CAD 452

AIRCRAFT MAINTENANCE SCHEDULES AND PROGRAMMES

Information and Guidance

Issue 2 Revision 3
15 March 2019

Civil Aviation Department
Hong Kong, China

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Foreword

The information in this document provides the general guidelines for the preparation of Aircraft Maintenance Schedule or Aircraft Maintenance Programme by Operators or Maintenance Organisations or Fleet Technical Management Organisations (also known as Continuing Airworthiness Management Organisations).

The subject matter has been dealt with in a general way. The text extracted from Hong Kong Aviation Requirements HKAR-1 may have been abbreviated and amended to fit the particular presentation of this document and does not, therefore, purport to give precise interpretation. Where the full authoritative text is required, reference should be made to the appropriate HKAR-1 Sub-sections.

The information given is correct at the time of issue of this document, but amendments to the Air Navigation (Hong Kong) Order, Hong Kong Airworthiness Notices and Hong Kong Aviation Requirements may subsequently vary the information.

Applications and Enquires

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Appendices

PREAMBLES

The preambles are intended to be a summarised record of the main changes introduced by each amendment of CAD 452.

ISSUE 2 Revision 2 1 March 2014

Amended Appendix E to give guidance on application of the manufacturers' prescribed tolerances or permitted variations.

ISSUE 2 Revision 3 15 March 2019

Revised the term 'Duplicate Inspection' as 'Duplicate/Independent Inspection' and added a Note to indicate that Duplicate Inspection will be phased out with effect from 1 January 2020.

Added a term Extended Diversion Time Operations (EDTO).

Minor typo and editorial changes

1 Introduction

In the early days of aviation, owners and engineers concerning with in-flight failures and component reliability developed Maintenance Schedules to help prevent costly occurrences. As aviation grew and scheduled air transport arrived, safety, reliability and economics became important in order to attract passengers. It became apparent that to achieve a controlled balance between safety and economics, Regulatory Authorities needed to ensure minimum standards were maintained and a level playing field existed for fair competition between operators.

What to maintain, when to maintain and how to maintain, are the keys to the content of the Maintenance Schedules and a system was developed for Operators, Manufacturers and Regulators to share experience and knowledge on these very issues for new aircraft being developed. Some Commercial Air Transport operators may choose to maintain their aircraft in accordance with a Maintenance Programme. This is a 'real time system' which consists of a Maintenance Schedule and a whole group of review and management procedures to ensure that it remains realistic and effective.

The Air Navigation (Hong Kong) Order 1995 (AN(HK)O) requires that an aircraft registered in Hong Kong in respect of which a Certificate of Airworthiness is in force, shall not fly unless it has been maintained in accordance with a Maintenance Schedule approved by the Chief Executive in relation to that aircraft and that a Certificate of Maintenance Review has been issued certifying that a maintenance review has been carried out.

This document is intended to give guidance for the compilation of a Maintenance Schedule that will satisfy the CAD for approval. Further help and guidance can be provided by the manufacturer of the product in question.

2 Maintenance Schedules and Maintenance Programmes

2.1 Maintenance Schedules

A Maintenance Schedule contains details of what is to be maintained on an aircraft and how often. The details are those published by the Original Equipment Manufacturer (OEM) who may also be the Type Certificate Holder (TCH) of that product. As the aircraft will consist of an airframe, engine, propeller and other equipment, there will be several sources of basic information. Not only will there be details of 'What and When' but also 'How' the parts are to be maintained; there are also details on the types of task that are to be performed.

Light aeroplane or helicopter owners can follow the Manufacturer's recommended schedule as found in the aircraft maintenance manual. For piston engine aeroplane or helicopter below 2730 kg MTWA, the CAD accepts the generic 'Light Aircraft Maintenance Schedule' (LAMS) published by the United Kingdom Civil Aviation Authority (UKCAA), CAP 411 or CAP 412 respectively as the basis of the Maintenance Schedule for the approval of CAD. However, the LAMS system requires that the Manufacturer's recommendations are considered as well, so users of LAMS have to employ both sets of data.

Owners and operators should be aware that properly maintained records not only assist in maintaining the safety of an aircraft but also help retain the resale value of an aircraft.

To assist owners/operators, the CAD encourages the use of CAD 543 (Time Limited Task and Component Change Record) in conjunction with aircraft maintenance schedule to control the overhaul life of engines, propellers and any other piece of equipment that may be installed.

2.2 Maintenance Programmes

In its simplest form, a Maintenance Programme is a Maintenance Schedule together with a host of procedures that are designed to continually review its applicability and effectiveness for the aircraft it is approved for. Appendix No. 1 to HKAR-1 Sub-section 1.6-2 gives a comprehensive list of what should be in a Maintenance Programme and a programme will not be accepted unless compliance with its intent can be demonstrated.

2.3 Compilation of Maintenance Schedules

As previously stated, the first place for information is the OEM/TCH documentation that is relevant to the aircraft being operated. As data will be obtained from several manuals, there will be a collection of tasks to be accomplished at varying intervals. These intervals can be based either on flying hours, flight cycles or calendar time and sometimes there are combinations of these. It is quite often inconvenient to take each task as it comes and accomplishes it; it is usually expedient to parcel the tasks into packages of work that can be carried out when it is convenient to do so, but at a frequency not exceeding the approved intervals. The general rule that can be applied for compiling work packages is that tasks can quite often be done earlier than when recommended. They can only be done later with agreement of CAD and only in exceptional circumstances. So for tasks that have more than one frequency in terms of flying hours, flight cycles and calendar time, then the event that occurs first is normally the governing one.

For large transport aircraft, the tasks can be found in Maintenance Planning Document provided by the TCH, these are described further in Paragraph 3 of this document. Smaller aircraft usually have the TCH recommended maintenance in the Maintenance Manual Chapter 5.

The frequency of maintenance tasks is affected by the way the aircraft is to be operated. When the TCH recommendations are first compiled they will have in mind a 'typical' flight profile for the aircraft type; any deviation from this may need an adjustment on the basic recommendations. For example, an aircraft may have a 'typical' flight profile of six hours for every cycle while another may be of six cycles every hour. It can be seen that in these cases a schedule based solely on flying hours may mean the first aircraft is maintained too often and the other not enough, so, with the help of the TCH, usually a schedule can be developed for any particular type of operation.

The area of operation is another important consideration, for example operating over salt water may require special tasks, such as engine compressor washes and other maintenance, to be done on a more frequent basis. Similarly, operation in sandy areas or off rough strips may affect the tasks required.

The age of an aircraft may affect the number and frequency of tasks, particularly if it has ageing structural inspections and significant repairs.

Significant parts of the aircraft such as make and type of engines, propellers and/or APU should be detailed as quite often operators have a choice of equipment and adding the same

type with a different engine to a common schedule will mean careful identification of tasks applicable to each aircraft. Finally, the modification state of equipment onboard has to be considered as it may be unique to the aircraft on any particular Maintenance Schedule.

To assist operators in preparing the Maintenance Schedule and showing compliance, CAD has produced following documents.

a) Maintenance Schedule Compliance Checklist (See Appendix A) to be submitted with the draft Maintenance Schedule
b) Standard Clauses for Insertion in Maintenance Schedule Introductory Pages (See Appendix B) to be used as template when preparing the Maintenance Schedule
c) Operator's Certification Statement (See Appendix C) to be submitted with the draft Maintenance Schedule.
d) Maintenance Requirements (See Appendix D) that should be adopted in the absence of manufacturer's recommendations

2.4 Application for Approval of Maintenance Schedules

An operator shall write to CAD to apply for the approval of the Maintenance Schedule. The application letter should be accompanied by the draft Maintenance Schedule, the Maintenance Schedule Compliance Checklist and the Operator's Certification Statement. The letter shall specify the revision status of the MRBR, MPD, CMR, airworthiness/time limitation and other relevant manufacturer's documents based upon which the Maintenance Schedule is drafted.

