



**Cooperative Development of Operational Safety and
Continuing Airworthiness Programme
COSCAP - SOUTH ASIA
International Civil Aviation Organization**



**ADVISORY CIRCULAR
FOR MAINTENANCE ORGANIZATIONS**

Subject: GUIDANCE FOR TASK AND SHIFT HANDOVERS

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1. INTRODUCTION

- 1.1 Accident and incident investigation data shows that shift and task handovers are one of the major contributing factors to error-caused events.
- 1.2 The primary objective of handovers is to ensure that all necessary information is communicated between the out-going and in-coming personnel.
- 1.3 Effective task and shift handover depends on three basic elements:
 - The outgoing person's ability to understand and communicate the important elements of the job or task being passed over to the incoming person.
 - The incoming person's ability to understand and assimilate the information being provided by the outgoing person.
 - A formalized process for exchanging information between outgoing and incoming persons and a place and time for such exchanges to take place.
- 1.4 Organizations should have a recognized procedure for task and shift handovers which all staff understand and adhere to. This procedure should be listed in the maintenance organization's procedures manual.
- 1.5 Ideally the procedure should provide for sufficient time to be made available by way of a shift overlap, depending on the complexity of task(s) to be handed over. As a guideline, 20 to 30 minutes could be considered good human factors practice.
- 1.6 It would also be good practice for the outgoing shift supervisor to leave a contact telephone number with the incoming shift, in case they have any queries after a handover has taken place.
- 1.7 Whilst all essential information (especially the detailed status of tasks) should be recorded in written form, it is also important to pass this information verbally in order to reinforce it.

2. SHIFT HANDOVER

- 2.1 It is recognized that at the point of changing shift the need for effective communication between the out-going and in-coming personnel in aircraft maintenance is extremely important. The absence of effective communication has been evident in many accident reports from various industries, not just aircraft maintenance.
- 2.2 Two characteristics must be present for effective shift handover to take place: ownership and formality. Individuals must assume personal ownership and responsibility for the tasks they perform. They must want to ensure that their tasks are completed correctly, even when those tasks extend across shifts and are completed by somebody else.
- 2.3 Formality relates to the level of recognition given to the shift handover procedures. Formality exists when the shift handover process is defined in the maintenance procedures manual and managers and supervisors are committed to ensuring that cross-shift information is effectively delivered. Demonstrable commitment is important as workers quickly perceive a lack of management commitment when they fail to provide ample shift overlap time, adequate job aids and dedicated facilities for the handovers to take place.

2.4 Aids to Effective Communication at Shift Handover

Research has shown that certain processes, practices and skills aid effective communication at shift handover.

- a) People have to physically transmit information in written, spoken or gestured (non-verbal or body language) form. If only one medium is used there is a risk of erroneous transmission. The introduction of redundancy, by using more than one way of communicating (e.g., written, verbal or non verbal) greatly reduces this risk. For this reason information should be repeated via more than one medium. For example, verbal and one other method such as written or diagrams, etc.
- b) The availability of feedback, to verify comprehension during communication increases the accuracy. The ability for two-way communication to take place at shift handover is therefore important.
- c) A part of the shift handover process is to facilitate the formulation of a shared mental model of the maintenance system, aircraft configuration, tasks in work, etc. Misunderstandings are most likely to occur when people do not have this same mental picture of the state of things. This is particularly true when deviations from normal working has occurred such as having the aircraft in the flight mode at a point in a maintenance check when this is not normally done. Other considerations are when people have returned following a lengthy absence (the state of things could have changed considerably during this time) and when handovers are carried out between experienced and inexperienced personnel (experienced people may make assumptions about their knowledge that may not be true of inexperienced people). In all these cases handovers can be expected to take longer and should be allowed for.
- d) Written communication is helped by the design of the documents, such as the handover log, which consider the information needs of those people who are expected to use it. By involving the people who conduct shift handovers and asking them what key information should be included and in what format it should be helps accurate communication, and their acceptance contributes to its use and acceptance of the process.

2.5 Barriers To Effective Communication At Shift Handover

Research has also shown that certain practices, attitudes and human limitations act as barriers to effective communication at shift handover.

- a) Key information can be lost if the message also contains irrelevant, unwanted information.

We have only a limited capability to absorb and process what is being communicated to us. In these circumstances it requires time and effort to interpret what is being said and extract the important information. It is important that only key information is presented, and irrelevant information excluded.

