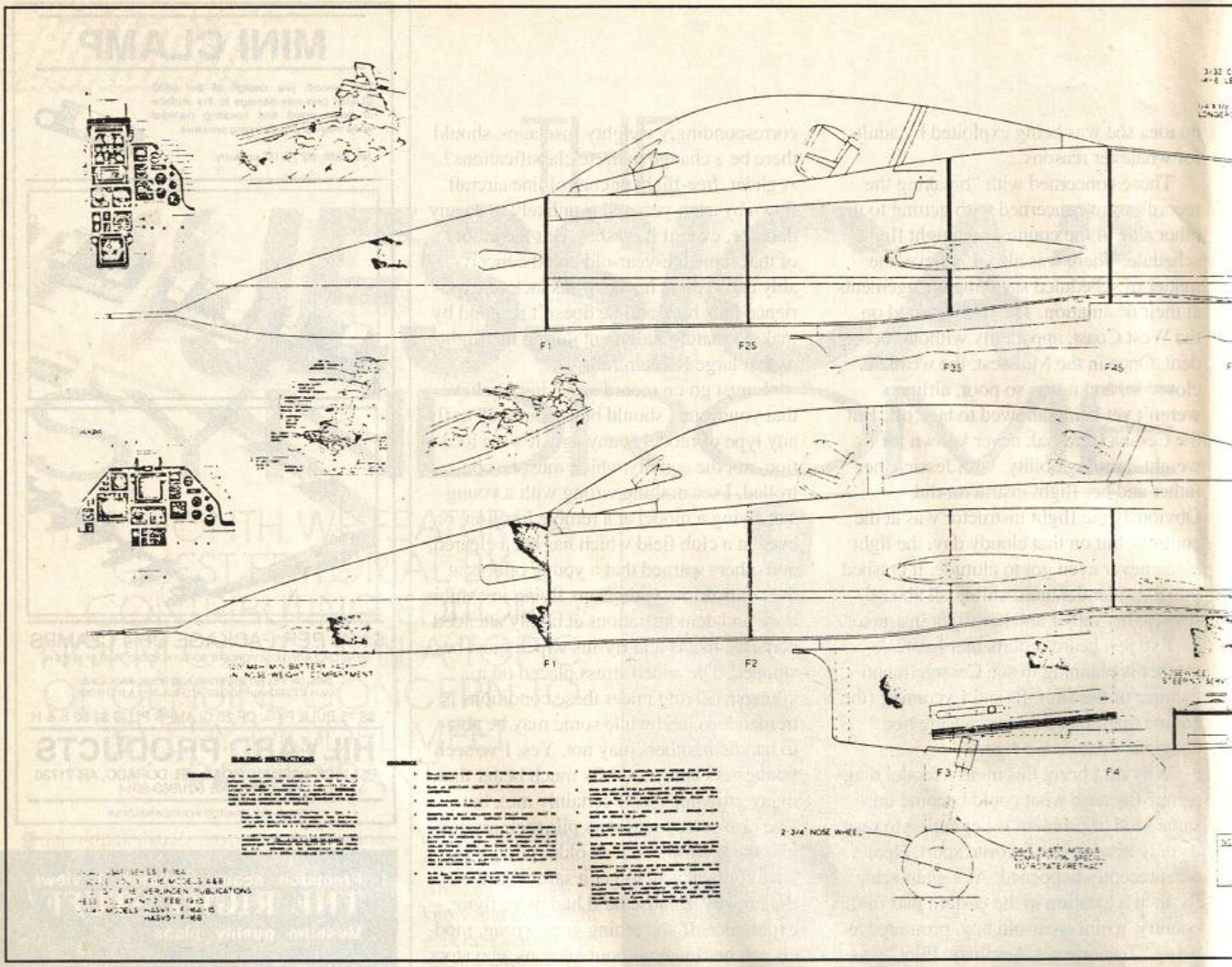


F-16 GIANT-PROP FAN JET

BIG JETS DON'T HAVE TO BE INTIMIDATING, OR ULTRA- EXPENSIVE!

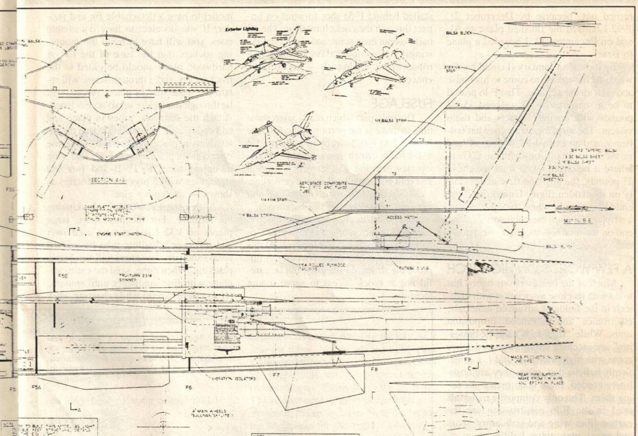
Like so many R/Cers I was always fascinated by the appealing lines of the F-16. Realizing the prop-fan concept was now proven and tested, I finally convinced myself this sleek jet fighter would make an excellent starter project.

