

Civil Aviation Authority

MAINTENANCE AND REPORTING PROCEDURE FOR AERONAUTICAL TELECOMMUNICATION FACILITIES

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Corrigendum of Amendments

No.	Rev	Description
01	01	This amendment incorporated the followings: (1) Inclusion of new terms or abbreviations in Glossary of Term (2) Updates on Surveillance Facilities and Automation System. (3) Details on preventive Maintenance. (4) Rectification for Failure Category 2 (5) Details on Facility Logbook (6) Updates details on periodic report
		(7) Revision on Appendix 6 to change total failure into total Outage
		 (8) Revision on Appendix 6A to add details on Problem Code (9) Revision on Appendix 6B to add condition to the title of related table. (10) ILS Integrity and Continuity method of calculation (11) Required editorial correction.

Glossary of Terms

The following terms or acronyms may be used in any manual or document published by CAA. Reproduction in part or whole is allowed without prior approval. The Document Control Office reserves the rights to include such a listing in any CAA manual or document prior to publishing.

AFS Aeronautical Fixed Service

AFTN Aeronautical Fixed Telecommunication Network

AIP Aeronautical Information Publication
AIS Aeronautical Information Service

ASMGCS Advance Surface Movement Guidance Control System

ATC Air Traffic Control
AUTHORITY Civil Aviation Authority

DME Distance Measuring Equipment FDPS Flight | Data Processing System

ICAO International civil aviation organization

IFR Instrument Flight Rules
ILS Instrument Landing System

MLAT Multilateration

Mean Time Between Failure **MTBF** Mean Time Between Outage **MTBO NDB** Non-Directional Beacon **PAR** Precession Approach Radar **PSR** Primary Surveillance Radar Radar Data Processing System **RDPS RMU** Remote Monitoring Unit Secondary Surveillance Radar SSR

UHF Ultra High Frequency

UPS Uninterrupted Power Supply

VDL VHF Digital Link
VFR Visual Flight Rules
VHF Very High Frequency

VOR Very High Frequency Omni Directional Radio Range.

WAM Wide Area Multilateration

1. GENERAL

1.1. Requirements

Civil Aviation Regulation (CAR) 171.235 requires each Aeronautical Telecommunication Service Provider shall apply proper maintenance to each Aeronautical Telecommunication / Radio Navigation Facilities and report its condition to the CAA.

This requirement includes all service interruption to the Aeronautical telecommunication service shall be reported and acted upon according to the standard corrective maintenance procedures

1.2. Implementation

In implementing of maintenance activity, service provider may cooperate with other Aeronautical Telecommunication Facilities Maintenance Organization approved by CAA.

1.3. Objectives

The objectives of maintenance activity in paragraph 1.1 are:

- (a) prevent equipment not functioning according to standard.
- (b) prevent failure of operation.
- (c) prevent major failure to the equipment.
- (d) ensure the availability, reliability, integrity, accuracy, and continuity of equipment's are met the standards.
- (e) ensure operational reliability of equipment by extending Mean Time Between Failure (MTBF).
- (f) shorten the repair time or Mean Time to Repair (MTTR).
- (g) extend the life of the equipment operation.
- (h) reduce repair costs by Carrying out maintenance activities effectively and efficiently.
- (i) Increasing direct and indirect support for aviation security and safety.
- (j) Ensure operational readiness of all facilities needed during emergency use.

1.4. Maintenance Elements

To achieve the maintenance objectives of Aeronautical Telecommunication facilities as referred to in paragraph 1.3, it is necessary to provide the following elements:

- (a) human resources in accordance with adequate quality and quantity of maintenance I personnel.
- (b) equipment maintenance fund.
- (c) work tools, measuring tools, testing equipment, spare parts (modules and / or consumables) and technical documents.
- (d) Maintenance guidelines

2. AERONAUTICAL TELECOMMUNICATION FACILITIES.

Aeronautical Telecommunication Facilities, consist of:

- (a) Communication Facilities.
- (b) Radio Navigation Aids.
- (c) Surveillance Facilities.
- (d) Automation System.

2.1. Communications

Communication Facilities as referred to paragraph 2.1. (a) covers:

2.1.1. Communication system for Aeronautical Mobile Service

- (a) Very High Frequency Air Ground Communication (VHF-A/G).
- (b) High Frequency Air Ground Communication (HF-A/G).
- (c) High Frequency Single Side Band (HF-SSB).
- (d) Voice Recorder.

2.1.2. Communication system for Aeronautical Broadcast Service

- (a) Automatic Terminal Information Service (ATIS).
- (b) Meteorological operation circuits, networks, and broadcast system
- (c) Meteorological information for aircraft in flight (VOLMET)

2.1.3. Communication system for aeronautical fixed service

- (a) ATS Direct Speech (DS) circuit and network.
- (b) Common ICAO data interchange network
- (c) Aeronautical Fixed Telecommunication Network (AFTN)
- (d) Automatic Message Handling System (AMHS).
- (e) Inter-Centre Communication (ICC)

2.1.4. Voice Switching Communication System

- (a) Voice Switching Communication System (VSCS).
- (b) Central Exchange and telephony system

2.1.5. Transmission system

- (a) Radio Link VSAT
- (b) Fiber optic

2.1.6. Digital data Link

- (a) SSR Mode S Air- Ground Data Link VHF Air-Ground Digital Link (VDL)
- (b) Transmission System
- (c) VHF Data Link.

2.2. Radio Navigation Aids

Radio Navigation Aid Facilities as referred to paragraph 2.1. (b) covers:

- (a) Non-Directional Beacon (NDB).
- (b) Instrument Landing System (ILS).
- (c) Very High Frequency Omni Directional Range (VOR).
- (d) Distance Measuring Equipment (DME).
- (e) Precision Approach Radar (PAR).
- (f) Global Navigation Satellite System (GNSS) and the augmentation system.

2.3. Surveillance

Surveillance Facilities as referred to paragraph 2.1. (c) covers:

- (a) Primary Surveillance Radar (PSR).
- (b) Secondary / Monopulse Surveillance Radar (SSR/MSSR).
- (c) Advance Surface Movement Guidance Control System (ASMGCS)
- (d) MSSR Mode S
- (e) Multilateration (MLAT)
- (f) Wide Area Multilateration (WAM)
- (g) Automatic Dependent Surveillance-Broadcast (ADS-B),
- (h) Surface Movement Radar (SMR)

2.4. Automation Systems

Automation System as referred to paragraph 2.1. (d) covers:

- (a) Controller Pilot Data Link Communication (CPDLC) Processing System.
- (b) Radar Data Processing System (RDPS).
- (c) Flight Data Processing System (FDPS).
- (d) Voice and Data Surveillance recording system

3. MAINTENANCE ACTIVITIES

The maintenance activities of Aeronautical Telecommunication facilities consist of but not limited to:

- (a) establishment of history of Facilities.
- (b) maintenance planning of facilities.
- (c) implementation of maintenance of facilities.

3.1. History of Facilities

The history of Aeronautical Telecommunication facilities should include:

- (a) date / month / year of equipment procurement / installation.
- (b) repair / replacement of units / parts / equipment modules.
- (c) recondition / overhaul equipment.
- (d) Repair / replacement of software.

The historical format of Aeronautical Telecommunication Facilities should refer to the Appendix 1 to this Document.

3.2. Planning

Planning for maintenance of Aeronautical Telecommunication facilities should include the following elements:

- (a) the planning of the maintenance personnel 's provision includes:
 - 1. quality and quantity of maintenance personnel.
 - 2. Training program for maintenance personnel to support the implementation of maintenance program
- (b) Allocation budget for maintenance activity.
- (c) providing work tools, measuring tools, testing tools and calibration laboratory of measuring tools for improvement.
- (d) required and recommended spare parts.

3.3. Implementation

Implementation of maintenance of Aeronautical Telecommunication facilities as referred to paragraph 3.1. (c) cover the following activities:

- (a) preventive maintenance.
- (b) corrective maintenance.

3.4. Preventative Maintenance

Preventive maintenance aims to maintain performance of equipment. The activity includes:

- (a) daily maintenance.
- (b) weekly maintenance.
- (c) monthly maintenance.
- (d) quarterly maintenance.
- (e) semi-annual maintenance.
- (f) annual maintenance

A list of minimum preventative maintenance contained in Appendix 2, 2A and 2B of this Document.

Aeronautical Telecommunication Service provider may adjust the preventive maintenance activity to include the preventive maintenance recommended by Equipment Manufacture. It is required for service provider to record the result of all the parameter's reading and measurement, during the preventive maintenance.

3.5. Corrective Maintenance

Corrective Maintenance aims to put the equipment that is experiencing in disruption / failure back to normal conditions. The corrective maintenance include:

- (a) analysis of equipment failure.
- (b) re-adjustment of equipment.
- (c) replacement of components / modules / parts / units of equipment.
- (d) repair of modules / parts / unit's / equipment software.
- (e) equipment modification.
- (f) recondition or overhaul equipment.

4. MAINTENANCE LEVEL

4.1. Levels of Maintenance

Based on the level of difficulties, maintenance of the facilities is divided into:

- (a) maintenance level 1 (Preventative).
- (b) maintenance level 2 (Minor Corrective Maintenance).
- (c) maintenance level 3 (Moderate Corrective Maintenance).
- (d) maintenance level 4 (Severe Corrective Maintenance).

4.2. Preventative Maintenance

Maintenance level 1 as referred to paragraph 4.1. (a) is a preventive maintenance that is carried out periodically with the following activities:

- (a) cleaning of the room.
- (b) cleaning equipment, units / parts of equipment or modules.
- (c) inspection of equipment, unit / equipment parts or equipment modules.
- (d) power supply and its back up measurement and indicator light tests.
- (e) measurement and recording of equipment's parameter.
- (f) replacement of indicator lights, safety components and other consumables

4.3. Minor Corrective Maintenance

Maintenance level 2 as referred to paragraph 4.1. (b) consists of:

- (a) preventive maintenance that is carried out periodically, with the following activities:
 - 1. trials on equipment, unit / piece of equipment.
 - 2. view and target observation.
 - 3. Checking the output of equipment, unit / parts of equipment.
- (b) corrective maintenance for minor abnormalities / failure / failure, the activities as follows:
 - 1. failure analysis.
 - 2. adjustment of equipment parameters.
 - 3. replacement and adjustment of defective equipment units / parts / modules.

4.4. Moderate Corrective Maintenance

Maintenance level 3 as referred to paragraph 4.1. (c) is corrective maintenance if the equipment is interrupted / failure moderately, with the following activities:

- (a) failure analysis.
- (b) repair and re-adjustment of defective unit / part / module of.

4.5. Severe Corrective Maintenance

Maintenance of level 4 as referred to paragraph 4.1. (d) is corrective maintenance if the equipment is subject to severe failure, with the following activities:

- (a) failure analysis.
- (b) repair of software system of the equipment.
- (c) repair and re-adjustment of unit / part / module of equipment with complex failure by using external measuring instruments.
- (d) modification and re-adjustment of equipment units / parts / modules.
- (e) recondition or overhaul equipment

4.6. Maintenance Methodology & Flow Charts

Maintenance of equipment in accordance with the levels of difficulty referred to paragraph 4.1, should be carried out in accordance with the flowcharts as contained in Appendix 3 of this document.

5. FAILURE CATEGORY

5.1. Categories

Failure to equipment is categorized as follows:

- (a) category 1 (one).
- (b) category 2 (two).
- (c) category 3 (three)

5.2. Category 1

Failure category 1 (one) as referred to paragraph 5.1. (a), shall constitute a breakdown causing the discontinuation / cessation of equipment operation (main and standby).

5.2.1. Rectification

Rectification works of failure category 1 (one) shall be done not later than 8 (eight) hours since the occurrence of failure.

5.3. Category 2

Failure category 2 as referred to paragraph 5.1. (b), shall constitute a failure which causes the decrease of equipment's performance but not cause the discontinuation / cessation of equipment's operation, such as decreased in coverage, or the emitted frequency is unstable.

