TR-260

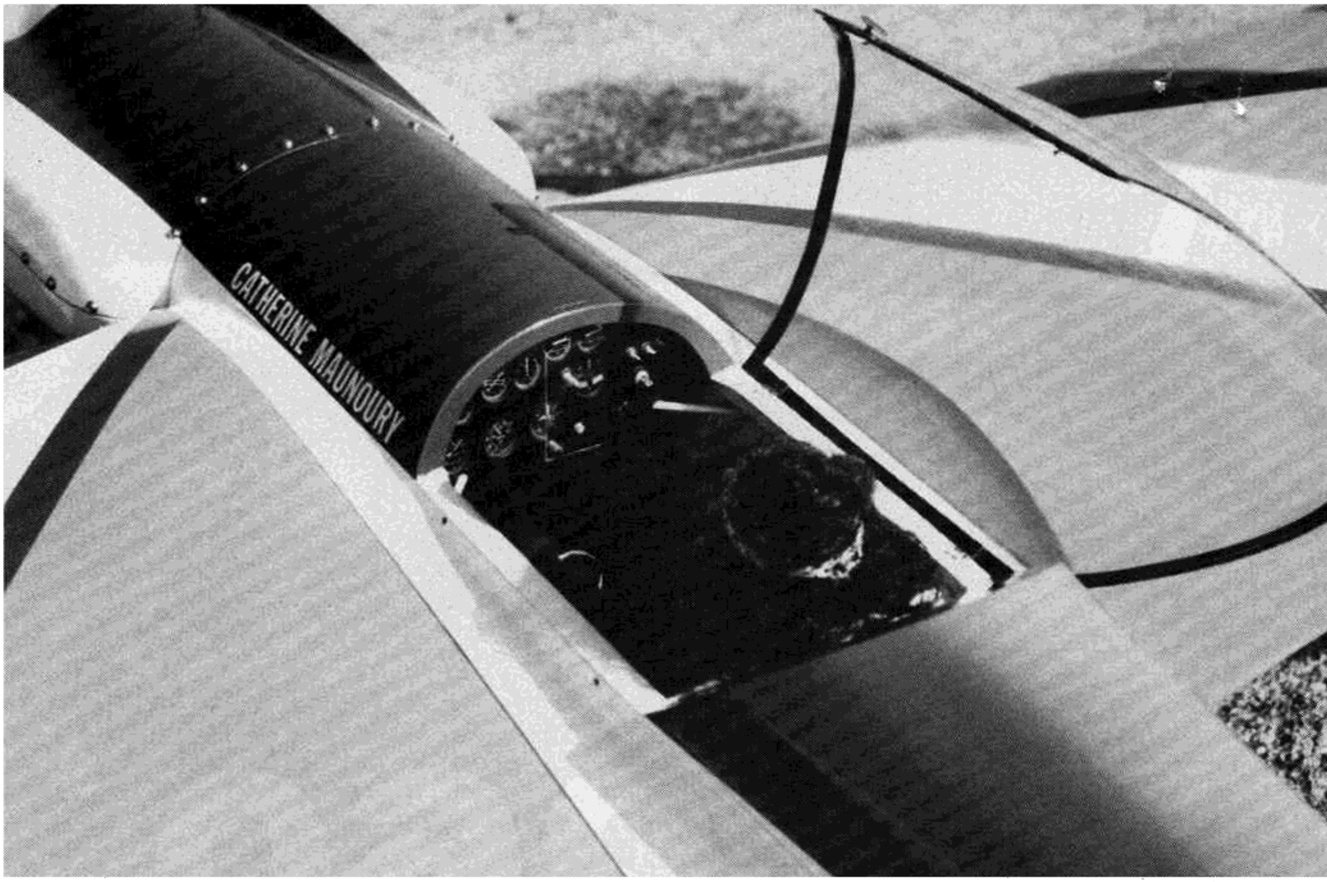
By Terry Moore

With a .75-.90 2-stroke for power, this sport Scale beauty is loaded with performance

I first saw this at South Cerney practicing for the 1986 World Aerobatic Championships. The French contingent was made up of an interesting and varied selection of monoplanes — low and mid-winged, i.e., CAP-230 (prototype) F-WZCH; CAPENA (one off) F-WZTC; ASA-100 (one off) F-WYGN; DL-260 (one off) F-WYSP; TR-260 (two off) F-WTXK and F-WYVF.