- b) The language we use in everyday life is inherently ambiguous. Effort therefore needs to be expended to reduce ambiguity by:
 - i) carefully specifying the information to be communicated (e.g., by specifying the actual component, tooling or document, etc.)
 - ii) facilitating two-way communication which permits clarification of any ambiguity (e.g., do you mean the inboard or outboard wing flap?)
- c) Misunderstandings are a natural and inevitable feature of human communication and effort has to be expended to identify, minimize and repair misunderstandings as they occur. Communication therefore has to be two-way, with both participants taking responsibility for achieving full and accurate communication.
- d) People and organizations frequently refer to communication as unproblematic, implying that successful communication is easy and that it requires little effort. This leads to over-confidence and complacency becoming common place. Organizations need to expend effort to address complacency by:
 - i) emphasizing the potential for miscommunication and its possible consequences
 - ii) developing the communication skills of people who are involved in shift handovers

2.6 Guidelines

In considering the theories of communication and the research that has been performed the following guidelines apply for operations that are conducted over multiple shifts to allow for continuous 24 hour maintenance. When shifts are adopted which do not cover a full 24 hour period (e.g., early and late shifts with no night shift) the handover where face to face communication is not possible poses an inherent risk. In such cases organizations should be aware that the potential for ineffective and inefficient communication is much higher.

Shift Handover Meetings

It could be said that the primary objective of the shift handover is to ensure accurate, reliable communication of *task-relevant* information across the shifts. However this does not recognize the users' needs for other information which may also be required to enable a complete mental model to be formed which will allow safe and efficient continuation of the maintenance process. Examples of such information could be personnel staffing levels, Authorization coverage, personnel sickness, people working extended hours (overtime), other personnel issues, etc.

An important aspect related to individual shift handover is when it actually begins. The common perception is that shift handover occurs only at the transition between the shifts. However, shift handover should really begin as soon as the shift starts. Throughout their shift people should be thinking about, and recording, information that should be included in their handover to the next person or shift.

The shift handover process should include at least two meetings: the Shift Managers'/Supervisors' handover meeting and the Supervisors/Certifying Staff walkthrough meeting.

2.6.1 Shift Managers'/Supervisors' Handover

2.6.1.1 The shift handover process starts with a meeting between the incoming and outgoing shift managers/supervisors.

2.6.1.2 Shift managers/supervisors need to discuss and up-date themselves on tactical and managerial matters affecting the continued and timely operation of the maintenance process. The purpose

of this meeting is to acquaint themselves with the general state of the facility and the overall status of the work for which they are responsible. Outgoing managers/supervisors should summarize any significant problems they have encountered during their shift, especially any problems for which solutions have not been developed or are still in progress. This meeting should be conducted in an environment free from time pressure and distractions.

- 2.6.1.3 Table 1 lists typical topics that should be covered in the managers’/supervisors’ handover meeting.

Table 1 Topics for managers’ shift handover meeting

Status of the Facility
Workstands/Docking
Visitors
Construction work
Health & Safety issues
Work Status
Aircraft being worked
Scheduled aircraft incoming/departing
Deadlines
Aircraft status against planned status
Staffing Levels and Status
Authorization coverage
Certifying staff
Non certifying staff
Numbers and names of personnel working overtime
Numbers and names of contract staff
Sickness
Injuries
Training
Other personnel issues
Problems
Outstanding/in work/status
Solved
Information
ADs, SBs, etc.
Company technical notices
Company policy notices

2.6.2 **Walkthroughs**

- 2.6.2.1 After the meeting between shift managers, and the assignment of tasks, there is a need for Supervisors and certifying staff to meet and exchange detailed information related to individual jobs and tasks. The most effective way to communicate this information is for the affected incoming and outgoing personnel to go over the task issues while examining the actual jobs on the hangar floor or at the workplace. A mutual inspection and discussion of this nature is called a “Walkthrough”.

- 2.6.2.2 Table 2 lists typical topics that should be covered in the supervisors/certifying staff’s walkthrough meeting.

Table 2 Topics for the Supervisors/Certifying Staff Walkthrough Meeting

Jobs/tasks in progress
Workcards being used
Last step(s) completed
Problems encountered
Outstanding/in work/status
Solved
Unusual occurrences
Unusual defects
Resources required/available
Location of removed parts, tooling etc.
Parts and tools ordered and when expected
Parts shortages
Proposed next steps
Communication with Planners, Tech Services, workshops
Communication with managers etc.

3. TASK HANDOVER

3.1 The handing over of tasks from one person to another does not always occur at the point of changing shifts. Tasks are frequently required to be handed over during a shift. This Section deals with two common situations: handing over a task to someone who is present at the time, and stopping a job part way through when it is not certain who will pick this up at a later stage. This section on task handover should be read in conjunction with the section on Non-Routine Tasks and Process Sheets.

