BD-5

Information Kit


5
N501BD

6. Easy maneuvering

5. Rapid climb-out

7. Fast, comfortable cruise

8. Landing

4. Smooth take-off

3. Taxiing to runway

2. Entering cockpit

1. Great day ahead

Why the BD-5 was created

By James R. Bode,

The BD-5 is the first of a new breed of aircraft It was designed to fulfill a need that actually has never been adequately filled by any aircraft since airplanes first Flew. The BD-5 has been designed specifically to be an aircraft that can be owned and operated by an individual and to be used efficiently and economically as a sport flying aircraft It is not just an airplane that is capable of flying, something that a pilot can at least get up in the air and fly around the pattern. There have been many airplanes designed and bullwhich can accomplish this goal

The problem, with just being able to fly. is that the pilot/ owner soon gets bored with the meager performance and complete lack of utility. Although these airplanes of the past could at least fly, were basically of simple design and had initial cost and operating cost considerably lower than any high preformance aircraft. the expense of flying was still relatively high compared to other forms of transportation or other sporting vehicles. Flying just simply was expensive . . . even in its simplest form

The BD-5 was created to meet the requirement that nearly every pilot wanted First, it had to be inexpensive to buy. Somewhere around the cost of an automobile, or less, if possible Second it had to be inexpensive to maintain and operate. Third. it had to have performance both fit speed and in strength Fourth, it should be attractive with a simple and functional cockpit.

We have believed, for a long time, that this dream was technically possible. The state of the art of aerodynamics of structure and of mass production indicated to us that a proper combination of fundamental design characteristics could be compounded to produce the product we have all wanted The BD-5 truly does become the first aircraft that can he purchased by any individual capable of affording an automobile The cost of operation is equal or better than that of at) automobile, thus the two major design objectives have been met.

Just how fast and now good the flight performance of the aircraft is just in creases its desirability if the BD-5 could only go 150 miles per hour this still would be fine We knew if the design could be, developed to permit 200 miles Der hour that would be considerably better if with larger engines we Would get into the middle 200 mile per hour range this would be spectacular

Obviously, if we could go over 300 miles oat hour while still meeting our first two objectives. this would be still better 'Unfortunately the state of the art of aerodynamics is not that good yet But, we did not have. *to settle for the pro World War 11 days performance figures Witt) the. extremely clean. smooth aerodynamic styling incorporated on the BD-5 we do obtain 200 miles. plus speeds

The strength of the aircraft must never be below a safe minimum Anything stronger means that it can be safer and capable of withstanding aerobatic maneuvers. Here is another area where we were able to exceed the normally acceptable levels. The BD-5 structurally ally is considerably stronger than most available light aircraft It is a solid, strong, tough little. aircraft.

In creating the BD-5 design. we kept a constant watchful eye on pleasing styling of the entire aircraft T he obvious outcome, if as a designer tries to develop a good looking airplane. is he finds that the feature. that produces good looks and high style is exactly the same feature that produces good, low drag aerodynamics. Beauty is therefore, good aerodynamics

A fixed landing gear is nor the most beautiful thing to look at Struts. skin taps. bulging windows and protruding exhaust pipe-, are ugly features and ugly aerodynamics Therefore our final objective of the BD-5 was practically automatically met by meeting the original basic objectives. The BD-5 has been designed for you. It is a pilot S airplane. If you are a professional pilot with thousands of hours. yet) will just love the snappy smooth flying qualities of the BD-5 If you are just a week end private pilot. YOU Will love the BD-5 exactly One same If you are a student pilot, or someone who has yet to learn to fly but has always had that burning desire, the BD-5 will produce enjoyment that almost is impossible for you now to comprehend When your flight training days are completed and you can step into a BD-5 your flame of flying enjoyment will build and burn ever) stronger You will begin to experence what very few pilots have before the coming of the BD-5. To a pilot, perhaps the BD-5 could be called a love machine

Origin of the BD-5

e BD-5 concept first originated in 1967, following the engineering data obtained by the mpany on its long range, highly efficient BD-2 aircraft. The BD-2 is a one of a kind, ecially designed aircraft capable of extremely long range flight. It has this capability due the extremely efficient aerodynamic design. This design concept permits the aircraft to ve an especially high lift to drag ratio, resulting in excellent range and endurance. The craft utilizes a relatively high aspect ratio wing. This is to say, the ratio of the span to the ord is quite large. This feature makes the BD-2 look like a sailplane and it has been metimes nicknamed a powered sailplane.

sailplanes need efficient aerodynamics to stay aloft in thermals and rising wave rrents. In recent years, efficient aerodynamics have been improved as the state of the art vanced appreciably in the development of high performance sailplanes. The same rodynamic properties used in high performance sailplanes are adaptable to general iation type aircraft. It is this efficient aerodynamics that were incorporated in the BD-2 at has permitted it to obtain three world records: 1. Maximum distance in a closed circuit the weight category; 2. Maximum distance in a closed circuit for any propeller driven plane (it broke a record set by a B29 in 1947); 3. Maximum solo flight without refueling total time of over 70 hours).

was found in flight testing the BD-2 that not only could the aircraft obtain very good miles r gallon cruise condition, but that it could fly on a relatively small amount of horsepower. r example, the BD-2 with 100 gallons aboard and a gross weight of about 3000 unds, can fly at 20,000 feet and with a true airspeed of 135 miles per hour. The engine turning at 1700 rpms with 71/2 inches of manifold pressure, resulting in only 21 rsepower output.

It was from this we realized we could develop an extremely small airplane, very light, but possessing very efficient aerodynamic concepts. This would then result in the very minimum power to fly.

With this approach, it was possible to look at power plants that were not the ordinary heavy, expensive aircraft engines. The first approach was to look at engine sizes of under 20 horsepower but it was discovered that these engines, although low in cost, did not possess the quality and reliability we would like for an aircraft engine. After extensive research and study, we discovered a new series of light twin cylinder, two cycle engines which not only gave more than adequate power at the minimum weight, but were extremely well built and with proper modification would provide all the reliability we would expect from an aircraft engine.

As the BD-5 project grew, we found we could develop two models with the same efficient aerodynamic properties. One with the long high aspect ratio wing for very efficient flight, and another with an ordinary size wing, not as efficient in miles per gallon or range, but capable of higher speeds.

It is from this that the BD-5A with the standard aspect ratio came about and the BD-5B with high aspect ratio wing similar in sailplane appearance was developed- The BD-5 represents the very best in clean efficient aerodynamics that the modern sailplane has demonstrated in recent years. It combines this with sound, solid, high quality aircraft structural methods of fabrication, resulting in an extremely tough, strong airframe powered by the new breed of light weight, low cost, extremely well built, compact engines. This design approach has produced the truly remarkable concept of the BD-5.

