

THE CESSNA SKYMASTER

YOUR LOCAL LIBRARY WILL LIKELY HAVE ONE OR MORE EDITIONS OF JANE'S ALL THE WORLD'S AIRCRAFT PUBLISHED BY MCGRAW-HILL. THIS 1965-1966 BOOK YIELDS A BEAUTIFUL INFLIGHT PHOTO AND THE FOLLOWING INFORMATION:

"...THIS UNIQUE ALL-METAL 4/6 SEAT BUSINESS AIRCRAFT RESULTED FROM SEVERAL YEARS OF STUDY BY CESSNA AIMED AT PRODUCING A TWIN-ENGINED AEROPLANE THAT WOULD BE SIMPLE TO FLY, LOW IN COST, SAFE AND COMFORTABLE, WHILE OFFERING ALL THE TRADITIONAL ADVANTAGES OF TWO ENGINES. CONSTRUCTION OF A FULL-SCALE MOCK-UP WAS STARTED IN FEBRUARY 1960 AND COMPLETED TWO MONTHS LATER. THE PROTOTYPE FLEW FOR THE FIRST TIME ON FEBRUARY 28, 1961, FOLLOWED BY THE FIRST PRODUCTION MODEL IN AUGUST 1962. FAA TYPE APPROVAL WAS RECEIVED ON MAY 22, 1962 AND DELIVERIES OF THE ORIGINAL MODEL 336 SKYMASTER, WITH NON-RETRACTABLE LANDING GEAR, BEGAN IN MAY 1963.

"A TOTAL OF 195 MODEL 336 SKYMASTERS HAD BEEN BUILT BY JANUARY 1965. IN THE FOLLOWING MONTH, THIS VERSION WAS SUPERSEDED BY THE MODEL 337 SUPER SKYMASTER, AS DESCRIBED BELOW, WITH INCREASED WING INCIDENCE, RETRACTABLE LANDING GEAR, AND OTHER CHANGES, MAKING IT VIRTUALLY A NEW AIRPLANE..."

YOUR LOCAL CESSNA DEALER HAS, OR CAN GET, A BEAUTIFULLY DETAILED THREE VIEW DRAWING OF THE SKYMASTER. THIS DRAWING ALSO INCLUDES OVERALL MEASUREMENTS, CROSS SECTIONS, AND AIRFOIL DATA. SPECIFICATIONS AND MAJOR DIMENSIONS FOR THE 1972 SKYMASTER ARE SHOWN BELOW:

AIRFOILS:

WING ROOT	NACA 2412
TIP	NACA 2409
TAILS (VERTICAL)	NACA 0009
(HORIZONTAL)	NACA 0009

INCIDENCE:

WING ROOT	4½ DEGREES
TIP	2½ DEGREES
STABILIZER	2 DEGREES

AREAS:

WING:	201 SQ. FT.
RUDDERS:	10.7 SQ. FT.
HORIZ. STAB.	52.4 SQ. FT.

WEIGHT:

EMPTY	2615 LBS.
MAX.	4200 LBS

DIMENSIONS:

WINGSPAN	38' 2"
LENGTH	29' 9"
HEIGHT	9' 4" (MAX)
TAILSPAN	10' 3/8"
WHEEL TRACK	8' 2"
BASE	7' 10"
PROP DIA.	6' 4"
DIHEDRAL	3 DEGREES (EACH PANEL)

PERFORMANCE:

MAX. SPEED (LEVEL)	200 MPH
ECON CRUISE	141 MPH
STALL SPEED	63 MPH
SERVICE CEILING	20,500 FT.
MAX RANGE	1,390 MILES

CONSTRUCTION OF THE SKYMASTER

BEGIN CONSTRUCTION WITH THE HORIZONTAL STABILIZER. STACK ALL THE RIBS (S-3) TOGETHER AND CAREFULLY DRILL THE HOLE SHOWN FOR THE VINYL PIPE (WHICH HOUSES THE RUDDER INTER-CONNECT). COVER THAT PORTION OF THE PLAN WITH WAXED PAPER AND PIN S-2 IN PLACE. NEXT GLUE AND PIN THE S-3 RIBS IN PLACE. FINALLY, SLIDE A SCRAP 3/16" OR 1/4" SQUARE STRIP UNDER THE FRONT END OF THE RIBS TO SUPPORT WHILE PINNING IN PLACE. NOW, CAREFULLY GLUE THE S-1 IN PLACE AND DOUBLE CHECK THE ALIGNMENT BY SIGHTING ALONG THE STRUCTURE FROM EITHER END. WHEN DRY, REMOVE FROM THE PLANS AND COVER BOTH TOP AND BOTTOM SIMULTANEOUSLY (TO PREVENT WARPS) WITH 3/32" Balsa SHEET. HOLD THE SHEETS SECURE WITH TAPE AND PINS. WHILE THAT DRIES, GLUE THE S-5 TIPS TO THE S-4 ELEVATOR AND SECURE WITH TAPE. WHEN BOTH STRUCTURES ARE DRY, REMOVE THE TAPE AND "SPOT" GLUE THE ELEVATOR IN PLACE ON THE S-2 STABILIZER TRAILING EDGE.

