FAA Approved

Supplemental Airplane Flight Manual

for

CESSNA MODELS 172N, S/N 17267585 THRU 17271034

REGISTRATION NO. LN-ASY

SERIAL NO. F172-1591

This supplement must be carried in the aircraft when it is modified by the installation of the O-320-D series engines and gross weight is increased to 2400 lbs in accordance with STC # SA1356GL . The information contained herein supplements or supercedes the basic placards and instrument markings only in those areas listed.

FAA APPROVED: for Donald P. Michal, Manager
Chicago Aircraft
Certification Office
FAA Central Region

DATE: MAR 0 1 1989

Penn Yan Aero Service, Inc.
2499 Bath Road, Airport
Penn Yan, NY 14527-9599

POH and AFM Supplement
for Cessna 172N

SECTION I - General

DESCRIPTIVE DATA

A. Engine

Number of engines: 1
Engine Manufacturer: Textron Lycoming
Engine Model: O-320-D2J,-D2G, -D1A
Horsepower Rating and Speed: 160 rated BHP at 2700 RPM

SECTION II - Limitations

A. The following placard must be displayed adjacent to the flap position selector switch:

MAXIMUM FLAP TRAVEL IS 30°

B. C.G. Range

Landplane:

Normal category	(+39.5) to (+47.3)	at 2400 lb.
	(+35.0) to (+47.3)	at 1950 lb. or less
Utility category	(+36.5) to (+40.5)	at 2100 lb.
	(+35.0) to (+40.5)	at 1950 lb. or less

Floatplane: (Edo 89-2000 or 89A2000 floats)

Normal category	(+39.8) to (+45.5)	at 2220 lb.
	(+36.4) to (+45.5)	at 1825 lb. or less

Straight line variation between points given.

SECTION III - Emergency Procedures - No Change.

SECTION IV - Normal Procedures - No Change.

SECTION V - Performance - See Pages 3 thru 10.

SECTION VI - Weight and Balance - See Page 11.

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required to complete the trip with ample reserve.

LANDING

A procedure similar to takeoff should be used for estimating the landing distance at the destination airport. Figure 5-11 presents landing distance information for the short field technique. The distances corresponding to 2000 feet and 30°C are as follows:

Ground roll	610 Feet
Total distance to clear a 50-foot obstacle	1390 Feet

A correction for the effect of wind may be made based on Note 2 of the landing chart using the same procedure as outlined for takeoff.

DEMONSTRATED OPERATING TEMPERATURE

Satisfactory engine cooling has been demonstrated for this airplane with an outside air temperature 23°C above standard. This is not be to considered as an operating limitation. Reference should be made to Section 2 for engine operating limitations.

AIRSPEED CALIBRATION

NORMAL STATIC SOURCE

CONDITION:
Power required for level flight or maximum rated RPM dive.

FLAPS UP													
KIAS	50	60	70	80	90	100	110	120	130	140	150	160	
KCAS	56	62	70	79	89	98	107	117	126	135	145	154	
FLAPS 10°													
KIAS	40	50	60	70	80	90	100	110	---	---	---	---	
KCAS	49	55	62	70	79	89	98	108	---	---	---	---	
FLAPS 30°													
KIAS	40	50	60	70	80	85	---	---	---	---	---	---	
KCAS	47	53	61	70	80	84	---	---	---	---	---	---	

Figure 5-1. Airspeed Calibration (Sheet 1 of 2)

AIRSPEED CALIBRATION

ALTERNATE STATIC SOURCE

HEATER/VENTS AND WINDOWS CLOSED

FLAPS UP											
NORMAL KIAS	50	60	70	80	90	100	110	120	130	140	---
ALTERNATE KIAS	51	61	71	82	91	101	111	121	131	141	---
FLAPS 10°											
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---
ALTERNATE KIAS	40	51	61	71	81	90	99	108	---	---	---
FLAPS 30°											
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---
ALTERNATE KIAS	38	50	60	70	79	83	---	---	---	---	---

HEATER/VENTS OPEN AND WINDOWS CLOSED

FLAPS UP											
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140
ALTERNATE KIAS	36	48	59	70	80	89	99	108	118	128	139
FLAPS 10°											
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---
ALTERNATE KIAS	38	49	59	69	79	88	97	106	---	---	---
FLAPS 30°											
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---
ALTERNATE KIAS	34	47	57	67	77	81	---	---	---	---	---

WINDOWS OPEN

FLAPS UP											
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140
ALTERNATE KIAS	26	43	57	70	82	93	103	113	123	133	143
FLAPS 10°											
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---
ALTERNATE KIAS	25	43	57	69	80	91	101	111	---	---	---
FLAPS 30°											
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---
ALTERNATE KIAS	25	41	54	67	78	84	---	---	---	---	---

Figure 5-1. Airspeed Calibration (Sheet 2 of 2)

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CRUISE

The cruising altitude should be selected based on a consideration of trip length, winds aloft, and the airplane's performance. A typical cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in figure 5-8, the range profile charts presented in figure 5-9, and the endurance profile charts presented in figure 5-10.