5.3.1. **Rectification**

Rectification works of failure category 2 (two) shall be done not later than 72 (seventy-two) hours since the occurrence of failure. The failure category shall be upgraded to Category 1 if the normal operation is not returned by due time.

5.4. Category 3

Failure category 3 as referred to paragraph 5.1. (c), shall constitute equipment failure occurring on the supporting equipment but shall not affect the performance of equipment and if not corrected may turn into failure Category 1 or Category 2 (with specific date/time for restoration).

5.4.1. **Rectification**

Rectification works of failure category 3 (three) shall be made not later than 30 (thirty) days after failure occurs.

6. FACILITY LOGBOOK

Each maintenance activities as referred to paragraph 3.5. (a) and (b) shall be recorded in the facility logbook.

The facility logbook shall contain sufficient information in the first pages of the logbook to identify:

- (a) Facility information.
- (b) Precautions of operation or its reference number that included in the exposition.
- (c) All entries include the date, time of entry, leaving and signature
- (d) The services are being provided from the facility.

The logbook is maintained throughout the operating hours of the facility and is signed by senior person, or the person on duty at a nominated operating position.

Logbook entries are:

- (a) In chronological sequence and in ink.
- (b) Without erasure, defacement, or obliteration; and
- (c) Corrected by drawing a single line through the erroneous information and initialing the correction.

Actual times of opening and closing facility are recorded in the logbook, together with the reason for every variation from published hours of service.

Logbooks are retained for a period of 3 years from the date of final entry.

Note: This facility logbook is shown in Appendix 4 of this Document.

7. EVALUATION of FACILITY SERVICE PERFORMANCE

The purpose of facility service performance evaluation is to determine the value of Availability, Reliability, Integrity, and Continuity of Service provided by each Equipment. Evaluation of facility service performance is conducted annually.

The Evaluation of value of facility service performance will assist the service provider to determine the maintenance program, including spare parts procurement and replacement of modules or units of an equipment or replacement of equipment as a full system.

7.1. Categorization

The evaluation's result of AT/RN facilities as meant in paragraph 7.1 shall be categorized into 3 groups as follows:

- (a) a group of equipment that is very often disrupted / failure with availability and reliability < 0%.
- (b) a group of equipment that often experience disrupted / failure with availability and reliability 70% <A <95%.
- (c) any group of equipment with very rare disruption / failure with 95% and above availability and reliability.

8. REPORT

Each maintenance activity of facility shall be reported to the Air Navigation Safety Department periodically.

The periodic report will consist of:

- (1) Monthly report, containing the following:
 - (a) The performance of facilities, as described in Appendix 6
 - (b) Failure and corrective maintenance report, as described in Appendix 6A
- (2) Annual report, containing of:
 - (a) Updated on list of equipment and condition, as described in Appendix 6B
 - (b) Summary or list of corrective maintenance of facility within one year, as described in Appendix 6C

Appendix 1

HISTORY LOG SHEET AERONAUTICAL TELECOMMUNICATION FACILITIES

AIRPORT NAME	:
FACILITY	:
EQUIPMENT NAME	:
BRAND/TYPE	:
SERIAL NUMBER	:

NO	DATE / TIME	DESCRIPTION	UPDATED BY

Chief of Section	

Appendix 2

LIST OF PREVENTIVE MAINTENNACE ACTIVITY AERONAUTICAL TELECOMMUNICATION FACILITIES

FACILITY: COMMUNICATION EQUIPMENT: AUTOMATIC MESSAGE HANDLING SYSTEM (AMHS)

MAINTENANCE ACTIVITIES						
DAILY	WEEKLY	MONTHLY	QUARTERLY	SEMESTER	YEARLY	REMARK
1	2	3	4	5	6	7
1. General	1. Generala. Check main supply outputb. Clean the entire room of the equipment	General Check the output power supply voltage of UPS / Stabilizer	General a. Inspect all connectors	1. General	1. Generala. Clean the dust on the UPS and Stabilizerb. Replace battery of UPS if necessary	
Supervisory Check the brightness Check the paper supplies in the printer	Supervisory Check the printer display introductory function	Supervisory a. Check the keyboard function	Supervisory Check interconnection system	Supervisory Check the software function	Supervisory Check the cooling fan function of the rack	

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c. Check the printer ribbon						
Reject Edit Check the brightness	Reject Edit Check printer output	Reject Edit Check the keyboard function	Reject Edit Check interconnection system	Reject Edit Check the software function	Reject Edit clean filter cooling system CPU	
b. Check the paper supplies in the printerc. Check the printer ribbon			System			

LIST OF PREVENTIVE MAINTENNACE ACTIVITY AERONAUTICAL TELECOMMUNICATION FACILITIES

FACILITY: COMMUNICATION PERALATAN: DIRECT SPEECH (DS)

	MAINTENANCE ACTIVITIES						
DAILY	WEEKLY	MONTHLY	QUARTERLY	SEMESTER	YEARLY	REMARK 7	
1	2	3	4	5	6		
-	a. Check the cleanliness of iPOS and indicators	a. Check physical equipment condition	a. Check the connection with the related section/unit	-	-		

LIST OF PREVENTIVE MAINTENNACE ACTIVITY AERONAUTICAL TELECOMMUNICATION FACILITIES

FACILITY: COMMUNICATION EQUIPMENT: VOICE SWITCHING COMMUNICATION SYSTEM (VSCS)

MAINTENANCE ACTIVITIES												
DAILY		WEEKLY		MONTHLY		QUARTERLY		SEMESTER		YEARLY	REMARK	
	1		2		3		4		5		6	7
1.	General -	1. a.	General Clean the entire equipment from dust / dirt	1.	General -	1. a.	General Export the Monitor And Control Station configuration for backup	1.	General -	1. a.	General Replace the Fan Filter of the cabinet or rack	
		b.	Check the room temperature									
2.	System Management	2.	System Management	2.	System Management	2.	System Management	2.	System Management	2.	System Management	
a.	Check the monitor brightness	a.	Check the event Log	a.	Check the main power supply voltage	a.	-	a.	-	a.	-	
		b	Check the cleaness of the rack	b.	Check the output power supply voltage of UPS / Stabilizer							
3.	Position Control	3.	Position Control	3.	Position Control	3.	Position Control	3.	Position Control	3.	Position Control	
a.	Check the monitor brightness	a.	Cek Monitor/function Indicator	a.	Clean the MCS screen	a.	-	a.	-	a.	-	
b.	Check the Monitor and Control Station - Status Display	b.	Check the Touch Screen Panel									

Rev.	1
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c. Check the status of RAID (if Applicable)	c. Clean the touch Panel			
d. Check the status of Duplicated MCS - Server (if Applicable)				

FACILITY: COMMUNICATION EQUIPMENT: VERY HIGH FREQUENCY AIR to GROUND COMMUNICATION

MAINTENANCE ACTIVITIES												
	DAILY		WEEKLY		MONTHLY		QUARTERLY		SEMESTER		YEARLY	REMARK
	1		2		3		4		5		6	7
1. a.	General Check the TX room temperature	1. a.	General Clean the entire Shelter of the equipment	1. a.	General Check the power supply voltage out of the Stabilizer and UPS	1 a.	General Clean all equipment thoroughly	1	General	1. a.	General Check lightning protection and grounding system.	
b.	Check the power supply voltage out of the Stabilizer and UPS			c.	Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration					b.	Check condition of supply cable and control cable	
2.	Transmitter	2.	Transmitter	2.	Transmitter	2.	Transmitter	2.	Transmitter	2.	Transmitter	
a.	Check all indicators	a.	Check meter reading based on BITE	a.	Perform performance check as per approved form	a.	Perform Transmitter Power calibration	a.	Check the coverage range by plane	a.	Check all the external connector s are securely fitted	
b.	Check LCD / Main Screen Display.	b.	Check Change over switch function	b.	Check operational equipment using backup power supply	b	Check VSWR			b.	Perform frequency measurement using frequency counter	

						С	Measure DC level terminal with ON equipment condition			c.	Perform a BIT Interruptive Test Perform an AC and DC Change over check (if both supplies are connected)
3.	Receiver	3.	Receiver	3.	Receiver	3.	Receiver	3.	Receiver	3.	Receiver
a.	Check all indicators	a.	Check meter reading based on BITE	a.	Perform performance check as per approved form	a.	Measure DC level terminal with ON equipment condition			a.	Check all the external connector s are securely fitted
b.	Check LCD / Main Screen Display.	b.	Check Change over switch function	b.	Check operational equipment using backup power						
				b.	supply Adjust Squelch to eliminate noise					b.	Perform frequency measurement using frequency counter
				C.	Do recording					c.	Perform a BIT
					parameter					d.	Interruptive Test Perform an AC and
											DC Change over check (if both supplies are connected)
4.	Antenna	4.	Antenna	4.	Antenna	4.	Antenna	4.	Antenna	4.	Antenna
								a.	Perform		
		_							antenna		
a.	-	a.	-						inspection		

FACILITY: COMMUNICATION EQUIPMENT: AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS)

MAINTENANCE ACTIVITIES										
DAILY	Weekly	MONTHLY	QUARTERLY	SEMESTER	YEARLY	REMARK				
1	2	3	4	5	6	7				
General Check the TX room temperature	1. Generala. Clean the entire equipment from dust / dirtb. Check the power supply voltage	General Check the backup power supply system (UPS)	1. General	General Clean the dust on the UPS and Stabilizer	General Check Battery of UPS, do replacement if necessary					
Console Check the monitor's brightness setting Check the Indicator of each Unit of Equipment	Console Check the connection system between units	2. Consolea. Check the keyboard functionb. Check the mouse function	 2. Console a. Check the recording function b. Check the play back function 	2. Console a. Clean air circulation filter (fan)	Console Check system operation thoroughly					
Transmitter Check the fan (fan) air conditioner Check all indicator lights	3. Transmitter a. Check the transmitter indicators locally and remotely	Transmitter Test switch over unit to play to standby and vice versa	3. Transmitter a. Measure DC level terminal with equipment condition "ON"	3. Transmitter a. Checking the transmitter working frequency	Transmitter Measurement of power output b. VSWR measurement					

EQUIPMENT: VOICE RECORDER

LIST OF PREVENTIVE MAINTENNACE ACTIVITY AERONAUTICAL TELECOMMUNICATION FACILITIES

FACILITY: COMMUNICATION

MAINTENANCE ACTIVITIES												
	DAILY		WEEKLY		MONTHLY		QUARTERLY		SEMESTER		YEARLY	REMARI
	1		2		3		4		5		6	7
1.	General	1.	General	1.	General	1.	General	1.	General	1.	General	
a.	Check the TX room temperature	a.	Clean the equipment room	a.	Check UPS's battery	a.	-	a.	-	a.	-	
		b.	Clean the equipment, unit / part of equipment or module									
		C.	Check main power supply									
		d.	Check output UPS/backup supply									
2	Management System	2	Management System	2	Management System	2	Management System	2	Management System	2	Management System	
a.	Check recording file	a.	Check all events in the event log file	a.	Do hard disk data back up	a.	Do hard disk data cloning, if necessary	a.	Check performance of voice recorder software	a.	Check the connection from server to hardware	
b.	Check channel status indicator									b.	Check replay function	
3	Workstation	3	Workstation	3	Workstation	3	Workstation	3	Workstation	3	Workstation	
a.	Check hardware status	a.	Check mouse and keyboard function	a.	Clean screen display	a.	Perform audio quality measurements of recorded items	a.	Check the PC function	a.	Check interconnection from server to hardware Perform replacement of hard disk, if needed	

AERONAUTICAL TELECOMMUNICATION FACILITIES

FACILITY: RADIO NAVIGATION AIDS EQUIPMENT: VERY HIGH FREQUENCY OMNI DIRECTIONAL RANGE (VOR)

