Cape Cod Community College AMTS

Practical Project Guide for AMT 103 General Curriculum, Subject Items 7 and 8

Part 147, Appendix B, Subject B – Aircraft Drawings

Item 7. Use aircraft drawings, symbols, and system schematics (Level 2) Item 8. Draw sketches of repairs and alterations (Level 3)

Project 1

Purpose: To acquaint the student with the proper methods of drawing technique's in order to develop aircraft repairs and alterations.

References:

(1) 14 CFR Federal Aviation Regulations for Aviation Maintenance Technicians, Aviation Maintenance Technician Handbook – General, Volume 1 (FAA-H-8083-30), Chapter 2
(2) Advisory Circular AC 43.13-1B change 1 /AC 43.13-2B Combined. Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair.

Equipment and Tools Needed:

(1) Damaged rib drawing
(2) Hole patch drawing
(3) Major Repair and Alteration Forms 337, taken from Cessna 402c Maintenance Records (N781EA), two repairs and one alteration.

Supplies and Materials Needed:

(1) Graph paper
(2) Straight edge ruler
(3) Drawing pencils.

Procedure:

Complete following procedure on project 1

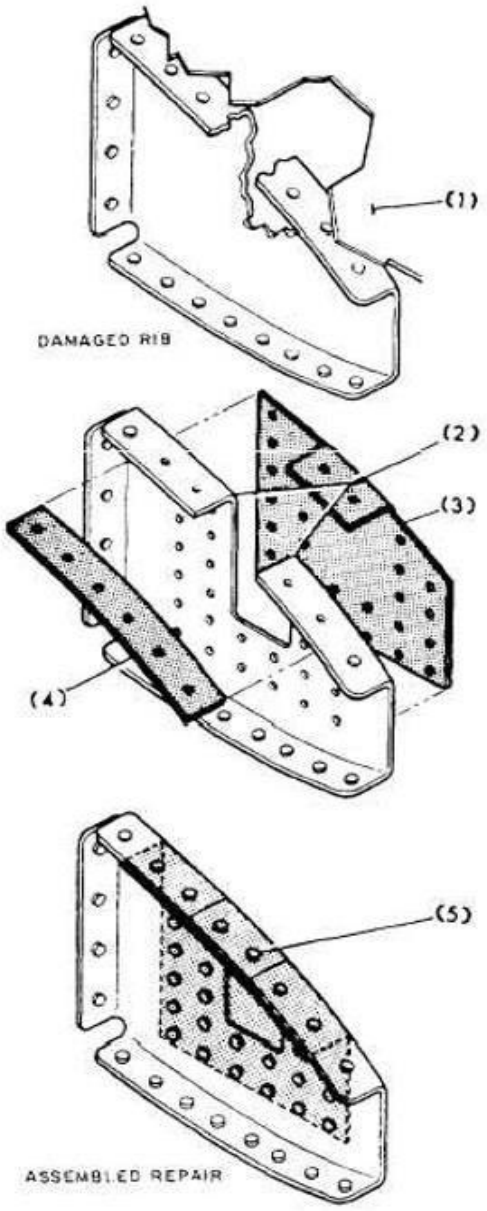
Project 1 Item 7. Use aircraft drawings, symbols, and system schematics (Level 2)

Item 8. Draw sketches of repairs and alterations (Level 3)

(1) The student will make three sketches of the major repairs or alterations shown below.

(2) The sketches must conform to standard drafting procedures, including correct position of views, adequate dimensions and specification of materials. The sketches will be of such quality to be used as part of the maintenance records for the airplane.

(3) Given the examples provided, the student will duplicate three new sketches for the repairs or alterations shown. The guide for technique will be taken from AMT General. Vol 1 (FAA8083-30) Chapter 2. All proper reference numbers, title blocks, dash numbers and methods of illustration will be used.