When satisfied with the Maintenance Schedule, CAD will issue an approval letter with the following documents.

a) Permitted Variations to Maintenance Periods (See Appendix E)
b) CAD Form DCA 281 – Maintenance Schedule Approval (See Appendix F)
c) CAD Form DCA 281/1 – Endorsement Pages for aircraft exceeding 2730 kg MTWA (See Appendix G), or
d) CAD Form DCA 281/2 – Endorsement Pages for aircraft not exceeding 2730 kg MTWA (See Appendix H)

2.5 Amendment of Maintenance Schedules

Once established, an owner or operator may wish to amend the Maintenance Schedule due to addition or deletion of task, or change of task interval. This can be done with the aid of

an amendment to the Maintenance Schedule, which is submitted to CAD for agreement and subsequent approval. To request for approval of the Maintenance Schedule amendment, an operator shall write to CAD. The letter shall be accompanied by the Maintenance Schedule Amendment Request Form (See Appendix I).

Doing tasks less frequently requires suitable justification in order that it may be approved. Proof that safety will not be compromised must be provided. Maintenance Programmes supported by a reliability programme will have an advantage here as they will readily be able to show how often a task has been performed without deterioration of the item/system. CAD 418 (Condition Monitored Maintenance: an Explanatory Handbook) provides general information on the concepts and practices of aircraft maintenance control by the use of Condition Monitored Maintenance Programmes. More information can be found in Paragraph 4 of this document.

3 New Maintenance Schedules - Initial Task Compilation

3.1 Maintenance Review Board (MRB)

A MRB is formed during the Type Certification process of an aircraft the MTWA of which is greater than 5700 kg. It consists of members of interested National Authorities chaired by the Authority of the State of Design/ Manufacture.

Reporting to the MRB is an Industry Steering Committee (ISC) which is a group containing representatives from various Working Groups (WG) who are looking at various aspects of the aircraft's design from a maintenance perspective. The ISC and the WG contain members from Authorities, the OEMs and the Operators. Each WG consists of specialists in that particular discipline (e.g. structures, powerplant, avionics etc.) from interested Authorities, the Design organisation and Operators, usually those who are already customers and have a vested interest in the meeting outcome. For a particularly advanced design, if the MRB believes that the customers do not have sufficient knowledge to contribute, then they may invite specialists to participate.

Before commencing work, the MRB will put together a 'Policy and Procedures Handbook', which will describe how the whole review process will work. The final outcome from the ISC will be Maintenance Review Board Report Proposal that is approved by the chairman of the MRB.

If an aircraft type which has been subject to the MRB process is modified by an STC, the relevant systems, powerplant and structure must be reviewed to determine the maintenance requirements, i.e. instructions for continuing airworthiness, as a result of the modification.

3.2 Maintenance Steering Group (MSG) Analysis

This is basically a process driven by a set of logic diagrams that are followed by the MRB and WGs in order to determine the types and frequency of tasks, depending on component and system failure modes and visibility of those failures to the operating crew.

For more information on MSG analysis, please contact the Airlines for America on www.airlines.org as the owner of this analysis logic.

3.3 Maintenance Planning Document (MPD)

All the maintenance tasks identified during the MSG 3 analysis are published in the MRB Report. These tasks, along with other tasks such as Airworthiness Limitations Items (ALIs) considered applicable by the OEM/TCH are all published in the MPD and hence this is the source document that the operator of a new aircraft type has to follow when compiling the Maintenance Schedule.

3.4 Other Tasks

3.4.1. Certification Maintenance Requirements (CMRs)

CMRs arise from the aircraft type certification process. FAR/CS 25.1309, for example, requires a System Safety Assessment (SSA) to ensure that failures are categorized on their consequential severity and within defined bounds of probability.

A CMR is a required periodic task, established during the design certification of the aircraft as an operating limitation of the type certificate. CMRs usually result from a formal, numerical analysis conducted to show compliance with catastrophic and hazardous failure conditions. A CMR is intended to detect safety significant latent failures that would, in combination with one or more other specific failures or events, result in hazardous or catastrophic failure condition.

Major aircraft manufacturers predominantly refer to two types of CMR task:

a) One Star CMR (CMR*)

Such tasks and intervals are mandatory and shall not be changed or deleted without the approval of the State of Type Certification Authority.

b) Two Star CMR (CMR**)

Changes to task intervals must be supported by an approved procedure and monitoring programme. Tasks may not be changed or deleted without the agreement of the State of Registry Authority.

NOTE: It is important to read carefully the introduction to the TC Holder's data that is being used for the production of a Maintenance Schedule. Some manufacturers will use a different terminology, for example some TCHs have the opposite definition for one/two star tasks to other TCHs.

CMRs should be clearly identified as such in a Maintenance Schedule submitted to CAD for approval. Any subsequent applications for approval to vary these tasks must be supported by the TCH. Care should be taken in understanding the Manufacturer's certification philosophy as some do allow short-term variations of these tasks.

3.4.2 Airworthiness Limitation Items (ALIs)

ALIs are structural items that the Certification process has defined as critical from a fatigue point of view during the Damage Tolerance assessment. The inspection frequency of such items is Mandatory and they should be treated in the same way as a CMR* task.

3.4.3 Critical Design Configuration Control Limitations (CDCCLs)

CDCCLs are design features that have been identified as being critical to the integrity of the Fuel System and must be maintained in order to ensure that unsafe conditions do not develop throughout the service life of the aircraft and must be retained during modification, repair or maintenance.

3.4.4 Zonal Inspections

The inspection level for the Zonal tasks in each Maintenance Schedule must be clearly defined, since interpretation of the MSG rule may differ between aircraft types and their respective Zonal Programmes. The MRB report should provide clearly defined criteria and in most cases this is repeated in the MPD.

The principle of Zonal inspections is to group tasks within an area together, in order to minimise the number of times an area is disturbed. Systems, installations and structure within a zone will all be inspected for security and general condition.

3.4.5 Lubrication

During the Working Group phase of the MRB process, the MSG-3 analysis has lubrication as the first consideration when looking at reducing a risk of failure of a component or system. It is a relatively quick and cost effective method of preventative maintenance.

Lubrication requirements may either be in the ATA chapters of the schedule with the daily and weekly check or in a specific lubrication section defining the intervals determined by the MRB.

Rescheduling of the lubrication frequency may be necessary if a check cycle is changed or the operating pattern is changed, so that degradation does not result.

Deterioration may take some time to be evident so the effectiveness of a lubrication programme must be monitored.

3.4.6 Inspection Level

There are no defined standards of inspection level; different manufacturers will have applied their own standards and these need to be understood and published in the Maintenance Schedule. Examples of types of Inspection are:

General Visual Inspection - A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance unless otherwise specified. A mirror may be necessary to enhance visual access to all exposed surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight or drop-light and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to gain proximity to the area being checked.

Detailed Inspection - An intensive examination of a specific item, installation or assembly to detect damage, failure or irregularity. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate. Inspection aids such as mirrors, magnifying lenses, etc. may be necessary. Surface cleaning and elaborate

access procedures may be required.

Special Detailed Inspection - An intensive examination of a specific item, installation, or assembly to detect damage, failure or irregularity. The examination is likely to make extensive use of specialized inspection techniques and/or equipment. Intricate cleaning and substantial access or disassembly procedure may be required.

Functional Check - A quantitative check to determine if one or more functions of an item perform within specified limits.

3.4.7 Other Items

There are significant parts of aircraft that also have mandatory lives that are not determined from the Certification process but arise due to their significance and use. Such items may include the rotating assembly within an engine, transmission parts of helicopters and landing gear parts.

3.5 Task Frequency

Maintenance task will have a time interval allocated based on the most appropriate parameter to maintain the condition of the item to which the task refers. The three types of frequency are: Flying hours, Flight cycles and Calendar time; sometimes there will be two limits with the operator normally having to comply with whichever limit comes first in their particular operation.

