

**RANCANG BANGUN ALAT MONOCULAR SEBAGAI
ALAT BANTU DALAM PELAKSANAAN
INSPEKSI PADA PESAWAT UDARA**

TUGAS AKHIR



Oleh :

GALUH KUSUMANINGRATRI
NIT. 30418057

**PROGRAM STUDI DIPLOMA 3 TEKNIK PESAWAT UDARA
POLITEKNIK PENERBANGAN SURABAYA
2021**

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Diajukan sebagai Salah Satu Syarat Untuk Mendapatkan Gelar Ahli Madya
(A.Md) pada Program Studi Diploma 3 Teknik Pesawat Udara



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INSPEKSI PADA PESAWAT UDARA**

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ABSTRAK

RANCANG BANGUN ALAT MONOCULAR SEBAGAI ALAT BANTU DALAM PELAKSANAAN INSPEKSI PADA PESAWAT UDARA

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Selain dilakukan perawatan secara berkala, pesawat juga perlu dilakukan inspection walk around baik saat pre-flight maupun transit. Antara jarak dan rute penerbangan, terkadang pesawat melakukan singgah atau transit ke suatu bandar udara karena merupakan kewajiban yang dilakukan sesuai dengan rute penerbangan yang akan dilintasi (flight waypoint), atau karena alasan tertentu sehingga harus singgah. Walk around inspection merupakan pemeriksaan bagian pesawat sebelum boarding atau take off, inspection ini dilakukan dengan mengelilingi sekitar pesawat untuk melihat kerusakan secara visual. Permasalahan yang kadang terjadi pada saat inspection pesawat di bagian yang tinggi seperti stabilizer. Untuk mempermudah inspection pada bagian atas pesawat diperlukan alat yang dapat melihat bagian atas tersebut. Meresponi hal tersebut, maka dibuat monocular sebagai alat bantu yang bertujuan mempermudah praktik Inspection Technic and Handling. Alat bantu ini dirancang dengan 1 lensa objektif, 2 lensa prisma, 3 lensa mata dengan tambahan senter sebagai alat bantu pengelihatian saat inspection malam hari.

Kata kunci: walk around inspection, monocular, pesawat, visual inspection

ABSTRACT

DESIGN OF MONOCULAR EQUIPMENT AS A TOOL IN CARRYING OUT AIRCRAFT INSPECTION

By:

Galuh Kusumaningratri

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In addition to regular maintenance, the aircraft also needs to do an inspection walk around both during pre-flight and transit. Between the distance and the flight route, sometimes aircraft make a stopover or transit to an airport because it is an obligation that is carried out in accordance with the flight route to be traversed (flight waypoint), or for certain reasons so that they have to stop. Walk around inspection is an inspection of the aircraft before boarding or take off, this inspection is carried out by surrounding the aircraft to see visual damage. Problems that sometimes occur when inspecting aircraft in high parts such as stabilizers. To facilitate inspection at the top of the aircraft, a tool that can see the top is needed. In response to this, a monocular was created as a tool that aims to facilitate the practice of Inspection Technic and Handling. This tool is designed with 1 objective lens, 2 prism lenses, 3 eye lenses with an additional flashlight as a vision aid during night inspections.

Keywords: *walk around inspection, monocular, airplane, visual inspection*

PERNYATAAN KEASLIAN DAN HAK CIPTA

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UDARA.

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Surabaya, 24 Januari 2021

membuat pernyataan


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KATA PENGANTAR

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Penulis

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DAFTAR SINGKATAN DAN LAMBANG

<u>Singkatan</u>	<u>Nama</u>	Pemakaian pertama kali pada halaman
VFR	<i>Visual Flight Rules</i>	8
IFR	<i>Instrument Flight Rules</i>	8
ATA	<i>Air Transport Association</i>	10
EASA	<i>European Aviation Safety Agency</i>	13
FAA	<i>Federal Aviation Administration</i>	13
NDT	<i>Non Destructive Testing</i>	13
ISO	<i>International Standard Organization</i>	14
OS	<i>Operating System</i>	20
iOS	<i>iPhone Operating System</i>	20
CASR	<i>Civil Aviation Safety Regulation</i>	22
<u>Lambang</u>		
m	meter	2
>	lebih dari	18
%	<i>persen</i>	19
mm	<i>Millimeter</i>	19

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LAMPIRAN

CASR Part 1

Mach number means the ratio of true airspeed to the speed of sound.

Magnetic variation. The angular difference between True North and Magnetic North.

Main rotor means the rotor that supplies the principal lift to a rotorcraft.

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Maintenance organization's procedures manual. A document endorsed by the head of the maintenance organization which details the maintenance organization's structure and management responsibilities, scope of work, description of facilities, maintenance procedures and quality assurance or inspection systems.

Maintenance program mean a document which describes the specific scheduled maintenance tasks and their frequency of completion and related procedures, such as a reliability program, necessary for the safe operation of those aircraft to which it applies.