The relationship between power and range is illustrated by the range profile charts. Considerable fuel savings and longer range result when lower power settings are used. For this sample problem, a cruise power of approximately 65% will be used.

The cruise performance chart, figure 5-8, is entered at 6000 feet altitude and 20°C above standard temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The engine speed chosen is 2500 RPM, which results in the following:

Power	66%
True airspeed	112 Knots
Cruise fuel flow	7.4 GPH

The power computer may be used to determine power and fuel consumption more accurately during the flight.

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in figures 5-7 and 5-8. For this sample problem, figure 5-7 shows that a climb from 2000 feet to 6000 feet requires 1.6 gallons of fuel. The corresponding distance during the climb is 10 nautical miles. These values are for a standard temperature and are sufficiently accurate for most flight planning purposes. However, a further correction for the effect of temperature may be made as noted on the climb chart. The approximate effect of a non-standard temperature is to increase the time, fuel, and distance by 10% for each 10°C above standard temperature, due to the lower rate of climb. In this case, assuming a temperature 16°C above standard, the correction would be:

$$\frac{16°C}{10°C} \times 10\% = 16\% \text{ Increase}$$

SECTION 5 PERFORMANCE | Aircraft Modified Per Penn Yan STC 2400 lb. gross wt. | CESSNA MODEL 172N

With this factor included, the fuel estimate would be calculated as follows:

Fuel to climb, standard temperature	1.6
Increase due to non-standard temperature (1.6 × 16%)	0.3
Corrected fuel to climb	1.9 Gallons

Using a similar procedure for the distance to climb results in 12 nautical miles.

The resultant cruise distance is:

Total distance	320
Climb distance	-12
Cruise distance	308 Nautical Miles

With an expected 10 knot headwind, the ground speed for cruise is predicted to be:

112
-10
102 Knots

Therefore, the time required for the cruise portion of the trip is:

$$\frac{308 \text{ Nautical Miles}}{102 \text{ Knots}} = 3.0 \text{ Hours}$$

The fuel required for cruise is:

3.0 hours × 7.4 gallons/hour = 22.2 Gallons

A 45-minute reserve requires:

$$\frac{45}{60} \times 7.4 \text{ gallons/hour} = 5.6 \text{ Gallons}$$

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	1.1
Climb	1.9
Cruise	22.2
Reserve	5.6
Total fuel required	30.8 Gallons

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
Full Throttle

NOTE:
Mixture leaned above 3000 feet for maximum RPM.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
2400	S.L.	76	805	745	685	625
	2000	75	695	640	580	525
	4000	74	590	535	480	420
	6000	73	485	430	375	320
	8000	72	380	330	275	220
	10,000	71	275	225	175	- - -
	12,000	70	175	125	- - -	- - -

Figure 5-6. Maximum Rate of Climb

TAKEOFF DISTANCE
2200 LBS AND 2000 LBS

SHORT FIELD

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES.