In cases of structural inspections, the threshold and repetitive inspection frequency can vary depending on the type of operation being used. Structural inspections are always based on flight cycle limits as their reliability is directly related to cyclic fatigue. When reviewing the effectiveness of a Maintenance Schedule, or carrying out an annual review, it is the frequency of all the tasks that is being considered. Reliability monitoring is the continual monitoring of task frequency. It is permissible to amend these frequencies recommended by the manufacturer by making application to CAD. As the operation of an aircraft is usually unique to an operator, a conscientious owner/operator will develop their schedule to maximise reliability and minimise costs.

3.6 Engine Tasks

Turbine powered engines, by implication, are more complex than piston ones and the way their lives and reliability are managed is significantly different, so they will be treated separately below.

3.6.1 Turbine Engines

Turbine engine reliability is based on a Condition Monitored Maintenance Programme for both on-wing and off-wing tasks. CAD 418 was developed by the CAD to provide guidance as to what should be contained in a Condition Monitored Maintenance Programme, a part of the Aircraft Maintenance Schedule.

By implication Auxiliary Power Units, being Turbine powered, are treated in a similar manner.

Engine Maintenance Programme is complicated and requires some expert control. On-wing health monitoring may include regular oil analysis (such as Spectrum Oil Analysis Programme), magnetic plug inspections and boroscope inspection. Modules may have separate lives, generally hot sections being shorter than cold ones, with rotating parts have finite cyclic lives. Removed engines need agreed workscopes and good strip reports to remain in compliance with the Engine Maintenance Programme. For gas turbine engine parts subject to retirement or ultimate (scrap) lives, Hong Kong Airworthiness Notice No. 44 should be referred to.

3.6.2 Piston Engines

Piston engines work on a manufacturer's ‘recommended' overhaul life. CAD views this 'recommended' life as the life limit of the engines concerned. Some aircraft not used for commercial air transport may have the life of their engine extended beyond that recommended by the manufacturer. Please refer to Hong Kong Airworthiness Notice No. 35 for CAD requirement on piston engine overhaul periods of light aircraft.

3.7 Propeller Tasks

For maintenance requirements of variable pitch propellers installed on aircraft holding a Certificate of Airworthiness, refer to Hong Kong Airworthiness Notice No. 75.

4 Other Crucial Elements

4.1 Reliability Programmes

Appendix No. 1 to Hong Kong Aviation Requirements HKAR-1 Sub-section 1.6-2 requires that any Maintenance Programme based on MSG logic or containing Condition Monitoring tasks should contain a Reliability Programme. There is guidance in CAD 418 on what constitutes a Reliability Programme. Typically, on a monthly basis an operator will review Technical Log entries, component failures (in particular - cause of failure), delays, Ground Incident Reports, Mandatory Occurrence Reports (MORs) and findings from task cards and look for trends or areas of deterioration that can be addressed by taking some kinds of preventative maintenance action.

Operators / Owners whose aircraft with MTWA do not exceed 2730 kg are exempted from this requirement. It has also been found that for fleets of six or fewer aircraft, insufficient data is produced to maintain an accurate programme and hence alternative procedures need to be established, whereby events rather than trends are monitored.

4.2 Annual Review

At least once in a year an owner or operator should meet and discuss with their contracted maintenance organisation and fleet technical management organisation on the performance of the aircraft over the preceding period of time. As already stated a good Maintenance Programme will make an aircraft more reliable, cheaper to run and more available.

4.3 Utilisation

The utilisation of an aircraft is inextricably linked to the effectiveness of a Maintenance Programme. When optimised for a certain utilisation, tasks will lose their effectiveness if the relationship between Flying Hours and Flight Cycles varies by a significant amount. The MRB will set task intervals to meet, what they have considered to be a 'typical' flight profile for their product. For example an aircraft type might reasonably have been considered to have a profile of about seven Flying Hours to one Flight Cycle. An operator then chose to use the aircraft on thirty-minute sectors. By using the original MRB derived data the operator would suffer failures due to the flight hour tasks not being done soon enough to protect the cyclic dependent parts and systems.

Operators are required to state their expected annual utilisation in the Maintenance Schedule. Part of the annual review of effectiveness is to determine that this figure

remains within plus or minus 25% of that figure. If the deviation is out of the 25% range, the responsible Operator should conduct a review of the Maintenance Schedule with the TCH to see if any amendment is required.

Quite often manufacturers will produce a 'low utilisation' programme for operators doing very low hours, for example, one for executive jet operation. This can be a cost effective solution for such an operator.

Finally, Supplemental Structural Inspection Programmes (SSIP) can have different inspection frequencies dependent on the type of operation. Details of these will be found in the introduction of the SSIP document itself.

4.4 Task Escalation

Following a period in operation it may be noticed that a particular inspection task is carried out routinely and no faults are ever detected. It is possible that the task frequency can be reduced, such that the task is carried out less frequently, provided that the inspection task is performed in accordance with the inspection standards required by the Maintenance Schedule. This gives an immediate cost saving with no loss of safety or reliability.

Task escalation is carried out on a grander scale by the manufacturers, as less frequent tasks mean lower maintenance costs for their product, which they perceive makes it more saleable. They achieve this by holding ISC meetings, where a group of operators and regulators meet with the manufacturer to review the results of scheduled inspections pooled by as many operators as they can get interested. This is basically a way of validating their original predictions for task requirements, which would have been understandably quite conservative.

In order to escalate the tasks, they will revisit the failure rates that the type design requires to achieve, and apply operational experience to determine that they can still be met with less frequent inspections.

5 Applicability

An aircraft can only be maintained to one Maintenance Schedule at any time. More than one aircraft, however, can be maintained to the same Schedule, providing they all bear similarities which are covered by the entire Schedule. The introductory part of the Maintenance Schedule will therefore contain details of the aircraft to which it applies.

Moving an aircraft from one Schedule to another will require CAD approval of amendment for each of the affected Schedules. In this case, the operator will need to consider the differences between the two Schedules and the need for a 'Bridging Check' to cater for such differences.

5.1 Registration

Aircraft maintained to any Maintenance Schedule are listed by registration in the document and in CAD database. If a new aircraft is added, an amendment will be required to be submitted for CAD approval highlighting the changes.

5.2 Mixed Age and Modification of Fleets

For a Maintenance Schedule with a number of aircraft of the same type on it, the varying ages and modification standards should be catered for, by highlighting effectivity of tasks that apply. For example, should two aircraft out of the fleet have an STC applied that does not feature on the others, then any task relevant to the STC should be included and clearly denoted in the Schedule that the two aircraft are applicable.

It follows that any aircraft being added to a Schedule is to be assessed by the operator for its modification standard and equipment fit to ensure the Schedule adequately addresses the needs of the individual aircraft build/change standard. Should any further task need to be added, an amendment should be submitted to address these needs.

5.3 Adding Aircraft to Maintenance Schedules

When adding an aircraft to a Maintenance Schedule, an amendment must be submitted to CAD. As stated above, the commonality of the aircraft and the Schedule must be established, in terms of modification standard, equipment fit, structural life inspections etc.

5.4 Bridging Checks

A Bridging Check is a set of tasks required to transfer an aircraft from one Maintenance Schedule to another. Every operation is unique and hence an aircraft may have been maintained to the same tasks at a different frequency or to different maintenance standards in its previous operation. The Bridging Check is carried out to bring the tasks in-line with the new frequencies and standards to ensure standards are met and no task is overrun.

6 Other Considerations

6.1 Task Cards and Work Packaging

Task management will differ from Schedule to Schedule. In LAMS, tasks are grouped by inspection frequency that is all the 50 hour repetitive tasks appear consecutively, followed by the 100 or 150 hour tasks. For the Maintenance Schedule of a large transport aircraft, the tasks will probably be grouped in ATA order. This means that consecutive tasks in the Schedule have different inspection frequencies.

In order to save costs, operators will want to have the minimum number of maintenance checks done on their aircraft. Hence, they will select items with the same or close frequency and 'package' them into workpacks to be done together.

LAMS comes in a format whereby the tasks are laid out in a way that can be used as a set of worksheets. When a workpack is compiled, the tasks are usually broken down onto separate 'cards' which can be certified individually as the tasks are accomplished.