Damaged Rib

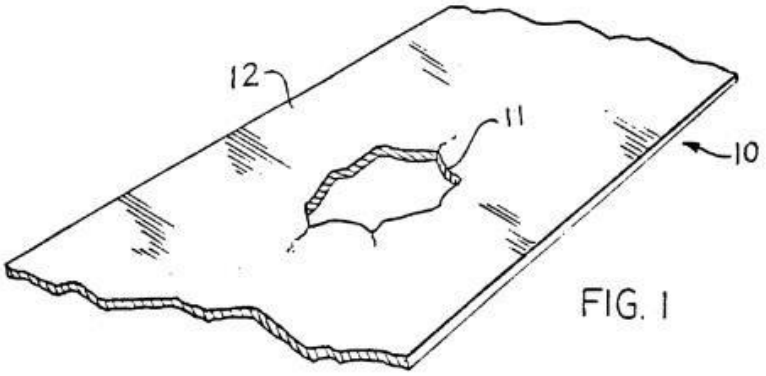


FIG. 1

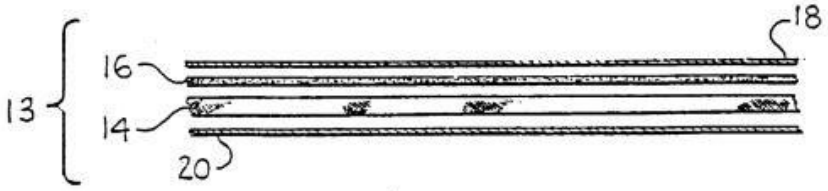


FIG. 2

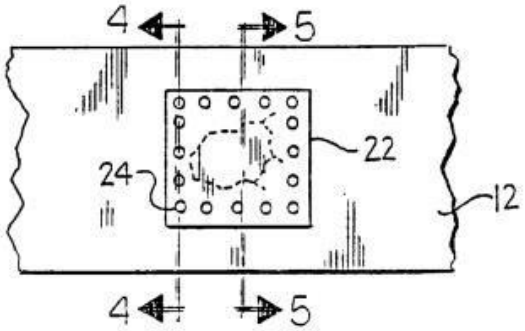


FIG. 3

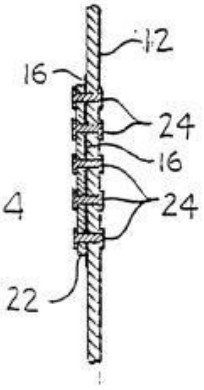


FIG. 4

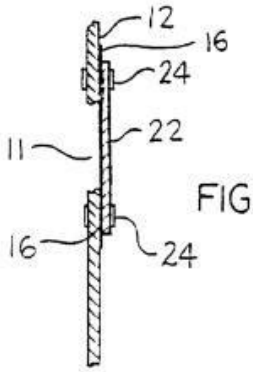
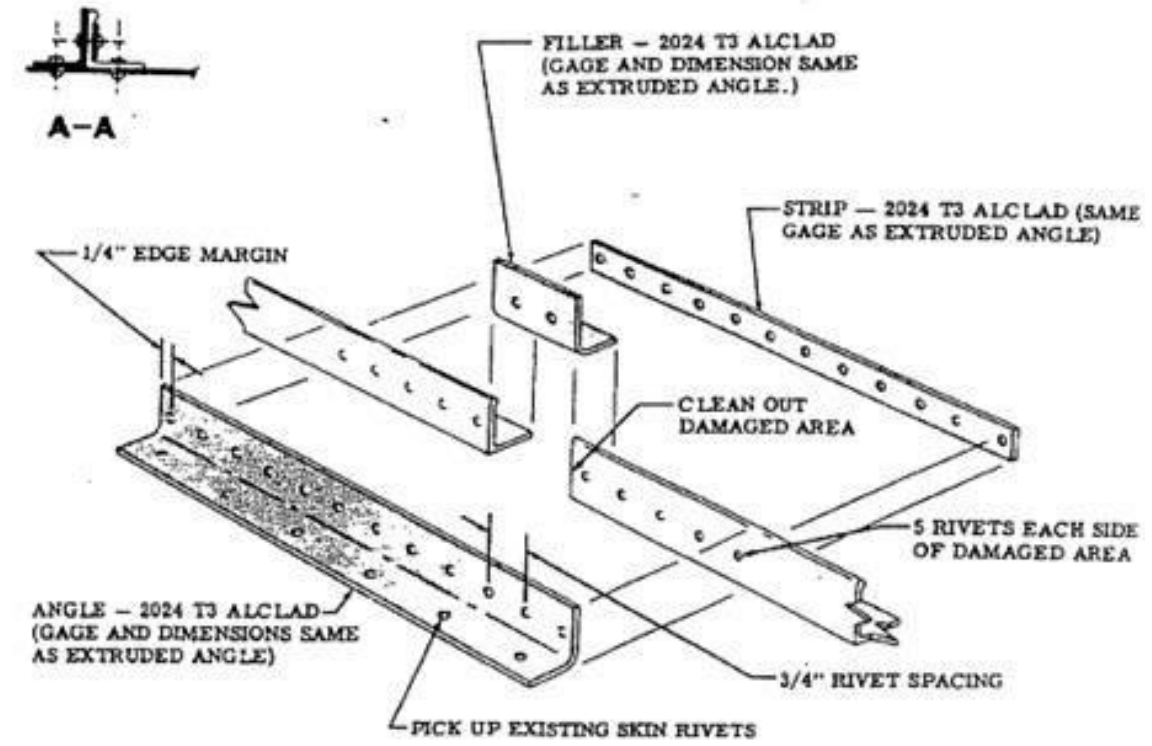
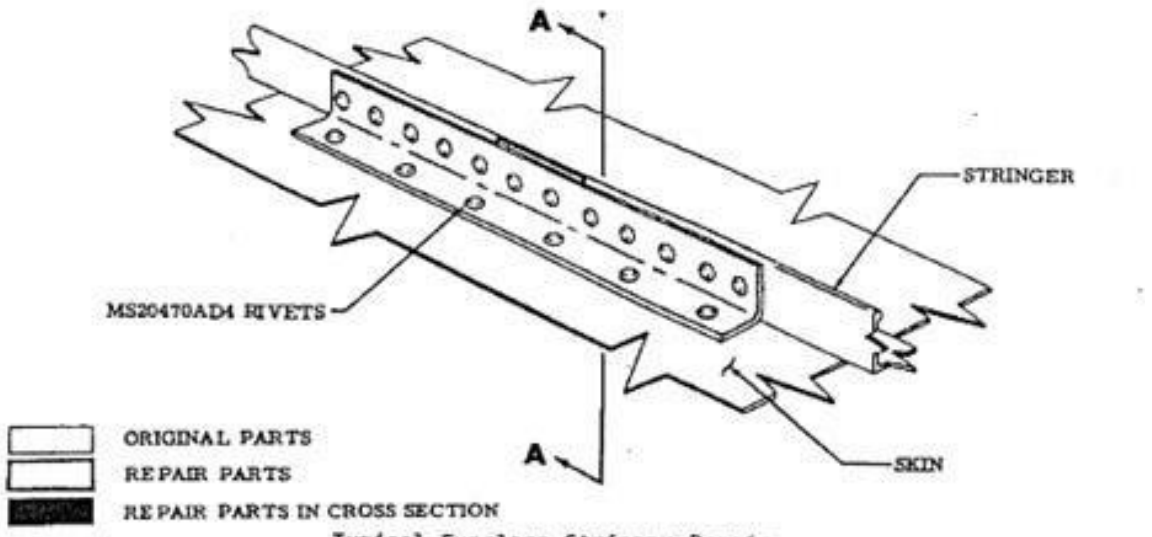


