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Multivariable Control for the GE T700 Engine Using the LQG/LTR Design Methodology William H. Pfeil 1984
DA Pam
Analysis of Consolidation of Intermediate Level Maintenance for Atlantic Fleet T700-GE-401 Engines 1992 This thesis is an analysis of consolidation of duplicate capabilities for intermediate level maintenance of T700-GE-401 turboshaft engines belonging to Naval Air Force, Atlantic Fleet. The down-sizing of the military in the next decade and the resulting budget constrained reality will force the Navy to adopt innovative measures to save costs. One of the methods by which costs can be reduced is by combining the maintenance functions of activities with duplicated capabilities into one facility, as is proposed for the maintenance facilities for this engine. To test the feasibility of the consolidation concept, the thesis uses simulation to model an Aircraft Intermediate Maintenance Department (AIMD) operating as a consolidated T7OO maintenance facility under a worst-case scenario. Based on the simulation results, the thesis concludes that the proposed consolidation is a viable concept. The thesis also uses life cycle cost analysis to quantify some of the cost savings resulting from the consolidation. Specific recommendations are then made regarding implementation of the consolidation concept.
Hearings on Military Posture and H.R. 5068 [H.R. 5970], Department of Defense Authorization for Appropriations for Fiscal Year 1978, Before the Committee on Armed Services, House of Representatives, Ninety-fifth Congress, First Session: bk. 1-2. Research and development, title II United States. Congress. House. Committee on Armed Services 1977
A Simplified Dynamic Mode of the T700 Turboshaft Engine 1992 A simplified open-loop dynamic model of the T700 turboshaft engine, valid within the normal operating range of the engine, is developed. This model is obtained by linking linear state space models obtained at different engine operating points. Each linear model is developed from a detailed nonlinear engine simulation using a multivariable system identification and realization method. The simplified model may be used with a model-based real time diagnostic scheme for fault detection and diagnostics, as well as for open loop engine dynamics studies and closed loop control analysis utilizing a user generated control law.
Sandy Environment And/or Combat Operations for T700 Series Engines United States. Dept. of the Army 2000
Descriptive Summaries for Program Elements of the Research, Development, Test and Evaluation, Army Program FY ... (U). 1987
Gas Turbines Claire Soares 2011-04-01 This major reference book offers the professional engineer - and technician - a wealth of useful guidance on nearly every aspect of gas turbine design, installation, operation, maintenance and repair. The author is a noted industry expert, with experience in both civilian and military gas turbines, including close work as a technical consultant for GE and Rolls Royce. • Guidance on installation, control, instrumentation/calibration, and maintenance, including lubrication, air seals, bearings, and filters • Unique compendium of manufacturer's specifications and performance criteria, including GE, and Rolls-Royce engines • Hard-to-find help on the economics and business-management aspect of turbine selection, life-cycle costs, and the future trends of gas turbine development and applications in aero, marine, power generation and beyond
Fault Detection and Diagnosis of the T700 Helicopter Engine Mehmet H. Kurtkaya 1992
Engine/Airframe Response Evaluation of the HH-60A Helicopter Equipped with the T700-GE-701 Transient Droop Improvement Electronic Control Unit Gary L. Bender 1986 The engine/drive train response was stable for all speed/power turbine speed droop recovery characteristics, and power turbine speed governing characteristics was the HH-60A with the T700-GE-401 engines equipped with the -401 transient droop improvement engine control unit. The HH-60A with the T700-GE-401 engine equipped with the -701 transient droop improvement engine control unit (with and without the collective potentiometer input) exhibited larger rotor speed droop, noticeable drive train oscillation during droop recovery, and less desirable power turbine speed governing characteristics. The undesirable engine/airframe characteristics of the HH-60A with the -701 transient droop improvement engine control unit is a shortcoming. The UH-60A with the T700-GE-700 engine demonstrated the largest main rotor speed droop but residual drive train oscillations were small, droop recovery characteristics were more predictable and power turbine speed governing was noticeably more stable than demonstrated by the T700-GE0-401 engines equipped with the -701 transient droop improvement engine control unit. The undesirable engine/airframe response (large main rotor speed droop) of the UH-60A with the T700-GE-700 engines is a previously identified shortcoming. Future designs for the UH-60 engine control units should include all the transient droop improvements of the -401 transient droop improvement engine control unit. Additionally, future designs of engine control units should have dynamics tailored to the particular helicopter in which the engines are to be installed.
