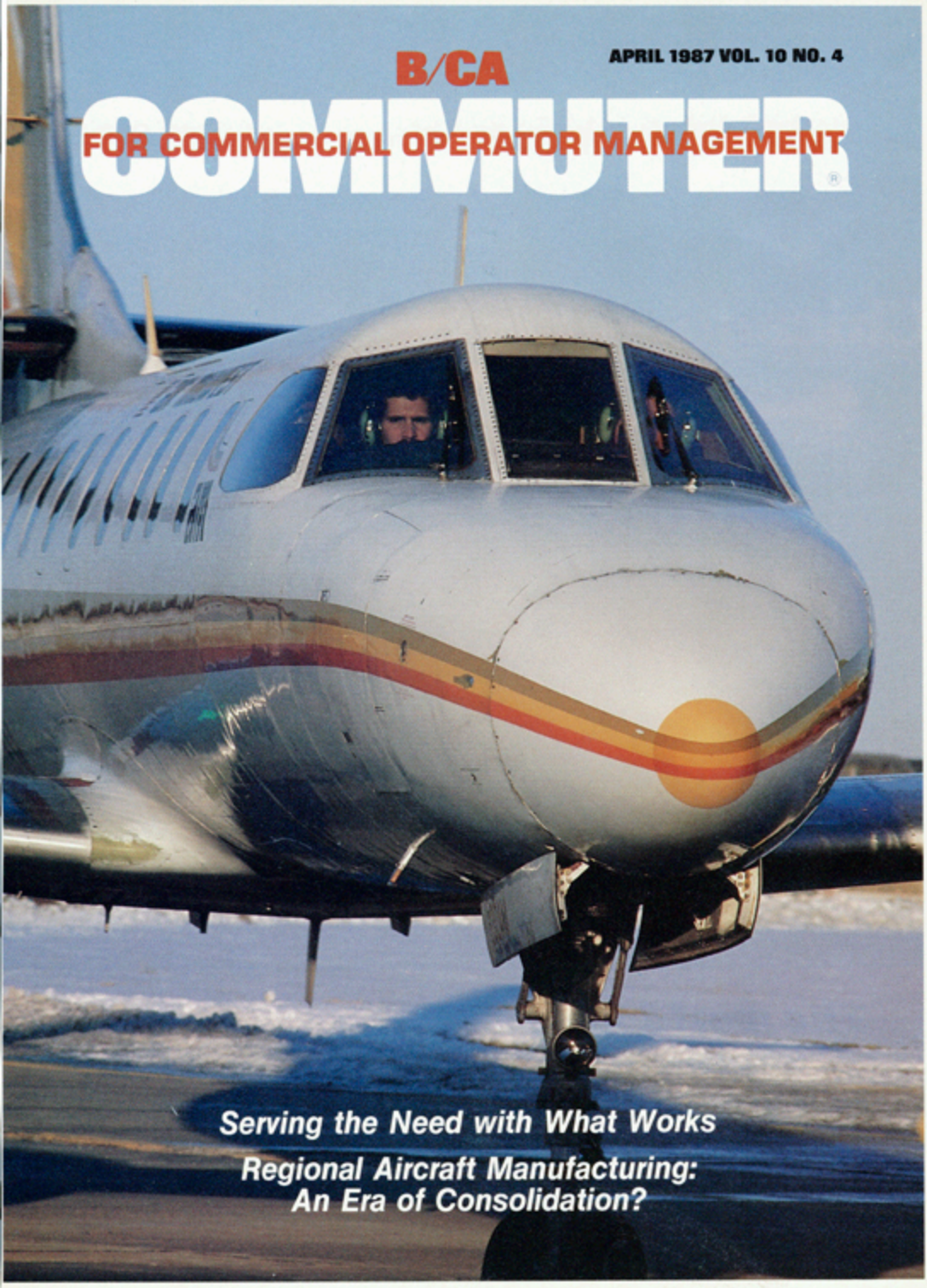
APRIL 1987 VOL. 10 NO. 4

B/CA COMMUTER®

FOR COMMERCIAL OPERATOR MANAGEMENT



Serving the Need with What Works

Regional Aircraft Manufacturing: An Era of Consolidation?

1987 Helicopters

The twin-turbine Bell 222 is one of the few helicopters that customers may select with either a retractable landing gear or skids, as shown here on the 222UT.

Enstrom's 280FX, powered by a six-cylinder Lycoming HIO-360-F1AD, offers potential customers an alternative to the costs of turbine-powered helicopters.

While the Lycoming-powered AS 350D continues to be offered, Aerospatiale is now marketing its Turbomeca-powered version in the United States.

Paul L. Shultz, recently retired vice president of sales and service at Enstrom in Menominee, Michigan, estimated that 65 to 75 percent of what he termed "viable prospects" for his firm's 1986 products decided against purchases on the basis of insurance rates alone. Kevin Hynes, vice president of Hynes Aviation in Frederick, Oklahoma added that numerous insurance agencies contacted by his firm simply refuse to write policies for low-time pilots. However, Larry Brooks of Schweizer Aircraft in Elmira, New York sees a positive aspect to the insurance situation: Coupled with the weak U.S. dollar, he believes that it may be helping to stimulate expanded international sales.

Virtually everyone agreed, though, that the most pressing problem to be addressed is that of product liability. Unless that issue is resolved in a timely manner, in the opinion of Frank Robinson, president of Culver City, California-based Robinson Helicopter, it could be a death knell for U.S. leadership in the entire aviation industry. "We have seen increasingly strong interest in helicopter manufacturing on the part of overseas companies whose courts are more realistic about product liability," he claimed. "There is imminent risk that companies in Europe and Japan may gain dominance in this area that has contributed substantially to our country's foreign trade balance." The feeling in the rotorcraft industry is that product liability problems will be solved only by tort-reform legislation at the federal and state levels.