MAINTENANCE ACTIVITIES											
	DAILY	WEEKLY		MONTHLY		QUARTERLY		SEMESTER)	'EARLY	REMARK
	1	2		3		4		5		6	7
1 a.	General Check the TX room temperature	General Check the input power supply voltage of Main Supply or Genset	1 a.	General Clean the entire Shelter of the equipment	1 a.	General Clean all equipment thoroughly	1	General	1 a.	General Check ligh protection system.	ntning and grounding
b.	Check the power supply voltage out of the Stabilizer and UPS	Supply of Genset	b.	Check Obstacle around the shelter					b.		ndition of supply control cable
			C.	Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration							
2 a.	Transmitter Check all indicators	Transmitter Record meter reading on VOR system	2 a.	Transmitter Perform Ground Check/inspection as per approved Ground Check Form	2 a.	Transmitter Check Auto Transfer	2 a.	Transmitter Check Carrier output power	2 a.	Transmitt Check Au	e er dio Frequency
b.	Check all Monitor Indicators	b. Perform Change Over Unit	b.	Check operational equipment using backup power supply	b.	Reassign Main /Standby Transmitter	b.	Check Station Ident			
C.	Check Tone Identification						c. d.	Check Antenna VSWR Check carrier frequency			

3 a. b.	RCSU Check RCSU/RSU panel indicator Check RCSU/RSU alarm indicator	3 RCSU	3 RCSU a. Clean RCSU/RSU front panel	 3 RCSU a. Visual Inspection b. RCSU Operational Check c. Station Alarm Check 	e. Check operating frequency f. Verify BITE Wattmeter Calibration g. Verify BITE Frequency Counter Calibration h. Verify BITE VSWR Calibration 3 RCSU	3 RCSU a.
4	Antenna	4 Antenna	4 Antenna	Antenna Perform Inspection of field monitor Antenna b. Clean the field monitor antenna from debris	4 Antenna	Antenna Perform Inspection of antenna system (carrier and sideband)

FACILITY: RADIO NAVIGATION AIDS EQUIPMENT: DISTANCE MEASURING EQUIPMENT (DME)

MAINTENANCE ACTIVITIES												
	DAILY		WEEKLY		MONTHLY	(QUARTERLY		SEMESTER		YEARLY	REMARK
	1		2		3		4		5		6	7
1 a.	General Check the TX room temperature	1 a.	General Check the input power supply voltage of Main Supply or Genset	1 a.	General Clean the entire Shelter of the equipment	1 a.	General Clean all equipment thoroughly	1	General	1 a.	General Check lightning protection and grounding system.	
b.	Check the power supply voltage out of the Stabilizer and UPS			b.	Check Obstacle around the shelter	b.				b.	Check condition of supply cable and control cable	
				C.	Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration							
2	Transmitter	2	Transmitter	2	Transmitter	2	Transmitter	2	Transmitter	2	Transmitter	
a.	Check all indicators	a.	Check meter reading on DME system	a.	Perform Ground Check/inspection as per approved Ground Inspection Form	a.	Perform Remote DME Certification Check	a.	Perform Transmitter Frequency Performance Check	a.	Perform Local full Diagnostics	
b.	Check all Monitor Indicators	b.	Perform Change Over Unit	b.	Check operational equipment using backup power supply	b.	Reassign Main /Standby Transmitter	b.	Receiver frequency performance check			

c. Check Tone		c. Interrogator
Identification		frequency
Tachancanon		performance
		check
		d. Transmitter pulse
		performance
		check
		e. Transmitter
		power output
		performance
		check
		f. Receiver and
		Decoder
		performance
		check
		reply delay
		performance
		check
		h. Identification
		frequency
		performance
		check
		i Monitor
		Interrogation
		performance
		check
		j. Monitor
		shutdown/transfer
		control
		performance
		check
		k. Monitor alarm
		integrity
		performance
		check
3 RCSU 3 RCSU	3 RCSU 3 RCSU	3 RCSU 3 RCSU
a. Check RCSU/RSU	a. Clean a. Visual	a
panel indicator	RCSU/RSU front Inspection	
· I	· · · · · · · · · · · · · · · · · · ·	
	panel	

b. Check RCSU/RSU alarm indicator			b. RCS Oper Chec c. Stati Alarr Chec	rational ck on m			
4 Antenna	4 Antenna	4 Antenna	4 Ante	4 a. b.	. Perform Inspection of Antenna	4 Antenna	

FACILITY: RADIO NAVIGATION AIDS EQUIPMENT: INSTRUMENT LANDING SYSTEM

MAINTENANCE ACTIVITIES										
	DAILY	WEEKLY	MONTHLY	QUARTERLY	SEMESTER	YEARLY	REMARK			
	1	2	3	4	5	6	7			
1 a.	General Check the TX room temperature	1 General - a.	1 General a. Clean the entire Shelter of the equipment b. Check Obstacle around the shelter c. Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other	1 General a. Clean all equipment thoroughly b.	1 General a	1 General a. Check lightning protection and grounding system. b. Check condition of supply cable and control cable				
2 a.		Localizer a. Check meter reading on Localizer system	deterioration 2 Localizer a. Perform Ground Check/inspection as per approved Ground Inspection Form	2 Localizer a. Check Spurious Modulation		Localizer a. Check polarization				

b.	Check Monitor Indicators	b.	Perform Change Over Unit	b.	Check operational equipment using backup power supply	b.	Check Coverage			b.	frequency synthesizer for carrier /and clearance	
C.	Check alarm indicator					c.	Check Auto Transfer			c.	frequency. Check transmitter signals with respect to further parameters like	
d	Check Tone Identification					d.	Reassign Main /Standby Transmitter			d	harmonics or spurious	Perform Phase Modulation every 3
3	Glide Path	3	Glide Path	3	Glide Path	3	Glide Path	3	Glide Path	3	Glide Path	years
a.	Check all indicators	a.	Check meter reading on Glide path system	a.	Perform Ground Check/inspection as per approved Ground Inspection Form	a.	Check Spurious Modulation	a.	Check unwanted Modulation	a	Check polarization	
b.	Check Monitor Indicators	b.	Perform Change Over Unit	b.	Check operational equipment using backup power supply	b.	Check Coverage			b	Check frequency synthesizer for carrier /and clearance frequency.	

c Check alarm indicator			c. Check Auto Transfer d. Reassign Main /Standby Transmitter		c. Check transmitter signals with respect to further parameters like harmonics or spurious d. Take a complete memory readout of all possible parameters
4 RCSU	4 RCSU	4 RCSU	4 RCSU	4 RCSU	4 RCSU
a	a	a. Clean RCSU/RSU front panel	a. Visual Inspection		a. UPS Battery Check
			b. RCSU Operational Check		
			c. Station Alarm Check		
5 Antenna	5 Antenna	5 Antenna	5 Antenna	5 Antenna	5 Antenna
a	a	Perform Inspection of Antenna			
		b. Clean the antenna			
		from debris			

FACILITY: SURVEILLANCE

EQUIPMENT: PRIMARY SURVEILLANCE RADAR (PSR)

SECONDARY SURVEILLANCE RADAR/

MONOPULSE SECONDARY SURVEILLANCE RADAR

(SSR/MSSR)

					MAINTENAN	ICE	ACTIVITIES		·			
	DAILY		WEEKLY		MONTHLY		QUARTERLY		SEMESTER		YEARLY	REMARK
	1		2		3		4		5		6	7
1 a.	General Check the TX room temperature	1 a.	General Clean the entire Shelter of the equipment	1 a.	General Check Obstacle around the shelter	1 a.	General Clean all equipment thoroughly	1	General	1	General	
		b.	Check the input power supply voltage of Main Supply or Genset	b.	Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration	b.	Check battery function by simulating a power failure					
		C.	Check the power supply voltage out of the Stabilizer and UPS									
2	Antenna	2	Antenna	2 a. b.	Antenna Check Oil Level and evidence of oil leaks Check for abnormal noise or vibration Visual inspection of Moving part	2	Antenna	2 a.	Antenna Check for Grease antenna rotation mechanism	2 a. b.	Antenna Check state of guides visually for oxidation of flanges Check VSWR at the guide input Check losses in the guide	

3	Transmitter	3	Transmitter	3	Transmitter	3	Transmitter	3	Transmitter	3	Transmitter
a.	Check all indicators	a.	Record meter reading based on BITE	a.	Perform Ground Check / Inspection as per approved ground inspection form			a.	Calibrate all meters and indicators		
b.	Check the input voltage of some core modules contained on the panel meter	b.	Perform Change Over Unit	b.	Check and adjust Transmitter frequency						
	•			c. d.	Check and Adjust Pulse Repetition Frequency Check and Adjust all Pulse Shape						
4	Receiver	4	Receiver	4	Receiver	4	Receiver	4	Receiver	4	Receiver
a.	Check all indicators	a.	Record meter reading based on BITE	a.	Perform Ground Check / Inspection as per approved ground inspection form			a.	Calibrate all meter and indicator		
b.	Check the input voltage of some core modules contained on the panel meter Check recovery time of receiver	b.	Perform Change Over Unit	b.	Check RF Amplifier Gain						
d.	Check noise										
5	factor Extractor & Processing	5	Extractor & Processing	5	Extractor & Processing	5	Video Extractor & Processing	5	Video Extractor & Processing	5	Video Extractor & Processing
a.	Check all indicators	a.	Record meter reading based on BITE					a.	Check all settings of Video Extractor		
b.	Check and observe all targets on the Radar viewer screen										

6 Radar Maintenance Maintenance Display Display	6 Radar Maintenance Display	6 Radar Maintenance Display	6 Radar Maintenance Display	6 Radar Maintenance Display
	a. Check all light indicators			Visual Inspection and Cleaning
	b. Check all functions of display switch/button			
	c. Observe the synthetic view/image (track, label, character)			
	d. Check the functionality of the Keyboard e. Check the function of Mouse / Trackball			
	f. Check the Brightness of the screen			
	g. Check the transponder test and observe all targets on the monitor screen			

FACILITY: AUTOMATION EQUIPMENT: ATC SYSTEM

					MAINTENANCE ACTI	VITI	ES					
	DAILY		WEEKLY		MONTHLY	(QUARTERLY		SEMESTER		YEARLY	REMARK
	1		2		3		4		5		6	7
a.	Check ATC System input status (AFTN, AMHS, etc.)	a.	Check operational of Air Situation Display (ASD) reply	a.	Clean outer part of console and CPU of ATC System	a.	Reboot server of ATC system	a.	Update layout of ATC System	a.	clean inner part of CPU's server of ATC system	
b.	Check Radars input status	b.	Check working light and mapping light of console desk	b.	Clean outer part of console and CPU of ATC System replay	b.	Reboot CWP's / Nodes of ATC system	b.	Update network connection of ATC system	b.	Clean inner part of CPU and keyboard of CWP's /Nodes	
C.	Check server status	c.	Clean ATC system display	C.	Change over server of ATC system	C.	reboot Server and CWP's of ATC system replay	C.	Update layout of ATC replay System	C.	Clean inner part of CPU and keyboard of replay's server	
d.	Check CWP's/nodes status			d.	Restart CWP's/nodes of ATC system			d.	Update network connection of ATC replay system			
e.	Check replies status											
f.	Check other related system status (i.e., simulator, traces file, billing file tape recorder, etc.)											