Traditionally, the Maintenance Schedule of a large transport aircraft would contain defined periods of A and B line checks and C and D base checks. The base maintenance tasks can be accomplished along with some of the lesser line tasks in order to make more efficient use of down time (overnight stops) and manpower. This requires complex packaging of tasks and imposes added responsibility on the operator to ensure repeat inspections are controlled properly.

6.2 Repairs

Since 1980, large transport aircraft (and latterly some LAMS aircraft) have been designed with 'Damage Tolerant' structures. This means that the designers have calculated with the expected lifetime loads experienced by the aircraft, when significant structural parts will begin to fail from fatigue. In this way, they can determine suitable inspection frequencies and techniques to detect fatigue cracks long before the part fails.

During the aircraft life, an aircraft can suffer from accidental damage, requiring some repair work to the structure. In most cases, the repair will return the damaged part to its 'as was' standard, and routine inspections of that piece of structure will continue as before. In some cases, Damage Tolerance analysis of the repair will require an interim inspection of it before the regular inspection period falls due. This new inspection requirement is now part of the Maintenance Schedule which should be amended to include these

inspections.

6.3 Regulatory Requirements

The CAD requirements regarding scheduled maintenance are set out in AN(HK)O, CAD 360 Part Two, HKAR-1 and Hong Kong Airworthiness Notices.

6.4 Special Operations (AWO, RVSM etc.)

Issues such as All Weather Operations (AWO), Reduced Vertical Separation Minima (RVSM), etc are operational issues, not used by everyone. They do, however, have specific maintenance requirements in order to maintain their accuracy. As such, any of these maintenance requirements must be included in the Maintenance Schedule.

6.5 Task Variations

All maintenance must be carried out at, or before, the specified frequency. In some unforeseen circumstances, the task frequency, typically 10%, can be varied by the operator based on the privilege of 'Permitted Variations to Maintenance Periods' granted by CAD, normally along with the Maintenance Schedule. Refer to Appendix E for sample of 'Permitted Variation to Maintenance Periods'.

Should the unforeseen circumstances dictate that the aircraft cannot meet its maintenance slot even with such a variation, the operator can apply to CAD for further variation. The application will need to be technically justified, with timescale supported by the TCH. If accepted, the extension will be approved as a one-off change.

Appendix A

MAINTENANCE SCHEDULE COMPLIANCE CHECKLIST

The purpose of the Maintenance Schedule Compliance Checklist is to assist owners / operators with a view to ensuring that Maintenance Schedules submitted to the CAD for approval are standardised and include all items that are required by HKAR Sub-section 1.7-5, CAD 452 and also other additional CAD required items. This checklist should be used when preparing a draft or re-issued Maintenance Schedule. When completed, it should be submitted with the draft or re-issued Maintenance Schedule. During routine amendment of Maintenance Schedule, the checklist should be used as reference to ensure compliance with CAD requirement. However, submission of the completed checklist is not required.

This document includes all the relevant information as detailed in Appendix No. 1 to HKAR-1 Sub-section 1.7-5 and CAD 452, the format of which may be modified to suit the operator's preferred method. In all cases the checklist should clearly show either compliance (Yes) with location of the compliance in 'Notes' column or not applicable (N/A) with the reason(s) in 'Notes' column.

The checklist is provided to ensure the minimum required items are contained in the Maintenance Schedule. It should be enhanced as necessary to suit the aircraft's operational, utilization and environmental needs.

The specific tasks and the relevant control procedures shall be included in the Maintenance Schedule (MS) and Maintenance Management Exposition (MME) of the operator respectively. The relevant cross-references shall be specified in the 'Notes' column at the appropriate paragraphs. The following information should be provided at the front of the checklist.

a) AOC Number

b) Owner's / Operator's Name

c) Owner's / Operator's MS reference and amendment status:

d) CAD approved MS reference (if granted)

e) MME and amendment status

MAINTENANCE SCHEDULE COMPLIANCE CHECKLIST

Details of the Maintenance Schedule:

1. General requirements			**Compliance**		
			Yes	N/A	Notes
1.1	Maintenance Schedule basic information:-				
	1.1.1	The type/model/and registration number of the aircraft			
		The type/model of the engines			
		The type/model of the propellers, where applicable			
		The type/model of the auxiliary power units, where applicable			
	1.1.2	The name and address of the owner, operator, maintenance organization or fleet technical management organisation managing the aircraft airworthiness			
	1.1.3	The schedule reference, the date of issue and issue number			
	1.1.4	A signed statement. (See Appendix C)			
	1.1.5	Contents list			
		List of effective pages			
		Revision status of the document			
	1.1.6	Check periods for anticipated utilisation; include an utilisation tolerance of plus or minus 25%. *Where utilisation cannot be anticipated, calendar time limits should also be included*			
	1.1.7	Procedures for escalation where applicable and acceptable to the CAD			
	1.1.8	Pre-flight maintenance tasks			
	1.1.9	The tasks and the periods (intervals / frequencies) at which inspections should be carried out, including type and degree of inspection of the following, together with the associated systems and installations:			
		a. Aircraft			
		b. Engine(s)			
		c. APU			
		d. Propeller(s)			
		e. Components			
		f. Accessories			
		g. Equipment			
		h. Instruments			
		i. Electrical and radio apparatus			
	1.1.10	The periods at which components should be:			
		a. Checked			
		b. Cleaned			
		c. Lubricated			

		d. Replenished			
		e. Adjusted			
		f. Tested			
	1.1.11	Details of ageing aircraft system requirements with any specified Sampling Programmes, if applicable			
	1.1.12	Details of specific Structural Maintenance Programmes issued by TCH, if applicable, including but not limited to:			
		a. Damage Tolerance and Supplemental Structural Inspection Programmes (SSID)			
		b. Maintenance requirement resulting from Service Bulletin review performed by the TCH			
		c. Corrosion prevention and control			
		d. Repair Assessment			
		e. Widespread Fatigue Damage			
	1.1.13	Details of CDCCLs			
	1.1.14	Statement of the limit of validity for the Structural Maintenance Programme in 1.1.12, if applicable, in terms of flight cycles / flying hours / calendar time			
	1.1.15	The periods at which overhauls should be made			
		The periods at which replacements should be made			
	1.1.16	A cross-reference to other documents related to:			
		a. Mandatory life limitations			
		b. Certification Maintenance Requirements (CMR's), if applicable			
		c. Airworthiness Directives (AD)			
		d. Specific identification of the above items mandatory status			
	1.1.17	Reliability Programme			
	1.1.18	A statement that practices and procedures should be the standards specified by the TCH's maintenance instructions			
	1.1.19	The definition of each inspection type should be provided in a section			

2. Schedule basis.		**Compliance**		
		Yes	N/A	Notes
2.1	Is the Maintenance Schedule based upon the MRB report, the TCH's Maintenance Planning Document or Chapter 5 of the Maintenance Manual?			
2.2	For newly type-certificated aircraft / comprehensively appraise the manufacturer's recommendations (MRB report) and other applicable continuing airworthiness information			
2.3	For existing aircraft types, comparisons with Maintenance Schedules previously approved			

2.4	ALIs, CMRs, and CDCCLs, etc			
3. Amendments.		Compliance		
		Yes	N/A	Notes
3.1	Amendments (revisions) to reflect changes:			
	a. In the TCH's recommendations			
	b. Introduced by modifications			
	c. Introduced by repairs			
	d. Discovered by service experience			
	e. As required by CAD			
4. Permitted variations to maintenance periods *(with the exception of items identified in 1.1.16)*		**Compliance**		
		Yes	N/A	Notes
4.1	Vary the periods through a procedure approved by the CAD?			
4.2	Vary the periods with the approval of CAD (See appendix E)			
5. Periodic review of maintenance schedule contents.		**Compliance**		
		Yes	N/A	Notes
5.1	Periodic review to ensure that the Maintenance Schedule reflects current:			
	a. TCH's recommendations			
	b. Revisions to the MRB report if applicable			
	c. Mandatory requirements			
	d. Maintenance needs of the aircraft			
5.2	Annual review defined			

