GNATSUM . . .

(Continued from Preceding Page)

desirable effect), no sign of wing drop, ailerons and rudder effective through the stall. Pattern speed is the 120 mph. IAS with gear out and 15 degrees flap (1900 rpm). Final is at 110 mph with full flap, bleeding airspeed back to 95 mph over the threshold — very noticeable ground-effect cushion just before touch-down — need a little left rudder to check minor swing as power is pulled off. Power is used through the entire approach until landing is assured. On take-off, a little right rudder needed to check swing -- plane is a little beauty." George always chuckles and grins after every flight!

Bill Hettrick (6,000 hours on bush aircraft and many others, including a Loving "Love") claimed: "Nice . . . no problem with trim — would be better with a constant speed prop!"

Harry Raday (400 hours, some Stearman time, but mostly tri-gear time) found it: "Very responsive — maneuverability tremendous—not bad at all!"

Performance data to date, related to 2,300 ASL field elevation, is:

Take-off speed .....70-80 mph
Take-off distance ..... 800 ft.
Take-off distance over 50-ft. obstacle .....1,200 ft.
Initial rate of climb, with gear down and 15 degrees flap.1,100 fpm
Rate of climb..1,300 fpm first 1,000 ft.
Stall clean .... 75 mph IAS power off
Stall—15 degrees flap .... 68 mph IAS power off
Stall, gear down and full flap .....65 mph IAS power off
Maximum speed attempted — 220 mph IAS in shallow dive from 1,000 ft.
Landing roll ..... 800 ft.
Landing distance over 50 ft. obstacle ..... 1,300 ft.

Other features of the prototype Jurca MJ-7H "Gnatsum" include all-wood and plywood construction; steel-tube engine mount; fiberglas nose cowl, dorsal fin, and removable dummy belly radiator housing. The cowls and wing-root leading edge section are aluminum, and the ship is covered with urethane plastic and fiberglas (Hipec Plastithane).

The engine is a 200 hp Ranger spinning a three-blade Hartzell propeller. The main wheels are Cleveland type, and brakes are hydraulic. The main landing gear retracts electrically with a manual emergency system, and the Maule P8 tailwheel also retracts electrically.

Fuel capacity is 30 gals. of 80/87 octane gas, and the ship uses eight to ten gallons per hour. Reserve tanks, when installed, can hold an additional 30 gals.

Cruise speed is 150-180 mph, depending on propeller-pitch setting, and range is about 500 miles (900 miles with reserve tanks).

Universal HOLE-FLAN Tool

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THIS ARTICLE describes a method of flanging lightening holes that is simple, economical, and flawless, utilizing only a few minutes of practice and scrap stock.

I'm a "Mustang II" builder, and quickly found a need to flange holes from ¾ to 4¾ in. diameter in ¼ in. increments. Too many potential "silver-bird" builders have been scared off by the necessity of stiffening structural members with flanged holes. The "taped pliers" method is time consuming. The "metal die-set" technique is fine for those who can afford it or where only four different hole sizes are required. The method described here is for anyone who has a fragment of mechanical ability and will stop long enough to collect a few parts, plus some ¾ in. plywood or chipboard or any other useless scrap of ¾ in. thick wood. The savings will be hours and hours of time, not to mention the benefit of pride of workmanship and a superior quality product of your own two hands, and the elimination of frustration which also counts for many hours.

Purchased Materials Required

1. Sears Roebuck #3460 Circle Cutter to cut and flange holes from 2 to 8 in. size.
2. Sears Roebuck #3465 Circle Cutter to cut and flange holes from 1 to 1¾ in.
3. A 5/16 x ½ in. ball bearing for a ¼ in. diameter shaft (½ in. dimension is not critical but should not be much less for best results). This item is used with Item 1 above.
4. A ¼ x ½ in. ball bearing (minimum size) for Item 2 above, with a ¼ in. shaft diameter.
5. A 2¾ x ¼ x ¼ in. square cold-rolled steel piece for Item 1.
6. A 2½ x ¼ in. piece of cold-rolled or water-hardened drill rod for Item 2. (It only costs 76c for a 3 ft. length, so buy it).
7. One piece of ¾ in. thick inexpensive plywood or chipboard or what have you, about 3 ft. square. Cut out pieces about 6 x 6 in. square for each hole in excess of 4 in. in diameter. All other pieces should be about 5 in. square. These are later cut to size with a saber saw or disc sander.

By now you're saying: "What a project! Forget it!" It's one of those things that takes hours to write about and one hour to accomplish. Besides, I never could say things in one simple sentence.

