Department of Transport

Bureau of Air Safety Investigation

RESEARCH PAPER

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Flying Training in Australia

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ABBREVIATIONS

AGL	Above Ground Level
AIP	Aeronautical Information Publication
ATS	Air Traffic Services
BASI	Bureau of Air Safety Investigation
CAA	Civil Aviation Authority (now Civil Aviation Safety Authority CASA)
CAIR	Confidential Aviation Incident Reporting
CAO	Civil Aviation Orders
CPL(A)	Commercial Pilot Licence (Aeroplane)
CRM	Crew Resource Management
ERSA	Enroute Supplement Australia
FAA	Federal Aviation Authority
FIM	Flight Instructor Manual
GA	General Aviation
GFPT	General Flying Progress Test
HF	High Frequency
HRDA	Human Resource Development in Aviation
ICAO	International Civil Aviation Organisation
NOTAM	Notice To Airmen
NVMC	Night Visual Meteorological Conditions
NZ	New Zealand
OASIS	Occurrence Analysis and Safety Information System
PPL(A)	Private Pilot Licence (Aeroplane)
RPT	Regular Public Transport
SIMOPS	Simultaneous Runway Operations
UK	United Kingdom
USA	United States of America
VFR	Visual Flight Rules

EXECUTIVE SUMMARY

One of the most significant factors in the formulation of safe flying habits and good airmanship is the quality of ab-initio flying training. It is therefore important for anyone involved in ab-initio training to receive adequate guidance on the required syllabus and the methods of teaching.

In recent years, the Australian flying training industry has been through a large number of changes, with some arising from the Civil Aviation Authority's (CAA) implementation of a new 'Day-VFR' syllabus, and others arising from major changes in the Australian aviation industry. While change has become a way of life for many industries, including aviation, it is important to ensure that student pilot training prepares new pilots for every flight that they will undertake. The syllabus of instruction, as well as the methods by which students are taught, should seek to encourage the development of responsible attitudes and ensure that an adequate knowledge of aviation is acquired. Training of instructors should also adequately prepare them for the task of being a teacher.

This project provides a critical review of the new 'Day-VFR' syllabus and highlights some of the deficiencies that BASI believes exist in Australian flying training. The major part of this report is concerned with the 'Day-VFR' syllabus; however, discussions on the adequacy of instructional methods and techniques, instructor training, and methods of checking and training, are also addressed.

As a result of this project, seven recommendations are directed to the CASA. Specifically, BASI recommends that the CASA:

- Develop a better standardisation system, including the assessment of students and instructors, to ensure a minimum standard of skill and knowledge is set out clearly and concisely. The system should include guidelines which are less prone to variance of interpretation.

- Conduct a review of instructor training and teaching methods to ensure that instructors are suitably qualified to teach students. The review should attempt to standardise teaching methods so that there is more consistent and better quality instruction throughout all phases of a student's training. Instructors should be encouraged to use proven teaching methods.

- Revise the 'Day-VFR' syllabus to include more guidance on lesson planning, prioritising subjects within the syllabus, methods of teaching subjects and ways of integrating the flying and ground syllabus so as to ensure effective learning by the student. Lesson planning should be part of a structured syllabus of teaching methodology.

- Review 'industry type examinations', and conduct periodic inspections, to ensure that a national standard exists, and that minimum standards are being met.

- Review the policy on the testing of human performance and limitations and expedite the integration of this area into all facets and levels of flying training, and identify methods of evaluating human performance.

- Review, and where necessary revise, the Flight Instructor Manual (FIM) to draw it into line with the new syllabus, or alternatively, adopt a new text as the primary reference source in lesson planning, content and conduct.

- Provide industry with more guidance on the appropriate texts and reference materials that may be used in conjunction with the 'Day-VFR' syllabus.

1. INTRODUCTION

The objective of the flying training research project was to identify problems, if any, associated with the ab-initio training of pilots within the Australian civil aviation industry. In 1993, the CAA introduced a new 'Day-VFR' syllabus of training. BASI acknowledges that identified problems may be overcome through the implementation of this new syllabus and that information was not available at the time of this project to determine its impact or effectiveness. The new syllabus has been reviewed in this report and an analysis made based on known problems of the old syllabus. The effectiveness of how the new syllabus addresses these problems is also considered.

The project involved a review of:

- current literature;
- the BASI OASIS database information; and
- specific occurrence investigation information.

1.1 Background

The purpose of flying training was summarised by Braune and Trollip in 1981:

> Training, especially in the area of aviation, should be to provide a skill and knowledge structure that will prove useful to a pilot in processing new information and dealing with novel situations.

In 1985 Buckingham and Wiersteiner saw flight instruction as 'a major factor in the safety and efficiency of aircraft operation'.

In 1987 Termoehlen stated that

> ...in flying training, it is not only a question about picking up theoretical knowledge about aviation and to develop the ability to handle an aeroplane. Another important factor is how the job is performed. Especially in aviation it is not just a question about what you do, but the way that you do it.

By their nature, aviation safety and aviation training cannot be separated. Issues relating to deficiencies in the flying training syllabus are often uncovered too late through accident investigations. It is therefore important that a greater emphasis be placed on teaching the importance of the relationship between aviation safety and training.

The importance of adequate flight training may also be underestimated. In 1988 Kershner made the comment that the flight instructor exerts more influence on flight safety than any other pilot. He asked the question:

> What about the airline captain who flies thousands of passengers every year; doesn't he have more influence than a person that may instruct, at most, thirty people in that time?

He then answered:

> An airline captain doesn't spring fully rated into the left-hand seat; much of his attitude towards flying, and the flying habits he has, are the result of the first few hours of his flight instruction.

Airline training schemes, except for the few that take pilots and train them from ab-initio, turn already qualified pilots into company men and women who, it is hoped, can safely operate their aircraft. This training may modify some of the pilot's thinking, but the basic piloting skills are there from the days of their ab-initio training. The recruitment processes employed by the major airlines include tests to determine a pilot's attitude and suitability for the task ahead. Tests of this nature are seldom used in the selection of flying instructors, and such tests are not prescribed by the CAA.

1.2 A changing environment

O'Hare and Roscoe (1990) reported that although massive advances have taken place in flight simulation technology since the 1940s, as they have in aircraft and systems development, comparable progress has not taken place in the basic training program for pilots or flight instructors. Even a superficial examination of flight training curricula shows syllabi that have changed little from methods used to train pilots in World War 2.

Similarly, although some of the aircraft in service today use advanced systems and construction techniques, the designs of common training aircraft such as those produced by Cessna, Piper and Beechcraft have changed little since the 1950s and 1960s.

In recent years, simulators and personal computer based procedural trainers have been introduced. Although these are a great improvement on the Link Trainer (which is still in use in some places), they are still only available in limited numbers. Significant advances in ground training have been made through the use of audio visual equipment, but syllabus requirements have not changed significantly. This should not be entirely unexpected as the basic skills required to fly an aircraft have not changed.

What should have changed with the advances in educational knowledge and skills are the techniques used by instructors to pass the necessary skills and knowledge to students and to test whether they have assimilated these skills and

knowledge. These techniques, both on the ground and in flight, have, in many areas, made little progress in comparison with the techniques used outside the aviation industry.

