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AFMAN 11-223 (I), VOL I
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**Multiservice Helicopter Sling Load:
Basic Operations and Equipment**

**HEADQUARTERS
DEPARTMENT OF THE ARMY
UNITED STATES MARINE CORPS
DEPARTMENT OF THE NAVY
DEPARTMENT OF THE AIR FORCE
UNITED STATES COAST GUARD**

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Multiservice Helicopter Sling Load: Basic Operations and Equipment

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Preface

SCOPE

Note: Army loads must be inspected by a qualified sling load inspector prior to the arrival of the supporting aircraft.

This manual is one of a series of manuals for aviation and ground personnel who perform helicopter sling load missions ashore or aboard ship. Other manuals in this series are FM 10-450-4/MCRP 4-11.3E, VOL II/NWP 3-04.12/AFJMAN 11-223, VOL II/COMDTINST M13482.3A and FM 10-450-5/MCRP 4-11.3E, VOL III/NWP 3-04.13/AFJMAN 11-223, VOL III/COMDTINST M13482.4A

These manuals are a coordinated effort of the US Army, US Marine Corps, US Navy, US Air Force, and US Coast Guard. All services participate in the sling load certification program begun by the Army in 1984. These manuals include standardized rigging procedures and other information from that program.

Efforts were made to standardize ground crew and hookup procedures and terminology. The terms "helicopter" and "aircraft" refer to vertical lift aircraft that participate in sling load operations. Where service-unique requirements apply to an entire chapter or body of text, the service initials are at the beginning of the chapter or text. Otherwise the initials are at the end of the applicable sentence.

The information in this manual will familiarize personnel with the sling sets, cargo nets, and other sling load equipment in the DOD inventory. It will also acquaint them with the helicopters used for sling load and provide basic procedures for rigging and hooking up loads. Rigging equipment and procedures described in this manual may not be authorized for all aircraft or services because of equipment or service restrictions. This manual does not provide details on aviation operations nor does it present detailed data that is normally contained in unit standing operating procedures (SOPs).

This publication applies to the Active Army, the Army National Guard (ARNG)/Army National Guard of the United States (ARNGUS), and the United States Army Reserve (USAR) unless otherwise stated.

USER INFORMATION

This manual implements the following International Standardization Agreements (STANAGs):

2949 - Technical Criteria for External Cargo Carrying Slings
2950 - Technical Criteria for External Cargo Carrying Nets
3117 - Aircraft Marshalling Signals
3542 - Technical Criteria for the Transport of Cargo by Helicopter

The proponent of this publication is United States Army Training and Doctrine Command (TRADOC). Recommendations for changes or improvement to the manual are requested.

Army personnel submit DA Form 2028 (Recommended Changes to Publications and Blank Forms) to:

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REQUEST FOR WAIVERS

Services should submit requests for waivers to their respective points of contact.

USA - Director, Aerial Delivery and Field Services Department, 710 Adams Avenue, Ft. Lee, VA 23801-1502

USMC - CG, MCCDC, Quantico, VA 22134-5021 with copy to CG, MARCORSYSCOM (PSE), Quantico, VA 2314-5021

USN - Naval Air Systems Command, AIR-4.3.5.4, Mechanical Systems Branch, External Loads Transport Systems, NAVAIR Lakehurst NJ 08733

USAF - Applicable major command (DO)

USCG - Cmdt (G-OAC), Washington, DC 20330

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Chapter 1

Fundamental Principles of Sling Load

INTRODUCTION

1-1. The helicopter sling load method of carrying cargo and equipment overcomes many of the obstacles that hinder other modes of movement. Helicopter sling load operations are used extensively in the ship-to-shore movement of cargo and equipment during amphibious operations, movement of supplies and equipment over the battlefield, vertical replenishment of ships, and firepower emplacement. The purpose of this chapter is to discuss helicopter employment considerations, request procedures, responsibilities, safety, and planning for sling load missions.