WEIGHT LBS	TAKEOFF SPEED KIAS: LIFT OFF	TAKEOFF SPEED KIAS: AT 50 FT	PRESS ALT FT	0°C: GRND ROLL FT	0°C: TOTAL FT TO CLEAR 50 FT OBS	10°C: GRND ROLL FT	10°C: TOTAL FT TO CLEAR 50 FT OBS	20°C: GRND ROLL FT	20°C: TOTAL FT TO CLEAR 50 FT OBS	30°C: GRND ROLL FT	30°C: TOTAL FT TO CLEAR 50 FT OBS	40°C: GRND ROLL FT	40°C: TOTAL FT TO CLEAR 50 FT OBS
2200	49	54	S.L.	650	1195	700	1280	750	1375	805	1470	865	1575
			1000	710	1310	765	1405	825	1510	885	1615	950	1735
			2000	780	1440	840	1545	905	1660	975	1785	1045	1915
			3000	855	1585	925	1705	995	1835	1070	1975	1150	2130
			4000	945	1750	1020	1890	1100	2040	1180	2200	1270	2375
			5000	1040	1945	1125	2105	1210	2275	1305	2465	1405	2665
			6000	1150	2170	1240	2355	1340	2555	1445	2775	1555	3020
			7000	1270	2440	1375	2655	1485	2890	1605	3155	1730	3450
			8000	1410	2760	1525	3015	1650	3305	1785	3630	1925	4005
2000	46	51	S.L.	525	970	565	1035	605	1110	650	1185	695	1265
			1000	570	1060	615	1135	665	1215	710	1295	765	1385
			2000	625	1160	675	1240	725	1330	780	1425	840	1525
			3000	690	1270	740	1365	800	1465	860	1570	920	1685
			4000	755	1400	815	1500	880	1615	945	1735	1015	1865
			5000	830	1545	900	1660	970	1790	1040	1925	1120	2070
			6000	920	1710	990	1845	1070	1990	1150	2145	1235	2315
			7000	1015	1900	1095	2055	1180	2225	1275	2405	1370	2605
			8000	1125	2125	1215	2305	1310	2500	1410	2715	1520	2950

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Figure 5-5. Takeoff Distance (Sheet 2 of 2)

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STALL SPEEDS

CONDITIONS:
Power Off

NOTES:
1. Altitude loss during a stall recovery may be as much as 230 feet.
2. KIAS values are approximate.

MOST REARWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
2400	UP	44	51	47	55	52	61	62	72
	10°	35	48	38	52	42	57	49	68
	30°	33	46	35	49	39	55	47	65

MOST FORWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
2400	UP	44	52	47	56	52	62	62	74
	10°	37	49	40	53	44	58	52	69
	30°	33	46	35	49	39	55	47	65

Figure 5-3. Stall Speeds

TAKEOFF DISTANCE
MAXIMUM WEIGHT 2400 LBS
SHORT FIELD

CONDITIONS:
Flaps 10°
Full Throttle Prior to Brake Release
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS
2400	51	56	S.L.	795	1460	860	1570	925	1685	995	1810	1065	1945
			1000	875	1605	940	1725	1015	1860	1090	2000	1170	2155
			2000	960	1770	1035	1910	1115	2060	1200	2220	1290	2395
			3000	1055	1960	1140	2120	1230	2295	1325	2480	1425	2685
			4000	1165	2185	1260	2365	1355	2570	1465	2790	1575	3030
			5000	1285	2445	1390	2660	1500	2895	1620	3160	1745	3455
			6000	1425	2755	1540	3015	1665	3300	1800	3620	1940	3990
			7000	1580	3140	1710	3450	1850	3805	2000	4220	---	---
			8000	1755	3615	1905	4015	2060	4480	---	---	---	---

Figure 5-5. Takeoff Distance (Sheet 1 of 2)

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TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:
Flaps Up
Full Throttle
Standard Temperature

NOTES:
1. Add 1.1 gallons of fuel for engine start, taxi and takeoff allowance.
2. Mixture leaned above 3000 feet for maximum RPM.
3. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
4. Distances shown are based on zero wind.

WEIGHT LBS	PRESSURE ALTITUDE FT	TEMP °C	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
					TIME MIN	FUEL USED GALLONS	DISTANCE NM
2400	S.L.	15	76	700	0	0.0	0
	1000	13	76	655	1	0.3	2
	2000	11	75	610	3	0.6	4
	3000	9	75	560	5	1.0	6
	4000	7	74	515	7	1.4	9
	5000	5	74	470	9	1.7	11
	6000	3	73	425	11	2.2	14
	7000	1	72	375	14	2.6	18
	8000	-1	72	330	17	3.1	22
	9000	-3	71	285	20	3.6	26
	10,000	-5	71	240	24	4.2	32
	11,000	-7	70	190	29	4.9	38
	12,000	-9	70	145	35	5.8	47

Figure 5-7. Time, Fuel, and Distance to Climb

RANGE PROFILE
45 MINUTES RESERVE
40 GALLONS USABLE FUEL

CONDITIONS:
2400 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTE:
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during climb.