Sandy Environment And/or Combat Operations for T700 Series Engines 2000
Multi-variable Control of the GE T700 Engine Using the LQG/LTR Design Methodology William H. Pfeil 1986
A High Fidelity Real-Time Simulation of a Small Turboshaft Engine National Aeronautics and Space Administration (NASA) 2018-07-17 A high-fidelity component-type model and real-time digital simulation of the General Electric T700-GE-700 turboshaft engine were developed for use with current generation real-time blade-element rotor helicopter simulations. A control system model based on the specification fuel control system used in the UH-60A Black Hawk helicopter is also presented. The modeling assumptions and real-time digital implementation methods particular to the simulation of small turboshaft engines are described. The validity of the simulation is demonstrated by comparison with analysis-oriented simulations developed by the manufacturer, available test data, and flight-test time histories. Ballin, Mark G. Ames Research Center DIGITAL SIMULATION; FLIGHT SIMULATION; HELICOPTERS; REAL TIME OPERATION; TURBINE ENGINES; TURBOSHAFTS; CONTROL SYSTEMS DESIGN; MODELS; ROTOR BLADES...
Hearings on Military Posture and H.R. 5068 (H.R. 5970), Department of Defense Authorization for Appropriations for Fiscal Year 1978, Before the Committee on Armed Services, House of Representatives, Ninety-fifth Congress, First Session ... United States. Congress. House. Committee on Armed Services 1977
Procurement 1985
Depot Maintenance United States. General Accounting Office. National Security and International Affairs Division 1999
Department of Defense appropriations for 1983 United States. Congress. House. Committee on Appropriations. Subcommittee on Department of Defense 1982
High Speed Balancing Applied to the T700 Engine 1989 This report presents results of T700 power turbine high-speed flexible rotor balancing evaluations and engine test cell diagnostic guidelines for the T53, T55, and T700 engines. The high-speed balancing evaluation was accomplished in two phases. The first phase used assembled T700 power turbine modules, while the final phase used a power turbine rotor assembly that permitted access to all four available balancing planes yet still incorporated the feasibility of high-speed flexible rotor balancing, while second phase of testing evaluated the approach most likely to be used in an overhaul environment. To make the second phase as meaningful as possible, mounting hardware that simulated engine support structures and that would fit in an existing high-speed balancing facility at Corpus Christi Army Depot (CCAD) was designed and fabricated for the balancing study. In both test series, it was shown that high-speed, multiplane flexible rotor balancing of T700 power turbine rotors is feasible.