Principle of Flanging

Referring to the accompanying drawing, the Sears Circle Cutter (Part 1) mounts the tool (Parts 2 and 3) to spin a flange in stock up to and including .032 in. The female die is simply a piece of wood (Item 7). Parts 5 and 6 are refinements if you wish to go further. The drill press is run at its slowest speed on the pulley drive for all hole sizes. The ball bearing is set at a 30 degree angle and rolls around the material surface with a quick pull to produce a ¼ in. x 30 degree flange in one second. More details on this later.

Construction

Items 2, 3 and 7 are all you make, and they're easy. They are easier if you consider the cost of a set of completed ribs or the hours it takes to flange by hand. Let's take it a step at a time. Part 1 you buy per the materials list. Part 3 is also pur-

chased from the list. Part 2 is made as follows:

For the ½ in. shank Circle Cutter #3460, you buy a piece of ¼ in. square cold-rolled steel about 2¾ in. long. This is Item 5 on the material list; most steel houses take pity and give it to you, even in Lynchburg. Now take the bearing and the piece of ¼ in. square cold-rolled and go to anyone who has a lathe and knows how to use it. The bearing hole is about .001 in. undersize for a ¼ in. shaft. Have him turn down the ¼ x ¼ in. stock to .250 in. plus .001 about ¾ in. up one end. Thank him profusely and leave. When you get home, grab the ¼ x ¼ in. stock, put it in a vise about 5/16 in. above where the rounded end stops, and **tap** it over until the rounded end is about 30 degrees off vertical. (It's not critical, so don't sweat it trying to get the last ¼ degree).

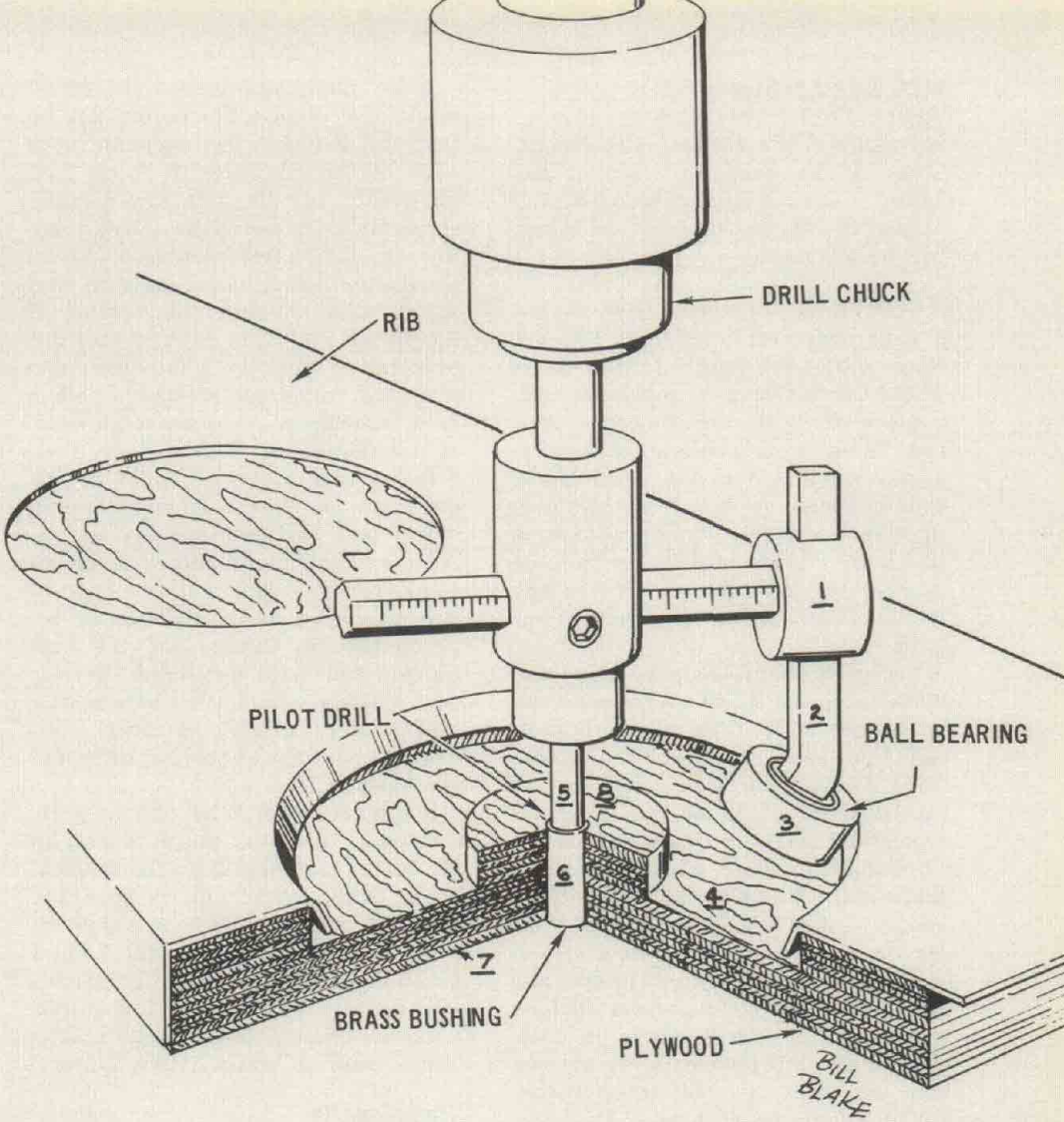
Now, you have Part 2 ready to mate with Part 3, which is the bearing. The bearing hole is .001 in. undersize, which is how they are made. The rounded part of Part 2 is .001 in. oversize if your friend didn't goof. This makes for a good "drive" fit. Here is how you make a driver. Take a piece of ½ in. square or ½ in. round steel and drill a hole in the end of it to accommodate easily the ¼ in. round shank of Part 2. (It need be only long enough so you won't hit your fingers like I did).