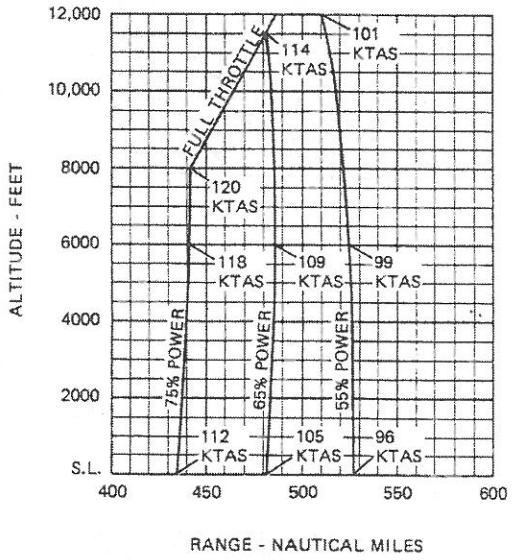

Figure 5-9. Range Profile (Sheet 1 of 3)

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CRUISE PERFORMANCE

CONDITIONS:
2400 Pounds
Recommended Lean Mixture (See Section 4, Cruise)

PRESSURE ALTITUDE FT	RPM	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		% 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	96	5.9	50	94	5.8

Figure 5-8. Cruise Performance

RANGE PROFILE
45 MINUTES RESERVE
50 GALLONS USABLE FUEL

CONDITIONS:
2400 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTE:
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during climb.

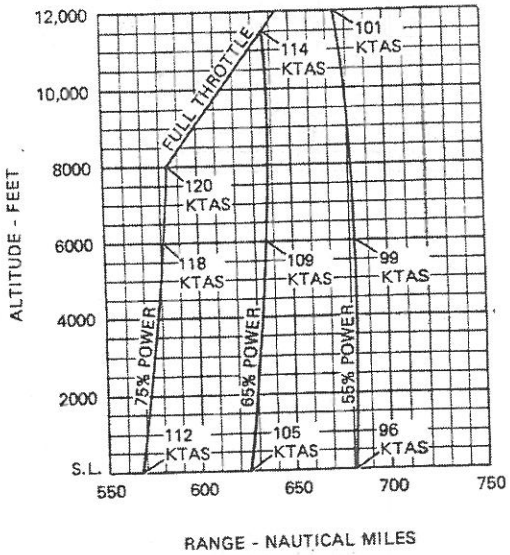

Figure 5-9. Range Profile (Sheet 2 of 3)

Penn Yan Aero Supplemental Airplane Flight Manual & Installation Instructions for the DeltaHawk STC SA-1356GL

Aircraft Modified
Per Penn Yan STC
2400 lb. gross wt.

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ENDURANCE PROFILE
45 MINUTES RESERVE
40 GALLONS USABLE FUEL

CONDITIONS:
2400 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

NOTE:
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during climb.

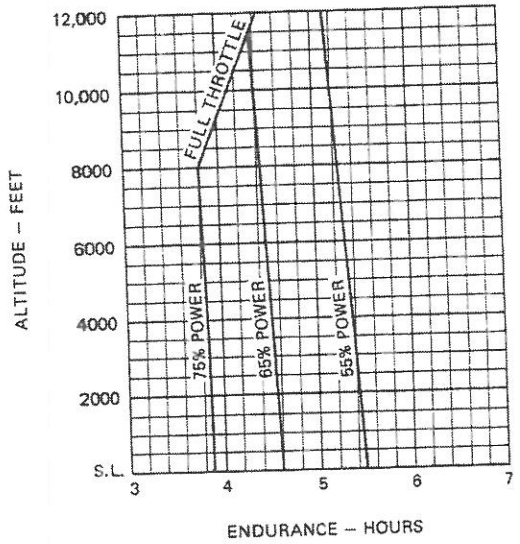

Figure 5-10. Endurance Profile (Sheet 1 of 3)

CESSNA
MODEL 172N

Aircraft Modified
Per Penn Yan STC
2400 lb. gross wt.

SECTION 5
PERFORMANCE

ENDURANCE PROFILE
45 MINUTES RESERVE
50 GALLONS USABLE FUEL

CONDITIONS:
2400 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

NOTE:
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during climb.

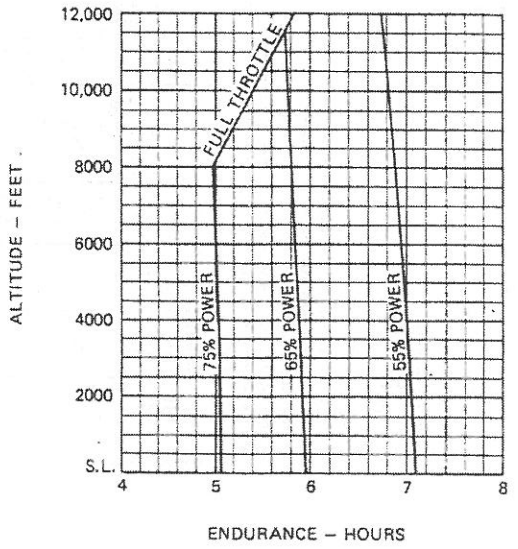

Figure 5-10. Endurance Profile (Sheet 2 of 3)

