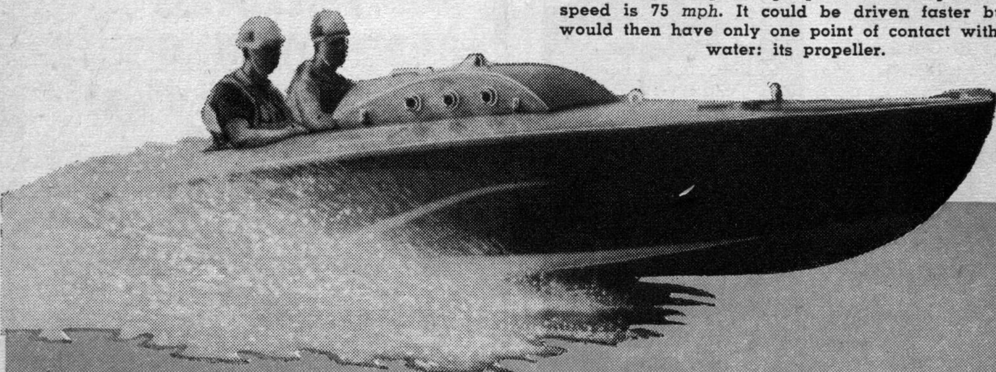
Section 1 Sports and Racing Runabouts

Panther

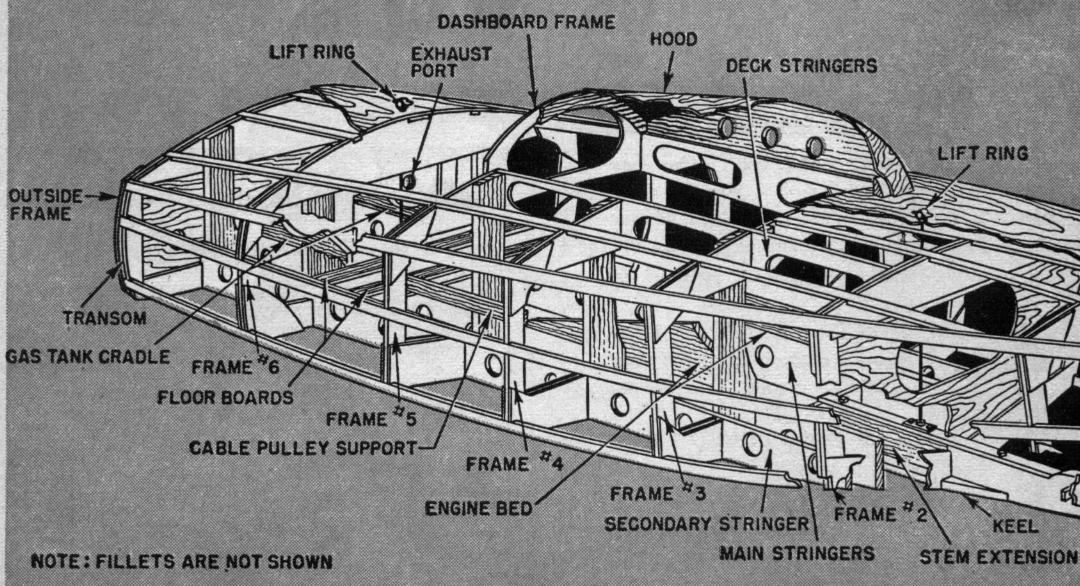
High-Speed, 15-ft. Inboard Runabout

By WILLIAM D. JACKSON
Naval Architect

HERE, veritably, is a projectile for water-borne space travel, an inboard speedster with super clean and efficient running lines. With any present-day automobile engine ('54 or later), or even with a "souped" '46 to '49 Ford or Mercury, speeds of 75 *mph* are possible—with no sacrifice of stability. On the contrary,



Panther, a runabout specially designed for use with today's lightweight, high-speed auto engines. Top speed is 75 *mph*. It could be driven faster but it would then have only one point of contact with the water: its propeller.



1

because of the employment of advanced methods of strut, rudder, and rearward motor installation, vibration is kept to a minimum and hands-off steering is possible. Finally, gas consumption is low because of low weight per *hp*, and power is applied so that there are minimal strains, maximum forward thrust and an almost complete absence of wave-making resistance. At speeds above 50 *mph* wake disappears and *Panther* begins to ride on its propeller.

Panther was designed for use with any of the auto engines for which conversion parts are available (see box copy, "Auto Engines for *Panther*," page 22). With an unaltered stock, 100 *hp* engine, you can attain speeds of over 45 *mph*. If you soup up such a motor and reduce the overall weight of boat and engine, you can get speeds of over 60 *mph*. For roughly $200 you can install a really "hot" motor that will haul from one to 10 water skiers, carry from two to four passengers—and pass up *expensive* inboards. Two years of developmental work have gone into *Panther*. The first engine used was a 1948 Mercury, the last, a 240 *hp* 1955 Buick. Every detail has been water-tested and retested. *Don't* depart from the plans given; this is a high-speed craft and changes could be dangerous.

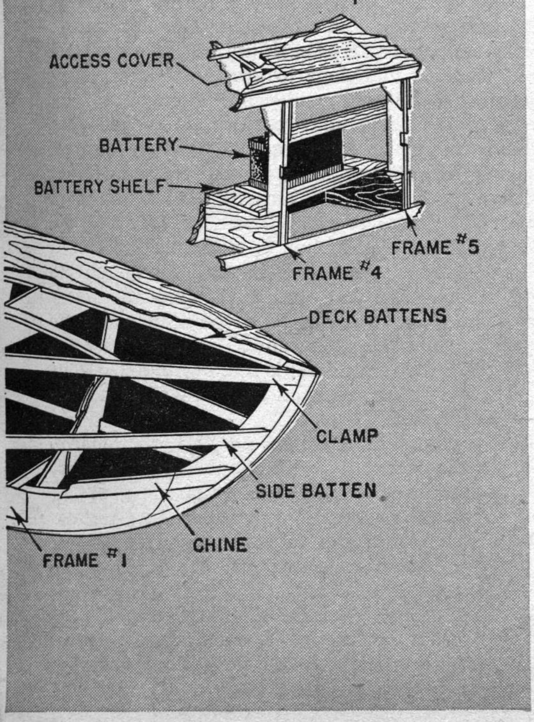
Study the Materials List on page 24. If oak is not available for the framing, use hemlock or Douglas fir. *Panther* does *not* depend upon the sheer strength of fastenings and wood members for strength; instead it uses a system of overlapping trussed members, glued with resin glues such as *Weldwood* or *Elmer's*.

Stringers should be spruce, hemlock or fir. For the original model we used No. 2 grade spruce. Shop around for lumber; if you make a careful selection of No. 2 stock, you can save up to 50% in cost on a finished product in no way inferior to a craft made entirely from No. 1 stock.

Don't use brass screws on the bottom; impact at high speeds will crystallize and fracture brass fastenings. For fresh water, use cadmium or zinc-plated steel screws; for salt water, monel screws; for either fresh or salt water, and to save time, use annular threaded nails such as *Anchorfast* or *Stronghold*. Use brass screws for sides and deck; they won't show hammer marks as nails will and they're easily puttied over smoothly. For utmost strength and slickness of bottom, cover it with fiberglass to the water line. If finances permit, fiberglass sides and deck also; you'll be money ahead with a high-speed hull that will outlast two or three engines.

Construction. First, make the building saw horses (Fig. 2). Then cut the four bottom stringers to size and shape bottom edges as indicated in Fig. 7. Then notch stringers for frames by clamping all four stringers together with Jorgensen "C" clamps, marking notches for frames on stringers and cutting out with band saw and 3/4-in. chisel, using sample piece of frame stock for snug fit. Secure stringers temporarily to saw horses with eight 2-in. metal angles. The 22-in. center-to-center widths of #1 and #2 stringers will fit most engine conversions but check to

Craft Print Project No. 286



STATEMENT OF USES

TYPE AND USES: High-speed, inboard runabout for racing, all-'round sports use.

LENGTH: 15 ft.

BEAM: 6 ft. overall.

DEPTH: Aft 18 in.; amidships 24 in.; bow 30 in. (sides-profile).

DRAFT: To bottom of rudder: 21 in.

WEIGHT: 450 lbs., hull only.

SEATING CAPACITY: 2 persons aft (with optional forward cockpit, 4 persons).

SPEED: 45 to 75 *mph* depending upon motor used and type of installation

CONSTRUCTION: Advanced monocoupe method of construction distributes stresses equally over lightweight hull, bottom does not bear all weight and impact.

REMARKS: For maximum durability, fiberglass bottom. For speeds in excess of 45 *mph*, specially designed strut and rudder (see text and Figures) are essential.

TECHNICAL ASPECTS

ASPECT RATIO: .385%.

RESISTANCE AT 20 lbs.: 38 oz.

PLANING ANGLE: 1.75°.

