
A 50" span, 1/7th scale model, for 4 function radio control, & 5-8cc (·30—·49 cu in) engines. APS Code, K, L, M.— Also suitable for free flight & single channel radio, using 2·5 to 3·5cc (·15-·19 cu in) engines APS Code G, H.
D.H.82A TIGER MOTH
designed by
H.J.Towner
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The Aeromodeller Plans Service
13-35 Bridge Street, Hemel Hempstead, Herts.
SHEET 1 of 2
NOTE port sidethrust shown for clockwise crankshaft rotation, provide right side thrust for normal (i.e. anti-clockwise rotation) engine
ALL WOODS BALSA UNLESS OTHERWISE STATED.
NOTE:- More details of centre section can be found on sheet 2.
Cowling shape
1/8" ply plate
Rudder bars from 18swg aluminium
Double wires to rudder
Door shown fully open & dropped down
Diagonals top surface only
Anti spin strakes
Diagonals bottom surface only
Tank
Bottom crosspiece
Firewall F1a under F1
Crosspieces F2 shown thus on bottom
Hole for aileron lever
1/16" sq strip on underside of fuselage
Centre frame
Counter shaft
To elevator trim handles
Luggage compartment
To elevators, top & bottom crossed over
Single wires - use 3cord linen twine 1/32 dia
Tailplane must be good fit in here
Rudder post
Oil tank made from thin aluminium
Hardwood engine bearer Make 2.
Centre stringer.- not shown fully for clarity
Elevator wire leadouts, 1mm ply, stuck on covering
Spring catch
Luggage door from tin
1/16" sheet decking
Engine ℄
Engine plate
Longeron
Engine bearer
SECTION X-X
1/8" ply tongue, lower longeron cut a way to accept tongue
TURN & BANK
DEVIATION CARD holder
'NO SMOKING' notice
A.S.I.
REV COUNTER
LIGHT SWITCH
WATCH HOLDER
ALTIMETER
COMPASS
OIL INDICATOR RED
Neoprene tube
Brass tube
Pin to horn
Solder
Brass tube crimped to hold heavy thread
DETAIL OF CONNECTORS
SIDE VIEW OF PEDALS
18swg wire
FRONT PEDAL
REAR PEDAL
Brass tube
Front view of rudder bars
Hinge
SECTION AT F5.
Diagonals at F5. only
Tail trim lever
NOTE:- All floor between F1 & F5 sheeted with 1/8" balsa, between & flush with longerons
Tin
Horn, fibre or paxolin.
3/16" dowel
4BA bolt, head epoxied to R5.
Underside of tail, good fit into end of fuselage
All fin ribs 1/16" sheet except where noted
1/8" sheet
Fin post
Lint strap over
Solder tubes & glue well
'Z' frames connected with brass tubes to assist lining up
View of bottom looking down
Leave open for access to plug
SECTION Y-Y
All cabane wires 16swg
Bracing wires 20swg soldered
Rear view mirror
14swg brass tube
'Z' frames 1/8" ply, cut out & groove to take 16swg wire cabane
Venturi head
Wind shield, note aluminium strip between front & sides.
Thin leather crash pad on both cockpits
Cane hoops
Section 18swg tube
18swg wire pins
Top view
18swg tube
Brass tubes & pins, both cockpits
Metal cowl, see pattern
MERCO 49 shown, rotation is clockwise, hence port side thrust
1/8" ply fill for glueing area for bearers & ply plate
Throttle lever
Gusset
Packing piece
Bind bracing wire to top longeron
Bind to top longerons
Stringer position 1/16"×3/16"
Doors from tin
Throttle lever
Square vertical
Porcelain head pin
Elevator trim levers
Similar stbd side, slat release
All levers mounted on 1mm ply
Tail trim bias
3/32" sq stringer
Metal plate
Set screw soldered
Bent to form bracket & soldered to top of compression cylinder & also to bottom bracket
Bolt through
Adjuster for throttle
Glue gusset
All square
1mm ply
Oil tank
Slot for rudder bar
Springs from MECCANO drive
Centre frame
Foothold, stbd
Strengthening piece
Eyelet
Brass tube
10BA bolts
Plunger rod shown extracted
Hinge fix if desired
Bottom of cabane struts bound to bottom of diagonals.
Bound to bottom longerons
Cowl from five 1/4" sheet laminations
1/8" ply
Bind to crosspiece
Staple soldered on
Jacking pad Section
LOWER WING POSITION
Strut
Floor slotted to accept thread
Fuselage longerons 1/8" sq spruce. Uprights/diagonals (except as noted) from 1/8" dia birch dowel.
1/16"×3/16" stringers
Brass tube soldered to top part of leg, lower leg should slide freely in tube.
Strut here
U/C movement
Bind & solder with 20swg wire
Fuel pipe
Screws for tin clip
Rear piece fits over exhaust
Rivets
14swg wire
Soldered to tube
Bind & solder
Sheet tin, folded over & soldered
Both seats made entirely from 1mm ply
Map pocket
Slots to clear cable etc
Crash pad supports 1/16"×1/8" cane, shape round hot soldering iron
Firewall F1a. 1/8" ply
Cover plate from aluminium, epoxy in place
Brass spacer tube
U/C from 12swg wire
Wire staples soldered in place, fairing pressed on.
Section
1/4 dia Brass tube push fit
SECTION
Metal or plastic plug
REAR SEAT Plan view
Centre frame
FRONT SEAT
Bulkhead removable with seat
Fuselage formers — F1. 3/16" sheet. remainder 3/32" sheet
Block balsa fill
Tailplane ribs 1/16" sheet
Solder
Cowling pattern — tinplate
Left hand propeller 10 x 6
Priming hole
Pressed aluminium
Fill with old car speedo cable to assist bending
Tin clip round cylinder
Rear piece
JOYSTICK DETAIL (NOT SCALE)
Brass tube
Fuselage frame
Brass sheet
Front seat (see detail)
12 swg Steel rod
12g Brass tube
Thrust nuts on steel rod
To elevator
Front view
Tail strut 20swg
Connectors see detail
Leadout on top
Cowl from front
Check fit using card template
Engrave these lines
BLACK walkway
Motor rests on bearers, but can be removed by drawing backwards & up through tank opening
Tin brackets, 2 off, solder to tube
Nick needle to form stop
Overflow
Enlargement of needle valve
Peen over
To header tank
Needle valve from MECCANO rod
Float
Hinge
Feed pipe
Aileron control
Slot
Peened over
Tube for adjustments
Keep clear
Centre frames, 2off glued to fuselage floor
Eyelet
1/8" sheet L.E.
Front spar
SPAR - 2 off 1/8" sheet
Rear spar
Fillet under
Throttle
Fillet
Bearers
Ply plate & engine bearers extend back to here (see top view)
Leave open for plug access
Oil tank
Foothold
Exhaust pipe
Strengthen here
STARBOARD VIEW
PORT VIEW
Balsa float soaked in Polyurethane
Mounting lug
FUEL TANK
Mustard tin cut down to suit.
Bracket
On original model all sheet metal parts were made from 24swg steel (plated) salvaged from u/s T.V. set
Blocks a,b,c,d, from H'dwood to support brackets & seats.
Tail trim lever here, see side view
Gusset
Block
SECTION T-T
Tin bent over & tube soldered on.
THIS TYPE HINGE USED THROUGHOUT
Fibre horn 2 off
Hinge
Anti spin strakes, carve & add after sheeting top
RC 1131