LANDING DISTANCE

SHORT FIELD

CONDITIONS:
Flaps 30°
Power Off
Maximum Braking
Paved, Level, Dry Runway
Zero Wind

NOTES:
1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.
4. If a landing with flaps up is necessary, increase the approach speed by 7 KIAS and allow for 35% longer distances.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
			GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS	GRND ROLL FT	TOTAL FT TO CLEAR 50 FT OBS
2400	61	S.L.	510	1235	530	1265	550	1295	570	1325	585	1350
		1000	530	1265	550	1295	570	1325	590	1360	610	1390
		2000	550	1295	570	1330	590	1360	610	1390	630	1425
		3000	570	1330	590	1360	615	1395	635	1430	655	1460
		4000	595	1365	615	1400	635	1430	660	1470	680	1500
		5000	615	1400	640	1435	660	1470	685	1510	705	1540
		6000	640	1435	660	1470	685	1510	710	1550	730	1580
		7000	665	1475	690	1515	710	1550	735	1590	760	1630
		8000	690	1515	715	1555	740	1595	765	1635	790	1675

Figure 5-11. Landing Distance

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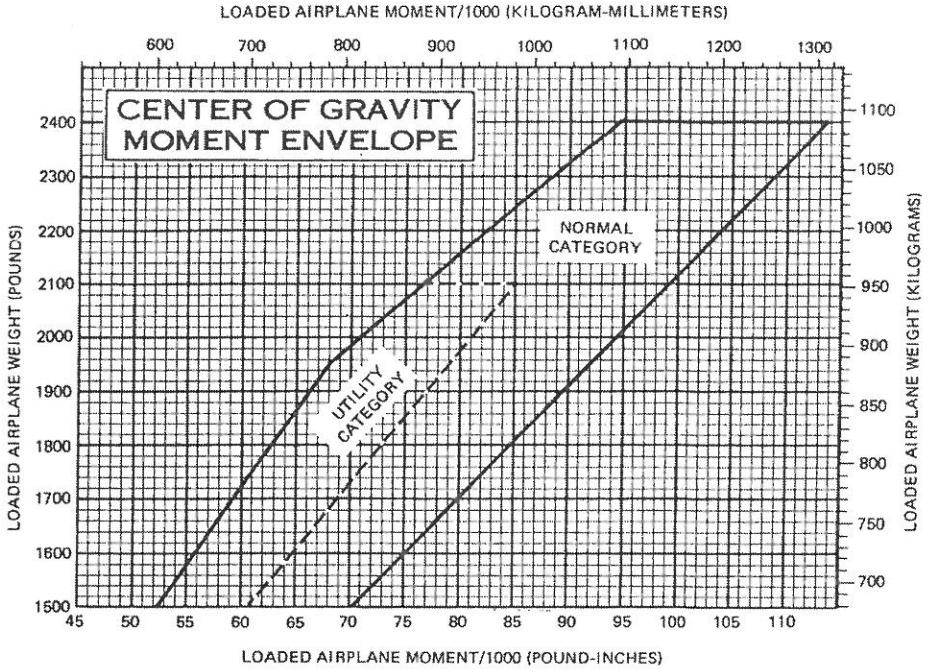