EFFECTIVE PLANING AREA: 4 sq. ft. TRANSOM FORWARD (10 sq. ft. AT MINIMUM SPEED)

WETTED AREA—AT REST, 64%; **AT SPEED,** 10%

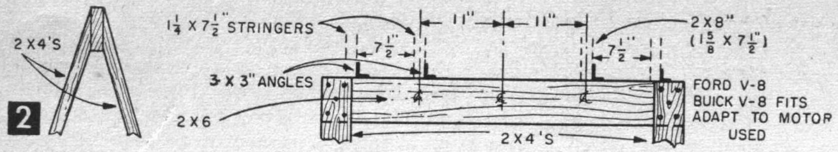
MAXIMUM LOAD: 31 lbs.

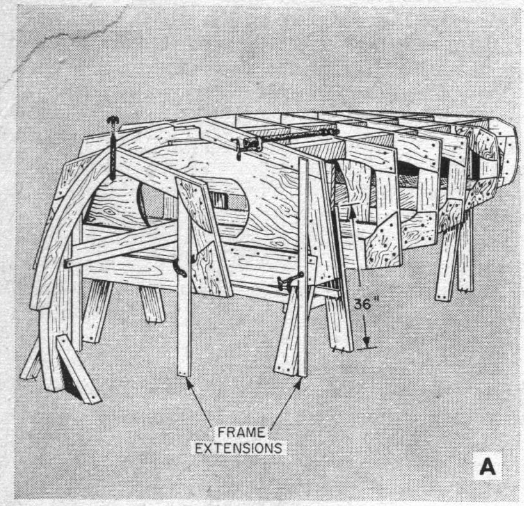
CENTER OF GRAVITY IS 6 ft. FORWARD OF TRANSOM

WEIGHT PER HORSEPOWER: 6 lbs.

PLANING AREAS: MONOCONDRON

ALL WEIGHTS AFT OF CENTER GRAVITY





see that it fits yours before continuing. (If it doesn't, make the necessary adjustment.)

The outside layers of the stem (Fig. 3) are 3/8-in. plywood, exterior AC grade with the C side next to the 1⅝-in. core. Make a full-size pattern of the stem on heavy wrapping paper and transfer outline to stock with a toothed wheel or prick punch. Join core with spline, coat all contact surfaces with resin glue and clamp until dry. This stem is stronger than conventional bolted stems and it is half as heavy.

Now, draw the full-size outlines of #7 (transom) frame on ¾-in. plywood, the #2 (bulkhead) frame (see Fig. 6) on ½-in. plywood and cut to shape. The center cut-out of the bulkhead can be used as a gasket to make a watertight compartment at the #2 frame but when your boat is not in use remove the cut-out to prevent condensation and rot.

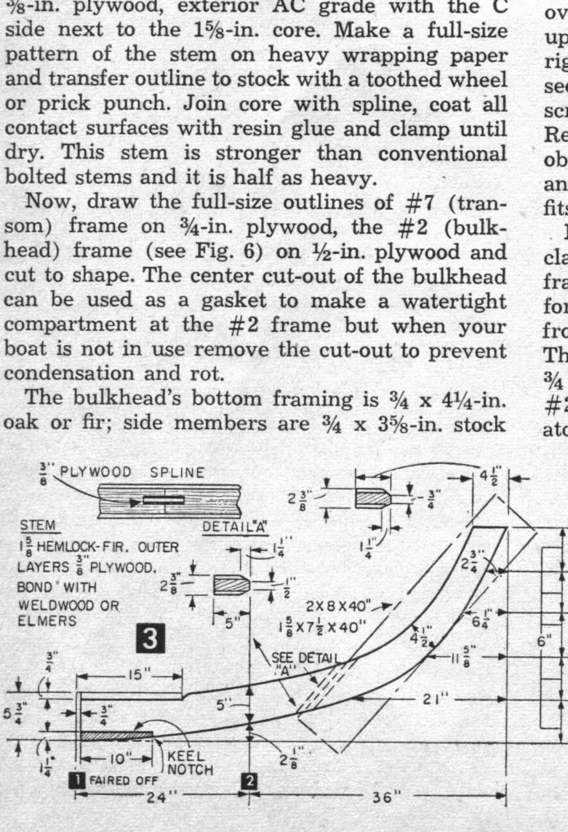
The bulkhead's bottom framing is ¾ x 4¼-in. oak or fir; side members are ¾ x 3⅝-in. stock (1 x 4's). Secure framing to #2 and #7 plywood pieces with resin glue and #8 x 1¼-in. *fh* screws spaced 2¼ in. apart and staggered out of line to prevent splitting.

Deck beams for all frames can be made from either hemlock or fir, glued and screw-fastened with the aid of gussets (for frames #1, 3, 4, 5, and 6) as indicated in Fig. 6. Gussets are of ⅜-in. plywood with filler pieces as shown. Make full-size paper patterns of the frames. The sawing outlines of the bottom members can be marked directly on the wood but patterns will be needed when putting bottom and side members together. Glue-coat all contacting surfaces and fasten gussets with either annular threaded nails or #6 x 1-in. *fh* screws.

Now trim stem evenly and bevel the upper part of it as indicated (Fig. 3). Bevel the lower part after framework is complete. Notch #1 frame to fit snugly over the stem, remove, coat contact areas with resin glue and then fasten to stem with one #8 x 1½-in. *fh* screw.

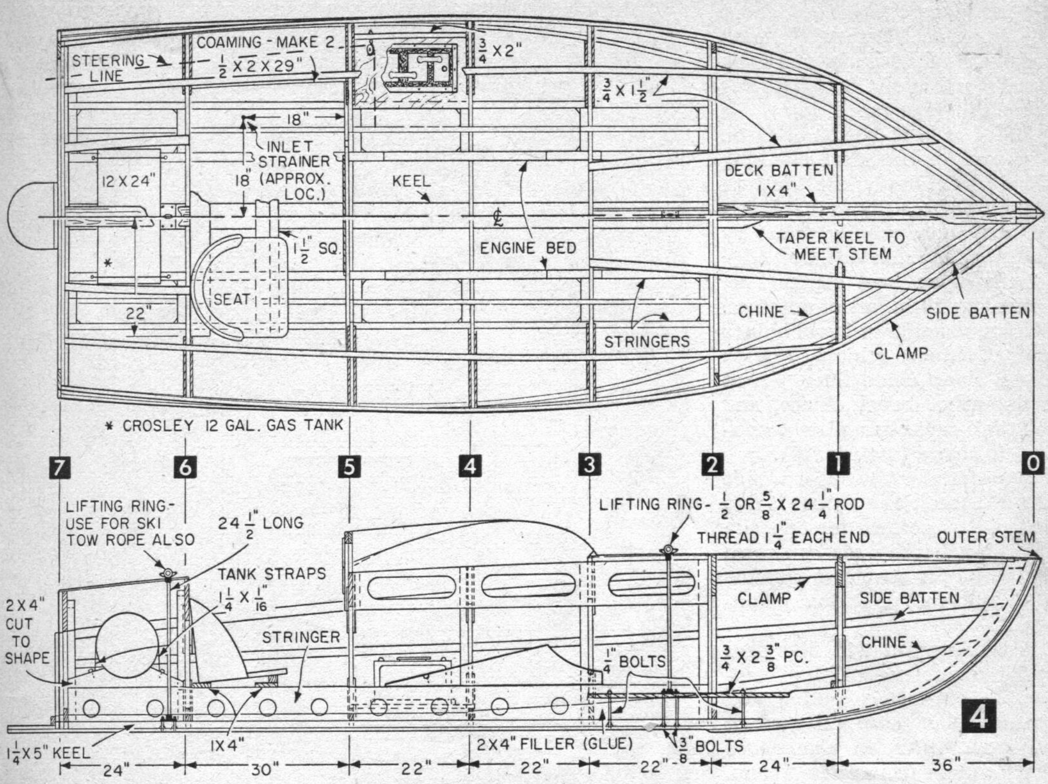
Now make a ¼-in. plywood centering pattern for the uprights (which can be either 1⅝-in. lumber or ¾-in. plywood), fitting this pattern (Fig. 7) individually to each frame in order to locate uprights exactly equidistant from keel center line. Align pattern's center line exactly over frame center line, clamp to frame, position uprights on each side of the pattern (notch uprights if you are using ⅝-in. spruce or hemlock; see Fig. 7), glue-coat contacting surfaces and screw-fasten with four #10 x 1½-in. *fh* screws. Remove pattern and proceed to next frame. To obtain exact length of each upright, mark pattern and transfer markings to upright. Making close fits now will save considerable fairing later.

Lift #7 frame into position atop stringers, clamp in place temporarily, position rest of frames, clamping #2 in place, temporarily at fore end of stringers, and fit keel truss piece from #2 frame to stem assembly (see Fig. 4). This piece can be either ¾ x 3⅝-in. lumber or ¾ x 3½-in. plywood and is slotted through the #2 frame. The fore end rests atop the notch atop the stem (see Fig. 3A), the after end butts against the #3 frame. The space between this piece and keel is filled with a 2 x 4 cut to fit now, secured in place after keel is fastened.



