

INITIAL
NAVY TRAINING SYSTEM PLAN
FOR THE
MARK 7 MOD 4
ARRESTING GEAR

JANUARY 1998

Enclosure (1)

MARK 7 MOD 4 ARRESTING GEAR

EXECUTIVE SUMMARY

This Initial Navy Training System Plan (NTSP) for the MK 7 MOD 4 Arresting Gear System, hereafter referred to as the MK 7 MOD 4, was developed by the Naval Air Systems Command (3.4.1) using the Training Planning Process Methodology. It provides an early estimate of the manpower, personnel, and training requirements needed to support and sustain the MK 7 MOD 4. It also contains appropriate and pertinent data required to make accurate decisions and assessments concerning manning, training, and design alternatives. The MK 7 MOD 4 is currently in Phase I, Program Definition and Risk Reduction, of the Weapon System Acquisition Process. Initial Operational Capability is scheduled for December 2002.

Development of the MK 7 MOD 4 will be accomplished by a teaming effort between the Naval Air Warfare Center Aircraft Division Lakehurst, New Jersey, and the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia. The MK 7 MOD 4 will be an enhanced capacity replacement for the current MK 7 MOD 3 Arresting Gear. The MK 7 MOD 4 will only be installed on new construction aircraft carriers beginning with CVN-76. It features increased absorption, inherently stronger components, and a longer runout, which will provide the capability to recover current carrier-based aircraft at significantly reduced wind over deck and the ability to accommodate future aircraft with higher approach speeds, weights, and engine thrusts.

Initial operator and maintenance training will be provided to shipboard personnel by Naval Aviation Technical Training Command Detachment Lakehurst during the at-sea verification test, currently scheduled to be conducted aboard CVN-76 in December 2002.

The MK 7 MOD 4 will be operated by Aviation Boatswain's Mate (Equipment) (ABE) personnel with Navy Enlisted Classification (NEC) code 7005 assigned to V-2 Division. The stand alone operator training course, Aircraft Launch and Recovery Equipment Arresting Gear, C-604-2029, will be updated to reflect difference data between the new MK 7 MOD 4 and the predecessor system. A slight but insignificant increase in course length is anticipated.

Organizational and intermediate level maintenance of the MK 7 MOD 4 will be performed by ABEs with NEC 7006 assigned to V-2 Division. The stand alone maintenance training course, Aircraft Launch And Recovery Equipment Maintenance Technician, C-604-2028, will be updated to reflect differences between the new arresting gear and the old MK 7 MOD 3 system. A slight but insignificant increase in course length is anticipated. Depot level maintenance will be provided by the shipyard, overhaul activity, and Voyage Repair Teams aboard ship during overhaul periods.

No increase to existing ABE manpower will be required to operate and maintain the MK 7 MOD 4.

MARK 7 MOD 4 ARRESTING GEAR

TABLE OF CONTENTS

	Page
Executive Summary.....	i
List of Acronyms.....	iii
Preface.....	iv
 PART I - TECHNICAL PROGRAM DATA	
A. Title-Nomenclature-Program.....	I-1
B. Security Classification.....	I-1
C. Manpower, Personnel, and Training Principals.....	I-1
D. System Description.....	I-1
E. Developmental Test and Operational Test.....	I-2
F. Aircraft and/or Equipment/System/Subsystem Replaced.....	I-2
G. Description of New Development.....	I-2
H. Concepts.....	I-3
I. Onboard (In-Service) Training.....	I-6
J. Logistics Support.....	I-6
K. Schedules.....	I-7
L. Government-Furnished Equipment and Contractor-Furnished Equipment Training Requirements.....	I-8
M. Related NTSPs and Other Applicable Documents.....	I-8
 APPENDIX A - POINTS OF CONTACT.....	 A-1