3.2 Handing Over a Task Directly To Another Person

When the task is being handed directly over to someone who is present at the time the process and concepts are the same as for a Walkthrough described in the Shift Handover Section of this Advisory Circular (AC). That is to say it is done face to face using verbal and written communication. In these cases the written element is normally accomplished by ensuring that the task cards or non-routine process sheets are accurately completed, clearly identifying the stage in the task the job has reached. Any deviations from normal working practices or procedures must be clearly highlighted during the Walkthrough. An example of this would be if in changing a valve, a clamp, not required to be removed by the maintenance manual, is disturbed to aid removal and installation. Many mishaps have occurred in these circumstances as the person taking over the job assumes that the task was being performed according to the maintenance manual, drawings, procedures etc. This deviation should be recorded by the outgoing person, and it is essential from a communication effectiveness point of view that this is reinforced during the Walkthrough.

3.3 Handing Over a Task for Somebody to Complete at a Later Stage

It is not uncommon that a job is left incomplete during a shift, perhaps in the case of someone being called away to attend to a more urgent task on another aircraft. In these cases it is often not known who will eventually pick up the job of completing and certifying the release to service. These situations present a far greater risk and challenge to effectively communicate the stage of task accomplishment and what is required to complete the job. Face to face communication is not possible therefore total reliance has to be placed on written communication, a single medium with no redundancy or opportunity to question and test a true understanding by the person expected to finish the job.

3.4 Scheduled Tasks

3.4.1 The paperwork normally associated with scheduled tasks are the Task Cards that are issued at the beginning of the maintenance input. These may have been written by the manufacturer, the

maintenance organization or the operator of the aircraft. In all cases the card, and associated task breakdown written on it, assume that the same person will start and finish the job. It was not *designed* to be used as a handover document. That is not to say that it could not be the handover, or that it could not form part of one. It depends on the circumstances.

3.4.2 Task Cards break down jobs into discrete stages, and ideally jobs should always be stopped at one of these stages so that the last sign off on the card is the exact stage of the job reached. In this case the card is the handover. However, a job is sometimes stopped at a point which is between the stages identified on the card, the stage sequencing has not been followed, or a deviation from normal working has occurred (such as in the example of disturbing the additional clamp to aid removal and installation of a valve). When this occurs additional written information must be used to clearly identify the point of exit from the task and what is required to complete the job and restore serviceability. Non-routine cards or sheets should then be used to record and transmit the relevant information necessary. Figure 1 is an example of a Task Card.

GO FAST AIRWAYS			
A/C type: B737 MP ref: MS/B737/668 Aircraft Reg: G-OFST			
Flight Controls			
Additional work card raised: Yes/No <input checked="" type="checkbox"/> / <input type="checkbox"/>			
27-00-56	Flap synchronizing system	Mechanic	Inspector
	a) Check the cable tensions are correct (mm 27-50-02)	B Bloggs	⑦ stamp
	b) With the flaps selected up, disconnect the operating link from one transmitter gearbox only.	B Bloggs	⑦ stamp
	c) Pressurize the hydraulic system and select flaps down	B Bloggs	⑦ stamp
	d) Make sure that the flaps start to move and then the system cuts out.	B Bloggs	⑦ stamp
	e) Depressurize the hydraulic system and connect the transmitter operating link.		
	f) Pressurize the hydraulic system and make sure that the flaps operate correctly.		

Figure 1 Task Card

3.4.3 In the case above (Figure 1), the job has been accomplished fully up to stage d), but the hydraulics have been depressurized therefore only part of stage e) has been accomplished. A supplementary card, worksheet or non routine sheet (the terminology will vary from one company to another) must be raised to communicate that the Task Card does not reflect the true state of the aircraft. In this case the wording could be:

Defect	Action Taken	Mechanic	Inspector
<i>Reference card 27-00-56. Card completed fully up to stage d). Hydraulic system depressurized but the transmitter operating link is not reconnected. Operating link to be reconnected prior to performing stage f).</i>			

Figure 2 Supplementary Card

3.4.4 The combination of both documents (Figure 1 and Figure 2) provides sufficient information for the person picking up the job to understand the stage of the work and what is required to complete it.

3.5 Non-scheduled Tasks

Complex or lengthy non-scheduled tasks should always be broken down into a number of discrete steps using stage or process sheets (the terminology may vary from one company to another). However, many incidents have occurred when people have started a straight forward job but had to exit the task part way through without anybody to handover to. These situations by their nature are unplanned and are normally associated with time pressure or emergency situations. In spite of this it is vital that time is taken by the person leaving the job to comprehensively record what activities have taken place and what is required to complete the job. This would be recorded on stage sheets and should emphasize any deviations from the normal or expected way of working (i.e., the maintenance manual). Management and supervisors have a responsibility to ensure that adequate time is given to maintenance staff to record their work if the task is not completed for any reason.