Descriptive summaries for program elements of the Research, Development, Test and Evaluation, Army Program, FY 1987 (U), February 1986 1986
The History of North American Small Gas Turbine Aircraft Engines Richard A. Leyes 1999 This landmark joint publication between the National Air and Space Museum and the American Institute of Aeronautics and Astronautics chronicles the evolution of the small gas turbine engine through its comprehensive study of a major aerospace industry. Drawing on in-depth interviews with pioneers, current project engineers, and company managers, engineering papers published by the manufacturers, and the tremendous document and artifact collections at the National Air and Space Museum, the book captures and memorializes small engine development from its earliest stage. Leyes and Fleming leap back nearly 50 years for a first look at small gas turbine engine development and the seven major corporations that dared to produce, market, and distribute the products that contributed to major improvements and uses of a wide spectrum of aircraft. In non-technical language, the book illustrates the broad-reaching influence of small turbinesfrom commercial and executive aircraft to helicopters and missiles deployed in recent military engagements. Detailed corporate histories and photographs paint a clear historical picture of turbine development up to the present. See for yourself why The History of North American Small Gas Turbine Aircraft Engines is the most definitive reference book in its field. The publication of The History of North American Small Gas Turbine Aircraft Engines represents an important milestone for the National Air and Space Museum (NASM) and the American Institute of Aeronautics and Astronautics (AIAA). For the first time, there is an authoritative study of small gas turbine engines, arguably one of the most significant spheres of aeronautical technology in the second half o
Preliminary Airworthiness Evaluation of the Woodward Hydromechanical Unit Installed on T700-GE-700 Engines in the UH-60A Helicopter 1989 The U.S. Army Aviation Engineering Flight Activity conducted a Prelimiary Airworthiness Evaluation of the Woodward Hydromechanical Unit (HMU) installed on T700-GE-700 engines in the UH-60A helicopter from 14 May 1989 to 14 June 1989. The evaluation was conducted at Edwards AFB, California (elevation 2302 feet) and Coyote Flat, California (elevation 9980 feet) on aircraft S/N 88- 26015. The evaluation consisted of eleven flights for a total of 15.5 productive flight hours. Performance of the Woodward HMU and the Hamilton Standard HMU, presently used on T700-GE-700 engines, was similar. The poor engine/rotor transient droop characteristics, as noted in previous testing, remain a shortcoming regardless of the HMU installed. Operation of T700-GE-700 engines with Woodard HMUs installed is satisfactory.
Army RD & A Bulletin 1997-05
Department of Defense Appropriations for ... United States. Congress. House. Committee on Appropriations 1979
Sandy Environment And/or Combat Operations for T700 Series Engines 2000
Aviation Unit and Intermediate Maintenance Repair Parts and Special Tools List (including Depot Maintenance Repair Parts and Special Tools) 1989
Engine, Aircraft, Turboshaft T700 ... 1989
Depot Maintenance United States Accounting Office (GAO) 2018-06-11 Depot Maintenance: Maintenance of T700 Series Engines for U.S. Forces in Korea
The Future of Military Engines Andrew P Hunter 2021-09-24 This CSIS report describes how DoD's investment in military aircraft engines will decrease significantly, presenting a challenge for the industrial base. The report also argues that DoD must make four major policy choices in its investment approach to military engines: priority, resources, business model, and competition.
Feasibility Study of T700 Rotorcraft Engine Rotor Supported by Hybrid Air Foil Bearings Mahesh Kumar Varrey 2011 A potential solution towards light weighted and simple structured turbomachinery lies in elimination of oil-lubrication system. These promising benefits of oil-free turbomachinery have demanded extensive research in the field of small turbomachinery, leading to the development of different types of oil free bearings. Air foil bearings (AFBs) are one of the oil-free bearings with many advantages over others. AFBs have simple construction, greater service life and reduced maintenance. Their superior dynamic performance compared to traditional rigid surface bearings is an added advantage. Implementation of these foil bearings in the rotorcraft propulsion system decreases the total weight of the engine setup, improving its performance. In addition it aids to reduce emissions. This article is a feasibility study on compatibility of hybrid air foil bearings (HAFBs) with the T700 engine rotor under two different bearing designs. The HAFB was developed in Dr. Kim's laboratory over years, and HAFBs use external pressurized air supply during start/stop while they operate under either hydrodynamic condition or continuous hybrid mode at normal operating condition. The first design is with two 2 pad HAFBs and the second design is with two 3 pad HAFBs. A multi-degree of freedom (DOF) nonlinear rotordynamic analysis of a rigid rotor model supported by two HAFBs has been presented. The non-linear equations of motion of the rotor have been solved to determine translational and gyroscopic motions, and time dependent Reynolds Equation was used to obtain the dynamic reaction forces and moments from the HAFBs. A Visual C++ code has been developed to simulate the characteristic behavior of the rotor based on former discussed numerical model. The imbalance response for both in cylindrical and conical modes has been discussed. In addition, minimum film thickness of the bearings in both cylindrical and conical modes has been evaluated.