It was the latter aircraft that I decided to model, although I have been sorely tempted by them all and photographed each and every one. Having made the decision I then embarked on the task of gathering sufficient information for production of an accurate scale replica. Unfortunately, information was limited to say the least (a familiar tale to many budding scale modelers, no doubt).

Fortunately, Clive Smalley — of Radio Modeller Scale Column fame — had taken lots of detailed photographs and by using a combination of these, and published dimensions from Janes A.W.A. (all the Worlds Aircraft) and Don Berliner's article in an American publication, I was able to interpolate and produce my own 3-view drawings.



General Description

Similar in general layout to the Laser and Akro mid-winged type of aircraft — Gerrard Feugray built the prototype F-WTXK for Georges Muzergues with a 260 hp Lycoming A10-540, whereas Catherine Manoury's "Sirius" F-WYVF has 330 hp!! Both aircraft are stressed to ± 10 G.

The fuselage is of welded steel tubing covered with undirectional fiberglass. The wings are of hemlock, pine covered with 2½mm — 45° mahogany plywood. The elevators and rudder are fabric covered. The airfoil is a modified NACA 2100 series symmetrical section, 14% at root tapering to 10% at tip.

Small external counterbalances underneath the ailerons are utilized. The propeller comes from Muhlbauer of West Germany; there is a single spring leaf type undercarriage with removable spats; side and underside clear vision panels are used along with a sighting device on the port wingtip to assist the pilot with alignment to precise vertical and 45° lines.

There are subtle differences in the canopy profile and underside of engine cowl detail between the two aircraft. Both options are detailed on the model plans. Also, F-WYVF does not have such sharp edges to the wingtips like F-WTXK.

CONSTRUCTION

Like most other designers of scale models, I will start with the assumption that anyone contemplating building this model is unlikely to be a novice, and should have already accumulated some experience with "built-up" structures. Consequently, the following notes highlight the principle areas that need particular care or more unusual methods of construction.

The main considerations are accurate, strong, but lightweight construction with an emphasis on the latter if good vertical performance is to be achieved. Select your wood with care and use the glue sensibly but sparingly.

TR-260
Designed By:
Terry Moore
TYPE AIRCRAFT
Sport Scale Aerobatic
WINGSPAN
71 Inches
WING CHORD
11⅛ Inches (Avg.)
TOTAL WING AREA
789 Sq. In.
WING LOCATION
Mid-Wing
AIRFOIL
Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
0
OVERALL FUSELAGE LENGTH
50 Inches
RADIO COMPARTMENT SIZE
(L) 10" x (W) 5" x (H) 3"
STABILIZER SPAN
21 Inches
STABILIZER CHORD (incl. elev.)
7⅜ Inches (Avg.)
STABILIZER AREA
150 Sq. In. (Approx.)
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
8 Inches
VERTICAL FIN WIDTH (incl. rud.)
7¾ Inches (Avg.)
REC. ENGINE SIZE
.75-.90 2-stroke
FUEL TANK SIZE
12 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage .... Balsa & Ply
Wing ...... Balsa, Spruce, Aluminum Tube
Empennage .... Balsa
Wt. Ready To Fly . 148 Ozs. (9 Lbs. 4 Ozs.)
Wing Loading .... 27-29 Oz./Sq. Ft.

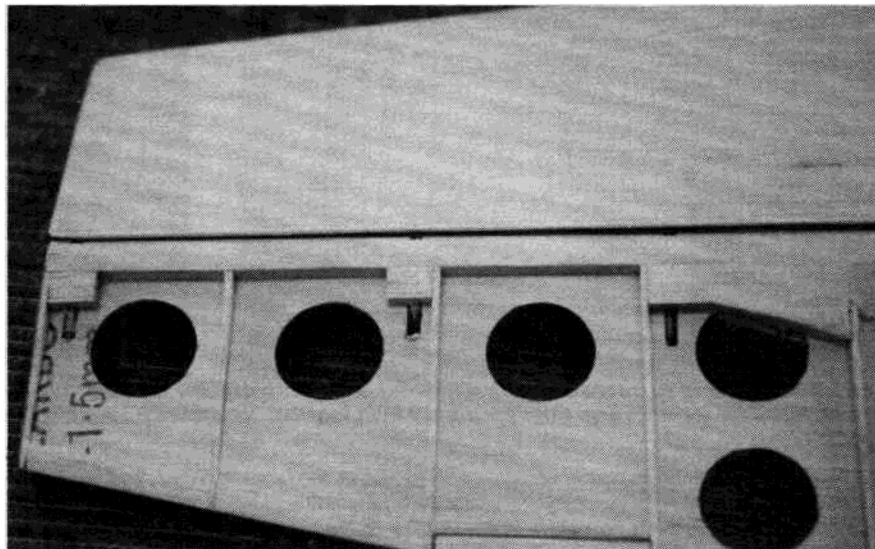
I like to start with the tail surfaces because I can then quickly complete an item and see a definite "result" of my labors.