General performance

The general performance figures on the BD-5 are quite good. It is a very small aircraft designed to be the optimum configuration to transport a single person comfortably. Every aerodynamic feature known today that could minimize drag, improve speed, climb, range and take off are incorporated in the BD-5. Its cruising speeds are quite fast. But this is not at the sacrifice of stall speeds which govern the take off and landing performance. The wing loading for the BD-5A is comparable to high performance single engine airplanes such as Beech Bonanzas and Cessna 210s. The stalling speeds and therefore approach speeds, are comparable. With the BD-5B, which has the longer wings, the wing loading is reduced further. With this configuration the wing loading is comparable to Cherokee 180s, Beech Musketeers and Cessna Cardinals. Again, the stalling speeds and approach speeds are similar to these aircraft.

When we compare cruising speeds, however, the BD-5 leaves all the rest behind. Speed is not the only good feature of the BD-5. It is highly maneuverable. It is fully aerobatic. It can perform the simplest and most complicated maneuvers flown. The cruising range, the miles per gallon, the service ceiling and all other performance figures are quite good. They either equal or exceed other light planes in most every area. The BD-5 has performance in exactly the same way a modern small sports car has performance in its operation.

Flying qualities (Test pilot report)

By Les Berven

Both the looks and the performance of the BD-5 are exceptionally good, but it's my opinion that the thing that will be long remembered about this aircraft is the way it feels to the pilot in the air. The combination of the side-stick and the excellent stability and control characteristics combine to produce an unforgettable sensation of perfection.

The side-stick controller has a lot to do with this feeling. In a study conducted by the Air Force at Edwards AFB it was determined that the use of a side-stick instead of the standard center-stick in the F-104 resulted in a marked decrease in the pilot workload required to perform precise maneuvers, and in almost every case the pilots who flew both systems preferred the side-stick over the center-stick. To me, the side-stick has a very natural feel; there is no need to adapt to it. When you first sit in the cockpit with both arms on the upholstered armrests, the throttle in your left hand and the side-stick in your right hand, the thing that comes to mind is not that it's different—instead you think: "This is the way it should have been all along!" The BD-5 side-stick geometry and deflection were set at the optimum values determined by the Air Force during their tests.

The ground handling characteristics of the BD-5 are excellent. The main wheel brakes and full swivel nosewheel give a maneuverability on the ground that is hard to beat. With the aircraft stopped, full brake on one side and about 4500 rpm, turning radius is 12 ft. 9 in. with the long wings and only 9 ft. 3 in. with the short wings. The low center of gravity and positive steering characteristics make the aircraft very stable during taxiing. On our initial taxi tests we had the aircraft as fast as 90 mph on the ground with no directional control problems whatever. Over the nose visibility while taxiing is excellent – you can see the runway 10 feet in front of the nose.

The first aerodynamic control occurs at only 20 mph IAS, at which time the rudder becomes effective. With the long wings, both rudder and ailerons are effective at this speed, and the ailerons are so powerful that you can lift one main wheel off the ground at 45 mph. The stabilator becomes effective at about 30 mph. Due to the high thrust line the power-on rotation speed is higher than the power-off. With full power and full aft stick the nosewheel will lift off at 45 mph; with power at idle the nosewheel can be held off until 30 mph IAS. The stick force required to rotate is approximately five pounds.

During take-off roll there is no noticeable assymmetric thrust from the prop due to P-factor, and very little need to use any rudder once the aircraft is lined up with the runway and moving.

With the trim set at neutral, there is almost no pitch trim change at liftoff, and the aircraft accelerates rapidly to climb speed. The nose attitude during climb is such that the top of the instrument panel is just slightly above the horizon.

If the aircraft is leveled off and the speed increased to 180 IAS with the climb trim setting, a forward stick force of about five pounds is required to maintain level flight.

The excellent visibility and handling qualities of the BD-5 make it one of the easiest planes to land that I have ever flown. With the gear down, a power setting of 5500-6000 rpm will maintain a pattern speed of about 100/110 (long wing/short wing) mph IAS. I usually put down half flaps opposite my desired touchdown point, leaving the power where it was on downwind. This results in about the correct rate of descent and slows the aircraft down to 90/100 mph IAS, which is a good speed for base leg. On final, with full flaps I would recommend a speed of 85/95 mph.

A good flare speed, or over-the-fence speed is 75/85 with touchdown at 65/75 mph (1.15 V stall). Stability in the power approach configuration is very good, and there is no problem in holding airspeed right on the desired value, again with no tendency for the nose to wander. I have found that the best way to land the BD-5 is to descend to about one foot above the ground at about flare speed and then hold it there (power off) until the angle of attack has increased to the point where the top of the instrument panel is on the horizon. If this altitude is then maintained the aircraft will settle onto the main gear at just about the recommended touchdown speed. Due to the landing gear position with respect to the aircraft's vertical and horizontal CG location, there is no noticeable pitch down tendency when the gear touches, and you can easily hold the nose off down to speeds of 25-30 mph IAS. The excellent ground stability and high lateral control power make crosswind landings a no-sweat operation.

I have used the slip to landing method in crosswind components up to 20 knots with considerably less difficulty than I would have in any of the current lightplane trainers.

