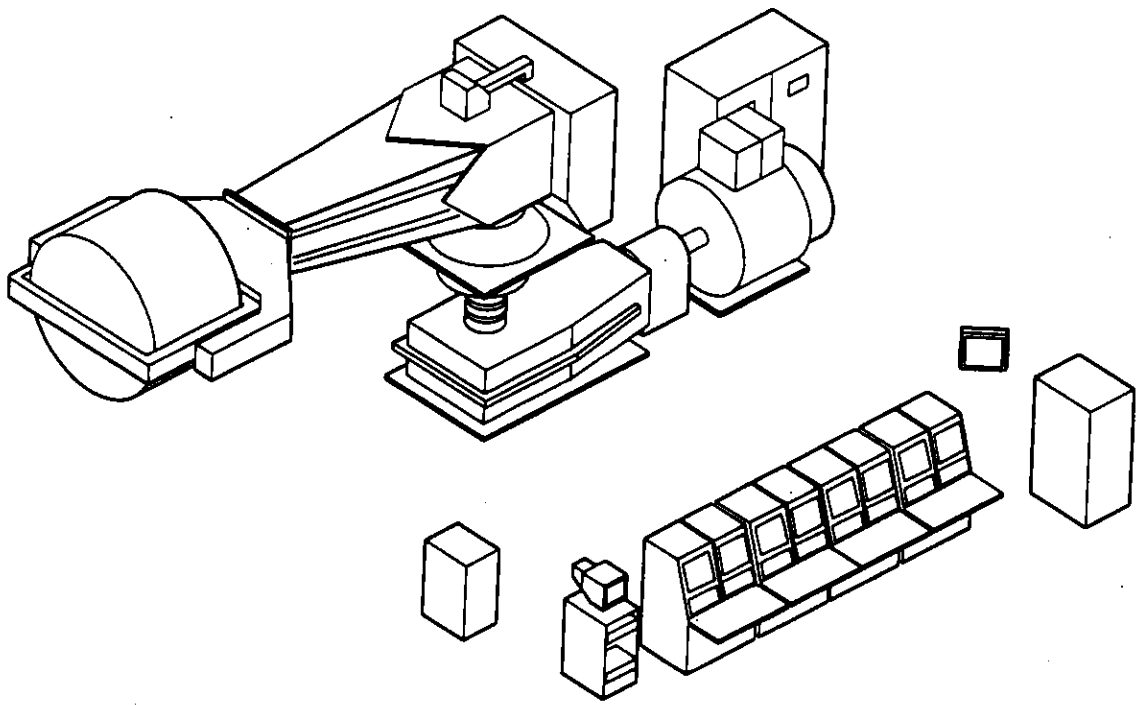
SUMMARY OF
CENTRIFUGE-BASED FLIGHT ENVIRONMENT TRAINER (CFET)

January 1997 Device 9A16

NAVAL AIR WARFARE CENTER TRAINING SYSTEMS DIVISION ORLANDO, FLORIDA



TRAINING CATEGORY:

AVIATION

ORIGINATING AGENCY:

Naval Air Warfare Center Training Systems Division (NAWCTSD), Orlando, FL

SECURITY CLASSIFICATION OF DEVICE:

CFET, Device 9A16, is unclassified.

PURPOSE OF DEVICE:

To develop pilot and aircrew proficiency to withstand high "G" and high "G onset and offset" environments.

INTENDED USE:

CFET is installed at NAS Lemoore, CA, and is used to develop pilot and aircrew proficiency with high G and high G onset/offset aircraft.

FUNCTIONAL DESCRIPTION:

CFET consists of a safety-rated centrifuge and associated power and control equipment.

The centrifuge features a simulated cockpit (gondola) mounted at one end of a rotatable arm, 25 ft from the center of rotation. The gondola is air conditioned, and "Check-6" display, handgrips, and breathing/G-suit air are provided. Gondola roll and pitch are

provided via a two-axis gimbal system, powered by computer-controlled DC motors and gear reducers. The gondola is mounted within a roll frame, which is mounted within a yoke at one end of the arm. A counterweight at the other end of the arm provides dynamic balance during arm rotation. The arm rotates in a horizontal plane on a vertical shaft, supported by two bearings, mounted in a pedestal. The arm and shaft are rotated by a computer-controlled, 1,250 HP, DC motor via a gear reduce and couplings. Monitoring and control equipment, located in the Control Room adjacent to the Centrifuge Room, is connected to the centrifuge via cabling and a slip ring.

Training is conducted by computer program control or by the pilot, using "stick" control. A display monitor provides a G-time scenario, which the student attempts to follow. Software training programs are stored so that G-time scenarios can be reproduced.

Centrifugal accelerations up to 15 Gs can be achieved, and onset rates from an initial 1.4 Gs, up to 6.0 Gs/sec can be selected.

Performance capability beyond the requirements of initial G-tolerance improvement is provided. The seat is adjustable to 11, 22, 30, 45, and 60 degree seat back angles. The gondola "payload" (equipment plus student) can be increased by 150 lbs. Computer control of the arm and gimbal system and response rates will permit future training to be conducted per future aircraft G environments.

PHYSICAL INFORMATION:

Centrifuge:

- Gondola Assembly - 126" diameter x 78" wide / Weight: 2,981 lbs
- Arm & Yoke - 232-3/8" wide x 398-1/2" long x 78-3/4" high, 25' rotational radius / Weight: 20,015 lbs
- Shaft & Low-speed Coupling - Weight: 28,000 lbs
- Roll Ring - Weight: 2,800 lbs
- Roll Drive - 960 lbs
- Pitch Drive - 760 lbs
- Counterweight - 59,347 lbs
- Total Rotating Weight - 114,863 lbs

Main Drive: One 1,250 HP DC Motor

Control Consoles: Instructor, Operator, Recorder, & Physiological

Computer System: DEC rtVAX (Real Time) & VMIC I/O Controller

EQUIPMENT REQUIRED (NOT SUPPLIED):

Students personal G-suit, torso harness, and helmet.

POWER REQUIREMENTS:

2,000 KVA, 3-phase, 60 Hz with peak loads of 330% for a maximum of 1 second.

PUBLICATIONS FURNISHED:

Operation and Maintenance Instructions (NAWCTSD P-7105)
Planned Maintenance System (NAWCTSD P-7106)
Computers Documentation Set (NAWCTSD P-7107)
Instructor Utilization Handbook (NAWCTSD P-7108)

PERSONNEL:

- Instructor (one CFET-trained)
- Operator (one CFET-trained military or civilian)
- Recorder/Facility Monitor/Loader (one CFET-trained military or civilian)
- Physiological Observer (one military aerospace physiologist or flight surgeon)
- Pilot (one pilot/NFO/aircrew on flight status in high-G aircraft)
- Maintenance Personnel (Government-designated contractor operation and maintenance personnel

CONTRACT IDENTIFICATION:

Manufactured by Environmental Tectonics Corporation, 125 James Way, Southampton, PA 18966-3877, under NAWCTSD Contract No. N61339-90-C-0074.

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