TAKE THE TIME TO CAREFULLY STUDY ALL THE ISOMETRIC DRAWINGS WHICH HAVE BEEN PROVIDED TO ILLUSTRATE DETAILS. DON'T HESITATE TO REFER TO THESE WHILE ACTUALLY GLUING PARTS TOGETHER, ESPECIALLY WHEN YOU DON'T UNDERSTAND CLEARLY WHAT MUST BE DONE. WHILE REFERRING TO THE FUSELAGE DRAWINGS, SET ALL THE APPLICABLE PARTS ASIDE AND CHECK THEM FOR TRIAL FITS (WITH EACH OTHER NOT THE PLANS).

BEGIN FUSELAGE CONSTRUCTION WITH FUSELAGE SIDES. EPOXY THE PLYWOOD DOUBLERS IN PLACE AND ADD THE 3/16" SQUARE Balsa LONGERON. MAKE ONE LEFT SIDE AND ONE RIGHT SIDE. CAREFULLY MARK THE LOCATION OF BULKHEADS F-1 THROUGH F-12. WHILE THESE ASSEMBLIES DRY, CAREFULLY MEASURE AND DRAW THE VERTICAL CENTER LINES ON EACH FUSELAGE BULKHEAD. NEXT, REFERRING TO THE FUSELAGE SIDEVIEW, CAREFULLY EPOXY THE TWO ENGINE MOUNTS TOGETHER USING THE EM-1, 2 AND 3 PARTS. GLUE FORMER F-3A AND F-3 TOGETHER, DRILL AND MOUNT THE NOSE GEAR BRACKET.

ASSEMBLE AND ALIGN THE FUSELAGE SIDE, FORMERS (F-1 THROUGH F-12) AND ENGINE MOUNT ASSEMBLIES INCLUDING EM-4, 5, 6 AND 7. USE TAPE AND PINS TO HOLD SECURELY AND INSURE THE ENTIRE ASSEMBLY IS ALIGNED AND SQUARE BEFORE THE GLUE DRIES. USE A 90° TRIANGLE AND SIGHT ALONG THE FORMER CENTERLINES. WHEN COMPLETELY DRY, REMOVE THE TAPE AND ADD ALL THE 3/16" SQUARE Balsa STRINGERS CAREFULLY TO PREVENT STRESS WHICH MIGHT MISALIGN THE MAIN STRUCTURE. NEXT, COVER THE BELLY, COWL TOPS AND FAIRING AREA IN FRONT OF THE WING WITH THE 1/8" SHEET Balsa PLANKING AND STRIPS PROVIDED. YOU MAY FIND IT EASIER TO INSTALL THE MAIN LANDING GEAR SUPPORT AND FAIRING PRIOR TO PLANKING THE BELLY. THE F-22'S ARE GLUED IN PLACE, THE 1/8" SHEET Balsa PLATE IS ADDED AND THE DURAL GEAR IS THEN BOLTED IN PLACE. THE MAIN GEAR HATCH IS CONSTRUCTED WITH FORMERS F-9A, F-9B, F-9C, THE PLYWOOD F-23'S, TWO PIECES OF 3/8" x 45° STOCK AND THE 1/8" Balsa STRIPS AS SHOWN IN THE ISOMETRIC DRAWING (RIGHT CENTER OF MAIN PLAN SHEET). NOTICE THE FUSELAGE TOP (FRONT OF WING) IS DONE WITH BLOCKS F-21, TWO PIECES OF 3/4" x 45°, AND 1/8" SHEET Balsa IN THAT ORDER. THE F-25'S AND WING HOLD DOWN BLOCKS MAY BE EPOXIED IN PLACE AT THIS TIME.

THE FUSELAGE NOSE IS FINISHED OFF BY GLUING BALSA BLOCKS F-15's, F-16's, F-17, F-18 AND F-19 IN PLACE IN THAT ORDER. CAREFULLY CENTER AND ADD THE F-14 AND F-13 BLOCKS NEXT. WHEN DRY, CARVE TO ROUGH SHAPE AND CUT OFF THE HATCH AS SHOWN IN THE DRAWING BY FUSELAGE TOP VIEW. INSET AND GLUE THE PLYWOOD FACINGS H-1's, H-2's AND H-3's. DRILL AND TAP THE HATCH HOLD DOWN BOLT HOLES.

THE FUSELAGE AFT ENGINE COWLING IS FINISHED IN A SIMILIAR FASHION USING H-4's, H-5's AND H-6's. START THIS CONSTRUCTION AFTER THE BLOCKS F-28, F-27's, F-29's, F-30's, F-31's, F-32, F-33's, F-34 AND F-35 AND THE PLYWOOD COWL RING F-26 ARE GLUED IN PLACE. NOTICE THAT ONCE CONSTRUCTED THE F-28 WILL BE CUT AWAY ON THE INSIDE TO FACILITATE ENGINE COOLING BY ALLOWING AIR PASSAGE THROUGH THE DUCT MOUNTED ON TOP OF THE WING. THE F-20's ARE INSTALLED BETWEEN F-4 AND F-5. THE F-24's ARE SHAPED AND ADDED TO THE FUSELAGE BOTTOM NOW OR AFTER FINAL ASSEMBLY.