MARK 7 MOD 4 ARRESTING GEAR

LIST OF ACRONYMS

ABE	Aviation Boatswain's Mate (Equipment)
BUPERS	Bureau of Naval Personnel
CIN	Course Identification Number
CINCLANTFLT	Commander in Chief, Atlantic Fleet
CINCPACFLT	Commander in Chief, Pacific Fleet
CNET	Commander, Naval Education and Training
CNO	Chief of Naval Operations
CVN	Aircraft Carrier (Nuclear)
HARDMAN	Hardware/Manpower
ILSP	Integrated Logistics Support Plan
NAMP	Naval Aviation Maintenance Program
NATTC	Naval Aviation Technical Training Center
NAVAIRSYSCOM	Naval Air Systems Command
NAWCADLKE	Naval Air Warfare Center Aircraft Division Lakehurst
NEC	Navy Enlisted Classification
NTSP	Navy Training System Plan
OPO	OPNAV Principal Official
PQS	Personnel Qualification Standards
RFT	Ready For Training
TD	Training Device
TTE	Technical Training Equipment

MARK 7 MOD 4 ARRESTING GEAR

PREFACE

This is the first iteration of the Initial Navy Training System Plan (NTSP) for the MK 7 MOD 4 Arresting Gear. It includes the proposed training sites, training equipment, training course information, and billet and personnel requirements.

This Initial NTSP is a product of the Training Planning Process Methodology which is the Navy's replacement for the Hardware/Manpower (HARDMAN) Integration Program Methodology. As such, the format of this document is somewhat different than its predecessor, the HARDMAN Concept Document. However, their purposes are the same.

PART I - TECHNICAL PROGRAM DATA

A. TITLE-NOMENCLATURE-PROGRAM

- 1. **Title-Nomenclature-Acronym.** MARK 7 MOD 4 Arresting Gear.
- 2. **Program Element.** NA.

B. SECURITY CLASSIFICATION

- 1. **System Characteristics** Unclassified
- 2. **Capabilities** Unclassified
- 3. **Functions**..... Unclassified

C. MANPOWER, PERSONNEL, AND TRAINING PRINCIPALS

- OPNAV Principal Official (OPO) Program Sponsor..... CNO (N880)
- OPO Resource Sponsor CNO (N880)
- Developing Agency..... NAVAIRSYSCOM (PMA251)
- Training Agency CINCLANTFLT (N721)
CINCPACFLT (N321)
CNET (T252)
- Training Support Agency NAVAIRSYSCOM (PMA205)
- Manpower and Personnel Mission Sponsor CNO (N1)
BUPERS (PERS-40, PERS-404D)
- Director of Naval Training CNO (N7)

D. SYSTEM DESCRIPTION

1. **Operational Uses.** The MK 7 MOD 4 Arresting Gear System, hereafter referred to as the MK 7 MOD 4, will provide improvements to the energy absorption capacity and operational life of arresting gear used aboard Aircraft Carriers (Nuclear) (CVN) in order to support the combination of aircraft weight, approach speed, and engine thrust of carrier-based fixed wing aircraft envisioned for operations in the 21st century. The MK 7 MOD 4 will apply technology

now in existence or under development to improve the arresting gear capability in support of the CVN Air Warfare Mission. The MK 7 MOD 4 will employ higher operating pressure, higher strength cables, and longer runout to gain a 55 percent increase in energy absorption over the current MK 7 MOD 3 Arresting Gear, while still remaining compatible with existing aircraft.

2. Foreign Military Sales. No Foreign Military Sales or other service procurements are planned for the MK 7 MOD 4.

E. DEVELOPMENTAL TEST AND OPERATIONAL TEST. Developmental testing of the MK 7 MOD 4 is scheduled to start in March 1998 at Naval Air Warfare Center Aircraft Division Lakehurst (NAWCADLKE), New Jersey and is scheduled to be completed in September 1998. Operational testing will be conducted aboard CVN-76 during sea trials in December 2002.

F. AIRCRAFT AND/OR EQUIPMENT/SYSTEM/SUBSYSTEM REPLACED. The MK 7 MOD 4 is an improved shipboard replacement for the existing MK 7 MOD 3. The MK 7 MOD 4 will only be installed on new construction aircraft carriers beginning with CVN-76. No retrofit of existing MK 7 MOD 3 installations is planned.

G. DESCRIPTION OF NEW DEVELOPMENT

1. Functional Description. The MK 7 MOD 4 will provide the capability to recover current carrier-based aircraft at significantly reduced wind over deck and provide increased capacity to accommodate future carrier-based aircraft with higher approach speeds, weights, and engine thrusts.