With regard to public-education programs to improve communities' acceptance of helicopters, several manufacturers acknowledged a responsibility to do more to overcome safety concerns and objectionable noise, as well as to help promote development of more public-use heliports in areas where they are most sorely needed. Robinson commented that to achieve an effective heliport program probably will require development of standards for two or more different categories of facilities, based on size and noise emission.

Like the industry's fixed-wing segment, helicopter builders recognize that they are faced with complex challenges. What is sustaining rotorcraft manufacturers in these troubled times is an apparent confidence that the civil sector of the industry ultimately will inherit the fruits of technology evolving from defense-related programs.

1987 Helicopters

As one of the first twin-turbine helicopters designed for civil use, the MBB BO 105 has found various roles, including emergency medical services.

U.S.-Manufactured Civil Helicopters
New Unit Deliveries: 1977-1986

Year	Domestic	Export	Value ($ Million)	Average Unit Cost
1977	527	321	$251	$ 295,990
1978	536	368	328	362,830
1979	560	459	403	395,485
1980	841	525	656	480,235
1981	619	453	597	556,900
1982	333	254	365	621,805
1983	171	232	303	751,860
1984	142	234	330	877,660
1985	166	210	505	1,343,085
1986*	41	260	273	906,975

*Preliminary report, Aerospace Industries Association of America

Although not regarded as a major cause for declining civil rotorcraft sales by U.S. manufacturers, some correlation can be noted above in price and numbers of units delivered annually. Of greater significance is the trend toward proportionately greater activity in the international marketplace.

funded activity do not portend immediate benefits to the civil segment, though.

David O. Smith, president of MBB Helicopter Corporation, in West Chester, Pennsylvania, pointed out that because of the depressed state of commercial rotorcraft sales, manufacturers have turned their attention to military programs as a tactic of business survival. "Needed resources therefore have been diverted away from solving commercial problems," he contended.

Agusta spokesman Marco Cicero indicated that the preoccupation of larger U.S. manufacturers with military contract activity may present a positive aspect for companies like his that focus their North American marketing program specifically on civil rotorcraft needs. Although Agusta expects the demand for executive-configured rotorcraft to remain depressed until the overall economy improves, it discerns opportunities for further market exploitation in law enforcement, firefighting and "drug-busting" applications.

Several others concurred that any technical advances incorporated into commercial helicopters will have to proceed from military developments and that, conservatively, the civil segment should not expect to see "new generation" equipment on the market before the mid-1990s.

In the meantime, most companies indicated that product improvement measures to enhance reliability and reduce operating costs may be adapted to present-day designs (which reflect 15 to 20 years of maturation) when they evolve from military R&D efforts.

The consensus regarding the broad outlook for the helicopter industry during the coming year is that problems will continue to include: the dampening effects of the oil situation; product liability; insurance rates and experience requirements; noise and public acceptance of rotorcraft operations in urban areas; the glut of idle equipment in the market; and lack of an infrastructure (heliports, ground-support systems, discrete IFR routes, etc.) to effectively support broader use of helicopters.

For turbine helicopter manufacturers particularly, the depression in the domestic energy field is the most devastating problem, according to Gainor Lindsey, Bell Helicopter senior vice president for commercial business. "The energy market traditionally accounted for 40 to 45 percent of new-unit production and one half to two thirds of annual revenues," he disclosed. Today, that market not only is dormant (other than for modest levels of fleet modernization replacement units); it has become a major competitor for other markets with its excess of equipment.

Manufacturers of piston rotorcraft believe that the inflated costs of hull and liability insurance coverage (apparently unrelated to actual loss experience, many contend) have become a major impediment not only to equipment sales, but to flight training activity. Commercial operators previously specializing in training have withdrawn on such a large scale that some manufacturers have instituted their own full-scale programs to fill the training void.

L. to r.: (Top) 34th St. Heliport, N.Y.; Damin Aviation, Weehawken, N.J. (Mid.) West Side Heliport, N.Y.; Univ. of Chicago Medical Center's helipad. Battery Park Heliport, N.Y.; DEC's helipad in Ma.

Introduction 1987 Helicopters

The posture of the civil rotorcraft industry in the United States over the past year perhaps was summed up best by William L. Brown, McDonnell Douglas Helicopter Company president, who characterized it as one of exerting "energy and imagination against the grain of a static market."

That description was as appropriate for commercial and business users of helicopters as it was for the manufacturing segment of the industry. And emerging from a year that saw the fewest new civil units delivered since at least 1960—according to U.S. Department of Commerce and Aerospace Industries Association of America (AIA) statistics—there were few prospects for a much brighter outlook during the coming year.

As spokespersons for several helicopter manufacturers noted, equipment suppliers essentially have resigned themselves (at least for the near term) to continued flat or only marginally increased activity in the civil marketplace. Bell Helicopter Textron—which has relocated its 206B JetRanger and 206L LongRanger production lines from Fort Worth to facilities owned jointly with the Canadian government near Montreal—foresees no increase in new-unit deliveries in 1987 over those of 1986. McDonnell Douglas Helicopters, which last fall transferred its MD 500E/530F production from Culver City, California to Mesa, Arizona, anticipates at best a four-percent rise in new civil helicopter deliveries during the year.

Among overseas firms that assemble and market products in North America, Aerospatiale reportedly is the most optimistic, budgeting for a 1987 upturn in deliveries ranging from 10 to 15 percent over those of 1985 and 1986. MBB, conversely, expects its 1987 delivery figures only to equal, or perhaps even to decline slightly, from those of 1986. Agusta, which reported six new unit deliveries and 22 lease contracts in North America during 1986, expects little change in market climate this year, although it has set a goal of delivering eight or more new units this year.

1987 Helicopters

Although smaller than some other corporate helicopters, the Agusta A109 Mk II has a "wide-body" cabin that can accommodate up to six people comfortably.