Drive the bearing onto the round shank with a soft mallet until it's on as far as it will go with the mallet. Then take the driver we just made and drive it on as far as it will go. That's all there is to it. Caution, however! You now have surplus ¼ in. round

GING

shank sticking out that gets in the way. Tape the bearing openings and grind off most of the surplus. Then take a ball peen hammer and peen over the excess to insure a tight fit. Incidentally, if the soft mallet will not drive the bearing onto the shaft fairly easily, use medium grit emery cloth to reduce the diameter slightly. It doesn't take much effort, so go easy.

Also, chamfer the end of the ¼ in. diameter shaft to provide a "lead." At any rate, it won't fly off since the flanging pressure forces it tighter on the shaft. You want the bearing to rotate easily so as to reduce the effect of "dragging." Keep it away from dirt and metal filings.



You now have the tool for holes from 2 to 8 in. in diameter. The Sears #3645 Circle Cutter will take you down to 1 in. holes. For this cutter, Part 2 in the drawing is made from a piece of ¼ in. round, rather than square, cold-rolled steel or drill rod. (Item 6 on the materials list). You simply grab the round stock for Part 2 in a vise and bend it 30 degrees from vertical ¾ in. up from one end. The bearing will drive on perfectly. Before driving on the bearing, file about 1⅛ in. of the shank to 3/16 x 3/16 in. square to fit the tool holder. Then bend it 30 degrees so the bend is in line with one of the flat faces. Then drive the bearing on. Grind off excess and peen as described above. Filing takes only about half an hour at most.

Construction of Wood Block Female Dies

You're lucky! The Sears Circle Cutters are used for this too. Take a piece of ¾ x 6 x 6 in. (or 5 x 5 in. for holes under 4 in. diameter) wood and clamp to your drill press with the pilot drill of the circle cutter in the wood-block center. Set the drill press stop for a ⅜ in. deep penetration. Take the cutting tool that comes with the larger #3640 Circle Cutter and put the non-cutter end to work as a means of knocking out material in the wood block. Here's how. Sharpen the opposite end by grinding it back at an angle of about 25 or 30 degrees. This provides a sharp square cutting edge with clearance in the back as it rotates clockwise. Looking at the cutter from the front, provide inside edge clearance (to your left) by grinding about a 3 to 5 degree angle from front to back (deepest part at the back) about 9/16 in. in length from the bottom of the cutter.

As an example, for a 3 in. female wood die, adjust the cutter bar of the Sears Circle Cutter to produce a 3½ in. diameter wood-block cut-out. (All wood-block hole diameters are ½ in. larger in diameter than the metal hole size to provide a ¼ in. flange). Bring the drill press arm down slowly and you will produce a ¼ in. wide by ⅜ in. deep 3½ in. diameter slot. Move the cutter bar inward and take out another ¼ in cut. Do this about five time to take out all required stock to clear the ball bearing race width when

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HOLE-FLANGING TOOL . . .

(Continued from preceding page)

it is fully to the bottom of the block. There is no need to chamfer any edges. Just sand off any loose material around the edge of the hole and knock off the sharpness.