2. Physical Description. The MK 7 MOD 4 will be a linear hydraulic arresting gear system comprised of two upgraded MK 7 MOD 3 pendant dedicated engines, two upgraded MK 7 MOD 3 pendant and or barricade capable engines, standard MK 7 MOD 3 deck gear, and newly designed fairlead drives and sheave dampers. The MK 7 MOD 4 will utilize a 105,000 pound maximum operating load purchase cable with a 345 foot runout to provide an energy absorbing capacity of 48 million foot pounds. The new fairlead drives will be configured for use with 33-inch diameter sheave assemblies capable of accepting purchase cable ranging from 1-7/16 to 1-3/4 inches diameter. Each fairlead drive will include two retractable sheaves, two through-deck sheaves and four engine-to-anchor damper turnaround sheaves. The new sheave damper assembly will consist of two sheave dampers with a maximum 15-foot operating stroke. Major components include a rotating sheave wheel assembly that is attached to a crosshead, a hydraulic cylinder (including piston, rod, heads, and snubber), an air charged accumulator assembly and charging panel, hydraulic flow control panel, and interconnect piping between the cylinder and accumulator.

3. New Development Introduction. The MK 7 MOD 4 will consist of newly developed fairlead drives and sheave dampers used in conjunction with upgraded MK 7 MOD 3 pendant and barricade engines and existing deck gear on new construction aircraft carriers beginning with CVN-76.

4. Significant Interfaces. The MK 7 MOD 4 will interface with other related air operations shipboard systems for control, data acquisition, and display functions.

5. New Features, Configurations, or Material. NA.

H. CONCEPTS

1. Operational Concept. Operation of the MK 7 MOD 4 will be performed by Aviation Boatswain's Mate (Equipment) (ABE) personnel with Navy Enlisted Classifications (NEC) code 7005 assigned to the CVN Air Department, V2 Division. The MK 7 MOD 4 is manned at all times when the ship is at Flight Quarters.

2. Maintenance Concept. General direction and guidance regarding the maintenance concept is provided by the Naval Aviation Maintenance Program (NAMP), OPNAVINST 4790.2F. The NAMP prescribes three levels of maintenance: organizational, intermediate, and depot. Maintenance of the MK 7 MOD 4 will be performed at the lowest practicable level in order to maintain the required readiness and material condition.

(a) Organizational. Typical organizational level maintenance functions include both preventive and corrective actions as described in the following subparagraphs.

(1) Preventive Maintenance. Preventive maintenance consists of periodic prescribed inspections and servicing of equipment based on hours of operation, and number of engagements.

(2) Corrective Maintenance. Corrective maintenance consists of troubleshooting and removal and replacement of defective components using Peculiar Support Equipment or Common Support Equipment.

(b) Intermediate. CVN class ships are considered afloat intermediate level maintenance activities. The same ABE personnel that perform organizational level maintenance on the MK 7 MOD 4 will perform intermediate level maintenance. Intermediate level maintenance consists of inspections, test, modification, repair, and replacement of damaged or unserviceable equipment, assemblies, and components, calibration, manufacture of selected parts, and incorporation of technical directives. Carrier and Field Services Unit Representatives are available to assist with specific maintenance problems on an as requested basis.

(c) **Depot.** Depot level maintenance will consist of sheave damper, fairlead drive, and arresting gear engine overhaul. Depot level maintenance will be provided by the shipyard during overhaul periods.

(d) **Interim Maintenance.** There are no interim maintenance requirements for this program.

(e) **Life Cycle Maintenance Plan.** Life cycle maintenance of the MK 7 MOD 4 includes corrective and preventive maintenance as well as long term rework. CVNs typically undergo shipyard overhaul every eight to twelve years. Rework of the MK 7 MOD 4 will be accomplished during these periods.

3. Manning Concept. Qualitative and quantitative manpower requirements for the MK 7 MOD 4 are driven by watchstation requirements, total preventive and corrective maintenance workload, Required Operational Capabilities, and Projected Operational Environment requirements. Introduction of the MK 7 MOD 4 will not cause a significant change to any of these factors. As a result, the MK 7 MOD 4 will not change current CVN manpower requirements.