New-unit deliveries for 1986, as recorded by the Commerce Department and the AIA, conflict with tallies given to B/CA by U.S. manufacturers themselves. AIA's preliminary computations for 1986 reflect production by eight U.S. manufacturers of 301 civil helicopters valued at $273 million—an average unit value of $906,975. Deliveries reported to B/CA by just five of those companies, however, came to 368 new units.

North American market shares in terms of new units delivered, based in part on the latter figure, figured out to 25.3 percent for Bell, 16.7 percent each for McDonnell Douglas and Robinson, 9.7 percent for Schweizer Aircraft (which in November bought from McDonnell Douglas all rights to the two- to three-place piston-powered Model 300C it has produced under a 10-year contract since 1983), and 5.4 percent for Enstrom Helicopter, with the remaining 26.2 percent shared by Sikorsky Aircraft, Rogerson-Hiller, and products imported by Aerospatiale, Agusta and MBB. From the standpoint of new-unit production by U.S. firms, Bell claimed 36 percent of the total, Robinson got 27.4 percent, McDonnell Douglas and Schweizer had 16.8 percent each. Enstrom's figures were unavailable at press time. Sikorsky Aircraft would not disclose its figures.

A conclusion to be drawn from these figures is that a substantial part of 1986 U.S. production was exported. An estimated 63 percent of the new units produced in this country last year went to overseas customers, with foreign markets absorbing 70 percent of Robinson and Schweizer deliveries and better than 64 percent of Bell shipments. This was attributed chiefly to the weak U.S. dollar, but increasingly burdensome insurance rates for U.S. operators were suspected of playing a role in what is viewed as an accelerating market trend.

The calculation of financial market shares is obfuscated by two major factors. One is that the continuing depressed state of the oil industry has idled and placed on the used aircraft market more than 25 percent of the equipment owned by large-fleet operators who a few years ago were the manufacturers' primary customers (for example, Petroleum Helicopters alone has pared its active rotorcraft fleet from about 420 to 375 units over the past two years and continues to hawk its surplus equipment so aggressively that it must be regarded as a major competitor in the retail market).

The other is that new, innovative marketing philosophies are being adopted by virtually every rotorcraft maker.

As explained by Herbert B. Epstein, president of Aerospatiale Helicopter Corporation in Grand Prairie, Texas, "You have to look at the marketplace in terms other than new-production units today. Most manufacturers now count used and leased equipment along with new units in their total delivery figures. For Aerospatiale, roughly one third of all deliveries falls into each of those categories right now."

Representatives of Bell and McDonnell Douglas also pointed to the used rotorcraft arena as a significant part of their business over the past year. Both have established programs to offer completely refurbished "zero time" units that have been taken in trade for new helicopters or bought at wholesale, but neither company includes those units in their new-aircraft delivery figures.

Marketing tactics practiced by manufacturers have undergone radical change since the sharp downturn in energy-related sales. Several firms noted that absent the multi-unit fleet sales of the past, competition has intensified for the one- or two-unit EMS, public-service or corporate sales that have come to be viewed as primary markets. Spokespersons acknowledged that this trend has virtually eliminated the shaving of profit acceptable on each unit for a number of reasons.

First, reduced production flow results in higher manufacturing cost for each unit produced. Second, the cost of selling to today's primary market prospects has increased. Unlike past dealings with experienced fleet operators, marketers often are required now to virtually educate the prospective customer from ground zero in the benefits of helicopter operation as well as to employ sales personnel or consultants who are well-versed in the customers' fields of endeavor. Additionally, helicopter marketers are finding that the "new breed" of helicopter prospects are more demanding of after-sale attention and expanded field support.

Despite dark spots in the picture, most helicopter manufacturers expressed optimism that they can weather current commercial-market conditions and emerge as a stronger industry capable of providing customers with vastly improved products at significantly reduced costs. For, ironically, while the civil market base has eroded over the past few years, overall revenues enjoyed by larger manufacturers have risen dramatically.

Bell, Boeing Vertol, McDonnell Douglas and Sikorsky reportedly fared well financially last year on the strength of military and other government contracts. Bell, in fact, claimed gross revenues of over $1 billion, making 1986 the highest income period in its history. Such levels of government-

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FOR MORE INFORMATION USE B/CA'S HANDY INQUIRY RESPONSE CARD

Continual refinement of the HS 125 design, such as enlarging the cockpit in the BAe 800, is part of the reason for the longevity of this business jet.

Six full-color CRTs are the heart of the Gulfstream IV's instrument panel. The Sperry EFIS includes advanced symbology created specifically for the G-IV.

Like other new-generation heavy-iron business jets, the Dassault Falcon 900 includes the latest avionics and electronic instrumentation.

Loran-C expanded its loyal constituency last year, with a half-dozen firms working toward IFR certification of such units. The competition has been intense, with firms now offering IFR-certificated units in the $3,000 to $4,000 range. Ironically, the lean, little Loran-C producers have pressured larger firms to re-evaluate their own pricing strategies, and the consumer has emerged as the big winner. The Loran-C units that have earned both TSO and IFR approval are less expensive and better built than ever before.

Don't look for a sudden proliferation of Loran-C non-precision approaches at formerly VFR-only airports, however. Certification of new approach procedures is a complex and time-consuming task for which the FAA has insufficient resources.

Nevertheless, Congress has good news for Loran-C enroute navigation users. Funding has been approved to build a GRI chain in the Midwest to close the infamous "Mid-Continent Gap" in signal coverage plaguing much of the Midwestern United States and Canada. Look for completion of the new chain by 1991.

GPS and MLS are more controversial than ever before. The operational status of the Navstar global positioning system has been set back at least three years because of the lack of enough suitable satellite launch vehicles. Airlines and non-commercial operators remain largely unconvinced as to the cost benefits of the GPS system. Yet, makers of FMS/NMS units are developing GPS sensors based on a market analysis of aircraft operators.