SHEET 2 of 2
djp
1/8" x 3/8" L.E. spruce
Slat
Nav light RED
1/8" spruce spar
Hard balsa
Compression strut
Compression strut & interplane struts
1/4" sheet rib
All ribs/riblets 1/16" sheet
1/8" spruce spar
1/8" sheet tip
1/4" sheet
1/4" x 1/2" T.E.
Captive nut
6 BA screw with wire soldered in slot on underside of wing
W.7.
W.8.
W.4.
W4
W.6.
WINGS ARE SHOWN IN TRUE RELATION TO EACH OTHER.
1/8" x 3/8" L.E. spruce
FUSELAGE ℄
1/4" sheet rib
Hardwood box 1/8" ply top & bottom
Black paper 3/32" sq
Walkway
1/8" spruce spar
Must be free to turn
1/8" ply plate
Differential angle
Aluminium disc
16 swg wire
Rivet
1/8" sheet tip
1/8" spruce spar
Covering support
Hinge, see sheet 1
Horn shape – from fibre or tufnol
1/8" sheet aileron spar
1/8" gusset
Block
dowel pin
1/4" x 1/2" T.E.
Brass tube adjuster.
W.1.
W.2.
W.3.
W.5
W.5.
W.5a.
Hinge
All aileron ribs W.5a.
Aileron control
20 swg wire to flex (same P & S)
Connect with split pin
Front spar
Top wings
Rear spar
1/8" spruce spars
Shape of T.E. root as seen from rear
Aileron spar 1/8" hard sheet
Rear spar
Lower wings
Front spar
Both spars spruce, 1/8" wide
Slat
Slat position
Wing box
2° 45"
℄ FUSELAGE
Upper riblet 80 off
All ribs 1/16" sheet hard
W.2. 2 off
W.3. 2 off
W.4. 26 off
W.5. 12 off
W.5a. 14 off
Lower riblet 36 off
W.6. 4 off
W.8. 2 off
W.1.
W.7.
Fix wings with bolt & captive nut
W.1. & W.7. - 2 off each 1/4" sheet hard
Root support cutout
Clip
Air pressure A.S.I. port strut only from tin.
Note different angle of struts because of upper & lower wing sweepback angle.
Strut slotted, tin plate inserted & epoxy
10 BA bolt
Brass tube flattened to accept return wire
20 swg
Tin plate
Bend & solder
NOTE- hole must be as high as possible to keep wire close to strut
Spreader
1/8" dowel
Woodscrew
4° 30"
Compression strut 1/8" dowel
Actual position of wing & struts at this point
16 swg tube
Wood
Tin
PLAN
Commpression strut.
Screw filler, screws into nut soldered into small sump
Fuel gauge, fibre or plastic sprue
Ply tongue
Root rib support
1/4" x 1/2" L.E.
Corrugations not shown on tank to avoid confusion
Sheet with 1/8" sheet crossgrain
3/16" cross members
3/8" x 1/2"
The above dwg shows filler for main tank only when float & needle are not necessary. However, if header tank is used (not shown) then float etc is necessary. Fuel line as shown will keep motor running but larger size must be used for inverted flying when feed is cut off & main tank subsequently must be filled while motor is still running
Metal scraper to cut corrugations clean up with file
Root rib support
RC 1131