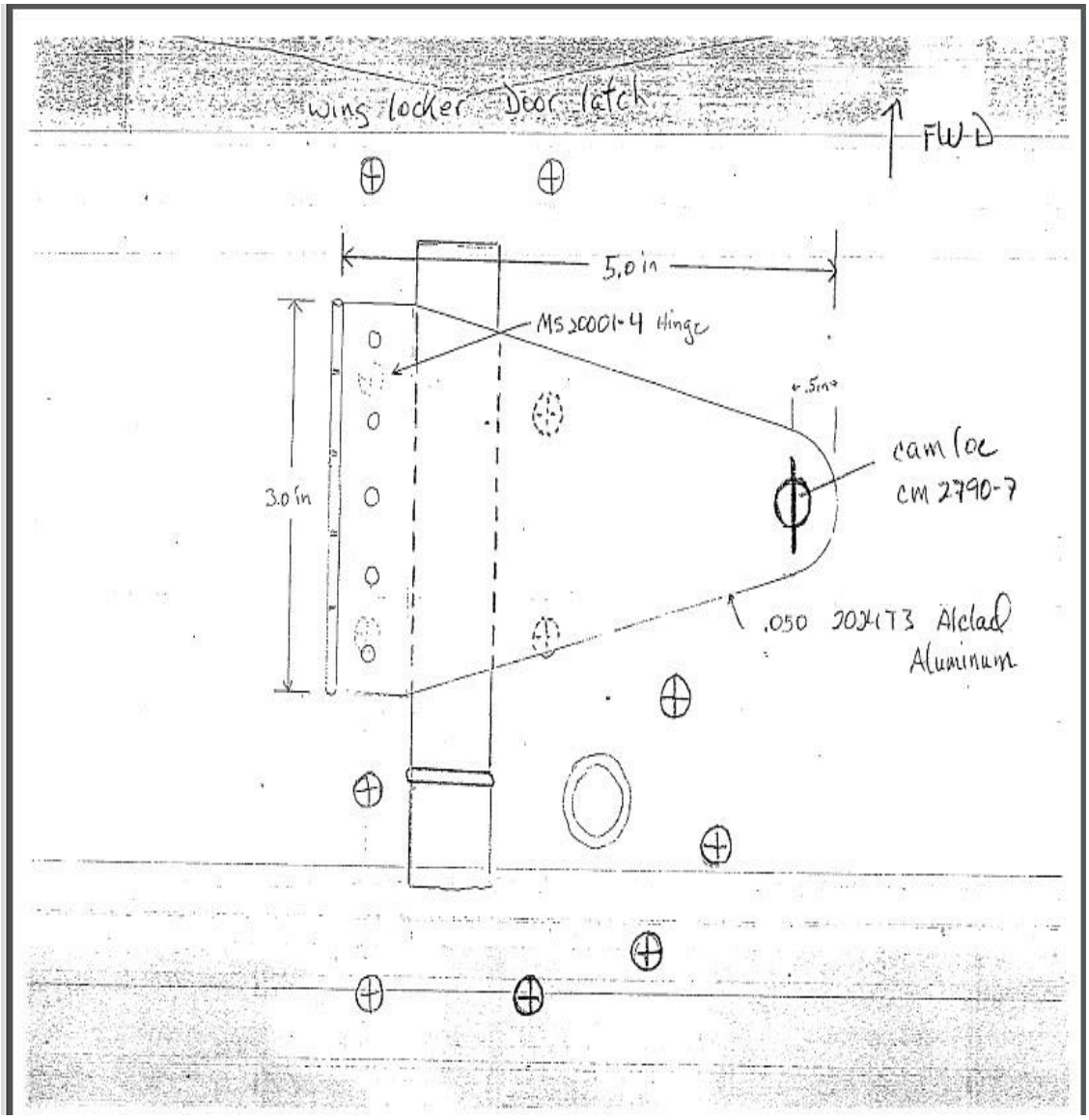
FIG. 5

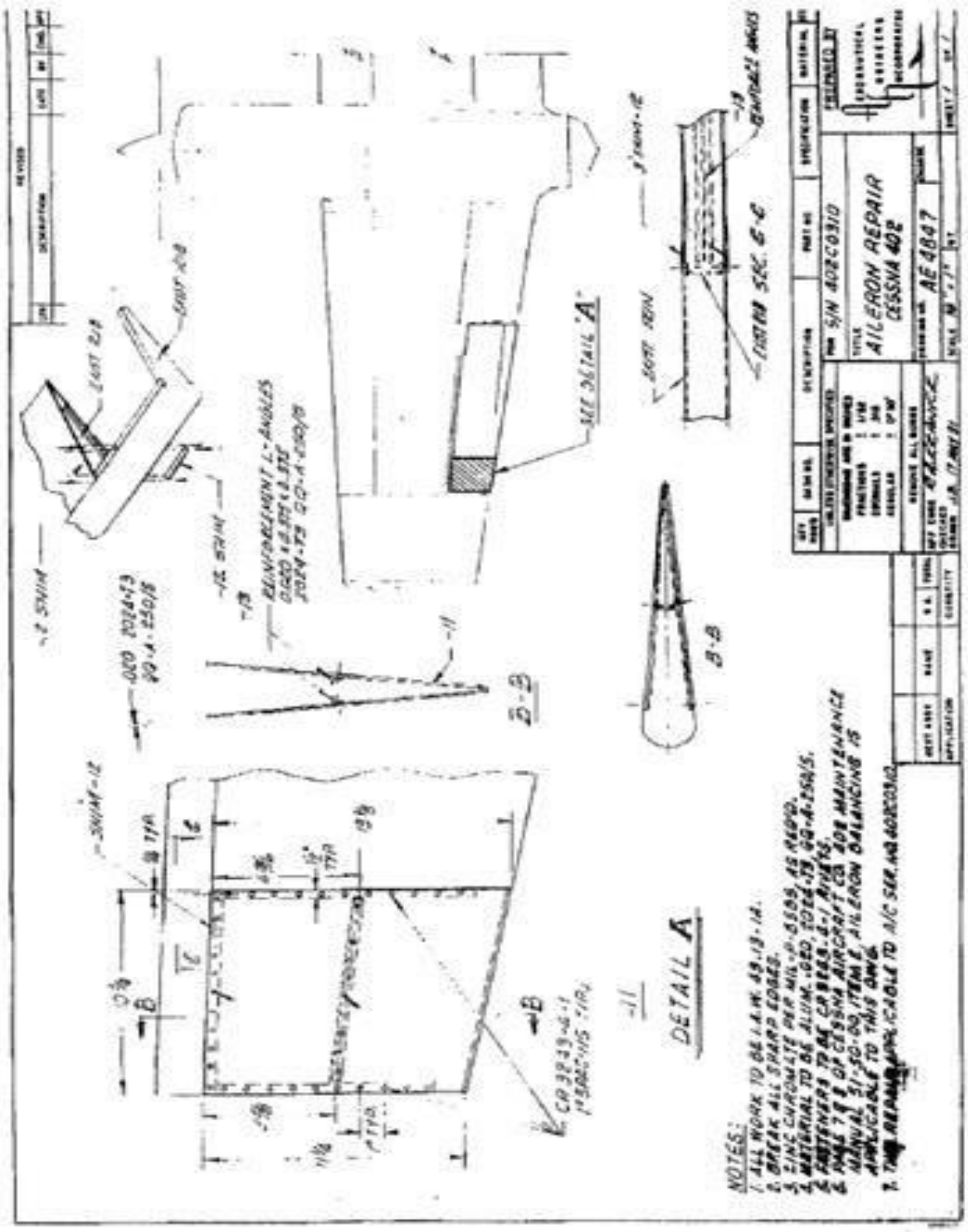
Hole Patch





Typical Fuselage Stringer Repair
Figure 809


wing locker Door latch
FWD
5.0 in
MS20001-4 Hinge
.5in
cam loc
CM 2790-7
3.0 in
.050 2024T3 Alclad
Aluminum



Cape Cod Community College AMTS

Practical Project Guide for AMT 103 General Curriculum, Subject Items 7 and 9

Part 147, Appendix B, Subject B – Aircraft Drawings.

Item 7. Use aircraft drawings, symbols, and system schematics (Level 2)
Item 9. Use blueprint information (Level 3)

Project 2

Purpose: To acquaint the student with the proper procedures for reading and interpreting aviation blueprints.

References:

1. 14 CFR Federal Aviation Regulations for Aviation Maintenance Technicians, Aviation Maintenance Technician Handbook – General, Volume 1 (FAA-H-8083-30) Chapter 2

Equipment and Tools Needed:

(1) Beechcraft Model 18, Drawing No 6-59-A, Plate 1 of 3 and Plate 3 of 3
(2) Ryan S-CW145, Drawing No AM-49-A, Plate 2 of 2
(3) Lockheed Vega PV-1, Drawing No EE-101-C, Plate 2 of 3
(4) Univair Aircraft Corporation, Drawing No U-14442, Landing Light Installation
(5) Well lighted area with wall space or table surface to adequately display a variety of blueprint sizes.

Supplies and Materials Needed:

1. N/A

Procedure:

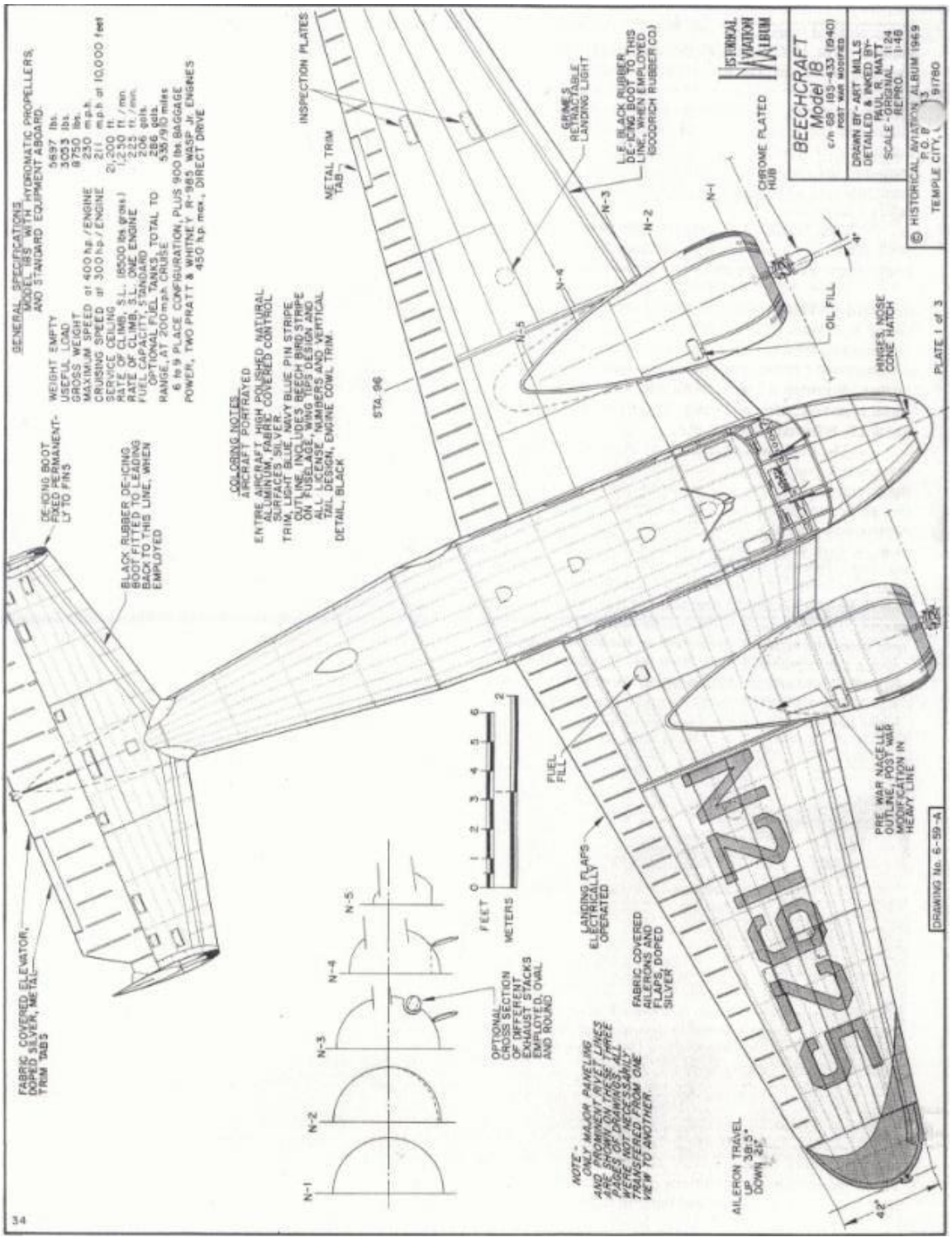
Complete following procedure on project 2