As with GPS, MLS generates much discussion as to its relative worth because it imposes an additional cost burden on operators who install such units in their aircraft while allegedly offering few advantages over the latest generation of ILS equipment. Both domestic and international commercial operators have voiced such concerns. However, like GPS, MLS is coming, but the system enjoys fewer supporters than any new avionics system.

As for the one-brand systems approach to original equipment installations, look for greater flexibility on the part of avionics manufacturers to accommodate future customer needs by offering a wide variety of digital and analog connection options. Actually, much of the need to accommodate avionics options is slowly diminishing as each aircraft electronics manufacturer narrows its product line to appeal to a specific market segment. Look for avionics firms to specialize in a narrow aircraft market segment or in a narrow product line.

Introduction 1987 Commuters

The twin-turboprop 46-passenger ATR 42 first flew in the United States with American Eagle regional Command Airways, and Aerospatiale is now developing a stretched model called the ATR 72.

The change that has overtaken the commuter airline industry during the past 12 to 24 months is little more than a revolutionary blur. To those who have been around the industry long enough to remember when it was called the "third level" and the entire membership of the old Commuter Airline Association of America could squeeze into one small hotel meeting room to thrash over the firebrand issue of certification, that change has been traumatic.

Some of the so-called entrepreneurs have sold out, albeit remaining on in top management capacities. They include Bill Britt, Dick Henson, Pennsylvania's Roy Clark, Pilgrim's Joe Fugere, Dawson Ransome and Suburban's Art Horst. Others, such as Air Wisconsin's Pres Wilbourne and Command's Kingsley Morse have forsaken their airlines' identities in favor of near complete vertical integration with their code-sharing senior partners. Still others, such as Air Midwest's Gary Adamson, Metro's Jay Seaborn and Simmons' Joel Murray, have spread their bets by becoming "portfolio" carriers and sharing the codes of more than one major carrier.

If there is a price to pay for independence, then it has been paid—in a figurative sense only—by Bill Britt, who adamantly declined affiliation and/or buyout overtures from several major carriers only to see his system disintegrate under the competitive weight of code-sharing agreements made by those same major carriers with other commuter carriers. The case will go down as the classic example of the power behind code-sharing agreements and the built-in computer-system biases that go with them.

By his own admission, Britt's airline was generating $3 million to $4 million a year in profits. It accounted for 94 percent of the connecting feed traffic into St. Louis—66 percent to TWA and 28 percent to Ozark—with 52 scheduled flights a day and 55-percent load factors. By the time the carrier suspended all service to St. Louis at the end of January, it was accounting for only 15 percent of the feed and posting load factors of only 28 percent.

Bill Britt is bitter. Not only was his airline biased in the computers, but the joint fares he had enjoyed at St. Louis with Ozark and TWA were withdrawn in favor of their subsequent respective code-sharing partners: Air Midwest and ResortAir, both now TWExpress carriers as a result of the Ozark-TWA merger.

Britt sold his airline to People Express at the end of 1985 for a figure reportedly between $20 and $30 million. "There is no way we could compete against that dual designator stuff any more. We had always been biased by the computers and everything else, so why stand there and waste money on it?," he asked.

Regional Aircraft Manufacturing: An Era of Consolidation?

Industry consolidation is inevitable among regional aircraft builders given the current excess in manufacturing capacity and changing customer buying habits, according to a new study.

by Arnold Lewis

Rationalization of the regional airline industry as a result of deregulation and code-sharing will lead to consolidation among the aircraft manufacturers as well, according to a study just released by The Economist Publications Limited.

The study also calls for increased competition from major and national carriers at the upper end of the regional carrier scale as an increasing number of smaller and more efficient jet transports, including those powered by unducted fans, reach the marketplace. And there will be increased pressure from the lower end of the scale by general and business aircraft manufacturers.

Entitled "The U.S. Regional Airline Industry to 1996; Markets, Competition and the Demand for Aircraft," the study was written by Daniel M. Kasper, head of the Transportation Division of Boston-based Harbridge House/International Planning and Analysis Center and former chief of the Civil Aeronautics Board's Bureau of International Aviation. Kasper warned of "profound changes" in the U.S. regional airline industry "in the continuing aftermath of U.S. airline deregulation." As fewer so-called mega-carriers have emerged from the consolidation and fare wars of the past two years, "the emphasis is turning to the smaller regional airlines as the final battleground in which to tie up market shares."

As a consequence of code-sharing, control of such critical operational activities as fares and routes by the major partners "could remove the last autonomy in decision-making. Indeed, for some observers the increasing integration of regional operations with those of major carriers through affiliation and acquisition is a further threat to the survival of a freely competitive airline industry in the [United States]."

Kasper predicted that the "regional carriers will be controlled increasingly by large commercial airlines, which will operate a growing share of the regional aircraft." Non-affiliated regionals, he said, "will be unable to remain competitive because they lack the ability to offer either the end-to-end on-line service, which travelers prefer, or be economically viable through fares to the 70 percent of the regional passengers who use their services as a connection to a larger airline for part of a longer journey."

Using data from the RAA's 1985 statistical report, Kasper pointed out that 19 of the top 20 regionals and 35 of the top 50, ranked by passenger enplanements, were engaged in code sharing agreements with large carriers. Subsequent to release of the study, RAA's 1986 statistics have been made available. The new statistics show that 45 of the top 50 carriers are now involved in such arrangements and that the highest-ranked independent carrier is 34th on the list. The top 50 carriers in 1986 accounted for 91 percent of the industry's revenue passenger miles, compared to 88 percent the previous year.

Majors Capture Regional Traffic

Some industry observers believe that in the last two years alone, major carriers have 'captured' up to three-quarters of the passengers carried by the previously independent regionals through acquisitions, code-sharing and other agreements. Kasper said that the trend will continue over the next two years—reflecting the remainder of the airline indus-

Used Airplanes

It's no secret that the used airplane market is very important to many business flight operations.