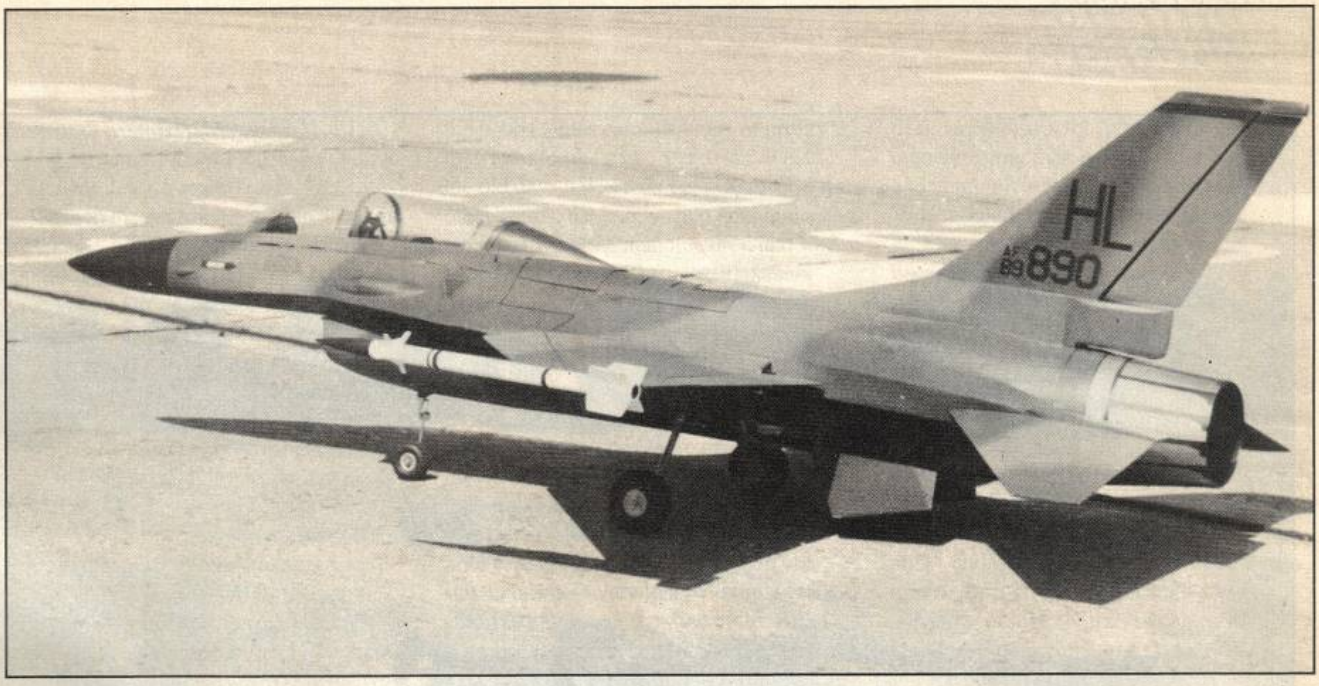
Using a three-view drawing from a 1992 issue of *Detail & Scale* magazine, I started building from scratch. My good friend Al Kalbfleisch, one of the most talented master craftsmen I've ever met, agreed to detail the

Designer-builder Josh Harel and his impressive, finely scaled ducted prop model of the F-16. With engine and retracts his entire investment in the model was about eight hundred dollars.

BY JOSH HAREL

PLANS AVAILABLE FROM THE AUTHOR • 286 HAWTHORNE AVE. • DERBY, CT 06418, (203)-732-0532


Exterior Lighting
SECTION A-A
ENGINE START HATCH
ACCESS HATCH
VIBRATION ISOLATORS
BALSA BLOCK
NOTE
WE STRONGLY RECOMMEND THE PURCHASE OF A GOOD QUALITY PLASTIC MODEL IN 1/48 SCALE TO AID IN BUILDING AND DETAILING THIS MODEL.
GIANT JETS INC.
F-16 A/B FIGHTING FALCON
DESIGNED AND DRAWN BY J. HOPEL



Although it's quite large, Josh Harel designed his model to be built quite inexpensively. He wants to encourage a greater number of young people to enjoy scale jet modeling.

ed after final painting of the model.