Figure 6-7. Center of Gravity Moment Envelope

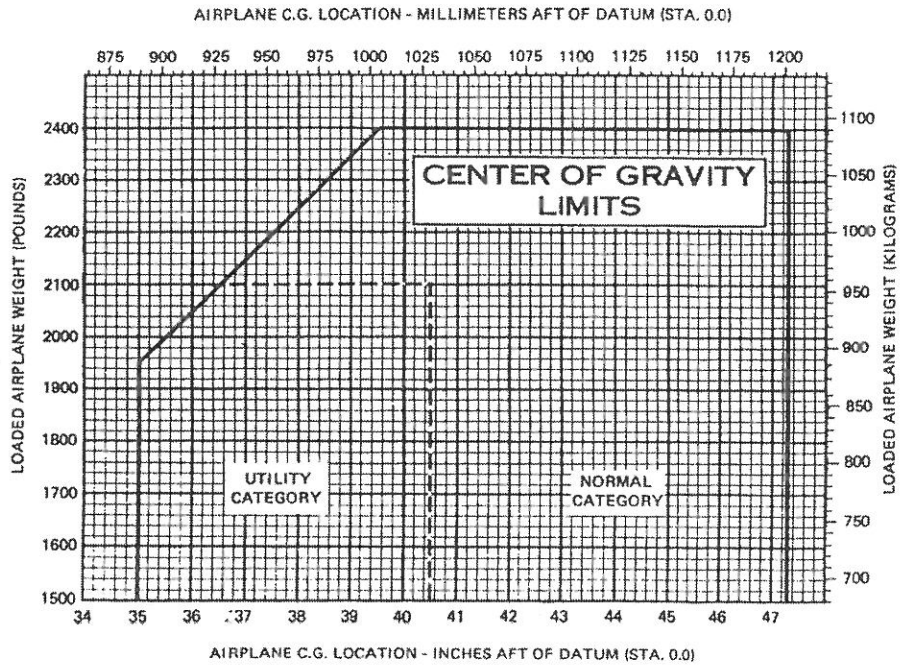

Figure 6-8. Center of Gravity Limits

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INSTRUCTIONS FOR INSTALLING

THE 0-320-D SERIES ENGINE IN THE CESSNA 172N

MODEL AIRCRAFT

PREFACE

These are the detailed instructions for installing the 0-320-D2J, D2G, or D1A 160 HP engine in the 1977 thru 1980 Cessna 172N Skyhawk aircraft.

Refer to AC 43.13-1A & 2A as a basis for approved data. The installing agency should procure or have available the current Textron Lycoming and 172 Cessna Parts and Service Manuals. These manuals are available through the Lycoming and Cessna distribution system. Refer to these manuals throughout the modification. Specific manufacturers part numbers are not specified in these instructions since they change periodically. Maintain and service the aircraft during and following the modification in accordance with the manufacturers instructions.

INSTRUCTIONS

1. Remove the 0-320-H2AD engine and propeller per the Cessna Service Manual.

2. Remove the necessary fittings from the 0-320-H2AD engine, inspect them and install them in the 0-320-D series engine.

3. Battery box relocation/modification on 28V airplanes will be required as part of this engine change in order to provide adequate box clearance from the left magneto. Paragraph 3 and subparts A thru C (8) refer to a non manifold vented battery. Subsequent paragraph 4 subpart A thru E will deal with a manifold vented type battery.