6. Reliability Programmes.			**Compliance**		
			Yes	N/A	Notes
6.1.	Applicability				
	6.1.1	Developed in the following cases:			
		a. Aircraft Maintenance Schedule is based upon MSG-3 logic			
		b. Aircraft Maintenance Schedule includes condition monitored components			
		c. Aircraft Maintenance Schedule does not contain overhaul time periods for all significant system components			
		d. Specified by the Manufacturer's MPD or MRB			
	6.1.2	Need not be developed in the following cases:			
		a. Aircraft Maintenance Schedule is based upon the MSG-1 or 2 logic (only hard times or on condition items)			
		b. Not a large aircraft (= or < 5700 kgs MTWA or single-engine helicopter)			
		c. Aircraft Maintenance Schedule			

		provides overhaul time periods for all significant system components			
	6.1.3	Operator may develop its own reliability monitoring programme			
6.2.	Applicability, small fleets				
	6.2.1	Less than 6 aircraft of the same type			
	6.2.2	Tailor reliability programmes to suit the size and complexity of operation			
	6.2.3	Use of “Alert levels” should be used carefully with small fleets			
	6.2.4	When establishing a Reliability Programme, consider the following:			
		a. Focus on areas where a sufficient amount of data is likely to be processed			
		b. How is engineering judgement applied?			
	6.2.5	Pool data and analysis (paragraph 6.6 specifies conditions)			
	6.2.6	If unable to pool data / additional restrictions on the MRB/MPD tasks intervals specified			
6.3	Engineering Judgment				
	6.3.1	Are there appropriately qualified personnel (with appropriate engineering experience and understanding of reliability concept) for the reliability programme?			
6.4	Contracted maintenance				
	6.4.1	Certain functions may be delegated to an HKAR-145 Organisation of a Fleet Technical Management Organisation			
	6.4.2	These are:			
		a. Developing the Maintenance Schedule and Reliability Programme			
		b. Collecting and analysing reliability data			
		c. Providing reliability reports			
		d. Proposing corrective actions			
	6.4.3	Approval to implement corrective action			
	6.4.4	Maintenance contract / MOE procedures			
6.5	Reliability Programme				
6.5.1	Objectives				
	6.5.1.1	Statement summarising the prime objectives of the programme			
		a. Recognise the need for corrective action			
		b. Establish what corrective action is needed			
		c. Determine the effectiveness of that action			

	6.5.1.2	The extent of the objectives should be directly related to the scope of the programme			
	6.5.1.3	All MSG-3 related tasks are effective and their periodicity is adequate			
6.5.2	Identification of items				
	The items controlled by the programme should be stated				
6.5.3	Terms and definitions				
	Significant terms and definitions should be clearly identified				
6.5.4	Information sources and collection				
	6.5.4.1	Sources and procedures in the Exposition			
	6.5.4.2	Type of information to be collected should be related to the objectives, examples of the normal prime sources:			
		a. Pilots Reports			
		b. Technical Logs			
		c. Aircraft Access Terminal / On-board readouts			
		d. Maintenance Worksheets			
		e. Workshop Reports			
		f. Reports on Functional Checks			
		g. Reports on Special Inspections			
		h. Stores Issues/Reports			
		i. Air Safety Reports			
		j. Reports on Delays and Incidents			
		k. Other sources: i.e. EDTO/ETOPS, RVSM, CAT II/III			
	6.5.4.3	Due account of Continuing Airworthiness information promulgated under HKAR-21			
6.5.5	Display of information.				
	Information displayed graphically or In tabular form or in combination				
	6.5.5.1	Provisions for “nil returns”			
	6.5.5.2	Where “standards” or “alert levels”, information oriented accordingly			
6.5.6	Examination, analysis and interpretation of the information				
	Method for examining, analysing and interpreting the information should be explained				
	6.5.6.1	Methods of examination may be varied – content & quantity			
	6.5.6.2	The whole process should enable a critical assessment of the effectiveness of the programme as a total activity. May involve:			
		a. Comparisons of operational reliability with established or allocated standards			
		b. Analysis and interpretation of trends			

		c. Evaluation of repetitive defects			
		d. Confidence testing of expected and achieved results			
		e. Studies of life-bands and survival characteristics			
		f. Reliability predictions			
		g. Other methods of assessment			
	6.5.6.3	Range and depth of analysis should be related to the particular programme:			
		a. Flight defects and reductions in reliability			
		b. Defects - line and main base			
		c. Deterioration observed in routine maintenance			
		d. Workshop and overhaul findings			
		e. Modification evaluations			
		f. Sampling programmes			
		g. Adequacy of maintenance equipment and publications			
		h. Effectiveness of maintenance procedures			
		i. Staff training			
		j. Service bulletins, technical instructions, etc			
	6.5.6.4	Contracted maintenance - arrangements established and details for information input included			
6.5.7	Corrective Actions				
	6.5.7.1	Procedures / time scales for implementing corrective actions / monitoring - should be fully described and could include:			
		a. Changes to maintenance, operational procedures or techniques			
		b. Changes requiring amendment of the approved Maintenance Schedule			
		c. Amendments to approved manuals			
		d. Initiation of modifications			
		e. Special inspections / fleet campaigns			
		f. Spares provisioning			
		g. Staff training			
		h. Manpower and equipment planning			
	6.5.7.2	Procedures for effecting changes should be described			
6.5.8	Organisational Responsibilities				
	Organisational structure – chains of responsibility should be defined				
6.5.9	Presentation of information to CAD				
		Information submitted to CAD for approval of the Reliability			

		Programme:			
		a. Format and content of routine reports			
		b. Time scales for reports / distribution			
		c. Format and content of reports requesting amendments			
6.5.10	Evaluation and review				
	Describe procedures and individual responsibilities – continuous monitoring of the effectiveness of the programme				
	6.5.10.1	Procedures for revising the "standards" or "alert levels"			
	6.5.10.2	Criteria to be taken into account during the review includes:			
		a. Utilisation (high / low / seasonal)			
		b. Fleet commonality			
		c. Alert Level adjustment criteria			
		d. Adequacy of data			
		e. Reliability procedure audit			
		f. Staff training			
		g. Operational and maintenance procedures			
6.5.11	Approval of organisation to implement Maintenance Schedule changes arising from the Reliability Programme results:				
	a. Does the Reliability Programme monitor the content of the Maintenance Schedule in a comprehensive manner?				
	b. Is appropriate control exercised by the owner / operator over the internal validation of such changes?				
6.6	Pooling Arrangements				
	6.6.1	Pooling information – must be substantially the same, including:			
		a. Certification / modification / Service Bulletin compliance			
		b. Operational factors			
		c. Maintenance factors			
	6.6.2	Is there a substantial amount of commonality and if CAD agreed?			
	6.6.3	Is the aircraft on short-term lease? CAD may permit more flexibility?			
	6.6.4	Reliability Programme managed by the aircraft manufacturer if agreed by CAD			

7. CAD required items		**Compliance**		
		Yes	N/A	Notes
7.1	Details of who may issue a CRS			
7.2	Define which inspections/checks are considered to be base maintenance			
7.3	Maintenance Requirements, in the absence of manufacturer's recommendations. (See Appendix D)			

	7.3.1	Aircraft battery capacity check / deep cycle			
	7.3.2	Emergency equipment			
	7.3.3	Emergency escape provisions:			
		a. Portable valise type life-rafts			
		b. Door & escape chutes / slides			
		c. Emergency exits / hatches			
	7.3.4	Flexible hoses			
	7.3.5	Fuel / oil system contamination checks			
	7.3.6	Pressure vessels			
	7.3.7	Seat belts and harnesses			
	7.3.8	Airworthiness notices - applicability			
	7.3.9	Vital points and control systems			
	7.3.10	Maintenance applicable to special operational approvals, if applicable:			
		AWO			
		RVSM			
		ETOPS			
		MNPS			
		Transport of dangerous goods			
		Other (Specify) …….			
	7.3.11	Customer furnished equipment			
	7.3.12	Engine & APU condition monitored maintenance			
	7.3.13	Mandatory requirements as listed in Hong Kong Airworthiness Notices			
	7.3.14	Flight data recorder systems			
	7.3.15	Mode “S” transponder ICAO 24-bit aircraft addresses			
	7.3.16	In-flight entertainment systems			

Completed by: [Name and Position] Signed and Date:

Appendix B

Standard Clauses for Insertion in Maintenance Schedule Introductory Pages

The purpose of this Standard Maintenance Practice is to ensure that the introductory pages of Maintenance Schedules are reasonably consistent and, where applicable, include the following items. Minor variation in the wording is acceptable providing that the intention remains clear.