FOR STRUT ASSEMBLY DETAIL REFER TO THE ISOMETRIC DRAWINGS IN THE LOWER RIGHT CORNER OF THE MAIN DRAWING AND ALONG THE LEFT MARGIN. THE STRUTS MAY BE ASSEMBLED AT THIS TIME AND FINISHED AFTER THE WING IS COMPLETED.

STUDY THE SECONDARY PLAN SHEET AND ALL DRAWINGS PRIOR TO BEGINNING WING BOOM AND RUDDER ASSEMBLY. BE SURE YOU KNOW WHERE AND HOW EACH PART FITS. DRAW CENTERLINES ON EACH OF THE WING RIBS SIMILAR TO THE EXAMPLE SHOWN IN THE CROSS SECTION OF THE AILERON BELLCRANK DETAIL. GLUE THE MAIN WING SPAR DOUBLERS IN PLACE ON THE BOTTOM SPARS ONLY. NOTICE THE WING CENTER SECTION IS FLAT SO THE SEPARATE WING PANELS WILL BUILT FROM THE W-2's OUTBOARD THEN JOINED AFTER BOTH ARE DONE. COVER THE PLAN WITH WAXED PAPER AND PIN THE BOTTOM WING SPAR IN PLACE. GLUE AND PIN ALL THE RIBS FROM W-3's TO W-13 IN PLACE AND BLOCK UP EACH ONE SO THAT THE CENTER LINE IS PARALLEL TO THE TABLE TOP. GLUE IN THE TOP SPAR AND ADD THE 1/8" FALSE LEADING EDGES AND THE REAR SPARS (TOP AND BOTTOM ON W-3's; TOP ONLY, OUTBOARD OF W-3). NEXT, ASSEMBLE AND INSTALL THE BELLCRANK ASSEMBLIES USING W-21, W-22 AND 3/16" SQUARE SCRAP BALSA. INSTALL THE W-20 BETWEEN THE OUTBOARD PAIR OF W-3's. GLUE THE 3/32" SHEET BALSA WING PLANKING IN PLACE ALONG THE TRAILING EDGE OF THIS PANEL AND WHEN DRY, REMOVE THE PANEL AND ADD THE MATCHING BOTTOM SHEET. MARK AND CUT OUT THE AILERON AS SHOWN IN THE DRAWINGS. TRIM AWAY THE EXCESSES AND INSTALL THE W-26 WITH HORN IN PLACE. THEN ADD W-24 TO COMPLETE THE AILERON ASSEMBLY.

THE WING PANEL IS FINISHED OFF BY ADDING W-23 AND THE 3/32" END RIB. NEXT INSTALL THE 3/16" x 3/8" BALSA HINGE BLOCKS INBOARD OF W-8, W-11 AND W-13 RESPECTIVELY. NEXT ADD THE AILERON AND BOOM CONTROL LINKAGES AND THE 3/8" BALSA CORNER BRACE ON OUTBOARD SIDE OF W-3 AT THE LEADING EDGE BREAK. NOW REPEAT THE ABOVE PROCEDURES FOR THE RIGHT WING PANEL.

THE WING CENTER SECTION IS BUILT IN PLACE OVER THE PLANS WITH BOTH WING PANEL INBOARD ENDS DRESSED OFF. EACH PANEL TIP SHOULD BE BLOCKED UP 1 3/4". INSTALL THE W-14, W-15 AND W-2's. BE SURE THE CENTER LINES ARE PARALLEL TO THE BUILDING SURFACE TOP.

ADD THE W-10, W-16, W-17, W-18'S AND ALL THE CENTER SECTION SPARS INCLUDING W-1. WHEN DRY, REMOVE FROM THE BOARD AND FIT TO FUSELAGE USING SCRAP 3/32" Balsa TO SHIM UP WHERE THE WING SKIN WILL BE. CAREFULLY ALIGN, FIT THE WING TO THE FUSELAGE AND THEN DRILL HOLES FOR THE DOWELS AND HOLD DOWN BOLTS. FINALLY, COVER THE ENTIRE WING WITH 3/32" SHEET Balsa AND ADD THE LEADING EDGES AND WING TIPS.

BOLT THE WING IN PLACE ON THE FUSELAGE. BUILD THE AIRSCOOP AND FAIRINGS AS SHOWN ON THE MAIN PLAN, BEGINNING WITH THE W-29'S AND W-28. ADD IN THE FOLLOWING ORDER THE W-30'S, W-32, W-33'S, W-34'S AND W-35'S.

STUDY THE BOOM ASSEMBLY DRAWINGS. NOTE THAT THE DETAILS SUCH AS THE F-40A'S MUST BE INBOARD AND THE F-40B'S OUTBOARD. MAKE THE BOOM SIDES IN TWO PAIRS (ONE INBOARD-ONE OUTBOARD). GLUE AN F-42 TO AN F-40A (TWICE) AND TO AN F-40B (TWICE). ADD THE 3/16" SQUARE Balsa AND THEN GLUE THE F-43'S AND F-47'S TO THE F-45'S TO MATCH THE FIRST SUB-ASSEMBLIES. LIKEWISE ADD THE 3/16" SQUARE Balsa STRIPS ALONG THE EDGES.