Preliminary Airworthiness Evaluation of the UH-60 Helicopter with T700-GE-701A Engines Installed J. I. Nagata 1983 This limited preliminary evaluation, conducted 24-25 June 1983, consisted of three flights for a total of 4.8 productive flight hours. The significant increase in power available for single engine contingencies (262 shaft horsepower (22%) at 4000 ft pressure altitude, 95 F) is an enhancing characteristic. The excellent torque matching engine stability and rotor speed control with one engine in electrical control unit lockout and the power lever set for level flight at 80 knots indicated airspeed is also an enhancing characteristic for both the T700-GE-701A engine and T700-GE-700 engine. The UH-60A acceleration, deceleration, and normal maneuvering response characteristics are essentially the same with either the T700-GE-700 engine or T700-GE-701A engine installed. Two shortcomings were identified: (1) slow engine acceleration during collective pulls from approximately zero torque to 50% or greater torque; and (2) rotor droop to less than 95% rotor speed during collective pulls from zero torque and during aggressive maneuvers such as a quick stop from the maximum airspeed in level flight. During the evaluation a popping sound was noted during collective pulls to approximately 80% and greater torque settings. This popping sound was subsequently identified as oil canning on the fuselage skin between the pilot's station and gunner/crew chief's window.
Life-limits for T700-GE-700 and T700-GE-701 Engine Components 1997
Department of Defense appropriations for 1980 U.S. Congress. House. Committee on Appropriations 1979
Aviation Unit and Intermediate Maintenance Instructions 1991
T700 Engine Case Study Report. (IDA/OSD R & M (Institute for Defense Analyses/Office of the Secretary of Defense Reliability and Maintainability) Study). P. F. Goree 1983 This document records the activities and presents the findings of the T700 Engine Case Study Report part of the IDA/OSD Reliability and Maintainability Study conducted during the period from July 1982 through August 1983.
United States Army Aviation Digest 1994-11
Depot Maintenance DIANE Publishing Company 1996-05
One Time Inspection and Conversion of Forms and Records for T700-GE-700, -701, and -701C Series Gas Turbine Engines 1997
Depot Maintenance United States. General Accounting Office 1996
Manuals Combined: 50 + Army T-62 T-53 T-55 T-700 AVIATION GAS TURBINE ENGINE Manuals Over 70 (350+ Mbs) U.S. Army Repair, Maintenance and Part Technical Manuals (TMs) related to U.S. Army helicopter and fixed-wing turbine aircraft engines, as well as turbine power plants / generators! Just a SAMPLE of the CONTENTS: ENGINE, AIRCRAFT, TURBOSHAFT MODELS T700-GE-700, T700-GE-701, T700-GE-701C, 1,485 pages - TURBOPROP AIRCRAFT ENGINE, 526 pages - ENGINE, GAS TURBINE MODEL T55-L-712, 997 pages - ENGINE