In fact, for certain piston and turboprop airplane models, the used market is all that there is.

This year B/CA has begun to look at the used market with the help of the Aircraft Bluebook Corporation.

Those of you familiar with B/CA's *Planning and Purchasing Handbook* will recognize the data presentation for each listing. This section represents the basic certification identification, weights, limits, cruise and range data for each subject aircraft.

These data come from the last official appearance of the subject airplane as a production aircraft in a previous issue of B/CA's *Planning and Purchasing Handbook*. We intend to present a moving five-year window of used aircraft in subsequent issues of the April *Handbook*.

The price information in the first column includes the list price of a B/CA equipped new aircraft in the stated production year and the current used retail price of the identified serial number block.

It should be noted that this price information is provided only for rough-cut planning purposes. To pin down the current retail price of used airplanes by serial number block, it is best to consult the *Aircraft Bluebook Price Digest*. However, *The Aircraft Bluebook Price Digest* only is available to qualified subscribers from Aircraft Bluebook Corporation, Will Rogers Airport, Box 59977, Oklahoma City, Oklahoma 73159. (405) 942-7428. **B/CA**

How to Use the Airplane Charts

The Malibu continues to be a principle element of Piper's production.

However, the pilot is considered to be part of the payload in all other types of aircraft.

Turbine powered airplanes carry NBAA IFR reserve fuel for the B/CA mission. In the case of turboprops, the alternate is 100 nm. In the case of turbojets and turbofans, the alternate is 200 nm.

Therefore, care must be taken in comparing missions between turboprop, and turbojet and turbofan classes. Reserve fuel for all piston aircraft is 45 minutes at normal (recommended) power as shown in the **Cruise** column.

Cabin class twin missions are computed for 300 and 600 nm. (All other piston aircraft missions are computed at 200 and 500 nm.) Turboprop and turbojet aircraft missions are computed at 300, 600 and 1,000 nm. Where an aircraft cannot cover the mission distance with the appropriate payload, B/CA shows a reduction in payload or a reduction in mission length at the editors' option.

Data elements for each mission are as follows:

Runway—This is the AFM runway requirement: The takeoff distance for piston singles, the accelerate-stop for piston twins and most turboprops, or the BFL for footnoted turboprops and all turbojet and turbofan aircraft.

Blk. or Flt. Time—This is the takeoff-to-touchdown elapsed time for the trip from origin to destination.

Fuel—This is the fuel that is consumed during the mission—start, taxi, takeoff, enroute and descent.

nm/lb and FL—Nautical-miles per pound of fuel burned (specific range) and trip flight level. This is a measure of transportation efficiency. To produce this ratio, aircraft miles generated by the mission are divided by the fuel consumed.

Notes

Deviations from the conditions stated above are shown in this column along with other notes of interest. This column also contains two other important pieces of information: suggested base price and certification data.

Suggested Base Price—In most instances, this price is the airplane manufacturer's recommended base price. In others, it is a B/CA estimate of the base price predicated on prices being quoted to prospects in the field. Unless noted, all prices are 1987 U.S. dollars, F.O.B., U.S. delivery point.

Certification—This element indicates the regulation (CAR or FAR) under which the aircraft was originally certificated. Two dates are also listed. The first is the date of the first type certificate. The second date is the most recent significant certification change.

For example, suppose Wing Brothers Airplane Company now is producing its 1987 model WB-220J. Further suppose that the 220 series actually is based on a type certificate granted to the 110 series back in 1950. Finally, imagine for a moment that the development of the 220 progressed through the alphabet from A to J, the last significant design change having been made to the aircraft in 1977. The certification data for this aircraft might read: CAR 3, 1950/77.

General

In addition to the aforementioned abbreviations, the following abbreviations will be found throughout the charts.

NA—Information applicable, but not available.

NP—Attempted mission not possible under given conditions.

(—)—Not applicable.

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How to Use the Airplane Charts

The evolution of the T-tail Cheyenne reached its zenith with the 400LS, Piper Aircraft Corporation's Garrett-powered 400-mph turboprop.

To get full value from the charts in the B/CA 1987 *Planning and Purchasing Handbook*, you'll need to know the ground rules for our calculations. These are outlined below by reference to chart column heads.

Manufacturer/Model—The name of the aircraft manufacturer and the aircraft model designation. Company addresses and other information can be found in the "Directory of Airframe Manufacturers."

B/CA Eqpd. Price—The B/CA equipped price. This is our calculation of the average retail price of an aircraft that is equipped according to the minimum specifications. These prices are calculated using the manufacturer's own standard equipment and options list for each aircraft. Generally, we are showing equivalently equipped aircraft at the lowest price at which each is offered by the manufacturer, according to its options list.

Adjustments were made if a required item of equipment was not available for factory installation. A value conformity—matching equally such factors as quality in construction, interior design and fabrication techniques—is, of course, impossible to achieve. Differences in those areas often show up in price differentials for otherwise similar airplanes.

It is important to remember that these prices are estimates based on first-quarter 1987 information. Most manufacturers adjust prices throughout the year.

Where long production lead times are involved, prices normally are quoted in dollars based on a certain year. Such cases are noted in the **Notes** section.

Characteristics

Seating—Information on typical configuration and seating is shown in the form: P+TS/MS. "P" is the number of crewmembers required by regulation for normal executive-transport operations. "TS" is the typical passenger seating. "MS" is the maximum passenger seating.

Editorial decisions must be made in order to determine both TS and MS. When differences arise, we have attempted to base both TS and MS on aircraft experience in the field. Neither TS nor MS includes crew. Therefore, a four-place single will be shown as 1+3/3.

Wing Ld./Pwr. Ld.—Wing loading and power loading are shown for all airplanes. Wing loading is in max gross takeoff weight in pounds per square-foot of wing area. Power loading is in max gross takeoff weight in pounds per horsepower (or per pound of thrust for turbofans and turbojets).