WHEN DRY, ADD THE F-41'S (TOP, BOTTOM AND CENTER) AND THE F-46 BLOCKS AS SHOWN BETWEEN THE F-42'S. LIKEWISE ADD THE F-44'S TO THE TOP AND BOTTOM OF THE F-45'S. INSURE A PRECISE FIT WITH THE MATING PIECES. NOW GLUE THE F-40 ASSEMBLIES IN PLACE ON THE WING AND ADD THE FAIRING BLOCKS F-49'S, F-50 AND F-51. GLUE IN THE F-53'S WHICH HOLD THE F-52 HATCHES IN PLACE. THE RUDDERS WILL BE ATTACHED TO THE BOOMS WITH THE F-48'S. NOTICE THAT THE PUSHRODS CAN BE BROUGHT OUT OF THE INBOARD SIDES OF THE BOOMS. USE ONE OF THESE PUSH RODS FOR THE RUDDERS (WHICH WILL BE INTERCONNECTED THROUGH THE STAB) AND THE OTHER FOR THE ELEVATOR.

THE RUDDERS ARE ALL THAT REMAIN TO BE DONE NOW AND YOU SHOULD STUDY THE DRAWINGS (BEFORE GLUING ANYTHING) TO SEE THE UNIQUE RELATIONSHIP OF THE R-12'S, R-13'S AND R-14'S. WHEN YOU UNDERSTAND IT, BEGIN CONSTRUCTION BY GLUING THESE PIECES TOGETHER AND THEN ADD THE RIBS R-7 AND R-8. NOW INSTALL R-3, R-2 AND R-9 IN THAT ORDER. FINISH BY ADDING R-6, R-5 AND R-4. RECHECK THE ALIGNMENT AND WHEN DRY, ADD THE R-1 SHEET Balsa SKINS. FINALLY, GLUE ON THE R-11'S, R-10'S AND R-18'S. WHEN THIS IS DRY MAKE THE CUTOUTS (SHOWN AS SHADED AREAS IN THE DRAWINGS). THIS SHOULD BE DONE TO FACILITATE FINAL ASSEMBLY OF THE RUDDER ATTACHMENT TO THE BOOMS AND THE STABILIZER TO THE RUDDERS. ADD THE R-15 AND R-19 FAIRINGS AND FIT THE CONTROLS.



Royal Products

CORPORATION

790 WEST TENNESSEE AVENUE • DENVER, COLORADO 80223

PHONE (303) 778-7711 • P. O. BOX 9706 SOUTH DENVER STATION, DENVER, COLO., 80209 • CABLE ADDRESS: "ROYAL" DENVER, COLO., U.S.A

CONGRATULATIONS ON HAVING JUST PURCHASED ONE OF THE FINEST SCALE MODEL KITS AVAILABLE TODAY.

THERE IS A GREAT DEAL OF INDIVIDUAL DETAIL TO BE TAKEN CARE OF PRIOR TO GLUING A TO B SO SIT BACK, RELAX AND CONSIDER THE FOLLOWING PRELIMINARIES.

YOUR CHOICE OF THIS KIT WAS INITIALLY MOTIVATED BY SOME PRIOR EXPERIENCE OR PREFERENCE FOR THIS PARTICULAR MODEL. PERHAPS IT IS A REAL PLANE OF THE SAME DESIGN YOU HAVE FLOWN OR MAYBE OWN NOW. THE POINT IS, RIGHT NOW, ONLY YOU ARE FAMILIAR WITH THAT FEELING. HAVEN'T YOU NOTICED THAT WHEN YOU SPEAK OF THIS BEAUTIFUL SCALE JOB THERE IS THE CASUAL INDIFFERENT LOOK ON YOUR COMPANION'S FACE? WOULD YOU BELIEVE THE SAME INDIFFERENT FEELING COULD BE IN THE JUDGE'S MIND AS HE INSPECTS THIS BEAUTY YOU WILL CREATE? 'TIS POSSIBLE, ISN'T IT?

THE ABSOLUTE FIRST THING YOU MUST DO AT THIS VERY TIME IS DETERMINE WHETHER THIS IS TO BE THE "ULTIMATE SCALE JOB" OR AN "EYEBALL SCALE". IF YOU CHOOSE "EYEBALL SCALE", WHICH IS JUDGED FROM 25 FEET AWAY, THEN YOU MAY AS WELL TURN TO CONSTRUCTION TECHNIQUES AND START BUILDING! HOWEVER, IF YOUR CHOICE IS "ULTIMATE SCALE", THEN YOUR PROJECT HAS NOT YET BEGUN.

THE NEXT DECISION YOU MUST MAKE IS WHICH PARTICULAR TYPE, MODEL AND SERIES YOU INTEND TO DUPLICATE TO THE NTH DEGREE. THE TYPE (THAT IS Bomber, Fighter, ETC.) HAS ALREADY BEEN DECIDED AS YOU BOUGHT THE KIT. THE MODEL (THAT IS 24-25-26 ETC) MAY NEED TO BE YOUR CHOICE AS FOR INSTANCE, THERE IS NO EASILY RECOGNIZABLE DIFFERENCE BETWEEN A B-44 AND A B-50. THE SERIES VARY WIDELY AND YOU WILL NEED TO MAKE THIS DECISION YOURSELF. FOR INSTANCE THERE IS VERY LITTLE DIFFERENCE BETWEEN A B-52B, B-52C, B-52D AND B-52E TO THE CASUAL OBSERVER, BUT TO THE TRAINED EYE OF A COMPETITION SCALE JUDGE THIS MAKES THE FIRST GREAT DIFFERENCE.