ASSEMBLY GAS TURBINE (GTCP36-150 (BH), GTCP36-150 (BH), 324 pages - ENGINE, AIRCRAFT, GAS TURBINE (T63-A-5A) (T63-A-700), 144 pages - ENGINE, AIRCRAFT, GAS TURBINE MODEL T63-A-720, 208 pages - ENGINE, AIRCRAFT, TURBOSHAFT (T703-AD-700), (T703-AD-700A), (T703-AD-700B), 580 pages ENGINE ASSEMBLY, T700-GE-701, 247 pages - ENGINE ASSEMBLY GAS TURBINE (GTCP3645(H), 214 pages - ENGINE, AIRCRAFT, GAS TURBINE MODEL T63-A-720, 208 pages - GAS TURBINE ENGINE (AUXILIARY POWER UNIT - APU) MODELT - 62 T - 40 - 1, 344 pages - ENGINE ASSEMBLY, T700-GE-700, 243 pages - SANDY ENVIRONMENT AND/OR COMBAT OPERATIONS FOR T53-L-13B, T53-L-13BA AND T53-L-703 ENGINES, 112 pages - DUAL PURPOSE MOBILE CHECK AND ADJUSTMENT/GENERATOR STAND FOR T62T-2A AND T62T-2A1 AUXILIARY POWER UNITS; T62T-40-1 AND T62T-2B AUXILIARY POWER UNITS, 193 pages - Others included: POWER PLANT, UTILITY; GAS TURBINE ENGINE DRI (LIBBY WELDING CO., MODEL LPU-71) (FSN 6115-937-0929) (NON-WINT AND (6115-134-0825) (WINTERIZED) POWER PLANT, UTILITY (MUST), GAS TURBINE ENGINE DRIVEN (AIRESEARCH CO MODEL NO. PPU85-5); (LIBBY WELDING CO., MODEL NO. LPU-71); (AME CORP., MODEL APP-1) AND (HOLLINGSWORTH CO., MODEL NO. JHTWX10/9 (NSN 6115-00-937-0929) (NON-WINTERIZED) AND (6115-00-134-0825) (WINTERIZED) POWER PLANT, UTILITY (MUST), GAS TURBINE ENGINE DRIVEN (AIRESEA MODEL PPU85-5), (LIBBY WELDING CO., MODEL LPU-71), (AMERTECH CO MODEL APP-1) AND (HOLLINGSWORTH CO., MODEL JHTWX10/96) (NSN 6115-00-937-0929, NON-WINTERIZED AND 6115-00-134-0825, WINTERIZED) GENERATOR SET, GAS TURBINE ENGINE DRIVEN, TACTICAL, SKID MTD, 1 400 HZ, ALTERNATING CURRENT GENERATOR SET, GAS TURBINE ENGINE: 45 KW, AC, 120/208 AND 240/4 3 PHASE, 4 WIRE; SKID MTD, WINTERIZED (AIRESEARCH MODEL GTGE 70 (FSN 6115-075-1639) POWER PLAN UTILITY, (MUST), GAS TURBINE ENGINE DRIVEN (AIRESEARCH CO., MOD PPU85-5) (LIBBY WELDING CO., MODEL LPU-71), (AMERTECH CORP., MODEL APP-1) AND (HOLLINGSWORTH CO., MODEL JHTWX 10/96) (NSN 6115-00-937-0929) (NONWINTERIZED) AND (6115-00-134-0825) (WINTERIZED) POWER PLANT, UTILITY, GAS TURBINE ENGINE DRIVEN (AMERTECH CORP MODEL APP-1) POWER PLANT UTILITY, GAS TURBINE ENGINE DRIVEN (LIBBY WELDING CO. MODEL LPU-71) POWER UNIT UTILITY PACK: GAS TURBINE ENGINE DRIVEN (AIRESEARCH MODEL PPU85-5 TYPE A) AVIATION UNIT AND INTERMEDIATE MAINTENANCE FOR GAS TURBINE ENGI (AUXILIARY POWER UNIT - APU) MODEL T-62T-2B, PART NO. 161050-10 (NSN 2835-01-092-2037) AVIATION UNIT AND INTERMEDIATE MAINTENANCE REPAIR PARTS AND SPE TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIA FOR GAS TURBINE ENGINE (AUXILIARY POWER UNIT - APU), MODEL T-62 PART NO. 160150-100 (NSN 2835-01-092-2037)
Department of Defense Appropriations for 1980: Army tank program. Army ammunition. Precision guided munitions. Tactical aircraft. Shipbuilding United States. Congress. House. Committee on Appropriations. Subcommittee on Department of Defense 1979