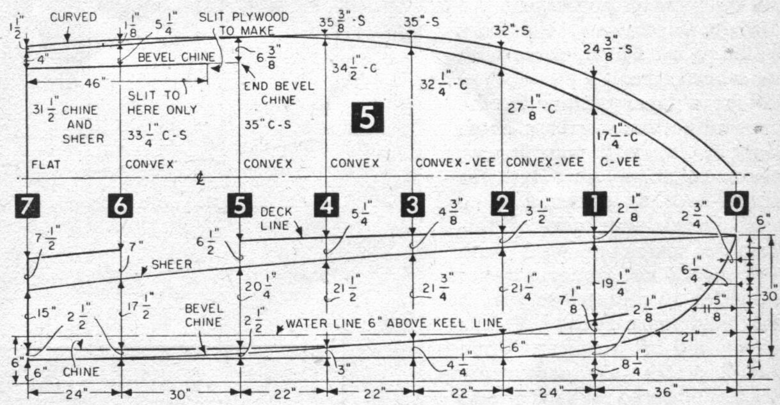
Check fit of frames on stringers, remove, glue-coat all contact surfaces, reinsert frames—checking for squareness at all points as work progresses—and screw-fasten uprights to stringers with #10 x 2¼-in. *fh* screws through glue-coated three-corner fillet blocks (Fig. 7) if uprights are of lumber, 4*d* nails if of plywood.

Next, position #1 frame and stem assembly together with keel truss piece, clamping in place. Before placing keel, stretch a



4

mason's line down the center of all frames and out over stem to check alignment. Then bridge up from floor to stem with 2 x 4 supports (see Fig. 3A), securing support upright to stem with several screws (withdrawn after hull is planked). Attach 1¼ x 5-in. keel (hemlock, fir or oak) after marking and *carefully* cutting out notches for it on each frame.



5

Place keel in notches and check with a straight edge. There must be no humps or hollows. Skim for hollows, seat deeper for humps, then glue-coat all contact surfaces and screw-fasten keel with two #10 x 2-in. *fh* screws to each frame. After gluing contact surfaces, through-bolt stem, truss piece and keel assembly with ¼ x 5-in. carriage bolts, recessing bolt heads ¼ in. so that you won't clip them with jack plane when fairing later. When the glue dries, the framework can be worked on without fear of distortion.

Now, saw off a small sample of chine and use it as a pattern to mark for chine notches. There will be considerable bevel at the #1 frame for chines; spring them into place and mark at #1 and 2 frames, remove and bevel, then replace and trim fore ends to fit against stem. Coat all contact surfaces with resin glue and screw-fasten with a #10 x 2-in. *fh* screw at each joint. Then notch chines all the way through transom.

Follow the same procedure for clamps and for side battens, screw-fastening clamps with one #8 x 1¾-in. *fh* screw to a joint, then trimming and fairing entire framework. Side battens are positioned midway between clamps and chines and screw-fastened with #8 x 1¾-in. *fh* screws also, but are notched only through the transom's inner framing. Notch bevel battens in place (see Fig. 4), bevel them as shown and screw. Fasten with #8 x 1¾-in. *fh* screws. Then attach transom's outside framing, coating contact surfaces with Kuhl's *Bedlast* and fastening with #8 x

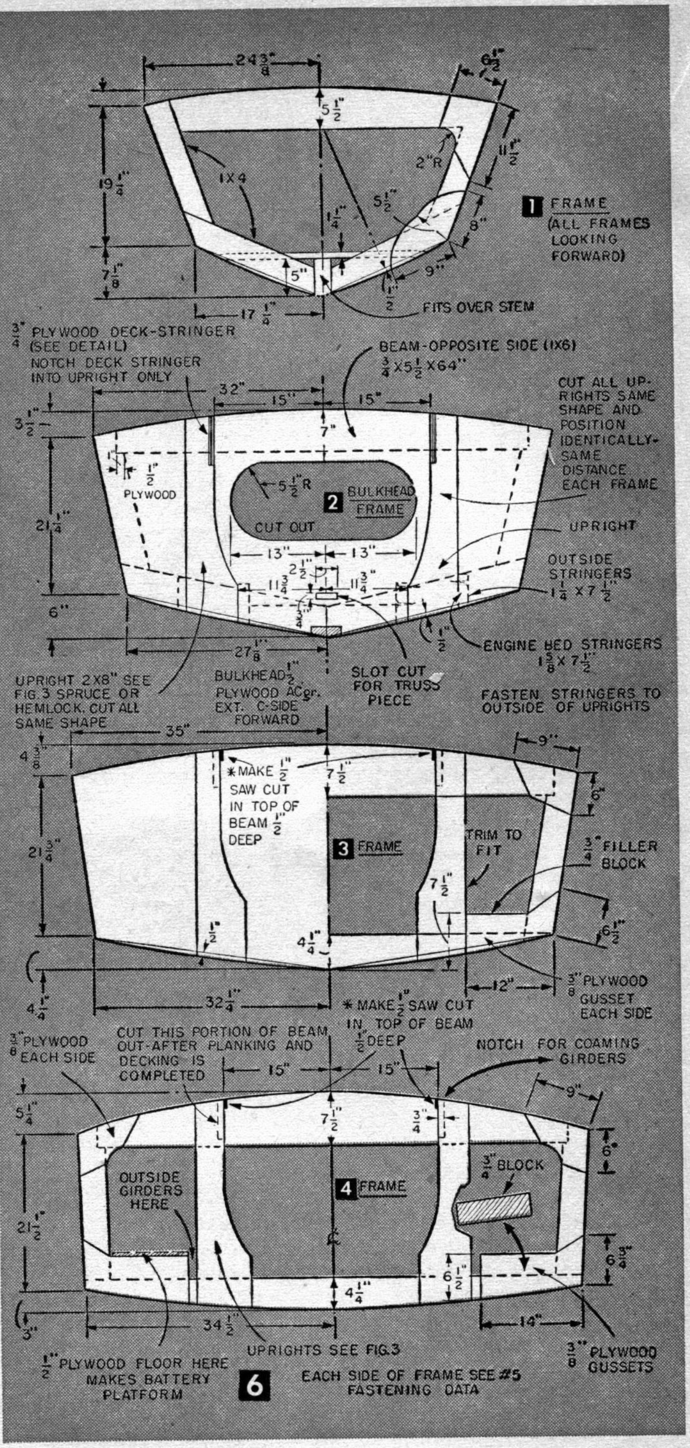
1¾-in. *fh* screws spaced about 3½ in. apart. Trim edges next to plywood of inner transom carefully. Finally, install lifting rods and rings (see Fig. 4).

The 4 x 10-ft. sheets of ⅜-in. plywood for the after planking should be five-ply; for the fore planking, three-ply so that it can be bent more readily. Start by clamping one sheet aft, keel edge exactly upon keel center line, extending 10 in. aft of transom. Mark underside at bevel chines and at chines; remove, saw to shape along chine lines, slit at midpoint of bevel chines, and saw anti-cavitation plate extension to shape (see Fig. 12).

Transfer plank to opposite side of hull, check to see that it fits, and use as pattern for opposite side. Bevel fore ends as shown in Fig. 12 for strongest possible joint with rest of bottom planking.

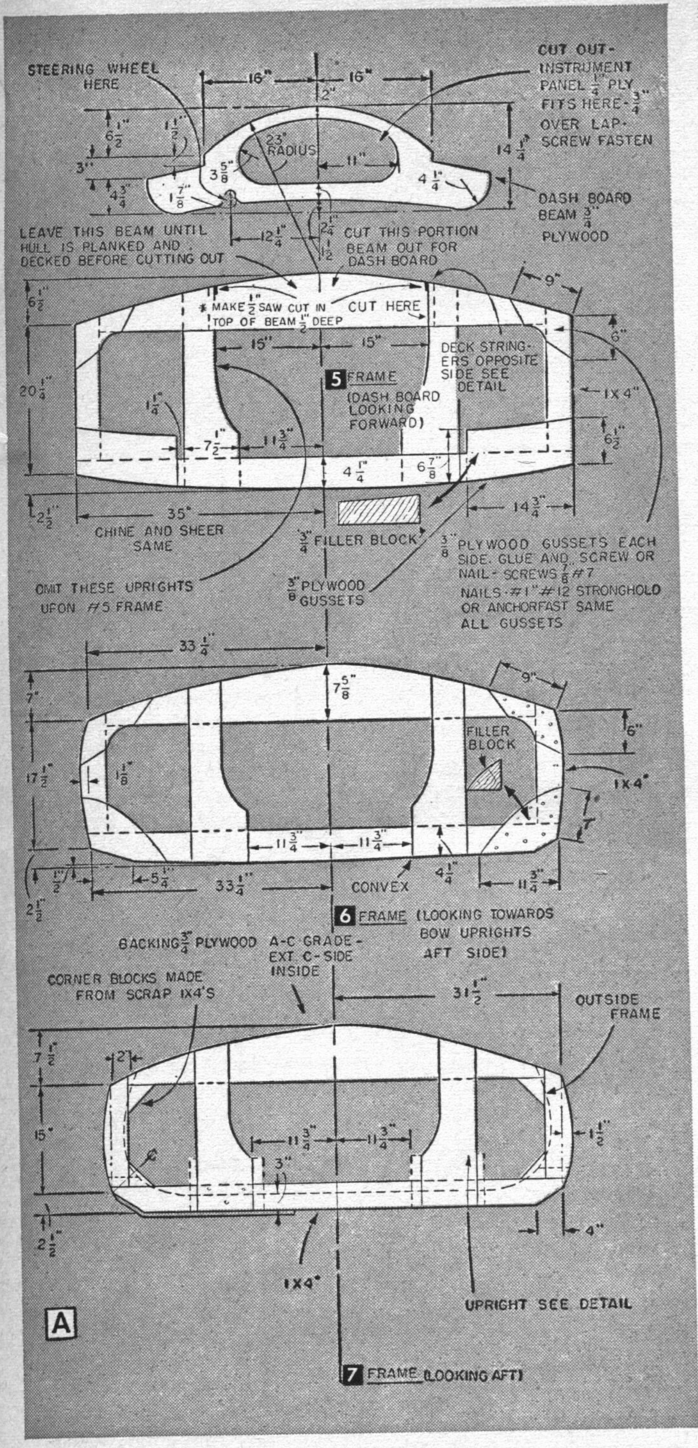
Assuming you will fiberglass hull, do not use calking compounds between planking and framing, but coat all contact surfaces with resin glue, place shaped piece in position, clamp, and fasten at all points with #8 x 1¼-in. *fh* screws spaced about 2½ in. apart. Do the same with the other piece.