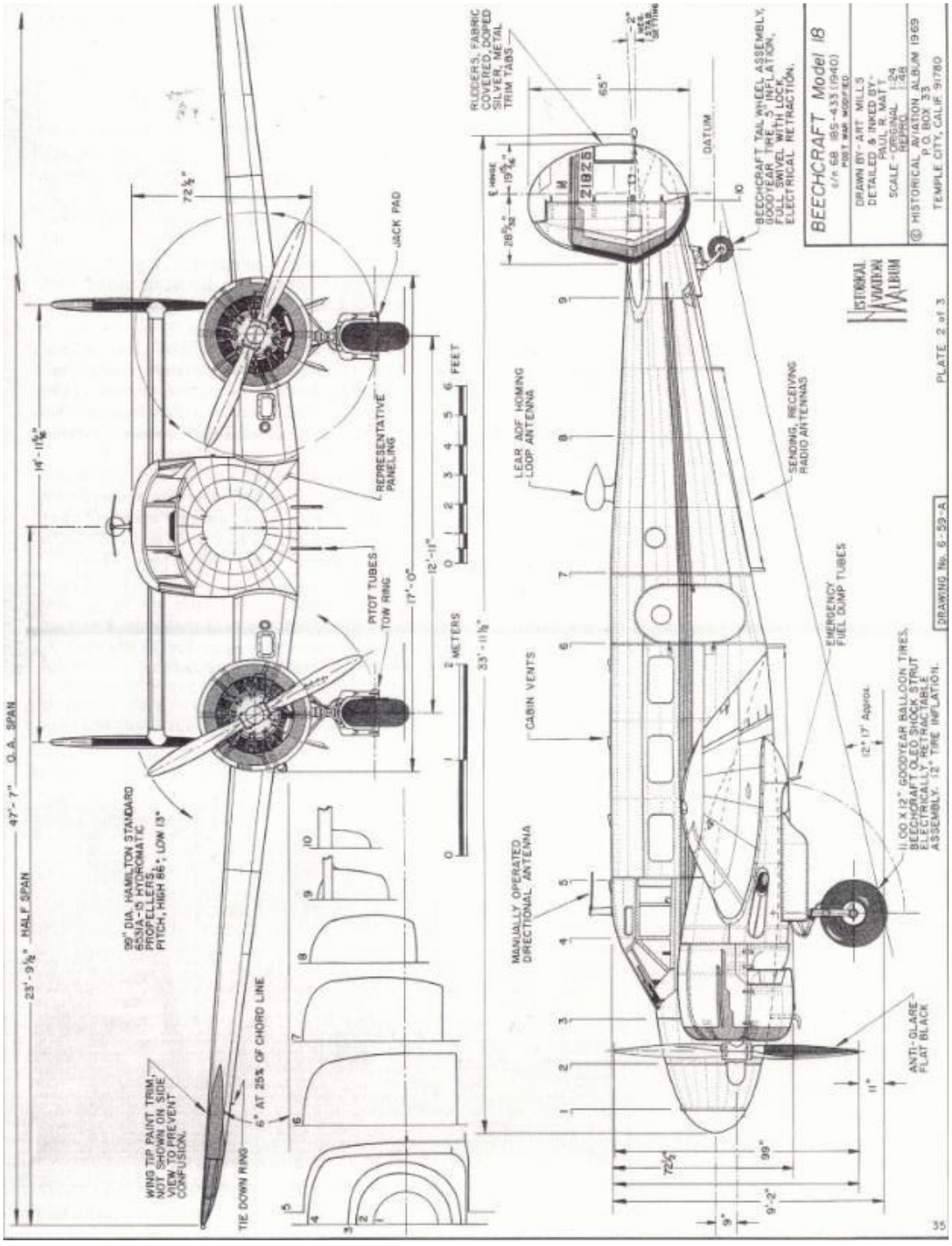
Project 2 Item 7. Use aircraft drawings, symbols, and system schematics (Level 2)

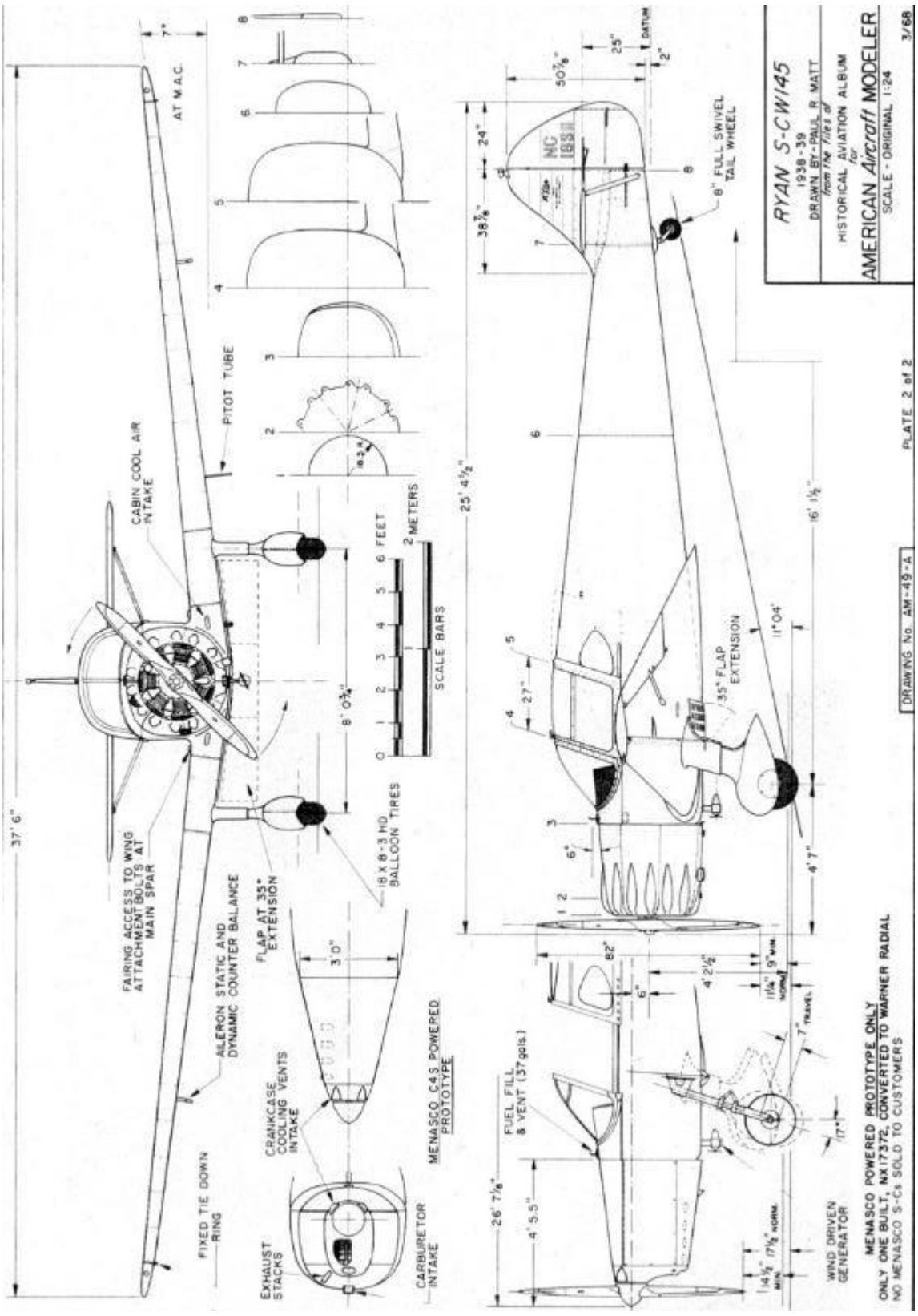
Item 9. Use blueprint information (Level 3)