1.3 A multi-faceted problem

A major problem in identifying deficiencies in flying training is that there are a number of inter-related areas in which the standard of training may be influenced. For example, deficiencies in the ab-initio syllabus may be a factor leading to an inadequately trained pilot. Similarly, the teaching techniques used by an instructor may also be a factor in a student pilot's limited understanding of concepts being taught. For example, many inexperienced instructors know how to demonstrate, but do not know how to evaluate, and so approach problems from the wrong premise. The deficiencies of the instructor may be a product of an inadequate instructor syllabus.

Adequate defences to ensure that suitable standards are met may not be in place, or may not be working as intended. Tests that assess thinking processes and not manipulative skills alone, may determine if a student has the ability to make timely and appropriate responses. Examinations may not contain suitable material, or sufficient depth of material, and may not be conducted in effective ways. Testing officers (and instructors) may not be given sufficient direction to gauge if syllabus objectives are met.

The above issues may all have profound effects on the standard of pilots graduating from Australian flight training institutions. This report addresses many of these issues.

2. OBJECTIVES

The objective of this project was to evaluate the current status of flying training in Australia, to identify any deficiencies in ab-initio flying training in Australia, and to make recommendations to address the deficiencies.

3. SCOPE

The project considered those facets of flying training that have had a direct effect on the teaching of ab-initio students. To this end, the CAA's 'Day-VFR' syllabus was considered as it provides the syllabus for ab-initio flying training in Australia. Methods of instruction, training of instructors, and guidance given to instructors were also considered as these issues have a direct effect on the standard of pilots graduating from Australian flying training institutions.

4. METHOD

Firstly, the BASI OASIS database was examined in order to provide statistics on flying training accidents in Australia.

Secondly, a literature search was completed on the subject of flying training to identify any relevant work. As some research on flying training, recently completed in Australia, has identified a number of issues, the information collected through that research formed the basis for this BASI project.

The third stage involved completing a brief review and analysis of the CAA's new 'Day-VFR' syllabus.

The fourth stage involved discussions with aviation industry personnel to establish which deficiencies they believed existed in flying training in Australia.

The fifth stage examined deficiencies previously identified to see if they had been overcome through the implementation of the new 'Day-VFR' syllabus.

Finally, conclusions were drawn as to the state of flying training in Australia and the effectiveness of the new 'Day-VFR' syllabus. As a result, a number of recommendations were made.

5. FLYING TRAINING ACCIDENTS IN AUSTRALIA – AUSTRALIAN ACCIDENT STATISTICS

5.1 Overview

During the ten-year period from 1981 to 1990, 10.9% of general aviation accidents in Australia involved flying training operations. This percentage of accidents involving flying training has remained fairly constant over the period.

A breakdown of accidents for the year 1992 is shown below in fig. 1.

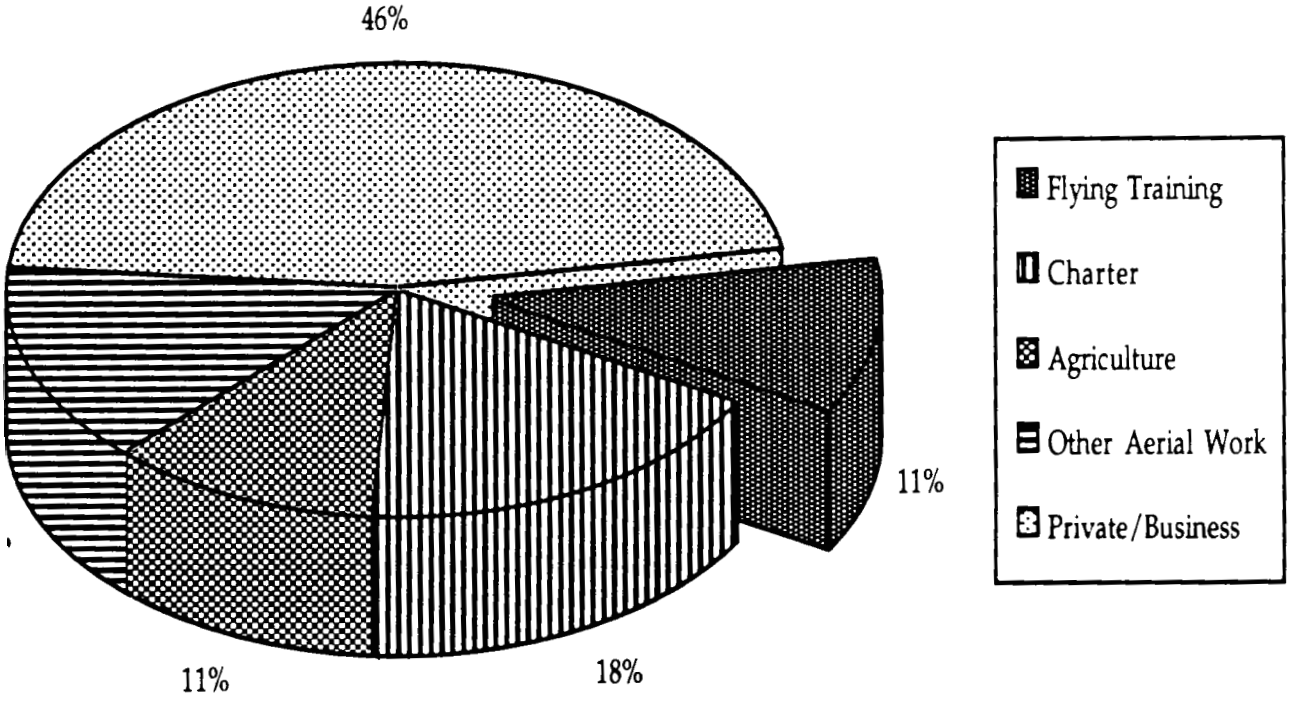

Figure 1 Accidents by category 1992

The percentages in 1991 and 1992 were also unchanged and when the flying training accidents are examined per 100,000 hours, the rates were 6.76 in 1991 and 6.09 in 1992. This is shown in fig. 2.