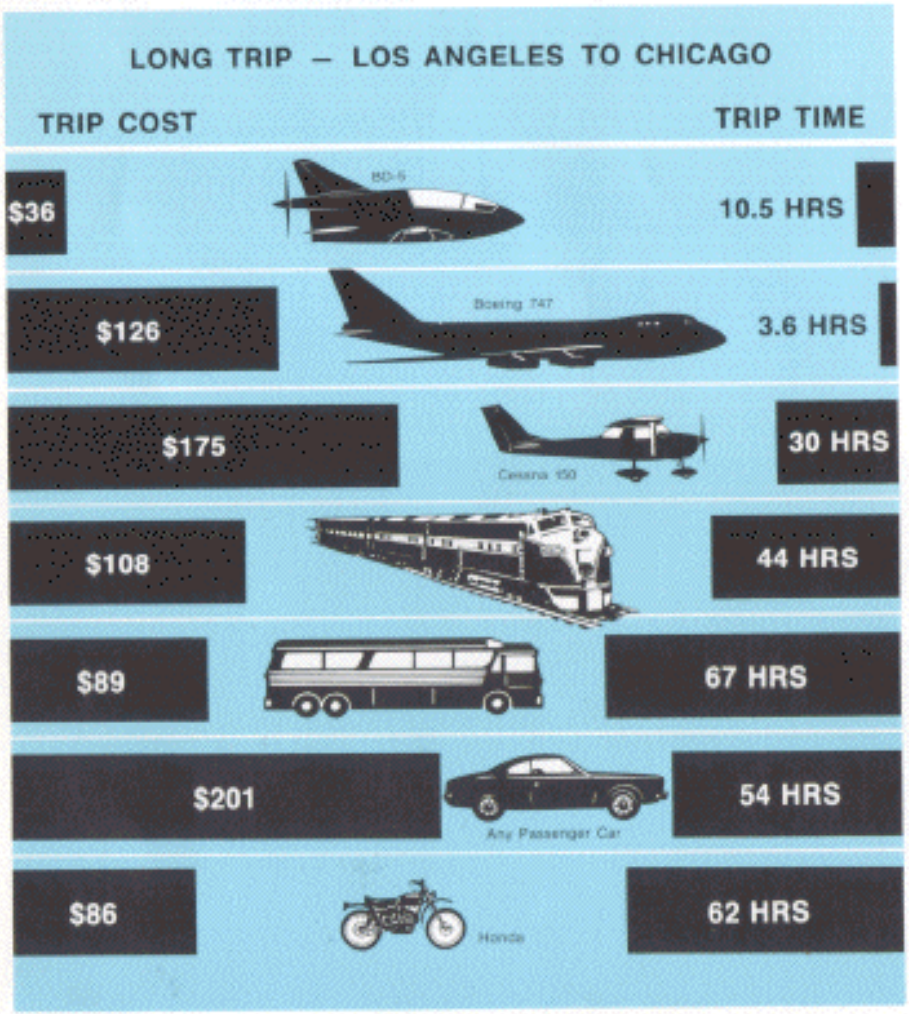
Operating costs

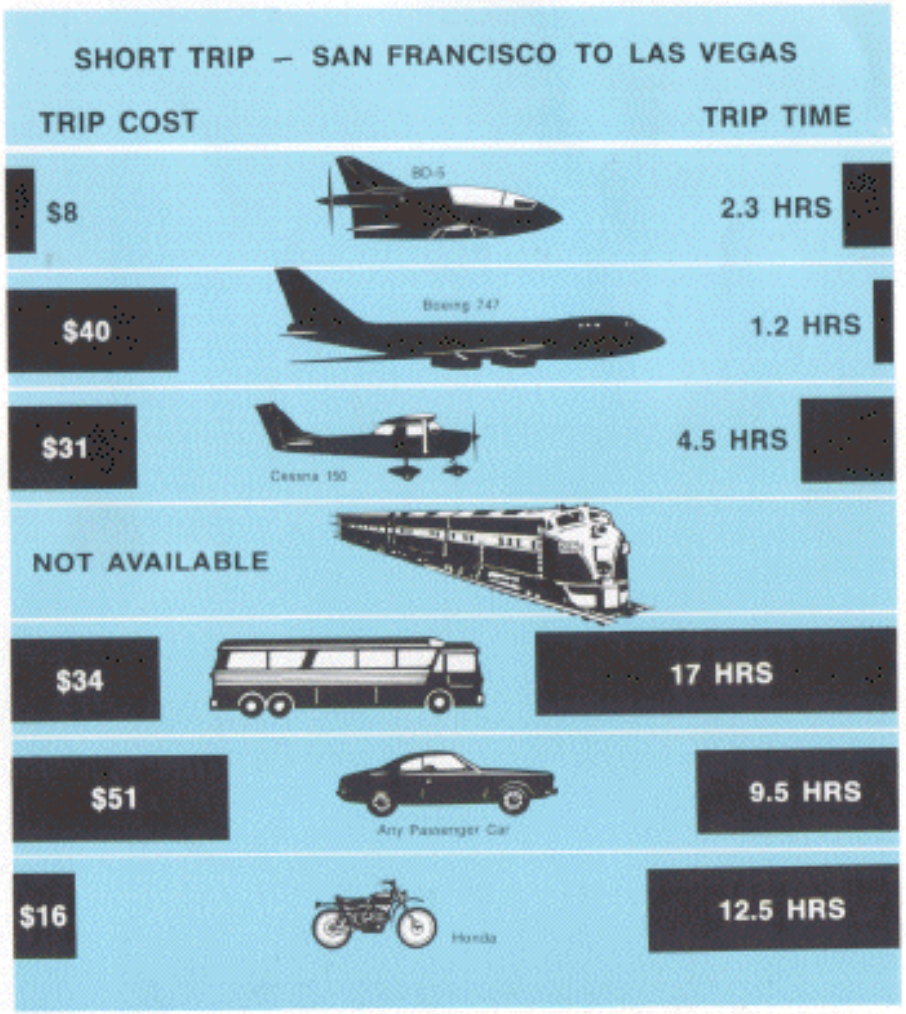
The economical advantages of the BD-5 are as evident in its operating cost as in its low initial purchase price. The following figures are a breakdown of approximate operating costs. Hangar rental is not included because the aircraft is so small that it can easily be taken home by its owner or even kept in an enclosed hangar/trailer that is being developed.

40 H.P. BD-5B		70 H.P. BD-5A	
FUEL 4 gal/hr @ $.45/gallon	$1.80	FUEL 7 gal/hr @ $.45/gallon	$3.15
OIL 1 qt/1.3 hr	.50	OIL 1 qt/.7 hr	.90
ENGINE OVERHAUL every 300 hr @ approx. $75.00	.25	ENGINE OVERHAUL every 300 hr @ approx. $125.00	.42
AIRFRAME MAINTENANCE every 100 hr @ $30.00	.30	AIRFRAME MAINTENANCE every 100 hr @ $30.00	.30
INSURANCE	.75	INSURANCE	.75
TOTAL	$3.60 per hr.	TOTAL	$5.52 per hr.
@ 185 mph cruise operating cost = 1.9¢/mile		@ 237 mph cruise operating cost = 2.3¢/mile	

Personal travel costs

The following charts compare the cost and time for BD-5 travel to other forms of personal transportation. The cost of meals and lodging are included where applicable. As you can see the BD-5 represents a major revolution in the cost and convenience of personal transportation. A 55 H.P. BD-5B was used for these calculations.