Make a paper pattern for the fore end bottom planking. Press paper in place with your fingers, scissor to shape, and transfer outline to 3-ply plywood to be used. Bevel underside of this piece to match at joint with after pieces and immerse in hot water for 10 minutes so that it will bend more readily. Fasten as you did after pieces. When glue dries, trim plywood evenly along chines and make the joint forward at the stem as shown in Fig. 12. Return to the transom and make the ¾-in. fillet reinforcers for anti-cavitation plate extension of bottom. Glue in place.



Side planking is ¼-in. plywood. If you use mahogany (more handsome than fir), be sure it has two plies of equal thickness. The kind with two thin outer plies sandwiching a thick inner ply will not work. Birch can also be used but it too must have two equal plies.

Starting at bow, clamp a 4 x 8-ft. sheet in place, mark, remove, and saw to shape. Use as pattern for other side. Then carefully fit bottom edges of the two pieces to bottom planking edges, providing ⅛-in. filler pieces in joint for flush meeting with thicker bottom planking. Coat all contact surfaces with glue and screw-fasten with



#8 x 1-in. screws. Do not use nails here. (If the hull will *not* be fiberglassed, use Kuhl's *Bedlast* on chines.) Where these 8-ft. pieces end amidships, provide ¾ x 2-in. battens between chine and batten and batten and clamps. Glue and fabricate after ends of sides in same way.

When glue dries, trim plywood evenly along stem and cover exposed edges with hardwood outer stem piece (Fig. 12), softening this piece in hot water, tapering to shape when in position, and fastening with #8 x 1¾-in. *fh.* screws. Now smooth entire hull, filling all fastening depressions by touching heads with acetone, then filling flush with plastic wood. Fine-sand entire hull.

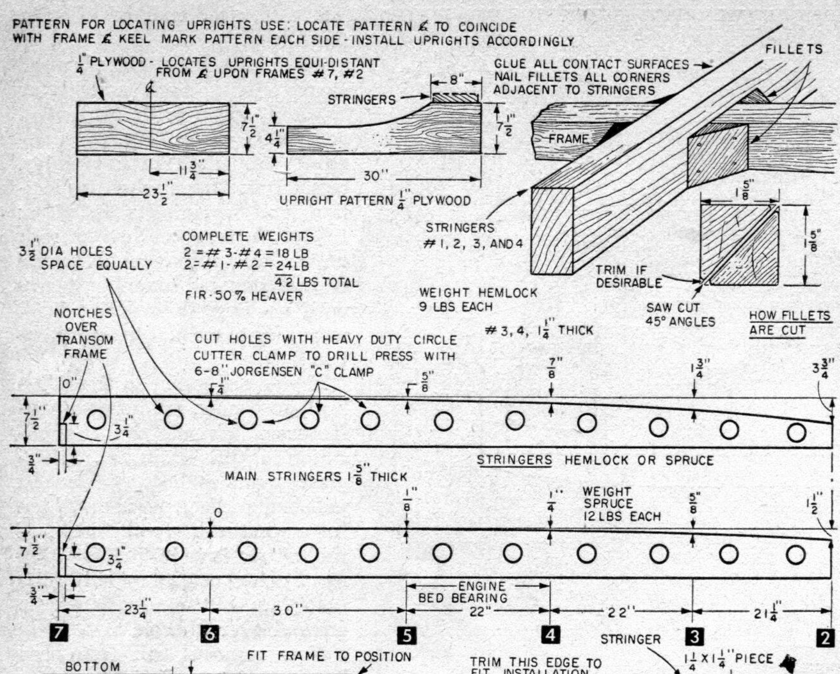
If you are going to fiberglass hull, do it now, following manufacturers' directions for application of this material. Fiberglass over mahogany can be polished for a permanent, high luster natural wood finish. If the bottom is to be painted, pigment colors can be added to the fiberglass but many prefer to enamel over fiberglass.

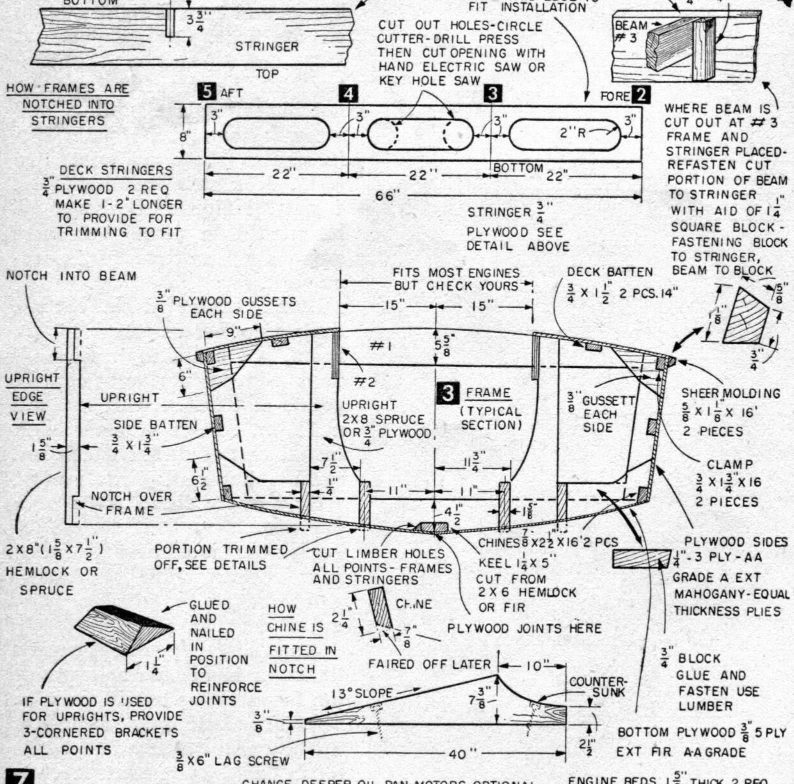
Now remove hull from saw horses and turn it right side up on the floor. Cut away beams #3, 4 and 5 (see Fig. 6), replacing #3 beam after making, notching in place, gluing, and screw-fastening with #8 x 1¾-in. screws (three to a joint) two ¾-in. deck stringers (see Figs. 4 and 7). Figure 8D shows #5 beam still in place, but most engines will not clear it, so remove it.

Notch center deck battens flush into beams—stem to #3 beam, #6 beam to transoms—daub with resin glue at contact points and fasten with two #8 x 1¾-in. screws at each joint. Install rest of deck battens and carlins. Trim all joints evenly.

Now apply three coats of a paint such as *Dolfinite* #9595 (grey) or Dolfinites' exterior spar varnish #700, whichever you prefer, to the interior. Then install decking.