Noise—These figures are external overhead or takeoff and approach noise levels as appropriate. For small, propeller-driven airplanes, the noise figure is dBA overhead. For turbojets and turbofans the noise figure is EPNdB for takeoff and approach.

Dimensions

External—These are the standard external dimensions—length, height and wingspan—in feet and tenths of feet that are utilized to determine hangar space requirements.

Internal—These are interior dimensions, in feet and tenths of feet, of an aircraft with a complete interior. For cabin class twins and turbine aircraft, the internal dimensions are for the passenger compartment only. The length measurement is taken from the rear surface of the cockpit or cabin divider to the back of the rearmost seat (that can be installed) in its normal upright position.

For all other airplanes these dimensions include the pilot compartment, with length measured from the bulkhead forward of the rudder pedals to the back of the rearmost seat in its normal upright position. Cabin dimensions, especially length, are subject to large variations depending on how an interior of an aircraft is furnished.

Power

Engines—The items in this information block show the number of engines (except for singles), the engine manufacturer and the engine model number. The following abbreviations are used for engine manufacturers: For piston airplanes, **Cont** is Teledyne Continental and **Lyc** is the Lycoming Division of Avco Lycoming. For turbine powered aircraft, **GTEC** is Garrett Turbine Engine Company, **CFMI** is CFM International, **ALL** is Allison Gas Turbine, **GE** is General Electric, **Avco** is Avco Lycoming, **P&W** is Pratt & Whitney of Canada and **RR** is Rolls-Royce.

HP/SHP/Thrust—Horsepower, shaft horsepower or thrust (in pounds) as appropriate, for each engine.

TBO—Engine manufacturer's recommended overhaul interval in hours is shown where available. "Prog." means progressive, and the term "OC" means on condition. (Note: Piper usually shows a TBO that should be achievable by the time the fleet reaches the value shown. Cessna does not. In any event, P&W engines of similar designations have similar TBOs regardless of airframe manufacturer claims.)

Weights

Weights (in pounds) appropriate to each class of aircraft appear under this heading.

Max Ramp—Maximum ramp (taxi) weight as specified in certification data.

Max TO—Maximum gross takeoff weight as specified in certification data.

Max Land—Maximum permissible

How to Use the Airplane Charts

During 1986 Cessna revived the Citation II, one of the most popular business jets ever, to complement the company's Citation S/II and Citation III models.

weight at landing appropriate to each aircraft specified in certification data.

Zero-Fuel—As applicable: maximum zero-fuel weight as specified in certification data (indicated by a "c"), maximum wing-bending moment as specified in certification data ("w"), or B/CA-calculated convenience zero-fuel weight based on the fuel required for 1.5 hours at normal-cruise fuel flow (indicated by a "b").

EOW—Empty operating weight. The EOW includes the total of factory standard weight, B/CA options, cabin stores (10 pounds per passenger for turbojets and turbofans, five pounds per passenger for turboprops and cabin class twins, and 15 pounds total for all other aircraft), full oil and unusable fuel.

BOW—Basic operating weight. The BOW is the total of the empty operating weight (EOW) plus the crew specified in the **Characteristics/Seating** entry. Each crewmember contributes 200 pounds to the BOW, including baggage, flight kit, etc. (BOW is used for cabin class twins and turbine airplanes. EOW is used for all other types.)

Max Pld.—Maximum payload as determined by B/CA. This is the difference between BOW and EOW and some limiting weight, usually zero-fuel weight or max landing weight.

Useful—Useful load. The difference between maximum ramp weight and BOW or EOW as appropriate.

Max Fuel—The maximum weight of an aircraft's usable fuel. Capacities of optional,long-range tanks are included in this figure. The weight of avgas is figured at 6.0 pounds per U.S. gallon; the weight of turbine fuel is calculated at 6.7 pounds per U.S.gallon.

Exec. Pld.—Executive payload. This is a B/CA-calculated convenience figure. It's the number of passengers that the aircraft can accommodate in the typical executive-seating (TS) configuration (as shown in the **Characteristics** column) multiplied by 200 pounds (170 pounds per person, 30 pounds per person for baggage). This Exec. Pld. can be thought of as the normal weight of the payload with all seats of the typical configuration filled. It is the payload carried in the **Range/Seats-Full** exercise of the charts. Note that an Exec. Pld. is not calculated for single engine aircraft. All singles will accommodate a 170-pound passenger in each seat, however, not all single engine airplanes are capable of carrying 30 pounds of baggage per passenger.

Pld.—M. Fuel—Payload with maximum fuel. This is the load-lifting capability with all tanks full.

Fuel—M. Pld.—Fuel with maximum payload. This is the amount of fuel that can be carried when the B/CA maximum payload has been boarded.

Fuel—Exec. Pld.—Fuel with Executive Payload. This is the amount of fuel that can be carried with the executive payload.

Limits/Speeds

V-speeds and limits, appropriate to the airplane class, are shown in all charts. Abbreviations used are:

VNE—Never exceed speed.

VNO—Maximum structural cruising speed.

VMO—Airspeed limit, maximum operating speed.

MMO—Mach limit, maximum operating speed.

VA—Design maneuvering speed.

VFE—Maximum initial flap-extension speed.

VDEC—Accelerate-stop decision speed.

VMCA—Minimum control airspeed (air).

VSO—Stall speed, MGTOW, landing configuration, SL, ISA.

VX — All-engine best-angle-of-climb speed.

VXSE — Engine-out best-angle-of-climb speed.

VY — All-engine best-rate-of-climb speed.

VYSE — Engine-out best-rate-of-climb speed.

PSI—Normal cabin-pressurization limit in pounds per square-inch.

Takeoff/Airport Perf.

This column shows various takeoff, accelerate-stop and (for Part 25 aircraft) BFL distances as appropriate for two sets of conditions: (1) sea level, standard day (SL, ISA); and (2) 5,000-foot elevation, hot-day (ISA+20°C). Note: Ambient temperature for this high-elevation and hot-day situation is 25°C.

