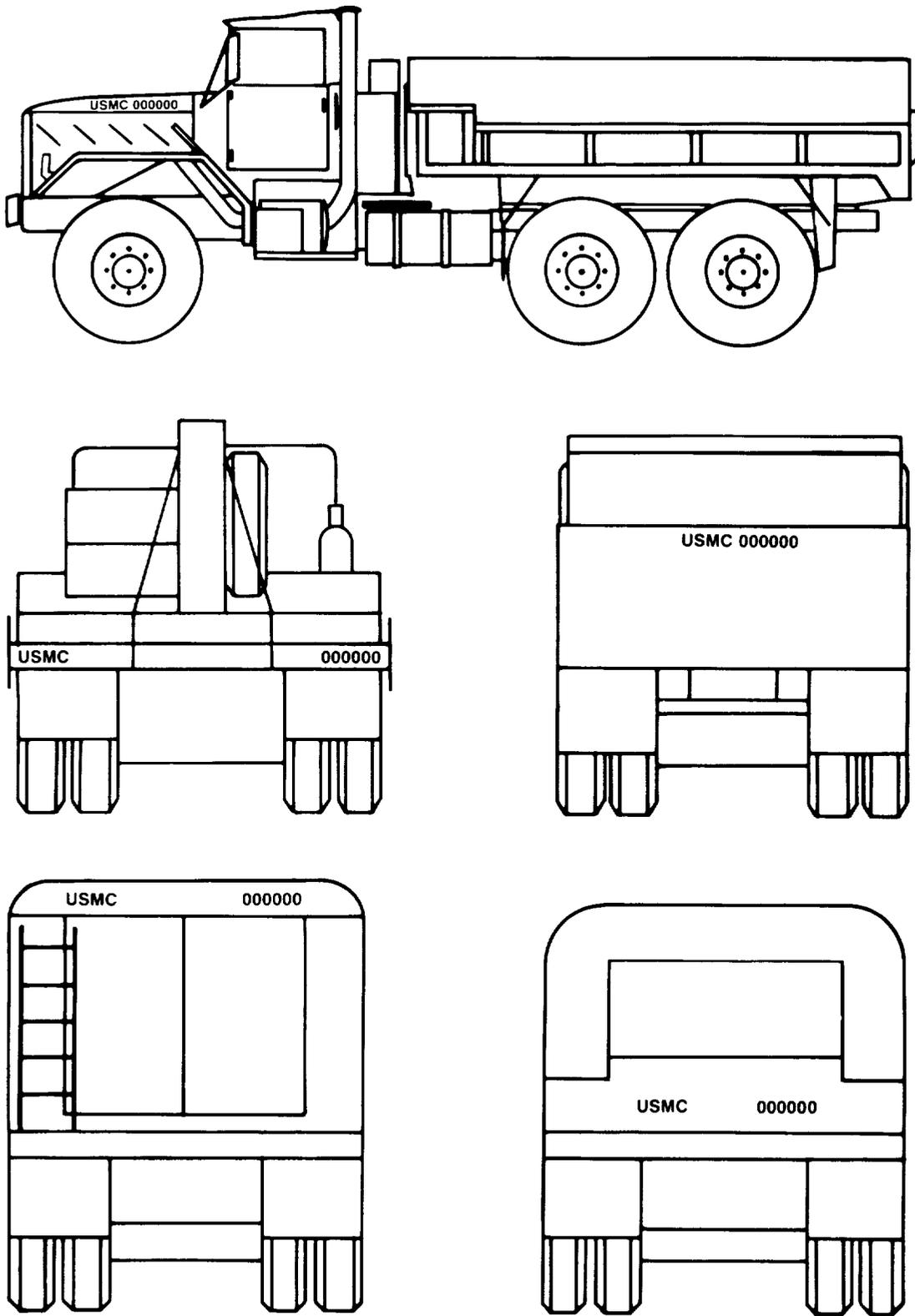


Figure D-9. Trucks.

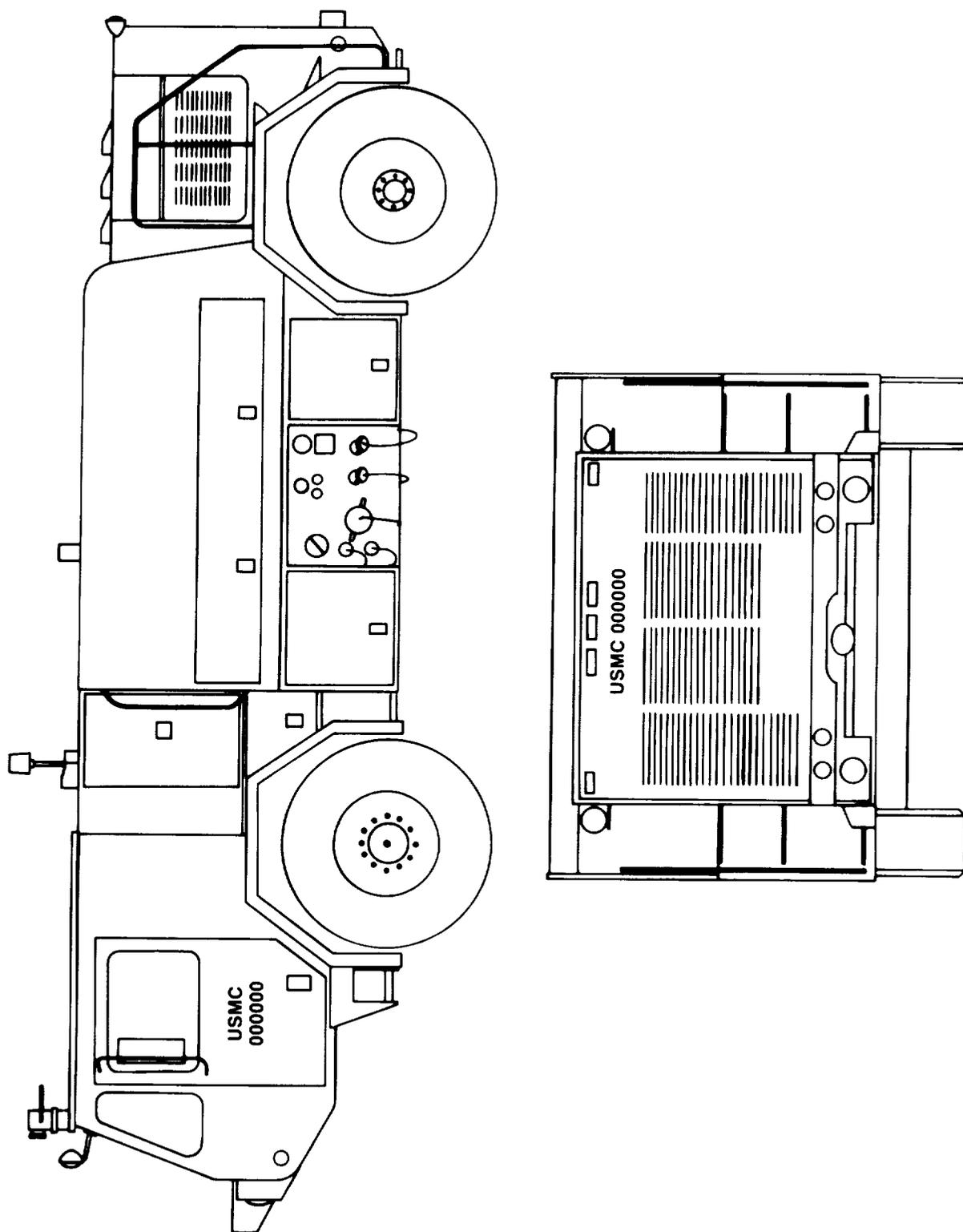


Figure D-10. Crash, Fire, Rescue Trucks

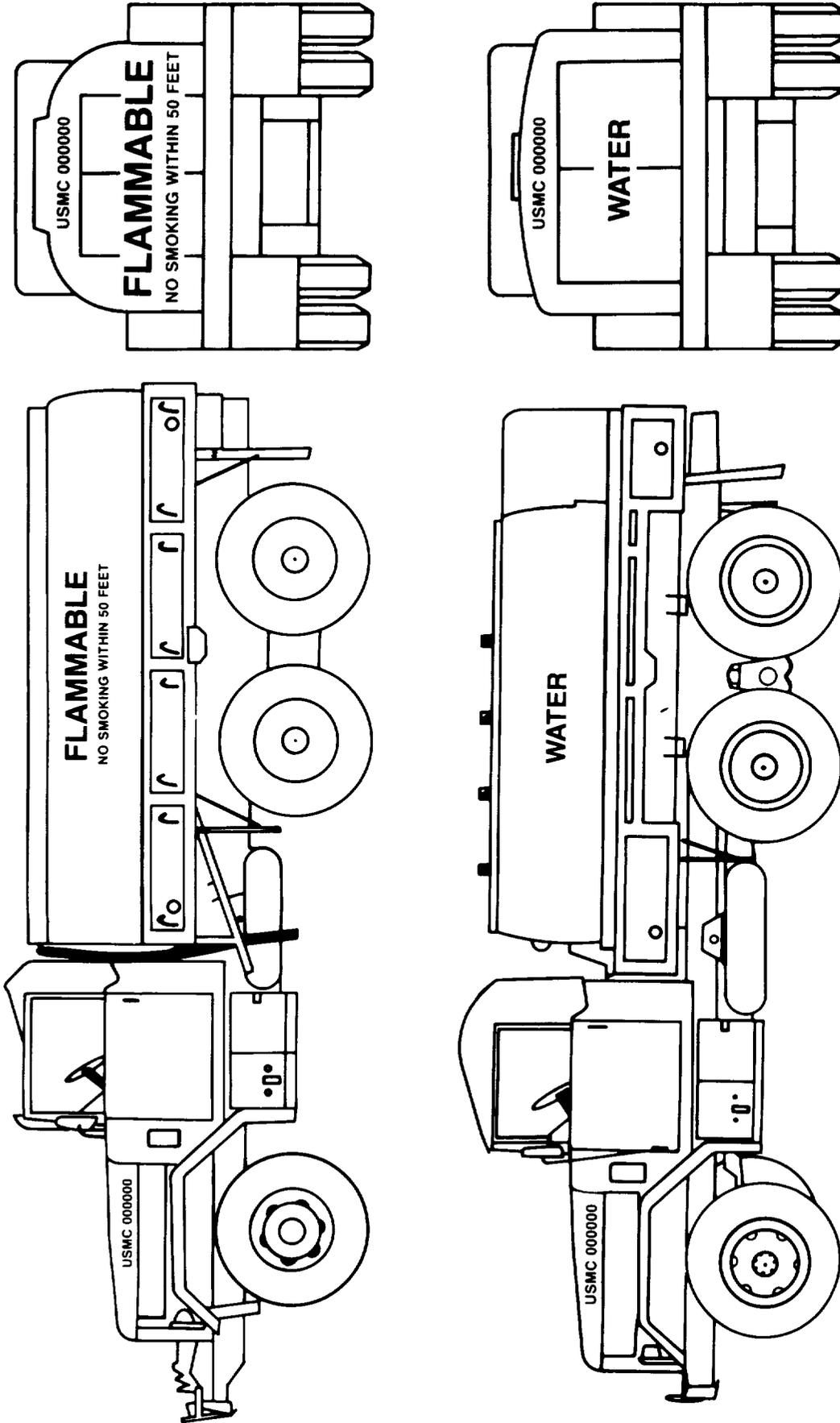


Figure D-11. Tanker Truck

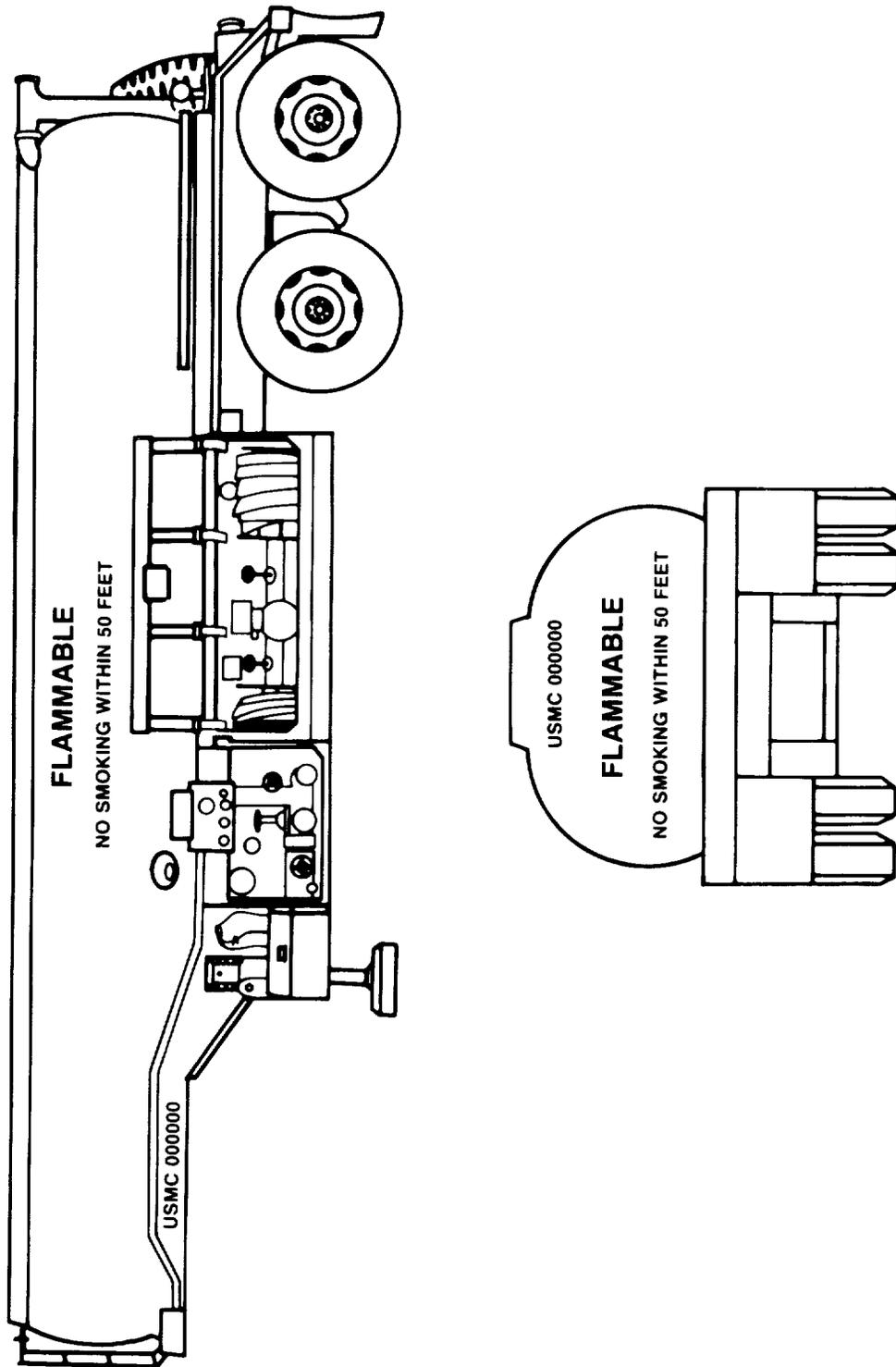


Figure D-12. Semitrailers

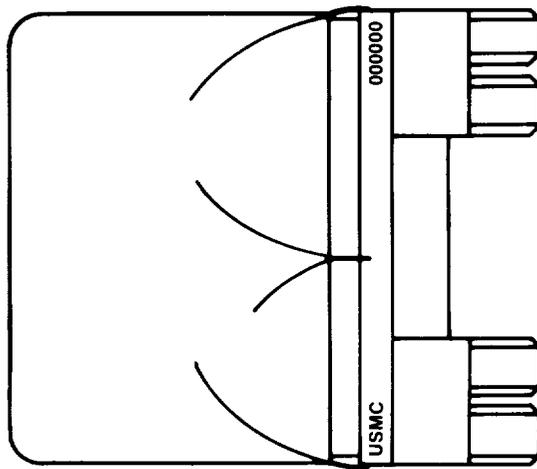
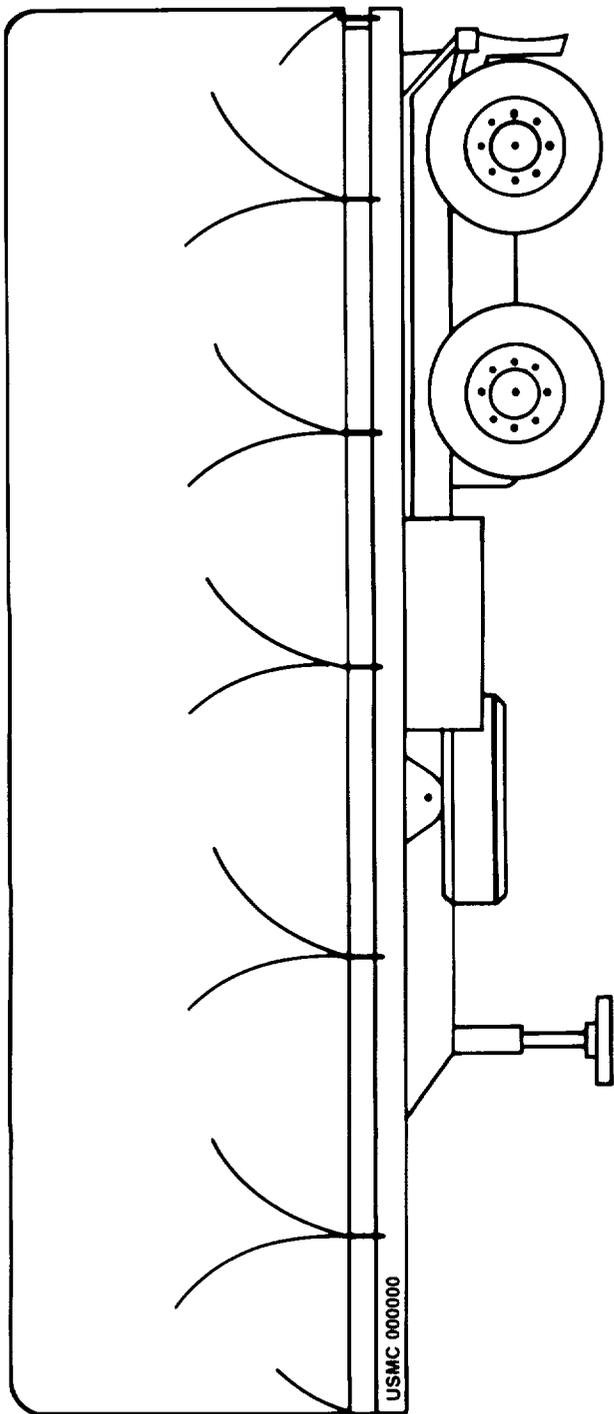