Stabilizer:

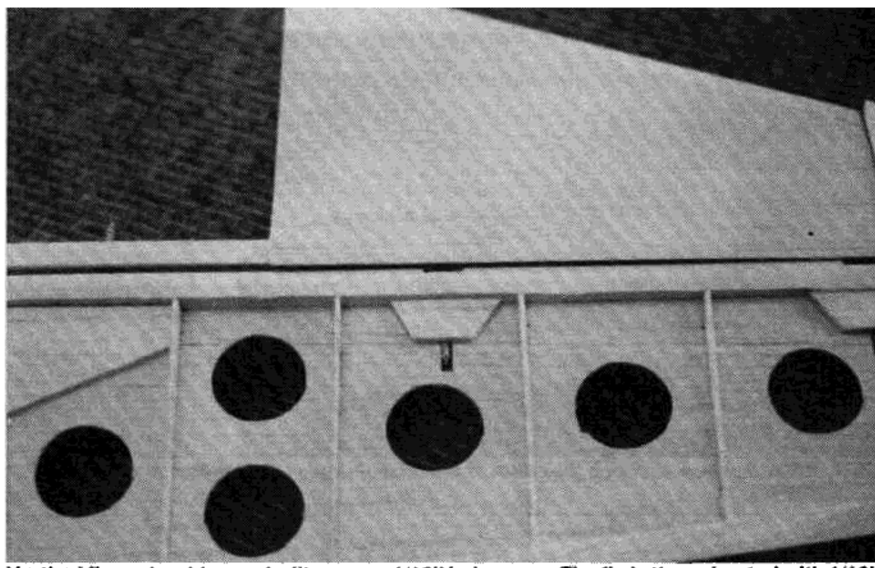
A central core is not necessary due to a parallel section with symmetrical taper to the leading edge. Build up over the plan onto the lower sheeting, and glue in place the recessed trailing edge, ribs, and false leading edge, followed by the hinge blocks and top sheeting. Remove from plan, sand false L.E. to profile, complete sheeting top and bottom forward of the dashed line, as shown on plan. Complete the leading edge.

A feature of the full-size, is the recessed control surfaces and the flat tips to the stabilizer and wings. I covered these tip ribs with thin plywood to help ensure retention of crisp angles and build in a degree of "ding-proofness!"