You're Ready to Flange a Hole

Let's start with holes from 2 in. up. Reverse the pilot drill in the Sears #3640 Circle Cutter or replace it with a piece of ¼ in. cold-rolled or drill rod. This is to prevent excess wearing of the pilot hole in the wood block. This is shown as Part 5 on the drawing. Part 6 is an added refinement which is a brass bushing to prevent excess wear. An entire set of ribs was done without any bushing, but it does help.

I aligned the rib hole by using the metal piece that I had cut out with the circle cutter. Run the pilot through the hole and into the wood block. Then position the rib so that the removed piece of metal fits the hole. Eyeballing is good enough, even if the fit is a little looose. Clamp the wood block and rib to the drill press table snugly. I did this by using four "C" clamps and two pieces of steel ½ x 1 x 10 in. long. The steel pieces are taped on one side to prevent surface marks. Put the steel pieces on each side of the rib hole as close as you can get without tool interference. Clamp snugly on each end. This also prevents the rib from warping during the flanging operation.

After clamping, remove the metal insert and adjust the cutter bar so that the ball bearing over-rides the edge of the rib hole by about 1/32 in. Grease the rib with any cooking shortening. On your first attempt, adjust the drill press stop for a ¼ in. penetration. Pull down quickly, but not jerkily. Observe the results. If the flange isn't deep enough, increase penetration slightly. You can also slide the cutter bar outward another 1/16 in. Practice on some scrap stock and you'll quickly find how easy it is. I found that doing all holes of the same size at once will save time in set-up and you get uniform results. Start with all stern ribs. As you go along, you will find that you have to trim the wood block edges to fit between the rib flanges and the hole flanges you have produced. This is done quickly with a saber saw or disc sander. Always leave as much wood stock as possible to provide sufficient clamping surface.

For holes under 2 in., the set-up is the same. However, the pilot gets in the way of the bearing for the smallest holes. After alignment, remove the pilot. Be sure to make a couple of practice runs on holes under 2 in. I found that you could make five passes at it before cracks occurred. One pass is best — resist the temptation of a "little more to make it look better."

Clamping Jig

I went a step further and built a clamping jig to speed things along even more. In essence, it is a ⅜ in. steel plate slightly wider than the widest rib and about 10 in. long. In the center, I pressed in the bushing (Part 6) which I made from a piece of ⅜ in. cold-rolled and drilled to take the pilot (Part 5). The female wood die is then placed on this bushing which nicely aligns it and makes for a quick change. On the two long edges of the steel plate, I attached 1½ or 2 in. angle stock, which is used to make benches and things.

It has round and elliptical holes in it and is available as scrap from many sheet metal working shops. The two steel clamping bars were notched on each end to accept a piece of ⅜ in. threaded rod. Four pieces of threaded rod were bent over as a hook at one end with the aid of a propane torch and ground flat on two sides to fit in the angle stock holes. With this arrangement and wing nuts to tighten down on the clamping bars, set-up time is reduced to a minimum. Use a wood spacer under each steel bar to take up the slack.

Good tools are needed to do a professional job, no matter what you build. Efficient use of time is paramount to reducing the frustration factor, especially when we have so precious little of it. Impatience and frustration combine to make for higher costs from wasted time and material. I hope that this idea will help a few to get their birds in the air more quickly and at a higher quality level.

CANADIAN HOMEBUILTS

COMING TO OSHKOSH

CANADIAN MEMBERS planning to attend the 1970 EAA International Convention with their amateur-built aircraft will, as before, find it necessary to provide the Federal Aviation Administration with certain information in order to obtain prior approval for the flight to Oshkosh.

If your plans are already formulated, please submit the following information to EAA Headquarters so that we may obtain approval for you at an early date. The following facts should be forwarded to EAA Headquarters **no later** than May 15, 1970.

1. Name of owner and operator of aircraft, along with home address;
2. Type and identification markings of each aircraft;
3. The points between which each aircraft will be operated, including the port of entry. Ports of entry are restricted to Pembina, N.D.; Duluth, Minn.; Sault Ste. Marie, Mich., and Port Huron, Mich.;
4. Passengers and/or cargo will not be carried for remuneration or hire;
5. The aircraft will have on board a currently effective flight permit issued by the Canadian Department of Transport.

Persons arriving in standard certificated aircraft are not required to go through this procedure. While it may seem awfully early to commit yourself in this respect, we are obligated to submit this information in advance by a certain date. Therefore, the May 15, 1970 deadline is **firm,** and any applications received at Headquarters after that date cannot be guaranteed.