Figure D-13. Semitrailers

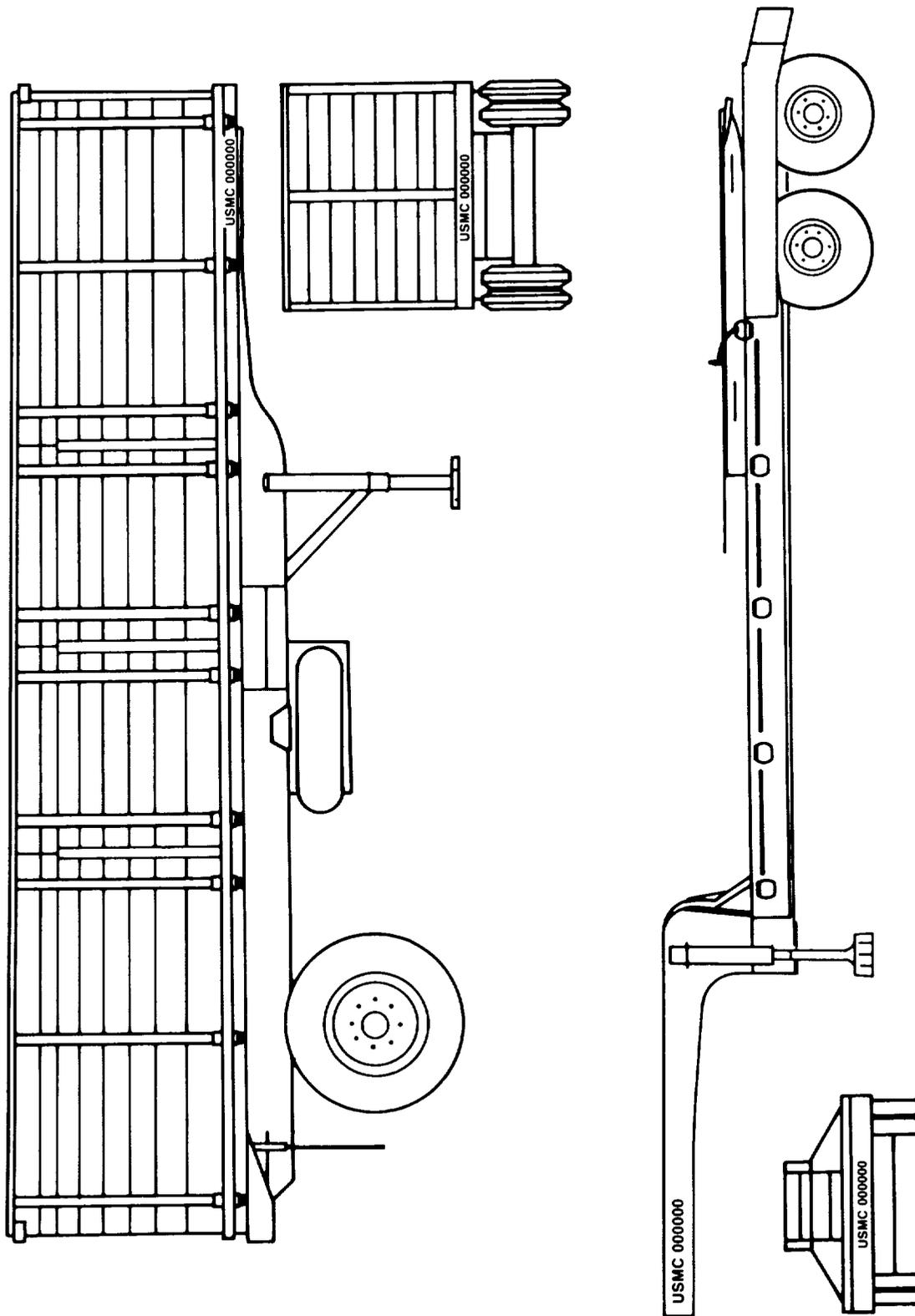


Figure D-14. Semitrailers

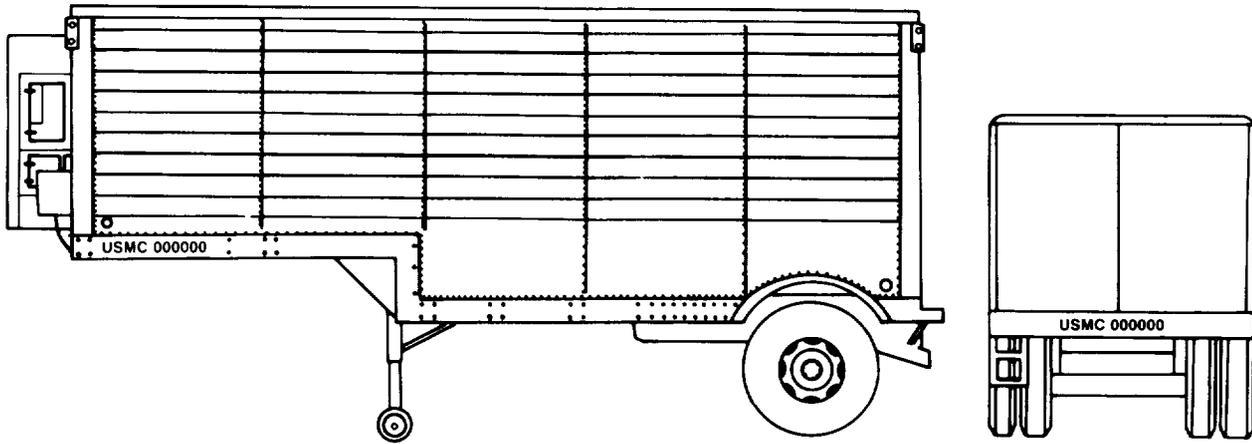


Figure D-15. Semitrailers.

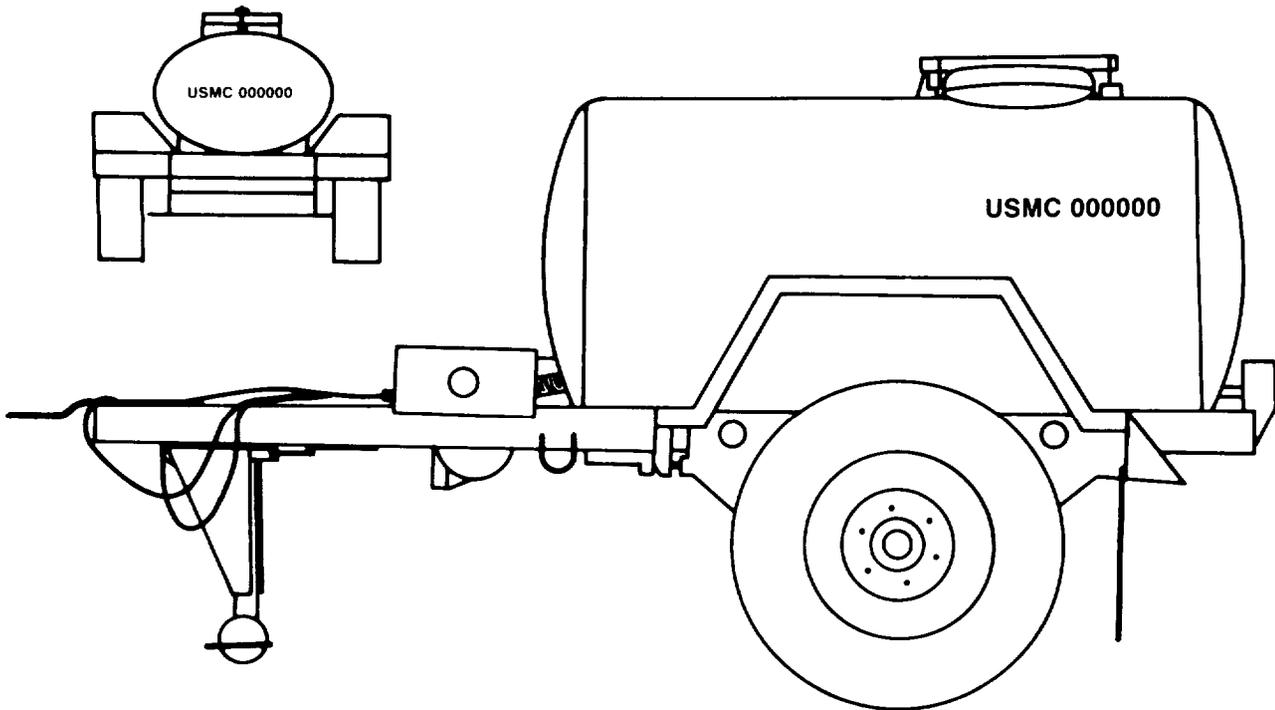
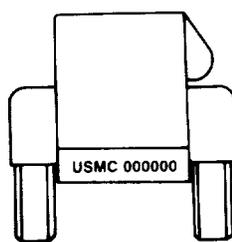
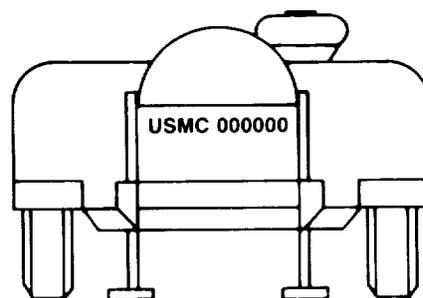
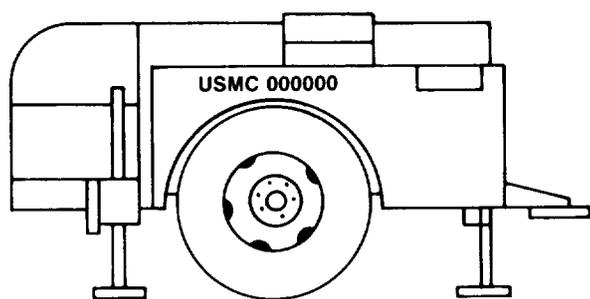


Figure D-16. Trailer.



Lube and Service Unit



Shower Unit

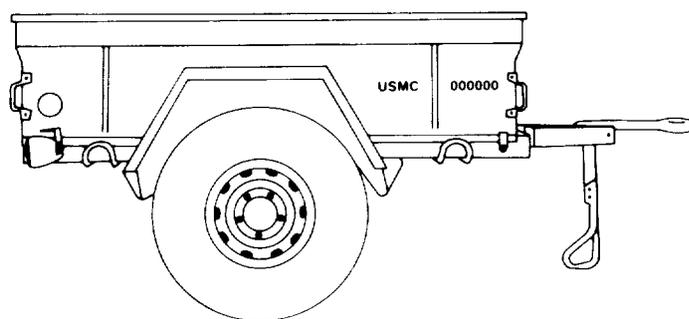
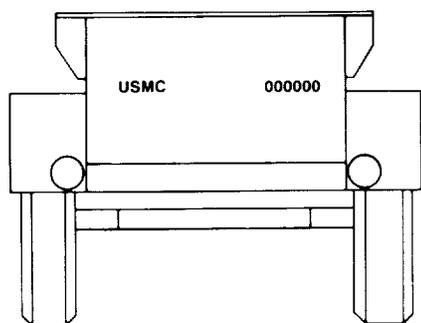
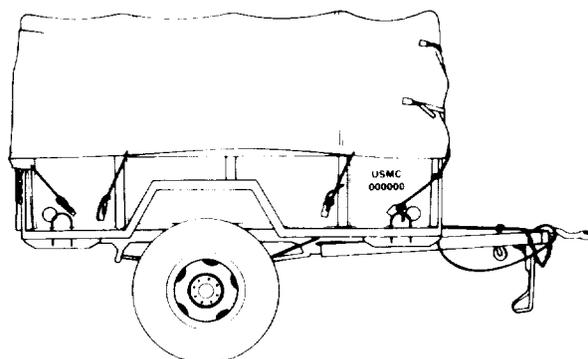
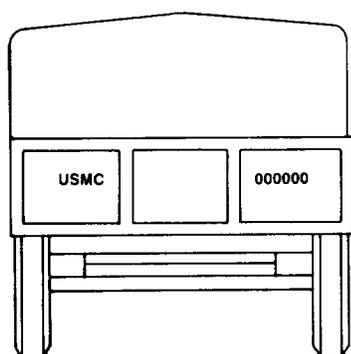


Figure D-17. Trailers.

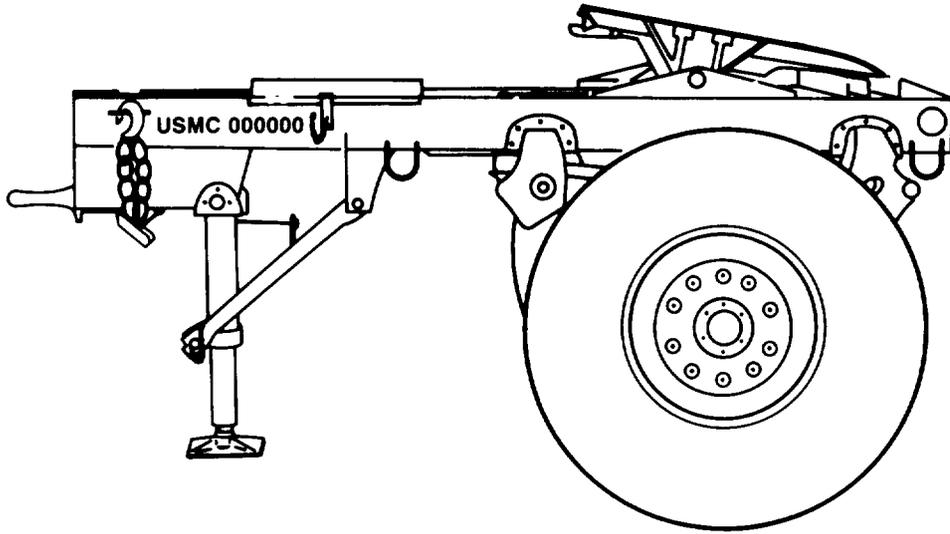


Figure D-18. Dolly Converter.

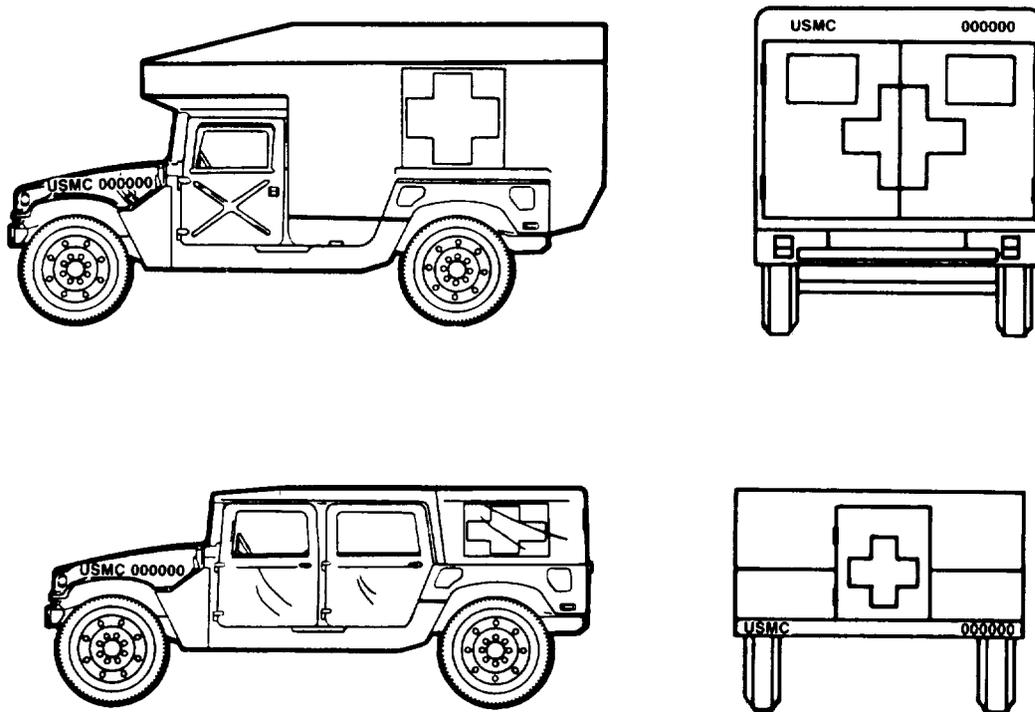


Figure D-19. Ambulances.