4. Training Concept. The overall objective of the training program is to provide a ready supply of trained MK 7 MOD 4 operators and maintenance technicians to the fleet. MK 7 MOD 4 training requirements identified during system development that differ from current MK 7 MOD 3 requirements will be added to the existing operator course C-604-2029 and maintenance course C-604-2098.

(a) **Initial Training.** Informal operator and maintenance training will be provided by Naval Air Technical Training Center (NATTC) Detachment Lakehurst, New Jersey, and contractor personnel to CVN-76 V2 personnel during at-sea verification scheduled for December 2002. No formal initial training will be required.

(b) **Follow-on Training.** Follow-on training will consist of current Navy stand-alone courses that have been updated to include MK 7 MOD 4 difference training.

(1) Operator

Title	Aircraft Launch And Recovery Equipment Arresting Gear
CIN	C-604-2029
Model Manager ..	NATTC Lakehurst, New Jersey
Description	Provides designated ABE personnel with the technical and practical knowledge to operate the MK 7 Arresting Gear with limited supervision in a shipboard environment.

Location NATTC Lakehurst ABE School
 Length 25 days
 RFT date Currently available
 TTE/TD No new TTE or TDs will be developed for the MK 7 MOD 4. The existing MK 7 MOD 3 TTE will be used to teach difference training.
 Prerequisites C-604-2012, Aviation Boatswain's Mate Launch and Recovery Class A1 school or ABE in paygrade E-4 or above with the ultimate assignment of a 7005 billet.
 Skill Identifier ABE 7005

(2) Maintenance

Title Aircraft Launch And Recovery Equipment Maintenance Technician
 CIN C-604-2028
 Model Manager ... NATTC Lakehurst ABE School
 Description Provides designated ABE personnel with the technical and practical knowledge to perform organizational and intermediate level maintenance on aircraft recovery equipment with limited supervision in a shipboard environment.
 Location NATTC Lakehurst
 Length 80 days
 RFT date Currently available
 TTE/TD No new TTE or TDs will be developed for the MK 7 MOD 4. The existing MK 7 MOD 3 TTE will be used to teach difference training
 Prerequisites C-6024-2012, Aviation Boatswain's Mate Launch and Recovery Class A1 School, and
 C-604-2029, Aircraft Launch and Recovery Equipment Arresting Gear
 Skill Identifier ABE 7006

(c) Student Profiles

SKILL IDENTIFIER	PREREQUISITE SKILL AND KNOWLEDGE REQUIREMENTS
ABE 7005	C-604-2012, Aviation Boatswain’s Mate Launch and Recovery Equipment Class A1 C-604-2029, Aircraft Launch and Recovery Equipment Arresting Gear.
ABE 7006	C-604-2012, Aviation Boatswain’s Mate Launch and Recovery Equipment Class A1 C-604-2028, Aircraft Launch and Recovery Equipment Maintenance Technician.

(d) Training Pipelines. The current stand-alone MK 7 Arresting Gear maintenance course CIN-604-2028 and operator course C-604-2029 will need to be updated to include differences between the MK 7 MOD 3 and MK 7 MOD 4. However, no new training pipelines will need to be established.

I. ONBOARD (IN-SERVICE) TRAINING

1. Proficiency or Other Training Organic to the New Development. N/A.

2. Personnel Qualification Standards. Personnel Qualification Standards (PQS), Air Department MK 7 Arresting Gear NAVEDTRA 43426-6B was used to establish a PQS program for all ABE personnel with NECs 7005 and 7006 assigned to CVN Air Department V-2 Divisions. Minor changes to the PQS will be required to include MK 7 MOD 4 data.