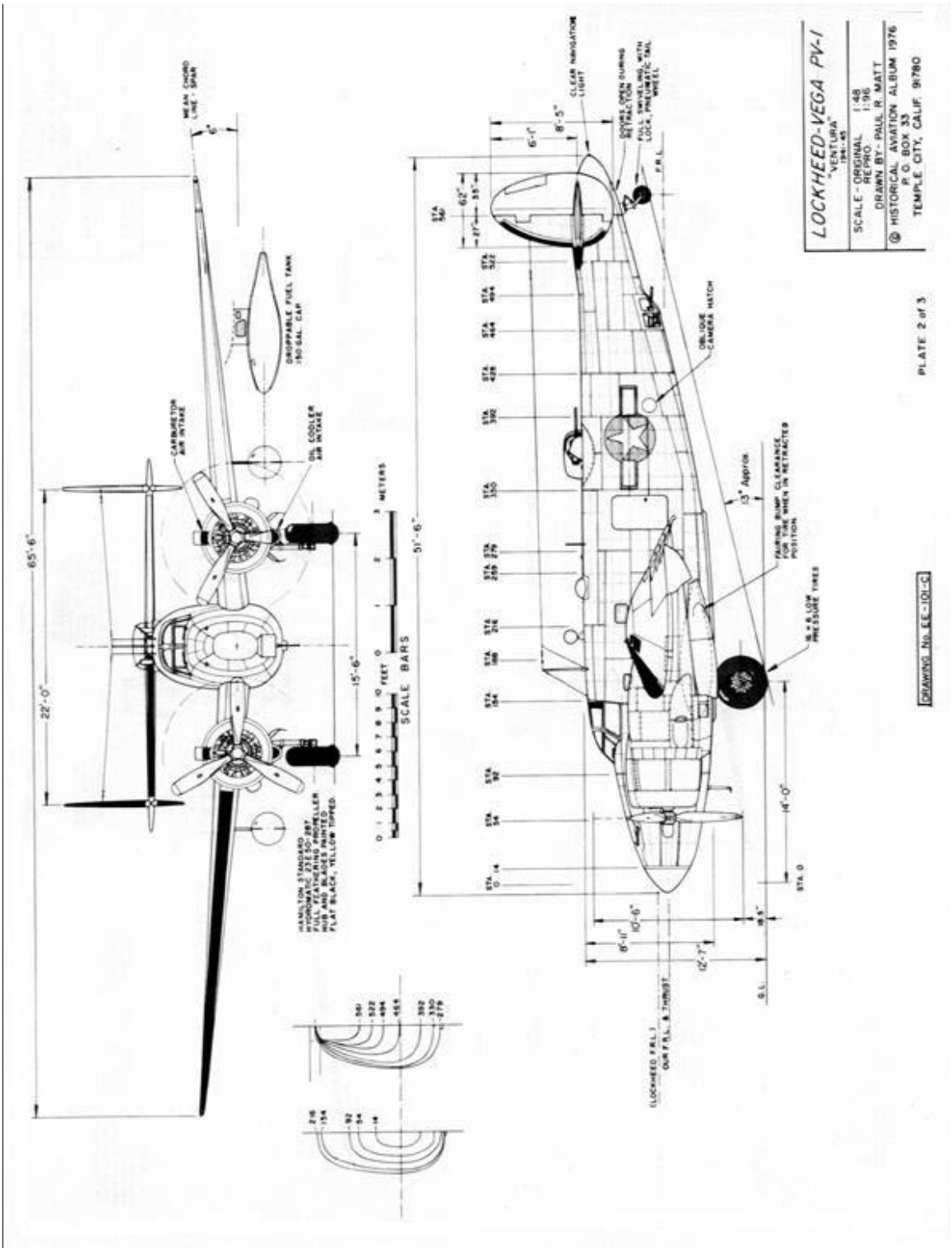
(1) The student will demonstrate how the drawing will provide such information as size and shape of the object and all of its parts, specifications for material to be used, how the material is finished, how the parts are assembled, and any other information essential to making or assembling a particular project.

(2) The student will determine how to read scale of drawings, understand Title Block information, and if there have been any changes to the original drawing.
(3) In addition, the student will be familiarizing the differences between standard blueprints and Installation Diagrams usually associated with Service Bulletins, modifications or Airworthiness Directives.


GENERAL SPECIFICATIONS
MODEL 18S WITH HYDROMATIC PROPELLERS
AND STANDARD EQUIPMENT ABOARD:
WEIGHT EMPTY 5697 lbs.
USEFUL LOAD 3053 lbs.
GROSS WEIGHT 8750 lbs.
MAXIMUM SPEED at 400 hp./ENGINE 230 m.p.h.
CRUISING SPEED at 300 hp./ENGINE 211 m.p.h. at 10,000 feet
SERVICE CEILING 21,200 ft.
RATE OF CLIMB, S.L. (8500 lbs gross) 1,250 ft./min.
RATE OF CLIMB, S.L. ONE ENGINE 225 ft./min.
FUEL CAPACITY, STANDARD 206 gals.
OPTIONAL FUEL TANKS, TOTAL TO 286 gals.
RANGE, AT 200 m.p.h. CRUISE 535/910 miles
6 to 9 PLACE CONFIGURATION, PLUS 900 lbs. BAGGAGE
POWER, TWO PRATT & WHITNEY R-985 WASP Jr. ENGINES
450 h.p. max., DIRECT DRIVE
DE-ICING BOOT FIXED PERMANENTLY TO FINS
BLACK RUBBER DE-ICING BOOT FITTED TO LEADING EDGE BACK TO THIS LINE, WHEN EMPLOYED
COLORING NOTES:
AIRCRAFT PORTRAYED
ENTIRE AIRCRAFT HIGH POLISHED NATURAL ALUMINUM SILVER COVERED CONTROL SURFACES SILVER
TRIM, LIGHT BLUE, NAVY BLUE PIN STRIPE OUTLINE INCLUDES BEECH BIRD STRIPE ON FUSELAGE, WING TIPS DESIGN AND ALL LICENSE NUMBERS AND VERTICAL TAIL DESIGN, ENGINE COWL TRIM DETAIL, BLACK
STA. 96
METAL TRIM TAB
INSPECTION PLATES
GRIMES RETRACTABLE LANDING LIGHT
L.E. BLACK RUBBER DE-ICING BOOT TO THIS LINE, WHEN EMPLOYED (GOODRICH RUBBER CO.)
CHROME PLATED HUB
OIL FILL
HINGED NOSE CONE HATCH
FUEL FILL
LANDING FLAPS ELECTRICALLY OPERATED
FABRIC COVERED AILERONS AND FLAPS, DOPED SILVER
PRE WAR NACELLE OUTLINE, POST WAR MODIFICATION IN HEAVY LINE
FABRIC COVERED ELEVATOR, DOPED SILVER, METAL TRIM TABS
OPTIONAL CROSS SECTION OF DIFFERENT EXHAUST STACKS EMPLOYED, OVAL AND ROUND
N-1
N-2
N-3
N-4
N-5
FEET
METERS
AILERON TRAVEL
UP 38.5°
DOWN 21°
NOTE- MAJOR PANELING AND PROMINENT RIVET LINES ARE SHOWN ON THESE PAGES OF DRAWINGS. ALL TRACINGS ARE TRANSFERRED FROM ONE VIEW TO ANOTHER.
DRAWING No. 6-59-A
PLATE 1 of 3
BEECHCRAFT
Model 18
c/n BB 193-433 (1940)
POST WAR MODIFIED
DRAWN BY- ART MILLS
DETAILED & INKED BY- PAUL R. MATT
SCALE- ORIGINAL 1:24
REPRO. 1:48
© HISTORICAL AVIATION ALBUM 1969
P.O. B 13
TEMPLE CITY, L 91780
HISTORICAL AVIATION ALBUM
N7835
34


BEECHCRAFT Model 18
d/n 68 (BS-433 (1940)
POST WAR MODIFIED
DRAWN BY - ART MILLS
DETAILED & TRACED BY - PAUL WATT
SCALE - ORIGINAL 1:24
REPRO 1:48
© HISTORICAL AVIATION ALBUM 1969
P.O. BOX 33
TEMPLE CITY, CALIF. 91780
HISTORICAL AVIATION ALBUM
DRAWING No. 6-59-A
PLATE 2 of 3
47'-7" O.A. SPAN
23'-9⅛" HALF SPAN
14'-11⅝"
72½"
29" DIA. HAMILTON STANDARD 6531A-15 HYDROMATIC PROPELLERS. PITCH, HIGH 86°; LOW 13°
WING TIP PAINT TRIM, NOT SHOWN ON SIDE VIEW, TO PREVENT CONFUSION.
TIE DOWN RING
6° AT 25% OF CHORD LINE
JACK PAD
REPRESENTATIVE PANELING
PITOT TUBES
TOW RING
17'-0"
12'-11"
33'-11⅛"
FEET
METERS
RUDDERS, FABRIC COVERED, DOPED SILVER, METAL TRIM TABS
BEECHCRAFT TAIL WHEEL ASSEMBLY, GOODYEAR TIRE, 5" INFLATION, FULL SWIVEL WITH LOCK, ELECTRICAL RETRACTION.
DATUM
65"
LEAR ADF HOMING LOOP ANTENNA
SENDING, RECEIVING RADIO ANTENNAS
CABIN VENTS
EMERGENCY FUEL DUMP TUBES
12" 17" Approx.
MANUALLY OPERATED DIRECTIONAL ANTENNA
11.00 X 12" GOODYEAR BALLOON TIRES. BEECHCRAFT OLEO SHOCK STRUT ELECTRICALLY RETRACTABLE ASSEMBLY. 12" TIRE INFLATION.
ANTI-GLARE FLAT BLACK
99"
72½"
11"
9'-2"
9"