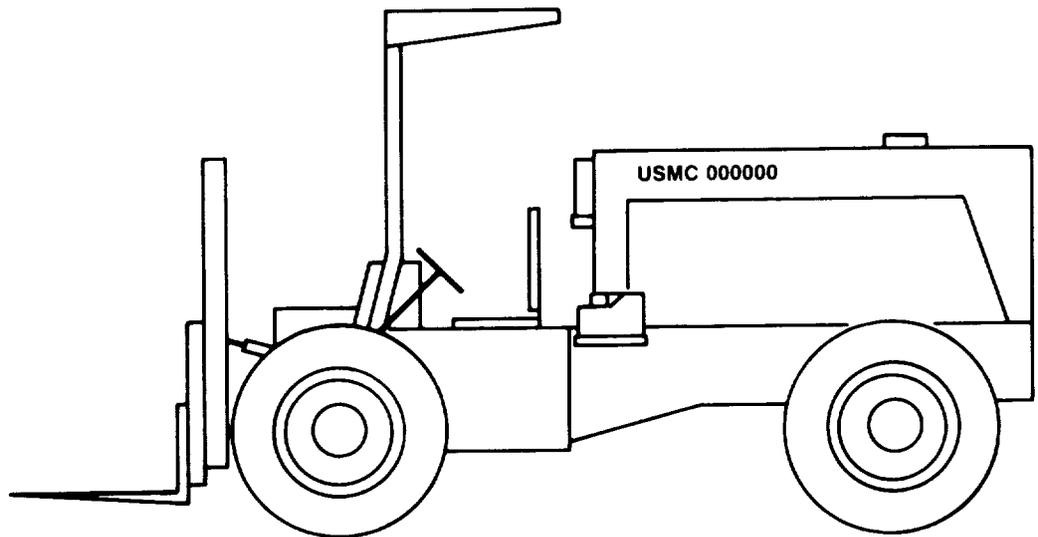
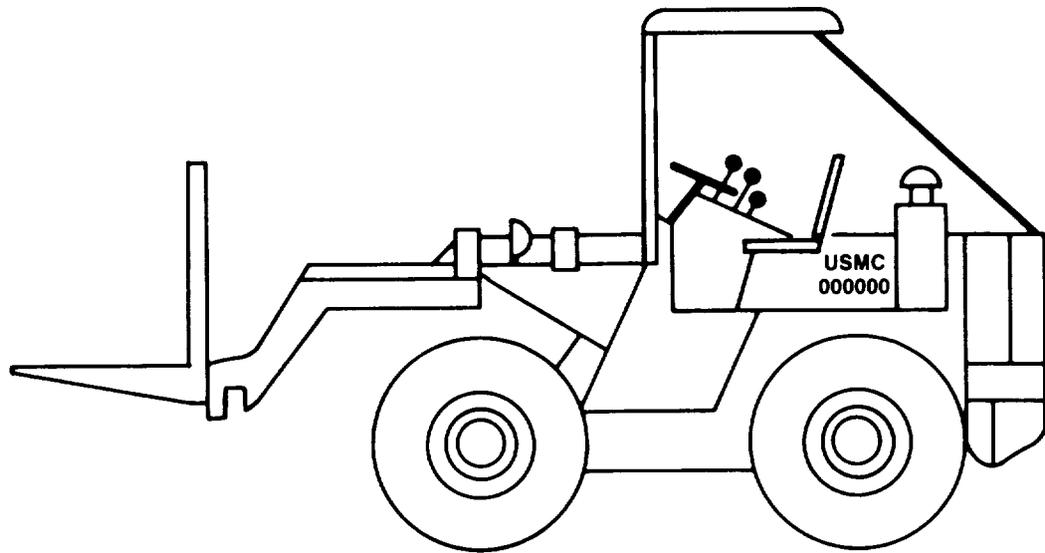


Figure D-20. Forklifts.

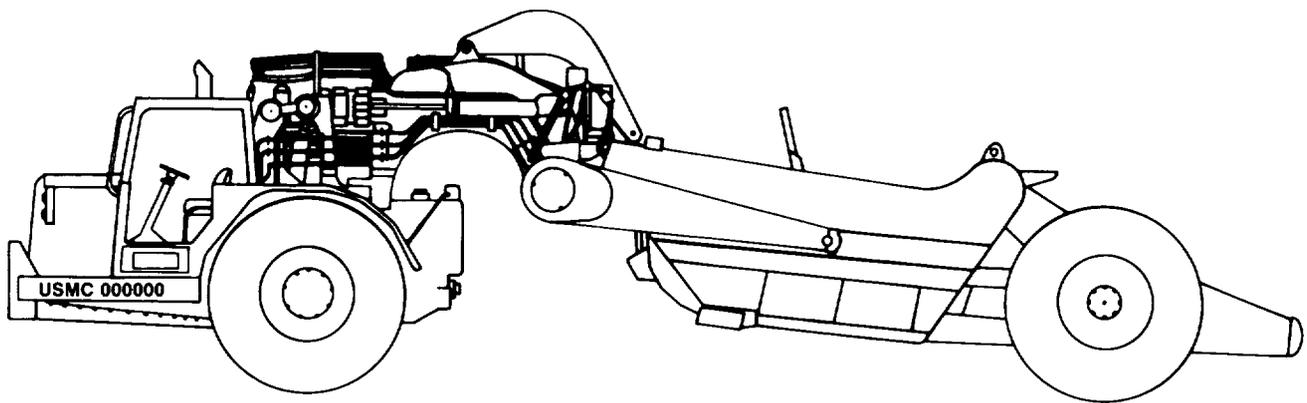


Figure D-21. Tractor, Scraper.

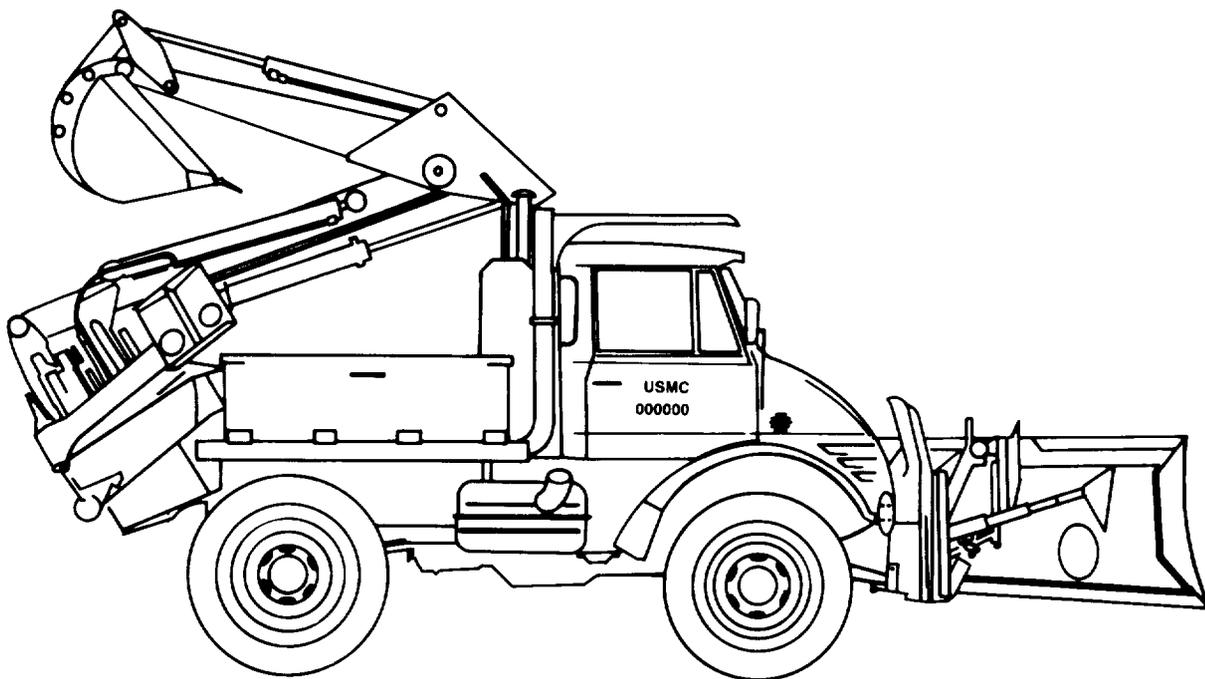


Figure D-22. Tractor, Rough Terrain, Wheeled, Industrial.

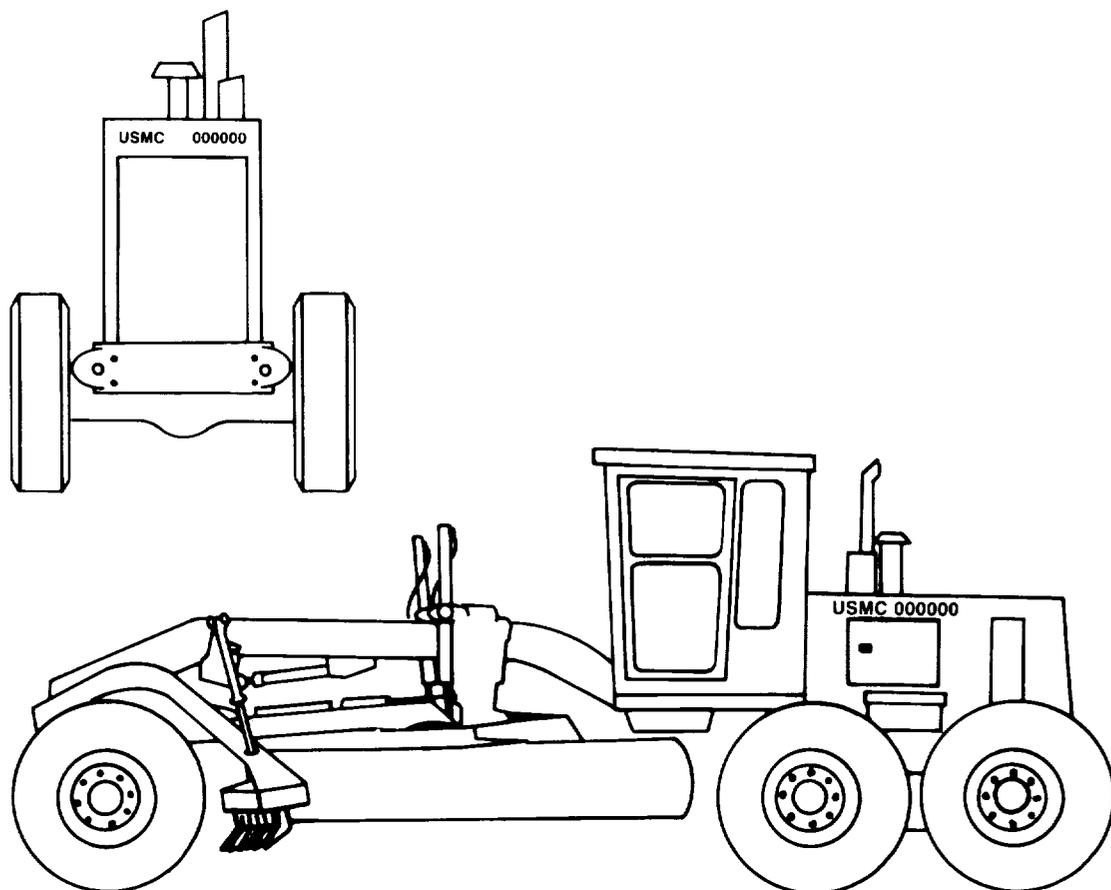


Figure D-23. Grader

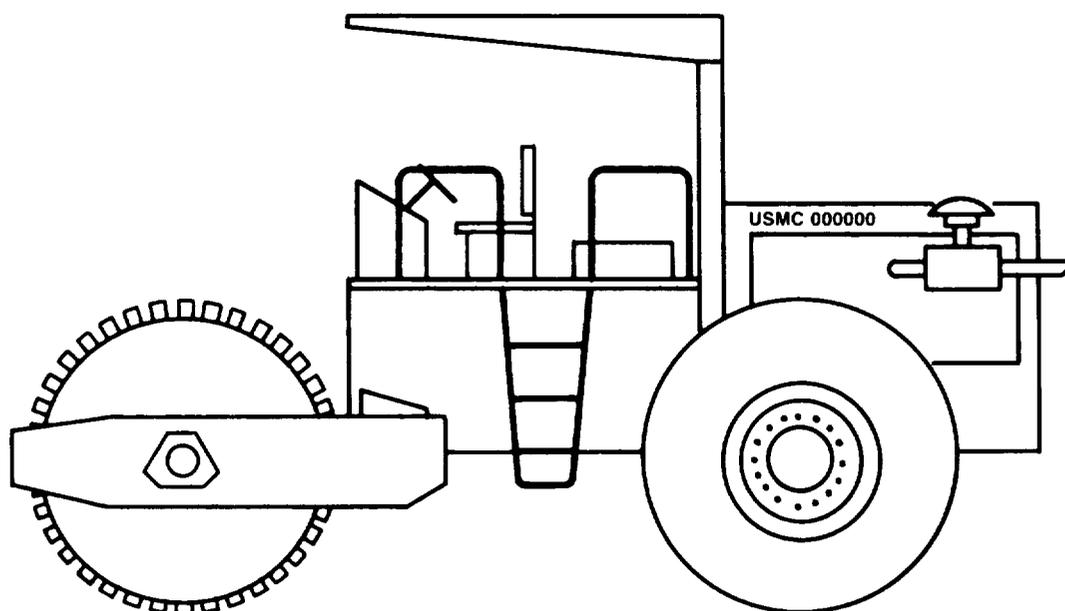
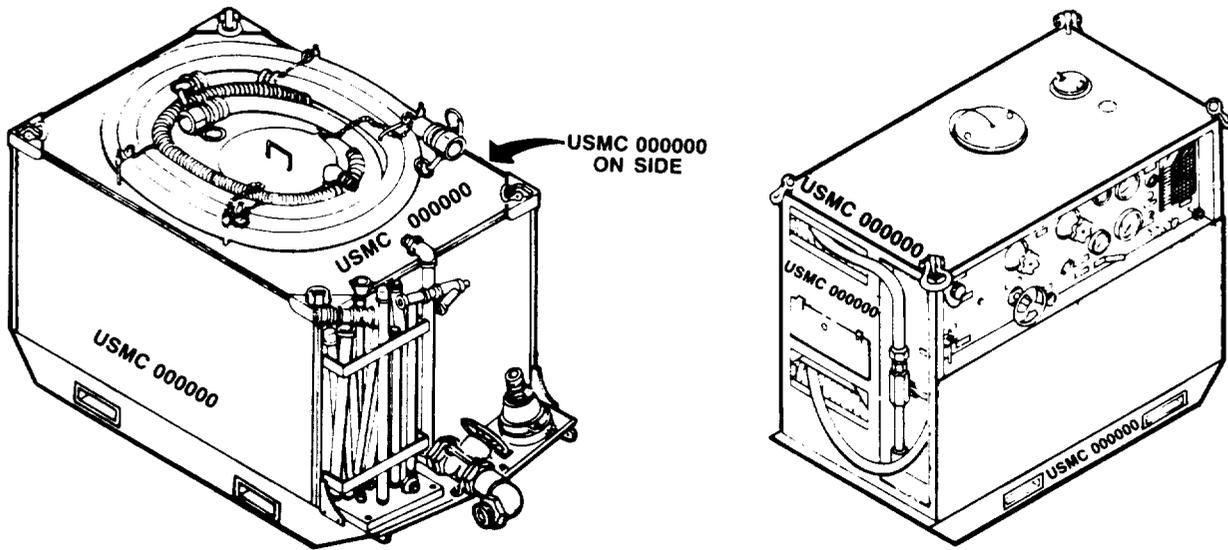
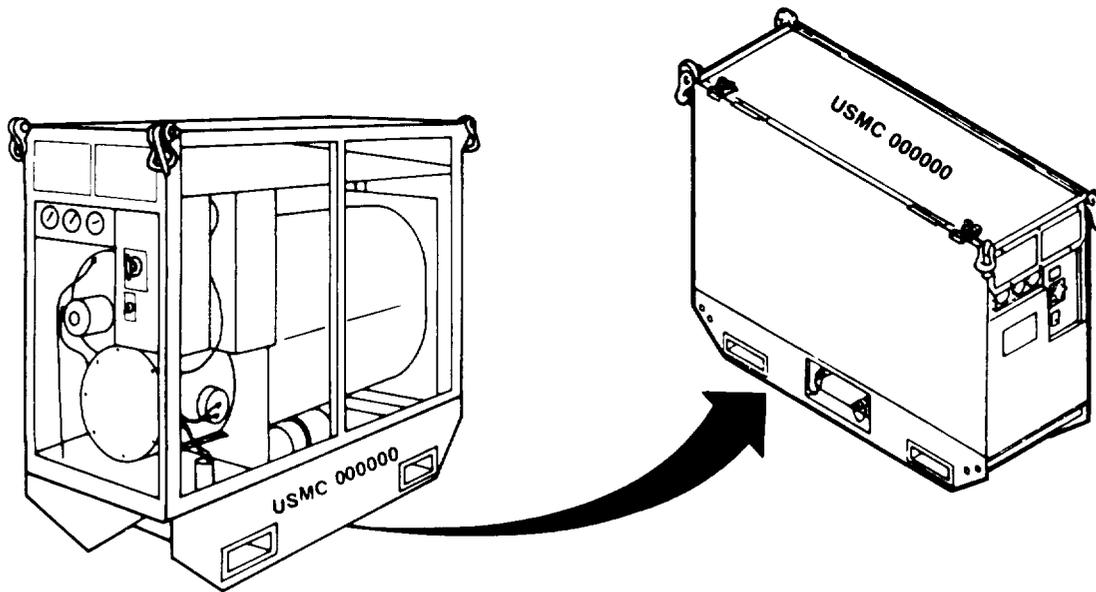


Figure D-24. Roller



TANK UNIT ASSEMBLY

PUMP UNIT ASSEMBLY



M2 SKID-MOUNTED, LIQUID FUEL WATER HEATER

Figure D-25. Skid-Mounted Decontamination Apparatus.