CLASSIFICATION DEFINITIONS OF SLING LOAD

1-2. All sling loads are classified under one of the following definitions:

- **Certified Sling Loads.** Certified sling loads are those items of equipment and their associated rigging procedures which have completed the evaluation and testing required by the US Army Natick Soldier Center (NSC) for sling load certification. Only certified sling loads are authorized for the Marine Corps. The following restrictions apply for sling load certification to remain in effect:
 - The load must be within the lifting capability of the desired helicopter model and not exceed the rated capacity of the sling set being used.
 - The load shall be rigged in accordance with the certified rigging procedure. Failure to rig the load exactly as directed by the certified rigging procedure creates a unique load.
 - The maximum tested stable airspeed (straight and level flight determined during one flight test) specified for the load in the applicability section of the rigging procedure or in the appendix of the appropriate sling load FM is a recommendation and not a restriction, unless so stated.
 - Changes or modifications to load characteristics (weight, model, NSN, accompanying load, structure of items etc.) creates a unique load.
- **Suitable Sling Loads.** Suitable sling loads are those items of equipment and their associated rigging procedures that have not been certified but have demonstrated acceptable static lift and flight characteristics during a flight test. In most cases these loads were not pull tested in accordance with MIL-STD-913, but are known loads which have been flown without incident for years and which NSC considers to be proven safe.
- **Unique Sling Loads.** Unique loads are equipment carried on a one time or low-frequency basis, such as telephone poles, artillery targets, or barrier material. The lack of sling load certification in itself does not preclude a commander from carrying a unique load. Due to the lack of rigging procedures, unique loads should be considered high risk loads. Each service is responsible for determining its policy on carrying unique loads. (USA) **The movement of unique loads should be approved by the high risk approving authority.** The name and rank of the approving authority should be printed in the bottom right corner of the remarks block on DA Form 7382-R (Sling Load Inspection Record). Only the most experienced personnel should attempt to rig and inspect a unique load. When possible static lift the load prior to flight.

LOAD CONFIGURATION DEFINITIONS

- 1-3. All sling loads are configured under one of the following definitions:
- **Single-Point Loads.** Single-point loads are one load rigged and one aircraft cargo hook used during flight.
 - **Dual-Point Loads.** Dual-point loads are one load rigged and two aircraft cargo hooks used during flight.
 - **Tandem Loads.** Tandem loads are two loads rigged, one in front of the other, and two aircraft cargo hooks used during flight.
 - **Side-by-Side (Shotgun) Loads.** Side-by-side (shotgun) loads are two loads rigged, one beside the other, and one or two aircraft cargo hooks used during flight.

EMPLOYMENT CONSIDERATIONS

- 1-4. The sling load method of aerial delivery has some advantages and limitations over other methods.
- **Advantages.** The advantages of sling load are:
 - The rapid movement of heavy, outsized equipment, or emergency supplies directly to the user.
 - The ability to bypass surface obstacles.
 - The rapid relocation of supplies and equipment.
 - The use of multiple flight routes and landing sites to enhance sustainability and security of ground units.
 - The establishment of multiple landing sites to support the maneuvering unit requirements.
 - Greater movement flexibility for the ground commander to accomplish the tactical mission.
 - **Limitations.** Some limitations of sling load are:
 - The weight of the load is restricted to the aircraft's operating capability.
 - Load instability during flight may restrict aircraft airspeed or maneuvering capabilities.
 - Adverse weather and darkness (low visibility) may limit sling load operations.
 - Atmospheric conditions (pressure, altitude, temperature, and winds) affect the helicopter's lift capacity.
 - A limited number of helicopters are available for sling load missions.
 - Landing site surface conditions may restrict helicopter operation. Loose debris, dust, and snow are safety hazards that also limit pilot visibility.
 - Landing site size must be increased during the hours of darkness or reduced visibility to allow the pilot more room to maneuver.

FACTORS AFFECTING HELICOPTER LIFT PERFORMANCE

- 1-5. The supported unit should coordinate with the aviation unit prior to any sling load mission to determine the accurate lifting capability of the helicopter. Several factors affect how much weight a helicopter can carry.
- **Altitude.** The helicopter rotor efficiency decreases at higher altitudes and requires more power to hover than at lower altitudes. This means less capability to lift cargo.
 - **Temperature.** High air temperature has an adverse effect on the power output of helicopter engines. An increase in temperature decreases engine performance. This means decreased lift capability.
 - **Humidity.** As the relative humidity increases, the helicopter's lift performance decreases.