ONCE YOUR CHOICE HAS BEEN MADE AS TO EXACTLY WHICH TYPE, MODEL AND SERIES YOU WILL BUILD, YOUR NEXT TASK WILL BE TO COMPLY WITH THE "SCALE PRESENTATION". BY THIS I MEAN YOU MUST ASSEMBLE AND ARRANGE THE "PROOF" YOU INTEND TO USE, TO THOROUGHLY CONVINCE THE JUDGE THAT YOURS IS THE BEST OF THE BUNCH! KEEP IN MIND THAT YOU CAN'T "TALK" HIM INTO IT SO EXTRA EFFORT SPENT AT THIS STAGE REAPS GREAT BENEFITS LATER.

START WITH AN ACCURATE, AUTHENTIC 3-VIEW DRAWING PREFERABLY FROM THE MANUFACTURER, AND WHICH GIVES DIMENSIONS OF THE REAL PLANE. IF NOT AVAILABLE, THEN SUCH GREAT WORKS AS THE COMMERCIAL SCALE 3-VIEWS BY NIETO, NYE, WYLAM, SUPERSCALE, ETC. ARE ACCEPTABLE. I KNOW THIS BECAUSE I JUST READ IT IN THE CURRENT AMA MODEL AIRCRAFT REGULATIONS BOOK WHICH INCIDENTALLY IS THE BOOK BY WHICH YOUR EFFORT WILL BE RATED. NEEDLESS TO SAY, BEFORE YOU GO ANY FURTHER, GET REAL FAMILIAR WITH THE RULES FOR SCALE.

ONE MORE WORD OF ADVICE ABOUT THE "SCALE PRESENTATION". THE BETTER IT LOOKS, THE BETTER YOUR SCORE WILL BE SO DON'T CUT CORNERS OR GO SECOND CLASS! 'NUFF SAID?

NOW THAT YOU'VE ASSEMBLED THE 3-VIEW, TECH DATA, PICTURES AND REFERENCES AND CONSTRUCTED A WELL ORGANIZED, WELL PLANNED, EYE APPEALING PRESENTATION, YOU MUST STUDY, COMPARE, MEASURE AND CAREFULLY PLAN THE MODEL YOU WILL BUILD.

FIRST, SELECT THE SCALE RATIO YOU WILL USE. THIS HAS BEEN APPROXIMATED IN OUR KITS BECAUSE THERE ARE SO MANY VARIANTS BETWEEN EACH DIFFERENT SERIES OF THE BASIC AIR PLANE. YOU MAY CHOOSE THE SERIES WHICH IS CLOSEST TO OUR KIT - STILL YOU WILL HAVE TO MAKE ADJUSTMENTS, PERHAPS AN INCH IN WINGSPAN, 1/2 INCH IN LENGTH OR SO ON. THE POINT IS--THIS IS THE TIME TO PLAN FOR THESE ADJUSTMENTS AND THEY MUST ALL BE THE SAME RATIO FOR MAXIMUM POINTS.

THE EASIEST WAY TO DO THIS IS TO OBTAIN A PAIR OF "PROPORTIONAL" DIVIDERS. THIS IS A TOOL WITH A MOVEABLE PIVOT IN THE MIDDLE AND WHEN OPEN LOOKS LIKE AN "X" WITH NEEDLE POINTS AT EACH TIP. WITH THESE YOU MAY SET THE "RATIO" SO THAT MEASURING WITH ONE END OFF THE 3-VIEW WILL GIVE THE DESIRED MEASUREMENT AT THE OTHER END. CAREFULLY ADJUST THE DRAWINGS WE'VE PROVIDED TO EXACTLY MATCH THE 3-VIEW YOU WILL USE.

NEXT, CAREFULLY STUDY THE MATERIAL YOU'VE GATHERED AND MAKE NOTE OF EXACTLY WHICH DETAILS YOU WILL INCLUDE ON YOUR MODEL AND WHERE AND HOW THEY WILL BE INCORPORATED. FOR INSTANCE, DO YOU PLAN ON FLAPS? RETRACTABLE GEAR? LIGHTS? THOUSANDS OF TECHNIQUES ARE INCLUDED IN MAGAZINES AND COLUMNS WHICH ARE DEVOTED TO SCALE CONSTRUCTION TECHNIQUES SO I'LL LEAVE YOU TO HUNT UP ALL THAT FOR YOURSELF.

WE WILL NOW CONSIDER THE BASIC AIRPLANE AND THEN IT'S CONSTRUCTION.

THE FINISH WORK

THE CONSTRUCTION PHASE CONCLUDED WITH THE REMAINING PARTS BEING STUCK ONE TO ANOTHER AND/OR "SHAPE" SANDED. THIS PILE OF PARTS WHICH MAY RESEMBLE AN AIRPLANE DEPENDING ON ARRANGEMENT MUST NOW BE FINISHED TO SATISFY THE GOAL.