EQUIPMENT : ATC SIMULATOR AND CBT

FACILITY: AUTOMATION

		MAINT	ENANCE ACTIVITIES			
DAILY	WEEKLY	MONTHLY	QUARTERLY	SEMESTER	YEARLY	REMARK
1	2	3	4	5	6	7
ATC 1 SIMULATOR a.	ATC 1 SIMULATOR a. Check Simulator Status b. Check working	ATC 1 SIMULATOR a. Clean CPU on Simulator server rack b. Clean console and	ATC 1 SIMULATOR a. Reboot server and CWP of Sim part	ATC SIMULATOR 1 a. Update layout of Simulator b. Update	ATC 1 SIMULATOR a. clean inner part of CPU's server and keyboard of simulator b. Clean inner part	
	light and console light	c. Clean simulator displays d. Restart server and CWP - Sim Part		network connection of Simulator	of CPU and keyboard of CWP's /Nodes c. Clean inner part of CPU and keyboard of replay's server	
2 CBT	2 CBT	2 CBT	2 CBT	2 CBT	2 CBT	
a. -	a. -	a. Clean display server and Client CBT	a	a. Update layout of CBT	a. Clean inner part of CPU's server and keyboard of CBT	
				b. Update network connection of CBT		

Appendix 2A

Airport Name																									Bran	nd/Ty	ne					
Site Location																									Mon	_	-					
Facility	· Δ11t/	omatio	on																						Yea							
Equipment		omatic		eeane	Han	dlina	Mae	eane	(ΔΝ/Ι	HS)															100							
_qupo.n	. Aut	Jinati	U IVIC	Jage	, i iai	uiiiig	IVICS	Jago	(/Alvii	10)																						
ACTIVITIES	ACTIVITIES DATE															REMAR																
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	KLWAK
ly Maintenance										11111																						
General		1		1	1	l			1	1	1		Ι	Γ		Ι												1				
-																																
Supervisory																																
Check the brightness																																
Check the paper supplies in the																																
printer		L	L	L	L					L_			<u></u>	L	L	L	L	L						L	L	L	L	L	L	L		
Check the printer ribbon																																
Reject Edit																					::::											
Check the brightness																																
Check the paper supplies in the																																
printer																																
Check the printer ribbon																																
ekly Maintenance																																
General																																
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a. Check the monitor brightness								I		T																						
b. Check the Monitor and Control Station - Status Display																																
c. Check the statusof RAID (if Applicable)																																
d. Check the status of Duplicated MCS -Server (if Applicable)																																
eekly Maintenance																																
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a. Clean the entire equipment from dust / dirt				Ĭ											<u> </u>														<u> </u>	Ĭ		
b. Check the room temperature																																
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a. Check the event Log		Ť	T	T	T	1	<u> </u>	<u> </u>	<u> </u>	T		<u> </u>			<u> </u>	<u> </u>	<u> </u>	·····	******		· · · · · · · · · · · · · · · · · · ·						*****	<u> </u>	<u> </u>	1		
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b. Check the output power supply voltage of UPS / Stabilizer																																
3 Position Control																																
a. Clean the MCS screen								1																								
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b. Check the power supply voltage		t					1	1																						1			
out of the Stabilizer and UPS 2: Transmitter																																	
a. Check all indicator s			*****																														
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a. Check meter reading based on BITE Check Change and a support to be a	4																																
b. Check Change over switch function 3: Receiver	1:1:1			:::::	1:::::			::::::	::::::	::::::	::::::	:::::					::::::	::::::	::::::							::::::	::::::	:::::					
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Perform performance check as per approved form																																	
b. Check operational equipment using backup power supply																																	
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b. Check operational equipment using backup power supply	000000000	****	*****	*****	*******			******		******		*****					******	******					*******		******	******					*******		
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a.	Check the TX room temperature																																	
2	Console																																	
a.	Check the monitor's brightness												T		T																			
	setting																																	
b.	Check the Indicator of each Unit																																	
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3	Transmitter			:::::	:::::	: ; ; ;	:::::		:::::			::::		:::::				:::::		::::	:::::	:::::	::::	::::				:::::	:::::	:::::		::::;		
	Check the fan (fan) air															Π																		
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b.	Check all indicator lights																																	
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	dust / dirt																																	
b.	Check the power supply voltage								l																									
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	Check the connection system			·····		·····	·····	·····	T	T	T	T	T	·····	·····	!	T	·····		·····		·····i	······		·····					····	·····			
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	Check the backup power supply					<u> </u>	······		Ť	<u> </u>	1	······		<u> </u>		<u> </u>	1	<u> </u>	******							*****				<u> </u>	······			
	system (UPS)																																	
2	Console																																	
	Check the keyboard function			·····		·····	<u> </u>		T	<u> </u>	1	T	T	······	1	<u> </u>	1	T												<u> </u>	······			
	Check the mouse function	1							t				t			T																\Box		
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	Test switch over unit to play to	*******		······		······	<u> </u>		Ī	<u> </u>	·····	<u> </u>	T	······		Ï	1	······								******				<u> </u>	······			
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1 General																																
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2 Management System																																
a. Check recording file																																
b. Check channel straus indicator				<u> </u>																												
3 Work Station																	****										11111				****	
a. Check hardware status				ļ																												
Weekly Maintenance																																
1 General																																
a. Clean the equipment room																																
b. Clean the equipment, unit / part of equipment or module																																
c. Check main power supply																																
d. Check output UPS/backup suplly																																
2 Management System																																
a. Check all events in the event log file																																
3 Work Station																																
Check mouse and keyboard function																																
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a. Check UPS's battery	1		10,000													T																
2 Management System	****																															
a. Do hard disk data back up	1																															
3 Work Station																							*****									
a. Clean screen display																																
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	Check the input power supply voltage of Main Supply or Genset																																
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C.	Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration																																
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a.	Perform Ground Check/inspection as per approved Ground Check Form																																
b.	Check operational equipment using backup power supply	Ī																															
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a.	Clean RCSU/RSU front panel								Ĺ		L				L		L		L		L	Ĺ											
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	Localizer Check meter reading on Localizer system																	Ť																			ŝ
	. Perform Change Over Unit	t	1																												士				<u> </u>	上	
	Glide Path Check meter reading on Glide path system																	Ī												Ī							
b	Perform Change Over Unit	t																t													+				+	+	+
4	RCSÚ	:								:::::																											1
a.	- Antenna	: :				<u> </u>			-:-:					<u></u>				1		Ι.	: : : :	:::::								<u> </u>				<u> </u>	<u></u>		-:
a		-				T	T	Ï	:::::					T	Ι		::::			Ϊ			::::: 							Ï	Ϊ		:::::		L	İ	
Mo	nthly Maintenance General	1	1		ı										ı																				1	-	8
a	. Clean the entire Shelter of the equipment	83 83			00000		200		*****			00000		8 888			0,000	8000		00 800	2220	8888	0000	0000				100000	00000	0000	80000		•••••		98000	8888	8
	Check Obstacle around the shelter	\downarrow																													\downarrow				igspace	\perp	
C	Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration																																				
	Localizer																																				ă.
a	Perform Ground Check/inspection as per approved Ground Inspection Form																																				
b	. Check operational equipment using backup power supply	t	1									H	+				t				=	\dagger	1						H	t	\dagger				 	+	
	Glidepath																																				8
а	Perform Ground Check/inspection as per approved Ground Inspection Form																																	I			
b	. Check operational equipment using backup power supply	\dagger	+				+	+									+			+	\parallel		+								\dagger				\perp	+	
	RCSU											<u> </u>																	<u> </u>						<u> </u>		8
	Clean RCSU/RSU front panel Anterna																																		<u> </u>		8
a	. Perform Inspection of Antenna . Clean the antenna from debris	Ţ	7		Ë	F	Ŧ	7				Ë	F	F	Ŧ	T	F	Е	Ŧ	Ŧ	7	7	Ŧ						Ë	F	Ŧ			F	F	Ŧ	1
D.	. Orean the antenna from debris	t																													士				士	士	
	Technician /Engineer	F						T															Ŧ								Ŧ						
_	- Commodan / Engineer	ŧ					ļ	4			E			L			L	F		ŧ			-							F	╪			F	╄	¥	
	Chief/Supervisor	d i	ê	of	SS	ue	13	3-Ji	un	-22	:			1	CAA	\ -	doi	fic	der	tia	al ii	ı IV	lat	tei					P	đĝ	ef	62				1	

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	Airport Name	-	-	+																						Bran		pe	:				
-		•																								Mon			:				
	Facility		-		Faciliti																					Year	1		:				
	Equipment	: Pri	mary	Surva	aillanc	e Ra	dar, S	Secor	ndary	Surv	aillan	ice R	adar	and	Mond	puls	e Sed	conda	ary Su	ırvaill	lance	Rada	ar.										
																	DATE	=															
	ACTIVITIES	-		1				1		1	1	1	1		1					1	1			_				1	ī		1	1	REMARK
٠		1	2	3	4	5	6	. 7	. 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
	ly Maintenance																																
1	General				<u> </u>																												
a.	Check the TX room temperature	<u> </u>			<u></u>	<u> </u>	ļ	<u> </u>	<u> </u>	<u> </u>						<u> </u>	<u> </u>				<u> </u>									L		<u> </u>	
	Antenna																																
a.																																	
	Transmitter			*****	******					******	******																		*****				
_	Check all indicators	1																															
b.	Check the input voltage of some																																
	core modules contained on the																																
	panel meter																																
	Receiver																																
a.	Check the input voltage of some																																
	core modules contained on the																																
	panel meter																																
_	Check recovery time of receiver																																
	Check noise factor	L						<u> </u>	<u> </u>	<u> </u>						L	<u> </u>			L								L				<u> </u>	
	Extractor and Processing																																
_	Check all indicators																																
b.	Check and observe all targets on																																
	the Radar viewer screen			· · · · · · · · · · · · · · · · · · ·			******	******								******	******			******	******					*****	******	******	*****			*****	
_	Radar Maintenance Display				******		· · · · · · · · · · · · · · · · · · ·																							•			
a.	-	-	-		-																												
eces:	<u> </u>	N 2000	*****		*****	*****	*****	*****			*****										*****		*****	******			*****		*****				
we	ekly Maintenance General				*****					****	*****	*****				****			*****	****			****				****	*****	****	*****			
	Clean the entire Shelter of the	8 2222		*****	******	*****	******	;;;;;; <u>;</u>	•	·····	·····		 I			•	······			:::::::: 						******	•	:::::::: 		;;;;;;; I		;;;;;;; 	
a.	equipment																																
h	Check the input power supply	╁	-																														
D.	voltage of Main Supply or Genset																																
	voltage of Main Supply of Schiset																																
_	Check the power supply voltage	+	+	+	1		\vdash															H											
0.	out of the Stabilizer and UPS																																
: 2:	Antenna															****											*****	//////					
a.		T	******	******			v	V.V.V.			******		*****			· · · · · · · · · · · · · · · · · · ·		******			*****	*****	*****						*****			*****	
	Transmitter		333333	88868	33333			33333	******							33333				::::::::::::::::::::::::::::::::::::::		******			*****			33333		933334		80000	
	Record meter reading based on	T	T	7			T		T	10000	,	******				ľ	1000		******							******	******	,	*****	ľ		1	
ι.	BITE	1		ĺ																													
h	Perform Change Over Unit	t	+	+	1	\vdash		\vdash		\vdash							\vdash					H				H			\vdash			\vdash	
	Receiver	9 900	W.W.							,,,,,,,,										::::::::::::::::::::::::::::::::::::::	()(()()		:::::::		(;;;;)	::::::::::::::::::::::::::::::::::::::	*****	:::::::					
	Record meter reading based on	2000		2000			900000	(17.77)		20000							20000			******		,,,,,,,,,					2.22.2					(00000)	
ື	BITE	1		ĺ																													
b.	Perform Change Over Unit	t	\top	\top	1																												
	Extractor and Processing	: ;;;;	*****		******	*****		*****			*****					*****				· · · · · · · · · · · · · · · · · · ·						*****		******				*****	
	Record meter reading based on		· · · · · · ·	1	4	1	1		<u> </u>		ľ		,,,,,,,,,			ľ	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							*****	,,,,,,,,		<u> </u>	·····		
ື	BITE	1		ĺ																													
6	:Radar Maintenance Display:	: 888																	*****	W.W.							*****						
a.		* (****	T	1	T											ĺ										******				ĺ			
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ACTIVITIES	DATE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31														DEMARK																	
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	REMARK
Monthly Maintenance																																
1 General																																
Check Obstacle around the shelter																																
Perform physical check of shelter inside and out, for any sign of water filtration, damage, or other deterioration																																
· 2 · Antenna						000000		00000	00000											*****		******										
Check Oil Level and evidence of oil leaks	*****	00000		00000		*****		00000	100000			******				000000	00000	*****	******	00000			00000	00000	00000	******			00000			
b. Check for abnormal noise or vibration																																
c. Visual inpection of Moving part	energy.		TO CONTROL OF													00000								00000			10000			and the		
3 Transmitter																																
a. Perform Ground Check / Inspection as per approved ground inspection form																																
b. Check and adjust Transmitter frequency																																
c. Check and Adjust Pulse Repetation Frequency																																
d. Check and Adjust all Pulse																																
Receiver a. Perform Ground Check / Inspection as per approved ground inspection form																																
b. Check RF Amplifier Gain 5 Extractor and Processing																																
a.	00000						*****										*****								*****						000000	
Radar Maintenance Display Check all indicators	*****	******			 I	 T		 I	······				 I				******		******	*****			******						•			
b. Check all functions of display switch/button																																
c. Observe the synthetic view/image (track, label, character)																																
d. Check the functionality of the Key board																																
e. Check the function of Mo-use / Trackball																																
f. Check the Brightness of the screen																																
g. Check the transponder test and observe all targets on the monitor screen																																
Technician /Engineer																																
Chief/Supervisor															-																	
Gilei/Supervisor																																
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Airport Name	:																								Bran	d/Ty	ре	:				
Site Location	:																								Mont	th		:				
Facility	: Auto	omati	on																						Year			:				
Equipment		Syst																														
111																																
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14		DATE		18	19	20	21	22	23	24	25	26	27	28	29	30	31	REMARK
Daily Maintenance																																
a. Check ATC System input status (AFTN, AMHS, etc)																																
b. Check Radars input status																																
c. Check server status																																
d. Check CWP's/nodes status																																
e. Check reply status																																
f. Check other related system status (i.e. simulator, traces file, billing file tape recorder, etc)																																
Weekly Maintenance																																
Check operational of Air Situation Display (ASD) reply																																
b. Check working light and maping																																
light of console desk																																
light of console desk c. Clean ATC system display																																
light of console desk c. Clean ATC system display Monthly Maintenance																				****	****											
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System												*****	*****					******				******		******	******							
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay																																
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC system							86000				000000																					
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC				\$88888		880000																									\$88888	
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC system d. Restart CWP's/nodes of ATC system								888888																								
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC system d. Restart CWP's/nodes of ATC										555555																						
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC system d. Restart CWP's/nodes of ATC system				\$88888				000000																								
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC system d. Restart CWP's/nodes of ATC system																																
light of console desk c. Clean ATC system display Monthly Maintenance a. Clean outerpart of console and CPU of ATC System b. Clean outerpart of console and CPU of ATC System replay c. Change over server of ATC system d. Restart CWP's/nodes of ATC system			88888																													