Maintenance release mean a document which contains a certification conforming that the maintenance work to which it relates has been completed in a satisfactory manner, either in accordance with the approved data and the procedure described in maintenance organizations procedures manual or under an equivalent system.

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications - (1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or (2) That is not done according to accepted practices or cannot be done by elementary operations.

Major repair means a repair: (1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or (2) That is not done according to accepted practices or cannot be done by elementary operations.

Manifold pressure means absolute pressure as measured at the appropriate point in the induction system and usually expressed in inches of mercury.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Marking. A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

Marker. An object displayed above ground level in order to indicate an obstacle or delineate a boundary.

Master minimum equipment list (MMEL) means a list established for a particular aircraft type by the organization responsible for the type design with the approval of the state of Design containing items, one or more of which is permitted to be unserviceable at the commencement of flight. The MMEL may be associated with special operating condition, limitations or procedures.

Maximum mass. Maximum certificated take-off mass.

statically under standard sea level conditions, within the engine operating limitations established under Part 33, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated takeoff thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically under standard sea level conditions, without fluid injection and without the burning of fuel in a separate combustion chamber, within the engine operating limitations established under Part 33 of this chapter, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated 30 minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under Part 33 of this chapter, and limited in use to a period of not more than 30 minutes after the failure of one engine of a multiengine rotorcraft.

Rated 30-second OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, for continued one-flight operation after the failure of one engine in multiengine rotorcraft, limited to three periods of use no longer than 30 seconds each in any one flight, and followed by mandatory inspection and prescribed maintenance action.

Rated 2-minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, for continued one-flight operation after the failure of one engine in multiengine rotorcraft, limited to three periods of use no longer than 2 minutes each in any one flight, and followed by mandatory inspection and prescribed maintenance action.

Rated 2 ½ minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under Part 33 of this chapter, and limited in use to a period of not more than 2 ½ minutes after the failure of one engine of a multiengine rotorcraft.

Rated continuous OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under Part 33 of this chapter, and limited in use to the time required to complete the flight after the failure of one engine of a multiengine rotorcraft.

Rating. An authorization entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence or means a statement that, as a part of a certificate, sets forth special conditions, privileges, or limitations.

Readback. A procedure whereby the receiving station repeats a received message or an appropriate part thereof back to the transmitting station so as to obtain confirmation of correct reception.

PART 43 - MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATION

- 43.1 Applicability.
 - 43.2 Records of overhaul and rebuilding.
 - 43.3 Persons authorized to perform maintenance, preventive maintenance, rebuilding, and alterations.
 - 43.5 Approval for return to service after maintenance, preventive maintenance, rebuilding, or alteration.
 - 43.7 Persons authorized to approve aircraft, airframes, aircraft engines, propellers, appliances, or component parts for return to service after maintenance, preventive maintenance, rebuilding, or alteration.
 - 43.9 Content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records (except inspections performed in accordance with part 91, 125 and 135 sections 135.411(a)(1) and 135.419.
 - 43.11 Content, form, and disposition of records for inspections conducted under parts 91, 125 and 135 sections 135.411(a)(1) and 135.419.
 - 43.12 Maintenance records: Falsification, reproduction, or alteration.
 - 43.13 Performance Rules (general).
 - 43.15 Additional performance rules for inspections.
 - 43.16 Airworthiness Limitations.
- APPENDIX A TO CASR 43 – MAJOR ALTERATIONS, MAJOR REPAIRS, AND PREVENTIVE MAINTENANCE
 - APPENDIX B TO CASR 43 – RECORDING OF MAJOR REPAIRS AND MAJOR ALTERATIONS
 - APPENDIX C TO CASR 43 – [Reserved]
 - APPENDIX D TO CASR 43 – SCOPE AND DETAIL OF ITEMS (AS APPLICABLE TO THE PARTICULAR AIRCRAFT) TO BE INCLUDED IN ANNUAL AND 100 HOUR INSPECTION
 - APPENDIX E TO CASR 43 – ALTIMETER SYSTEM TEST AND INSPECTION
 - APPENDIX F TO CASR 43 – ATC TRANSPONDER TESTS AND INSPECTIONS

(b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for suspending or revoking the applicable license, operator, or production certificate, Technical Standard Order Authorization, part Manufacturer Approval, or Product and Process Specification issued by the DGCA and held by that person.

(c) The maintenance records shall be retained for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service.

43.13 Performance Rules (general).

(a) Each person performing maintenance, alteration, or preventive maintenance on an aircraft, airframe, engine, propeller, or appliance shall use the methods, techniques, and practices prescribed in the current manufacturer's maintenance manual or Instructions for Continued Airworthiness prepared by its manufacturer, or other methods, techniques, and practices acceptable to the DGCA, except as noted in section 43.16. Tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices shall be used. Where special equipment or test apparatus is recommended by the manufacturer involved, that equipment or apparatus, or its equivalent if acceptable to the DGCA, must be used.