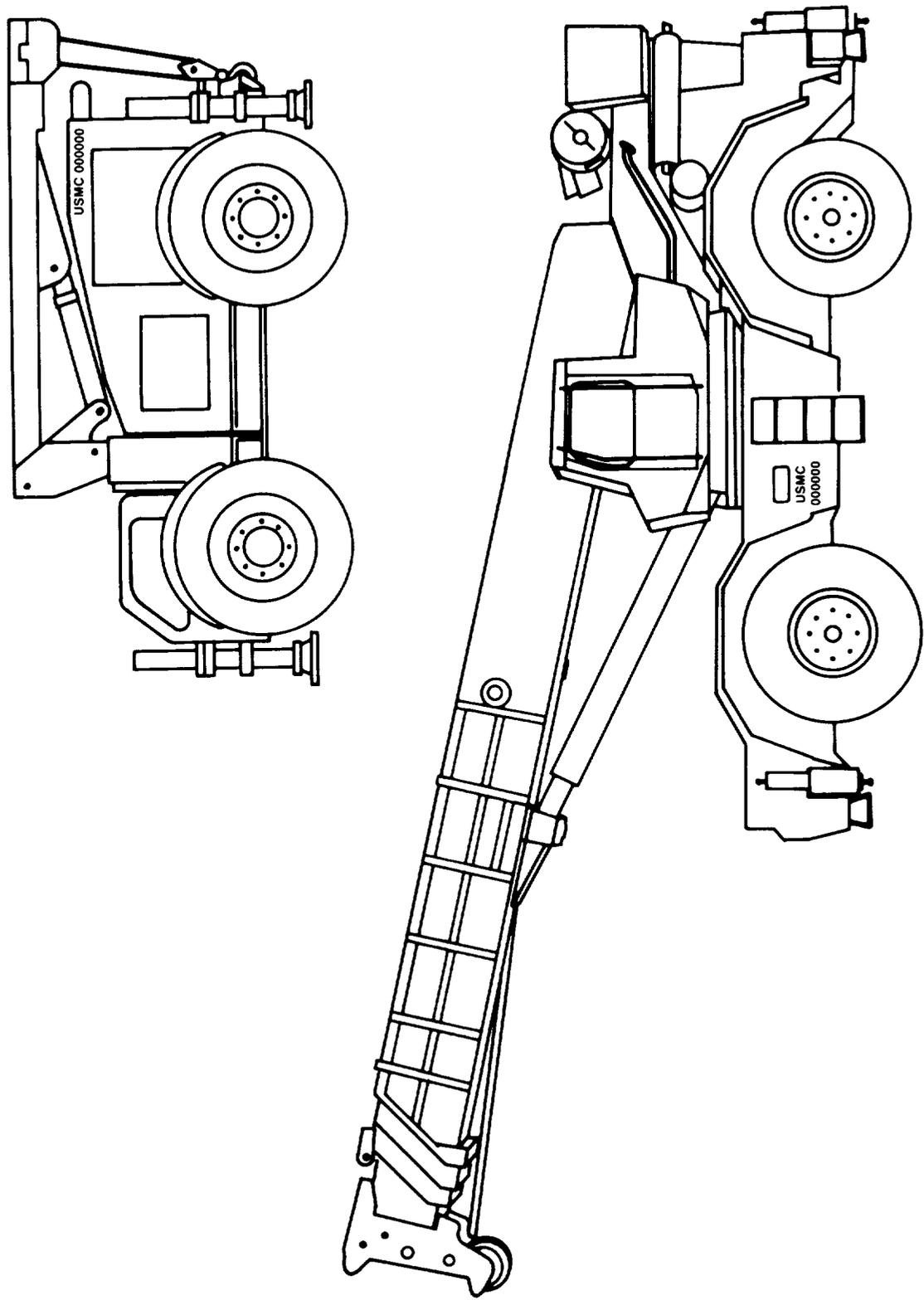


Figure D-26. Cranes

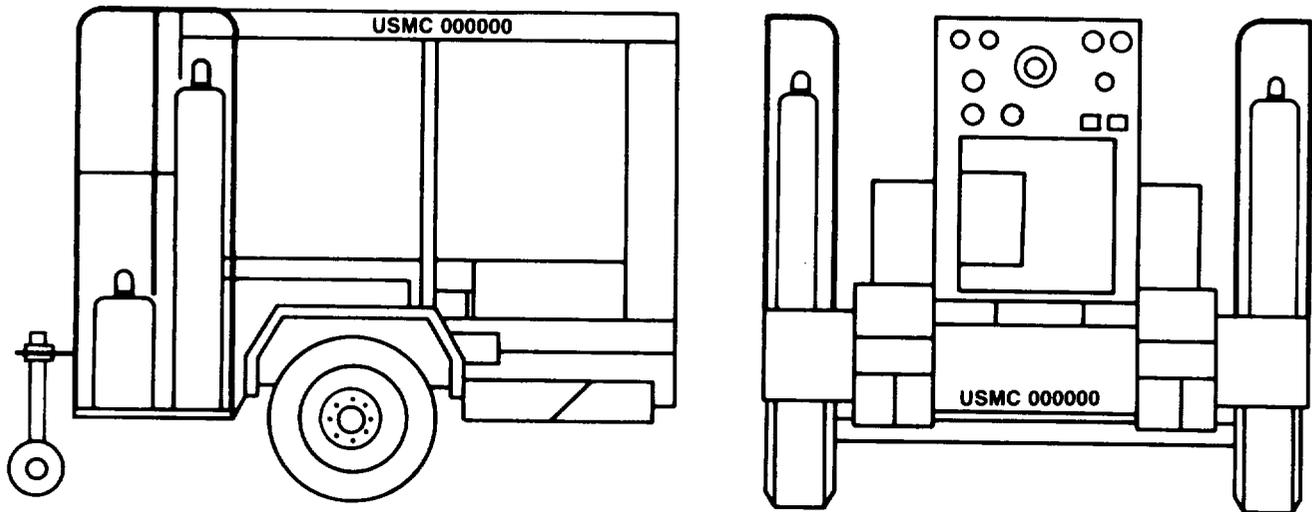


Figure D-7. Welder.

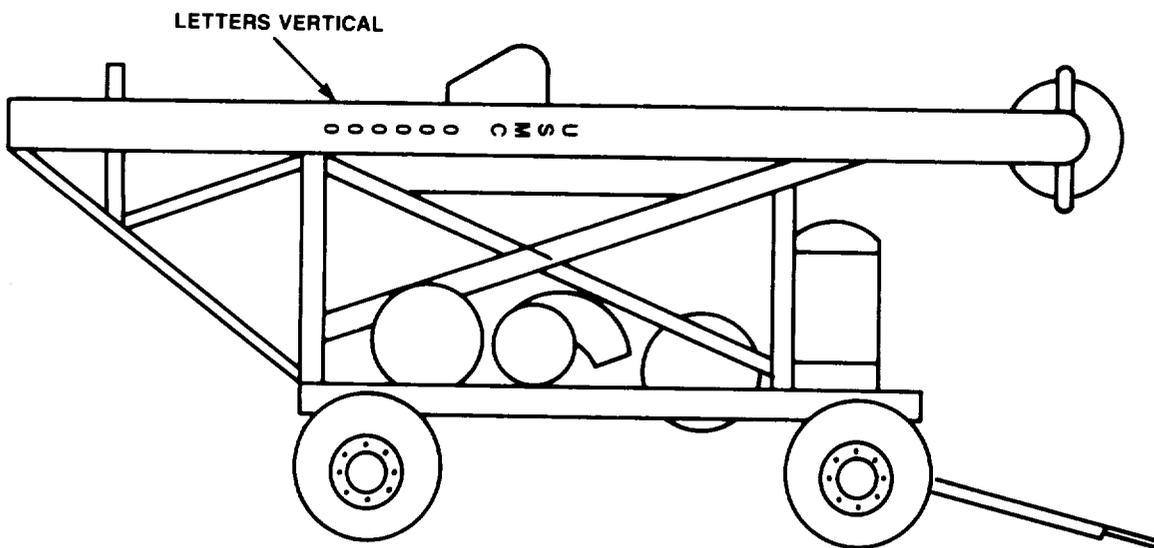


Figure D-28. Well Rig.

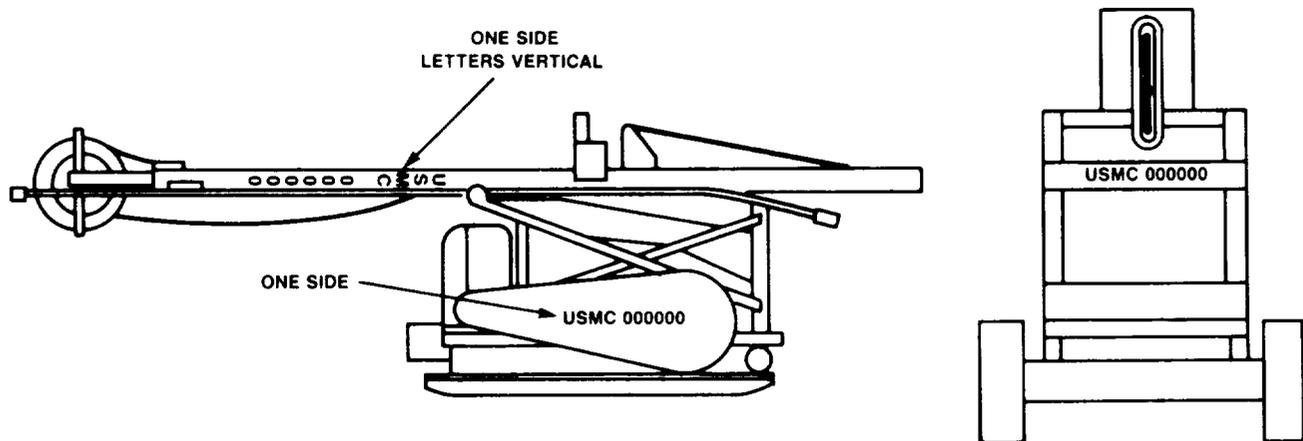


Figure D-29. Drill Rig Percussion

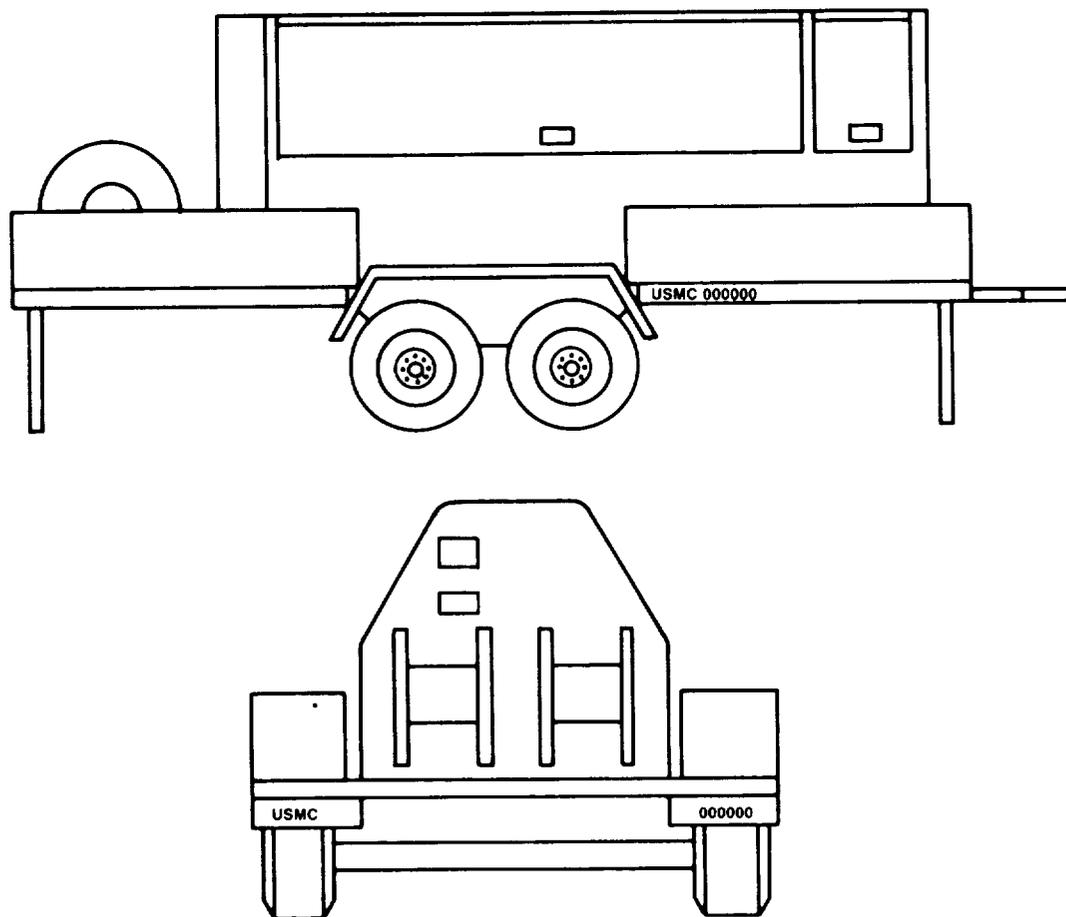


Figure D-30. Air Compressor.

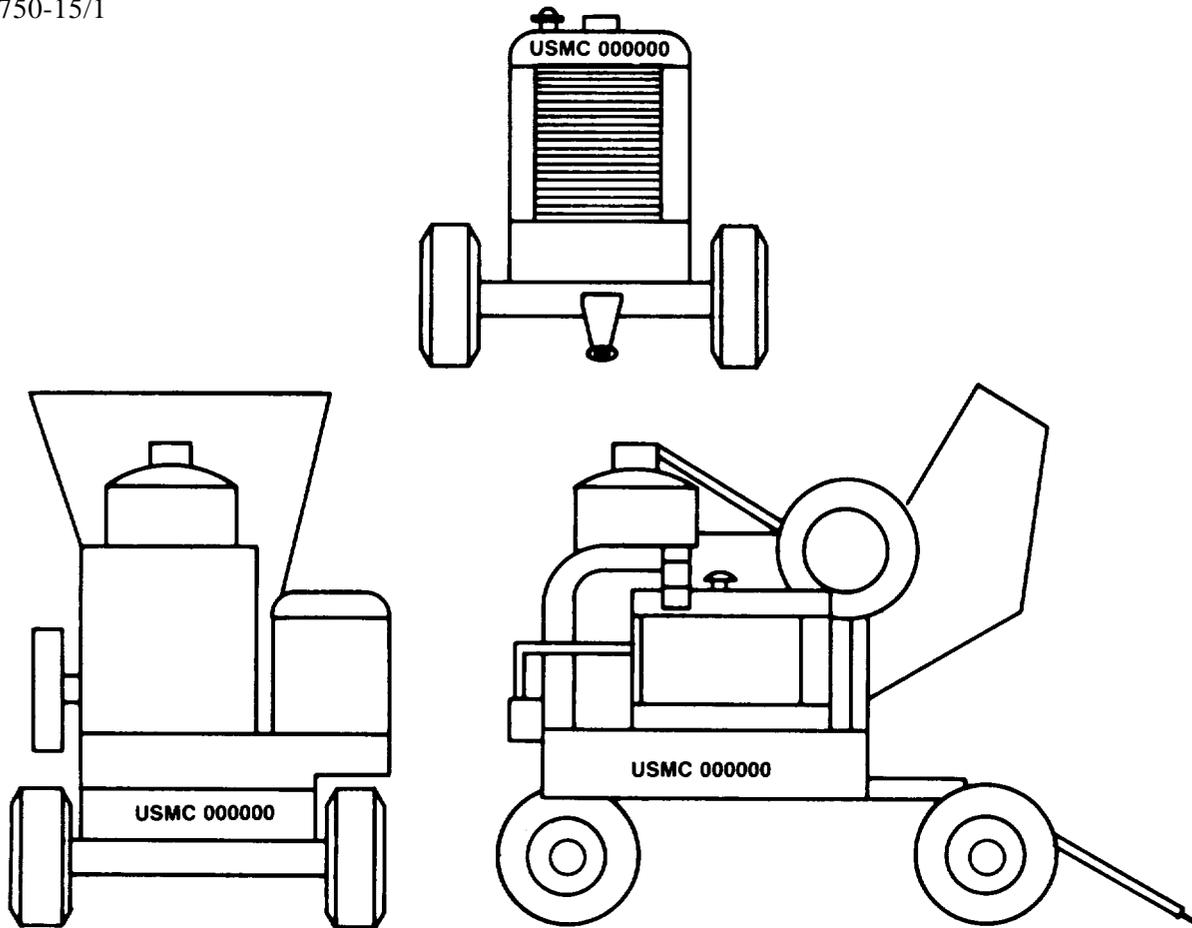


Figure D-31. Cement Mixer

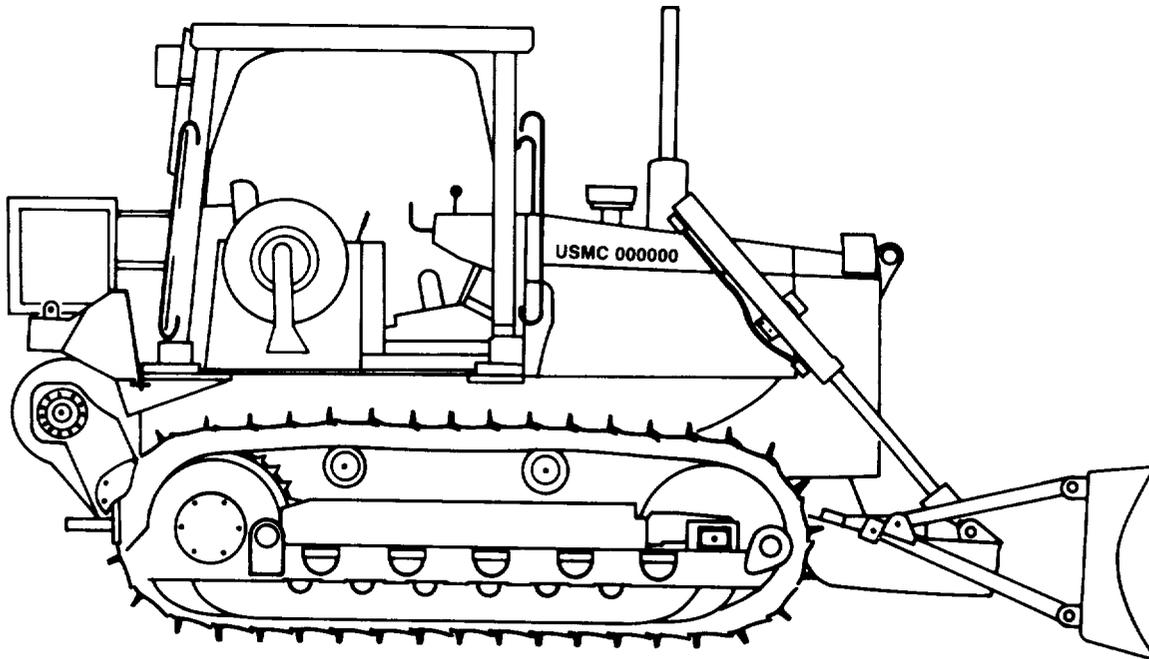


Figure D-32. Tractor.

