## MAKING SENSE MANUALS

Ever tried to determine from your owner's manual what your takeoff distance will be, from a field at 6,748 feet msl, when the temperature is 74°F and your aircraft is 293 pounds under maximum gross weight?

If your plane has an owner's manual typical of most offered with light aircraft, it will be next to impossible to come up with an answer that is much more than a studied guess. In the evolution of owners' manuals, simplicity has generally transcended usefulness, and tradition has precluded organization.

These conclusions are among those reached by organizations that have studied the problem and now recommend a complete overhaul and standardization of all flight manuals.

The General Aviation Manufacturers Association (GAMA) recently circulated a fat guide to suggest how to go about making up a "pilot's operating handbook." GAMA is an organization made up of the manufacturers of most noncommercial aircraft and their primary components.

GAMA's guide, a draft version not binding on any of the association's members, comes after two years of deliberation, study, and consultation with other aviation groups.

A major contribution to the final report came from an analysis sponsored by the AOPA Air Safety Foundation. In that report the foundation, in conjunction with aviation consultant Robert W. Goldin, concluded that current owners' manuals exhibit a "confusing lack of consistency in contents/format and scope of data." The study noted, too, that manuals for aircraft under 6,000 pounds are "generally deficient in data content."

To digress for a moment, there are several different terms for the manual found in airplanes. Most commonly, the book will be called an "owner's manual." FAA specifies in Part 23 of its regulations that aircraft must come equipped with "airplane flight manuals." And GAMA's latest study calls for standardization of the same information in a book called the "pilot's operating handbook."

Technically, there is a big difference between an "owner's manual" and a "flight manual." A flight manual, containing information required in FAR Part 23, must be approved by the FAA. Owners' manuals, though they may have much of the same material, are not FAA-approved.

Part 23 allows (for aircraft of 6,000 pounds or less) required information to be presented "in any combination of manual, markings, or placards." The regulation also allows manufacturers to provide "additional information" (not specified in the reg) "that is required for safe operation ..."

Under this provision aircraft manufacturers can publish owners' manuals not requiring approval of the FAA. The approved "flight manual" is frequently tucked away by the owner in a seat-back pocket or file folder.

The AOPA study called for clarification of the ambiguity between an "FAAapproved flight manual, which receives little use, and the owner's manual, which is truly the pilot's workhorse flight manual." These documents should be combined, suggested the study, and identified as the one and only flight manual. "The term 'owner's manual' is best reserved for automobiles, which usually are driven almost exclusively by the owner, and [manuals for] which are seldom used," the report pointed out.

In the AOPA analysis of owners' manuals, it was found that the "widest and most serious disparities, omissions, and inconsistencies exist in the treatment of performance data."

continued

## EVERY AIRCRAFT MANUAL IS DIFFERENT - IN STYLE, ARRANGEMENT, CONTENT,

## MANUALS continued

An examination of five aircraft manuals showed some of them to be totally deficient in providing performance data at various weights and density altitudes. The study reported that a few manuals, when discussing takeoffs and landings, ignored the effects of wind, runway grade, and runway condition. Angle and rate of climb, the AOPA study determined, "are generally treated sparingly." And the study found that "none of the manuals provide explicit definitions and clarification of absolute ceiling, service ceiling, and the concept of cruising ceiling, with its associated implications of a maximum altitude for safe takeoff and climbout

Bernard A. Geier, chief of FAA's General Aviation Operations Branch, explained how some of these deficiencies have arisen. Owners' manuals, he said, "have been traditionally the responsibility of the sales and marketing departments of the manufacturers, and are more a sales and promotion gimmick than a performance guide."

Since aircraft under 6,000 pounds have not been subject to the stringent performance standards applied to heavier aircraft, and since manufacturers are not required (for light aircraft) to produce an FAA approved aircraft flight manual, the owner's manual evolved into a "selling tool."

On occasion, Geier said, the aircraft manuals would minimize operational characteristics that did not compare favorably with competitive aircraft. Or, by varying definitions, some performance figures could be "stretched."

Geier, who was among several FAA officials working with GAMA on the manual standardization project, was pleased to see the project taking place. "It's important to clarify what a manual has to have and what must be listed."

GAMA President Edward W. Stimpson said in a cover letter with the draft manual specifications that GAMA's object is "to make handbooks more useful to the pilot by establishing uniformity in arrangement, content and, most significantly, specifications."

Some of the key features of the proposal are:

1. Standard definitions to be used in all aircraft handbooks.

2. Standard performance data, whether shown in graphic or table format. 3. Standard weight and balance definitions and information.