(b) Each person maintaining, altering or performing preventive maintenance shall do that work in such a manner and use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness).

(c) Special provisions for holders of air operator certificates issued under the provisions of part 121 or 135 and part 129 operators holding operations specifications. Unless otherwise notified by the DGCA, the methods, techniques, and practices contained in the maintenance manual or the maintenance part of the manual of the holder of an air operator certificate under part 121 or 135 and part 129 operators holding operations specifications (that is required by its operating specifications to provide a continuous airworthiness maintenance and inspection program) constitute acceptable means of compliance with this section.

43.15 Additional performance rules for inspections.

(a) *General.* Each person performing an inspection required by part 91 or 135 of the CASRs shall—

(1) Perform the inspection so as to determine whether the aircraft, or portion(s) thereof under inspection, meets all applicable airworthiness requirements; and,

(2) If the inspection is one provided for in part 135 or 91 section 91.409(e), perform the inspection in accordance with the instructions and procedures set forth in the inspection program for the aircraft being inspected.

(b) *Rotorcraft.* Each person performing an inspection required by part 91 on a rotorcraft shall inspect the following systems in accordance with the maintenance manual or Instructions for Continued Airworthiness of the manufacturer concerned:

(1) The drive shafts or similar systems.

(2) The main rotor transmission gear box for obvious defects.

(3) The main rotor and center section (or the equivalent area).

(4) The auxiliary rotor on helicopters.

(c) *Annual and 100 hour inspections.*

(1) Each person performing an annual or 100 hour inspection shall use a checklist while performing the inspection. The checklist may be of the person's own design, one provided by the manufacturer of the equipment being inspected or one obtained from another source. This checklist must include the scope and detail of the items contained in Appendix D to this part and paragraph (b) of this section.

(2) Each person approving a reciprocating engine powered aircraft for return to service after an annual or 100 hour inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations of—

- (i) power output (static and idle rpm);
- (ii) magnetos;
- (iii) fuel and oil pressure; and
- (iv) cylinder and oil temperature.

(3) Each person approving a turbine engine powered aircraft for return to service after an annual, 100 hour, or progressive inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations.

(d) Progressive inspection.

(1) Each person performing a progressive inspection shall, at the start of a progressive inspection system, inspect the aircraft completely. After this initial inspection, routine and detailed inspections must be conducted as prescribed in the progressive inspection schedule. Routine inspections consist of visual examination or check of the appliances, the aircraft, and its components and systems, insofar as practicable without disassembly. Detailed inspections consist of a thorough examination of the appliances, the aircraft, and its components and systems, with such disassembly as is necessary. For the purpose of this subparagraph, the overhaul of a component or system is considered to be a detailed inspection.

(2) If the aircraft is away from the station where inspections are normally conducted, an appropriately rated aircraft maintenance engineer, an Approved maintenance organization, or the manufacturer of the aircraft may perform inspections in accordance with the procedures and using the forms of the person who would otherwise perform the inspection.

43.16 Airworthiness Limitations.

Each person performing an inspection or other maintenance specified in an Airworthiness Limitations section of a manufacturer's maintenance manual or Instructions for Continued Airworthiness shall perform the inspection or other maintenance in accordance with that section, or in accordance with operations specifications approved by the DGCA under parts 121 or 135, or an inspection program approved under part 91 section 91.409(e).

DAFTAR RIWAYAT HIDUP



GALUH KUSUMANINGRATRI, lahir di Surabaya pada tanggal 23 Februari 1999. Anak ke-dua dari 2 bersaudara. Mempunyai kakak bernama Gandhewa Bismantoro (26) dan yang lahir dari pasangan Sarwo Edy Wibowo dan Ninik Nuraini.

Menyelesaikan pendidikan dasar formal di Sekolah Dasar Negeri Pakis VIII Surabaya pada tahun 2011, menyelesaikan pendidikan menengah formal di Sekolah Menengah Pertama Negeri 33 Surabaya pada tahun 2014, dan menyelesaikan pendidikan formal sekolah menengah atas di Sekolah Menengah Atas Sejahtera Surabaya pada tahun 2017.

Kemudian menyelesaikan pendidikan Program Diploma III Teknik Pesawat Udara Angkatan IV Charlie di Politeknik Penerbangan Surabaya pada tahun 2018 hingga saat ini. Pada April – Juni 2021 melaksanakan *On the Job Training* di PT. Batam Aero Technic Base Maintenance Surabaya.

Setelah menamatkan pendidikan, saya ingin membahagiakan kedua orang tua saya, kakak saya, serta keluarga besar saya menjadi seorang teknisi yang bertaqwa, berakhlak mulia, disiplin, jujur dan profesional, serta dapat berguna bagi agama, negara, dan bangsa.