3. Other Onboard or In-service Training Packages. N/A.

J. LOGISTICS SUPPORT

1. Manufacturer and Contract Numbers

CONTRACT NUMBER	MANUFACTURER	ADDRESS
No stand-alone contract number. The MK 7 MOD 4 is included in the new construction package.	Newport News Shipbuilding and Dry Dock Co.	12129 Jefferson Avenue Newport News, VA 23602

2. Program Documentation. An Integrated Logistics Support Plan (ILSP), NAWCADLKE I80095001, for the MK 7 MOD 4 was developed in December 1995. A Draft Operational Requirements Document, NAWCADLKE 13800, Ser 32A/903 was published in October 1993 but subsequently canceled due to massive program changes.

3. Technical Data Plan. No new technical manuals will be developed for the MK 7 MOD 4. Existing MK 7 MOD 3 publications will be updated to include MK 7 MOD 4 data.

4. Test Sets, Tools, and Test Equipment. Support equipment requirements will be determined during developmental testing at NAWCADLKE. Any support equipment requirements identified will be documented via Support Equipment Requirement Data.

5. Repair Parts. The Navy Inventory Control Point, Philadelphia, Pennsylvania, will be responsible for provisioning all spare and repair parts for the MK 7 MOD 4. The Material Support Date is scheduled for August 2002.

6. Human Systems Integration. Established human engineering principles and practices will be used to develop the MK 7 MOD 4 system. These principles will guide the design and development of the systems functions and features. It will be directed toward developing and improving the operator-system interface and achieving effective human performance during arresting gear operation and maintenance while making economical demands on personnel, skills, training, and costs. As a minimum the design will include:

- Physical measures to preclude interchange of units or components of the same or similar form that are not functionally interchangeable.
- Physical measures to preclude improper mounting of units or components.
- Measures (e.g., coding) to facilitate identification and interchange of interchangeable units or components.
- Measures to ensure that identification, orientation, and provisions include cables and connectors.
- Physical measures to facilitate scheduled and unscheduled maintenance.

K. SCHEDULES

1. Schedule of Events

(a) Installation and Delivery Schedule. The MK 7 MOD 4 is only scheduled to be installed on CVN-76 and subsequent new construction aircraft carriers. CVN-76 is currently

under construction at the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia, and is scheduled for at-sea verification in July 2002.

(b) Ready For Operational Use Schedule. The Ready For Operational Use date for the MK 7 MOD 4 will coincide with the Initial Operational Capability date for CVN-76 which is scheduled for December 2002.

(c) Time Required to Install at Operational Sites. The installation of the MK 7 MOD 4 will be completed during ship's initial outfitting prior to commissioning.

(d) Foreign Military Sales and Other Source Delivery Schedule. Currently no foreign military sales or other service procurements of the MK 7 MOD 4 are planned.

(e) Training Device and Technical Training Equipment Delivery Schedule. There will be no new Technical Training Equipment (TTE) or Training Devices (TD) developed especially for the MK 7 MOD 4. Existing MK 7 MOD 3 TTE and TDs have been determined to be adequate to support all training requirements.

L. GOVERNMENT-FURNISHED EQUIPMENT AND CONTRACTOR-FURNISHED EQUIPMENT TRAINING REQUIREMENTS. NA.

M. RELATED NTSPs AND OTHER APPLICABLE DOCUMENTS

DOCUMENT OR NTSP TITLE	DOCUMENT OR NTSP NUMBER	PDA CODE	STATUS
Aircraft Launch and Recovery Equipment Maintenance Program NTP	A-50-8509C/D	PMA251	Preliminary Draft Jan 95
MK 7 MOD 4 Arresting Gear ILSP	NAWCADLKE I80095001	NAWCADLKE 3.1.2	Approved Dec 95