1 Annual Utilisation and Maintenance Review

In the preparation of this Maintenance Schedule (provide reference) to meet the requirements of the Air Navigation (Hong Kong) Order 1995 and HKAR-1, the recommendations made by the manufacturers have been evaluated and, where appropriate, have been incorporated. It is agreed that it is a duty of the Operator or his contracted Maintenance Organisation or Fleet Technical Management Organisation that subsequent maintenance recommendations, including airworthiness information promulgated in Maintenance Review Board Report, Maintenance Planning Document, Service Bulletins, and Service Letters, etc., issued by the manufacturers, should be evaluated and, where appropriate, should be incorporated in this Schedule by approved amendment procedures.

The periods/frequencies of the maintenance tasks in this Schedule are generally based on an anticipated annual utilisation of ..... flying hours and large variations in the annual utilisation of individual aircraft could invalidate the effectiveness of certain tasks. If the annual utilisation varies by more than 25% from that anticipated, the Operator accepts that it, or its contracted maintenance organisation, must review the maintenance tasks and periods with a view to making any necessary adjustments.

In addition to variations in utilisation, the data contained in this Schedule will be reviewed at least annually by the Operator, or its contracted Maintenance Organisation, to ensure that the detailed requirements continue to be valid in the light of operating experience.

2 Maintenance Schedule Applicability

This Maintenance Schedule is applicable only to the following aircraft:

Registration	Type	Serial No.

NOTE: Any changes in aircraft applicability must have prior approval by the CAD.

3 Flying Times

All periods in this Schedule quoted in 'flying hours' are to be calculated and recorded on a 'Take-Off to Touch-Down' basis.

4 Certification of Maintenance

Attention is drawn to the necessity of ensuring that the appropriate certification of maintenance is completed. The requirements are specified in the CAD Approval Document and Endorsements relating to this Schedule.

5 Permitted Variations to Maintenance Periods

The periods prescribed by this Schedule may be varied subject to the conditions and limits contained in Permitted Variations to Maintenance Periods (See Appendix E).

6 Airworthiness Directives and Manufacturer's Service Information

CAD 360 Air Operator's Certificates Requirements Document Part Two Chapter 4 requires the operator to assess airworthiness directive and manufacturer technical information. Airworthiness Directives (or documents of comparable intent) are issued by the Authority responsible for the type design of the aircraft/engine concerned whereas and manufacturer technical information is in the form of Service Bulletins, Letters, Information Leaflets, etc. resulting from in-service experience.

Compliance with the mandatory requirements of the Authority responsible for the type design of the aircraft/engine must be achieved unless this requirement is varied by the CAD.

Continuing Airworthiness and other Service Information must be continuously evaluated by the Operator or the contracted Maintenance Organisation or Fleet Technical Management Organisation and, where necessary, appropriate action must be taken to amend the Maintenance Schedule.

7 Fatigue Lives and Airworthiness Limitations Items

Structural 'fatigue' lives and Airworthiness Limitations Items published by manufacturers are classified by CAD as mandatory for aircraft on the Hong Kong register.

8 Maintenance Practices and Procedures

The practices and procedures necessary to accomplish the requirements of this Schedule, or work resulting from its application, should be, as a minimum, to the standards recommended in:

a) relevant Maintenance, Overhaul and Repair Manuals and where applicable

b) UKCAA CAP 562 Civil Aircraft Airworthiness Information and Procedures.

9 Area or Zonal Inspection

Where the term 'ZONAL' is used in this Schedule, this is to be interpreted to mean that a general visual inspection is made for the general condition, security and leaks in the structure, systems and components and their installation in the specified zone or area. The inspection must be of sufficient depth to establish that any significant deterioration is identified and rectified to ensure that the general quality/condition of the zone/area is satisfactory until the next higher inspection becomes due.

10 Inspection Standards

Unless otherwise stated, all inspection requirements are to be applied without removing an item from the aircraft or dismantling the item, group or sub-assembly unless dismantling is considered essential in order to ensure airworthiness. Where dismantling is required by this Schedule, this is stated against the item concerned.

All significant terms and abbreviations used within this Schedule to define each maintenance task are defined in accordance with the Type Certificate Holder’s

definitions, or, in the absence of formal definition, those quoted in World Airlines Technical Operations Glossary.

The inspection standards applied to individual task inspections must meet the requirements of the Type Certificate Holder's recommended standards and practices. In the absence of specific manufacturers' guidance, refer to UKCAA CAP 562 (Civil Aircraft Airworthiness Information and Procedures) or other approved data, as appropriate.

11 Condition Monitored Maintenance/Reliability Programme

The method of data collection, analysis, corrective actions and reporting specified for the implementation of this Approved Maintenance Schedule is prescribed in the current Reliability Programme Ref. XXXX, which constitutes part of the Schedule.

12 Maintenance Requirements

The introductory page should state that in the absence of manufacturer's recommendations, the maintenance requirements stipulated in Appendix D and listed below should be adhered to by operators.

a) Aircraft battery capacity checks
b) Emergency equipment
c) Emergency escape provisions (as applicable)
d) Flexible hoses
e) Fuel/oil system contamination checks
f) Pressure vessels
g) Seat belts and harnesses
h) Hong Kong Airworthiness Notices
i) Vital points and control systems
j) Maintenance applicable to specific aircraft operations
k) Customer furnished equipment
l) Engine and APU maintenance programme
m) Mandatory requirements – Airworthiness directives and manufacturer's service information
n) Flight recorder systems
o) Mode "S" transponder ICAO 24-bit aircraft addresses
p) In-flight entertainment systems

Appendix C

OPERATOR'S CERTIFICATION STATEMENT

In the preparation of this Maintenance Schedule to meet the requirements of AN(HK)O 1995 Article 9 and HKAR-1, the recommendations made by the aircraft, engine and equipment manufacturers have been evaluated and, where appropriate, have been incorporated.

This Maintenance Schedule lists the tasks and identifies the practices and procedures, which form the basis for the scheduled maintenance of the aircraft. The operator undertakes to ensure that these aircraft will continue to be maintained in accordance with this Schedule.

The data contained in this Schedule will be reviewed for continued validity at least annually in the light of operating experience.

It is accepted that this Schedule does not prevent the necessity for complying with any new or amended regulations or requirements published by CAD from time to time where these new or amended regulations may override elements of this Schedule.

It is understood that compliance with this Schedule alone does not discharge the operator from ensuring that the Schedule reflects the maintenance needs of the aircraft, such that continuing safe operation can be assured. It is further understood that CAD reserves the right to suspend, vary or cancel approval of the Maintenance Schedule if the CAD has evidence that the requirements of the Maintenance Schedule are not being followed or that the required standards of airworthiness are not being maintained.

Name ..... Position.....

Signed .....

For and on behalf of operator:.....

Date: .....

NOTE: The post holder identified above is either the Accountable Manager or Quality Manager of the operator or when the aircraft's continuing airworthiness management is contracted to an approved organisation, the Accountable Manager or Quality Manager of such organisation.

Appendix D

MAINTENANCE REQUIREMENTS

(1) AIRCRAFT BATTERY CAPACITY CHECKS

Aircraft batteries shall be maintained in accordance with the manufacturer's recommendations. In the absence of any manufacturer's instructions the following periods apply:

a) Lead acid Battery – not exceeding 3 months.

b) Ni-Cad Battery – not exceeding 4 months.