ONE OF THE KEYS TO A GOOD FINISH IS SAND, SAND, SAND, DUST IT OFF AND SAND ONCE MORE. REMEMBER THAT, AS IT'S IMPORTANT. THE FIRST SANDING IS DONE WITH ROUGHER OR. 4 COAT SAND PAPER (I PREFER ALUMINUM OXIDE OR GARNET PAPER) 280-320 RANGE. I GLUE MINE TO 1"x4"x12" BLOCKS WITH SPRAY CONTACT ADHESIVE OR "STICKY BACK" BY SCOTCH. IT'S BEST TO SAND ALL COMPONENTS PRIOR TO FINAL ASSEMBLY AND IS ALSO MUCH EASIER. THE NEXT SAND IS DONE WITH 320-400 GRIT PAPER. AFTER THIS STEP TAKE A GOOD REST, THEN COME BACK AND SAND UNTIL TIRED AGAIN. NOW WIPE THE PLANE DOWN WITH A CLEAN SOFT RAG AND CHECK IT FOR SEAMS, LOW SPOTS, AND SYMMETRY. THEN SAND ONCE MORE WITH THE 400 GRIT.

IF YOU PLAN TO "MONOKOTE" YOUR EYEBALL SCALE, IT IS DONE AT THIS STAGE ON BARE WOOD AND IN ACCORDANCE WITH THE DIRECTIONS FURNISHED WITH THE "MONOKOTE". AFTER IT'S ALL MONOKOTED, GO TO THE FINAL ASSEMBLY STEP.

IF YOU PLAN AN ULTIMATE SCALE JOB FINISH YOU MUST PAINT IT 'CAUSE NO REAL AIRPLANES ARE MONOKOTED. (TOO BAD, THOUGH!) YOU MUST DECIDE WHAT TYPE HINGES YOU WILL USE NOW BECAUSE IT MAKES A DIFFERENCE. IF YOU ARE GOING TO USE HINGES WITH REMOVABLE HINGE PINS, THEN INSTALL ALL HINGES AND CONTROL RODS, LINKAGE, RADIO GEAR, (ACCORDING TO MANUFACTURERS INSTRUCTIONS) ETC., AT THIS TIME. THEN DISMANTLE IT AND COVER IT INDIVIDUALLY. IF YOU ARE TO USE "HIDDEN" HINGES (LIKE THE NO GLUE MOLDED NYLON ONES) THEN COVER ALL THE SEPARATE PIECES AND THEN ASSEMBLE THEM.

TO PREPARE THE MODEL FOR COVERING, YOU DOPE THE BALSA WITH AT LEAST A 50/50 DOPE-THINNER MIXTURE. AFTER EACH COAT SAND LIGHTLY AND CONTINUE UNTIL NO "FUZZ" OCCURS AFTER DOPING. (USUALLY 3 OR 4 COATS). NOW COVER WITH THE MATERIAL OF YOUR CHOICE (FOR INSTANCE, SILK, SILRON, NYLON ETC.) CHECK THE GRAIN (LOOK AT A CORNER OF THE MATERIAL TO DISCOVER THE GRAIN IS PARALLEL TO THE HEAVIEST OR MOST DENSE THREADS WHICHEVER THE CASE). THE GRAIN MUST GO LENGTHWISE ON EACH PIECE.

TO APPLY THE COVERING, CUT IT OVERSIZE, HOLD IN PLACE AND SPRAY WITH A FINE FINE MIST WATER SPRAYER CAREFULLY WORKING OUT ALL THE WRINKLES AND DOPE IT WHILE STILL WET WITH THE BRUSH NEARLY PARALLEL TO THE SURFACE AND LIGHTLY, LIGHTLY STROKING IT. IF DONE WHILE WET, THE DOPE WILL "FLOAT" ON THE DAMP SURFACE AND DRY "WHITE OR CLOUDY" BUT WILL REQUIRE FAR FEWER COATS AND THE CLOUDY LOOK WILL DISAPPEAR AFTER THE 2ND OR 3RD COAT.

CAREFULLY TRIM (WITH A DOUBLE-EDGE RAZOR BLADE) AND SAND THE "ROUGH" AREAS BUT BE CAREFUL NOT TO "CUT" OR "SAND" OUT THE FIBERS OVER A "HIGH" PLACE LIKE A RIB.

WHEN SURFACE REMAINS SMOOTH AFTER A COAT OF DOPE (3RD OR 4TH COAT) IT'S TIME TO THIN THE MIXTURE AND ADD TALC OR CORNSTARCH FOR FILLER "BODY". SAND AFTER EACH COAT

UNTIL DESIRED SMOOTHNESS IS ACHIEVED. THEN ASSEMBLE THE PARTS AND SPRAY PAINT THE FINAL COLORS TO SUIT. JUST REMEMBER ALOT OF PLANES MODELED ARE GLOSSY WHEN THE PROTOTYPE WAS NOT. THIS MISTAKE COSTS POINTS. AS I MENTIONED EARLIER, I WON'T PRESUME TO ADVISE ON ACHIEVING THE "ULTIMATE SCALE" FINISH, BUT IF IN DOUBT, THERE ARE VOLUMES WRITTEN ON THE SUBJECT. THERE MAY EVEN BE A "SCALE HUT" IN YOUR AREA WHO CAN HELP. DON'T FORGET THE PLASTIC MODELER WHO KNOWS FINISHES. REMEMBER ALSO, THE PLASTIC MODEL IS AN EXCELLENT SOURCE OF SCALE DETAIL AS WELL.