Mahogany plywood presents the most handsome appearance for the decking but it must be fiberglassed. If only varnished, the sun will quickly destroy its finish (unless you cover it when not in use). Begin by placing plywood in position, mark, and cut to shape, cutting openings for motor hatch and cockpit as shown. Give the underside of decking three coats of paint, coat contact surfaces with Kuhl's *Bedlast,* position, and screw-fasten with #8 x





7

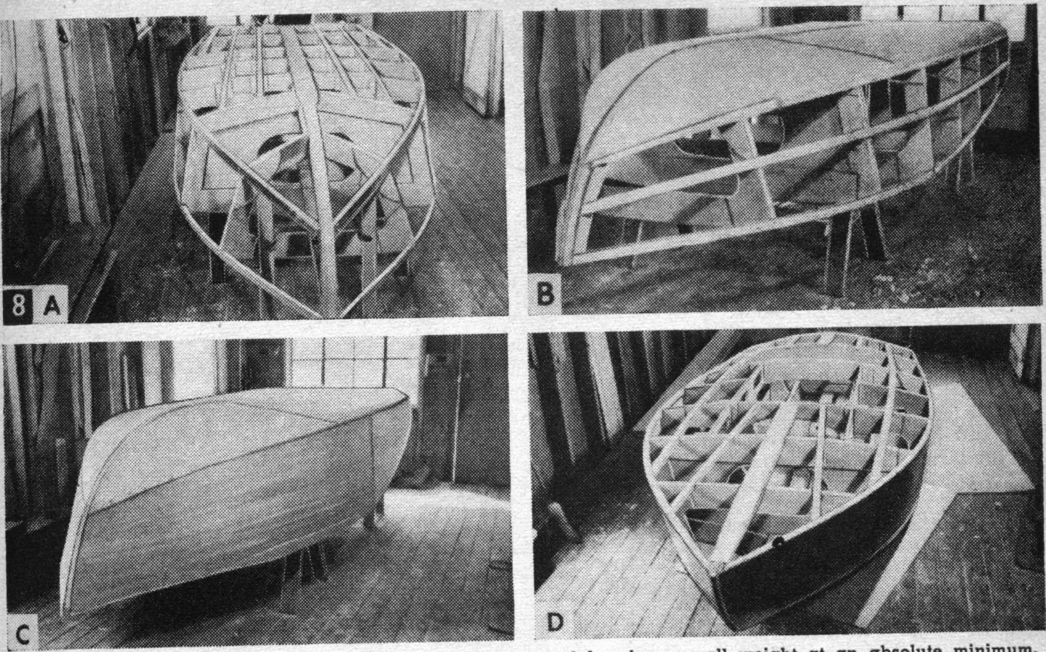
1-in. *fh* screws spaced about 3 in. apart. Trim edges evenly along sheer and cockpit edges. Make and bevel sheer moldings (Fig. 4) and screw-fasten at 8-in. intervals with #8 x 1¾-in. screws. Round ends of sheer molding at stem and transom. Install coamings at cockpit now unless you are going to fiberglass deck; if so, install them after glassing.

To groove deck ⅛ in. use a small electric hand router. Fill mahogany with paste wood filler and apply four coats of varnish, rubbing with water and fine sandpaper between coats.

Installing Engine. First, bore shaft alley. The jig to use for this is shown in Fig. 9. Drill a 1⅛-in. hole lengthwise through a 4 x 4, cut piece to desired angle (for our engine, 13°; deeper oil pans may require more of an angle), fasten slanted block to hull (inside or outside) with screws, insert bit and bore shaft alley. Lengthen 1⅛-in. bit with an extension or with a length of rod welded to it if necessary. Coat interior of shaft alley with fiberglass paste to waterproof.

Next, make a cardboard profile pattern of the lower part of the engine you are going to install, the part that will extend below the engine beds, set the two engine beds (Fig. 4) atop #1 and #2 stringers approximately in place and try out profile pattern in position to find out exactly what clearances will be demanded by your engine.

Some engines may have very deep oil pans aft and—since engine is set as far aft as possible—cannot function with shaft angle of 13°. If you set the engine further ahead, *Panther* will be *mph* slower, so you must either increase shaft angle, and you can, up to about 17° (over this, you'll run into oiling difficulties), or drive the engine



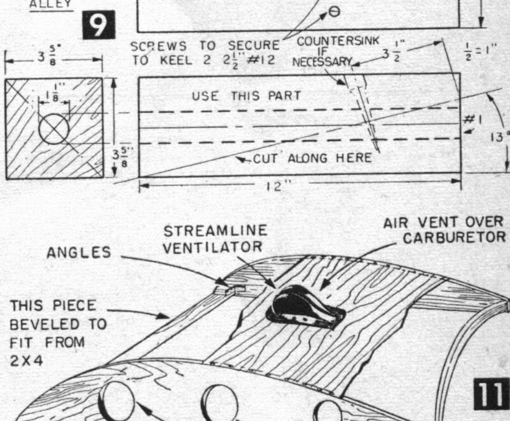
Every part used in *Panther* was selected with a view toward keeping overall weight at an absolute minimum. It's low weight per *hp* that makes those top speeds possible. Even the floor boards were dispensed with for this reason; fortunately, the bottom itself is quite strong enough to walk upon.

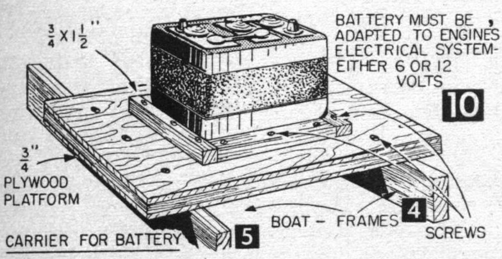
from the opposite end (see Fig. 17).

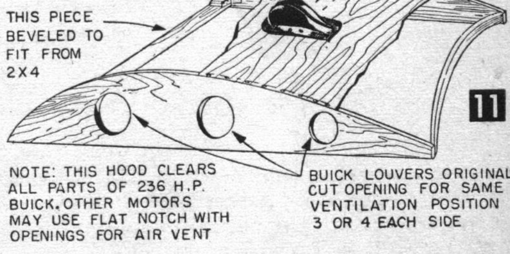
Position engine beds exactly atop stringers and fasten with two 3/8 x 5-in. lag screws to each bed. If you wish, paint engine brightly now—yellow underbody, black top—let dry, and then swing it into place. You'll need a chain hoist for this. If you can't use the one at your auto service station, hire a local auto wrecker to hoist the engine in place.

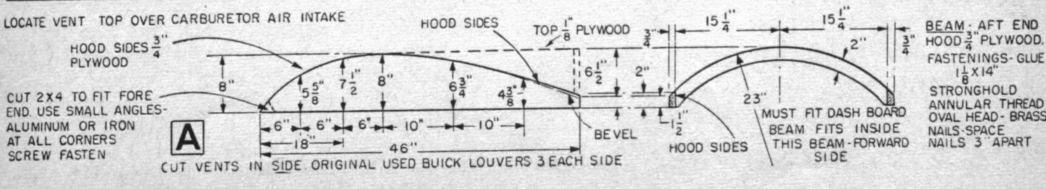
Before fastening engine to bed, temporarily place shafting, shaft log, strut, and coupling flanges in position. Check for fit. If engine is too high on beds, pinch-bar ahead and chisel bed away where necessary; if too low, shim. Or if, say, the stuffing box or strut face plate should not fit along the keel, provide tapered shims for these parts.

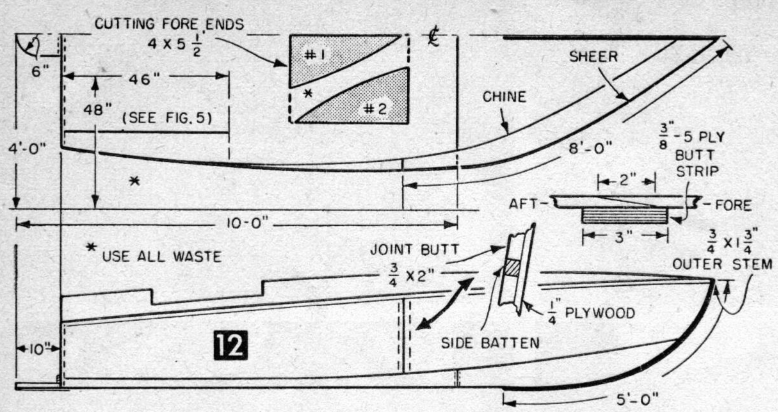
Now, daub underside of shaft log with *Bedlast* and screw-fasten to keel with #14 x 1¼-in. *fh* screws into 9/64-in. pilot holes. Next, position strut (see Fig. 14A) on keel and fasten with from six

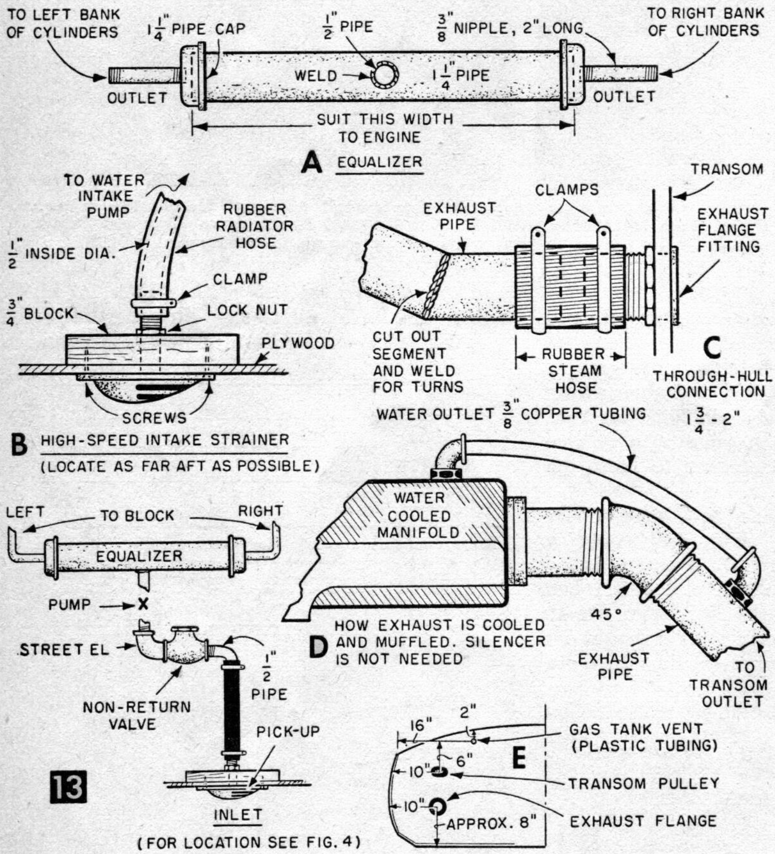












to eight 5/16-in. strut bolts (carriage bolts will do). Provide a 3/4-in. wood gasket inside hull to reinforce strut bolts. Back all inlets and outlets of hull with a 3/4-in. collar or plate.