(2) EMERGENCY EQUIPMENT

The required Emergency Equipment will be maintained to a schedule based on the equipment manufacturer's recommendations. In addition, the following requirements are complied with in the Maintenance Schedule:

Emergency equipment is to be checked for correct complement, stowage, installation and expiry date(s) at suitable periods.

First Aid Kit(s) contents are checked at periods not exceeding 12 months.

(3) EMERGENCY ESCAPE PROVISIONS (as applicable)

a) Portable Valise Type Life rafts

At the appropriate Overhaul Period, 10% of all life rafts installed in fleets will be test inflated using system bottle and release mechanisms.

b) Door and Escape Chutes/Slides

A schedule of release and inflation tests will be carried out to the requirements specified in Hong Kong Airworthiness Notice No.12, Appendix 16.

c) Emergency Exits/Hatches

All emergency exits and hatches are functioned by both internal and external means at periods specified in this Maintenance Schedule. In the absence of manufacturer's specific recommendations, these should occur at suitable periods not exceeding six months elapsed time.

(4) FLEXIBLE HOSES

Flexible hoses shall be inspected, overhauled or life limited in accordance with the manufacturer's recommendations.

In the absence of manufacturer's recommendations, hoses shall be subject to a schedule of pressure testing at periods not exceeding six years from installation and three yearly thereafter, or in accordance with an alternative schedule as agreed by the CAD.

(5) FUEL/OIL SYSTEM CONTAMINATION CHECKS

Consumable fluids, gases etc. uplifted prior to flight will be of the correct specification, free from contamination, and correctly recorded.

Fuel system water drain checks are to be carried out in accordance with operator's Maintenance Management Exposition procedures.

The procedures shall be in accordance with the manufacturer's recommendations. In the absence of manufacturer's recommendations, the frequency of the water drain checks shall be approved by the CAD.

(6) PRESSURE VESSELS

Oxygen/Nitrogen pressure vessels are to be overhauled or tested in accordance with manufacturer's recommendations. In the absence of any such recommendations the periods specified in British Standard Institute Standard (BSI) BS5430-2 should be followed.

(7) SEAT BELTS AND HARNESSES

In the absence of manufacturer's recommendations, all installed seat belts and harnesses shall be subject to a schedule of Detailed Visual Inspection at periods not exceeding six months.

(8) HONG KONG AIRWORTHINESS NOTICES

Hong Kong Airworthiness Notices detail additional maintenance requirements. Procedures are in place to assess all Airworthiness Notices on a continuing basis for

applicability to aircraft maintained to this Maintenance Schedule. Where necessary, relevant maintenance tasks should be included in the Maintenance Schedule.

(9) VITAL POINTS AND CONTROL SYSTEMS

Whenever inspections are made or work is undertaken on vital points in flying or engine control systems, a detailed investigation must be made on completion of the task to ensure that all tools, rags or any other loose articles which could impede the free movement and safe operation of the system(s) have been removed and that the system(s) and installation in the aircraft zone are clean and unobstructed.

If, as a result of the application of the Schedule, any part of either the main or any associated system is dismantled, isolated, adjusted, repaired or renewed, that part of the system(s) which has been disturbed shall be subjected to a duplicate/independent inspection, with free movement, range, direction and tension checks and shall be certified in accordance with HKAR-1 Sub-section 1.6-2.

NOTE: Independent inspection serves the purpose of 'Duplicate Inspection' as stipulated in various Hong Kong airworthiness requirements. 'Duplicate inspection' will be phased out with effect from 1 January 2020.

(10) MAINTENANCE APPLICABLE TO SPECIFIC AIRCRAFT OPERATIONS

The Maintenance Schedule contains the necessary tasks required to ensure continued compliance with additional specific authorisations/approvals:

- Automatic Approach and Automatic Landing CAT II/CAT III
- Minimum Navigation Performance Specifications (MNPS)
- Reduced Vertical Separation Minima (RVSM)
- Extended Diversion Time Operations (EDTO)/Extended Range Twin Operations (ETOPS)
- Others (Specify)

(11) CUSTOMER OR BUYER FURNISHED EQUIPMENT

The Maintenance Schedule contains the necessary tasks required to ensure continued airworthiness of customer or buyer furnished equipment fitted to the aircraft.

(12) ENGINE AND APU MAINTENANCE PROGRAMME

For engines and APUs which are controlled by a Reliability Centered Maintenance or Condition Monitored Maintenance Programme, compliance with Hong Kong Aviation Requirements, HKAR-1 Sub-section 1.6-2.

Note: For engines and APUs controlled by a fixed Hot Section Inspection and Overhaul Life, no entry is required.

(13) MANDATORY REQUIREMENTS – AIRWORTHINESS DIRECTIVES AND MANUFACTURER'S SERVICE INFORMATION

HKAR-1 Sub-section 1.6-6 requires Operators to institute a system for the assessment of continuing airworthiness information. An Airworthiness Directive (AD) is a document issued or adopted by the Authority of the State of Registry of an aircraft which mandates the actions to be performed to restore an acceptable level of safety to an aircraft when an unsafe condition has been identified.

The constructor/manufacturer issues technical information in the form of Service Bulletins, Letters, Information Leaflets, etc. resulting from in-service experience. Compliance with the mandatory requirements of the Authority responsible for the type design of aircraft and equipment must be achieved unless the requirement is varied by the Director-General of Civil Aviation.

Continuing Airworthiness and other Service Information must be continuously evaluated by the Operator or the contracted Maintenance Organisation or the Fleet Technical Management Organisation and, where necessary, appropriate action must be taken to amend the Maintenance Schedule.

(14) FLIGHT RECORDERS

The Maintenance Schedule should contain the necessary tasks required to ensure that flight recorders, which include flight data recorders and cockpit voice recorders, remain serviceable with regard to the parameters to be recorded and the duration of recording. In addition to the maintenance requirements stipulated by the aircraft and recorder manufacturers, the requirements of Hong Kong Airworthiness Notice No. 36F shall be complied with.

(15) MODE “S” TRANSPONDER ICAO 24-BIT AIRCRAFT ADDRESSES

The correct Mode S address should be periodically confirmed for each transponder installed on the aircraft, via a field test set at an appropriate maintenance opportunity (not to exceed a 2-year period). This task should be incorporated into the Maintenance Schedule.

(16) IN-FLIGHT ENTERTAINMENT SYSTEMS (IFE)

Hong Kong Airworthiness Notice No. 65 is issued specific to IFE installations, which should be addressed and form part of the periodic schedule review. Appendix No. 1 to Hong Kong Airworthiness Notice No. 65 provides detail guidance on the development of IFE scheduled maintenance tasks and solutions.

Appendix E

PERMITTED VARIATIONS TO MAINTENANCE PERIODS

1. Where the manufacturer has not prescribed tolerances or permitted variations in its maintenance schedule recommendations then the permitted variations to maintenance periods described in sub-paragraphs 4 (a) to (e) shall apply. The Operator may vary the periods prescribed by this Schedule provided that such variations are within the limits of the sub-paragraphs.

2. When the manufacturer has prescribed tolerances or permitted variations then these will apply. The details must be specified in this Schedule. The Operator may vary the periods prescribed by this Schedule provided that such variations are within the manufacturer's permitted tolerances or permitted variations. Sub-paragraphs 4 (a) to (e) shall not apply to this type of variations.

3. Variations shall be permitted only when the periods prescribed by this Schedule (or documents in support of this Schedule) cannot be complied with due to circumstances which could not reasonably have been foreseen by the Operator.

4. The decision to vary any of the prescribed periods shall be made only by the Operator or its contracted organisation for the management of Maintenance Schedule. Particulars of every variation so made shall be entered in the appropriate Log Book(s).