Building a homebuilt aircraft

Getting a homebuilt aircraft approved for flight is actually quite a simple thing to do. It is necessary; however, in the very early stages to contact the appropriate FAA office and begin the procedure of getting an airworthiness certificate for an aircraft that you build at home. Anyone is allowed to build his own aircraft if it is for educational and recreational purposes, and if they can demonstrate that they have completed over 51 percent of the work required in building this aircraft. If these basic requirements are met, the airplane can be licensed in the experimental amateur built category. The BD-5 is designed to qualify as an amateur built aircraft. Bede Aircraft, Inc. does supply all the materials and does do some of the difficult forming but the major portion of the work is left up to the individual builder.

Due to the considerable amount of interest in the BD-5, your FAA office will be well aware of the materials package supplied with the BD-5 design. The first step, therefore, is for each builder to contact personnel in his local FAA office when the materials arrive and advise them you will be building the BD-5. If that particular FAA office does not certify amateur built aircraft, they will advise you which FAA office in your area has that responsibility. It is usually the General Area District Office (GADO) or an FAA Engineering and Manufacturing Office.

After you have advised the appropriate office of your intentions, they will brief you on the various requirements and stages that they would like to observe while you are constructing your aircraft.

A particular examiner may be assigned to coordinate the building of your aircraft or you may have several different inspectors reviewing your work as you proceed. They may want to come out and see your materials package before you begin construction. This is a very good procedure because you and your local FAA man can review all of the factors affecting inspection on your aircraft.

The general procedure with FAA is to inspect the various components before you completely close it up so that they can study each and every construction point. This is known as pre-covering inspection. It allows the FAA inspector to simply and accurately review the structure before closing off internal work which would make inspection difficult. It is therefore very good to advise the FAA office early enough to give them time to schedule a visit before you get to a stage of completing a sub-assembly. You must remember that the FAA field inspectors are involved with many aviation activities and it may not be possible for them to come and view your aircraft on short notice.

Following the pre-covering inspection, the FAA examiner will want to see the aircraft when it is finally completed ready for its initial flight. He then performs a very thorough inspection and issues the aircraft operating limitations. The general rule for an amateur built aircraft, using a non-certified aircraft engine, is to be restricted to a flight test area, usually within a 25 mile radius of the airport from which you want to operate. After the 75 hours of flight time is performed on the aircraft, you advise your inspector and he will again perform a thorough inspection of the aircraft.

It is necessary for you to perform your own inspection before inviting him out so that you may service the aircraft and perform any maintenance that may be necessary.

The inspection at this point will confirm whether there is any adverse wear or unusual service experience that might jeopardize the safety of the aircraft. If everything is shown to be airworthy, you will be issued a new airworthiness certificate permitting you to fly outside of your test area. One year after this date it will be necessary to relicense the aircraft and repeat the inspection process. All maintenance and servicing on the aircraft and engine can be performed by the builder. It is expected that since you have built the aircraft you are equally well qualified to service and maintain it.

It must be remembered that the purpose of the FAA inspection is to insure the airworthiness and safety of the aircraft. You will find that the FAA inspector can give you a great deal of advice and helpful suggestions based upon his experience. It is always best to follow his advice. If you follow the plans as they are illustrated, and use all the quality materials supplied with the materials package, you will find that it will be easy to build a completely airworthy and safe aircraft. Your FAA inspector will confirm your construction process. The building, the certification of an amateur built aircraft and the maintenance of such an aircraft is quite simple, as long as you follow instruction and follow accepted aircraft construction procedures.

To help facilitate the building and the certification of a homebuilt aircraft we very strongly recommend each builder join the Experimental Aircraft Association located in Hales Corners, Wisconsin. This non-profit organization is over 20 years old and has become the world authority on building amateur built aircraft. There are over 300 local EAA chapters made up of members who are interested in building their own aircraft. For a newcomer, this is an excellent source of assistance by experienced aircraft builders. The headquarters of EAA publishes a monthly magazine that is filled with valuable and instructional information. In addition, the EAA office has available many publications and manuals describing building techniques for the amateur constructing his own aircraft. This organization is one of the most outstanding aviation organizations in the world and is a valuable asset to anyone building his own aircraft.

Specifications for Hirth aircraft engines

The following information defines the characteristics of the Hirth two-cycle, air cooled aircraft engines to be installed in the BD-5A and BD-5B.

Power—At sea level standard conditions (29.92 in. Hg. and 15°), the Hirth engine models 438, 650, 720, respectively, brake horsepower outputs of 40, 55, and 70 bhp, measured at the power take-off end of the crankshaft, using a Hirth designed intake and exhaust system.

Weight—The weight of the models 438, 650, and 720, respectively, is 70, 90, and 92 pounds, including the carburetor, exhaust system, starter, and alternator.

Specific Fuel Consumption—Specific fuel consumption of all three engine models will be 0.75 lb/hr/bhp at a power setting of 75% of the maximum bhp available at sea level standard conditions. Maximum power sfc will be equal to or less than 0.90 lb/hr/bhp.

Time Between Overhauls—The time between major overhauls for all models will be 500 hours engine operating time, assuming that the engine will be operated at 75% rated power 90% of the time and at maximum rated power 10% of the time. Time between top overhauls will be 200 hours operating time under the same conditions.

Maintenance—Preventative maintenance and minor repairs will not require any special tools or equipment. All types of maintenance, including major overhauls, will not require more than 0.03 man hours per flight hour (assuming that the major overhauls will be performed by an experienced mechanic with the proper tools).

Inspection—Prior to final assembly of the engine, the power take-off end of the crankshaft will be nondestructively tested (Magnaflux, Zyglo, etc.) to insure structural integrity. Additionally, each part of each engine will be individually visually inspected prior to final assembly.

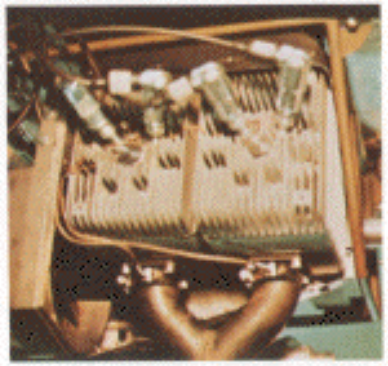
Run-In—After final assembly and prior to shipping, each engine will be run for a minimum of 30 minutes to verify the integrity of all fluid seals, to assure that the carburetor mixture and idle speed adjustments are correct, that the engine meets the required minimum bhp output, and to verify correct operation of the electrical/ignition system. Additionally, each 500th engine will be run continuously for not less than 90 hours at 75% of maximum sea level bhp and 10 hours at full throttle without failure.

Packaging—The final assembled engine will be packaged in a container adequate to withstand normal handling during shipping without damage to the engine or accessories. Additionally the container will contain some provision to protect the contents against moisture damage (in the form of humidity) for a storage period of not less than 6 months.