Takeoff for single engine airplanes is based on the maximum-effort technique. For all other airplanes, takeoff, accelerate-stop and BFL distances assume a "normal" takeoff procedure and therefore do not necessarily represent the best runway performance possible.

In the turbojet/turbofan tables, V_2 is takeoff safety speed, VREF is reference landing speed and LD is the landing distance in feet.

Two additional figures are shown in this column for turbojets and turbofans: (1) the weight at which the hot-day, high-elevation departure was made; and (2) the four-passenger range with NBAA IFR reserves after departure under the hot-day, high-elevation condition. When the "mission weight" is less than maximum gross takeoff weight, the most common reason is second-segment climb limitations.

For clarity of presentation, the Weight at Takeoff figure is listed first.

Speeds—Speeds, as defined above in the **Limits/Speeds** section, are listed for each aircraft for comparison purposes. The spreads between the speeds can be important with takeoff data to determine the feasibility of various minimum-length airport operations.

Introduction 1987 Airplanes

Spring marks the arrival of the long-awaited Gulfstream IV, which features a stretched fuselage, redesigned wing, new Rolls-Royce Tay powerplant and Sperry EFIS.

Nice handling characteristics, a comfortable cockpit and good dispatch reliability have made the King Air 200 popular among business turboprop operators.

Mooney prospered in 1986 by revamping its single engine line, introducing several new models, including the high-performance turbocharged 252TSE.

The year 1987 won't go down in the record books for the sheer numbers of general aviation airplanes sold, nor perhaps even for the gross dollar-value of the new airplane fleet. However, 1987 just may go down in the books as the year the industry started all over.

We'll see why that is so in a minute, but first let's take an overview of the airplane charts.

The charts in the pages that follow, as usual, tell part of the story in that they give us a snapshot of current production and development.

The first thing you'll notice after glancing at the charts is that many airplanes are missing. In fact, the entire Cessna piston fleet is not listed because that company has decided to halt all recip aircraft production until at least mid-1988.

The Mitsubishi twins are gone, too. When Beech took over Mitsubishi's Diamond business jet program, the turboprops were orphaned and production ended.

While most of the Piper twins and turboprops are still listed here—and indeed most are available in new condition due to previous production—only the single-engine Malibu was in production at this writing.

The difference between Piper and Cessna is that the Piper management would get its piston airplanes back into production immediately if it could figure out how to sell new airplanes at affordable prices in the face of staggering manufacturing and product support (read liability) costs.

Cessna, on the other hand, doesn't know if it can continue building present designs at some future time or if the marketplace will allow only new designs that are able to take advantage of lower-cost (read less manpower) fabrication techniques.

If 10 years ago you were asked to guess which of the "Big Three"—Beech, Cessna, Piper—would show the most dedication to the small airplane market when the "big crunch" ultimately came, would you have named Beech? Don't feel bad. We can't find

1987 Airplanes

Dassault's top-of-the-line business jet—the three-engine Falcon 900—entered service earlier this year after having been certificated in 1986.

Although sales of Gates Learjet's 55B have slackened, the company has opened a center in Tucson to outfit all types of business jets.

anyone who would have gone with Beech either, but it looks like staid old Beech, the company that always somehow seemed to disdain the less-affluent airplane owner, is emerging as the hero in this area.

Not only is Beech keeping a representative piston fleet in production, but it has lowered prices on the popular F33 Bonanza to make it more competitive. The company has also announced that it has no plans to abandon the bottom of the general aviation market and that it is working with Burt Rutan to develop a whole new generation of airplanes for the low-end market.

Several European and Asian firms are looking at the U.S. piston market—especially the trainer end—with thoughts of capitalizing on the woes of Cessna and Piper. Aerospatiale, for example, has named six dealers and is reportedly negotiating with several flight schools and other "bulk" buyers. Its two products currently certified here are the Tobago and Trinidad. Both are four- to six-place piston singles. Ultimately we'll have full coverage of these aircraft in the *Planning and Purchasing Handbook*; however, as of this writing Aerospatiale was unable to provide the engineering and flight manual data we need to develop performance numbers. (As most readers know, B/CA does not use sales-brochure figures in any form.)

The turboprop and turbofan markets have been significantly stronger than the piston segment recently, and this is reflected in the charts. While there have been some dropouts, the fleets are relatively intact.

Learjet fans may notice that the GE-powered models 25D and G are missing. While they are not officially in production, you may call Gates Learjet for price and availability information for special orders.

Big-iron aficionados will notice new numbers for the Gulfstream IV, the Dassault Falcon 900 and the latest version of the Canadair Challenger. All of these figures reflect new flight-test work.

We suggested at the outset that 1987 might be the year of regeneration for the general aviation industry, particularly the piston end of the business. We believe that this will be true for several reasons:

- First, the training market will bring pressure upon all piston manufacturers—past and present—to provide some 400 to 800 new trainers that are desperately needed.
- Congress may become a player too, by having another go at limiting liability in some way that reduces a manufacturer's ultimate exposure.
- Finally, the companies themselves have promised big decisions this year. Some product lines are for sale. Either buyers for these lines will emerge or manufacturers will shut down and write off the losses. In either event, the ultimate questions will have been answered and airplanes will be in production or the way will be cleared for new parties to enter the market. . .with new ideas and new energy, we hope.

Forecast for 1987

De Havilland's Dash 8 has been sold in the corporate market, in addition to strong sales in the commuter arena. A stretched version is due out soon.

Canadair business jets joined the EFIS club with the introduction of the Challenger 601-3A, which has a "glass cockpit" as standard equipment.