De Havilland 82A TIGER MOTH

a superbly detailed 50 in. span, one-seventh scale version of the classic biplane, designed for free-flight or radio control, using 2·5-8 cc. engines, designed by scale doyen HAROLD TOWNER

GEOFFREY DE HAVILLAND'S Tiger Moth is perhaps the most well-known biplane of all time, and with so many of these machines still flying today, it seems almost unbelievable that it first saw the light of day over four decades ago.

Designed and built in 1931 as a solution to the problem of producing an efficient primary, intermediate and advanced training aeroplane which would be cheap to produce and operate, the *Tiger* fitted the bill perfectly. However, it rapidly found other operational roles in the Services, including formation flying, reconnaissance, bombing and photographic duties. More recently, Tigers have found favour with film companies and are featured in such aviation epics as 'The Blue Max' and 'The Red Baron' – although they are not so easily recognisable!

Virtually viceless in its flying characteristics, the 'Tiggie' gives only a gradual stall and a slow resultant spin. As a model, these features provide a most stable machine, but one fully capable of aerobatics if the control and power is available.

The design presented here is Harold Towner's latest scale model, being intended primarily for four function proportional radio control using .49 cu. in. engines, but could equally successfully be flown as either a single channel R/C model or free-flight, in which case 2.5-3.5 c.c. engines would be adequate. A glance at the plans reveals that this is no beginner's machine, but a *modeller's* model! All the information is provided for a really true-to-life replica (note how the fuselage longerons are to scale thickness . . .), the amount of detail included on the model, depending on the builder's ability, ingenuity and patience! Being aimed at the more experienced modeller, the following instructions do not cover every point to be encountered, but will point the less-able enthusiast on the right lines and guide him through the tricky parts! All flying surfaces are readily detachable to facilitate access and ease of transportation. R/C installation is not shown, this being dependent on the equipment used and the degree of interior detail envisaged by the constructor, but remember to keep the majority of the weight as far forward as practical to maintain the correct C.G. position.