Warrantee—Any engine supplied by Bede Aircraft, Inc., under this specification will be unconditionally guaranteed against any defects in materials or workmanship for a period of 90 days after the first use of the engine.

Engine Data—Hirth will develop a method for determining inflight brake horsepower and will supply curves of bhp as a function of carburetor inlet temperature and pressure and engine RPM and intake manifold pressure. An operators manual and a parts manual will be supplied with each engine. The full maintenance and shop manuals will be individually ordered by the customer as required.

Ground Operation—With the engine (either model) mounted inside the BD-5 fuselage and using the production blower, intake and exhaust systems, it is possible to operate the engine at the following conditions without exceeding any critical engine temperatures:



a. Engine start and 2 minute warm-up at zero forward velocity and 2,000 RPM.

b. Six minutes taxi time at a power output of 8 bhp.

c. One minute idle, followed by a one minute runup at 50% rated power, both at zero forward speed.

d. Three minutes at idle at zero forward speed, followed by full throttle for 15 seconds with airspeed increasing linearly from zero to 70 mph.

Exhaust System—The exhaust system is designed and manufactured by Hirth to provide a minimum power loss and minimum weight addition to the aircraft. The exhaust system will consist of the exhaust manifold, muffler(s) and tailpipe.

Mixture Control—All engines supplied under this specification have provision for varying the carburetor fuel/air ratio to maintain the optimum value up to an altitude of at least 15,000 feet. The engine shall continue to run normally at all throttle settings up to an altitude of 18,000 feet.

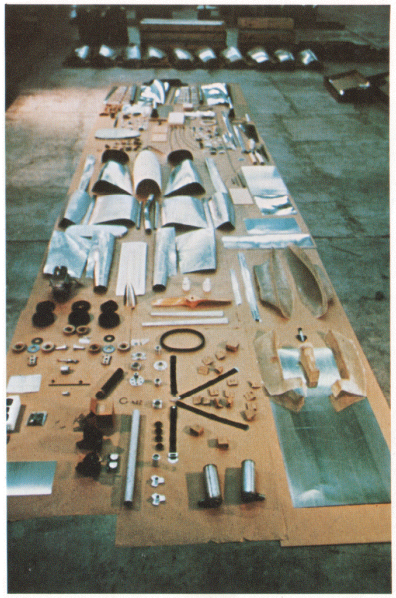
Engine Cooling—All three models are supplied by Hirth with an integral blower for cooling. This system provides adequate cooling for 10 minutes full throttle operation at an ambient temperature of 105°F, and continuous operation at 75% maximum rated power without exceeding any critical engine temperatures.

Electrical System—The electrical system of the engine consists of single engine-driven alternator, capable of an output of 5 amps at 14 volts at 6,000 RPM. All wiring, including that to the battery, voltage regulator and starter are furnished by Bede Aircraft, Inc. The starter and a 20 amp alternator will be furnished by Hirth separate from the engine, designed for optional installation by the BD-5 builder. Bede Aircraft, Inc. will supply the voltage regulation system.

Ignition System—The ignition systems for the models 650 and 720 engines supplied to Bede Aircraft under this specification are of the dual ignition (2 spark plugs per cylinder), capacitor discharge type. A shielded ignition harness is included. The 438 engine has an unshielded single ignition.

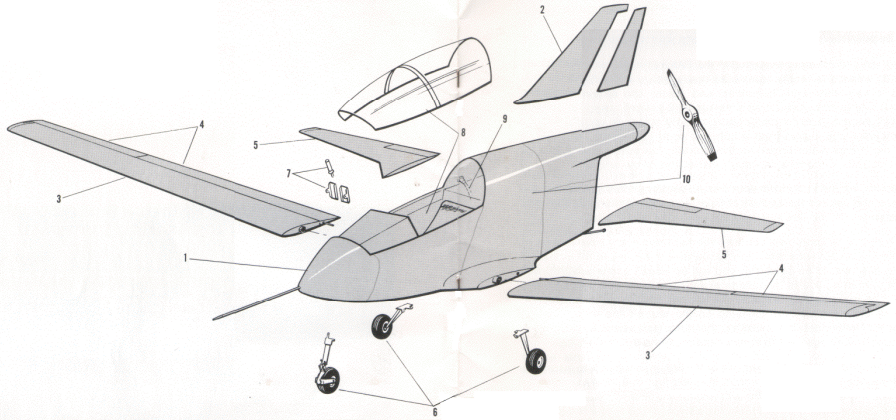
Lubrication—Hirth will supply a list of acceptable oils and mix ratios.

Fuel System—All models are designed to operate on aviation grade gasoline of 91 octane or greater. During normal operation there will be no tendency toward pre-ignition, detonation or vapor lock at any cylinder head temperature less than 450°F and altitude up to 18,000 feet. Hirth will provide an optional boost pump, adequate to run the engine normally if the diaphragm pump fails.



Building your BD-5

You will find building your BD-5 will be one of the most rewarding and enjoyable experiences you can have. Although a reasonable amount of spare time is required, practically every aircraft homebuilder will tell you that it is an enjoyable, rewarding experience to build your own aircraft.



Order of construction

1. Fuselage
2. Vertical Stabilizer
3. Wings
4. Ailerons and Flaps
5. Horizontal Stabilizer
6. Landing Gear
7. Controls
8. Cockpit and Canopy
9. Fuel System
10. Engine and Drive

Typical forming

This illustrates a typical procedure used in forming parts for a BD-5. Complicated and difficult-to-form parts are already performed by the factory.