a Check working loight nd console light Weekly Maintenance 1. ATC Simulator a. Check Simulator Status b. Check working loight nd console light 2. CBT a Monthly Maintenance 1. ATG Simulator server rack	\RK
Facility	ARK
Equipment ATC Simulator and CBT	ARK
ACTIVITIES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	ARK
ACTIVITIES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Daily: Maintenance 3. ATC Simulator a Check working loight nd console light Weekly Maintenance 1 ATC Simulator 2 CBT a. Check Simulator Status b. Check working loight nd console light Daily: Maintenance 1 ATC Simulator a. Check Simulator Status a. Check Simulator Status b. Check working loight nd console light ATC Simulator a. Check Simulator Status b. Check morking loight nd console light ATC Simulator a. Check Simulator Status	ARK
a Check working loight nd console light Weekly Maintenance 1. ATC Simulator a. Check Simulator Status b. Check working loight nd console light 2. CBT a Monthly Maintenance 1. ATG Simulator server rack	
a Check working loight nd console light Weekly Maintenance 1. ATC Simulator a. Check Simulator Status b. Check working loight nd console light 2. CBT a Monthly Maintenance 1. ATG Simulator server rack	
2 CBT a Check working loight nd console light Weekly Maintenance 1. ATC Simulator a. Check Simulator Status b. Check working loight nd console light light 2. CBT a Indicate the status light	
a. - Check working loight nd console light Weekly Maintenance 1. ATC Simulator a. Check Simulator Status b. Check working loight nd console light light 2. CBT a. - Monthly Maintenance 1. ATC Simulator 3. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack 4. Clean CPU on Simulator server rack	
Weekly Maintenance 1 ATC Simulator a. Check Simulator Status b. Check working loight nd console light light 2 CBT a Monthly Maintenance 1 ATC Simulator server rack	
a. Check Simulator Status b. Check working loight nd console light light 2 CBT a Monthly Maintenance 1 ATC Simulator a. Clean CPU on Simulator server rack	
b. Check working loight nd console light 2: CBT a Monthly Maintenance 1: ATC Simulator a. Clean CPU on Simulator server rack	
light 2 CBT a Monthly Maintenance 1 ATC Simulator a. Clean CPU on Simulator server rack	
a. Clean CPU on Simulator server rack	
a. Clean CPU on Simulator server rack	
a. Clean CPU on Simulator server rack	
a. Clean CPU on Simulator server rack	
a. Clean CPU on Simulator server rack	
b. Clean console and CPU simulators	
c. Clean simulator displays	
d. Restart server and CWP - Sim Part	
2. CBT	
a. Clean display server and Client CBT	
Technician /Engineer	
Chief/Supervisor Chief/Supervisor	

Appendix 2B

				PI	REVENTIVE	MAINTENA	NCE ACTIV	ITIES CHEC	KLIST					
		Communication AUTOMATIC		ANDLING SY	STEM					Brand/Type Month Year			:	
	MAINTENANCE ACTIVITY	1	2	3	4	5	MONTH 6	/YEAR 7	8:	9	10	11	12	REMARK
	erly Maintenance General									ı				
2 a.	Inspect all connectors Supervisory Check interconnection system													
a.	Reject Edit Check interconnection system ster Maintenance													
a.	General -													
a.	Supervisory Check the software function Reject Edit													
Yearl	Check the software function y Maintenance General													
a. b.	Clean the dust on the UPS and Stabilizer Replace battery of UPS if necessary													
a.	Supervisory Check the cooling fan function of the rack Reject Edit													
	clean filter cooling system CPU Technician /Engineer													
	Chief/Supervisor													

			P	REVENTIVE	MAINTEN/	NCE ACTIV	ITIES CHEC	KLIST					
Airport Name	:								Brand/Type			:	
Site Location	:								Month			:	
Facility	: Communication								Year			:	
Equipment	: Direct Speech	1											
						MONTH	I/YEAR						
MAINTENANCE ACTIVITY	4	2	3	4	5	6	7	8	9	10	11	12	REMARK
uarterly Maintenance							•						
a. Check the connection with the related													
section/unit													
emester Maintenance				1		······································							
a. early Maintenance													
a													
T. I				2 (28)281281281281281281						200000000000000000000000000000000000000			
Technician /Engineer													
Chief/Supervisor													

			PI	REVENTIVE	MAINTENA	NCE ACTIV	ITIES CHEC	KLIST					
Airport Name Site Location Facility Equipment	: Communication: VOICE SWITC		UNICATION S	YSTEM					Brand/Type Month Year			:	
MAINTENANCE ACTIVITY	4	2	3	4	5	MONTH 6		8	9	10	11	12	REMARK
Control Control Control Control Station													
configuration for backup 2. System Management													
a.													
a. emester Maintenance 1. General													
a 2. System Management													
a													
early Maintenance 1. General													
a 2. System Management - a													
a. Position Control													
Technician /Engineer													
Chief/Supervisor													

			PI	REVENTIVE	MAINTEN	ANCE ACTIV	ITIES CHEC	KLIST					
Site Location	:								Brand/Type Month			:	
	: Communicati : VERY HIGH	FREQUENCY	AIR TO GROU	JND					Year			:	
MAINTENANCE ACTIVITY	4	2	3	4	5	MONTH 6	/YEAR	- 8	9	10	111	12	REMARK
Quarterly Maintenance 1. General													
a. Clean all equipment thoroughly Transmitter									600000000000000000000000000000000000000			000000000000000000000000000000000000000	
a. Perform Transmitter Power calibration b. Check VSWR													
c. Measure DC level terminal with ON equipment condition 3. Receiver													
Measure DC level terminal with ON equipment condition													
4 Antenna a													
Semester Maintenance 1. General a			le de la companya de la companya de la companya de la companya de la companya de la companya de la companya de										
2. Transmitter a. Check the coverage range by plane													
a 4 Antenna													
a. Perform antenna inspection Yearly Maintenance													
1. General													
a. Check lightning protection and grounding system.													
b. Check condition of power supply cable and control cable 2: Transmitter													
Check all the external connector s are securely fitted													
b. Perform frequency measurement using frequency counter													
c. Perform a BIT Interruptive Test d. Perform an AC and DC Change over check (if both supplies are connected)													
a. Check all the external connectors are securely fitted													
b. perform frequency measurement using frequency counter													
c. Perform a BIT Interruptive Test d. Perform an AC and DC Change over check (if both supplies are connected)													
4 Antenna a													
Technician /Engineer													
Chief/Supervisor													

			PI	REVENTIVE	MAINTENA	NCE ACTIV	ITIES CHEC	KLIST					
Site Location Facility	: Communicat		NFORMATION	SERVICE					Brand/Type Month Year			:	
MAINTENANCE ACTIVITY	4)	3	Δ.		MONTH	/ YEAR	Q	q	10	-14	12	REMARK
Quarterly Maintenance 1. General		-			l a	U		Ü		10		14	
a 2. Console													
a. Check the recording function b. Check the play back function 3. Transmitter													
a. Measure DC level terminal with equipment condition "ON"													
Semester Maintenance 1. General a. Clean the dust on the UPS and Stabilizer			ı									I	
Console Clean air circulation filter (fan)													
Transmitter Checking the transmitter working frequency													
Yearly Maintenance 1. General													
a. Check Battery of UPS, do replacement if necessary 2. Console													
a. Check system operation thoroughly Transmitter													
a. Measurement of power output b. VSWR measurement													
Technician /Engineer													
Chief/Supervisor													

		PREVENTIVE MAINTEN	ANCE ACTIVITIES CHECKLIST		
Airport Name	:		i i	Brand/Type	:
	:		ı	Month	:
Facility	: Communication		,	Year	:
Equipment	: VOICE RECORDER				
MAINTENANCE ACTIVITY	1 2	3 4 5	MONTH / YEAR 6 7 8	9 10 11	REMARK 12
Quarterly Maintenance					
1. General					
a					
2. Management System					
a. Do hard disk data cloning, if necessary					
3. Work Station			Here was a second and a second and a second and a second and a second and a second and a second and a second a		535681
a. Perform audio quality measurements of					
recorded items					
Semester Maintenance 1. General					
			H H H H H H H H H H H H H H H H H H H		
a 2. Management System		i i i i i i i i i i i i i i i i i i i			
a. Check performance of voice recorder				•	
software					
3. Work Station			<u></u>		\$\$\$\$I.
a. Check the PC function					
Yearly Maintenance				<u> </u>	8888
1. General					
a					
2. Management System					
a. Check the connection from server to					
hardware					
b. Check replay function					
3. Work Station					3333
a. Check interconnection from server to hardware					
b. Perform replacement of hard disk, if needed					
Technician /Engineer				***************************************	*****
Chief/Supervisor					
	<u> </u>	<u> </u>	<u> </u>	<u></u>	•