Insert prop shaft in place and—with coupling flanges on shaft and motor, but not yet fastened together—secure motor to beds with four 1/2 x 4-in. lag screws. Don't fasten tightly, but position engine fraction by fraction with a pinch bar until cigarette papers *cannot* be withdrawn from three sides of flanges when they are pushed together by hand alone. Then tighten lag screws.

Because torsional twists and strains are plentiful at the high speeds *Panther* is capable of, especially when the boat jumps clear of the water, it would be wise—though not essential—to introduce a universal joint between the engine and prop shaft. You can use a truck universal for this joint or an oversize flexible coupling such as that made by Federal Motors of Chicago. We used the latter. You will also need a thrust bearing (available from conversion suppliers).

Place boat on saw horses and couple motor flange to prop shaft with suitable machine bolts, lock-washered. Use steel keyway stock (obtainable at machine shops) for couplings and propeller. Place propeller in position, provide keyway, and tighten prop shaft nut. Then provide cotter pin and also pack graphited pocking under pocking gland of stuffing box, tightening gland just snug.

Exhaust outlets come next. With V-8 engines use two outlets if possible, one to each bank of cylinders, to reduce back pressure. Use truck muffler exhaust pipe; it won't last as long as will pipe but it's lighter.

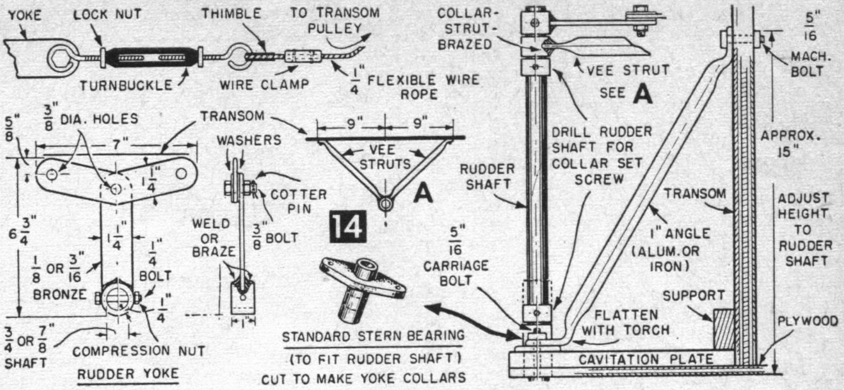
The pipe exhausts through the transom exiting through either pipe flanges or through hull connections. Introduce somewhere in the exhaust lines sections of rubber steam hose (Fig. 13) and provide support for lines within hull. The water outlet from the engine pipes directly into the exhaust and not only cools the exhaust pipes, but also muffles the back of the exhaust. Seal all thread and contact surfaces of pipe with *Permatex* #2.

Locate the water intake, a high-speed strainer (Figs. 4 and 13), as far aft as possible. The inlet pipes (preferably, radiator hose) go to the water pump located on the engine. In a V-8 installation it is customary to use two inlets and two pumps. With the equalizer shown in Fig. 13 only one intake is needed for both banks of cylinders.

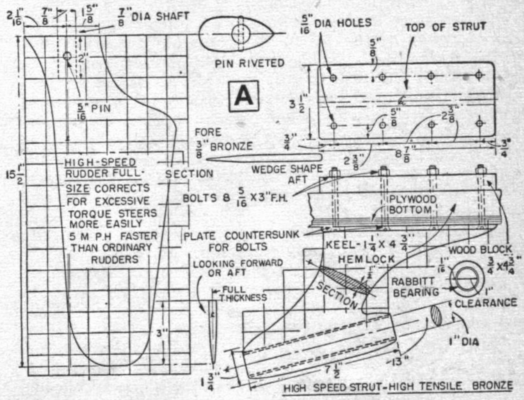
Locate and support an automobile gas tank as shown in Fig. 4 under the after deck. Inlet for tank is on deck through standard fill pipe connection to hose. Outlet from tank is forward to engine through standard copper tubing and fittings with a section of neoprene tubing introduced into the line to prevent crystallization and fracture of copper tubing. Vent through plastic hose to *outside* of transom.

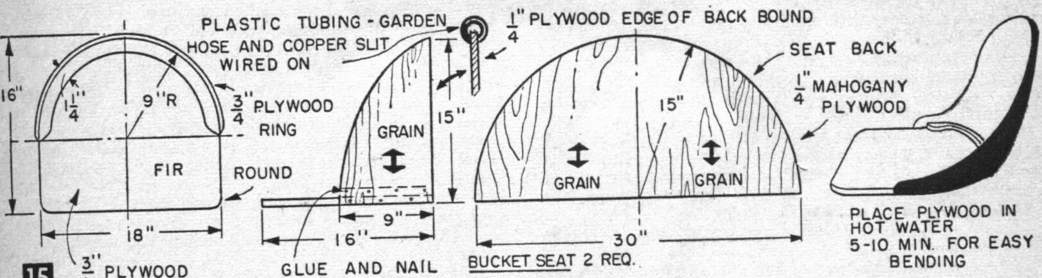
Steering arrangement is shown in Fig. 14. Flexible steel tiller lines through large sheave pulleys go out the transom (see Fig. 13E), through flush mounting pulleys to the steering arm.

Rudder for *Panther* is shown in Fig. 14A. It is for use at speeds above 45 *mph*. Both it and the high-speed strut shown in Fig. 14A are available either from Crest Marine Hardware Co., Inc. (444 Clementina St., San Francisco 3, Calif.), Stokes

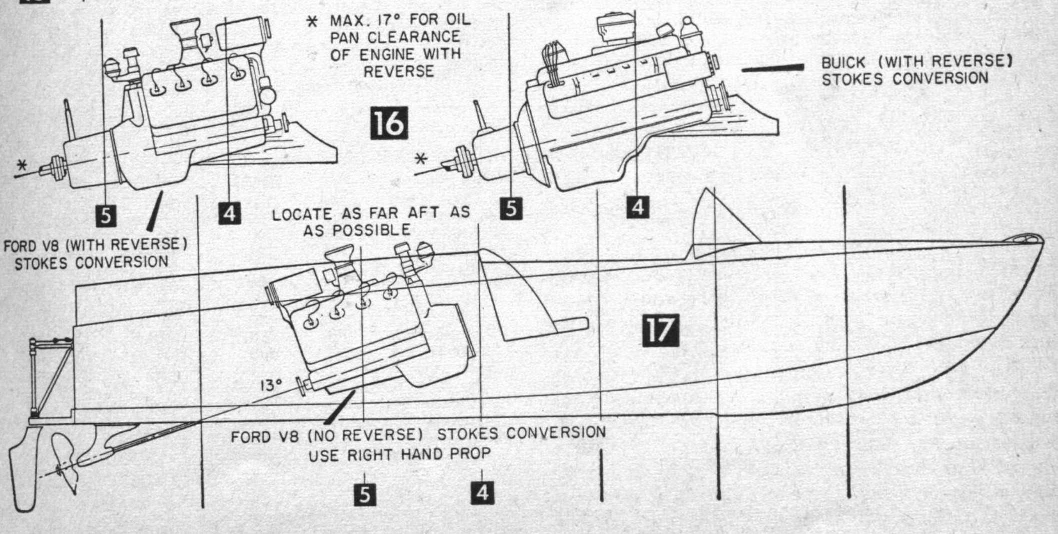


14

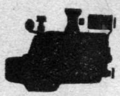




15 3/4" PLYWOOD



Auto Engines for Panther.



Auto engines for *Panther* are readily available, comparatively inexpensive, fast, can be used as is or—if you want to live dangerously—can be further hopped (and with inexpensive bolt-on equipment). If replacement parts are needed, a visit to your local auto parts distributor will provide you with everything you need.

Sources for engines are wrecked cars available from insurance companies, junk yards, classified ads in local papers, salvage auto parts establishments or wholesale engine rebuilders.

Which engine to use? In-line or L-head engines such as those made by Plymouth, Studebaker, Ford, Willys, Dodge, or Pontiac will require too much souping to obtain any power or to obtain peak performance. It is much less expensive to obtain a late model V-8. Flathead Chevvys, Nash, Hudson, Lincoln, Cadillac—though cheap—deliver poor engine performance. Forget them. With the exception of the '46 to '48 Fords or Mercurys, especially with 59-A blocks, only late models should be considered. The early Fords and Mercurys can be purchased rebuilt, and later hopped up. Hop-up equipment does cost, however, and since present-day Detroit engines have plenty of soup, with far snappier performance, than earlier hopped-up engines, it is up to you to decide whether a late vintage or early iron is best for your needs. The engine to use is the one with the most power and the lowest weight.