STABILATOR

The stabilator is built around the carbon-rod. Glue E-1 in place (use CA) then add E-2 to E-4, eyeballing to make sure they are all symmetrically positioned. Glue the leading edge and trailing edge spars, and then add E-5 and E-6. Cover bottom of stabilator with 1/16 competition balsa. Add stiffeners between E-1 and E-4 ribs, and epoxy to carbon-rod. Cut a piece for the top sheeting — do no glue yet. Cut a piece of lead and *statically balance* the stabilator so it is slightly nose-heavy (to account for the added weight of the glass finish and paint). Glue the lead piece in place as shown, and add top sheeting. Sand smooth and glass.

The stabilator control horn is made from Allied Devices four (4) set-screw collar part no. DL425. The inside diameter is drilled to 5/16 and three (3) of the four (4) supplied set screws are used to fasten the collar to the carbon rod, while the fourth one takes a 6-32 to be used as control horn with Du-Bro plastic link. Loctite all screws in place. If you cannot get the collars, I can supply them for a small fee.

FIN & RUDDER

If the assembly is to be detachable, building technique is the same as the stabilator. Pay attention to the two (2) carbon-rods and make sure they fit well into the tubes. If they are too tight, pass a 5/16 drill through the tube to open them up slightly. If the fin is permanently mounted, glue it directly to the fin base. The rudder control horn is mounted permanently in the fin base. Note the building technique for the rudder allowing a pocket to snugly fit over the control horn.

WING

The foam wing is sheeted with 1/16 competition balsa. (Grains parallel to leading edge.) Add front and rear spars, and sand smooth. Cut the wing where the carbon strip is to be glued. For improved scale appearance, this cut line can be sanded so that, after the carbon strip is epoxied in place, the slat can be epoxied back into place with one to two degrees of "droop". Drill the holes for the wing mount carbon-rods. (Extra care should be taken to drill them parallel to each other and in the right location.) Epoxy the carbon-rods in after trial mounting them to the fuselage. Form a hook from a piece of 4-40 threaded-end Du-Dro pushrod. Drill a hole in the end of the forward wing carbon-rod (spar), and epoxy the threaded end of the hook in place. (Both wings.) Build the flaperons per plans, and attach to the wings using heavy-duty hinges. (Klett RK-15 recommended.)

Missile launchers can be added at this stage. Glass the wings and paint. The AIM-7 "Sidewinder" missiles are made from Estes rockets and the fins are cut from white styrene sheets and CA'ed in place.

LANDING GEAR

All my jet designs are based on competition retracts for economy. The basic unit is very sturdy, yet extremely lightweight and reliable, and lends itself readily to modifications. The basic main gear is a 90-degree retract unit, and can be modified to rotate/retract configuration. The nose gear is a 115-degree unit, and can also be modified for the F-16 application. Both units can be changed back to their basic configuration easily to fit other airplanes.

FUEL TANKS

Use of Sullivan 11-ounce saddle tanks is recommended. Two (2) are used, and on the prototype, they were mounted with sticky-back velcro strips (2 per tank) to the inside of the fuselage strakes between formers F-5B and F-6. The two feed and pressure lines are combined through common tees, and fed to the carburetor and tune-pipe respectively.

FLYING

Due to the limited inlet area on this model, we recommend that you fly without the starting hatch. This provides a cheater hole which is hardly noticeable. The plane *can* be flown with the hatch in place, but performance will suffer. You will find that, due to the large wing area and low wing loading, this F-16 is very easy to handle. It flies much like a 40-size advanced trainer, and can really be slowed down for landings.

Good luck!

turned out, because by December 21, 1992 I handed the finished plane to Al, and on December 22, I boarded a plane to Israel.

By the end of January (I could hardly wait), Al invited me to come to his house and pick up the airplane. That F-16 proved to be a masterpiece. It weighed 15-1/2 pounds with engine, retracts and radio system. The airplane was somewhat tail-heavy, and an extra 1-1/2 pounds of lead in the nose finally brought the C.G. to where it belonged. At a final weight of 17 pounds, the airplane flew majestically on its maiden flight. Unfortunately, it ended in tragedy when, before landing, a stripped servo on the stabilators gave up, and on the final leg, the plane went down and was destroyed.