Spend some time getting the hinge detail accurate and smooth — a long shaped

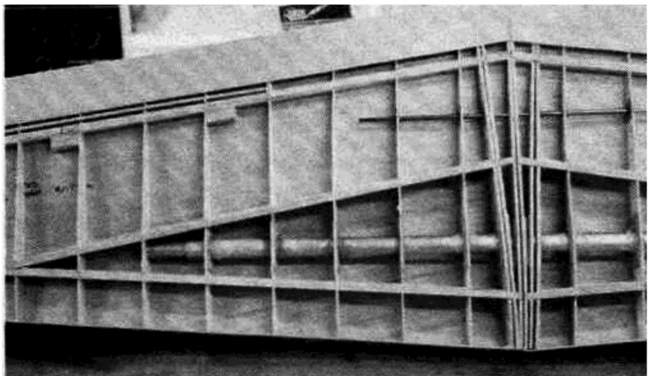


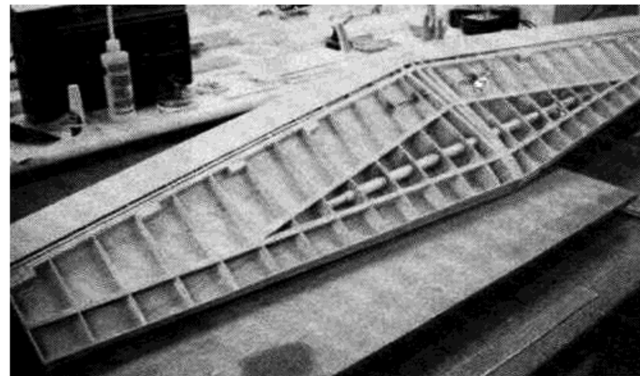
The horizontal stabilizer is built-up using a balsa frame which is then sheeted with 1/16" balsa. The elevators are built-up on a 1/16" core, then covered with a covering material. Note: Robart Hinge Points used on all control surfaces.



Vertical fin and rudder are built-up on a 1/16" balsa core. The fin is then sheeted with 1/16" balsa, and the rudder is covered with your favorite covering material.

The wing is built upside down over the plans, so that the top surface will be straight, with no dihedral. Trailing edge of ribs shimmed to ensure a straight and true structure.





LEFT: Main and drag spars are spruce, trailing edge spars are balsa, and the wing joiner is an aluminum tube. RIGHT: Left and right wing panels ready for top sheeting. Both panels are built together for accurate spar alignment.

sanding block is useful here.

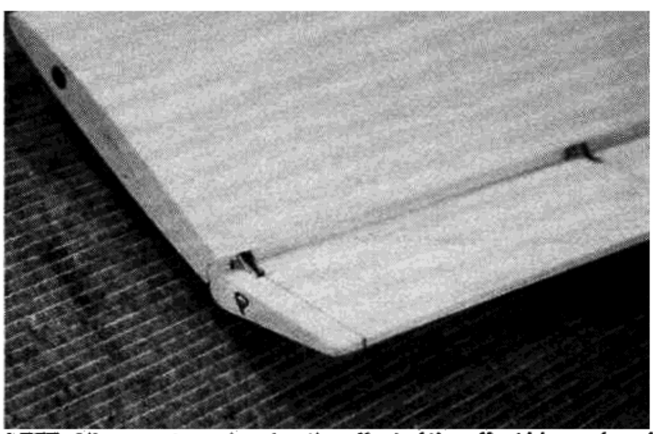
Elevators:

The elevators are built-up over a sheet balsa core with lightening holes cut out. A tip here is to precut slots in the core for the Robart hinges; this helps to center the drill when opening out at a later stage. The elevators are fabric covered, and use a wire elevator joiner.

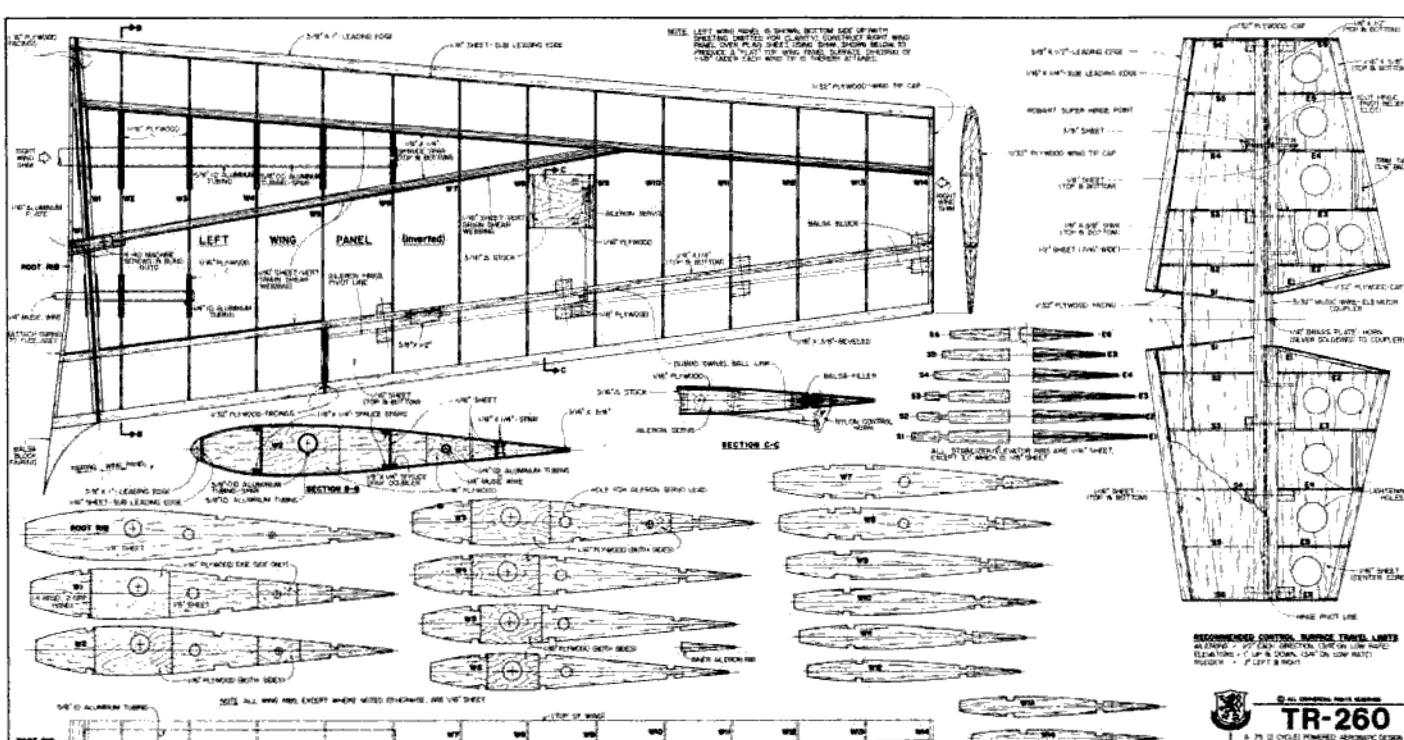
Fin & Rudder:

Both are built as per the elevators, but the fin is sheeted with 1/16'' balsa on both sides, whereas the rudder is fabric covered. Take care over control surface hinging and section; pre-slot the cores for the hinges. Use light wood and go easy on the cyano (or balsa cement, which I still use!).

Note: With all the control surfaces, remember to offset hinge centerlines back from the leading edge of the surface for geometrically correct action. Also note



LEFT: Aileron set-up showing the effect of the offset hinges (up aileron shown). RIGHT: Aileron down. Take your time and get a good fit.



FULL SIZE PLANS AVAILABLE — SEE PAGE 198

from photos of the full-size, the trailing edges of **all** control surfaces (not just ailerons) are sharply squared off to improve control response. They are neither knife-edge nor rounded, but blunt and square.

Wings:

There are a number of **very** important factors to bear in mind when assembling the wings, and they are:

(1) The top surface of the wing is level. Consequently the full depth of reduction in thickness is tapered from root to tip on the **underside only**. Therefore, each wing panel should be built upside down over the plan with the root and all other ribs precisely vertical.

(2) Each wing half and stub wing half are built as one and only separated much later after satisfactorily aligning with the fuselage and tail surfaces.

(3) The position of the tubular spars is parallel to the **top** surface of the wing and **not** in the center of each rib. See pattern sheet.

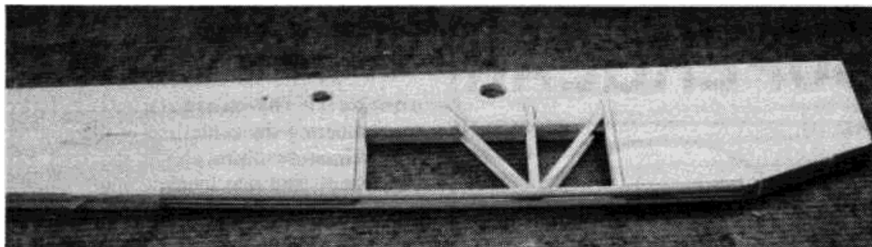
(4) The wings should be built with the spars in place during construction with the ribs rotated around the main tubular spar. You need to carefully jig during construction with strip shims to maintain 0° incidence at root **and** tip.

(5) Make up sheet skins before commencing construction of the wings. Do not remove the wings from building board until spars are in place and sheeting is installed to the undersurfaces (remember, build upside down).

(6) If possible, build the second wing panel onto the first panel's projecting spar, and jig the two halves together to ensure accuracy of incidence.

