



SHIPS PROPELLER CONTROLLABLE PITCH MOCKUP T/A, DEVICE 19E12/1

TRAINING CATEGORY:

PROPULSION ENGINEERING (Maintenance Equipment)

ORIGINATING AGENCY:

CNET

SECURITY CLASSIFICATION:

Device 19E12/1 is unclassified.

INTENDED USE:

The training aid, Device 19E12/1, is intended for use in a classroom to present principles of operation and general arrangement of a controllable pitch ship screw propeller assembly to military personnel.

a. To identify parts, show relationship between parts, and demonstrate the sequence of actions with controllable pitch ship screw propeller assembly as used on the DD963.

b. To demonstrate operation and fundamental shipboard maintenance procedures associated with the controllable pitch ship screw propeller assembly as used on the DD963.

FUNCTIONAL DESCRIPTION:

Device 19E12/1 is one-fourth scale, three-dimensional, hand-operable mockup of the controllable pitch ship screw propeller assembly as used on the DD963. The mockup is sectionalized and includes the hub, one complete blade and portions of the remaining two blades, part of the propeller shaft, indications of all the mechanical components, hydraulic components, and hydraulic pressure. Manual controls are provided for demonstrating the principles of operation.

Propeller pitch is controllable through the controls, from zero to 30° forward (positive) and from zero to 15° reverse (negative). Operation of the crosshead rotates the flanges of the three propeller blade assemblies equally. Two of the propeller blade assemblies are represented by flanges and truncated propeller blades. One of the propeller blade assemblies is complete and is removable by removal of the eight blade bolt covers, eight blade bolts, and lifting the blade from the mockup. After this blade has been removed, then the PRAIRIE air nipple, blade port cover, bearing ring, crank pin ring, and sliding block may be removed.

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A control handle on the valve rod is provided for use in demonstrating changes in propeller pitch.

The hub assembly is sectionalized to reveal the form of the crosshead and piston assembly and indicate bearings and seals. The crosshead and piston are sectionalized to reveal the form and functioning of the valve rod assembly and the hydraulic valves and ports that control movement of the piston assembly. Sections through the hub, crosshead, and piston assemblies reveal the location of the PRAIRIE air tubes, PRAIRIE air passages, ports and seals. Section through one propeller blade assembly partially reveals the PRAIRIE air passages.

A removable transparent polycarbonate plastic cover protects the sectionalized hub area and can be snapped in and out. A support stand constructed of aluminum tubing and cross bracing supports the mockup at the junction of the hub and propeller shaft assembly. The stand has four swivel rubber-tired casters. Two of the casters have side locking brakes. A dust cover of vinyl plastic is provided to protect the mockup when it's not in use.

Components of the mockup are identified by number on the component. A nomenclature plate with component titles and identifying numerals and color code for air and oil is provided on the support stand.

Air and oil are color coded as follows:

Dark Green	High Pressure
Olive Drab	Low Pressure Oil
Red	PRAIRIE Air

The device may be used to demonstrate the principles of operation of the controllable pitch ship screw propeller by showing how the valve rod actuator movement changes blade pitch position.

OPERATION:

CAUTION:

Do not use excessive force in operating the valve rod and piston control or in removal and replacement of components. Do not rotate the valve rod and piston control. Damage to components will result from excessive force.

To Operate:

Push the valve rod piston control forward or aft. This moves the regulating valve pin assembly which is attached to the valve rod assembly. The first one-fourth inch of movement offsets the regulating valve pin in relation to the piston. Movement of the piston moves the crosshead and sliding block. Axial movement of the sliding block causes a rotary movement of the crank pin

ribs. This rotary movement is transmitted to the propeller blades through the blade bolts turning the propeller blade.

To demonstrate the removal of the propeller blade and related components, remove only full blade.

- a. Remove blade bolt covers with combination bolt and bolt cover tool by inserting two projections in mating holes in bolt cover.
- b. Remove blade bolts using opposite end of combination tool. Insert rod end into hole in bolt head and body into slot in bolt head.
- c. Lift propeller blade off.
- d. Lift out PRAIRIE air nipple.
- e. Remove eight slot head machine screws to remove blade port cover.
- f. Lift out blade seal base ring.
- g. Using supplied spanner bar, unscrew and remove bearing ring.
- h. Lift out crank pin ring.
- i. Lift out sliding block.

The propeller blade and related components are assembled by reversing the above procedure.

PHYSICAL INFORMATION:

Number of Pieces: Three (3)
Size: Assembled Device 50" x 31" x 67"
Weight: 145 lbs.

ENVIRONMENTAL CHARACTERISTICS:

Ambient temperatures ranging from -5° to +165° F. Relative humidity ranging up to 95%.

INSTALLATION AREA:

Classroom

PUBLICATIONS FURNISHED:

Summary, NAVTRADEV P-3952 (U)

PERSONNEL:

Instructor: One (1) qualified to instruct in DD963 propulsion system power train.

Trainees: Class of up to Twenty (20)

Maintenance: No maintenance other than routine cleaning is required.

CONTRACT IDENTIFICATION:

Manufactured by Bird-Johnson Co., Walpole, MA under NAVTRASYS-SCEN Contract No. N61339-73-C-0199.

LOCAL STOCK NUMBER:

6910-LL-C00-3207

DIRECTORY OF NAVAL TRAINING DEVICES

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A removable transparent polycarbonate plastic cover protects the sectionalized hub area and can be snapped in and out. A support stand constructed of aluminum tubing and cross bracing supports the mockup at the junction of the hub and propeller shaft assembly. The stand has four swivel rubber-tired casters. Two of the casters have side locking brakes. A dust cover of vinyl plastic is provided to protect the mockup when it's not in use.

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