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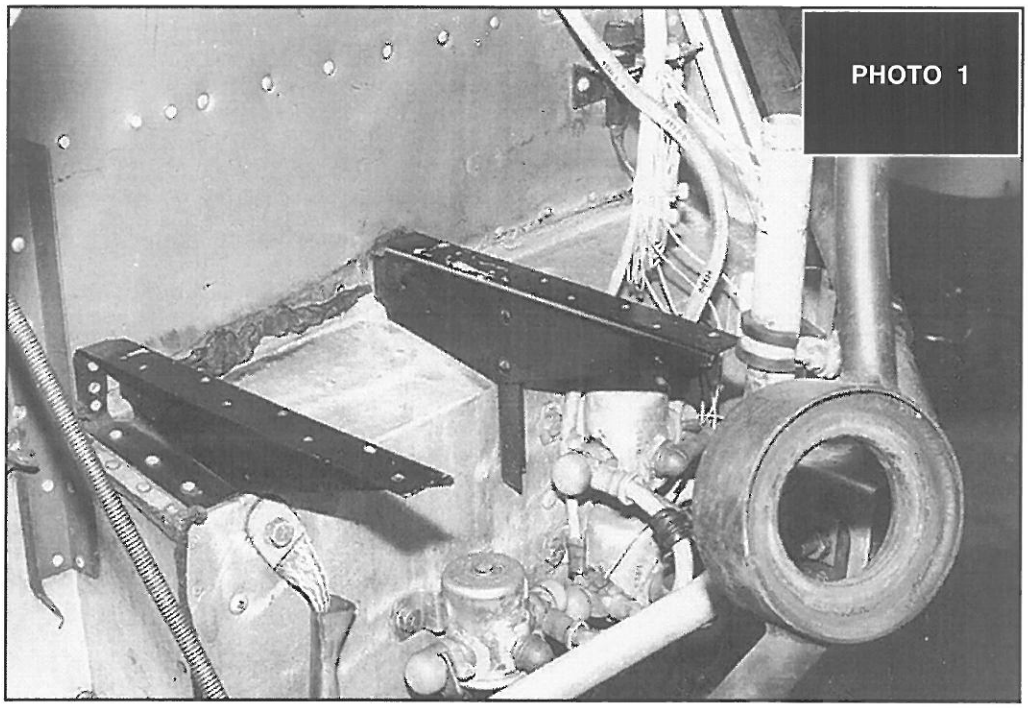
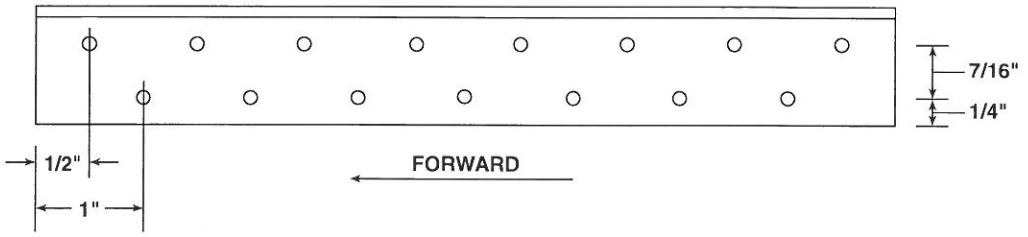
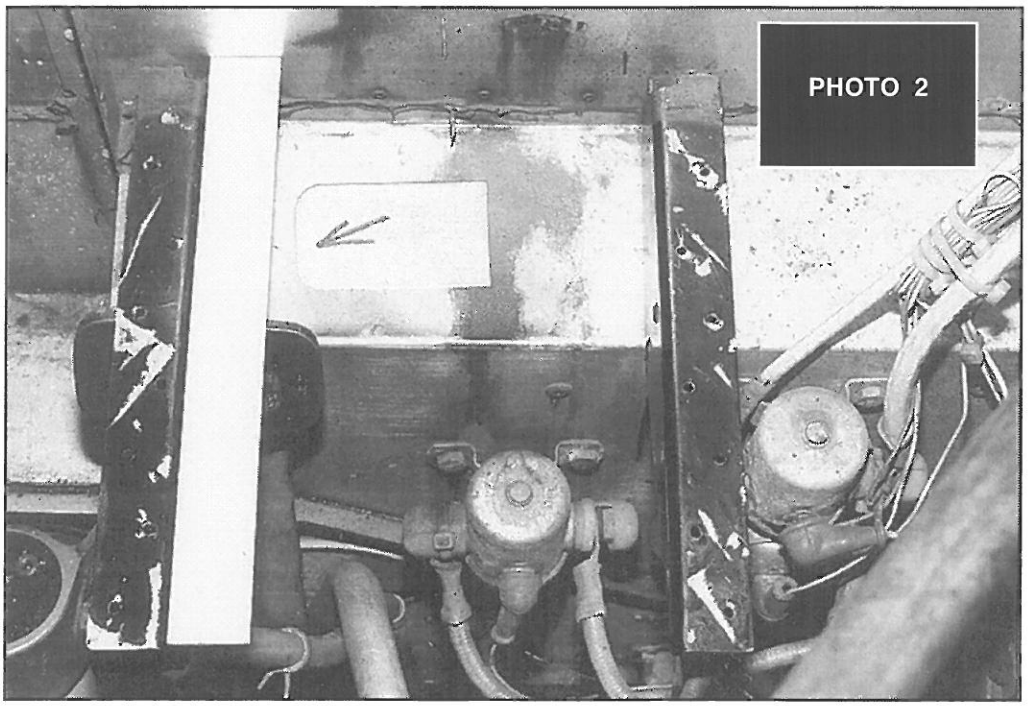
A. Remove the battery box from its mounting bracket. Reference Photo 1.



B. Fabricate or obtain a piece of .064-2024T3 aluminum angle 1" X 1" X 8" long and rivet it to the inboard side of the right mounting bracket, using 15 each AN470-AD-4-6 rivets. Double row one inch spacing. Reference Sketch (below) and Photo 2 (next page).