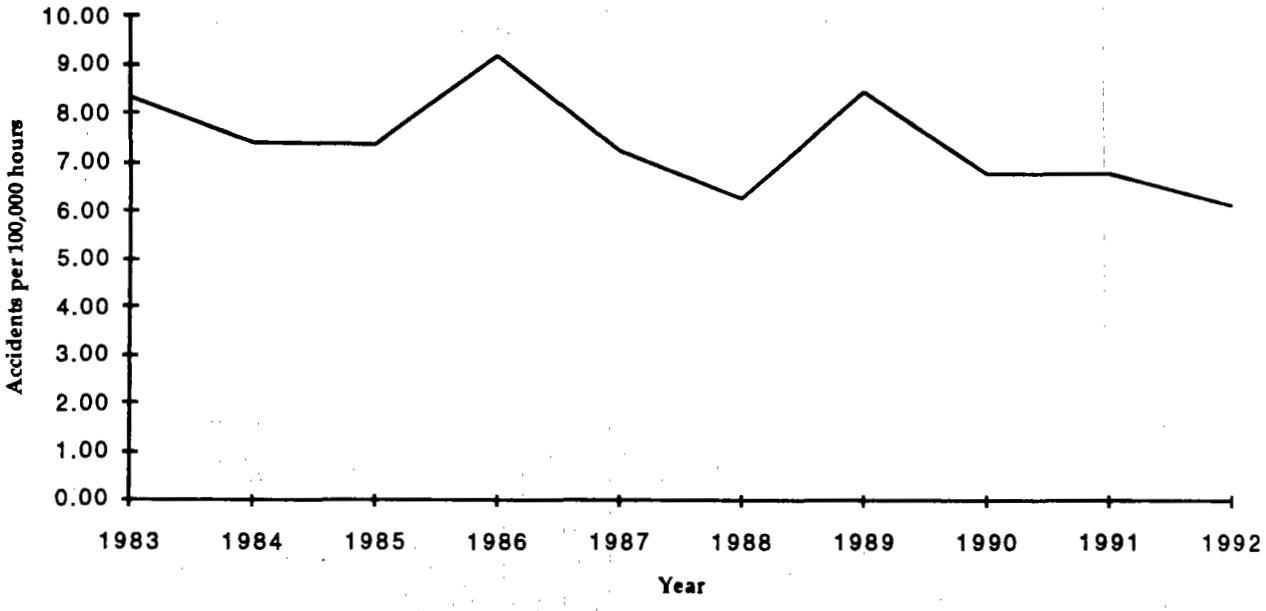

Figure 2 Accidents per 100,000 hours 1983–1992

There was an increase in the number of fatal accidents during the period 1983 and 1992. There were two fatal flying training accidents in 1986, two in 1988, three in 1989, four in 1990, three in 1991 and one in 1992.

Fatal accident rates are shown in fig. 3.

Figure 3 Fatal accidents per 100,000 hours 1983–1992

5.2 BASI air safety occurrence data

The BASI accident and incident database has been examined in detail for the period 1987–1991 when the fatal accident rate was greatest. During the five-year period a total of 1,037 air safety occurrences involving flying training operations were reported to the Bureau. Of these, there were four incidents (0.4%) and no accidents involving regular public transport operations, and 878 incidents (84.6%) and 155 accidents (15%) involving general aviation operations.

The majority of accidents involved either poor approach technique (33%) or loss of control on the ground (25%). Most incidents (78%) involved either poor navigation techniques or improper in-flight procedures which led to the pilot becoming lost or unsure of position. In some instances the pilot then penetrated controlled airspace without a clearance.

5.3 Occurrences involving ab-initio students.

The BASI database does not identify ab-initio students as a "factor" involved in an occurrence. Therefore the database was examined for flying training operations in fixed landing gear aircraft on the assumption that the majority of ab-initio operations are conducted in these types of aircraft. Inspection of the relevant records indicated that there were 619 specific occurrences which were then analysed to determine the more common factors.

5.3.1 Flying training occurrences in fixed landing gear aircraft

Table 1 shows a list of the major factors in flying training *accidents* in fixed landing gear aircraft and helicopters for the period 1987–1991.

Type of Occurrence	Total Number	Number Dual*	Percentage of Total
Misjudged flare to landing, also affected by wind, bounced landing	24	4	33
Loss of control on the ground	18	4	25
Misjudged landing in helicopters (usually practice emergency landing)	10	8	13
Incorrect in-flight procedures	8	8	10
Loss of control during manoeuvres	4	2	5
Premature lift off	4	2	5
Others—one occurrence each	7	2	9
Totals	75	30	100

* Dual = Instructor and student on board the aircraft

Table 1

The accident figures in table 1 show that in 58% of these accidents there was either a misjudged landing or a loss of control on the ground. The figures also show that practice emergency landings in helicopters have a relatively high accident potential.

Table 2 shows the major factor in reported flying training *incidents* in fixed landing gear aircraft and helicopters for the period 1987–1991.

Type of Occurrence	Total Number	Number Dual	% of Total
Unsure of position due to pilot technique, includes penetration of controlled airspace	186	53	34
Incorrect in-flight procedures	161	82	31
Unsure of position due to pilot technique but also related to weather avoidance	64	16	13
Reduced separation in-flight (also includes incorrect procedures and/or unsure of position in some cases)	47	36	7
Incorrect procedures whilst the aircraft was on the ground	29	13	5
Loss of control when the aircraft is on the ground	27	5	5
Pilot misjudged the approach	18	6	3
Reduced separation on the ground (collisions)	7	3	1
Medical problems	5	3	1
Totals	544	217	100

Table 2

'Unsure of position' and 'incorrect in-flight procedures' made up 78% of the reported incidents. These occurrences were reported primarily because the pilot requested assistance, or because there was some other ATS involvement which resulted in the submission of an air safety incident report by an ATS staff member. In the majority of cases the occurrence was not initially reported by the pilot.

In 40% of those occurrences there was an instructor on board. The instructor may have either:

(a) allowed the student to continue in the hope that he would learn from his mistakes; or

(b) been unaware of the problem or became aware too late to take preventative action.

6. LITERATURE REVIEW

A search of the Department of Transport library's database disclosed a considerable body of work relating to the psychological aspects of flying training, particularly in the field of flying instruction. However, there was little information available which discussed the practical problems of ab-initio flying training.

6.1 Flying training and flying instruction

There is an indisputable link between the quality of the instruction given to a student by an instructor and the quality of the pilot produced at the end of that instruction. What is not taught to a student at the ab-initio stage may subsequently be learnt merely through trial and error and bad habits may become ingrained.

Similarly, the most comprehensive syllabus, if taught by an incompetent instructor, may not adequately prepare a student for solo flight. Thus, the quality of ab-initio pilot training must partially rest with the training of instructors.

6.2 Overseas literature and research

Literature reviews of the situation overseas indicate that whilst considerable research has been and is being undertaken, problems remain at the ab-initio level. Roscoe and Bergman (1980) indicated that 'basic research in human learning has had a virtually imperceptible effect on the configuration of either civilian or military pilot training programs despite the lip service it continually receives'.

In 1984, Collins, when writing about the US training system, called for 'the system to be improved by continuous evaluation of what is taught and how'.

In 1985, Kohn, a UK senior aviator and training inspector, reported that 'he (the flight instructor) will find very little if anything...that will help prepare for the problems that he may, indeed will, encounter when dealing with students'.

Other relevant research outside Australia has taken place at Massey University in Palmerston North, New Zealand (Hunt 1992), where a program called Human Resource Development in Aviation (HRDA) has been conducted in conjunction with the NZ Civil Aviation Authority. The HRDA program looked at the ab-initio section of flying training in an endeavour to develop a new syllabus which would provide for more positive results in a shorter period of actual flying times. The new syllabus concentrates on the human performance aspects of flying training. The various stages of ab-initio training have been broken down into individual components. Syllabi, which take advantage of advances in technology and learning techniques are being developed for each component. These individual syllabi are combined to form the complete syllabus. Each individual syllabus includes a standard assessment section including examinable goals.

One outcome of this program is that New Zealand's Civil Aviation Authority now requires that a candidate for all levels of licence in New Zealand must pass examinations in Human Factors.

6.3 Australian literature and research

In Australia, relevant research on ab-initio training incudes Marshall's *Analysis of Pilot Training and Aircraft Accidents in Australian General Aviation* (1991) and Henley's *Problems and Solutions in Flight Instructor Training* (1989).