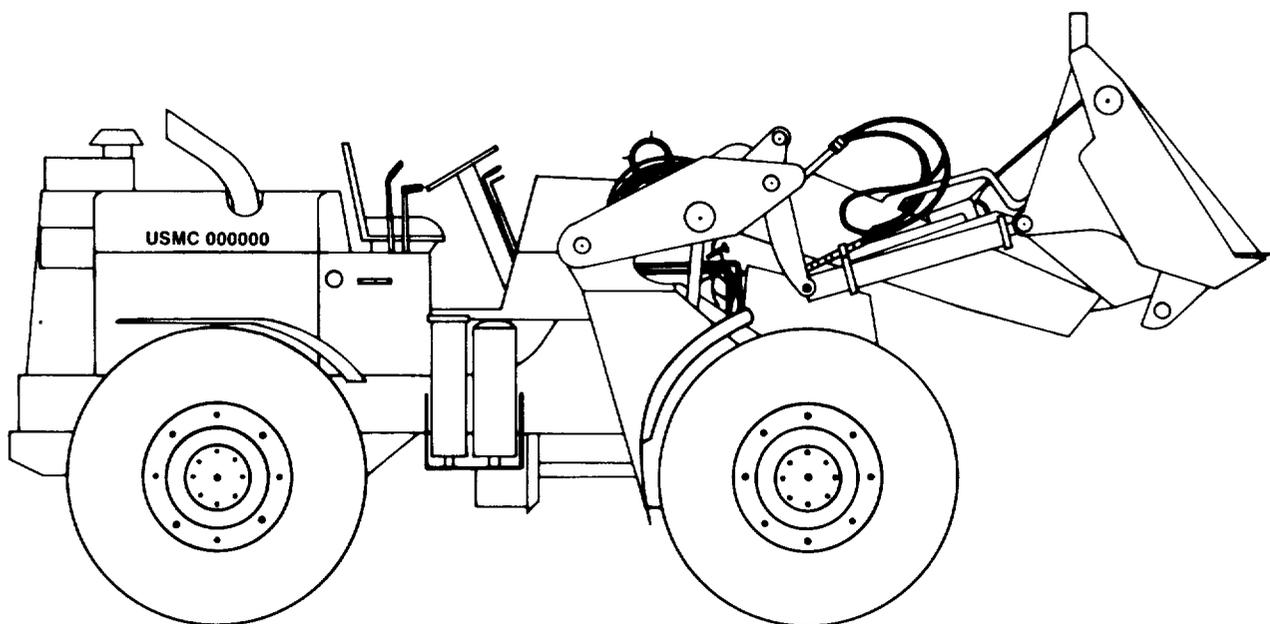


Figure D-33. Loader.

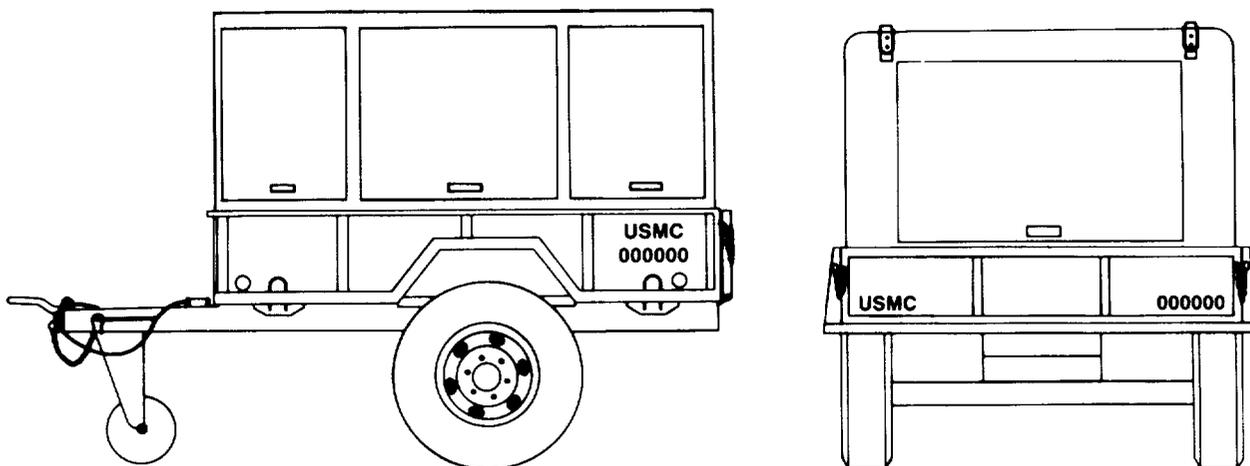


Figure D-34. Repair Trailer, Textile.

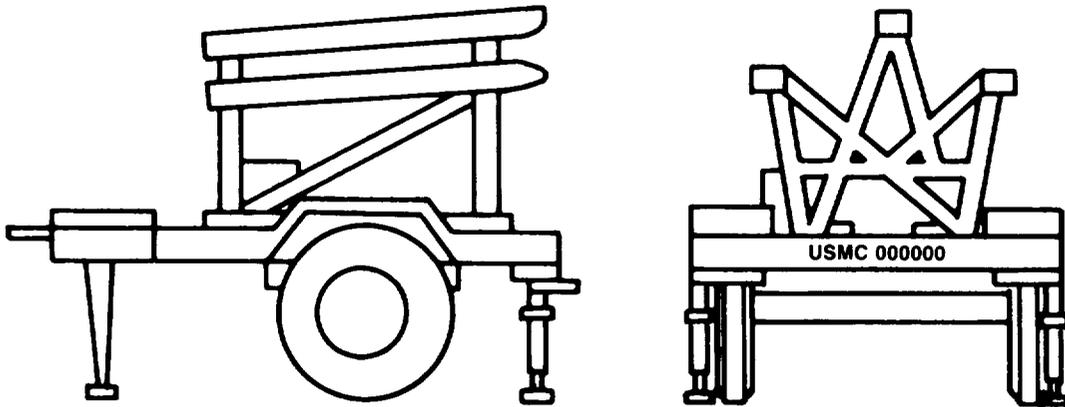


Figure D-35. HAWK M502E2 GM Trailer

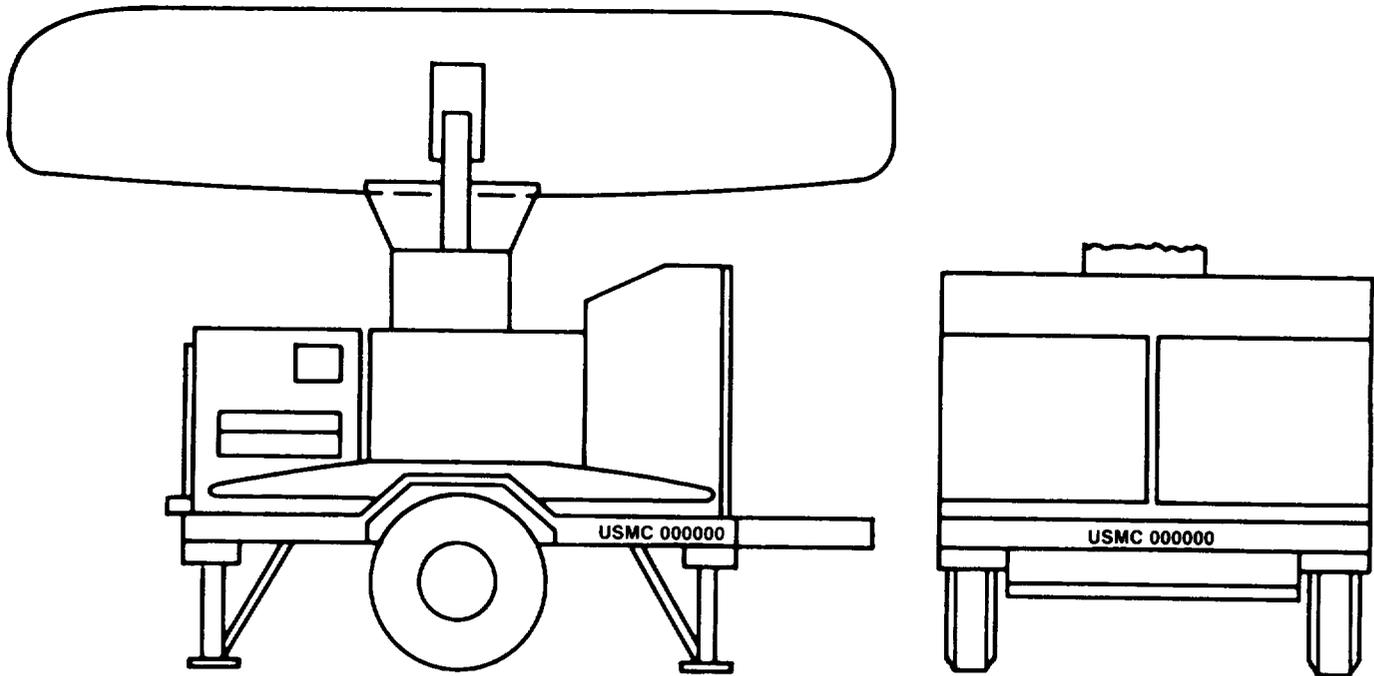


Figure D-36. HAWK AN/MPQ-50 X 02.

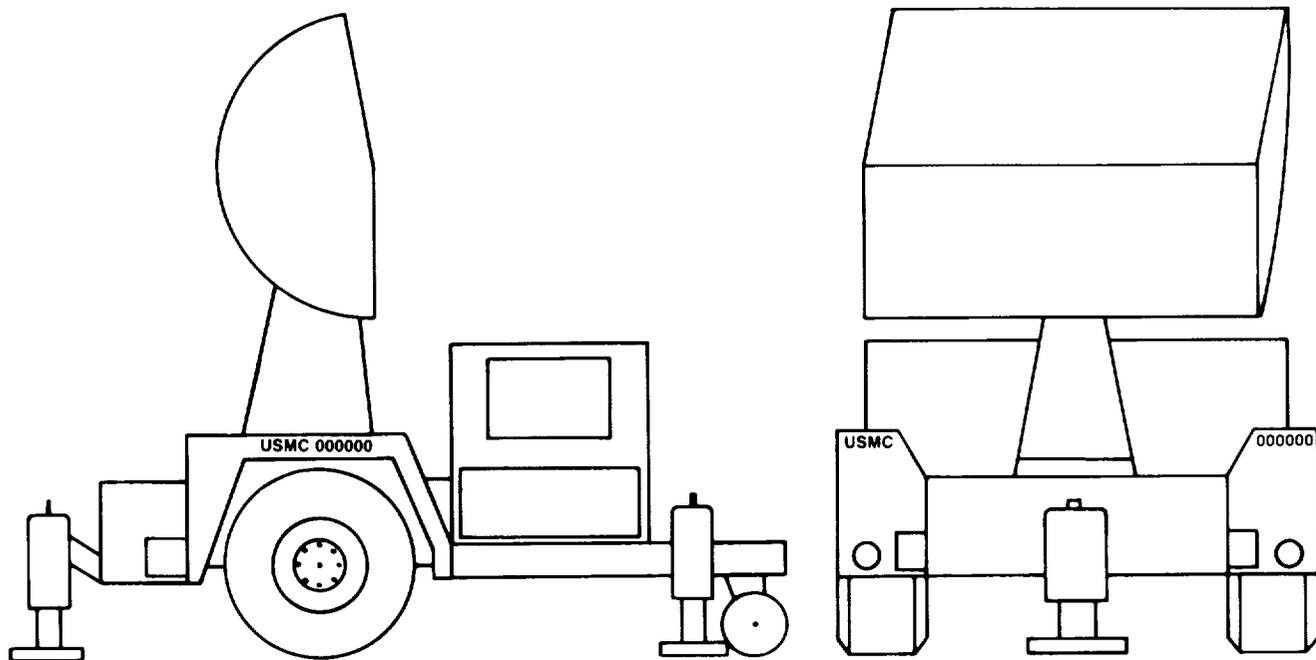


Figure D-37. HAWK AN/MPQ-55.

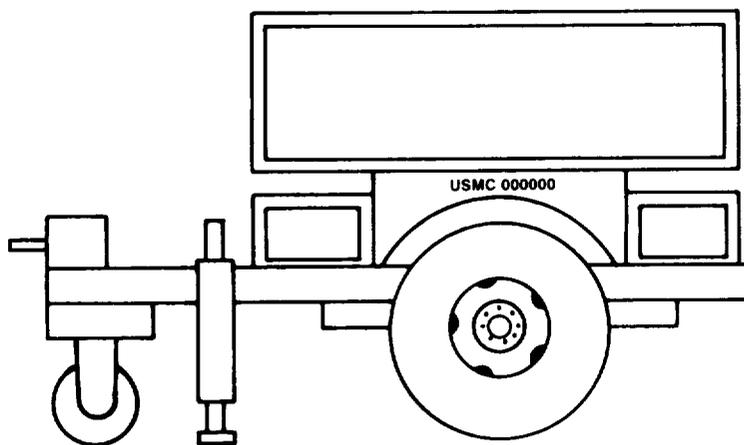


Figure D-38. HAWK AN/TSM-148.

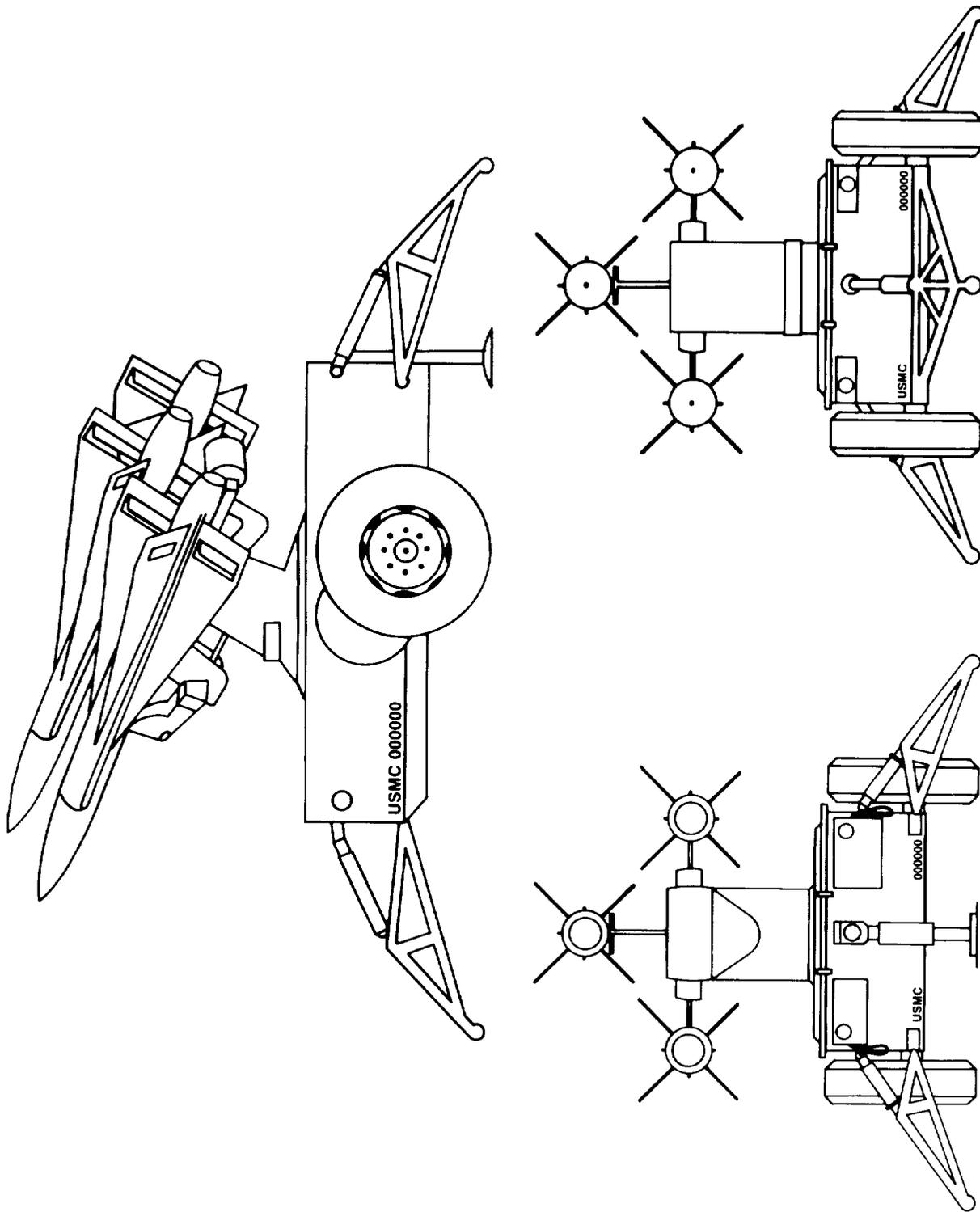


Figure D-39. HAWK M192-I

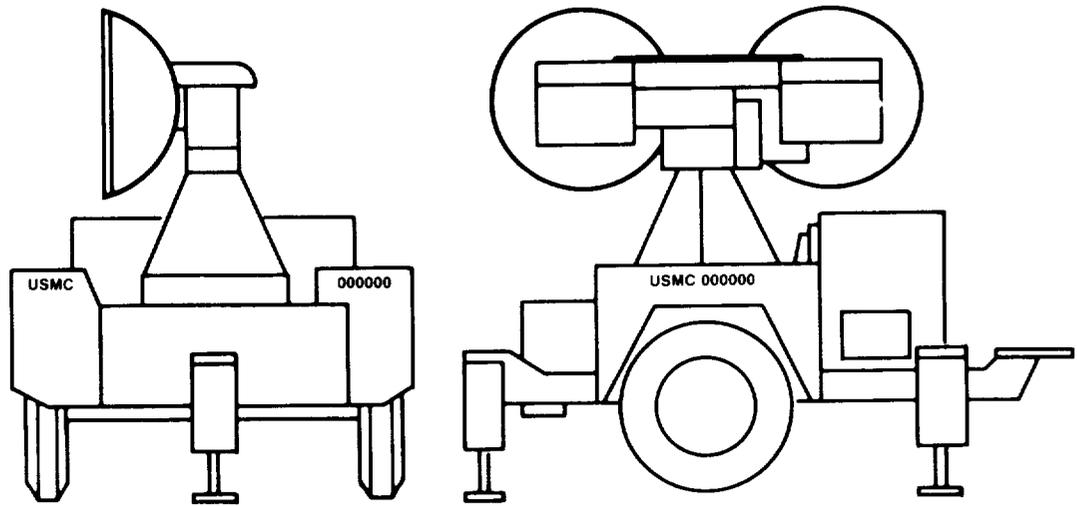


Figure D-40. HAWK AN/MPQ-57.