4. NON-ROUTINE TASK AND PROCESS SHEETS

4.1 Task Cards for scheduled maintenance are an everyday document for aircraft engineers. They not only identify the job to be performed, but they also break down the task into stages to allow for individuals to sign or certify the various stages. The reasons for breaking down the job into discrete tasks is often wrongly seen as record keeping, and of being able to identify who did what part of a job so that if there is an incident the employer or regulator can take action against the person. Whilst it does confer accountability for the work this could be achieved by other means. The primary purpose of a job card is to identify the task to be performed and then act as a job aid to help the engineer plan, complete the task fully, and in the correct sequence.

4.2 Maintenance Programmes today are frequently based on the principles of Condition Monitoring. Most components on the aircraft therefore have no specific period defined as to when they will be removed for repair, overhaul, etc. The time to remove them is determined by a reliability programme or scheduled inspections which assess their serviceability. Operator's Task Cards are normally derived or copied from those provided by the aircraft manufacturer. Unfortunately these are usually only the required tasks and do not include those tasks which must be performed as a consequence of some other action. An example of this is an engine change. The manufacturer will have written cards describing the breakdown of various inspections such as borescope, oil sampling and magnetic chip detectors, but not a card on changing the engine. This had led to the situation whereby many jobs, often long and complex, have no pre-printed task cards or process sheets which break down the job in to stages and so help the engineers.

4.3 This Section of the AC describes the types of tasks that need Non-Routine Task Cards or Process Sheets, and the goals from a human factors perspective.

4.4 **Developing Non-routine Task Cards or Process Sheets**

If a task contains any one of the attributes in the left hand column of Table 3 an Operator or maintenance organization should develop pre-printed task cards, or process sheets if the task stages are particularly numerous or lengthy. The right hand column of the table provides the reasons and goals that are to be achieved by the documentation.

Table 3 Non-routine Task Cards

Task Attributes	Reason and Goals to be Achieved
Task is Complex	<ol style="list-style-type: none"> 1. Helps to structure the sequence that the various sub tasks will be performed. 2. Identifies the significant stages in the process. 3. Provides cues and prompts. 4. Helps prevent errors of omission because:- <ul style="list-style-type: none"> • The greater the amount of information in a procedural step, the more likely that items within the step will be omitted. • Procedural steps that are not obviously cued by preceding actions, or that do not follow in a direct linear sequence are more likely to be omitted.
Task involves multiple Trade disciplines	<ol style="list-style-type: none"> 1. Identifies what tasks require specialist task disciplines to perform and certify the work. 2. Ensures that specialist trades are called upon to perform their task at the correct point in the process. 3. Provides evidence that the specialist task has been performed.
Task that could extend over shifts	<ol style="list-style-type: none"> 1. Provides clear evidence of what tasks have been performed and what is outstanding. 2. Compliments the task or shift handover process. 3. Helps prevent errors of omission because:- <ul style="list-style-type: none"> • The larger the number of discrete steps in an action sequence, the greater the probability that one or more will be omitted.
Well practiced, routine tasks where the consequence of error is unacceptably high (safety or economic impact).	<ol style="list-style-type: none"> 1. Well practiced or routine tasks are susceptible to ‘slips’ and ‘lapses’. Errors of omission are most common in these circumstances. Examples are: <ul style="list-style-type: none"> • Distraction causing the person to ‘lose his place’ upon resumption of the task. People tend to think they are further along in the task than they actually are and therefore miss a step out. • Premature exit. This is moving on to the next job before the previous one is complete. The last activity in the task is frequently the one omitted. We are particularly vulnerable to this sort of error when under time pressure. Examples are not

	<p>torque tightening a pipe coupling, wire locking or calling up an engine run for leak checks</p> <p>2. Written sheets serve as ‘mind joggers’ to prevent forgetting a step</p>
Task involves the recording of measurements or calculations	<p>1. Measurements which are required to be recorded are more likely to be captured if pre-supplied paperwork is readily available with the facility to do so. It makes compliance easy.</p> <p>2. Provides a prompt that recording of data is required.</p> <p>3. If calculations are required, as in the case of taking measurements and then selecting shims. Recording the measurements and providing a place for doing the calculation augments the limited capacity of the working memory.</p>

5. APPLICABILITY

- 5.1 Maintenance organizations should consider the information contained in this AC for task and shift handovers.

6. REFERENCE

CAP 716 *Aviation Maintenance Human Factors (EASA / JAR145 Approved Organisations)* of 18 December 2003 of UK CAA.

Signed by: (Appropriate CAA Official)