The research conducted by Marshall and Henley was based on the flying training syllabus before it was changed in 1993. Nevertheless, they both identified a number of deficiencies which may not be addressed by the new 'Day–VFR' syllabus and because of this, their research is considered in detail. It should also be noted that Henley's work was mainly based on the Canadian flying training system, which is purported to be similar to that operating in Australia. It should also be noted that a large portion of Henley's work remains applicable today, as instructor training has remained largely unchanged.

The CAA's 'Flight Instructor Manual' (FIM) (1988) was also relevant to the BASI research project as it provided information on the instructional techniques to be used and the results to be achieved.

A review of the work by Marshall and Henley is provided in paragraphs 6.3.1 'National standards' and 6.3.2 'Instruction and instructors'. Within these

sections, other aspects which directly affect the standard of flight training in Australia are discussed.

6.3.1 National standards

The CAA's program of flying training in the 'Day-VFR' Syllabus aims to deliver a set syllabus in a prescribed way that should ensure national standards are met. Prior to 1993, research identified a markedly different picture (Marshall, 1991). This is reflected in the variety of approaches to training, the lack of a standard instructional manual or text and the lack of uniformity in checking and training. This variety still exists as although the 'Day-VFR' syllabus has changed. The natural progression to flying instruction methodology has not changed.

6.3.1.1 Teaching aids and practices

It appeared to Marshall that there were a wide variety of approaches to training. He found that data suggested significant differences between the CAA's intended teaching practices and observed teaching practices. In addition, the publications failed to provide any guidance to the instructor as to the importance of subjects.

Students reported to Marshall that instructors had a wide variety of topics that were given high priorities. Marshall indicated that the diversity of topics may reflect individual instructor bias despite the instructors being guided by CAA publications as to what should be taught and how to teach it. Marshall concluded that this effectively could mean that two students may well pass a course in flying training, yet have different ideas and different skills depending on their instructor's idea as to what is, or is not, important.

Marshall noted that instructors, after completing an instructors' course, could be expected to implement much of the information and skills gained. Marshall, however, indicated that 'it is apparent that little of the learning theory covered in instructor training courses is taken into account when instructors practice flying instruction'.

Teaching methods used by most flight instructors included the use of formal and informal lesson plans, with 99% of instructors using teaching aids. Marshall noted that the intended use of formal lesson planning and to a lesser extent the use of teaching aids, were both evident in training practice. He also noted that the use of informal lesson planning does not appear to be covered in the FIM or the instructor training syllabus, yet occurred frequently in training.

Both Marshall and Henley found that most instructor training centred on rote learning. The inadequacies of this training principle and a general lack of knowledge of teaching principles were reported by both students and instructors. As Henley (1989) reports: 'Flight instructors generally felt that their training did not equip them with basic teaching skills, such as instructional methods, lesson planning, psychology of learning, adult learning theories, interpersonal and

communication skills, strategies to retain and kindle motivation, evaluation methods and stress management.'

6.3.1.2 Summary

The data available indicates that ab-initio flight training is limited by deficiencies in the syllabus in areas such as the importance and priority of topics and the methods by which they are taught. This was confirmed by instructors having a variety of approaches to training in addition to a wide variety of topics which they considered important. The limited use of learning theories, and different methods of teaching employed by instructors, also contributes to a non-uniform national standard of flight training in Australia.

The above problems may generally be attributed to an inadequate syllabus and a poor standard of instructor training.

6.3.1.3 Use of a standard instructional manual or text

A recurring issue in both BASI research and Marshall's work was that of training being non-standard. Marshall suggested a factor that contributed significantly to this problem was the lack of a standard 'instructional' manual in use amongst instructors. He noted that the FIM was endorsed as the official manual for instructors on which exam and test material was to be based. It was clear to Marshall that the CAA intended that instructors use the manual in their training courses as well as later in their instructional careers.

Marshall noted that an important part of ensuring uniform national standards was the existence of objective statements of the skills and knowledge required. He reported that, because these objectives did not exist in the FIM, in practice instructors must develop their own objectives.

Marshall's results indicate that only 12% of instructors based their training on the FIM and that no students reported their instructors referred to the FIM. Marshall's work quotes other texts, programs and references as the primary sources of information. A further limitation of the FIM identified by Marshall was that it did not give clear direction on the objective of each exercise.

6.3.1.4 Summary

Although the CAA intend that a standard text be used for flight instruction, it appears that a variety of texts are used both as teaching aids and as reference material. This leads to individual instructors pursuing different teaching goals and objectives and does not encourage a uniform standard of ab-initio flight training.

6.3.1.5 Checking and training

Marshall noted that, 'critical to the notion of "uniform national standards" in flying training are the methods of student evaluation. The two areas of student evaluation are: the assessment of skills and knowledge of the student by the instructor and the examination prepared by the CAA. However, it should be noted that neither of these areas of evaluation tests the student to the full extent'.

Marshall found that, although instructor rating courses do include sessions on evaluation, the data collected suggests that there was no uniform national approach. He noted a number of types of evaluations in place among instructors, the most common being practical demonstrations (25%) with only 11% of instructors reporting that they used objective-type evaluations of student performance. This information appeared to be confirmed by 27% of students. In both of Marshall's surveys, larger percentages of students reported that their instructor had their own method of evaluation. It appeared clear to Marshall from the data on evaluation procedures, that flying instructors did not practise a uniform evaluation procedure for their students. He concluded that students will have attained different standards of flying skill and knowledge when they gain their licences.

Marshall noted that examinations appeared to be one means whereby the CAA could control the standards of flying instruction and flying instructors. He thought that serious discrepancies in educational contingencies occurred between the 'instructional methods' courses and the written examinations.

6.3.1.6 Summary

From the discussion above, it can be seen that a number of deficiencies exist in both the methods and types of checking and training used in flying training in Australia. Different standards of pilots may be attained as different methods of evaluation are employed by individual instructors.

Similarly, the number of checks performed by the CAA, the most appropriate body to ensure a national minimal standard is achieved, appears to be insufficient.

6.3.2 Instruction and instructors

6.3.2.1 Training of instructors

Information presented previously in this report showed that instructors rely heavily on rote teaching methods. Such reliance seemingly reflects the quality and type of teaching to which they where subjected during their instructor training.

Both Marshall and Henley noted that flight instructors indicated that their training had been 'rather mechanical or parrot-like' and placed 'a heavy emphasis on rote learning'. Instructors identified an emphasis in their training on a good understanding of aerodynamics and theory of flight, as well as an opportunity to hone personal flying skills, which nevertheless did not prepare them to teach or to recognise student learning problems. Areas such as lesson planning, psychology of learning, and interpersonal and communication skills, were stated as receiving minimal coverage. There was also a need for structured 'aircraft type' training courses for each aircraft type.

Marshall illustrated a deficiency in instructor training by indicating that trainee instructors were often given models of lesson plans and handed a set of notes. The lesson was later demonstrated by a more senior instructor, with no discussion of possible problems or areas which should be emphasised. As one trainee instructor said: 'I can repeat what my instructor told me to say in a lesson, but that does not mean I'm getting the lesson across to the student'.