(7) For spar tubes, I used drawn aluminum alloy tube from my local home improvement store. Quite thick walled, but light, and I could not bend it by hand. **Do not use soft aluminum.** I used 5/8" o.d. inner and 5/8" i.d. outer tube. The rear spars are steel rod and are solely for alignment when assembled.

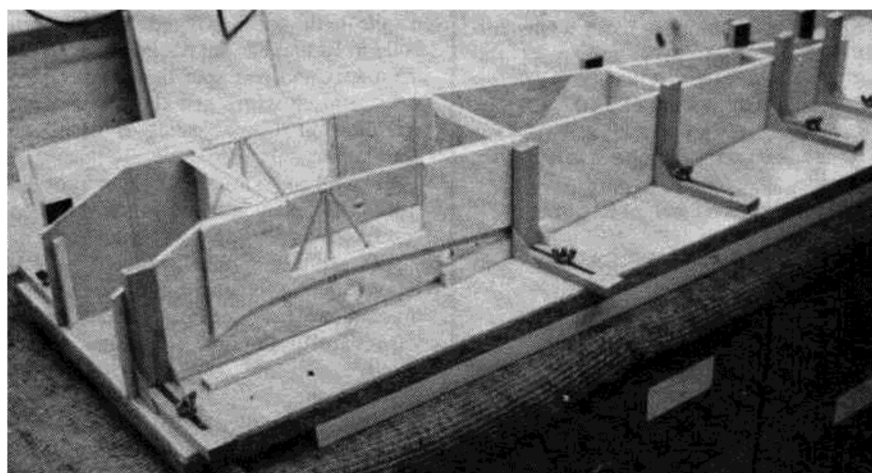
(8) The ailerons have their centerline considerably offset to the rear — see photographs.



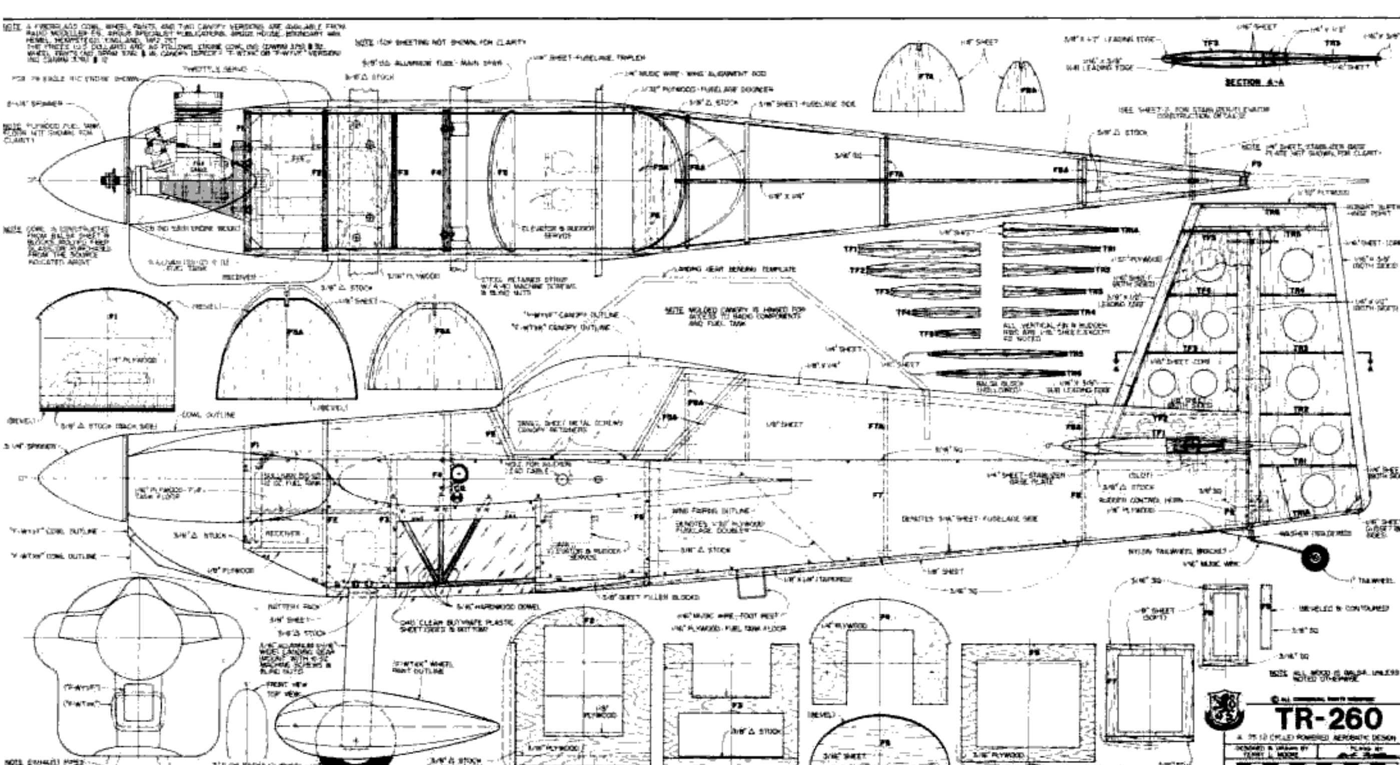
Left and right fuselage sides. 3/16" dia. dowels used for glazed area in bottom of fuselage.