Gates Learjet has responded to slower demand for its Model 55 by offering other services such as completions of *all* types of business jets.

surers had an operating profit of $4.5 billion, according to a preliminary report by the Insurance Information Institute, a nonprofit industry group. The 1986 results are quite a turnaround from the $4 billion and $5.6 billion losses that the insurance industry suffered in 1984 and 1985, respectively. The reversal was even more dramatic among airline insurers. In 1985 those firms paid $1.1 billion in claims while collecting only $850 million in premiums, but in 1986 they received $1.2 billion in premiums and only paid $300 million in claims.

Last year most insurers recouped their prior-year losses by charging higher premiums, but they were also aided by 32-percent lower underwriting losses and an 11-percent increase in investment income last year. And fewer losses have drawn more insurance suppliers into the market, thereby increasing capacity and competition and putting downward pressure on rates—trends that bode well for aviation insurance buyers in 1987.

For example, experts predict that airline hull-insurance rates will register double-digit declines this year, and increases in liability insurance premiums for air carriers are expected to moderate. In addition, it is anticipated that many airlines will opt for lower liability limits because recent disasters have shown that lower limits are sufficient.

In the corporate or "industrial aid" arena, spokesmen for several major aviation-insurance companies say that there will be very little upward movement in rates in 1987. In fact, many anticipate that the cost of hull coverage will drop, and one pundit predicted that there will be a slight reduction in war-risk premiums as well. Because the industrial aid area has traditionally been one of the most profitable for insurers, there may even be a return to discounting in order to attract new business and retain old accounts. As has been the case for a number of years, insurers will be emphasizing stringent pilot requirements, recurrent training and use of flight operations manuals in order to minimize losses.

Despite the generally favorable aviation-insurance outlook, product liability remains the industry's most pressing problem. James L. Churchill, president of Collins and chairman of the General Aviation Manufacturers Association declared earlier this year, "Product liability continues to be a cancer eating away at our industry." In addition to

Forecast for 1987

The British Aerospace 800 offers corporate operators a very comfortable "middle ground" with its large cabin size and relatively economical operating costs.

Perhaps more than any other aircraft, the new-technology Beech Starship embodies the general aviation industry's hopes for the future.

With powerplants by Pratt & Whitney, an airframe by Sikorsky, and major systems by Hamilton Standard, the S-76B is a complete United Technologies' product.

chase price may be financed, with loan terms up to 12 years.

With the prime rate hovering around 7.5 percent, monthly payments for an aircraft loan are highly competitive with lease payments. And the elimination of the investment tax credit has caused aircraft lenders to sharpen their pencils so they are able to fine-tune loan numbers to make purchase even more attractive.

Both fixed- and variable-rate loans remain available, with some lenders fixing the interest rate loan for one to three years and letting the rate float at 1.5 to 3.5 percent over prime thereafter. However, look out for loan packaging fees and other incidental charges. But, in this competitive market anything is negotiable. A borrower who shops around for a loan will likely get better loan terms than one who does not.

Leasing

Historically, leasing has been a popular alternative to purchasing in times of tight money. This is because the requirement for a healthy down payment and relatively high interest rates made the capital costs associated with purchasing less attractive than leasing. Notwithstanding lower loan interest rates, leasing remains attractive for business aircraft operators who wish to take advantage of off-balance sheet accounting that improves their debt-equity ratio.

The slump in new aircraft sales has left many leasing companies with large inventories of used aircraft that are being offered for short- or long-term lease. Rates have been slashed. Some of these aircraft have less than 400 hours and can be leased for a period of a few months to several years. For companies wishing to lease new aircraft, look for very long lease terms that assure full payout of the aircraft's cost back to the lessor.

With the glut of used aircraft on the market, business aircraft operators continue to enjoy a "lessee's market" as well as a "buyer's market".

Taxes

With the impending passage last year of the Tax Reform Act of 1986, economic sages in the private, public and academic sectors were predicting hazardous going for the U.S. economy in 1987. The repeal of the investment tax

Forecast for 1987

Speed has always been a hallmark of the Merlin series, and the latest version of the Garrett-powered airplane—the nearly 300-knot Merlin 300—is no exception.

The big cabin of the Westland 30 makes the twin-engine rotorcraft one of the more popular candidates for airline operations.

Beech, which has long been a leading maker of turboprops, officially reentered the business jet market a year ago when it rolled out the Beechjet 400.

credit, the adverse effect of the alternative minimum tax with the expansion of tax preference items and altered depreciation schedules all were supposed to be disastrous for aircraft sales in 1987. Such has not been the case.

While there has been no sudden upturn in aircraft sales, the market has remained relatively stable. With some light airframe manufacturers suspending production to help dry out the market, other firms have reaped modest benefits from new, tough and lean cost-containment programs. In reality, some buyers are re-entering the light aircraft market because of recent disposable profits made possible by the improving economy.

Although large airframe companies bemoan sluggish new aircraft sales, their production seems to be more immune to recent tax law changes.

It's quite difficult for many aircraft industry officials to see the long-term benefits of these changes. The elimination of special tax benefits associated with purchasing a new aircraft will curb the future expansion of the used aircraft market.

Each aircraft, be it new or used, will have to earn its own way without the artificial support of investment tax credit and a 60-month cost-recovery schedule. Companies may again look at aircraft as profit-generation tools rather than strictly as tax shelters.

But, we do not mean to imply that all tax benefits associated with operating a business aircraft have evaporated as a result of the 1986 Tax Reform Act. To the contrary, all cash operating costs remain fully deductible to business aircraft operators, and the new depreciation schedule offers a 13-percent better write-off after the first three years than did the Accelerated Cost-Recovery System that was put into effect by the 1981 tax act. And with the required 60-month holding period for earning ITC now completed by operators who purchased aircraft prior to April 1982, there are substantial tax benefits associated with trading up this year.

Insurance

For the first time in several years, many segments of aviation have reason to be optimistic that they will be able to get the kind of insurance coverage that they want at a price they can afford.

The primary reason for this change has to do with insurance industry economics. In 1986 property/casualty in-