RYAN S-CW145
1938-39
DRAWN BY-PAUL R. WATT
from the files of
HISTORICAL AVIATION ALBUM
for
AMERICAN Aircraft MODELER
SCALE - ORIGINAL 1:24
3/68
PLATE 2 of 2
DRAWING No. AM-49-A
MENASCO POWERED PROTOTYPE ONLY
ONLY ONE BUILT, NX17372, CONVERTED TO WARNER RADIAL
NO MENASCO S-Cs SOLD TO CUSTOMERS
MENASCO C45 POWERED PROTOTYPE
SCALE BARS
2 METERS
6 FEET
37' 6"
AT M.A.C.
PITOT TUBE
CABIN COOL AIR INTAKE
FAIRING ACCESS TO WING ATTACHMENT BOLTS AT MAIN SPAR
AILERON STATIC AND DYNAMIC COUNTER BALANCE
FLAP AT 35° EXTENSION
8' 0¾"
18 X 8-3 HD BALLOON TIRES
3'0"
CRANKCASE COOLING VENTS INTAKE
EXHAUST STACKS
CARBURETOR INTAKE
FIXED TIE DOWN RING
25' 4½"
8" FULL SWIVEL TAIL WHEEL
35° FLAP EXTENSION
FUEL FILL & VENT (37 gals.)
WIND DRIVEN GENERATOR
26' 7⅛"
4' 5.5"


LOCKHEED-VEGA PV-1
"VENTURA"
1941-45
SCALE - ORIGINAL 1:48
REPRO 1:96
DRAWN BY - PAUL R. MATT
© HISTORICAL AVIATION ALBUM 1976
P. O. BOX 33
TEMPLE CITY, CALIF. 91780
PLATE 2 of 3
DRAWING No. EE-101-C
SCALE BARS
65'-6"
22'-0"
15'-6"
51'-6"
14'-0"
8'-5"
6'-1"
10'-6"
8'-11"
12'-7"
13° Approx.
CLEAR NAVIGATION LIGHT
DOORS OPEN DURING RETRACTION
FULL SWIVELING WITH LOCK, PNEUMATIC TAIL WHEEL
OBLIQUE CAMERA HATCH
FAIRING BUMP CLEARANCE FOR TIRE WHEN IN RETRACTED POSITION
35 PSI LOW PRESSURE TIRES
DROPPABLE FUEL TANK 150 GAL. CAP
CARBURETOR AIR INTAKE
OIL COOLER AIR INTAKE
MEAN CHORD LINE OF WING
HAMILTON STANDARD HYDROMATIC 23E50-287
FULL FEATHERING PROPELLER
HUB AND BLADES PAINTED FLAT BLACK, YELLOW TIPPED

Cape Cod Community College AMTS

Practical Project Guide for AMT 103 General Curriculum, Subject Items 7 and 10

Part 147, Appendix B, Subject B – Aircraft Drawings

Item 7. Use aircraft drawings, symbols, and system schematics (Level 2)
Item 10. Use graphs and charts (Level 3)

Project 3

Purpose: To acquaint the student with the type of charts and graphs that appear in manufacturer's service and operating manuals.

References:

(1) 14 CFR Federal Aviation Regulations for Aviation Maintenance Technicians, Aviation Maintenance Technician Handbook – General, Volume 1 (FAA-H-8083-30), Chapter 2

Equipment and Tools Needed:

(1) Power Table Setting Graph for Lycoming Model IO-540-K, -L, -M Series, 300 HP Engine
(2) Engine Performance Data Graph for Lycoming Model O-320-B, D Series.
(3) Take-Off Performance Graph for PA-28-140 Cherokee
(4) Cruise Performance Graph for Cessna Model 172P
(5) Fuel, Distance and Time to Climb Graph for PA-32R-300 Cherokee
(6) Manufactures approved Operating handbook containing information in regard to engine performance and power settings.

Supplies and Materials Needed:

1. N/A

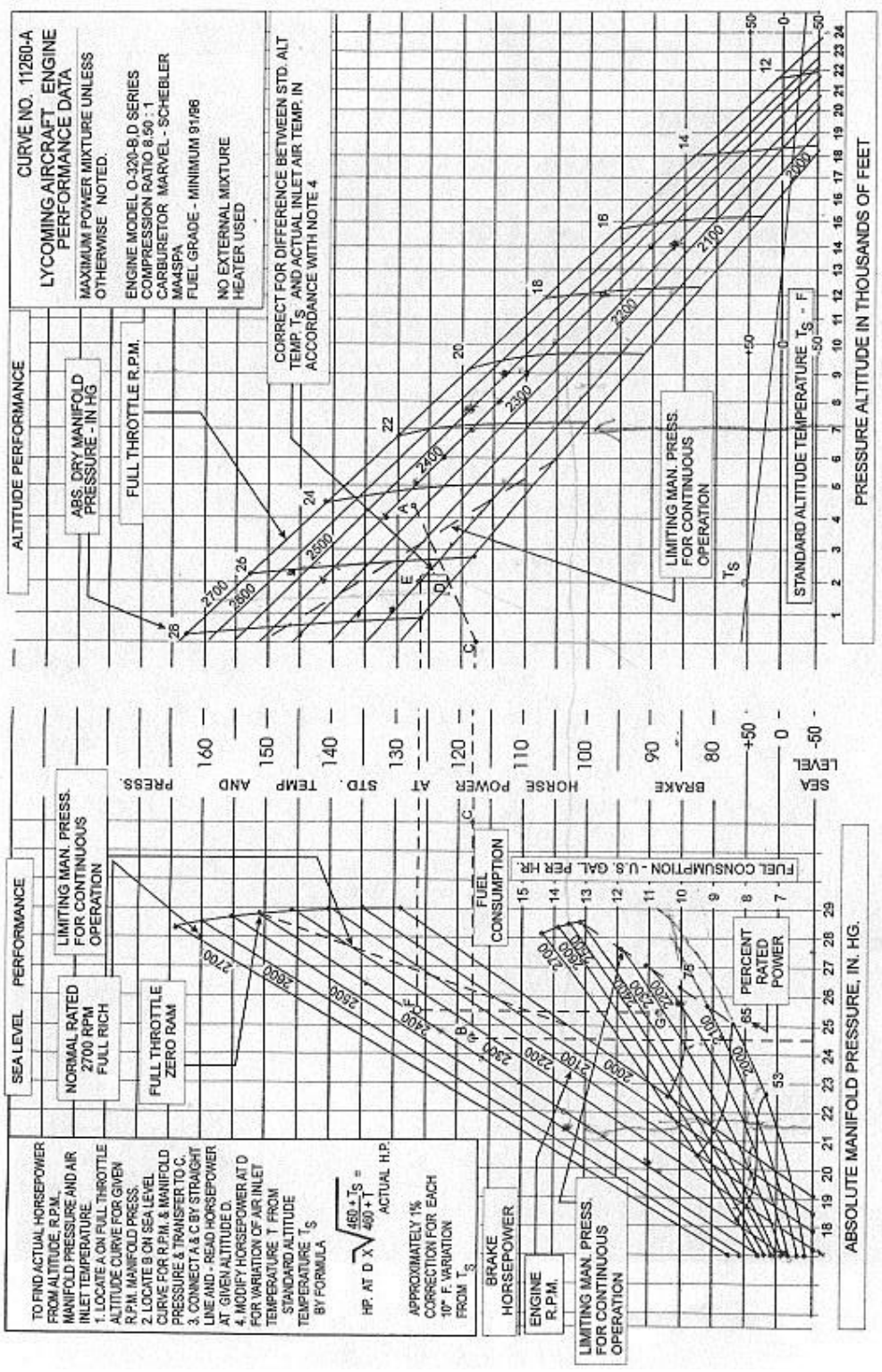
Procedure:

Complete following procedure on project 3

Project 3 Item 7. Use aircraft drawings, symbols, and system schematics (Level 2)

Item 10. Use graphs and charts (Level 3)

(1) The student will use the charts and graphs to interpret data represented. Interpretation is paramount and the student must have a high degree of accuracy to guarantee understanding of graphs and charts.