AIRCRAFT ALIGNMENT

THIS SHEET IS INCLUDED AS AN ADDITION TO THE NORMAL INSTRUCTIONS IN HOPES THAT YOU MAY BENEFIT FROM THE INFORMATION IT CONTAINS. THE TIME IT TAKES TO ACCURATELY ALIGN AN AIRPLANE IS REPAYED MANY, MANY TIMES BY THE SUPERIOR PERFORMANCE OF THE AIRCRAFT.

ALL ALIGNMENT INFORMATION IS INCLUDED ON THE PLANS. NOTE THAT WING AND STAB ANGLES, THRUST ANGLES, ETC., APPEAR NEAR THEIR COMPONENT LOCATIONS. GENERALLY, THE ANGLES ARE REFERENCED TO A FUSELAGE CENTERLINE WHICH IS ALSO DRAWN ON THE PLANS.

MOST ANGLES ARE EXPRESSED IN DEGREES OF ANGULAR OFFSET. DON'T LET THIS STOP YOU FROM USING THEM! THE LEAST EXPENSIVE CONVERSION METHOD IS TO BORROW AN ALGEBRA BOOK WHICH HAS TRIGONOMETRY SECTIONS. USE THE FORMULAS TO CONVERT THE DEGREES TO FRACTIONS OF AN INCH OF OFFSET. THE EASIEST METHOD IS TO USE A ROBERT INCIDENCE METER. THIS DEVICE IS CALIBRATED IN DEGREES AND ALLOWS DIRECT READINGS OF THE INCIDENCE ANGLES.

THE FIRST STEP IN ALIGNING THE AIRCRAFT IS TO TRANSFER THE CENTERLINE TO THE FUSE SIDES. USUALLY THE CENTERLINE RUNS PARALLEL TO A MAJOR PIECE OF THE FUSE SUCH AS THE TOP EDGE OF THE SIDE. USE A FELT TIP PEN AND DRAW A LINE PARALLEL TO THE CENTERLINE ABOVE THE WING SADDLE AND BELOW THE STAB SADDLE.

NEXT, MARK THE CENTERLINES OF THE LEADING AND TRAILING EDGES ON THE STAB AND WING. MAKE A TEMPLATE FROM THE PLANS TO TRANSFER THIS LOCATION.

PLACE THE FUSE ON THE WORKBENCH AND BLOCK UP SO THAT THE CENTERLINE IS PARALLEL TO THE TABLE TOP. NOW PLACE THE STAB IN ITS SADDLE AND TRIM AND SKIM IT UNTIL THE LEADING AND TRAILING EDGES ARE AT THE REQUIRED DIFFERENT ANGLES. LET'S SAY THE PLANS CALL FOR 1°/16" POSITIVE INCIDENCE. THAT MEANS THE CENTER OF THE LEADING EDGE IS 1°/16" HIGHER (REFERENCED TO THE TOP) THAN THE CENTER OF THE TRAILING EDGE. IT MAKES NO DIFFERENCE HOW FAR UP THE TRAILING EDGE IS FROM THE WORK SURFACE--JUST MAKE THE LEADING EDGE 1°/16" HIGHER. THE STAB MAY HAVE POSITIVE, NEGATIVE, OR NO INCIDENCE DEPENDING ON THE DESIGN.

ALIGN THE WING THE SAME WAY. A METHOD TO USE, WHERE DOWELS ARE EMPLOYED ON THE LEADING EDGE, IS TO DRILL THE DOWEL HOLES IN THE BULKHEAD HIGHER THAN NECESSARY (TOWARD THE TOP OF THE FUSE IN A LOW WING DESIGN). NOW, WHEN THE WING IS PUT IN PLACE, THE TRAILING EDGE WILL STICK UP OFF THE WING SADDLE. USING A RAT TAIL FILE, ELONGATE THE HOLES DOWNWARD UNTIL THE WING IS AT THE CORRECT INCIDENCE. IF THERE IS A GAP ALONG THE WING SADDLE USE Balsa, PLY, OR FILLER TO CLOSE. IF YOU WANT TO USE WING SEATING TAPE, BE SURE TO MAKE ALL YOUR MEASUREMENTS WITH THE TAPE IN PLACE.

THE WING AND STAB MUST ALSO BE CHECKED TO BE SURE THEY HAVE THE SAME LENGTH EXTENDING OUT FROM THE FUSELAGE. USE A Balsa STICK OR YARDSTICK AND BE SURE THAT IF THE TOTAL WINGSPAN IS 70" THAT 35" MINUS 1/2 THE FUSE WIDTH, EXTEND ON EACH SIDE OF THE FUSELAGE.

NEXT, BE SURE THE WING AND STAB ARE NOT SKEWED ON THE FUSELAGE OR TO EACH OTHER. USE A PIECE OF NON-STRETCHABLE STRING AND TIE A LOOP IN ONE END. PIN THROUGH THE LOOP ATTACHING THE STRING IN THE EXACT CENTER OF THE FUSELAGE. FOR THE WING ATTACH NEAR THE TAIL. (NEAR NOSE FOR STAB) MEASURE OUT TO ONE TIP AND THEN GO TO THE OTHER TIP. IT MUST BE THE SAME DISTANCE. DO THIS FOR THE WING AND STAB.