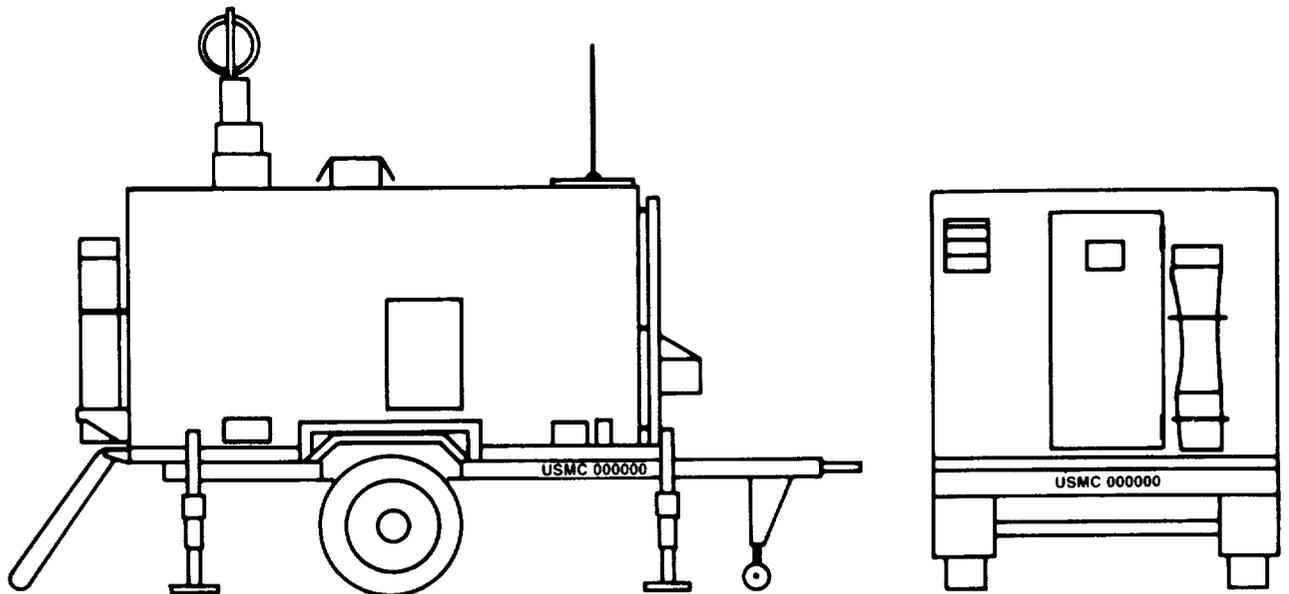


Figure D-41. HAWK AN/MSQ-111 and AN/MSW-18.

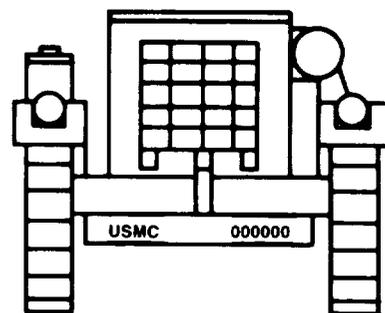
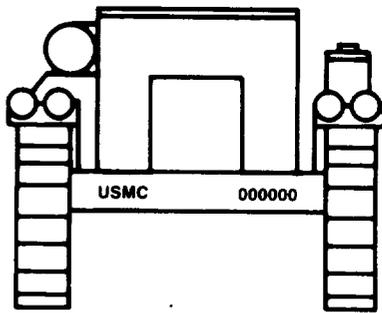
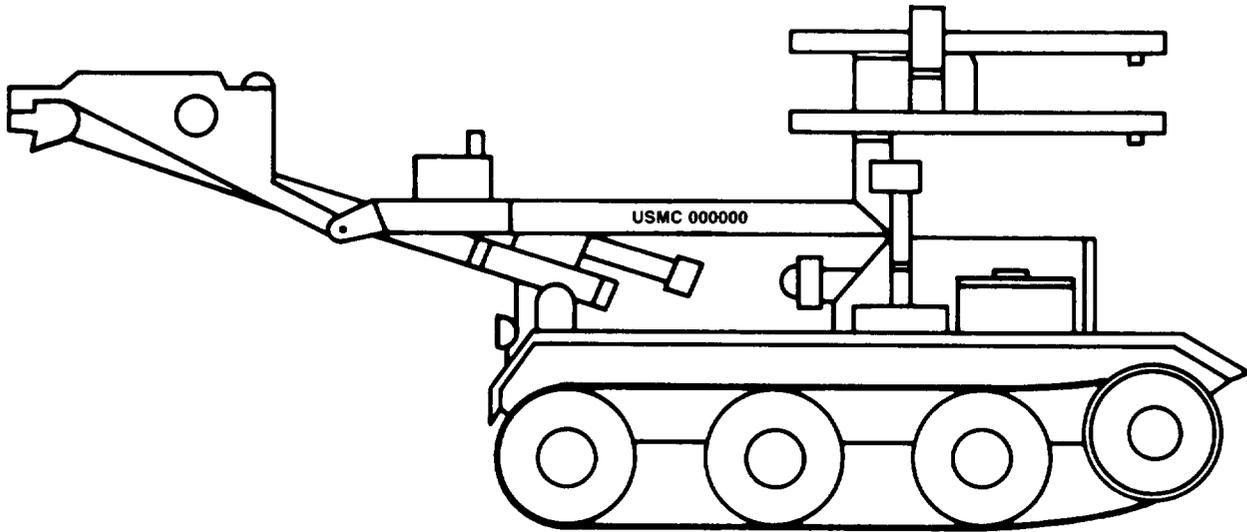


Figure D-42. HAWK M501E3 Loader Transporter.

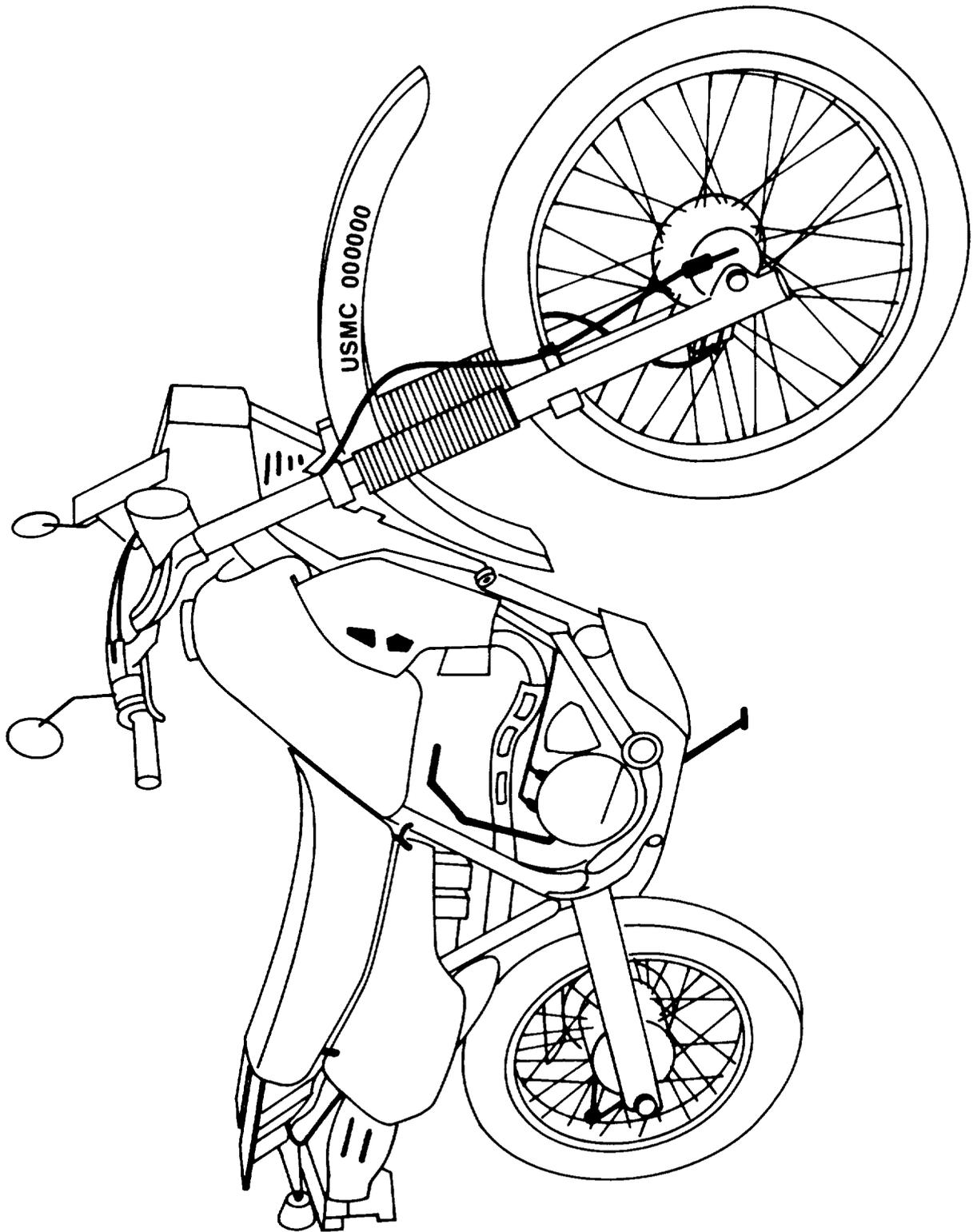


Figure D-43. Motorcycle

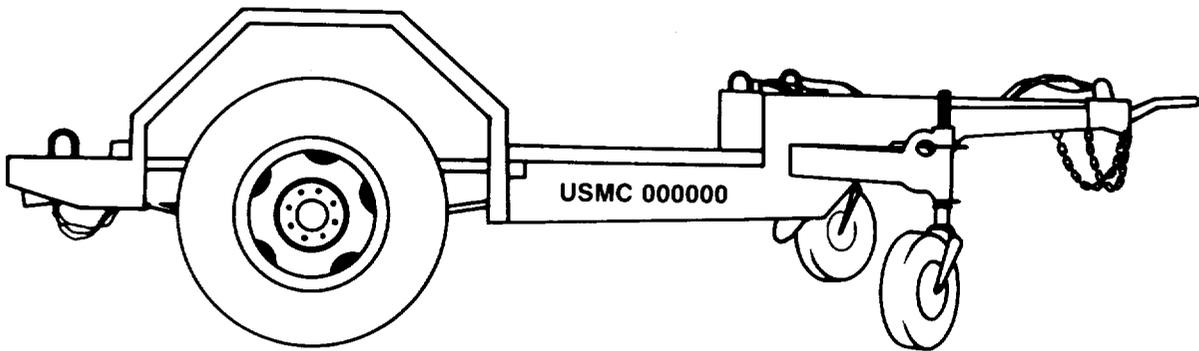


Figure D-44. M-353 Trailer.

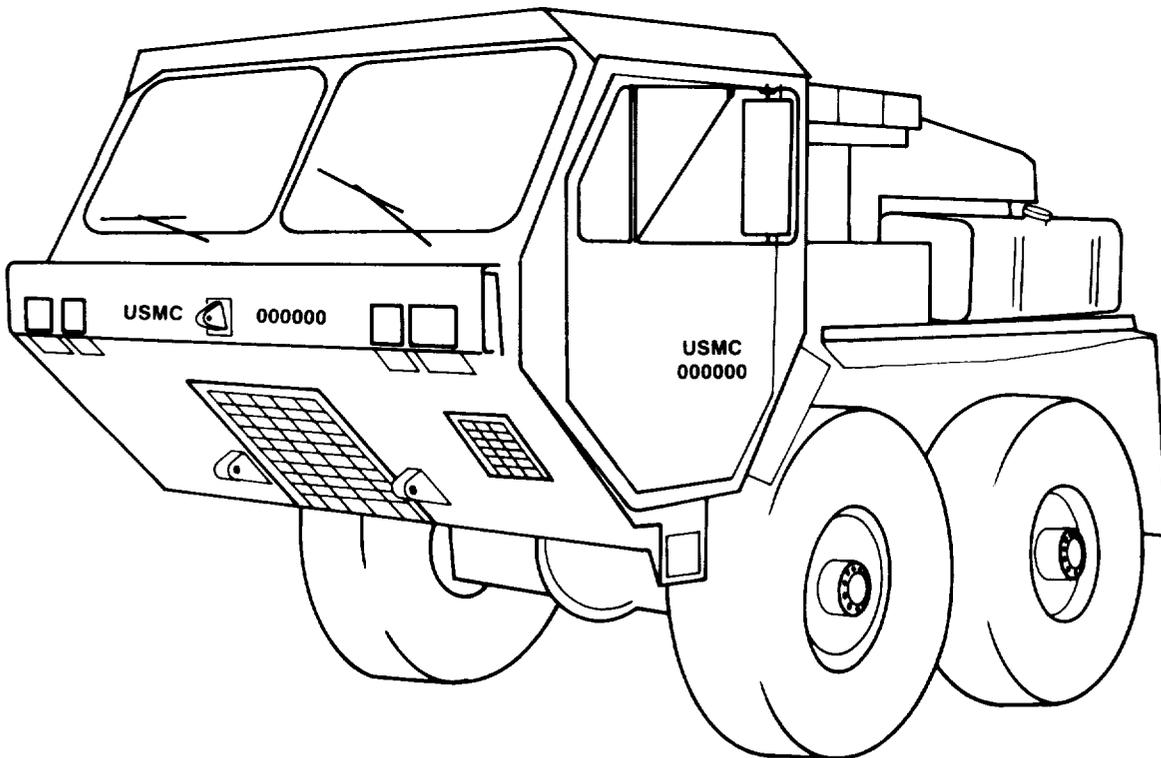


Figure D-45. Logistics Vehicle System MK 48.