1. Trimming metal


3. Drilling holes


2. Filing rough edges


4. Cutting slots


5. Making wood form


6. Bending metal over form


7. Finished piece

Notes:

Kinds of customers

A SUMMARY OF OCCUPATIONS TAKEN FROM QUESTIONNAIRES

*accountant
air traffic controller
art director
architect
auto dealer
advertising executive
*armed forces—servicemen
lieutenants
majors
colonel
major general
barber
bander
bartender
baker
bus driver
*broker
court recorder
clergymen
crane operator
coal miner
chemist
chiropractor
compositor
company presidents
computer programmer
C.I.A. agent
*consultant
customs worker
construction worker

commercial artist
college president
dentist
dairyman
draftsman
*doctor
export forwarding agent
*electrician
*engineer
economist
entertainer
*factory worker
farmer
funeral director
forest ranger
gas station attendant
goldsmith
hydrologist
hairdresser
insurance man
interior decorator
industrial psychologist
lawyer
lumber worker
*lab technician
locksmith
marketing executive
metalurgist
miner
missionary

mill worker
musician
mathematician
management consultant
meteorologist
nurse
oceanographer
oil man
optician
powerplant operator (nuclear)
piano tuner
purchasing agent
programmer
pharmacist
personnel director
printer
plumber
pipe fitter
policeman
painter
physicist
postal clerk
psychiatrist
*pilot
photographer
producer-movies, T.V.
radiologist
retiree
restauranteur
rancher

real estate broker
*research technician
sewage disposal worker
scientist
sub-station operator
steam fitter
steel worker
sculptor
*salesman
silicone mixing operator
*student
sailmaker
social worker
telephone installer
*teacher
travel agent
truck driver
T.V. director
tax examiner
transportation consultant
tool maker
vice president
welder
water sampler
writer
watchmaker
warehouseman
x-ray technician

*indicates vast areas of specialization in the general field

Pilot skill required

Both the BD-5A and B are basically very easy to fly. The excellent stability and control characteristics, combined with the side stick and good cockpit visibility make the long wing, low powered aircraft docile enough for the inexperienced pilot, yet with the larger engines and short wings it has more than enough zip for the seasoned aerobatic enthusiast.

Since pilot skill is not always a function of number of hours or ratings, it's somewhat difficult to set either of these as criteria for check-out in the different versions of the BD-5. However, as a general guideline the inexperienced pilot should start out with the lowered powered long wing aircraft and work his way up to the higher powered short wings.

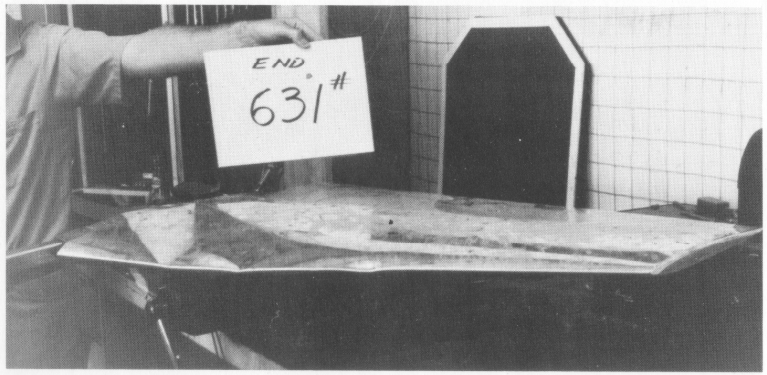
This is not to say that everyone has to fly every version, but simply a recommended progression of increasing speed and performance that could take some getting used to.

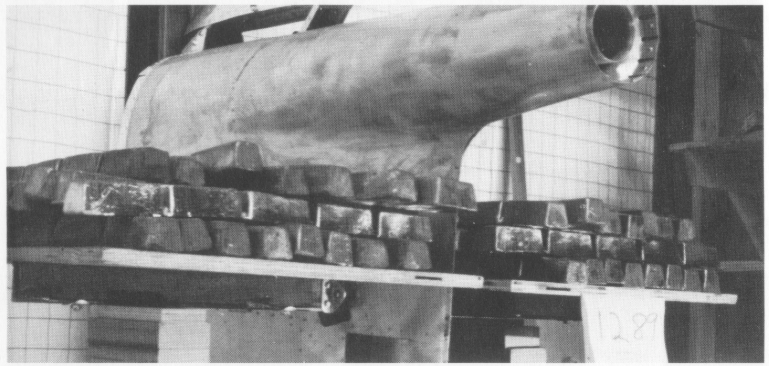
As another general rule, 10 hours solo time in a Yankee should be adequate training for the 40 H.P. short or long wing BD-5, with the understanding that some dual in a retractable gear airplane would be helpful. All versions of the BD-5 are easier to fly than a Yankee from a pure control manipulation standpoint, but the performance of the 55 H.P. and 70 H.P. versions could be a little surprising—a 2000 + fpm rate of climb and 200 + mph IAS are something few lightplane pilots have ever seen, much less flown. To step right into either a 70 H.P. BD-5A or B, a pilot should have at least 100 hours total time as pilot in command and at least some stick time in a lightly loaded high performance retractable gear airplane, just to get used to the rate of change of airspeed and altitude during maximum performance take-offs and climbs.

A complete program for initial flight testing and checking yourself out in the BD-5 will be a part of the pilot's flight manual, which will be included in each material package.

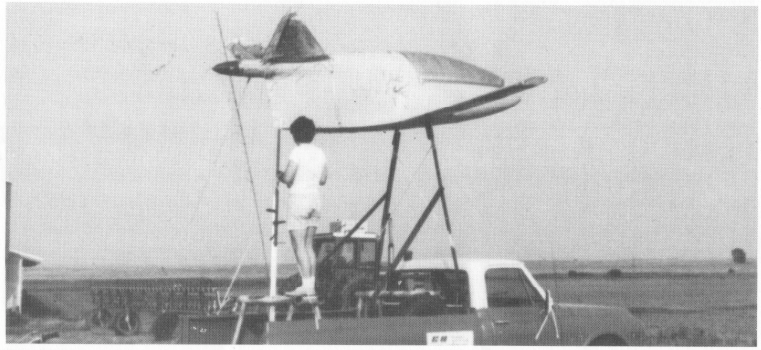
The development of the BD-5 included structural proof-load tests to assure that each component met rigorous strength requirements. The BD-5s structure exceeds the F.A.A. requirements for certification in all areas. Major static load test areas included the fuselage, the wing, the horizontal and vertical tail and flaps and all control surfaces. The landing gear was developed and tested to withstand a 600 feet per minute rate of sink landing at gross weight. Over 100 drop tests were conducted during the landing gear development.

For example, the horizontal tail was designed to withstand full aft stick deflection at the maneuvering speed for the short wing configuration which is a load equal to twice that required to pull eight g's. With a safety factor of 1.5 this required an 1800-lb load on the horizontal tail, almost three times the gross weight of the airplane!