	PREVENTIVE MAINTENANCE	E ACTIVITIES CHECKLIST	
Airport Name :		Brand/Type	:
Site Location :		Month	:
	Radio Navigation Aids	Year	:
·	VHF Omni Range (VOR)	Total	
Equipment .	VIII CHIIII Range (VOIV)		
MAINTENANCE ACTIVITY	1 2 3 4 5	MONTH / YEAR 6 7 8 9 10	11 1.2 REMARK
Quarterly Maintenance 1. General			***************************************
a. Clean all equipment thoroughly		#85.85.85.85.85.85.85.85.85.85.85.85.85.8	
2. Transmitter			
a. Check Auto Transfer			
b. Reassign Main /Standby Transmitter			
3. RCSU			
a. Visual Inspection			
b. RCSU Operational Check			
c. Station Alarm Check		93303303303303303303303303303	
4 Antenna			
a. Perform Inspection of field monitor Antenna			
b. Clean the field monitor antenna from debris			
Semester Maintenance			300000000000000000000000000000000000000
1. General			
a			
2. Transmitter			
a. Check Carrier output power			
b. Check Station Ident			
c. Check Antena VSWR			
d. Check carrier frequency			
e. Check operating frequency f. Verify BITE Wattmeter Calibration			
g. Verify BITE Frequency Counter Calibration			
h. Veryfy BITE VSWR Calibration			
3. RCSU		P	383-833-83-83-83-83-83-83-83-83-83-83-83
a			
4 Antenna		H.	300000000000000000000000000000000000000
a			
Yearly Maintenance			
1 General			
a. Check lightning protection and grounding			
system.			
b. Check condition of supply cable and control			
cable			
2. Transmitter			
a. Check Audio Frequency			
3: RCSU			
a. UPS Battery Check			
4 Antenna			
a. Do Inspection of antenna system (Carrier and Sideband)			
Technician /Engineer			
Chief/Supervisor			
Criticity Capetivicos			

		PREVENTIVE MAINTENAN	CE ACTIVITIES CHECKLIST				
Airport Name Site Location	:			Brand/Type Month		:	
Facility Equipment	Radio Navigation Aids Distance Measuring Equipment (DME)			Year		:	
MAINTENANCE ACTIVITY	. Bistance measuring Equipment (DME)	4 5	MONTH / YEAR 6 7 8	9	10 11	12	REMARK
Quarterly Maintenance							
1. General			# 01001010101010101010101010101010101010				
a. Clean all equipment thoroughly							
2: Transmitter a. Perform Remote DME Certification Check							
b. Reassign Mian /Standby Transmitter							
3. RCSU			- Residence in the second seco				
a. Visual Inspection							
b. RCSU Operational Check							
c. Station Alarm Check			<u> </u>				
4 Antenna a						***************************************	
Semester Maintenance						:	
1. General							
a							
2. Transmitter							
a. Perform Transmitter Frequency Performance Check							
b. Receiver frequency performance check							
c. Interrogator frequency performance check							
d. Transmitter pulse performance check e. Transmitter power output performance check							
f. Receiver and Decoder performance check							
g. Transponder reply delay performance check							
h. Identification frequency performance check							
i. Monitor Interrogation performance check							
j. Monitor shutdown/transfer control performance check							
k. Monitor alarm integrity performance check							
3. RCSU			H:::::::::::::::::::::::::::::::::::::			:1	
a							
4 Antenna							
a. Perform Inspection of Antenna							
b. Clean the antenna from debris							

	MAINTENANCE ACTIVITY	1	2	3	4	5	MONTH 6	8	9	10	11	12	REMARK
Year	ly Maintenance												
1	General												
	Check lightning protection and grounding system.												
	Check condition of supply cable and control cable												
43	RCSU												
a.													
4	Antenna												
a.	-												
	Technician /Engineer												
	Chief/Supervisor												