Instructors' lack of understanding of the psychology of learning was also reflected in comments made by students to Henley and Marshall. In particular students commented on:

(a) the lack of feedback which they received about their performance;

(b) the use of demonstration followed by imitation; and

(c) 'instructor-induced psychological stress' which emanated from the instructor's negative behaviour (shouting, intolerance and unreasonable expectations).

On a more positive note, feedback from students indicated that they generally found their instructors to be competent and skilful pilots.

Marshall noted that efficient teaching required that teachers should be able to recognise where their students were having difficulty in order to help them overcome the difficulty. As the FIM states, the instructor 'must study his pupils, understand them and adapt his methods...accordingly'.

Henley and Marshall both noted that while a component of instructor training was to prepare instructors to become aware of student learning problems, this apparently was not happening in the majority of cases. Consequently, instructors' perceptions of student difficulties were not accurate.

Remedial training may have been based on erroneous beliefs by instructors that students were having difficulty with one aspect of flying when the real difficulty lay elsewhere; e.g. instructors felt students had the most difficulty with landings, whilst students felt least competent with radio procedures.

The situation with regard to instructor training is perhaps best summarised by an observation which was made over 50 years ago but still holds true (Viteles, 1943):

'The actual administration of flight instruction remained, for the most part, in the hands of persons *with interest and experience in flying but little or no experience with methods of training...* There persisted the point of view that any pilot supplied with the program and materials of instructions could teach others to fly. In other words, there remained the belief —to be found also in other industries, and even to some extent in higher institutions of learning—that teaching others is a matter of sixth sense, an 'intuitive faculty' which defies explanation; a 'hunch', appearing spontaneously in the teaching situation, that tells what is the right thing to do at the right time in training others [italics ours].'

6.3.2.2 Summary

The available data shows a deficiency in instructional technique used by instructors. This deficiency has been linked directly to the content of instructors' courses and the actual training of instructors is, in general, taught by rote learning methods, and teaching skills are often acquired through trial and error. The data also shows that the deficiency in instructional skills may lead to instructors gaining an incorrect perception of a student's learning problem. This may lead to instructors not understanding and not being able to adapt the syllabus for individual students to ensure that the learning process is working.

6.3.2.3 Motivation and perceived status of instructors

Viteles (1943) commented that flight instruction tended to be placed in the hands of highly skilled pilots with little teaching experience. Telfer and Briggs (1988) noted: 'There appears to have been a tendency to blur the distinction between a highly skilled pilot and a highly skilled teacher. Because of the unique combination of experience, skill, knowledge and values that make a top pilot, there may still be a tendency to defer to flying ability rather than teaching ability. This is not an argument where one can have the latter without the former: it's a call for parity of esteem. Both are needed for a dynamic aviation industry. Teaching people to fly requires top-level skills in both flying and teaching.'

Apart from the problems associated with an instructor's course and its effectiveness in producing teachers as well as flight instructors, Henley also notes the high cost of learning to instruct and the poor financial rewards which the job brings. As a consequence, few are tempted 'to stay and make flight instruction their career. Many new instructors are there strictly to build time for a more prestigious job with the airlines' (Henley, 1989).

Henley notes that the status of instructors in the aviation industry is often perceived to be low: 'Until the industry offers a parity of social and economic status for the professional flight instructor, this problem is the overriding one.

It affects both the way others see flight instructors; and the way flight instructors see themselves.'

This is despite the important role that instructors play in training tomorrow's airline captains. As Henley points out, 'next to the student, the most important and certainly the most critical person in flight training is the flight instructor'.

Henley concludes: 'The solution to the inadequacy of flight instructor training does not lie in simply adding hours to courses but in providing adequate training and resources to those who train instructors...In the 1990s flight training needs to take advantage of the advances made in related fields, such as educational psychology and adult education. It is imperative that teaching practices and human factors, including psychological stress, no longer be ignored in flight instructor training. Flight instructors must be effective teachers as well as skilful pilots. Once that gap has been filled, we can hope that the quality of flight training as a whole will improve, because the manner in which instructors are taught necessarily reflects on their approach to teaching and on the way they deal with students.'

6.3.2.4 Summary

The data presented above indicates that many instructors may not be properly motivated to effectively teach ab-initio students. Although the instructor may be one of the most important persons in the ab-initio student's development, many instructors instruct purely to 'gain hours' for other flying careers. The economic rewards for instructing do not compare to many other aviation industry jobs. Furthermore, data indicates that instructors are generally not regarded as bona fide teachers by their students. These factors may all lead to the often perceived low status of flight instructors in the aviation industry.

7. CHANGES TO THE FLYING TRAINING SYLLABUS

One of the major changes that has occurred to flying training in Australia recently is the design and implementation of a new 'Day-VFR' syllabus. The new syllabus addresses some of the deficiencies discussed by Marshall and Henley, but still has a number of shortfalls. The following section is a brief overview of the new 'Day-VFR' syllabus. Later sections of this report discuss some of the deficiencies of the new syllabus.

The new 'Day-VFR' syllabus (Aeroplanes) is divided into three major sections. These sections are discussed below.

7.1 Section 1—Overview

Section 1 is divided into four subsections:

1. Introduction;
2. Training administration;
3. Flying training; and
4. Aeronautical knowledge.

Section 1 ('Overview') attempts to give a general overview of requirements laid down by the VFR syllabus. It discusses minimum prerequisites for flight and theory tests, and some of the administrative procedures involved in the processing of licence applications. There are two paths available for candidates to achieve a commercial pilots licence, an integrated 'approved CPL(A) training course of 150 hours' and a '200-hour CPL course'. Both the flying training and aeronautical knowledge assumptions and expectations required from the courses are also discussed briefly in section 1.

Specifically, subsection 2 ('Training administration') provides guidance on the use of flight test proformas, application forms and recording of examination results. Subsection 2.5 also provides a small amount of information on required course structure for both the approved CPL(A) training course and subsection 2.6 covers the 200-hour CPL(A) qualification. Basic information is provided on requirements relating to assessment flights and record keeping to gauge a student's progress.

Subsection 3 ('Flying training') directs the reader towards the flying training syllabus that is found in section 2 of the 'Day-VFR' syllabus, and provides information on the structuring of section 2.

Subsection 4 ('Aeronautical knowledge') directs the reader towards the aeronautical knowledge syllabus that may be found in section 3 of the syllabus. It also provides information on the structuring of section 3.
This subsection also specifically states that:

4.2 In undertaking study in accordance with the aeronautical knowledge syllabus, a student may:

(a) proceed independently using a self-study course;
(b) utilise a correspondence study package;
(c) attend a ground training institution which offers the appropriate course; or
(d) complete the training at a flying training school which offers both flight and theory training to the level required.

7.2 Section 2—Flying training

This section is divided into five subsections:

1. Introduction
2. Performance standards and flight tests;
3. Flying training syllabus;
4. Associated training syllabus; and
5. Flight test proforma.

Section 2 provides information about the practical flying phase of the 'Day-VFR' syllabus. The syllabus divides the flying training into five phases, and provides levels of proficiency to be attained in various aspects of training before each phase is considered complete. Section 2 also requires that a candidate complete a phase of training known as 'Associated training and aeronautical knowledge'. This section requires knowledge of airmanship and the theory behind the operation and safety of aircraft.