Stay away from engines over six or seven years old; they are usually completely worn out. More, mounting a heavy in-line motor in Panther, will upset its weight characteristics and seriously impair its performance. If you have friends in the auto repair business, ask them to assist you in locating the right engine.

When you find the engine that fulfills your requirements, obtain a guarantee that the block is not cracked. It may be to your advantage to have the block and heads Magnafluxed to avoid trouble later. Try also to obtain an engine complete with starter, generator, carbs, and all ignition intact. These parts, if bought separately, will boost the total price beyond what a new engine direct from the manufacturer would have cost you. Obtain a clear title to used engines; check with your state's motor vehicle department.

The cost of a recent engine will vary anywhere from $100 to $500, perhaps less, depending upon your ability to trade. The writer's choice for *Panther* today would be a new Chevvy Turbofire V-8 with four-barrel manifold. *Panther* now has a 240 *hp* Buick engine; with the addition of special manifolds and carbs this power can be boosted to 265 *hp*.

When you have the engine, eliminate its fan and introduce cooling water through water cooled manifolds; conversion equipment is available through the manufacturers listed in Table A. Reverse gears will cost anywhere from $150 to $350. They create additional weight (50 to 75 lbs.), so you must decide if the convenience is worth it to you.

The engine should be placed *just as far aft as possible*. If it is installed in the customary position—slightly aft of amidships—performance will suffer. For top speed, keep all weights (including engine, starter buttons, passengers and gas tank) *aft*.

Usually the amateur builder will install all of the extra equipment that can be crammed upon his boat. If speed is your goal, spend that extra money on a better engine. Let your craft resemble a grey hound suffering from malnutrition; you'll be miles ahead.

Muffler pipes leading aft are customarily heavy well pipe 1½ to 2 in. in diameter. The boat racing fraternity, however, uses thin-wall, truck muffler pipe. Angles in this pipe are made by cutting out small segments and welding cut ends together. Always utilize steam hose somewhere in the muffler line, preferably near the transom, and twin exhausts to reduce back pressure. Pipe the water outlet directly into the muffler pipes for cooling and muffling the exhausts. Cast-iron mufflers are unnecessary and only add weight. The water-cooled truck muffler pipe muffles engine exhaust quite effectively; noise is in no way objectionable.

On the propeller shaft, adjacent to the engine, use a lightweight, truck universal joint to absorb torsional loads. A coupling manufactured for the purpose and used upon the original Buick was a Federal flexible coupling. This unit absorbs propeller vibration, allows slight misalignment caused by swelling of hull or distortion when jumping clear of the water, absorbs thrust and torsional loads, and enables mounting of the motor on rubber bushings (for the quietest running hull imaginable). Flexible inserts should be placed in gas lines and water pick-up lines to prevent fatigue failure of these vital connections. Use neoprene for gas lines and auto heater hose for water pick-ups.

If *Panther* will be propelled at speeds over 45 *mph*, do not use ordinary stock struts and rudders. The shapes shown in Fig. 11 are safer and faster. The designer made special patterns for both strut and rudder and these can be obtained as rough castings of high-tensile bronze from Crest Marine Hardware, Inc., Stokes Marine Supply Co. or from I. E. Debbolds Marine Supply. These specialized parts are not expensive and it will pay you to obtain them. They include in their design the very latest advances in hydro-dynamics.

For speeds up to 50 *mph*, bronze shafting is satisfactory, but for speeds in excess of 50 *mph* use stainless steel shafting. Use aluminum brackets and angles in the construction of *Panther* in order to reduce its overall weight. Dispense with floor boards and step directly upon the bottom; it will take the thrust of 240 *hp* so it will certainly stand up under your weight. For comfort, pad the bucket seats with sponge rubber, securing as indicated in Fig. 12.

SUITABLE ENGINE WEIGHTS AND DIMENSIONS

Make	HP*	Weight	Length	Width
AMC V-8	190	601	27¾"	25⅜"
Buick V-8	255	620	27"	25"
Cadillac V-8	285	725	28"	30"
Chevrolet 6	140	527	33"	26"
Chevrolet V-8	170	531	21¾"	24"
Chrysler V-8	280	700	30¾"	31½"
Dodge 6	131	575	Unknown	Unknown
Dodge V-8	218	610	25"	28"
Ford 6	137	502	31"	22"
Ford V-8L	130	590	28"	24"
Ford V-8	200	575	29"	28"
Hudson 6L	165	650-750	36"	Unknown
Kaiser 6L	145	575	Unknown	Unknown
Lincoln V-8	285	750	26"	28"
Mercury V-8	210	650	26"	27"
Nash 6L	100	450	30"	Unknown
Nash 6	135	690	39⅝"	Unknown
Oldsmobile V-8	240	700	33"	32"
Packard 8L	212	750	41½"	Unknown
Packard V-8	290	700	27¾"	30"
Plymouth 6L	125	590	Unknown	Unknown
Plymouth V-8	187	595	30"	24½"
Pontiac 6	122	650	40½"	23"
Pontiac V-8	227	575	29"	27"
Rambler 6	120	480	30"	17"
Studebaker 6L	100	430	Unknown	Unknown
Studebaker V-8	195	645	26"	24"
Willys 6L	75	411	29½"	Unknown

* For stock, current models, minus power pack

Dimensions: Front of fan to face of flange, rear of block. Widths from exhaust manifold to exhaust manifold. Generator location may add 6 to 12" in width. All weights and dimensions are approximate.

Courtesy *Speed Mechanics*

Propellers for Panther

Contact surface of *Panther* and the water is comparatively small. Consequently, propeller of minimum dia. and maximum pitch should be used. (Large dia. props are adapted to boats with maximum wetted area, such as slow moving runabouts and cruisers.) Diameter should be kept to 11 in. to 12 in. at the most, while pitch is adjusted to allow your particular engine to develop maximum *hp* at peak *rpm*.

To achieve maximum results from any auto engine it may be necessary to obtain from the engine manufacturer a *hp* graph denoting the maximum output of that particular engine at peak *rpm*. The pitch of the propeller, roughly speaking, for Ford and Mercury engines will approximate 14 in. If the engine is souped with high lift cams, stroked, the graphs will no longer apply, however, and you will have to submit your propeller problem to either Michigan Wheel or Johnson Propeller Co. for analysis.

Even these experts are not infallible, however. The best method is to try two or three different propellers with your particular engine until you find one that is just right. To generalize again, for utmost speed use a two-blade propeller of hydrodynamic shape. For general usage, such as water skiing or passenger carrying, use three blades, still retaining the 11 in. to 12 in. diameter.

The Buick 55 Motor developing 240 *hp* @ 4600 *rpm* utilized a general purpose, three-blade propeller 11 x 17-18 in. optimum for general usage. For the average Ford or Mercury, "hopped" or otherwise, use a 11 x 14 in. two-blader as a starter, but again to achieve peak results, try different props. Be sure you know what you want. For instance, one propeller will produce top speed but lack acceleration (of concern only in competitive racing). Another will give good acceleration but lack top speeds.

If more pitch is needed, return propeller to manufacturer for re-pitching (cost: $2-$3 against $20 for a new prop).

Most auto engines will require left-hand propellers but if the motor is reversed—turned end for end—and driven from opposite end as it would be in an auto, use a right-hand prop.

TABLE A—PROPELLER MANUFACTURERS

MICHIGAN WHEEL COMPANY
235 Market Ave.
Grand Rapids 3, Michigan
Propellers for inboard and outboard racing and service use

JOHNSON PROPELLER COMPANY
603 Lancaster St.
Oakland 1, California
Specialists in propellers for racing, inboard or outboard

LEHMAN MFG. CO.
972 Broad St.
Newark 2, N. J.
Columbian manganese bronze props manufactured to order

STANNUS PROPELLER COMPANY
356 East Jefferson Ave.
Detroit 26, Michigan
Propellers for service or racing—inboards or outboards

Special consideration will be given by these manufacturers for use of props with converted, high-speed, auto engines. Submit your data upon bore, stroke, *rpm*, *hp* and designate SCIENCE AND MECHANICS "hot-rod" *Panther* as your boat

TABLE B—APPROXIMATE SPEED COMPUTATION FOR RACING INBOARD HYDROS

Method No. 1: Total gross weight of boat including passengers and fuel, divide this gross weight figure by actual horse power of engine. Result is pounds per horse power; table below indicates approximate speed

POUNDS PER HORSE POWER	SPEED IN STATUTE MILES PER HOUR
4	65
6	62
8	59
11	56
14	53
17	49
20	46
23	42
26	39
29	37
32	35
35	35

When weight is over 35 lbs. per horse power, planing action ceases and boat runs as displacement boat