			PREVENTIVE MAINTENANCE A	ACTIVITIES CHECKLIST		
	Airport Name	:		Branda	Type :	
		:		Month		
	Facility	: Radio Navigation Aids		Year		
		: Instrument Landing System (ILS)				
	MAINTENANCE ACTIVITY		N	IONTH / YEAR		REMARK
		1 2 3	4 5 6	7 8 9	9 10 11	12
Quart	erly Maintenance					***************************************
4	General					
a.	Clean all equipment thoroughly					
	Localizer					
	Check Sporious Modulation					
	Check Coverage					
	Check Auto Transfer					
	Reassign Main /Standby Transmitter					
	Glide Path					
	Check Sporious Modulation					
	Check Coverage					
	Check Auto Transfer					
	Reassign Main /Standby Transmitter					
	RCSU		Danistica de la compansión de la compans	Hadadadadadadadadadadadadadadadada		
	Visual Inspection					
	RCSU Operational Check					
	Station Alarm Check			<u> </u>		
~~~	Antenna		100000000000000000000000000000000000000	H .	r e e e e e e e e e e e e e e e e e e e	***************************************
a.	ster Maintenance			L		0000000000000
	General					000000000000000000000000000000000000000
а.	-					
	Localizer	:		B:::::::::::::::::::::::::::::::		00000000000
	Check unwanted Modulation					200000000000000
	Glide Path			Research Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Contr		***************************************
	Check unwanted Modulation					***************************************
	RCSU			Macael (2000) 2000 2000 2000 2000 2000 2000 20		***************************************
a.	<del></del>					000000000000000
	Antenna			<u></u>		
a.	-		<u> </u>			

MAINTENANCE ACTIVITY	1 2	3 4	5	MONTH 6	/ YEAR	8	9	10	11	12	REMARK
Yearly Maintenance											
1 General											
Check lightning protection and grounding system.											
b. Check condition of supply cable and control cable											
2. Localizer											
a. Check polarization											
b. Check frequency synthesizer for carrier /and clearance frequency.											
c. Check transmitter signals with respect to further parameters like harmonics or spurious											
d. Take a complete memory readout of all possible parameters											
3. Glide Path											
a. Check polarization											
b. Check carrier frequency											
c. Take a complete memory readout of all possible parameters											
4 RCSU											
a. UPS Battery Check											
5 Antenna											
a											
Technician /Engineer											
Chief/Supervisor											

		PREVENTIVE MAINTENANCE	ACTIVITIES CHECKLIST			
Airport Name				Brand/Type		:
Site Location				Month		:
Facility	SURVEILLANCE			Year		:
Equipment	: PRIMARY SURVEILLANCE RAD SECONDARY SURVEILLANCE I MONOPULSE SECONDARY SU					
MAINTENANCE ACTIVITY	1 2	а I <u>и</u> Б Б	MONTH / YEAR	9 10	11 12	REMARK
arterly Maintenance						
General						
Clean all equipment thoroughly						
Check battery function by simulating a power failure						
Antenna	000000000000000000000000000000000000000	000000000000000000000000000000000000000	Beleichen		5055050550505050	
-						
Transmitter -						
Receiver			A constant	ļ.		
Video Extractor & Processing		1:00:00:00:00:00:00:00:00:00:00:00:00:00	<b>4</b> 000000000000000000000000000000000000			
-						
Radar Maintenance Display			Belancia		505-50-50-50-50-50-50	
.   <del>-</del> 						
ester Maintenance General						
Anterna						
Check for Grease antena rotation mechanism						
Transmitter						
Calibrate all meters and indicators						
Receiver			<b>#</b>		::::::::::::::::::::::::::::::::::::::	
Calibrate all meter and indicator						
Extractor & Processing  Check all settings of Video Extractor						
Radar Maintenance Display			<b>A</b> 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			
-						

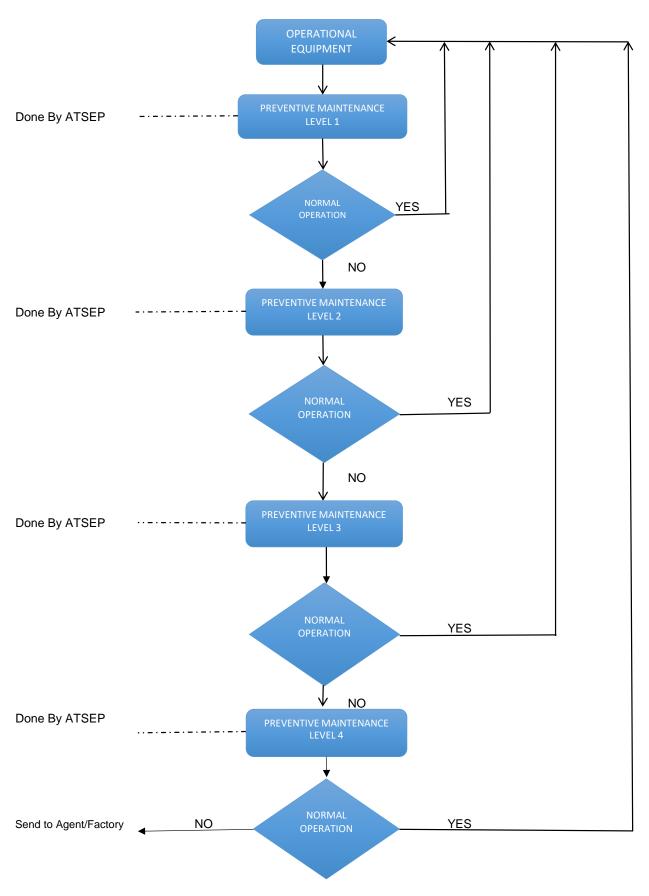
MAINTENANCE ACTIVITY						MONTH	/ YEAR						REMARK
	4	2:	3	4	5	6	·····7	8	9	1:0	11	12	
Yearly: Maintenance													
1. General													
a													
2 Antenna													
a. Check state of guides visually for oxidation of flanges													
<ul> <li>b. Check VSWR at the guide input</li> </ul>													
c. Check losses in the guide													
3 Transmitter													
a													
4 Receiver													
a													
5 Extractor & Processing						1					I		
a G. Radar Maintenance Display													
a. Visual Inpection and Cleaning													
Technician /Engineer													
Chief/Supervisor													

			Pl	REVENTIVE	MAINTENA	NCE ACTIV	ITIES CHEC	KLIST					
Airport Name Site Location										Brand/Type Month			:
Facility	AUTOMATIO	N								Year			:
	ATC SYSTEM	Л											
MAINTENANCE ACTIVITY	4	2	2	4	5	MONTH	/ YEAR	Q	Q	10	11	12	REMARK
Quarterly Maintenance													
a. Reboot server of ATC system													
b. Reboot CWP's / Nodes of ATC system													
c. reboot Server and CWP's of ATC system replay													
Semester Maintenance													
a. Update layout of ATC System													
b. Update network connection of ATC system													
c. Update layout of ATC replay System													
d. Update network connection of ATC replay system													
Yearly Maintenance													
a. clean inner part of CPU's server of ATC system													
b. Clean inner part of CPU and keyboard of CWP's /Nodes													
c. Clean inner part of CPU and keyboard of replay's server													
Technician /Engineer													
Chief/Supervisor													

			Pl	REVENTIVE	<b>MAINTEN</b>	NCE ACTIV	ITIES CHEC	KLIST					
Airport Name										Brand/Type			
Site Location													
	41170144710									Month			:
Facility	AUTOMATIO									Year			:
Equipment	: ATC SIMULA	TOR AND CB											
MAINTENANCE ACTIVITY						MONTH	/YEAR						REMARK
	1	22	<u> 3</u>	4	<u> 5</u>	6	7	8	9	1:O	11	12	
arterly Maintenance													
ATC Simulator		1.0000000000000000000000000000000000000			100000000000000000000000000000000000000						100000000000000000000000000000000000000		
a. Reboot server and CWP of Simulator part													
СВТ	000000000000000000000000000000000000000	100000000000000000000000000000000000000	T		000000000000000000000000000000000000000	T	9-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0				[00:00:00:00:00:00:00:00:00:00:00:00:00:		
a			L			L							
mester Maintenance													
ATC Simulator													
a. Update layout of Simulator													
b. Update network connection of Simulator													
CBT													
a. Update layout of CBT													
b. Update network connection of CBT													
arly Maintenance													
ATC Simulator													
a. clean inner part of CPU's server and keyboard of simulator													
b. Clean inner part of CPU and keyboard of CWP's /Nodes													
c. Clean inner part of CPU and keyboard of replay's server													
CBT													
Clean inner part of CPU's server and keyboard of CBT													
Technician /Engineer													
Chief/Supervisor													

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# FLOWCART PREVENTIVE MAINTENANCE AERONAUTICAL TELECOMMUNICATIO/RADIO NAVIGATION FACILITIES



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## Appendix 4

		FACILITY LOG BOOK AND A AERONAUTICAL TELECOMMUNICATION/RADION		
AIDDO	NDT.			
AIRPC		:		
FACIL		:		
	PMENT	<u>:</u>		
MONT	H	:		
NO.	DATE &TIME	ACTIVITY/NOTE/ACTION		TECHNICIAN/ENGINEER
			CHIEF OF F	ACILITY
			(Signat	ure)
				_,
			(NAM	<u>E)</u>

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#### **Appendix 5**

#### **GUIDANCE ON EQUIPMENT EVALUATION**

#### A. Calculation of MTBF

Mean time between failures (MTBF) is the actual operating time of a facility divided by the total number of failures of the facility during that period of time. The operating time is in general chosen so as to include at least five, and preferably more, facility failures in order to give a reasonable measure of confidence in the figure derived.

The following formula is used to calculate MTBF.

#### B. Facility Reliability

Facility Reliability is the probability that the ground installation operates within the specific tolerance. This definition refers to the probability that the facility will operate for a specified period.

1. The following formula expresses facility reliability as a percentage:

$$R = 100 e^{-t/m}$$

where:

R = reliability (probability that the facility will be operative within the specified tolerances for a time t , also referred to as probability of survival, Ps );

e = base of natural logarithms;

t = time period of interest;

m = mean time between facility failures.

the above formula is true for the majority of electronic equipment's where the failures follow a Poisson distribution. It will not be applicable during the early life of an equipment when there is a relatively large number of premature failures of individual components; neither will it be true when the equipment is nearing the end of its useful life.

Reliability increases as mean time between failures (MTBF) increases. For a high degree of reliability, and for operationally significant values of **t**, we must have a large MTBF; thus, MTBF is another more convenient way of expressing reliability

#### For example:

A conventional navigation equipment has MTBF = 1000 hours, time period of interest t = 24 hours, then reliability R/PS of the equipment is:

R/PS = 
$$100 e^{-24/1000} \%$$
  
=  $100 e^{-0.024} \%$   
=  $97.6 \%$ 

i.e. the likelihood of facility failure during 24 hours period is about 2.4 %

- 2. The Factors which affect MTBF, and Facility Reliability are:
  - a. Inherent equipment reliability.
  - b. Degree and type of *redundancy*.
  - c. Reliability of serving utilities such as power and telephone or control lines.
  - d. Degree and quality of maintenance.
  - e. Environmental factors such as temperature and humidity.

Figure F-1 shows the probability of facility survival, Ps, after a time period, t, for various values of MTBF

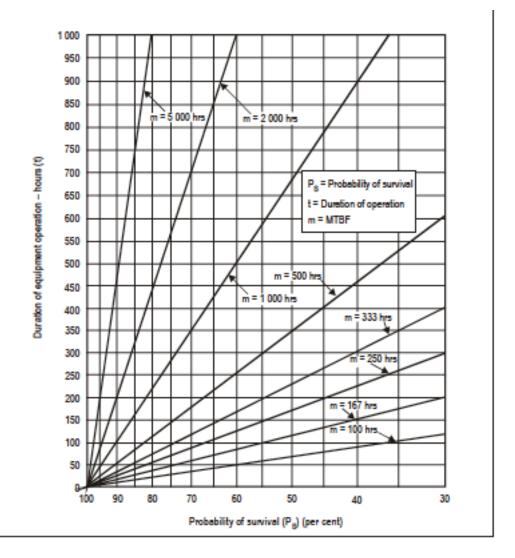


Figure - 1. Graphic Ps = 
$$100 e^{-t/m}$$

#### C. Availability

1. The availability of equipment indicates the degree of readiness of an equipment or group of equipment to operate. Availability is a comparison between the actual operating time and the time of operation specified in a given period and expressed in percent.

Expressed in the formula,

Actual operating time
$$A = \frac{\text{Actual operating time}}{\text{The specified operating time}} X 100 \%$$

Example: if a equipment operates normally for 700 hours from 720 hours (24 hours x 30) in a month, availability of the equipment for that month is:

$$A = \frac{700}{720} \times 100 \%$$

- 2. Factors which affect the level of equipment availability are:
  - a. facility reliability.
  - b. quick response of maintenance personnel to failure.
  - c. adequate training of maintenance personnel.
  - d. equipment design providing good component accessibility and maintainability.
  - e. efficient logistic support.
  - f. provision of adequate test equipment.
  - g. standby equipment and/or utilities
- Practical Aspect of reliability and availability
   The basic quantity and manner of reliability and availability measurement are indicated in Figure 2.

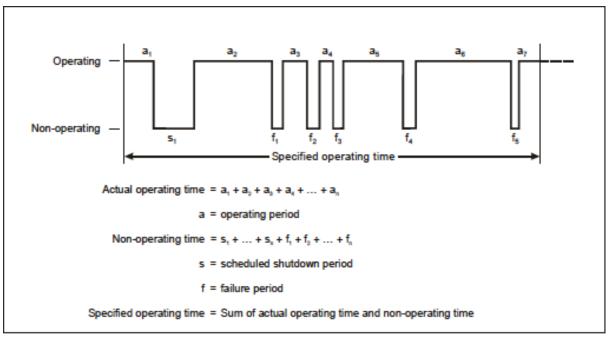


Figure 2. Evaluation of facility availability and reliability

Referred to figure 2, the calculation of the mean time between failure (MTBF) and availability (A)

#### Example:

$$\begin{array}{rclcrcl} a_1+a_2+a_3+a_4+a_5+a_6+a_7 & = & 5540 \text{ hours} \\ & s_1 & = & 20 \text{ hours} \\ & f_1 & = & 2 \frac{1}{2} \text{ j hours} \\ & f_2 & = & 6 \frac{1}{4} \text{ hours} \\ & f_3 & = & 3 \frac{3}{4} \text{ hours} \\ & f_4 & = & 5 \text{ hours} \\ & f_5 & = & 2 \frac{1}{2} \text{ hours} \\ & Number of failures} & = & 5 \text{ times} \\ & The specified operating time} & = & 5580 \text{ hours} \end{array}$$

MTBF = 
$$\frac{\text{Actual operating time}}{\text{Number of failures}}$$

$$=$$
  $\frac{5540}{5}$   $=$  1108 hours

$$\frac{\sum_{i=1}^{7} a_i \times 100}{\sum_{i=1}^{7} a_i + s_1 + \sum_{i=1}^{5} f_i}$$

$$= \frac{5540}{5580} \times 100 \% = 99.3 \%$$

### E. Calculation of Mean Time To Repair (MTTR)

$$\begin{array}{cccc}
5 \\
\Sigma & f_i \\
i & = 1
\end{array}$$

$$= 5$$

$$= \frac{2 \frac{1}{2} + 6 \frac{1}{4} + 3 \frac{3}{4} + 5 + 2 \frac{1}{2}}{5} = \frac{20}{5} = 4 \text{ hours}$$

#### F. ILS CLASIFICATION.

ILS classification system is given in conjunction with the current facility performance categories to provide a more comprehensive method of describing an ILS system.

The ILS Localizer classification is defined by using three characters as follows:

- a) I, II or III: this character indicates conformance to Facility Performance Category in Annex 10 Volume I Chapter 3, 3.1.3.
- b) A, B, C, T, D or E: this character defines the ILS points to which the localizer structure conforms to the course structure given at Annex 10 Volume I Chapter 3, 3.1.3.4.2, except the letter T, which designates the runway threshold. The points are defined in Chapter 3, 3.1.1.
- c) 1, 2, 3 or 4: this number indicates the level of integrity and continuity of service of the localizer as defined in Annex 10 Volume I Chapter 3, 3.1.3.12 and summarized in Table F-1.

The ILS glide path classification is defined by using three characters as follows:

- a) I, II or III: this character indicates conformance to Facility Performance Category in Chapter 3, 3.1.3 and 3.1.5.
- b) A, B, C or T: this character defines the ILS points to which the glide path structure conforms to the path structure given at Chapter 3, 3.1.5.4.2, except the letter T, which designates the runway threshold. The points are defined in Chapter 3, 3.1.1.
- c) 1, 2, 3 or 4: this number indicates the level of integrity and continuity of service of the glide path as defined in Chapter 3, 3.1.5.8 and summarized in Table F-1.

As an example, a Facility Performance Category II — localizer which meets the localizer course structure criteria appropriate to a Facility Performance Category II — localizer down to ILS point "D" and conforms to the integrity and continuity of service objectives of Level 3 would be described as class II/D/3.

ILS classes are appropriate only to the ground ILS element. Consideration of operational categories must also include additional factors such as operator capability, critical and sensitive area protection, procedural criteria and ancillary aids, such as transmissometers and lights.

		Localizer or glide path	
Level	Integrity	Continuity of service	MTBO (hours)
1		Not demonstrated, or less than required for Level 2	
2	$1 - 10^{-7}$ in any one landing	$1-4 \times 10^{-6}$ in any period of 15 seconds	1 000
3	$1-0.5 \times 10^{-9}$ in any one landing	$1-2 \times 10^{-6}$ in any period of 15 seconds	2 000
4	$1 - 0.5 \times 10^{-9}$ in any one landing	$1-2 \times 10^{-6}$ in any period of 30 seconds (localizer) 15 seconds (glide path)	4 000 (localizer) 2 000 (glide path)

Note.— For currently installed systems, in the event that the Level 2 integrity value is not available or cannot be readily calculated, it is necessary to at least perform a detailed analysis of the integrity to assure proper monitor fail-safe operation.