(a) **Items Controlled by Flying Hours**

	Period Involved	*Maximum Variation of the Prescribed Period*
(i)	5000 flying hours or less	10%
(ii)	More than 5000 flying hours	500 flying hours

(b) **Items Controlled by Calendar Time**

	Period Involved	*Maximum Variation of the Prescribed Period*
(i)	1 year or less	10% or 1 month, whichever is the lesser
(ii)	More than 1 year but not exceeding 3 years	10% or 2 months, whichever is the lesser
(iii)	More than 3 years	3 months

(c) **Items Controlled by Landing/Cycles**

	Period Involved	*Maximum Variation of the Prescribed Period*
(i)	500 landings/cycles or less	10% or 25 landings/cycles, whichever is the lesser
(ii)	More than 500 landings/cycles	10% or 500 landings/cycles, whichever is the lesser

(d) **Items Controlled by More Than One Limit.** For items controlled by more than one limit, e.g. items controlled by flying hours and calendar time or flying hours and landings/cycles, the more restrictive limit shall be applied.

(e) **Items Already Subject to CAD Trial Extension Programme.** For an item already subject to an agreed CAD trial extension programme, the trial period may be varied by a maximum of 50 flying hours only provided that such a variation is not specifically excluded by the agreed trial extension programme.

NOTES:

(1) The variations permitted above do not apply to:-

(a) Those components for which an ultimate (scrap) or retirement life has been prescribed (e.g. primary structure of components with limited fatigue lives and high energy rotating parts or which containment is not provided). Details concerning all items of this nature are included in the Type Certificate Holder's documents or manuals.

(b) Those tasks included in the Maintenance Schedule, which have been classified as mandatory by the Type Certificate Holder or the CAD.

(c) Certification Maintenance Requirements (CMR) unless specifically approved by the CAD.

(2) Air Navigation (Hong Kong) Order, Hong Kong Airworthiness Notices and Hong Kong Aviation Requirements may override these conditions.

Appendix F

Civil Aviation Department

Airworthiness Office

MAINTENANCE SCHEDULE APPROVAL

Pursuant to the Air Navigation (Hong Kong) Order for the time being in force, the Director-General of Civil Aviation hereby approves, subject to the conditions hereto, the following Maintenance Schedule:

CAD Approval Reference.....

Operator's Schedule Reference.....Issue No..... Dated.....".....

Operator(s).....

Aircraft Applicability.....

For the purpose of.....Flying

CONDITIONS

(a) The requirements of this Schedule shall be completed within the periods specified therein and in the appropriate Endorsements to this Approval Document.

(b) All amendments/alterations to this Schedule shall be approved by the Director-General of Civil Aviation. No change to the Conditions or the Endorsements shall be made other than by the Director-General of Civil Aviation.

(c) Prior permission of the Director-General of Civil Aviation shall be obtained before any maintenance check is sub-divided.

(d) It is the responsibility of the Operator to ensure that recommendations made by the Aircraft or Equipment Manufacturers in Maintenance Manuals, Recommended Maintenance Schedules, Service Bulletins and other technical service information are evaluated and, where appropriate, the Operator must initiate Maintenance Schedule amendments.

(e) In addition to the accomplishment of the maintenance actions prescribed in the Schedule, compliance shall also be established with all appropriate mandatory requirements issued by the Director-General of Civil Aviation and by the Type Certification Authority of the aircraft. Retirement life limitations prescribed by manufacturers shall also be observed, unless otherwise directed by the Director-General of Civil Aviation normally through the medium of Hong Kong Airworthiness Notices or CAD Additional Airworthiness Directives.

(f) Non-compliance with any of the Conditions of this Approval Document or its Endorsements shall invalidate the approval of this Maintenance Schedule.

(g) This Approval Document includes ..... Endorsement(s)

(Name of CAD Officer)
for Director-General of Civil Aviation

Date:

Appendix G

Civil Aviation Department

Airworthiness Office

MAINTENANCE SCHEDULE APPROVAL - AIRCRAFT EXCEEDING 2730 kg MTWA

ENDORSEMENT No 1 CAD Approval Reference.....

CERTIFICATION OF MAINTENANCE

(a) Work carried out on aircraft maintained to this Maintenance Schedule requires the following certification:

(i) A Certificate of Maintenance Review (CMR)

(ii) A Certificate of Release to Service (CRS)

(b) A Maintenance Review in accordance with HKAR-1 must be carried out and certified for aircraft in the Transport or Aerial Work Category at intervals not exceeding 380 days. The Certificate may be re-issued at any time prior to the expiry of the last Certificate. The Review need not be completed coincident with a Scheduled Maintenance Inspection.

(c) The signatory for the CMR shall meet the qualification requirement of HKAR-1 Sub-section 1.8-13 Appendix No. 3.

(d) A CRS must be issued whenever a Scheduled Maintenance Inspection has been carried out, except Pre-flight Check where no CRS is required.

(e) The signatory for the CRS following Scheduled Maintenance Inspections shall be person holding HKAR-66 licence of appropriate Category in accordance with HKAR-1 Sub-section 1.8-13 Appendix No. 3.

(f) For aircraft maintained to HKAR-145, the signatory for the CRS following Scheduled Maintenance Inspections shall be person authorised in accordance with HKAR-1 Sub-section 1.8-13 Appendix No. 3 and the signatory shall use the Approval Reference of the Approved Organisation. For all other cases, the signatory shall be holder of an appropriately type rated HKAR-66 Category B Licence.

(Name of CAD Officer)
For Director-General of Civil Aviation

Date:

Appendix G (Continued)

ENDORSEMENTS (Continued)

No.		CAD Approval and Date

Appendix H

Civil Aviation Department

Airworthiness Office

MAINTENANCE SCHEDULE APPROVAL - AIRCRAFT NOT EXCEEDING 2730 kg MTWA

ENDORSEMENT No 1 CAD Approval Reference.....

CERTIFICATION OF MAINTENANCE

(a) Work carried out on aircraft maintained to this Maintenance Schedule requires the following certification:

(i) A Certificate of Maintenance Review (CMR)

(ii) A Certificate of Release to Service (CRS)

(b) A Maintenance Review in accordance with HKAR-1 must be carried out and certified for aircraft in the Transport or Aerial Work Category coincident with the Annual Check. The period of validity of the CMR must not exceed the due date of the next Annual Check. The Maintenance Review may be anticipated by up to 62 days to coincide with the Annual Check.

(c) The signatory for the CMR shall meet the qualification requirement of HKAR-1 Sub-section 1.8-13 Appendix No. 3.

(d) A CRS must be issued whenever an overhaul, repair, replacement, modification, mandatory inspection or Scheduled Maintenance Inspection has been carried out, except Pre-flight check where no CRS is required.

(e) The signatory for the CRS following Scheduled Maintenance Inspections shall be:

(i) person holding appropriately type rated HKAR-66 Category B Licence on the aircraft concerned.

(ii) a person appropriately authorised by an Organisation approved by the Director-General of Civil Aviation for that purpose.

GENERAL CONDITIONS

(f) It is the responsibility of the Operator to ensure that Supplementary Special Inspection, Overhaul, Placard and Notice Requirements related to the specific aircraft are accurately entered in the appropriate supplement pages of the Schedule.

(Name of CAD Officer)
For Director-General of Civil Aviation

Date:

Appendix H (Continued)

ENDORSEMENTS (Continued)

No.		CAD Approval and Date

Appendix I

MAINTENANCE SCHEDULE AMENDMENT REQUEST FORM

CAD Schedule Ref: _____ Issue No: _____ Aircraft Type: _____

Operator Schedule: _____ Issue Date: _____ Amendment No.: _____

Item	*Action to be taken*	*Justification*	*CAD Remarks*
1. Introduction page A	Replace with new page dated……	Introduction of new check cycle	
2. Introduction page B	Replace with new page dated……	Introduction of Aircraft Registration B-……	
3. Page 45 – Item E12	Replace with new page dated……	Revision of forward and aft pressure bulkhead inspection requirements. In accordance with manufacturer's latest requirements	

COMPLIANCE STATEMENT: This Maintenance Schedule complies with the manufacturer's minimum maintenance and inspection requirements and the requirements of the Civil Aviation Department Hong Kong for the airframe, engines (on wing), systems and components except wherein previously or hereby approved by the Civil Aviation Department.

Signed: _____ Position: _____ Date: _____

Organisation: _____ on behalf of : _____

The above requested amendments are approved
with the exception of : _____ Signed: _____ for Director-General of Civil Aviation

Date: _____