Method No. 2: Divide gross running weight of boat and engine in pounds by actual horse power of engine; obtain square root of this weight per horse power and divide by coefficient 160 to obtain speed in statute miles per hour

$$\frac{C}{\sqrt{\frac{W}{P}}} = S$$

S—Speed
W—Total gross weight (boat engine, occupants, fuel)
P—Actual brake *hp*
C—Coefficient of 180 for fast runabouts

TABLE C—WHERE TO BUY

SPECIAL HIGH SPEED EQUIPMENT

The Offenhauser Equipment Corp.
5156 Alhambra Ave.
Los Angeles 32, California
equipment for engines

Crest Marine Hardware Co., Inc.
444 Clementina St.
San Francisco 3, Calif.
rudder, struts, parts

Almquist Engineering Co.
Milford, Pa.
used engines, parts, equipment

J. C. Whitney & Co.
1917-19 Archer Ave.
Chicago 16, Illinois
used engines, parts, equipment

RACING FUELS

Christopher Bros.
12800 Eaton Ave.
Detroit 27, Michigan

Commercial Solvents Corporation
Automotive Specialties Dept.
260 Madison Ave.
New York 16, N. Y.
undiluted nitromethane fuel ("Peak Nitro Fuel")

SPEEDOMETERS

Air Guide Instrument Co.
2210 Wabansia Ave.
Chicago 47, Illinois
Model No. 703
0 to 75 *mph*

Ketcham & McDougall
465 Eagle Rock Ave.
Roseland, New Jersey
Model 60 "Racing Special"
0 to 60 *mph*

Finson Products Inc.
2934 W. Sunnyside Ave.
Chicago 25, Illinois
"Racing 70"
0 to 70 *mph*

INSTRUMENT PANELS

Stewart Warner Corp.
Instrument Div.
1840 Diversey Parkway
Chicago 14, Ill.
also tachometers and speedometers

LIFE JACKETS

Billy Boy Products
Quincy, Michigan

Tapatco, American Pad & Textile
S. Washington St.
Greenfield, Ohio

MATERIALS LIST—PANTHER

No.	Description	Use
1 pc.	2 x 6″ x 8′	building horses
2 pcs.	2 x 4″ x 12′	building horses
4 pcs.	1 x 2″ x 4′	building horses
1 pc.	1 x 2″ x 6′	building horses
2 pcs.	2¼ x ⅞″ x 16′	chines
2 pcs.	1½ x ¾″ x 16′	clamps
2 pcs.	1¼ x ⅝″ x 16′	moldings
1 pc.	1¼ x 4¾″ x 12′—cut from 2x6	keelson
4 pcs.	1⅝ x 7½″ x 10′—2x8's plane 2 pcs. 1¼″ thick	bottom stringers
2 pcs.	1½ x ¾″ x 16′	side battens
2 pcs.	¾ x 2″ x 5′—1 pc. 10′ long	bevel chines
1 pc.	1⅝ x 7½″ x 6′	stem inner core
1 pc.	1⅝ x 7½″ x 16′—makes 10 uprights	uprights
1 pc.	¾ x 1¾″ x 5′	outer fore stem pc.
1 pc.	¾ x 3⅝″ x 14′—1x4	side frames
3 pcs.	¾ x 4¼″ x 12′	bottom frames
1 pc.	¾ x 4¼″ x 6′—cut from 1x6's	bottom frames
1 pc.	¾ x 5½″ x 10′—1x6	#7 transom outer frame
3 pcs.	¾ x 7½″ x 12′—1x8's, 1 pc. 1x6x64″	beams
4 pcs.	¾ x 1½″ x 12′	deck battens
1 pc.	¾ x 3⅝″ x 10′—1x4	deck battens
1 pc.	¾ x 2⅜ x 40″	strut piece
2 pc.	½ x 2 x 32″	coamings

PLYWOOD REQUIRED

No.	Description	Use
2 pcs.	⅜″ x 4′ x 10′ 5 ply AA gr. ext. Waste makes gussets	bottom
1 pc.	⅜″ x 4′ x 8′ 3 ply AA gr. ext. Makes two fore ends	(fir)
2 pcs.	¼″ x 4 x 8′ 3 ply, mahogany plies equal thickness, ext.	sides
4 pcs.	¼″ x 4 x 8′ 3 ply, mahogany, plies equal thickness, ext.	deck
1 pc.	¾ x 16″ x 6′ makes 2 pcs. 8″ wide (fir)	girders-deck
1 pc.	¾ x 26″ x 6′ (fir)	transom #7
1 pc.	½ x 36 x 72″—fir ext. AC gr.	bulkhead #2
	¾ x 16 x 36″	seats (bottoms)
	¼ x 30 x 30″	seats (backs)
	¾ x 16 x 48″	hood (sides)
1 pc.	⅛ x 36 x 48″	hood (top)
	⅜ x 24 x 72″ AC gr. ext. fir	outer stem layers

Rod, 2 lifting rings and 2 keel plates
gas tank vent
fill pipe plate for gas tank
1 gas tank
1 high-speed intake strainer
2 through-hull connectors (transom exhaust) 2″ dia., or 2 exhaust flanges
1 throttle control
1 self-aligning shaft log. for 1″ dia. shafting
1 aqua-dynamic rudder-Stokes 16″ shaft
1 high-speed strut-Stokes
3 rudder shaft collars
1 racing fin (optional)
2 stern bearings for ⅞″ dia. shafting—rudder bearings
1 15″ dia. steering wheel
4 windshield keepers to retain hood in position
4 pulleys—2 flush mounting (transom), 2 swivel
30 ft. ¼″ dia. flexible wire rope for steering cable
3 ft. Bowden control cable for throttle
1 pc. shafting, 1″ dia., 52″ long—check your installation for this
1 set thrust bearings
1 bow handle
hose clamps where needed
1 ignition switch
1 hatch handle
2 tiller rope clamps
2 Petite turnbuckles for steering gear
2 sponge rubber cushions for seats
2 life preservers
1 crash helmet
1 flame arrestor for carburetor

FASTENINGS

5 gross #8 x 1¼″ *fh* screws (or 3 lb. 1¼″ stainless steel Stronghold annular thread nails) (bottom)
5 gross #8 x 1″ *fh* screws (sides and deck)
1 gross #6 x 1″ *fh* screws (gussets)
6 dozen #10 x 1½″ *fh* screws (uprights-notched). If uprights are unnotched, use #12 x 2½″ *fh* screws
4 dozen #10 x 2″ *fh* screws (chines-keel)
6 dozen #8 x 1¾″ *fh* screws (clamps)
2—¼ x 5″ carriage bolts for truss assembly
2—⅜ x 6″ carriage bolts for lifting plate forward
2—⅜ x 2″ carriage bolts for after lifting plate

TABLE D—CONVERSION PARTS MANUFACTURERS FOR AUTO ENGINES

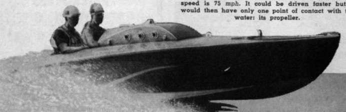
AUTO ENGINE WORKS 331 North Hamlin Ave. St. Paul 4, Minnesota	Conversion parts for all auto engines. Also special reverse gears
BARR MARINE PRODUCTS CO. 2700 East Castor Ave. Philadelphia 34, Pa.	Conversion parts for Jeep, Chevvy, Buick, Dodge, Ford, Oldsmobile, DeSoto, Cadillac
I.E. DEBBOLDS MARINE SUPPLY 10366 Long Beach Blvd. Lynwood, California	Conversion parts for Ford and Mercury. Also racing equipment—heads, manifolds (catalog, 25c)
FEDERAL MARINE MOTORS CO. 9011 Cottage Grove Ave. Chicago 19, Illinois	Chevrolet, Ford, Willys, Jeep, Mercury, Lincoln and Cadillac conversion kits. Also flexible couplings, tachometers
LEHMAN MFG. CO. 972 Broad St. Newark 2, New Jersey	Sells Ford, Lincoln, Mercury and Jeep, fully converted engines or parts to convert them
OSCO MOTORS CORP. 3627 N. Lawrence St. Philadelphia 40, Pa.	Ford and Jeep conversion parts or completely converted engines
STOKES MARINE SUPPLY CO. 505 East Chicago St. Coldwater, Michigan	Olds, Ford, Buick, Jeep, Studebaker, and all Chrysler product engine kits for conversions and transmissions—240 *hp* Buick used on *Panther* converted by Stokes

Marine Supply Co., or I. E. Debbolds Marine Supply (specify the "hot-rod" rudder and strut designed by W. D. Jackson). A 15-in. dia. standard steering wheel is used.

Build battery platform and bucket seat (Figs. 10 and 15) and install. Hood is detailed in Fig. 11. Instrument panel should include speedometer, oil gauge, ammeter and water temperature indicator. Throttle can be either foot feed or dash mounted. The carburetor should have a flame arrestor.

Figure 17 shows how *Panther* can be built as a forward cockpit runabout for water skiing (engine is reversed). When not in use, cover cockpit.

Install bow handles and *Panther* is complete. Take it easy when trying her out the first time, ease the throttle forward gradually. Planing will begin within 100 ft. and you're on your way. This is a fast boat; handle with care, especially near fishermen or swimmers.



speed is 75 *mph*. It could be driven faster but would then have only one point of contact with the water: its propeller.