More specifically, subsection 2.1 ('Introduction') describes how the flying training section is constructed. Subsection 2.2 ('Performance standards and flight tests') provides a key as to how performance standards are presented later in the flying training section. Proficiency standards range from 1 (has demonstrated a high level of proficiency in conducting the exercise when under pressure) to 4 (has had some training in the exercise but lacks sufficient skill or understanding of the techniques involved for solo operations). Subsection 2.2 also provides a similar key to the associated training and aeronautical knowledge with proficiency standards ranging from A (knowledge considered essential) to C (knowledge is considered to be additional). The final part of the performance standards and flight test section provides minimal guidance on standards required to pass the three flight tests relating to the syllabus—the general flying progress test (GFPT), the PPL flight test, and the CPL flight test.

Subsection 3 ('Flying training syllabus') sets the standards required on different flight sequences prior to various phases of flight training. For example, a candidate is required to have achieved a standard of 3 in the sequence of entry to a climb prior to reaching first solo.
A candidate must reach a standard of 2 in the same sequence prior to attempting a GFPT, and a standard of 1 prior to attempting a CPL test.

Various standards are set for most flight sequences and must be achieved prior to commencing the following phases of training:

(a) first solo;
(b) first area solo;
(c) GFPT;
(d) PPL test; and
(e) CPL test.

Similarly, subsection 4 ('Associated training syllabus') sets standards of 'theoretical' knowledge to be achieved prior to undertaking the above phases of flight training. Addressed in this subsection are topics such as common expressions and abbreviations, flight preparation, radio usage, pre-flight inspection, pre-start considerations and procedures, and other operational aspects.

Although subsection 5 refers to the 'Flight test' proforma, the initial issue of the 'Day VFR' syllabus does not contain guidance on the flight tests.

7.3 Section 3—Aeronautical knowledge training

Section 3 is divided into a number of subsections which detail the theoretical knowledge required to be covered by candidates prior to reaching various phases of their training. The section is divided into subsections such as 'Aircraft general knowledge', 'Flight rules and air law', 'Radio telephony', 'Navigation', and 'Aerodynamics'. These subsections are further divided into two groups: one relating to pre-GFPT and one detailing the post-GFPT requirements. Details of the 'Human performance and limitations' knowledge requirements are also detailed.

The introduction briefly explains how to interpret information contained in the syllabus. It addresses the marking, content and types of (industry) examinations required at various phases of training, as well as the compulsory examinations set and marked by the Civil Aviation Authority.

The final paragraph of this section is significant to the training syllabus:

> 1.5.4 Human Performance and Limitations (Subsection 11) will not be tested in CAA examinations. This subject is to be covered by the student completing, under supervision, a self learning text available from the CAA Publications Centre.

The latter parts of the 'Aeronautical knowledge training' section detail the specific knowledge requirements and related standards of each phase of training. As mentioned previously, the requirements are in two blocks: one which relates to the GFPT and one which details requirements post-GFPT. Examples of the required subjects include, but are not limited to:

- Stating the purpose of components/features such as the carburettor and throttle. The required B-standard prior to GFPT must be known in considerable depth and relates to the efficient and practical operation of an aeroplane. The standard post-GFPT and prior to the CPL flight test requires additional knowledge on the principles of carburetion to a C-standard, but should be known in considerable depth for CPL.

- Extracting/decoding information contained in ERSA, NOTAMs, and AIP supplements.

- Listing the effect of changes in temperature, pressure and humidity on air density.

The final two subsections of the 'Aeronautical knowledge training' section detail recommended pre-study and Human Performance and Limitations requirements. 'Recommended pre-study' details the knowledge of mathematics and physics necessary to meet the aeronautical knowledge objectives of the syllabus. Human Performance and Limitations addresses factors affecting human performance such as fatigue, drugs and health and fitness. There is, however, no requirement to test a candidate's knowledge of either the recommended pre-study or the Human Performance and Limitations subjects. Anecdotal evidence suggests that unless this subject is tested, students will not go to the trouble of obtaining a copy of the appropriate study material, let alone study the subject matter.

The new syllabus allows instructors a large amount of freedom in choosing how and when to teach a subject, requiring that a certain standard of knowledge on a subject be reached at a certain phase. However, the new syllabus lacks guidance material such as a lesson flow chart, a student progress file proforma, and appropriate test proformas for aeronautical knowledge.

8. EFFECTIVENESS OF THE NEW SYLLABUS

This section discusses the effectiveness of the new 'Day-VFR' syllabus in addressing the problems discussed previously. Some new areas of flying training are addressed by the new syllabus; however, there are other areas that remain untouched by the new syllabus.

8.1 General

Since aviation is continually changing with the advance of both technology and the social sciences, the problem of achieving a comprehensive and complete syllabus will never be completely solved. The new syllabus however, does list a substantial number of subjects, both theoretical and practical, and stipulates the required levels of knowledge that must be achieved before students may commence a new phase of their training. This includes a subsection on human performance and limitations which is not examinable.

8.2 National standards

8.2.1 Teaching aids and practices

The new 'Day-VFR' syllabus does not address the problems associated with the use of unrecognised teaching aids and practices. It provides some guidance on required levels of knowledge on a variety of subjects, but does not address the most appropriate ways of teaching these subjects, be they formal, informal, by demonstration, or through the use of aids. Furthermore, the syllabus does not provide logical lesson plans. Instructors are not given guidance on those subjects which are best briefed by formal or informal methods.

The 'flying training' syllabus objectives, which provide guidance to instructors as to the adequacy of a student's skill are written so that the objectives and required standards are subject to the instructor's interpretation. Even the 1-standard is open to a degree of interpretation and is often not tested to its full extent during training.

Additionally, subjects are listed in the new 'Day-VFR' syllabus only in general terms. The syllabus requires that the subject be learnt, but does not expand on the subject matter apart from stating whether the subject is to be known in considerable depth, completely, or as background knowledge.

The syllabus does not provide the instructor or student with any reference to texts or related material that sufficiently covers the required material. The syllabus therefore relies on the instructor having an adequate knowledge of the material being taught, and knowledge of where relevant information is available.

The syllabus provides enough freedom for an instructor to plan, deliver and

evaluate the success of a lesson without using recognised teaching methods. The syllabus assumes that an instructor has had sufficient training and experience to effectively interpret the student's requirements, responses and difficulties. The new 'Day-VFR' syllabus does not address the times or lesson plans required for adequate coverage of each subject. Instead, only standards to be reached are given. This allows instructors and schools to tailor individual courses for students, but it also encourages a further shift away from a uniform national teaching program, methodology or standard.

Because of the freedom of lesson content and teaching methods given to instructors, it is considered that:

1. the problems identified prior to the implementation of the new syllabus regarding the uniformity of teaching aids and practices will still exist;

2. the use of non-recognised instructional methods and the lack of guidelines concerning lesson-plan structure, methods of teaching, and psychology of learning, will contribute to a lack of standardisation of flying training; and

3. instructors will most likely continue to use their own methods of teaching, resulting in students graduating at different skill and knowledge levels, contrary to CAA intended practice.

8.2.3 Use of a standard instructional manual or text

The FIM in its present form is a practical publication in which instructors are given guidance on the actual lesson content and on important points of flying training sequences. A problem that has existed since the introduction of the new 'Day-VFR' syllabus is that the FIM is now outdated. The manual should be re-written to include guidance on when and how subjects should be taught with reference to the "Day-VFR" syllabus. It would also be appropriate if the FIM addressed common faults which might be encountered during student training.