4. The consistent use of knots when discussing airspeed, instead of statute miles per hour.

5. Use of indicated airspeed instead of calibrated airspeed, where permitted by FAA regulations.

A consultant to GAMA on the project is former FAA Deputy Administrator David Thomas. Although the draft manual specifications are still out for comments, Thomas said the initial reactions to the GAMA study are "pretty complimentary."

The proposed rearrangement of handbooks will place aircraft limitations and emergency procedures in the second and third chapters. This arrangement, said Thomas, will make such essential information easier to find and more accessible for the pilot in flight. And the standardized placement of similar information in each aircraft manual will permit more effective transition when a pilot moves from one aircraft to another. Thomas said there had been several significant disagreements among the planners of the proposed handbook. One centered on whether to use knots or miles per hour. "There was a lot of argument," said Thomas, "but I think we've [the industry] grown up enough to settle on one."

There was also debate on whether operating handbooks should be looseleaf or bound. Supporters of looseleaf books said they would be easier to revise. Supporters of the bound book pointed out that it would always be together and there would be no lost pages.

and there would be no lost pages. "We took the easy way out," explained Thomas. The final draft says, "At the discretion of the manufacturer, the handbook may either be prepared in looseleaf form . . . or in a permanently bound form."

No aircraft handbooks have yet been printed in GAMA's proposed format. But



## AND DEFINITIONS. NOW AVIATION GROUPS ARE PUSHING FOR CONSISTENCY

Cessna has prepared mockups of handbooks for its Model 402 and Model 172 aircraft. The mockups are being analyzed by GAMA to help assess the results of the GAMA recommendations.

GAMA points out that the draft specification "contains little, if any, new material or novel approaches." It is solely a standardization guide that is intended to apply to "all types of general aviation airplanes, ranging from simple two-place trainers to complex and sophisticated business jets."

Comments on the draft, including reaction from AOPA, were due June 1. GAMA will consider the comments and make changes where necessary. Eventually, the specifications will come out as official guidance from GAMA, although use of its suggestions will be voluntary.

During this same period of time, FAA is rewriting Part 23 of the Federal Aviation Regulations. It is this part that prescribes certification standards for aircraft and includes details concerning airplane flight manuals, markings, and placards.

Paul D. Wilburn, assistant chief of FAA's Flight Test Branch, says the new regulation will, among other things, require aircraft flight manuals for all aircraft—including those under 6,000 pounds. Details of the proposed revisions are not yet available and will not be officially released until later this year. The new regulations probably will not take effect until early 1976, Wilburn said.

Several specific changes called for by GAMA might surprise pilots familiar only with the owners' manuals now supplied with light aircraft.

For one thing, all manuals will have a "revision service." If, after the manual is printed, the manufacturer determines that information in the manual should be revised, new pages would be sent to replace outdated pages in the manual. In addition, a "log of revisions page" would be included in the operating



handbook to help the pilot keep track of the changes in the book.

The proposed new handbook would have staggered, plasticized thumb tabs to allow quick reference to any of the 10 proposed handbook sections.

GAMA's proposals call for clear diagrams and schematics to explain systems of the aircraft. "Legends shall be spelled out rather than abbreviated," says the proposal, and "each symbol shall physically resemble the actual system component depicted in the schematic diagram." In addition, use of color printing is permissible.

Many details are standardized in the proposal. For instance, range figures are to include fuel necessary for taxi, takeoff and climb to altitude, descent, and possible diversion to an alternate airport. Up to now, no such clarifications have been made standard in handbooks.

Derived terms, such as "density altitude," will not be used in the new handbooks. Instead, pilots will be presented charts and tables with raw information—in this case, pressure altitude and temperature.

A section on handling, servicing, and maintenance will be standard in the proposed handbooks. Included will be information on FAA-required and manufacturer-suggested inspection periods, preventive maintenance that can be accomplished by a certificated pilot, ground-handling procedures, service and maintenance details for all systems, and cleaning and care procedures for both exterior and interior finishes of the aircraft.

GAMA proposes a new concluding section in the handbook: safety tips. "GAMA will prepare a chapter on safety tips that would be applicable to all aircraft and which could be included if desired by each manufacturer," says the draft specification.

Detailed instructions to pilots on how to bring single-engine aircraft out of spins are also suggested for inclusion in aircraft handbooks. The proper spin recovery procedure would be in the "emergency" section of the book for normal-category planes, and in the "normal procedures" section for aerobatic aircraft. Recovery techniques for twins could be included "at the option of the manufacturer."

GAMA President Stimpson characterizes his organization's proposals as an "important first step." But the ultimate judges of the revised handbooks will be the pilots who use them.