Table F-1 Integrity and Continuity of service objectives

#### G. INTEGRITY AND CONTINUITY FOR INSTRUMENT LANDING SYSTEM

#### 1) Introduction.

Integrity is needed to ensure that an aircraft on approach will have a low probability of receiving false guidance and continuity of service is needed to ensure that an aircraft in the final stages of approach will have a low probability of being deprived of a guidance signal.

Integrity and continuity of service are both key safety factors during the critical phase of approach and landing. The integrity and continuity of service must be known from an operational viewpoint in order to decide the operational application which an ILS could support.

The requirements for integrity and high continuity of service require highly reliable systems to minimize the probability of failure which may affect any characteristic of the total signal-in-space. It is suggested that ANSP endeavour to achieve reliability with as large a margin as is technically and economically reasonable. Reliability of equipment is governed by basic construction and operating environment. Equipment should be operated in environmental conditions appropriate to the manufacturers' design criteria.

It is generally accepted, irrespective of the operational objective, that the average rate of a fatal accident during landing, due to failures or shortcomings in the whole system, comprising the ground equipment, the aircraft, and the pilot, should not exceed  $1\times 10$ –7. This criterion is frequently referred to as the global risk factor. In the case of Category, I operations, responsibility for assuring that the above objective is not exceeded is vested more or less completely in the pilot. In Category III operations, the same objective is required but must now be inherent in the whole system. In this context it is of the utmost importance to endeavour to achieve the highest level of integrity and continuity of service of the ground equipment.

#### 2) ILS Integrity.

#### 2.1 Achievement and retention of integrity service levels

An integrity failure can occur if radiation of a signal which is outside specified tolerances is either unrecognized by the monitoring equipment or the control circuits fail to remove the faulty signal. Such a failure might constitute a hazard if it results in a gross error.

The highest order of protection is required against the risk of undetected failures in the monitoring and associated control system. This would be achieved by careful design to reduce the probability of such occurrences to a low level and provide failsafe operations compliant with the ICAO Standards of Annex 10 Volume I Chapter 3, 3.1.3.11.4 and 3.1.5.7.4, and by carrying out maintenance checks on the monitor system performance at intervals which are determined by a design analysis.

The following formula applies to certain types of ILS and provides an example of the determination of system integrity, I, from a calculation of the probability of transmission of undetected erroneous radiation, P.

(1) I : 1 - P

P : T1T2 when T1 < T2  $\alpha 1\alpha 2M1M2$ 

where

I : integrity

P : the probability of a concurrent failure in transmitter and

monitor systems resulting in erroneous undetected radiation

M1 : transmitter mean time between failures (MTBF)

M2 : MTBF of the monitoring and associated control system

signal to the rate of all monitoring and associated control

system failures

T1 : period of time (in hours) between transmitter checks

T2 : period of time (in hours) between checks on the monitoring

and associated control system

When  $T1 \ge T2$  the monitor system check may also be considered a transmitter check. In this case, therefore T1 = T2 and the formula would be:

(2) P : 
$$\frac{T2}{\alpha 1 \alpha 2M1M2}$$

Since the probability of occurrence of an unsafe failure within the monitoring or control equipment is extremely remote, to establish the required integrity level with a high degree of confidence would necessitate an evaluation period many times that needed to establish the equipment MTBF. Such a protracted period is unacceptable and therefore the required integrity level can only be predicted by rigorous design analysis of the equipment

#### 2.2 Data Collection and Analysis

Integrity calculation required total outage data collection at least for one-year operational period. Data is categorized based on nature of fault, the cause and time of occurrence as shown in form G-1. It is recognized that total failures in the for G-1 will not cause total outage of the facility. Only few of them caused an outage and remaining will cause change over to the transmitter.

The monitor consists of inbuilt integrity test. It is required to initiate a fault to check the performance of monitor and associated control system. The time period between checks for both transmitters and monitor shall be recorded. Then, details of integrity calculation required is tabulated in form G-2a to G-2d.

#### Form G-1 - Categorization

#### Nature of Fault and Number of events

SR	Nature of Fault	Number of Events
1	Failure of facility due to power supply problem	
2	Antenna and Antenna Cable faults	
3	Modules problem	
4	Remote status indication failure due to transmission media	
5	RCMS or RMM Software problem	
6	Failure due to bad connector, wire and component	
7	Failure Due to lightning, bad weather and storm	
8	Interlock failure between Runway In Use	

9	Obstruction and passage of vehicle and men at NFM and FFM	
	Fallows of facility with a color and	
10	Failure of facility with unknown cause	

FORM G-2a

# Calculation of Transmitter MTBF (M1)

	II C Dumuray	Equipment in	Scheduled O	perating Time		Non-Opera	_		Actual Operating	No. of Failures	Remark/Signature
Date ILS Runway selected		Operation	(	(A)		hutdown of X	Shutdown	of TX due to reason	Time (AOT) ( A - B )	(C)	Remarky Signature
		LLZ/GP	From	То	From	То	From	То	Hrs		
TOTAL											
	ter MTBF M1										
( Total A			:								
Failures)											

Form G-2b

# Calculation of Monitoring and Associated Control system MTBF (M2)

						Non-Opera	ating Time		Actual		
	ILS Runway	Equipment in		perating Time		(E	3)		Operating	No. of	
Date	selected	Operation	(	A )		Shutdown of X	Shutdown other i	of TX due to reason	Time (AOT) ( A - B )	Failures (C)	Remark/Signature
		LLZ/GP	From	То	From	То	From	То	Hrs		
TOTAL											
Monitori	-				1				•	•	
Assciated M2	d Control MTBF		:								
( Total A	OT/ No.		•								
Failures)											

Form G-2c

# $\frac{\text{Calculation of 1/}\alpha\text{1}}{\text{( C1/D1 )}}$

Date	ILS Runway selected	Equipment in Operation	Opera	ting Time	Failures of ⁻ due to Ra Erroneous Si RMS log (A	diation of gnal (refer to g Alarm)	due to all re user point o Refer Indica Rep	Transmitter easons (from of view) and etor Monthly cort e1)	Rate of Failure of A1 (total failures times per no. of failures)	Rate of Failure of B1 (total failures times per no. of failures)	Remark/Signature
		LLZ/GP	/GP From To		From To		From To		C1	D1	
TOTAL											
	1/α1 (C1/D1)	:						1	l	I	

Form G-2d

# Calculation of Monitoring and Associated Control system MTBF (M2) ( C2 / D2 )

Date	ILS Runway selected	Equipment in Operation	Opera	ting Time	Associated due inability erroneous Signature self-cert activ	Monitor / Control Unit to detect an gnal (Monitor cification ated)	due all	Monitor / Control Unit reasons (2)	Rate of Failure of A2 (total failures times per no. of failures)	Rate of Failure of B2 (total failures times per no. of failures)	Remark/Signature
		LLZ/GP	From	То	From	То	From	То	C2	D2	
TOTAL	_										
(	1/α2 ( C2/D2 )	:									

#### 2.3 Result.

Refer to the data collected and tabulated in from G-2a to G-2d, the final calculation of ILS integrity will be shown in the form G-3; result of Integrity Calculation.

FORM G-3

#### **RESULT OF INTEGRITY CALCULATION**

								)	
Facility	T1	T2	M1	M2	α1	α2	P = T1T2	P = T2 ²	I = ( 1 - P )
(ILS)	(Hrs)	(Hrs)	IVII	IVIZ	u i	uz	α1α2M1M2	α1α2M1M2	1-(1-7)
							(for T1 <t2)< td=""><td>(For T1=T2)</td><td></td></t2)<>	(For T1=T2)	
	_								

T1	: Period of time (in hours)	between transmitters checks
----	-----------------------------	-----------------------------

T2 : Period of times (in hours) between checks on the monitoring and associated control system.

Date of Issue 13-Jun-22: |

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#### 3. ILS Continuity

#### 3.1 Achievement and retention of continuity of service level

ILS level continuity of service requires Mean Time Between Outage (MTBO) to be confirmed by evaluation in an operational environment. Outage is defined as any unanticipated cessation of signal in space. The evaluation of MTBO take into account the impact of operational factors, such as airport environment, inclement weather condition, power availability, quality and frequency of maintenance. MTBO is related to MTBF, but is not equivalent. Some equipment failures, such as a failure of transmitter resulting in the immediate transfe4r to a standby transmitter and may not necessarily result in an outage. For continuity of service level 2,3 or 4 the evaluation period should be sufficient to determine achievement of the required level with a high degree of confidence.

Sequential test method is one of method that can be used to demonstrate the continuity standard are met. In term of service provider decide to use the method, then the following consideration will be applied:

a. The minimum acceptable confidence level is 60 per cent. To achieve the confidence level of 60 per cent, the evaluation period has to be longer than the required MTBO hours. Typically, these minimal evaluation periods for new and subsequent installations are for Level 2, 1 600 operating hours, for Level 3, 3 200 hours and for Level 4, 6 400 hours.

To assess the seasonal influence of the environment, a minimal evaluation period of one year is typically required for a new type of installation in a particular environment. It may be possible to reduce this period in cases where the operating environment is well controlled and similar to other proven installations. Where several identical systems are being operated under similar conditions, it may be possible to base the assessment on the cumulative operating hours of all the systems; this will result in a reduced evaluation period. Once a higher confidence level is obtained for a type of installation, subsequent installation of the same type of equipment under similar operational and environmental conditions may follow shorter evaluation periods;

b. During the evaluation period, it should be decided for each outage if it is caused by a design failure or if it is caused by a failure of a component due to its normal failure rate. Design failures are, for instance, operating components beyond their specification (overheating, overcurrent, overvoltage, etc. conditions). These design failures should be dealt with such that the operating condition is brought back to the normal operating condition of the component or that the component is replaced with a part suitable for the operating conditions. If the design failure is treated in this way, the evaluation may continue and this outage is not counted, assuming that there is a high probability that this design failure will not occur again. The same applies to outages due to any causes which can be mitigated by permanent changes to the operating conditions.

An assigned continuity of service level should not be subject to frequency change. A suitable method to assess the behaviour of particular installation is to keep the records and calculate the average MTBO over the last five to eight failures of the equipment. This weighs the MTBO for continuity of service purpose to be more relevant to the next approach, rather than computing MTBO over the lifetime of the equipment. If continuity of the service deteriorates, the assigned designation should be reduced until improvement in performance can be effected.

The following documents may be consulted for additional guidance and details to calculate the continuity of service of ILS:

European Guidance Material on Continuity of Service Evaluation in Support of the Certification of ILS & MLS Ground Systems, EUR DOC 012

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## Appendix 6

									]	F <b>A</b> (	CIL	ITY	<u> </u>	ERI	OF	RM	AN	CE	M	)N	ГНІ	Y	RE	PO	<u>RT</u>											
AIRPO FACIL MONT		:	Communication	/Naviga	ation	n/Sur	veill	ance	e/Aut	oma	tion ³	*																								
NO.	EQL																DATI	<b>=</b>															TOTAL HOURS	REMARK		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	OF OUTAGE	
1																																				
						-													-									-								
																			1																	
	Operational Co	olor Ir	ndicator:	-		rmal									=	0		_	en C													,				
		-		-	-	ermitt lure (			creas	se o	perat	ion			=	- X			llow ( d Col		r							-						C	hief of Facility	
				-					ppor	ting	equi	pme	nt		=	V			e Co																	
*	: Choose the	арр	ropriate			Ė					Ė																									

# Appendix 6A

		F#	VILURE AND	CORECT	IVE A	CTION I	REPOR	Γ				
NO.	DESCRIPTION						ATA					
1.	Date/Month/Year											
2.	Location/Site Name											
3.	Facility											
4.	Equipment Name											
5.	Part Of Equipment Name											
	Follow Outcome											
7.	Failure Category Failure Description											
8.	Corrective Action				Ву			SITE			FACTORY	
9.	Cause of Failure											
0.	Date of Failure								Prob	lem Cod	le	
	Time of Failure	_				ET - I	No Equ Waiting	ipment for Flig	rest nt Check Engineer re Part			
1.	Date of Corrective Action  Time of Corrective Action Complete					— TR - I SAT -	No Trar ⋅ Not Si	for Spansportate Acce	ion ptance Y	et		
12.	Total Failure Hours					— AR - NO- 1	Anothe	r Reaso tacle/Pr	er on (PIs Ex oblem	rplain)		
13.	Problem Code									L		
	Known By										.,	
	CHIEF OF FACILITY/									Person	In Charge of Correcti	ve Action
	Signature										Signature	

## Appendix 6B

					LIST OF I	EQUIPN	MENT an	d CONDIT	ION					
AIRPO	RT	:												
FACILI	TY	:												
YEAR														
ILAK														
No.	Equipment Nar	ne	Brand	Туре	Quantity			TECHN	ICAL DATA			Installation	Condition	Remark
140.	Equipment Nai	116	Diana	Туре	Quantity	MTBF	MTTR	Availability	Realibility	Integrity	Accuracy	Year	(%)	Kemark
$\vdash$														
														<del>                                     </del>
	NOTE:	Cond	ition (%) = (1-age of equipmer	nt in years/15)X100%	, 0									
			, , , 5											
												,		
												С	hief of Facility	

### Appendix 6C

			L	IST OF CORRECTIVE MAINTENANCE A	CTIVITY				
41000	\n								
AIRPO		:							
FACIL YEAR		:						_	
ILAN									
		F.A	ILURE		DATE/TIME	DATE/TIME	TOTAL		
NO.	EQUIPMENT NAME	CATEGORY	PART NAME	ACTION	FAILURE	COMPLETION	FAILURE HOURS	REMARI	K
								+	
$\vdash$								+	
								_	
							HIEF OF FACILITY		

********E N D*******