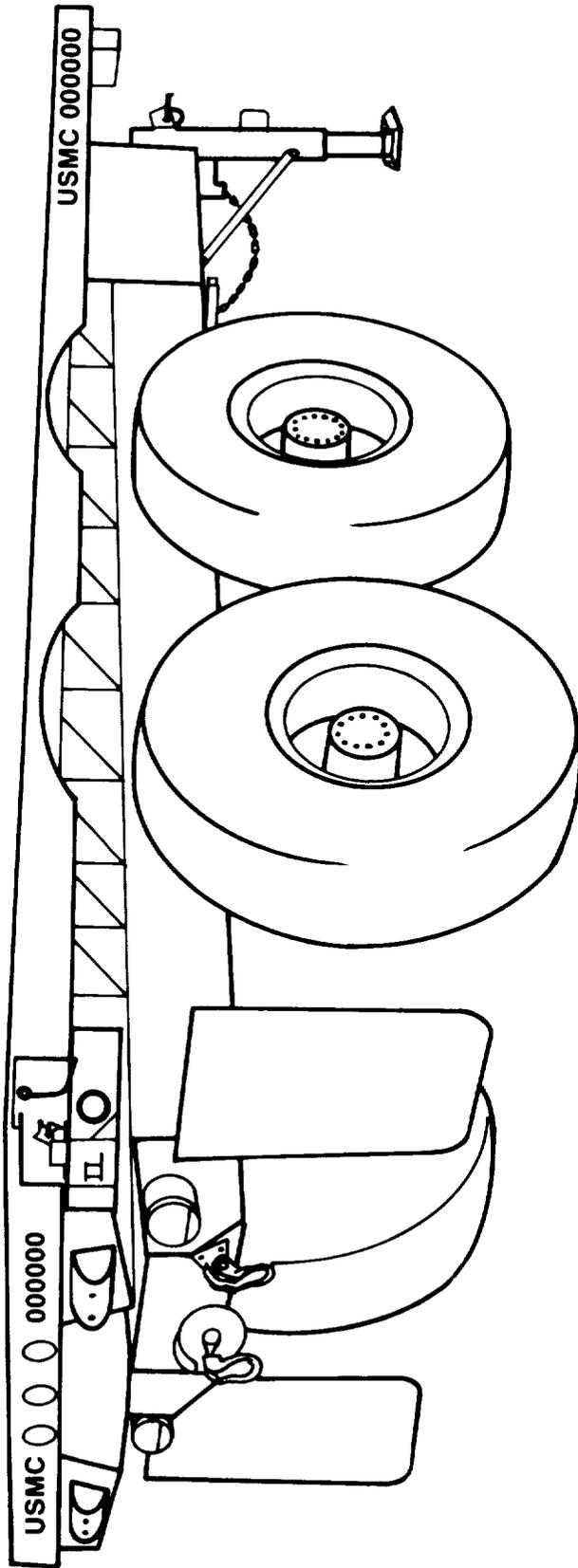


Figure D-46. Logistics Vehicle System MK 14

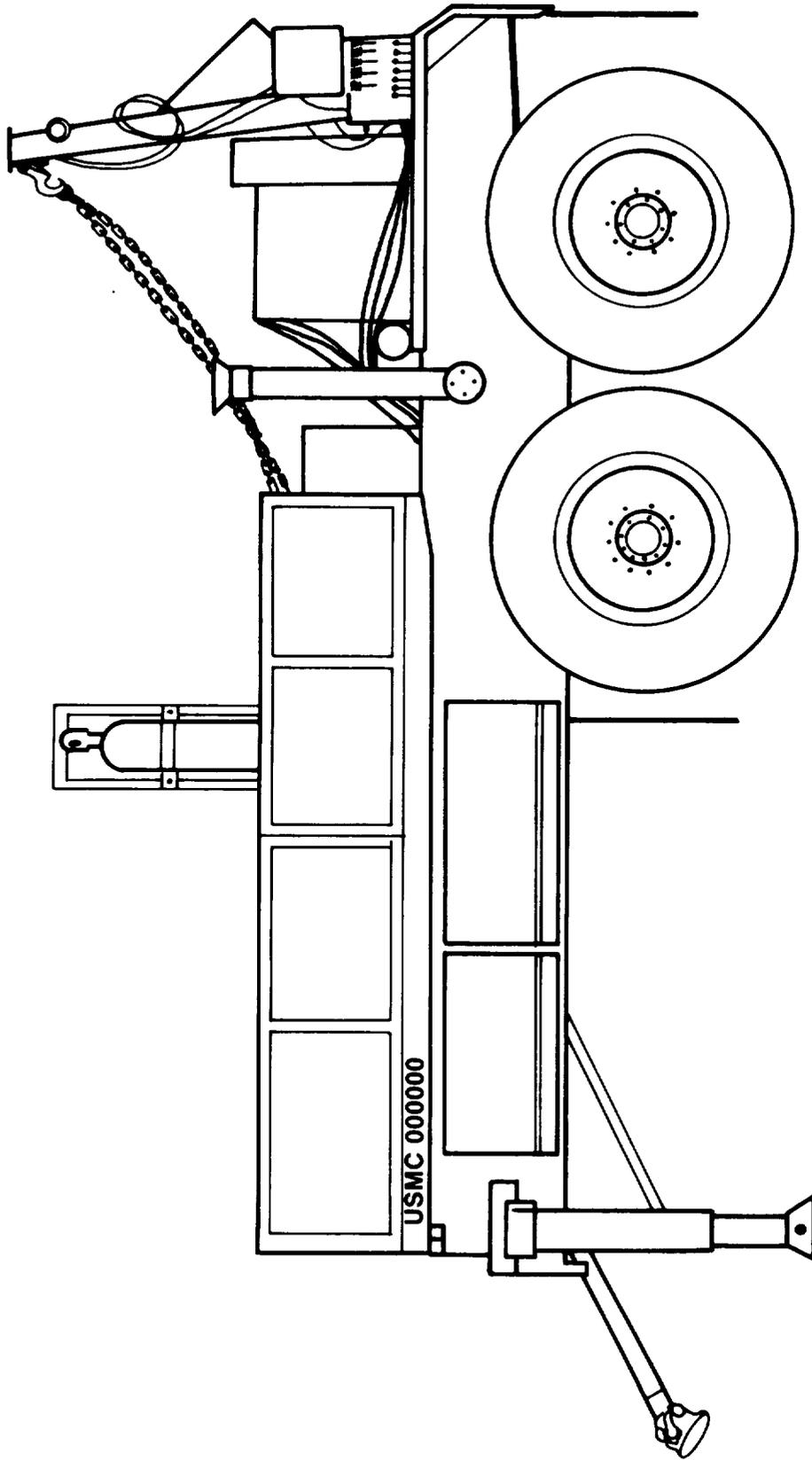


Figure D-47. Logistics Vehicle System MK 15

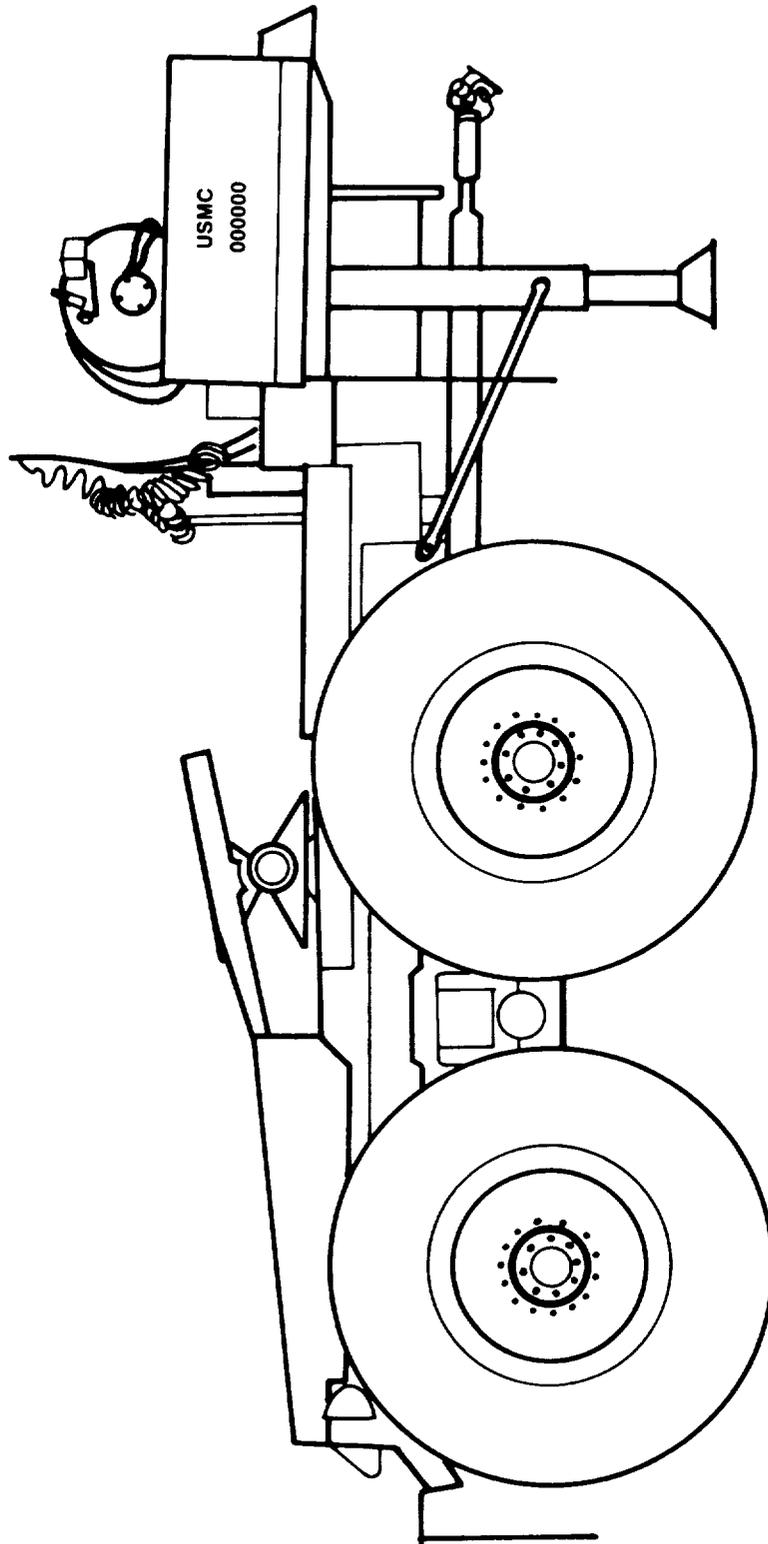


Figure D-48. Logistics Vehicle System MK 16

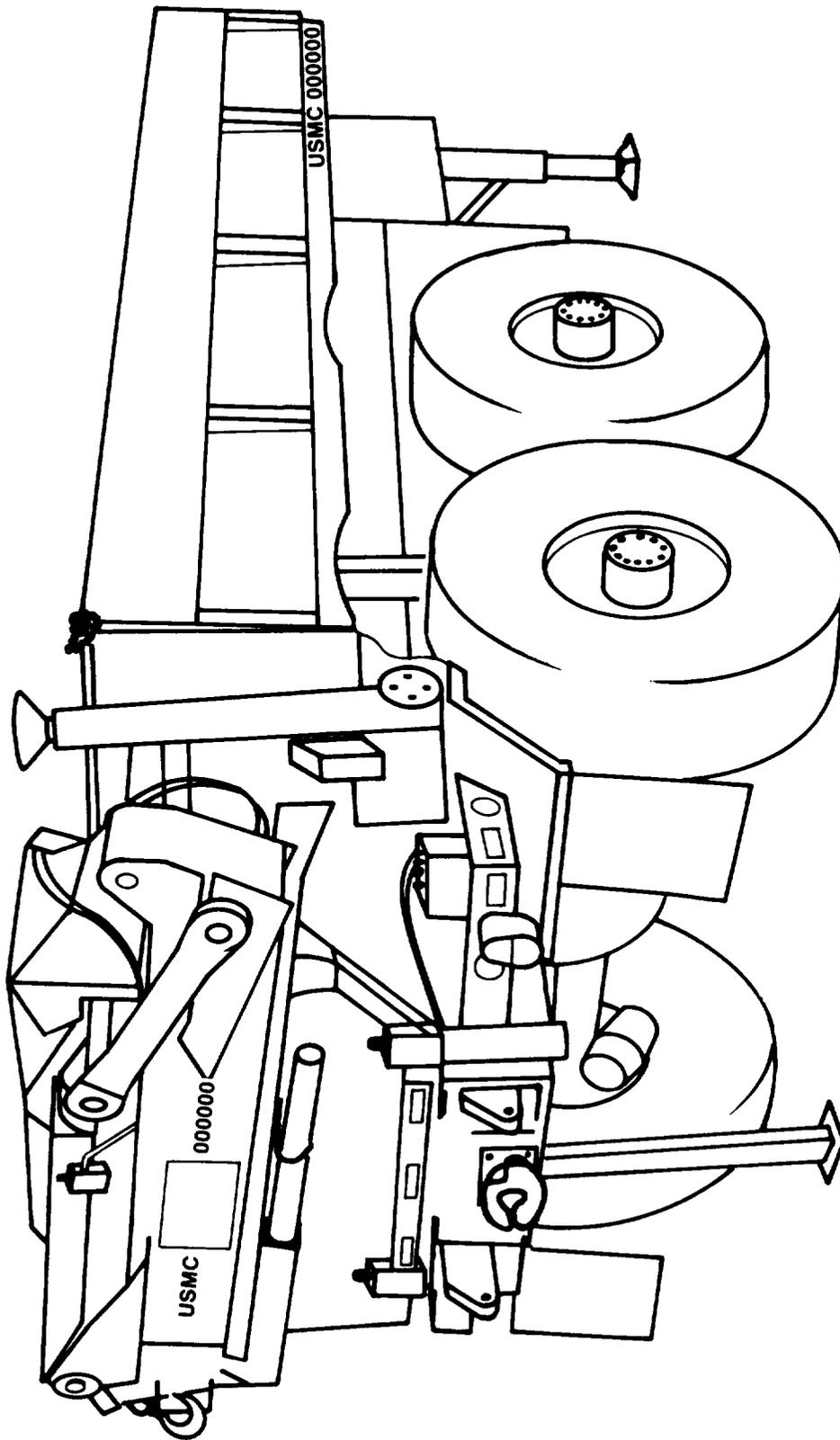


Figure D-49. Logistics Vehicle System MK 17

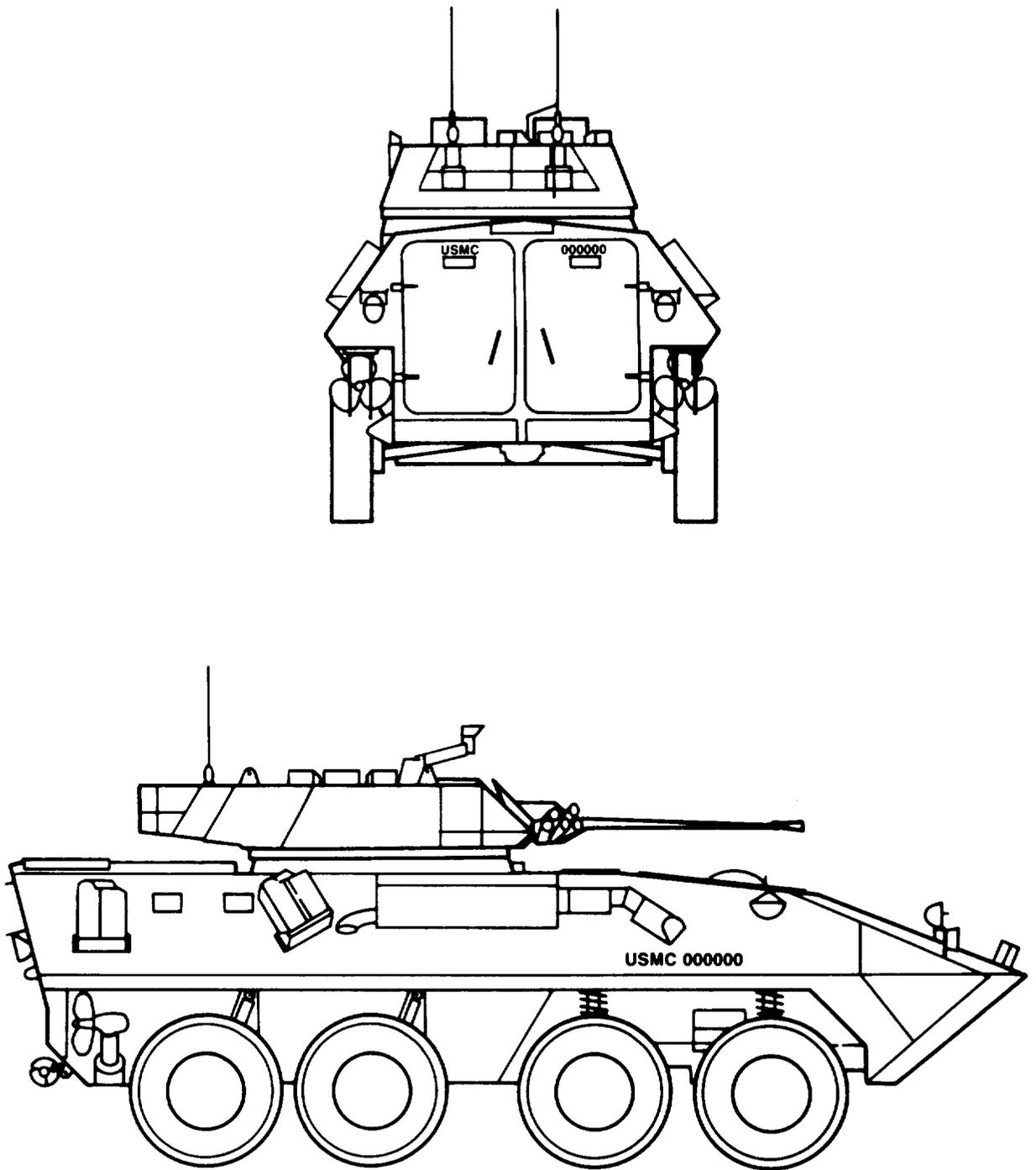


Figure D-50. Light Armored Vehicle.

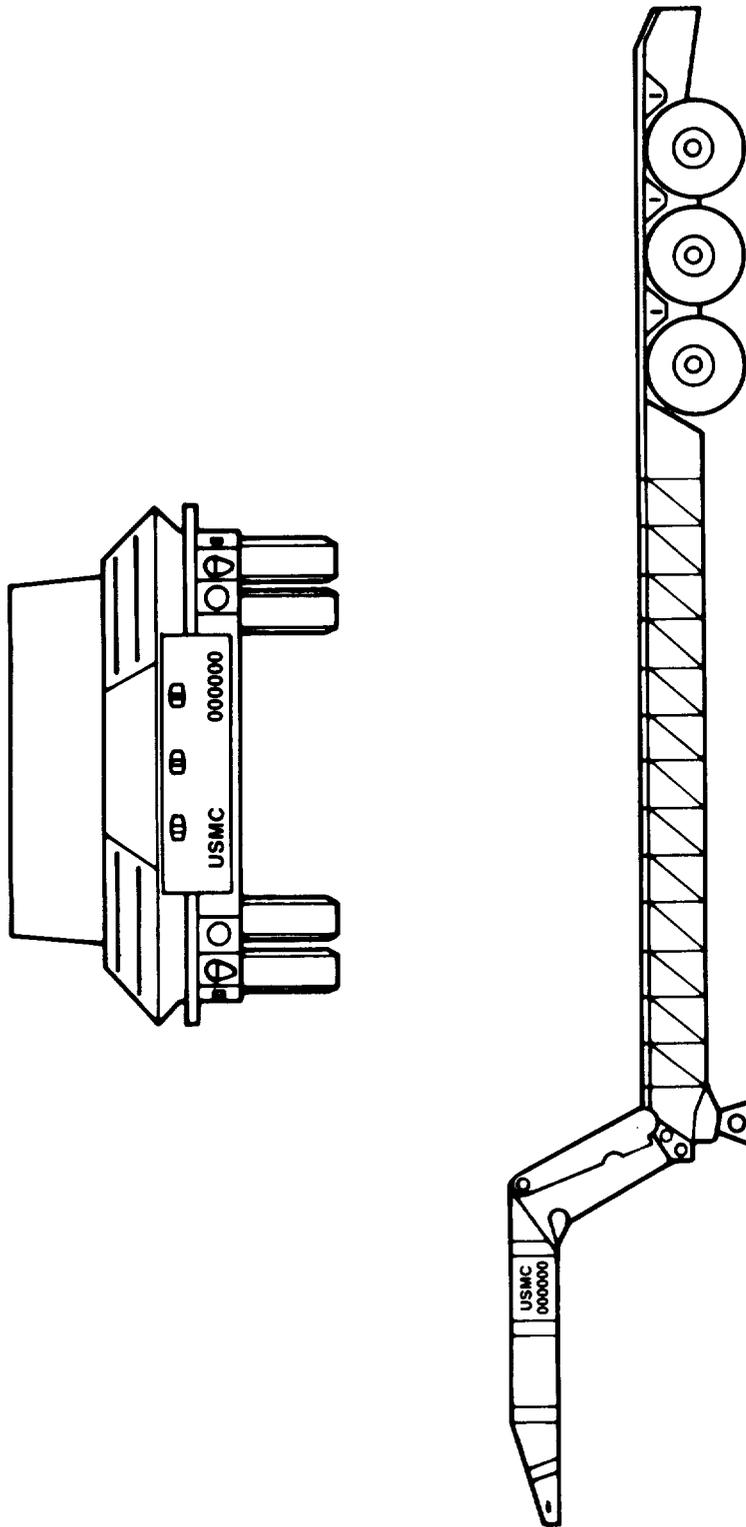


Figure D-51. Trailer M870.