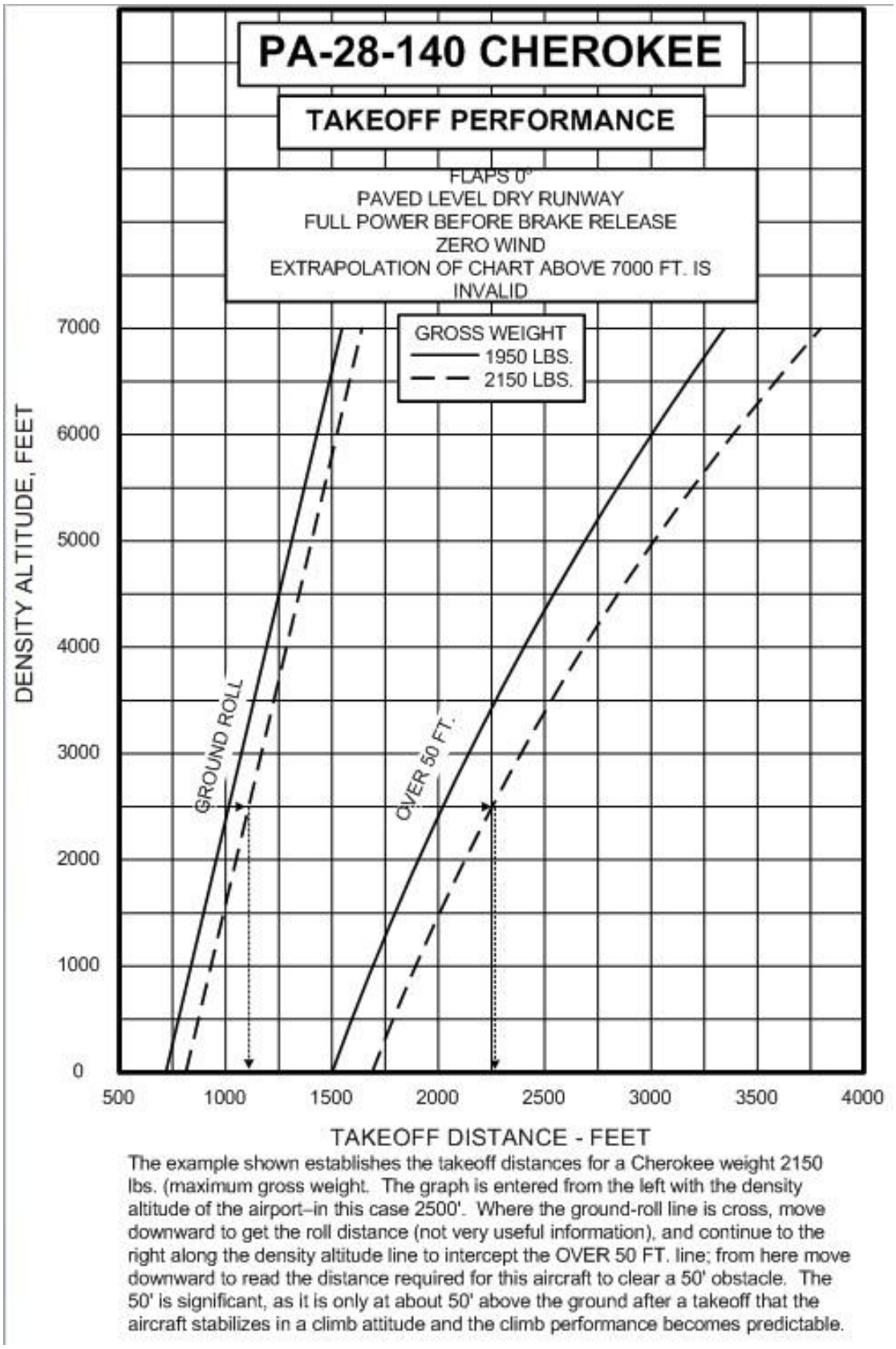

CURVE NO. 11260-A
LYCOMING AIRCRAFT ENGINE
PERFORMANCE DATA
MAXIMUM POWER MIXTURE UNLESS OTHERWISE NOTED.
ENGINE MODEL O-320-B,D SERIES
COMPRESSION RATIO 8.50 :1
CARBURETOR MARVEL - SCHEBLER MA4SPA
FUEL GRADE - MINIMUM 91/96
NO EXTERNAL MIXTURE HEATER USED
CORRECT FOR DIFFERENCE BETWEEN STD. ALT TEMP T_S AND ACTUAL INLET AIR TEMP. IN ACCORDANCE WITH NOTE 4
ALTITUDE PERFORMANCE
ABS. DRY MANIFOLD PRESSURE - IN HG
FULL THROTTLE R.P.M.
LIMITING MAN. PRESS. FOR CONTINUOUS OPERATION
STANDARD ALTITUDE TEMPERATURE T_S - F
PRESSURE ALTITUDE IN THOUSANDS OF FEET
SEA LEVEL PERFORMANCE
NORMAL RATED 2700 RPM FULL RICH
FULL THROTTLE ZERO RAM
PRESS. AND TEMP AT STD. SEA LEVEL
HORSE POWER
BRAKE
FUEL CONSUMPTION - U.S. GAL. PER HR.
PERCENT RATED POWER
ENGINE R.P.M.
LIMITING MAN. PRESS. FOR CONTINUOUS OPERATION
ABSOLUTE MANIFOLD PRESSURE, IN. HG.
TO FIND ACTUAL HORSEPOWER FROM ALTITUDE, R.P.M., MANIFOLD PRESSURE AND AIR INLET TEMPERATURE
1. LOCATE A ON FULL THROTTLE ALTITUDE CURVE FOR GIVEN R.P.M. MANIFOLD PRESS.
2. LOCATE B ON SEA LEVEL CURVE FOR R.P.M. & MANIFOLD PRESSURE & TRANSFER TO C.
3. CONNECT A & C BY STRAIGHT LINE AND - READ HORSEPOWER AT GIVEN ALTITUDE D.
4. MODIFY HORSEPOWER AT D FOR VARIATION OF AIR INLET TEMPERATURE T FROM STANDARD ALTITUDE TEMPERATURE T_S BY FORMULA
HP. AT D X $\sqrt{\frac{460+T_S}{460+T}}$ = ACTUAL H.P.
APPROXIMATELY 1% CORRECTION FOR EACH 10° F. VARIATION FROM T_S

POWER TABLE SETTING-

LYCOMING MODEL IO-540-K, -L, -M SERIES, 300 HP ENGINE

Press. Alt.	Std. Temp	165 HP – 55% Rated RPM and MAN. Press.				195 HP – 65% Rate RPM and MAN. Press.				225 HP – 75% Rated RPM and MAN. Press.		
Feet	F	2100	2200	2300	2400	2100	2200	2300	2400	2200	2300	2400
SL	50	22.5	21.8	21.2	20.7	25.6	24.7	23.8	23.3	27.6	26.6	25.8
1,000	55	22.3	21.6	21.0	20.5	25.3	24.4	23.5	22.9	27.3	26.3	25.5
2,000	52	22.1	21.4	20.7	20.2	25.1	24.2	23.3	22.7	27.1	26.1	25.2
3,000	48	21.9	21.2	20.5	20.0	24.8	23.9	23.0	22.5	26.8	25.8	24.9
4,000	45	21.7	21.0	20.3	19.8	24.6	23.7	22.8	22.2	26.5	25.6	24.6
5,000	41	21.5	20.8	20.1	19.6	24.3	23.5	22.5	22.0	-	25.3	24.4
6,000	38	21.3	20.6	19.8	19.3	24.0	23.2	22.3	21.7	-	25.0	24.1
7,000	34	21.0	20.4	19.6	19.1	23.7	22.9	22.0	21.5	-	-	23.8
8,000	31	20.8	20.2	19.4	18.9	-	22.5	22.8	21.2			
9,000	27	20.6	20.0	19.2	18.6	-	-	21.5	21.0			
10,000	23	20.4	19.8	19.0	18.4	-	-	21.2	20.7			
11,000	19	20.2	19.6	18.7	18.2	-	-	-	20.4			
12,000	16	20.0	19.4	18.5	18.0							
13,000	12	-	19.2	18.3	17.7							
14,000	9	-	-	18.0	17.3							
15,000	5	-	-	-	16.9							

To maintain constant power, correct manifold pressure approximately 0.18” Hg for each 10 degree F variation in induction air temperature from standard altitude temperature. Add manifold pressure for air temperature above standard; subtract for temperature below standard.