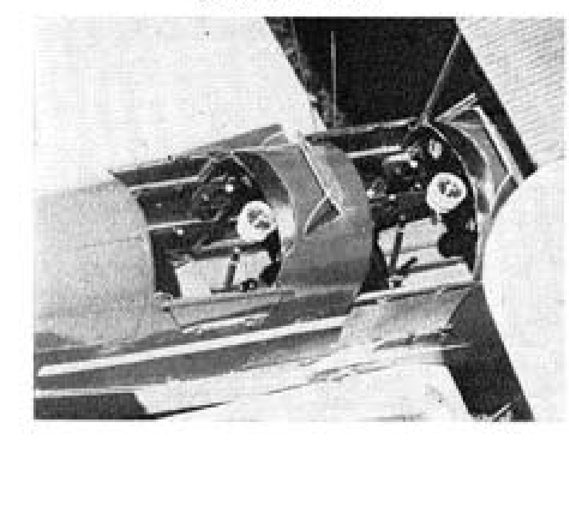
Start work on the fuselage by building a pair of basic sides directly over the plan. Note that the longerons are from ⅛ in. square spruce, while uprights and diagonals are from ⅛ in. dia. birch dowel, except where stated. Take care to make accurate joints and use a good quality glue. Remove from the plan, then cut out all the ⅛ in. square spruce cross braces. Reposition the plan on the building board so that the position of F1 lies approximately ½ in. off the edge of the board – this is to enable the fuselage frames to be inverted flat over the plan. Pin the cross braces for the top of the fuselage to the plan view, invert the fuselage frames and glue securely, checking that the sides are kept vertical. When dry, add the diagonals, followed by the bottom spars and their diagonals. Remove from plan, then draw the nose sections together, using temporary cross struts, which will be removed later.

The cabane wires are now bent from 16 s.w.g. wire, accuracy being most important. Note how the two side assemblies are connected at the top with brass tubes soldered in place in order to assist their lining-up. Bind these struts to the fuselage sides as shown, then add the ⅛ in. ply fairings. These are grooved with a saw to accept the wire and are then epoxied in position.

Cut out the ⅛ in. plywood engine mounting plate to size, then add the hardwood bearers, spaced according to the width of the engine crankcase used. Note that this bearer assembly is to be glued to the longerons, which are inclined upwards, so to restore the thrust line hardwood or dural packing pieces should be filed to shape. When satisfied, drill the engine mounting holes, remembering to incorporate the appropriate sidethrust, depending upon the direction of rotation of the crankshaft. Most people will no doubt leave their motor unmodified and so select right thrust! See plan. Harold opted for absolute realism and had his Merco 29 modified to clockwise rotation – hence the left-handed prop shown! The whole unit may now be securely epoxied into position, including the ⅛ in. ply fill-in reinforcing the longeron joints.

The ⅛ in. plywood firewall may now be epoxied in place, followed by the obechi gusset. Laminate the nose cowling from ⅛ in. sheet obechi, hollowing the laminations before gluing to ensure adequate clearance for the motor. Carve and sand to approximate shape, then glue in place. The lower part of this cowl is connected to the bottom of the firewall by a plywood plate complete with side members, and reinforced with obechi fillets.

Superb cockpit detail evident in Harold's model – note the opening cockpit access doors and full instrumentation, plus flying controls. Add as much detail as you like, but keep an eye on those scales!



No, the picture is not back to front, the prop is left-handed! Harold's Merco 49 has been modified to clockwise rotation for true scale effect. Check that the side thrust on your model is suited to the crankshaft direction of the motor to be used.

The dummy centre section tank should be made up as shown (or, for true scale fanatics, a tinplate header tank could easily be incorporated within, but this is not drawn) and attached to the cabane struts so as to position the wing at a positive angle of 4° incidence to the top longerons. Also ensure that everything is truly square – a couple of long straight balsa strips pinned temporarily to either side of the tank will clearly reveal any inaccuracies. The tank is secured at the rear by binding the trailing edge to the rear cross wire, leaving off the last inch of sheeting until this job is complete. The front is keyed into position with scrap material epoxied into the slot for this purpose. The 20 s.w.g. bracing crosswires are now bound and soldered into position and are made fast to the motor bearer plate below before the centre section wing root ribs are cemented either side of the tank, again at 4° incidence.

Formers F1-9 are then cut out and glued in position, followed by the 3/16 in. x 1/16 in. stringers before the rear decking is sheeted with 1/16 in. medium soft balsa. The section between F1 and F2, F3 and F4 may also be sheeted at this stage, cutting small grooves to fit around the wires.

The ⅛ in. ply wing tongue is glued and screwed securely to the fuselage base, cutting away the lower longerons to accommodate it. If foot pedals are to be fitted, the rudder bars should be fixed before the subframe is glued finally in place.