8.2.4 Checking and training

The new "Day-VFR" syllabus covers both the assessment of skills and knowledge of the student by the instructor and the examinations prepared by the CAA.

The new syllabus lists objective type statements on skill and knowledge levels that a student is required to reach at various phases of their training. However it does not specify the appropriate level of knowledge for individual subjects, or

the skills required in individual sequences. Instructors may therefore interpret skill and knowledge levels differently, allowing a number of different standards of teaching and assessment to occur.

An additional problem introduced by the new syllabus involves the industry examinations that students must complete throughout their training. The syllabus requires that a number of examinations be set and marked by members of industry, as well as some that are set and marked by the CAA. There are three theory examinations that the syllabus requires candidates to sit and pass. These examinations are the basic aeronautical knowledge (BAK) examination, set and administered by the industry, and the CAA PPL(A) and CAA CPL(A) examinations. Because of the limited guidance given by the syllabus on the content of industry type examinations, it is quite possible that the CAA-administered examinations are the only ones in which a common standard exists throughout Australia.

Finally, the adequacy of instructors to perform assessments on students' progress throughout their training or in various sequences of flight is not addressed by the new 'Day-VFR' syllabus. Other regulations ensure that supervision by a more senior instructor is available for inexperienced instructors teaching ab-initio students. Some 'in-flight' training sequences cannot be completed by junior instructors.

8.3 Instruction and instructors

8.3.1 Training of instructors

The training adequacy of instructors is not addressed within the new syllabus. The syllabus of training leading to the issue of an instructor rating may be found in CAO 40.1.7 and its related appendices. As the training syllabus for instructor ratings has not changed dramatically in the past few years, it could also reasonably be expected that the methods of rote learning are still in existence. CAO 40.1.7, appendix I, part 2.2 details the minimal ground training that is to be completed as part of a grade-3 instructor rating. Subjects such as learning theory, instructional techniques, aids to instruction, behavioural objectives and lesson planning, are some of the subjects that are required to be covered within a course of at least 12 hours duration.

A test to determine the instructor's level of knowledge in this subject is no longer required for grade-3 instructors. Grade-1 instructors are required by CAO 40.1.7, appendix II to pass a written examination in teaching and learning principles.

8.3.2 Motivation and perceived status of instructors

Anecdotal evidence suggests that the problems relating to the motivation and status of instructors still exist. These problems are mostly due to industrial issues, but they may indirectly affect the way instructors present themselves and their lessons.

Industrial issues relating to awards and payment for instructing are some of the more significant concerns that affect the motivation and status of instructors. Many junior instructors, because of the limited financial rewards associated with instructing, are forced to take full- or part-time jobs away from aviation. Some instructors have indicated to BASI that they instruct during the day and do shift work until late at night, which could imply that instructors may not be functioning to their full capability when instructing. While the practice shows that an instructor has dedication and motivation towards flying, it also shows that the system in which instructors operate, and the financial rewards received, are not suitable.

Anecdotal evidence also suggests that many instructors instruct for the sake of 'building hours', and not because they wish to make instructing a career. Many still see their jobs as a stepping stone to the 'more glamorous' and higher paying airline jobs.

9. FLYING TRAINING—THE AUSTRALIAN EXPERIENCE

9.1 General

In Australia, tertiary institutions have introduced aviation courses with some theoretical training provided on the same basis as the training for other professions. BASI discussions with some of these institutions have shown that, whilst the flying component and issue of a pilots licence must comply with CAA regulations, the majority of these courses are conducted to a syllabus and standard set by the tertiary institutions. Such courses may lead to a Bachelor of Science specialising in aviation and include aviation-related subjects such as aviation management and psychology.

Many comments made to BASI by these institutions related to the small amount of input that the CAA has had in the syllabus that must be completed prior to the issue of a pilot's licence. This part of these courses must be completed to the CAA's minimum standards at least. Students must fulfil requirements of the 'Day-VFR' syllabus, or an equivalent approved syllabus, in order to be issued with a pilot's licence. Usually the gaining of an Australian pilot's licence then forms part of the requirement for the tertiary institution's certificate, diploma or degree. Comments were made that the CAA was prepared to answer questions put to it concerning the ground syllabus, although it had not been involved in the detailed syllabus.

The impression given to BASI was that these institutions would like more guidance from the CAA on flying training in general, and that the new 'Day-VFR' syllabus was not successful in providing this guidance.

Other flying schools not associated with tertiary institutions were also asked to comment on the new syllabus. Discussions between BASI and these flying schools revealed that, while many schools believed that the new syllabus was an improvement on the pre-1993 syllabus, deficiencies existed in areas such as standardisation and syllabus content. Many complained of the lack of reference texts and the lack of guidance provided by the 'Day-VFR' syllabus. This perceived lack of guidance often stemmed directly from the lack of specific direction in the 'Day-VFR' syllabus. For example, comment from one school related to the inability of many pilots to arrange and maintain traffic separation from other aircraft. One might expect to find a requirement relating to this in the syllabus, but there is no mention of the subject in specific terms, or even under a more general heading such as airmanship. The decision whether to teach such practical considerations is left to the instructor.

The largest area of concern discussed with BASI relates to the standard of instruction provided by instructors and the content of courses offered by training institutions. BASI has received letters addressing the general standard of flight training in Australia. Comments have been received on the difficulty in finding an organisation that is able to determine the type and amount of training

required to meet individual customer requirements. This can be shown to be a deficiency in the syllabus as well as a deficiency in the ability of instructors to monitor a student's progress and hence the instructor's ability to instruct. This was found to be an industry-wide problem, as were the perceived conflicting standards in both instruction and testing.

Industry discussion indicates that often the most junior or the least experienced instructors are teaching ab-initio students. While deficiencies in the syllabus may be overcome through experience, the inexperience of more junior instructors will tend to highlight the deficiencies of the syllabus. Deficiencies will be even more noticeable if the instructors do not use proper teaching methods or neglect to acquire effective instructor training.

9.2 The effect of the 1989 airline pilots' dispute in Australia

The 1989 pilots' dispute may have had an effect on the flying training industry in Australia. There has been a natural progression for pilots from ab-initio training through general aviation, the charter operators and regional airlines, to the two major domestic airlines. The pilots' experience levels and knowledge increased progressively as they moved through each level of operation.

Following the airline pilots' dispute the operators began to hire new flight crews both within Australia and overseas. The result was that in a short time period a significant number of the more experienced general aviation pilots moved into the domestic airlines. In general terms, the vacancies in the GA were filled by less-experienced GA pilots. The same applied to training positions. Many of the instructors moved up to fly with the charter and low-capacity RPT operators. Their positions were filled by less-experienced instructors. This discontinuity in the normal advancement process for commercial pilots has taken several years to be addressed. Only now are the instructors who were trained subsequent to the pilots' dispute achieving significant experience levels.

> The instructor and student were on a NVMC navigational exercise. During the flight it was decided to conduct a touch-and-go landing on the Narrogin airstrip. Whilst in the climb after the landing, the engine began to run rough. The instructor took control of the aircraft after an initial assessment of the engine problem, but the aircraft hit a tree before he could take any further action. The instructor elected to return to Jandakot after hitting the tree. Subsequent ground inspection of the aircraft revealed a damaged left-wing leading edge and damaged HF antenna. BASI Occurrence No. 9402050.