The example shown establishes the takeoff distances for a Cherokee weight 2150 lbs. (maximum gross weight. The graph is entered from the left with the density altitude of the airport–in this case 2500'. Where the ground-roll line is cross, move downward to get the roll distance (not very useful information), and continue to the right along the density altitude line to intercept the OVER 50 FT. line; from here move downward to read the distance required for this aircraft to clear a 50' obstacle. The 50' is significant, as it is only at about 50' above the ground after a takeoff that the aircraft stabilizes in a climb attitude and the climb performance becomes predictable.

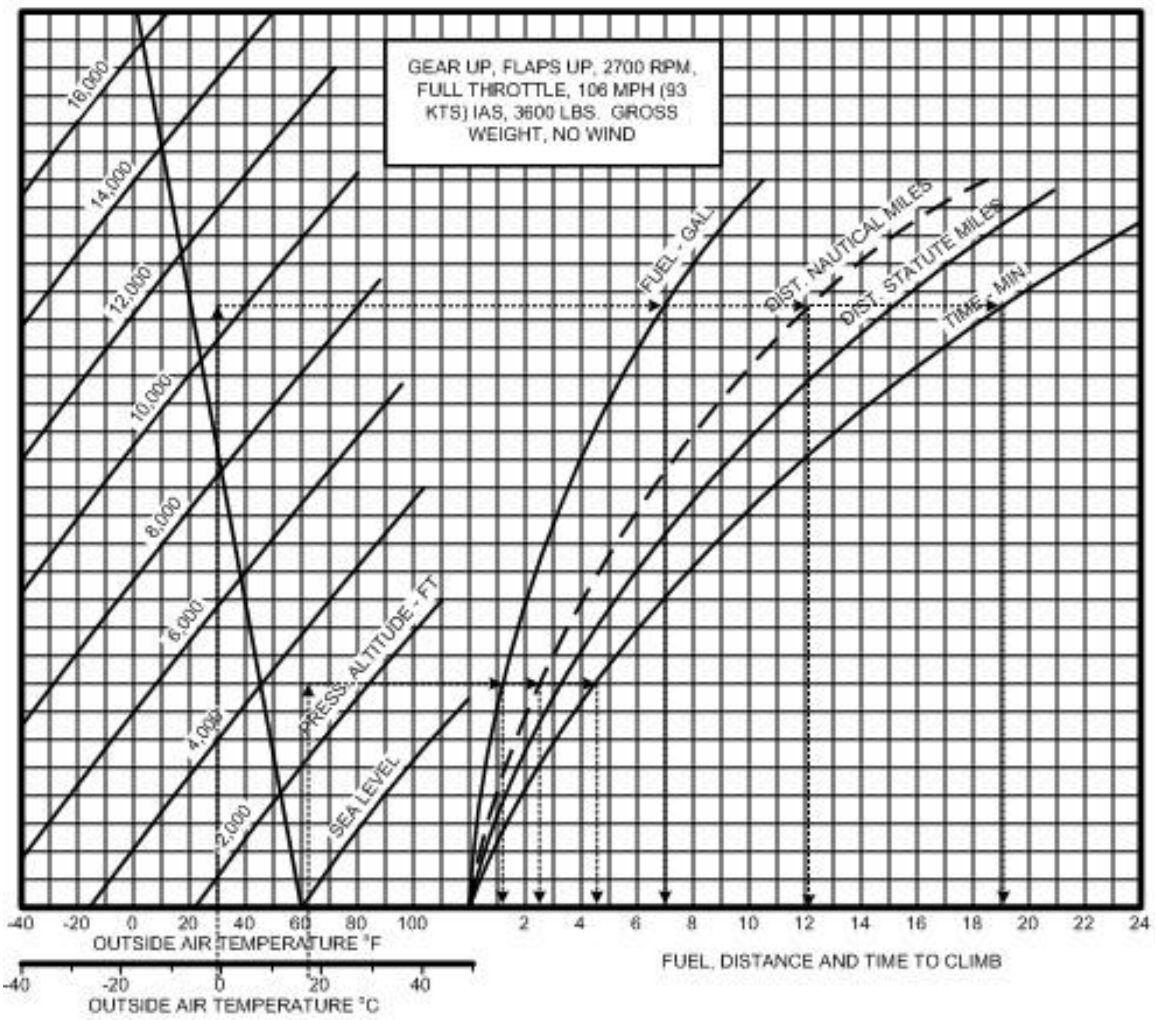
CRUISE PERFORMANCE

CONDITIONS
2400 Pounds
Recommended Lean Mixture

PRESSURE ALTITUDE		20 DEGREE C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20 DEGREE C ABOVE STANDARD TEMP		
FT	RPM	% BHP	KTAS	GPH	%BHP	KTAS	GPH	%BHP	KTAS	GPH
2000	2500	-	-	-	76	114	8.5	72	114	8.1
	2400	72	110	8.1	69	109	7.7	65	108	7.3
	2300	65	104	7.3	62	103	6.9	59	102	6.6
	2200	58	99	6.6	55	97	6.3	53	96	6.1
	2100	52	92	6.0	50	91	5.8	48	89	5.7
4000	2550	-	-	-	76	117	8.5	72	116	8.1
	2500	77	115	8.6	73	114	8.1	69	113	7.7
	2400	69	109	7.8	65	108	7.3	62	107	7.0
	2300	62	104	7.0	59	102	6.6	57	101	6.4
	2200	56	98	6.3	54	96	6.1	51	94	5.9
	2100	51	91	5.8	48	89	5.7	47	88	5.5
6000	2600	-	-	-	77	119	8.6	72	118	8.1
	2500	73	114	8.2	69	113	7.8	66	112	7.4
	2400	66	108	7.4	63	107	7.0	60	106	6.7
	2300	60	103	6.7	57	101	6.4	55	99	6.2
	2200	54	96	6.1	52	95	5.9	50	92	5.8
	2100	49	90	5.7	47	88	5.5	46	86	5.5
8000	2650	-	-	-	77	121	8.6	73	120	8.1
	2600	77	119	8.7	73	118	8.2	69	117	7.8
	2500	70	113	7.8	66	112	7.4	63	111	7.1
	2400	63	108	7.1	60	106	6.7	58	104	6.5
	2300	57	101	6.4	55	100	6.2	53	97	6.0
	2200	52	95	6.0	50	93	5.8	49	91	5.7
10,000	2600	74	118	8.3	70	117	7.8	66	115	7.4
	2500	67	112	7.5	64	111	7.1	61	109	6.8
	2400	61	106	6.8	58	105	6.5	56	102	6.3
	2300	55	100	6.3	53	98	6.0	51	96	5.9
	2200	50	93	5.8	49	91	5.7	47	89	5.6
12,000	2550	67	114	7.5	64	112	7.1	61	111	6.9
	2500	64	111	7.2	61	109	6.8	59	107	6.6
	2400	59	105	6.6	56	103	6.3	54	100	6.1
	2300	53	98	6.1	51	76	5.9	50	94	5.8

PA-32R-300 CHEROKEE LANCE

FUEL, DISTANCE AND TIME TO CLIMB



The example shown in the above graph represents a climb from an airport with an elevation of 3000' to a cruising altitude of 10500'. The procedure used is to determine the fuel, distance and time to climb from sea level to 10500', and from this must be subtracted the fuel, distance and time values to climb from sea level to the departure airport (3000'). The math involved is shown to the right.

Sea Level to 10500':	7.0 GAL	12.2 NM	19.1 MIN
Sea Level to 2500' (subtract):	1.2 GAL	2.5 NM	7.0 MIN
2500' to 10500':	5.8 GAL	9.7 NM	12.1 MIN

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