The next stage is to assemble the undercarriage and then to bind and epoxy it to the reinforced underside of the fuselage – the front radius rods are likewise attached. The lower portion of the cowling between the upper and lower longerons is sheeted with 1/32 in. ply, fairing it into the upper sheeting, while ⅛ in. hard sheet balsa (cross grained) is added to the fuselage floor from the firewall to just behind the rear seat.

Fitting of all detail parts, such as oil tanks, opening doors, footholds, cockpit furnishings, etc., may be added during 'waiting time' while the flying surfaces are made.

Wing construction may seem laborious at first, but it is surprising how the repetitive work becomes fascinating! Cut-out ply or metal templates for the ribs and riblets, a separate template being placed on the ribs to mark the cut-away portions, which can be filled in after the wing is assembled, if found advisable.

Each panel is built in a similar fashion – start by pinning the leading and trailing edges, together with the tip piece, over the plan with appropriate packing to suit the camber of the underside of the ribs. Cut out the two spars and insert the ribs upon them loosely, without any glue. Pin the spars in position, again with suitable packing underneath, then position each rib accurately before applying a PVA glue to each joint. When dry, add the riblets to the top surface (two between each rib), allow the glue to dry once more, then remove from plan and add the single riblets between each rib on the underside. Carefully hinge the ailerons if the model is to be flown radio control, but glue them securely if the machine is destined for free-flight use. Complete by adding strut anchorage points and aileron linkages.

Tailplane features conventional construction and again the elevator should be hinged only if an R/C model is contemplated. Use thick aluminium 'hinges' for F/F models, so that the elevator may be adjusted for trim. The fin/rudder are equally conventional, and are designed to bolt to the tailplane, which, in turn, is bolted to the fuselage – see details on plan.

It is advisable to rig all four wing panels in position using dummy struts, then to glue the wing root ribs in position – noting at the same time the different dihedral angles of the upper and lower wings. The correct interplane struts can now be made and bolted to the tin clips. Bracing wires are added and securely epoxied in position. Where the interplane struts and the bracing wires emerge, glue card or balsa supports for the covering.

The upper wing roots will tend to sag at the trailing edge owing to the tension of the wires, hence a small length of ¼ in. square balsa protrudes from the centre section wing root and suitably cut away in the wing root so that the wing root rests upon this projection. This is quite sufficient to cure this problem.

Correct, accurate rigging is most important, and it is a good idea to make plywood jigs on wooden bases cut out to receive the wing tips for rigging purposes. The designer used the concrete floor of his garage to set up the rigging operation, making off in chalk the various datum lines, and using lengths of ¼ in. square wood to check the heights, etc. Measure

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View of the designer's Tiger Moth which visitors to the Model Engineer Exhibition saw on the M.A.P. stand. Much interest was shown in this highly detailed model.

the distances from the wing tips to the rudder post and adjust with small packing pieces on the wing roots until both sides are alike. The spaces left in the wing roots can be readily filled with soft balsa.

The wing boxes can now be finally fixed – slide these on to their respective tongues, offer up the wings and then when all is correct glue home, adding short lengths of 3/16 in. square balsa to buttress the boxes against the ribs.

The free-flight enthusiast is recommended to cover the model using the 'silk on tissue' technique described by Eric Coates in the September, 1971, issue of *Aeromodeller*, while R/C types would do better to employ nylon, due to its greater strength. In either case, the fuselage may be tissue covered.

All final fittings, such as opening doors, tinplate engine cowling, and sundry other details, should now be added before the model is finally ready for decorating.

Colour schemes for the Tiger are, of course, many and varied, but the modeller would be well advised to study both the *Aeromodeller* scale drawing 2681 (price 20p) and Profile Publication No. 132 for suitable ideas.

When completed and painted, fitted with four-function proportional R/C equipment plus engine, the original model weighed around 5 lb. and required no further ballasting as the C.G. worked out to be spot on. It may be remembered that full-size *Tigers* were generally nose heavy, the pilot occupying the rear seat when flying solo. This is a good point for scale models, as they so often finish up tail heavy, which requires a considerable amount of unwanted ballast to correct.

For transporting, the wings are readily detachable and it is suggested that end plates of ply or hardboard with small tongues are made to fit into the wing roots to keep the wings in their natural position and thus to relieve strain on the flying wires.