A FEW WORDS ON HIGH-TECH

Much of the beauty of our hobby has to do with its close association with high-tech in the fields of advanced materials, electronics and advanced propulsion units. While "high-tech" and "composites" are excellent selling buzzwords, they come with high price tags, and I, for one, firmly believe that unless they are absolutely needed, there is no reason for using them. The only composite materials used in the F-16 construction are the carbon-fiber wing and stabilators' spars and epoxy-glass tubes holding them.

CONSTRUCTION - GENERAL

The plans appearing in this article reflect all the lessons learned from building and flying the first prototype. Weight distribution was changed so that a ready-to-fly weight of 16 pounds can easily be obtained. All balsa used is competition grade (4 - 6 pounds) and about 95 percent of the construction is carried with CA glue. Epoxy is used only for the fan bulkhead (F6), landing gear mounts, stabilator spars attachment to the ribs and wing spars, and mounting tubes.

For ease of construction, hard-to-make parts (i.e., nose cone, tail cone, inlet duct) are offered separately in fiberglass as well as canopies (single or dual sitter) and foam wings. The entire plane is covered with 3/32 balsa and glassed with 0.5-ounce fiberglass and epoxy. Paints used are Hobby-Poxy. The completed airplane, ready-to-fly, represents approximately $800 invested (engine and retracts included).

The concept of "Build to fly — not to crash" really proved itself, when as a result of the crash, only the forward half of the fuselage was destroyed when the 1200 mah battery pack (which was installed behind F-5) shot forward on impact through the cockpit interior. The aft half was not even scratched (including the wings) and is mounted on a plaque as a tribute to the "Build to fly — not to crash" concept.

FUSELAGE

The only part which really takes some time to make is the portion of the fuselage from F-1 to F-9. Start by pinning the 1/4 x 1/4 balsa crutch spars directly on the top view drawing. Cut formers F-1 to F-9 and split horizontally along the centerline.

Remember to mark all horizontal and vertical centerlines on the bulkheads.

Glue the 1/16 plywood strake base on each side of the crutch, and then glue top-half of formers F-1 to F-9 in place. At this stage, you can add some sheeting to improve the structural integrity, but be careful not to block access to servo mount locations.

The F-16 makes one of the best entry-level jets. Its easy-flying characteristics can make even an inexperienced pilot look good.

Remove structure from the building board and add the lower half formers F-1 to F-9. Cut the 1/64 plywood tail pipe, trial-fit roll to shape, and glue in place (using CA) as shown on the plans. Add FS-1 to FS-4 to the skeleton.

I strongly recommend that, at this stage, you start installing all servo mounts in place. This will eliminate installation and routing problems which I experienced on the prototype. With the servo mounts in place, you can now glue the tail cone to its proper place (F-9).

Build the basic fin structure and mount in place. This is when you will have to decide whether or not you want your model to have a detachable fin and rudder. If you do elect to have detachable ones, you will have to build the mounting sockets into the base of the fin. A hardwood block should be glued to the front socket, and a through-screw will retain the front spar in place. Access will be through the rudder servo access hatch. Attach the stabilator tubes in place and add epoxy glue for strength. Glue the inlet duct in place against F-5. Glue the nose cone in place against F-1. Glue wing mounting tubes to F5-B and F-6 and strengthen with 5 plys plywood strips as shown — use epoxy glue.

At this stage you can finish skinning the airplane. For the most part, large pieces of 3/32 balsa can be used (wet and roll over a mailing tube for curved areas) and very few areas will need strip planking. When done, sand the entire airplane with fine sandpaper until smooth. (If you were careful while sheeting, very little sanding will be required.)

Glass the entire frame with 0.5 glass. "Easy-Lam" epoxy is recommended (available from Aerospace Composites). Follow their recommendations. Overlap the glass fiber over the nose cone, tail cone and inlet duct for added strength. When cured, feather in the glass in those ares. If you decide to incorporate the retractable landing gear, now is the time to cut out the doors and install the hinges. All access hatches should be cut out at this stage and fitted. Detailing of the cockpit interior should also be finished at this stage as well as trial-fitting of all systems to make sure that no cutting will be need-

General Dynamics F-16 A/B Fighting Falcon

Specifications:

Scale:	1:6.5
Wing Span (Less Missiles):	57.23 Inch
Wing Area:	1022.48 Sq. Inch
Length (Including Pitot Tube):	91.37 Inch
Weight:	16 Lbs.
Radio:	5 Channels
Recomended Engine:	K&B 82 / 100 DF

Scratch Builder's Full Kit:	$350.00
Short Kit:	$300.00
Plans:	$45.00
Nose Cone:	$35.00
Tail Cone:	$25.00
Intake:	$40.00
Canopy F-16 A/B:	$25.00 / $35.00
Wings Foam Core:	$50.00
Fiberglass Full Kit:	CALL