9.3 The economic effects

There is anecdotal evidence that some previously well-established organisations have suffered from a lack of students and are being forced to offer package deals which are based on the minimum number of flying hours required by the Civil Aviation Authority. Previously the student could receive additional training as required at a cost to the student. These 'packaged deals' impose an incentive on the training organisation to complete the training in the minimum number of hours.

Either the training organisation accepts additional flying hours at no additional cost to the student or it graduates the student at a lower level of skill than might otherwise have been the case. Other organisations that do not offer such packages are still being forced by the competition to reduce the hours of training. Furthermore, the introduction of a new syllabus during the recession may have imposed an even greater burden on many establishments to 'cut corners' and use the grey areas of the new syllabus to maximum economic advantage.

> The student pilot was instructed to follow the river at 100 ft AGL. Both the instructor and student failed to see the powerlines prior to the strike. The aircraft plunged into the river in a nose-down attitude. The wire and poles were obscured by trees. BASI Occurrence No. 8803440.

9.4 Comparison with USA

Since the introduction of the new 'Day-VFR' syllabus, training requirements in Australia have been brought closer to those required in the USA. The result has been that the experience level of pilots trained under the new syllabus is below that of pilots trained under the old syllabus. In 1992 the minimum training requirements for a restricted private licence (now a GFPT student licence with passenger-carrying privileges) was reduced from approximately 33 hours to 20 hours and includes five hours of solo flying. The hours required for a full private licence have fallen from 57 to 40. The 40 hours can also include five hours in a simulator.

A study in the USA published by Amy Laboda (aviation journalist) in the October 1991 issue of *Flying* indicates that it takes an average of 72 hours for students to pass the private-licence test, although some complete it in 40–50 hours. The article points out that the FAA determined back in 1947 that it should take a pilot 40 hours of flight time, plus ground study, to pass the test. The FAA developed these minima for students flying a basic aeroplane across country, with few if any electronic navigation or communication aids, and without the modern-day complexities of operation and airspace.

10. CONCLUSIONS

10.1 In recent years the Australian flying training industry has been through a number of changes including the introduction of the CAA 'Day-VFR' syllabus and reductions in the minimum number of hours to complete training.

10.2 A review of the accidents statistics showed that the rate of flying training accidents has remained relatively unchanged at around 7 per 100 000 hours.

10.3 The predominate factors in flying training accidents were "misjudged flare and landing" and "loss of control on the ground". Unsure of "position and incorrect in flight procedures " were factors in 78% of incidents.

10.4 Studies by Henley (1989) and Marshall (1991) concluded that ab-initio flight training was limited by deficiencies in the syllabus, that training was non-standard and a variety of texts were used as reference material.

10.5 Instructional techniques used by instructors are not always effective. The training of instructors is often inadequate in the areas of theory-of-learning and student interaction.

10.6 Instructors may not be totally motivated as often they use flying training as a means of gaining hours towards a career in the airlines.

10.7 A number of conclusions can be drawn in relation to the new CAA 'Day-VFR' syllabus and the problems associated with flying training.

The new 'Day-VFR' syllabus, whilst listing a comprehensive range of subjects that are to be completed during flying training, is not specific on the actual content of courses, important aspects within each subject, or the order in which the subjects should be taught.

The new 'Day-VFR' syllabus does not provide for, or require that, specific reference texts or standard manuals be used in conjunction with the syllabus. This applies to both students and instructors. In addition, the FIM now appears to be an outdated publication.

The syllabus, for a number of reasons listed in this review, does not encourage or promote a uniform national standard in either assessment or training. Whilst the new syllabus attempts to give guidance on expected behavioural standards, it does so in a way that is open to interpretation by individual instructors. This does not encourage a uniform standard of student performance. In addition, the lack of guidance on reference material, as well as a now outdated 'preferred' reference text, does not

encourage instructors to teach lessons out of a standard text, nor will it encourage instructors to aim towards achieving a minimum common standard amongst students.

The syllabus will allow instructors a large amount of freedom on how and when theory subjects and flight exercises are to be taught. One problem evident in the old syllabus that will continue to be evident from the new one involves students being taught only what instructors deem necessary (or know). No records are required to be kept to show adequate completion of exercises.

The syllabus does not promote the use of recognised teaching methods or aids, but gives freedom for instructors to teach students however they feel fit, as long as a required standard is reached before various phases of training are completed. Although this allows courses to be tailored to individual students, it relies on the instructors having sound teaching and assessment skills (and hence sound initial training), and instructors interpreting the standards that have been set in a similar way.

The 'Day-VFR' syllabus has allowed industry to 'set' many of the checking and training standards itself. It allows employers to assess employees for adequacy of operations and knowledge, and instructors to assess students whilst allowing employers and instructors to interpret the guidelines. There are no proformas from which assessment guidance may be obtained.

Although there is provision for the student to cover human performance and limitation theory, there is no provision for the testing of the student's knowledge on this aspect of aviation at any stage during a student's training. Additionally, the syllabus allows a student to gain the ground-based knowledge from methods such as self-study and correspondence. These methods do not ensure that subjects deemed critical to flight safety are presented as such, especially when guidance on assessment methods is inadequate.

There is evidence that some instruction is of a low standard as a result of an inadequate training system for instructors. The inadequacy of the instructor syllabus includes:

(i) the lack of use and recognition of teaching and learning principles;
(ii) the instruction and testing of new instructors by people from within the same organisation;
(iii) the poor economic status of flight instruction; and
(iv) the lack of general flying experience of many newly employed grade-3 instructors.

Deficiencies in the training syllabus may not be recognised as inexperienced instructors are often involved in teaching ab-initio students.

11. RECOMMENDATIONS

Recommendations dealing with those areas of flying training (and particularly the new syllabus) that are considered to be inadequate, are presented below.

It is recommended that the Civil Aviation Safety Authority:

11.1 Develop a better standardisation system, including the assessment of students and instructors, to ensure a minimum standard of skill and knowledge is set out clearly and concisely. The system should include guidelines which are less prone to variance of interpretation.

11.2 Conduct a review of instructor training and teaching methods to ensure that instructors are suitably qualified to teach students. The review should attempt to standardise teaching methods so that there is more consistent and better quality instruction throughout all phases of a student's training. Instructors should be encouraged to use proven teaching methods.

11.3 Revise the 'Day-VFR' syllabus to include more guidance on lesson planning, ordering and priorities of subjects within the syllabus, methods of teaching subjects and ways of integrating the flight and ground syllabus to ensure effective learning by the student.

11.4 Review 'industry type examinations' to ensure a national standard exists and that minimum standards are being met.

11.5 Review policy on the testing of human performance and limitations and expedite the integration of this area into all facets and levels of flying training.

11.6 Review, and where necessary revise, the Flight Instructor Manual to draw it into line with the new syllabus, or alternatively, adopt a new text as the primary reference source in lesson planning, content and conduct.

11.7 Provide industry with more guidance on the appropriate texts and reference materials that may be used in conjunction with the 'Day-VFR' syllabus.

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