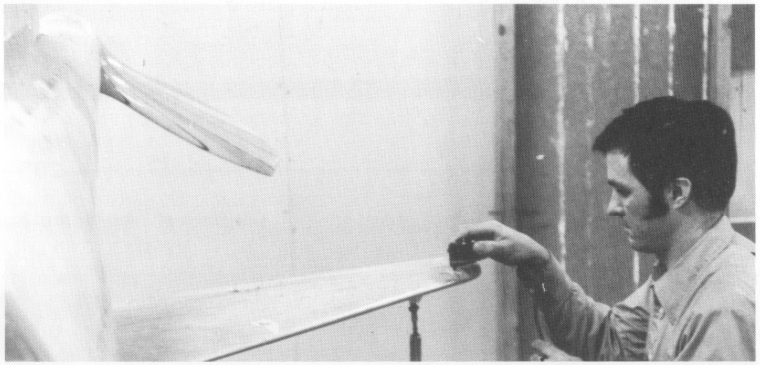
Structural testing

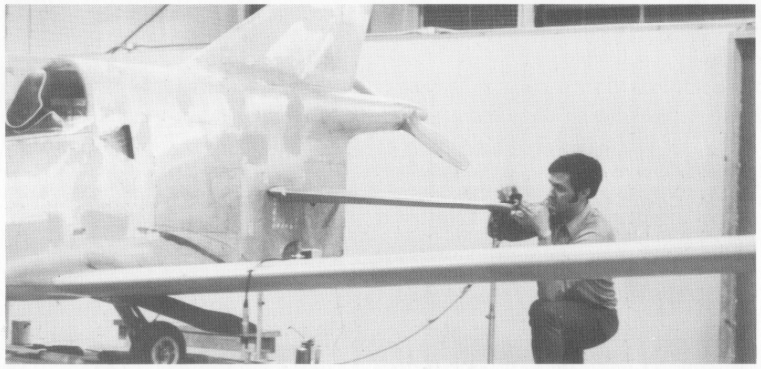


Flutter testing

The geometric shape and high strength of the BD-5 result in a very rigid structure which is very beneficial from a flutter standpoint. To assure a flutter free airframe, Bede Aircraft employed an outside consulting service to conduct ground vibration tests and a computerized flutter analysis.

The results of this analysis show that the BD-5 is free from flutter throughout its flight envelope and, in fact, has a much greater margin of safety for flutter than the average certificated aircraft.





Size of shop (work space required)

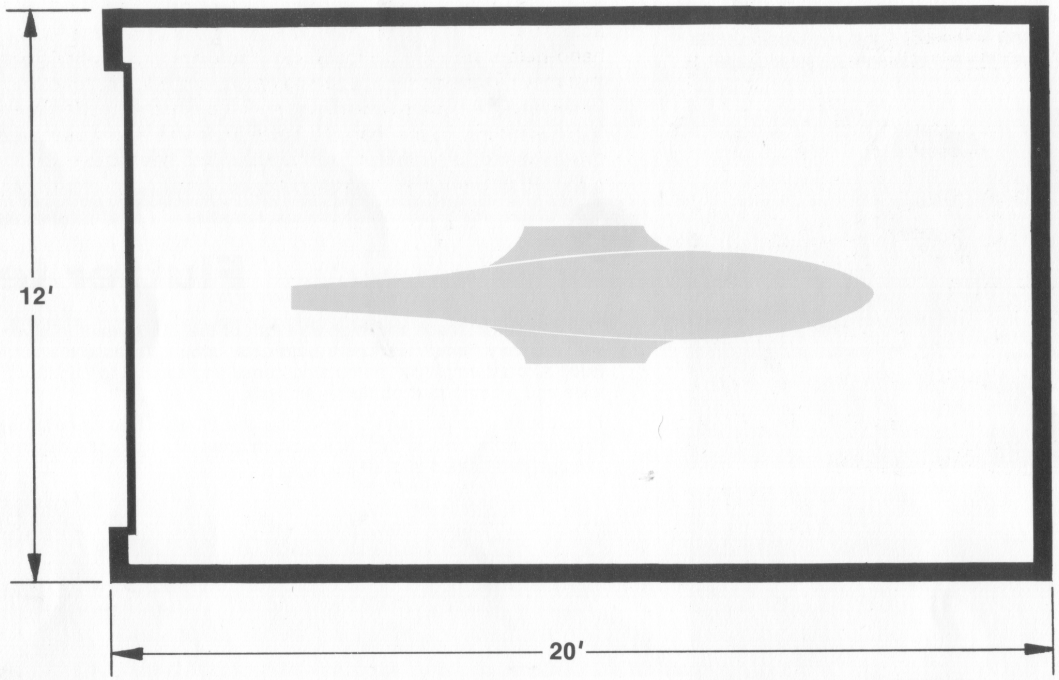
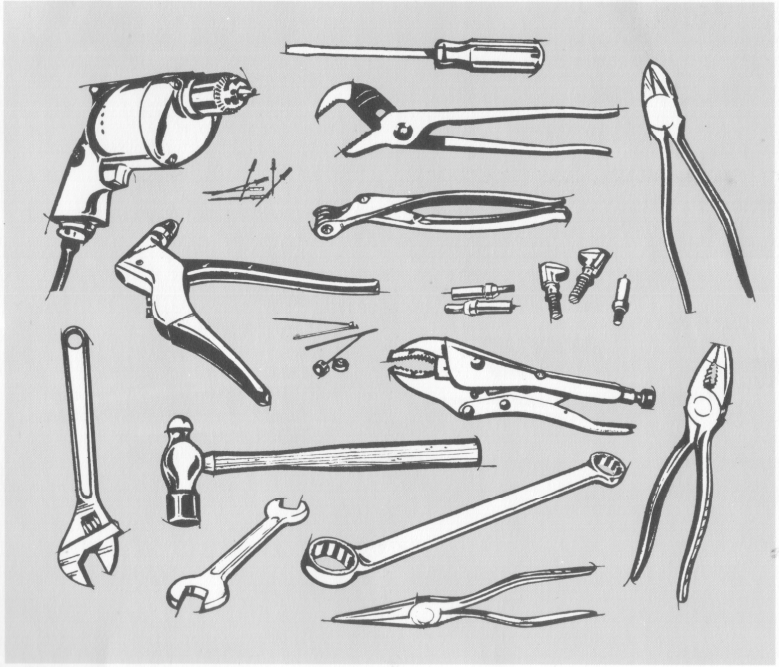


Diagram shows typical space requirement

In building a BD-5, it is necessary that you have adequate space to do the construction. The BD-5 is a relatively small aircraft assembled from several small components. For example, the wings and tail structure can be built in an area of relatively small size. From an overall construction standpoint, we feel an area approximately the size of a one car garage is needed for efficiency. This area can be in a home basement shop or in a car garage suitably equipped with benches, lights and heat, if required. We know it is quite possible to build an aircraft in extremely cramped and unusual areas. One homebuilt aircraft is actually being constructed in an apartment in downtown Manhattan. These small areas are not recommended unless nothing else is available. Construction will be considerably smoother and more efficient if an adequate space is available. A two car garage converted to a shop would provide an excellent construction area. Any shop that fits the individual's particular needs, approximating the size described above, will serve as a building area for the BD-5 in which the individual builder will discover a great deal of construction pleasure.