Fuselage:

Study the plans carefully and assemble the basic sides with ply doublers. The 3/16" diameter beech doweling is then let in, taking care to only cut away the basic sides so that the doweling is seated on the 1/16" ply doubler. It is important to file in good accurate joints to simulate the visible tubular steel structure in the sides and bottom of the vision panel. This part of the



Fuselage jig recommended for assembly. Note plywood doublers used inside from fire wall to behind the wing.



FULL SIZE PLANS AVAILABLE — SEE PAGE 198

model structure is carrying similar loads to the full-size. Glue on the 1/4" balsa triplers.

With the two sides taped together, mark and drill for main tubular spar (remembering the centerline of the spar is approximately 5mm above the root rib centerline), and rear locating spar.

Glue on the 3/8" triangular reinforcing strips, chamfer and recess ends as per plan. Finally, saw through the **inside** only of the sides to the rear of F6, to within 3/32" of full depth, and **carefully** crack. This is to follow the sharp plan profile change.

Make up the formers and mark the centerlines on each. Align the formers over the plan or on a fuselage building jig. F3, F6, F7, F8, and F9 are installed first to allow the fuselage sides to lay flat, upside down, thereby assisting with alignment.

Then, when all the glue is dry, lift the fuselage and turn it right side up and space it so that the top of the fuselage sides are parallel to the building board. You can then build in F1 and F2, but not F4. Slide in the main spar and rear spar through fuselage sides, slip on wings and check alignment and dihedral (0°), adjusting as necessary until correct.

F4 can then be installed tight against the front of the main spar, to which it is then bracketed and bolted before gluing in place.

The remaining fuselage construction follows normal practice, **but** pre-plan the installation of radio gear, fuel tank, etc., with careful thought regarding accessibility.

Installation:

Engine: I installed my Super Tigre "75" side mounted with a manifold from which silicone tubing is routed to the remote scale position silencer. The fuel tank is positioned on a removable platform.

Radio Gear:

Separate aileron servos are used in each wing, with direct drive to each aileron. These are connected by a "Y" cable lead. The elevator and rudder servos are under a hinged hatch accessible from the underside, behind the fuselage vision panel. The receiver switch and charging socket are also in this location. The receiver and batteries are located above the undercarriage. The throttle servo is immediately behind F1, adjacent to the fuel tank. I used a closed loop pull-pull system to the rudder, with an internal NyRod elevator pushrod. The receiver antenna was placed inside the fuselage through a clear plastic tubing exiting next to the tail wheel assembly.

Assembly:

Accurate alignment is essential for accurate flying. I have used the word "alignment" several times, but it is of paramount importance.

Using a length of strong thread, I check wingtips to fuselage end on both sides. Wingtip to fin tip, and wingtip to tail tip, always checking that each side is equal. The model was set up with a 0° thrust line, 0° wing incidence, and 0° tail plane incidence.

Finishing:

There are two very different schemes from which to choose:

(1) F-WTXK — with spats, shorter canopy, slightly more streamlined cowl, etc. This is basically silver with orange/red trim and black cheat-lines. There is a lot of sponsorship writing on behalf of Prodera "Vibrations" in mid/pale blue and black, and BMW motor cars. The BMW logo is on the top outer wing surfaces with the telephone number of the Evreux EMW agents in large black lettering. In addition, the constructor's name G. Feugray is painted on the fuselage underneath the canopy, with TR-260 N° 1 on the top of the rudder. A very comprehensive set of photographs of this particular airplane was taken by Clive Smalley, the ex-Radio Modeller Scale columnist.