APPENDIX A - POINTS OF CONTACT

NAME / FUNCTION / ACTIVITY, CODE / INTERNET EMAIL	TELEPHONE NUMBERS
<p>CAPT A. Steigelman Head, Plans, Policy, and Fleet Maintenance Support CNO, N881B steigelman.anthony@hq.navy.mil</p>	<p>COMM: (703) 604-7747 DSN: 664-7747 FAX: (703) 604-6972 or 604-6994</p>
<p>CDR F. Smith Head, Aviation Technical Training Branch CNO, N889H smith.frank@hq.navy.mil</p>	<p>COMM: (703) 604-7730 DSN: 664-7730 FAX: (703) 604-6969</p>
<p>MSGT D. Anderson Aviation Training Plan / Track CNO, N889H2A anderson.david@hq.navy.mil</p>	<p>COMM: (703) 604-7722 DSN: 664-7722 FAX: (703) 604-6969</p>
<p>AVCM O. Guidry Master Trainer CNO, N889H2B</p>	<p>COMM: (703) 604-7709 DSN: 664-7709 FAX: (703) 604-6969</p>
<p>CDR T. O'Loughlin Battle Forces Manpower CNO, N122C</p>	<p>COMM: (703) 695-3113 DSN: 225-3113 FAX: (703) 614-5308</p>
<p>Mr. R. Zweibel Training Technology Policy CNO, N751</p>	<p>COMM: (703) 614-1344 DSN: 224-1344 FAX:</p>
<p>Mr. R. Bushway Acquisition Manager PMA251A</p>	<p>COMM: (301) 757-7008 DSN: 757-7008 FAX:</p>
<p>LCDR L. Lamarre Assistant Program Manager PMA260C15</p>	<p>COMM: (301) 757-6889 DSN: 757-6889 FAX:</p>
<p>CAPT S. Davis Deputy Assistant, Chief of Military Personnel for Distribution BUPERS, PERS 4B 4b@bupers.navy.mil</p>	<p>COMM: (703) 614-3454 DSN: 224-3454 FAX: (703) 614-7705</p>
<p>CDR Lineberg Branch Head, Aviation Rating BUPERS, PERS 404 404@bupers.navy.mil</p>	<p>COMM: (703) 693-1370 DSN: 223-1370 FAX: (703) 693-1392</p>
<p>LCDR E. Cunningham Head, Aviation Manpower Requirements Section NAVMAC, 30</p>	<p>COMM: (901) 874-5573 DSN: 883-5573 FAX:</p>
<p>LCDR E. Hawkins Aviation NTSP Manager CINCLANTFLT N-721</p>	<p>COMM: (757) 445-7853 DSN: 565-7853 FAX:</p>

APPENDIX A - POINTS OF CONTACT

NAME / FUNCTION / ACTIVITY, CODE / INTERNET EMAIL	TELEPHONE NUMBERS
LCDR Hoffer Fleet Training and Readiness Coordinator CINCPACFLT, N-321 s341@cpf.navy.smil.mil	COMM: (808) 474-6965 DSN: 474-6965 FAX: (808) 471-5451
LCDR Langlais Aviation Technical Training CNET, T2512	COMM: (904) 452-8911 DSN: 922-8911 FAX: (904) 452-4901
Mr. E. Scheye Aviation NTSP Manager CNET, T252 cnet.t252@smtp.cnet.navy.mil	COMM: (904) 452-4853 DSN: 922-4853 FAX: (904) 452-4901
LT W. Harrison PQS Development NETPMSA Pensacola, 034	COMM: (904) 452-1035 DSN: 922-1035 FAX:
Mr. J Wenger Logistics Manager NAWCADLKE 3.1.2000C	COMM: (732) 323-1831 DSN: 624-1831 FAX:
AZC G. Greenlee Manpower and Personnel CNO, N122C1C	COMM: (703) 614-5364 DSN: 224-5364 FAX:
Ms. F. Hart Training Support PMA205-3A	COMM: (301) 757-8131 DSN: 757-8131 FAX:
Mr. Phil Szczyglowski Competency Manager NAVAIRSYSCOM, 3.4.1 szczyglowski_phil%pax8b@mr.nawcad.navy.mil	COMM: (301) 757-9182 DSN: 757-9182 FAX: (301) 342-4723, DSN 342
Mr. Bruce Colby Front End Analysis Manager NAVAIRSYSCOM, 3.4.1 colby_bruce%pax8b@mr.nawcad.navy.mil	COMM: (301) 757-2635 DSN: 757-2635 FAX: (301) 342-4723, DSN 342
AFCM M. Breboneria Front End Analysis Coordinator NAVAIRSYSCOM, 3.4.1 breboneria_marlon%pax8b@mr.nawcad.navy.mil	COMM: (301) 757-9184 DSN: 757-9184 FAX: (301) 342-4723, DSN 342