Tools required



Relatively simple tools are required to fabricate the BD-5. Normal tool box equipment with screwdrivers, wrenches, socket set, hack saw, hammer, etc. are needed. In addition to this, a ¼" electric hand drill is necessary. Not absolutely essential, but desirable, is some type of electric saw. A simple hand-held sabre saw is most ideal. There are a few welded parts on the BD-5 that may require some builders to have their welding done by an outside shop if they are not equipped with gas welding equipment. There are only a few of these specialty items that can easily be done by an outside shop. From an overall standpoint, therefore, the BD-5 has been designed to be fabricated with nothing more than basic tools.

MINIMUM TOOLS

PLUMB BOB
HACKSAW
CENTER PUNCH
8 OZ. PLASTIC TIP HAMMER
MEDIUM WEIGHT BALL PEEN HAMMER
ADJUSTABLE WRENCH
SMALL SET OPEN, BOX-END AND SOCKET WRENCHES
MEDIUM OR HEAVY DUTY ELECTRIC DRILL WITH 21 PIECE (1/16 TO 3/8 INCH BY 64TH OF AN INCH) SET OF DRILL BITS. ALSO NEEDED WILL BE NO. 40, NO. 39, NO. 28, NO. 29 & NO. 19 DRILL BITS
AT LEAST THREE COMMON AND THREE PHILLIPS SCREWDRIVERS OF ASSORTED SIZES.
ONE DOZEN 4-INCH C-CLAMPS
100° COUNTERSINK BIT
120° COUNTERSINK BIT
ONE FLAT MEDIUM AND ONE FLAT FINE FILE
WIRE CUTTERS
MACHINIST'S BENCH VISE (3½ to 4½ INCH JAW SIZE)
BLIND RIVET GUN
TUBING CUTTER (½ INCH CAPACITY)
TUBE FLARING TOOL (37° FLARE)
CLECO PLIERS
100 NO. 40 (3/32) CLECO SHEET HOLDERS
50 NO. 30 (⅛) CLECO SHEET HOLDERS
NICOPRESS SLEEVE SQUEEZE TOOL
ONE CYLINDRICAL AND ONE TREE-RADIUS ROTARY CUTTERS
TIN SNIPS
10 FOOT METAL RULE
DIMPLING DIES
1¾ AND 2 INCH HOLE SAWS
SCRIBE

OPTIONAL TOOLS

SABRE SAW WITH ALUMINUM CUTTING BLADES
AUTOMATIC CENTER PUNCH
DRILL PRESS
ADDITIONAL NO. 30 AND NO. 40 CLECO SHEET HOLDERS
CLECO SHEET CLAMPS
ADDITIONAL C-CLAMPS
AUTOMATIC STOP COUNTERSINK WITH NO. 40 X 100°, NO. 30 X 100°, NO. 28 X 100°, NO. 19 X 100°, NO. 12 X 100°, AND NO. 30 X 120° CUTTER
RIGHT AND LEFT HAND AVIATION SNIPS
ASSORTMENT OF FLAT, HALF-ROUND AND ROUND FILES
VICE-GRIP PLIERS
TORQUE WRENCH
POWER HACKSAW, CUTOFF SAW, TABLE SAW WITH NON-FERROUS METAL CUTTING BLADE, BAND SAW, SMALL TABLE SHEAR, SMALL TABLE BRAKE.

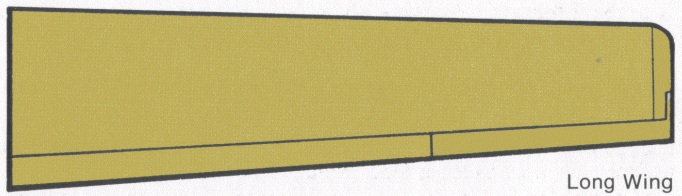
Mobile hangar

A specially designed, enclosed trailer has been developed for the BD-5. The trailer becomes a customized, low-cost aircraft hangar. Not only does this provide excellent storage facilities for this aircraft, but it offers the flexibility of complete mobility. The mobile trailer can be kept at home and used to transport your aircraft to and from the airport or can be kept at the airport when desired where it becomes an excellent customized hangar. There are provisions in the design to store an extra set of wings and various accessories you may want to keep with your aircraft.

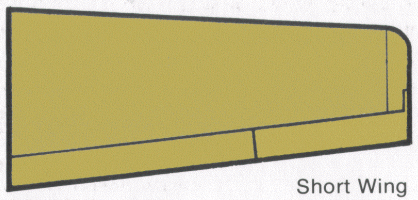
Optional equipment

An extra size of wings can be built for the BD-5 providing you with the capability of having practically two different types of aircraft. The short wings have maximum strength and maneuverability as well as high speed. The long wing affords lower landing and take off speeds, more docile handling characteristics and the capability of limited soaring. It is suggested you build and fly the long wing version first. Either an extra set of the long or short wings can be built at any time. All wings will be interchangeable with the fuselage.

A variety of optional equipment is available or will be available soon. Complete electrical system, instruments, radios, extended pitot boom, and other items permit you to tailor your BD-5 configuration to meet your exacting needs.



Long Wing



Short Wing

Placing orders

We hope this information kit provides you with enough information to answer all your questions regarding the BD-5. We feel certain that if you would like an efficient, fast, strong, personal aircraft the BD-5 is your best answer. Since the introduction of the BD-5 there has been considerable amount of interest with pilots from all over the world ordering their own aircraft. This has resulted in a back log of orders that is requiring a certain amount of lead time to fill. It is for this reason we have established an order form that requires a $200 deposit to establish a definite production schedule position. Upon receiving this order form at the company headquarters in Newton, Kansas, a serial number is assigned to the customer. Aircraft are then shipped on a first come first served basis.

Your order can be placed through any dealer listed on the sheet enclosed in the back of this information kit. Or you can place your order directly with the company by sending in the order form in the back pocket. It is not necessary to select the various optional equipment you may like at this time. However, you can if you so desire. It is only necessary to pick the size of engine and other accessories 30 days before your scheduled delivery date. At this time, you are required to pick your optional equipment and remit the balance owing on your order. This assures smooth and uninterrupted delivery of your BD-5. An alternate program permits the balance owing to be paid on a COD basis. There is, however, an additional $75 charge to be paid 30 days before your scheduled delivery.

BEDE AIRCRAFT, INC.

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