THE LAST THING TO CHECK IS THAT THE WING AND STAB ARE NOT TILTED. CAREFULLY SIGHT FROM THE FRONT AND BE SURE THAT ONE TIP OF THE STAB DOES NOT DROOP LOWER THAN THE OTHER.

AS YOU CAN SEE, THESE 5 PARAMETERS MUST BE COMPLETED TAKING INTO ACCOUNT THE OTHER 4 AS ONE IS BEING WORKED UPON. USUALLY, WE ESTABLISH THE STAB INCIDENCE, EQUAL EXTENSION, SKEWNESS FIRST, AND THEN GLUE THE STAB IN POSITION WHILE SIGHTING FROM THE FRONT WITH A STRAIGHT ROD RESTING ON THE WING SADDLE.

THE LAST DIFFICULT AREA IS THE FIN AND RUDDER. BE SURE THE FIN IS PERPENDICULAR TO THE STAB. A LARGE RIGHT TRIANGLE IS NECESSARY FOR THIS STEP. ALSO, SIGHT CAREFULLY FROM THE FRONT TO BE SURE THAT THE FIN IS INLINE WITH THE TOP CENTERLINE. SIGHT FROM THE FRONT AND MAKE SURE YOU SEE THE SAME AMOUNT OF EACH SIDE OF THE FIN.

MOTOR OFFSET IS DIFFICULT TO MEASURE. IF THE ROBART GAUGE IS USED, IT IS EASY. INCASE YOU DON USE THE GAUGE, ABOUT THE BEST METHOD IS TO DRAW THE THRUST LINE ON THE NOSE OR NACELLE AND THEN EXTEND THIS LINE WITH A STICK. MEASURE FROM THE CRANKSHAFT TO THE STICK AND COMPARE WITH WHAT THE PLANS CALL FOR. REMEMBER THAT THRUST ANGLES MAY BE ALTERED WITH SKIMS OR OVERSIZE MOTOR MOUNT HOLES. WHEN YOU VERIFY THAT THE THRUST IS CORRECT, FILL THE UNNEEDED PART OF THE HOLE WITH EPOXY TO MAINTAIN STRENGTH.

WE ARE SURE THAT IF YOU TAKE THE TIME TO COMPLETE THE ABOVE STEPS YOU WILL HAVE MUCH MORE SATISFACTION FROM YOUR NEW MODEL.



BALANCE AND FLIGHT

There before you is the result of these many efforts. All of the work is done, you say. Nay, say I. All of what is done, anyone could do. What lies ahead is important, for it makes an almighty difference.

This phase begins with the model ready for flight and ends with a successful landing. Begin with the airplane assembled as if to fly. Set it on a smooth surface with a plain, unbroken background, and go around behind the craft and "eyeball" it. Very carefully check to see that the rudder and vertical fin are perfectly aligned. In the case of twin rudders, measure them accurately. Is the horizontal stabilizer parallel to the wing? Are there any warps in any of the flying surfaces? Is the fuselage straight? If the answer is yes to all these questions, you are in great shape. If not, adjust it so it is. You know what must be done to align surfaces, but wait awhile to do that while we consider warps.

Warps are crooked or "bent" surfaces. They cause most accidents. it isn't necessary, as they can be fixed. On any wood airplane which has been doped or painted with any of several different paints, the problem is to soften the paint and twist the surface opposite the warp, then let it harden again.

The paint can generally be softened two ways. It can be heated or dissolved. To heat it, use steam. If a small surface is the problem, a teakettle over a stove does nicely. If a large surface is warped, the outlet behind a steam cleaning plant will do the job. You apply both sides of the warped surface to the steam until good and hot, then hold opposite warp, remove from steam and allow to cool well. Wait awhile, then check again. Do this until the warp is gone.

To dissolve the paint, use more coats of paint over both sides of the warp. This doesn't work on all paint, but has been done successfully with dope and lacquer. I have also seen guys fasten the surface down in proper position and paint and paint until it will stay. That's the hard way.

Now that all the warps are gone, reassemble the plane, put it on a true flat surface and measure the distance from that surface to leading edge of wing, then from the surface to trailing edge of wing at same station (chord point) and verify that it agrees with the incidence shown on the plans. Do the same for the tail. If it doesn't agree, do whatever is necessary to make it agree.

Next check the thrust. Fasten a string to the centerline of the plan back near the tail and compare the distance to each prop tip with the prop horizontal, ensuring that the offset agrees with that shown on the plans. Then vertical for downthrust.

Now, check the balance point to be sure it is exactly as shown on the plan. If not, add weight or relocate the radio in such a manner that it agrees with that shown.

Lastly, turn the radio on and operate all the surfaces one at a time to ensure that they move in the proper direction, do not bind, do not interact with other controls and do run smoothly. When you have satisfied all these requirements, put the outfit on charge all night before you go fly.

When you get to the field, don't be afraid to ask an expert to fly your plane for you if you are a novice or if you haven't flown in awhile.

If you decide to fly it yourself, plan your flight from takeoff, through climb, turns, pattern, approach and landing with careful consideration given to wind direction, runway orientation, other traffic and relative position of the sun.

I have seen everything mentioned in this chapter cause a scale job to crash when not done properly, so if you will carefully tend to each one of these points, your odds will be much better. Don't you agree?

GOOD LUCK AND HAPPY LANDINGS!