(2) F-WYVF — without spats, longer canopy, cruder cowl, etc. This is in two-tone turquoise/green with white sunburst to wing and tail top surfaces; an under wing spanwise arrow and fuselage side stripe. There is no sponsorship writing, only the Registration; the pilot's name (Catherine Maunoury) in white and "Sirius" TR-260 in black on the fin top. An excellent set of photographs of this aircraft is available from Scale Model Research.

It was this latter scheme I chose. I finished my model traditionally with tissue and dope, then used Humbrol white enamel, and "Dulux" household gloss mixed to "Lido" BS16E53 for the light, and "Scarab" BS16D45 for the darker turquoise. There are a lot of heavy type screwbolts and rivets on the full-size, which I duplicated to add to the authenticity. I fuelproofed initially with Tufkote, flatted down, and finally finished to a high gloss with yacht varnish.

My model finished up at a shade under 10 lbs. but that was with a full paint finish, smoke system up front, a pretty hefty silencer/expansion box and 4 ozs. of lead in the tail. By my calculations, the theoretical C.G. position is 35% at the root; however, playing it safe, I set mine up at only 30% and the model "grooves" nicely but is still highly responsive to the elevator control. I would imagine that the weight could be lowered to nearer the 9 lb. mark by using film covering and lighter hardware up front.

Flying:

Set up the control throws as follows: Elevators 1" each way (3/4" on low rate); ailerons 1/2" each way (3/8" on low rate); rudder 2" each way. And so to the acid test. Two year's research, design, putting to one side, and building came to fruition on Good Friday (the 13th). Slightly chilly, wind 15-20 mph, engine tested, radio range test satisfactory, nothing left to do but to get onto the runway at Fradley, point it into wind, open the throttle, and away she went. A little right rudder to track straight, no need for up elevator as there was no tendency to nose-over and I wanted to avoid a premature lift-off. As with similar mid-winged models, you do have to fly it off the runway with the elevator, but only when flying speed has been reached.

The first flight was simply for trimming (one notch up elevator, and two left aileron) and familiarization. With the S.T. 75 and a 14 x 6 propeller, it flies at a realistic speed, loops and rolls well, and goes up vertically a respectable height. (Note: an S.T. 90 fits in the same mounting holes, and also into the cowl, but I'm happy with the performance of mine.) Time for landing. I take it on a wide circuit to give plenty of time to line up on final. Over the hedge and it almost hovers in the wind with no tendency to drop a wingtip. Caution dictates a trickle more throttle, and so it floats halfway down the runway. After touchdown, it pirouetted nicely due to my inexperience with fully castoring tail wheels.

To summarize: The flying characteristics of the model emulate the full-size with an aerobatic capability far exceeding my own piloting. Having said that, it's quite easy to fly for anyone with low wing aerobatic experience. Being a mid-wing set-up at 0°-0°-0° with no dihedral, it has no built-in self-righting, it goes exactly where you point it, up or down. At 72" span and 10 lbs., it's also big enough to penetrate through windy turbulent air that would blow a smaller model about quite a lot.

To anyone building this model I wish you luck, and hope you enjoy both the building and flying as much as I have. My next project? Scale of course, probably something more sedate for the summer evenings. □

Dimensions:	
(Full Size)	
Wingspan	27' 4" (8.24m)
Length	19' 3½" (5.80m)
Wing Area	118 sq. ft. (11m²)
Flying Weight	1320 lbs. (600 kg)
Wing Loading	11.2 lb./sq. ft. (54.4 kg/m²)
(Model 1:4.6 scale)	
Wingspan	71" (1.79m)
Length	50" (1.26m)
Wing Area	5.58 sq. ft. (0.52m²)
Flying Weight	9¼-10 lbs.
Wing Loading	26½-29 oz./sq. ft.
Performance:	
(Full Size)	
Maximum level speed	235 mph
V.N.E.	280 mph
Maximum manuever	200 mph
Rate of climb at sea level	4000 ft./min.
Roll rate	270 deg./sec.

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