APPENDIX E
NATIONAL STOCK NUMBERS (NSNs)

No.	NSN	Description	Amount of Issue
1	8010-01-141-2421	Coating, Light Green MIL-C-46168	1 Quart Kit
2	8010-01-128-6957	Coating, Light Green MIL-C-46168	1 Gallon Kit
3	8010-01-131-6256	Coating, Light Green MIL-C-46168	5 Gallon Kit
4	8010-01-127-8909	Coating, Light Green MIL-C-46168	55 Gallon Kit
5	8010-01-144-9888	Coating, Forest Green MIL-C-46168	1 Quart Kit
6	8010-01-144-9874	Coating, Forest Green MIL-C-46168	1 Gallon Kit
7	8010-01-144-9881	Coating, Forest Green MIL-C-46168	5 Gallon Kit
8	8010-01-144-9889	Coating, Forest Green MIL-C-46168	55 Gallon Kit
9	8010-01-160-6741	Coating, Green 383 (# 34094) MIL-C-46168	1 Quart Kit
10	8010-01-162-5578	Coating, Green 383 (# 34094) MIL-C-46168	1 Gallon Kit
11	8010-01-160-6742	Coating, Green 383 (# 34094) MIL-C-46168	5 Gallon Kit
12	8010-01-160-6743	Coating, Green 383 (# 34094) MIL-C-46168	55 Gallon Kit
13	8010-01-160-6744	Coating, Brown 383 (# 30051) MIL-C-46168	1 Quart Kit
14	8010-01-160-6745	Coating, Brown 383 (# 30051) MIL-C-46168	1 Gallon Kit
15	8010-01-160-6746	Coating, Brown 383 (# 30051) MIL-C-46168	5 Gallon Kit

No.	NSN	Description	Amount of Issue
16	8010-01-160-6747	Coating, Brown 383 (# 30051) MIL-C-46168	55 Gallon Kit
17	8010-01-141-2412	Coating, Dark Green MIL-C-46168	1 Quart Kit
18	8010-01-130-3343	Coating, Dark Green MIL-C-46168	1 Gallon Kit
19	8010-01-131-0611	Coating, Dark Green MIL-C-46168	5 Gallon Kit
20	8010-01-132-2977	Coating, Dark Green MIL-C-46168	55 Gallon Kit
21	8010-01-141-2413	Coating, Olive Drab MIL-C-46168	1 Quart Kit
22	8010-01-130-3344	Coating, Olive Drab MIL-C-46168	1 Gallon Kit
23	8010-01-131-6258	Coating, Olive Drab MIL-C-46168	5 Gallon Kit
24	8010-01-127-8907	Coating, Olive Drab MIL-C-46168	55 Gallon Kit
25	8010-01-141-2414	Coating, Field Drab MIL-C-46168	1 Quart Kit
26	8010-01-130-3345	Coating, Field Drab MIL-C-46168	1 Gallon Kit
27	8010-01-148-3662	Coating, Field Drab MIL-C-46168	5 Gallon Kit
28	8010-01-127-8911	Coating, Field Drab MIL-C-46168	55 Gallon Kit
29	8010-01-141-2415	Coating, Earth Yellow MIL-C-46168	1 Quart Kit
30	8010-01-130-3346	Coating, Earth Yellow MIL-C-46168	1 Gallon Kit
31	8010-01-131-0612	Coating, Earth Yellow MIL-C-46168	5 Gallon Kit

No.	NSN	Description	Amount of Issue
32	8010-01-133-1986	Coating, Earth Yellow MIL-C-46168	55 Gallon Kit
33	8010-01-141-2416	Coating, Sand (# 33303) MIL-C-46168	1 Quart Kit
34	8010-01-130-3347	Coating, Sand (# 33303) MIL-C-46168	1 Gallon Kit
35	8010-01-131-6259	Coating, Sand (# 33303) MIL-C-46168	5 Gallon Kit
36	8010-01-151-9370	Coating, Sand (# 33303) MIL-C-46168	55 Gallon Kit
37	8010-01-141-2417	Coating, Earth Red MIL-C-46168	1 Quart Kit
38	8010-01-130-3348	Coating, Earth Red MIL-C-46168	1 Gallon Kit
39	8010-01-131-6260	Coating, Earth Red MIL-C-46168	5 Gallon Kit
40	8010-01-150-0717	Coating, Earth Red MIL-C-46168	55 Gallon Kit
41	8010-01-141-2418	Coating, Earth Brown MIL-C-46168	1 Quart Kit
42	8010-01-134-0383	Coating, Earth Brown MIL-C-46168	1 Gallon Kit
43	8010-01-132-4986	Coating, Earth Brown MIL-C-46168	5 Gallon Kit
44	8010-01-150-0718	Coating, Earth Brown MIL-C-46168	55 Gallon Kit
45	8010-01-142-0132	Coating, Desert Sand MIL-C-46168	1 Quart Kit
46	8010-01-131-6253	Coating, Desert Sand MIL-C-46168	1 Gallon Kit
47	8010-01-135-9985	Coating, Desert Sand MIL-C-46168	5 Gallon Kit

No.	NSN	Description	Amount of Issue
48	8010-01-150-0719	Coating, Desert Sand MIL-C-46168	55 Gallon Kit
49	8010-01-141-2419	Coating, Black (# 37030) MIL-C-46168	1 Quart Kit
50	8010-01-131-6254	Coating, Black (# 37030) MIL-C-46168	1 Gallon Kit
51	8010-01-131-6261	Coating, Black (# 37030) MIL-C-46168	5 Gallon Kit
52	8010-01-141-2420	Coating, Aircraft Green MIL-C-46168	1 Quart Kit
53	8010-01-131-6255	Coating, Aircraft Green MIL-C-46168	1 Gallon Kit
54	8010-01-131-6262	Coating, Aircraft Green MIL-C-46168	5 Gallon Kit
55	8010-01-146-2650	Coating, Olive Drab (# 34087) MIL-C-46168	1 Quart Kit
56	8010-01-055-2319	Coating, Olive Drab (# 34087) MIL-C-46168	1 Gallon Kit
57	8010-01-144-9875	Coating, Olive Drab (# 34087) MIL-C-46168	5 Gallon Kit
58	8010-01-144-9882	Coating, Aircraft Gray MIL-C-46168	1 Quart Kit
59	8010-01-127-8908	Coating, Aircraft Gray MIL-C-46168	1 Gallon Kit
60	8010-01-144-9876	Coating, Aircraft Gray MIL-C-46168	5 Gallon Kit
61	8010-01-144-9883	Coating, Aircraft White (# 37875) MIL-C-46168	1 Quart Kit
62	8010-01-144-9872	Coating, Aircraft White (# 37875) MIL-C-46168	1 Gallon Kit
63	8010-01-144-9877	Coating, Aircraft White (# 37875) MIL-C-46168	5 Gallon Kit

No.	NSN	Description	Amount of Issue
64	8010-01-144-9884	Coating, Aircraft Red (# 31136) MIL-C-46168	1 Quart Kit
65	8010-01-144-9873	Coating, Aircraft Red (# 31136) MIL-C-46168	1 Gallon Kit
66	8010-01-144-9878	Coating, Aircraft Red (# 31136) MIL-C-46168	5 Gallon Kit
67	8010-01-144-9885	Coating, Aircraft Black (# 37038) MIL-C-46168	1 Quart Kit
68	8010-01-146-2646	Coating, Aircraft Black (# 37038) MIL-C-46168	1 Gallon Kit
69	8010-01-144-9879	Coating, Aircraft Black (# 37038) MIL-C-46168	5 Gallon Kit
70	8010-01-144-9886	Coating, Interior Aircraft Black (with Glass Beads), MIL-C-46168	1 Quart Kit
71	8010-01-146-2647	Coating, Interior Aircraft Black (with Glass Beads), MIL-C-46168	1 Gallon Kit
72	8010-01-146-4376	Coating, Interior Aircraft Black (with Glass Beads), MIL-C-46168	5 Gallon Kit
73	8010-01-144-9887	Coating, Insignia Blue (# 35044) MIL-C-46168	1 Quart Kit
74	8010-01-146-2648	Coating, Insignia Blue (# 35044) MIL-C-46168	1 Gallon Kit
75	8010-01-144-9880	Coating, Insignia Blue (# 35044) MIL-C-46168	5 Gallon Kit
76	8010-01-170-7583	Coating, Interior Aircraft Gray MIL-C-46168	1 Quart Kit
77	8010-01-146-2649	Coating, Interior Aircraft Gray MIL-C-46168	1 Gallon Kit
78	8010-01-170-0132	Coating, Interior Aircraft Gray MIL-C-46168	5 Gallon Kit
79	8010-01-229-7540	Coating, Black (# 37030) MIL-C-53039	1 Quart

No.	NSN	Description	Amount of Issue
80	8010-01-229-7541	Coating, Black (#37030) MIL-C-53039	1 Gallon
81	8010-01-229-7542	Coating, Black (# 37030) MIL-C-53039	5 Gallon
82	8010-01-233-1568	Coating, Black (# 37030) MIL-C-53039	55 Gallon
83	8010-01-229-7543	Coating, Brown 383 (# 30051) MIL-C-53039	1 Quart
84	8010-01-229-7544	Coating, Brown 383 (# 30051) MIL-C-53039	1 Gallon
85	8010-01-229-7545	Coating, Brown 383 (# 30051) MIL-C-53039	5 Gallon
86	8010-01-233-0060	Coating, Brown 383 (# 30051) MIL-C-53039	55 Gallon
87	8010-01-229-7546	Coating, Green 383 (# 34094) MIL-C-53039	1 Quart
88	8010-01-229-7547	Coating, Green 383 (# 34094) MIL-C-53039	5 Gallon
89	8010-01-229-9561	Coating, Green 383 (# 34094) MIL-C-53039	1 Gallon
90	8010-01-232-8514	Coating, Green 383 (# 34094) MIL-C-53039	55 Gallon
91	8010-01-234-2934	Coating, Sand (# 33303) MIL-C-53039	1 Quart
92	8010-01-234-2935	Coating, Sand (# 33303) MIL-C-53039	1 Gallon
93	8010-01-234-2936	Coating, Sand (# 33303) MIL-C-53039	5 Gallon
94	8010-01-234-2937	Coating, Sand (# 33303) MIL-C-53039	55 Gallon
95	8010-00-935-7080	Primer (Type 1) MIL-P-23377	1 Quart

No.	NSN	Description	Amount of Issue
96	8010-00-082-2450	Primer (Type 1) MIL-P-23377	1 Gallon
97	8010-01-048-2477	Primer (Type 1) MIL-P-23377	5 Gallon
98	8010-00-082-1714	Primer MIL-P-52192	5 Gallon
99	8010-01-193-0516	Primer MIL-P-53022	1 Quart Kit
100	8010-01-193-0517	Primer MIL-P-53022	1 Gallon Kit
101	8010-01-187-9820	Primer MIL-P-53022	5 Gallon Kit
102	8010-01-193-0519	Primer MIL-P-53030	1 Quart
103	8010-01-193-0520	Primer MIL-P-53030	1 Gallon
104	8010-01-193-0521	Primer MIL-P-53030	5 Gallon
105	8010-01-218-0856	Primer (Type 1), Light Green MIL-P-85582	1 Quart Kit
106	8010-01-218-0857	Primer (Type 2), Dark Green #34052, MIL-P-85582	1 Gallon Kit
107	8010-01-218-0858	Primer (Type 2), Dark Green #34052, MIL-P-85582	1 Quart Kit
108	8010-01-218-7354	Primer (Type 1), Light Green MIL-M-85582	1 Gallon Kit
109	8010-00-181-8080	Thinner (Type 1) MIL-T-81772	1 Gallon
110	8010-00-181-8079	Thinner (Type 1) MIL-T-81772	5 Gallon
111	8010-01-200-2637	Thinner (Type 2) MIL-T-81772	1 Gallon

No.	NSN	Description	Amount of Issue
112	8010-01-212-1704	Thinner (Type 2) MIL-T-81772	5 Gallon
113	8010-01-053-2647	Paint, Epoxy White MIL-C-22750	2 Quart
114	8010-00-082-2439	Paint, Epoxy White MIL-C-22750	2 Gallon
115	8010-01-211-9645	Paint, Epoxy Seafoam Green MIL-C-22750	2 Quart
116	8010-01-053-2649	Paint, Epoxy Red MIL-C-22750	2 Quart
117	8010-01-053-2650	Paint, Epoxy Yellow MIL-C-22750	2 Quart
118	8010-01-106-0110	Paint, Epoxy Yellow MIL-C-22750	2 Gallon
119	8030-00-850-7076	Primer, Wash, DOD-P-15328	1 Quart
120	8030-00-281-2726	Primer, Wash, DOD-P-15328	1 Gallon
121	8010-01-132-0205	PUP Catalyst	55 Gallon
122	7240-00-061-3785	Pail, Fire, Pint	Each
123	7240-00-061-1163	Pail, Fire, Quart	Each
124	6850-00-270-6225	Detergent, Calcium Hypochlorite	
125	8010-00-286-7840	Paint, Fire Retardant, White	1 Quart
126	8010-00-616-0005	Paint, Gray # 26492	1 Quart
127	5130-00-720-0551	Drill, Pneumatic Air Operated, 1/4 Inch, Low Speed	Each
128	5130-00-288-7741	Drill, Pneumatic Air Operated, 1/4 Inch, Medium Speed	Each

No.	NSN	Description	Amount of Issue
129	5130-00-294-9511	Drill, Pneumatic Air Operated, 1/4 Inch, High Speed	Each
130	5130-00-957-2844	Drill, Pneumatic Air Operated, 3/8 Inch, Medium Speed	Each
131	5130-00-596-8420	Drill, Pneumatic Air Operated, 3/8 Inch, High Speed	Each
132	8415-00-964-4925	Gloves, Painters, Cotton, Large Size	Pair

GLOSSARY

Aerosol	A suspension of extremely fine solid particles or liquid droplets in a gas, usually air.
Air Assisted Airless Spray	A pump is used to force material through a small orifice or tip at low hydraulic pressure. Normal airless pressures are at 1500 to 2500 psi. Most materials cannot obtain quality atomization at these low airless spray pressures and paint patterns are affected. To complete the atomization low pressure (10-30 psi), compressed air is added by an air cap. This results in increased transfer efficiency.
Air Spray	The use of compressed air to break materials into small droplets while giving them direction toward a surface. This process is accomplished through the use of an air spray gun. Air and paint enter the gun through separate channels and are mixed and ejected at the air cap in a controlled spray pattern.
Airless Spray/ Electrostatic Spray	Paint is forced under high pressure from a central supply source through a supply line to an airless/electrostatic spray gun. The paint is forced through a small orifice under high pressure, atomizing the fluid as it is discharged from the gun. The tip restriction (orifice) forms a spray pattern. It can be compared to a garden hose which atomizes a liquid by forcing it through the nozzle under pressure.
Alkyd Paints	Paints that are produced by reaction of natural unsaturated fatty acids with synthetic organic acids and polyols. They are classified by weight of unsaturated fatty oils, referred to as short-, medium-, or long-oil length. Alkyds absorb chemical agents into the painted surface, making decontamination difficult if not impossible.
Allergic	Subject to exaggerated or pathological reaction to substances that are without comparable effect on the average individual.
Atomizing	The breaking up of liquid material into small droplets or particles.

CARC System	Two coatings, polyurethane paint and epoxy polyamide paint are applied over epoxy primer. When components of a coating are combined, a chemical reaction begins. This reaction causes components to crosslink and form a tough, virtually impervious coating. This will provide a service life at least twice of alkyd coatings and will provide additional corrosion protection under a broad spectrum of environmental conditions.
Catalyst	A substance which causes or accelerates the rate of a chemical reaction without being consumed in the reaction.
Chronic	Constant, lasting for a long time.
Chemical Agent Coating (CARC)	Coating capable of withstanding chemical and biological Resistant agents. They prevent absorption of harmful substances into the paint and subsequently into human bodies. Decontamination is simplified and decontamination time is reduced.
Crazed Surfaces	Minute cracks on/in a glazed/painted finish.
Defatting	The drying out of natural skin oils by some solvents.
Diisocyanate	An organic compound containing two reactive isocyanate groups.
Dry Spray Booth	A spray booth not equipped with a water washing system. It may be equipped with distribution or baffle plates to promote an even flow of air through the booth or cause the deposit of overspray before it enters the exhaust duct. It can be equipped with overspray dry filters to minimize dusts, or dusts and residues entering exhaust ducts. It can be equipped with overspray dry filter rolls designed to minimize dusts or residues entering exhaust ducts.
Hexamethylene Diisocyanate (HDI)	A chemical compound contained in Component B of polyurethane paint. It has the potential to evoke an allergic response in sensitive individuals. Once sensitized, an asthmatic condition may develop which can be triggered from very small subsequent exposure.

Paint	A mixture of suspended solid inorganic or organic particles, known as pigments, and a resinous binder dissolved in a solvent. The binder, sometimes with additives, literally binds the pigment particles together as the paint film dries and it remains as part of the final solid phase. The drying process involves either evaporation of solvents, oxidation of a drying oil, or polymerization through application of heat, addition of a catalyst, or a combination of reactive components.
Particulate	Composed of fine particles or droplets.
Primers	Paints employed to improve adhesion of topcoat paints on substrates by interposing a layer of material comparable with both. Primers may contain additives which prevent corrosion of the substrate.
Side Draft Spray Booths	These are booths with a horizontal airflow. They take advantage of the momentum of the spray mist and are best used when painting small to medium-sized articles.
Spray Booth	A power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor and residue, and to safely conduct or direct them to an exhaust system. The air exhausted must be replaced to achieve optimum plant environmental control.
Teratogen	An agent that causes developmental malformations in fetuses.
Thinner	A thinner is a chemical compound that is used to reduce coatings to a required viscosity.
Threshold Limit Value (TLV)	TLV Concentration under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.
Time Weighted Average (TWA)	TWA for a normal workday in relation to TLV.

Vascular	Pertaining to the vessels within the body that convey blood or lymph.
Viscosity	The property in a substance that allows proper level and flow.
Volatile Organic Compound (VOC)	Organic carbon compounds which readily vaporize (evaporate) at normal pressures and temperatures. Examples are methyl ethyl ketone, paint thinner, and carbon tetrachloride.
Water-Wash Spray Booth	A spray booth equipped with a water washing system designed to minimize dusts or residues entering exhaust ducts and to permit the recovery of overspray finishing material. Advantages are constant airflow, inherent fire protection, and high mist removal efficiency.

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