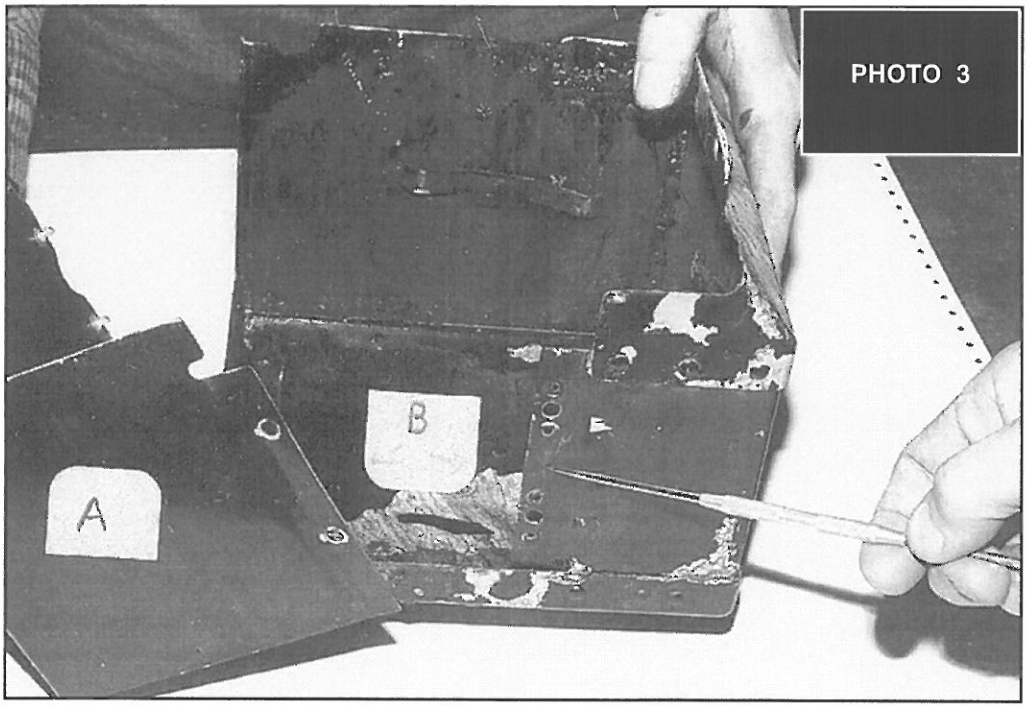


Top row shall have 8 rivets. First rivet shall be 1/2" aft of the forward end. The bottom row shall have 7 rivets with the first rivet 1" aft of the forward end. Rivet hole size shall be 0.1285 inch.

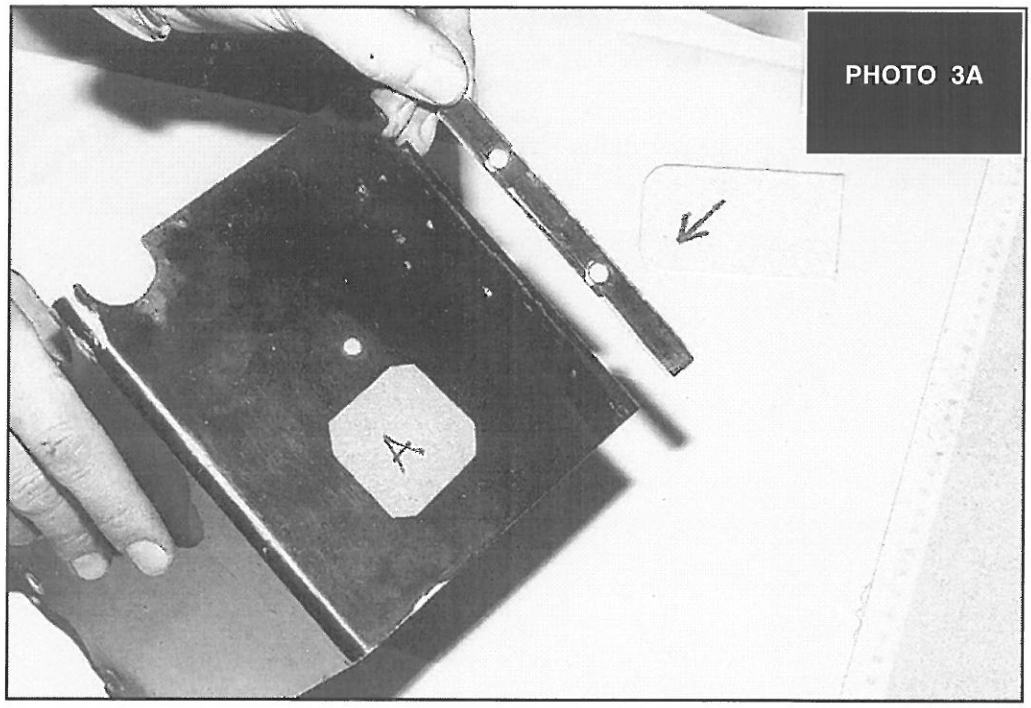


C. The battery box when relocated must fit flush against the firewall. To accomplish this take the following steps:

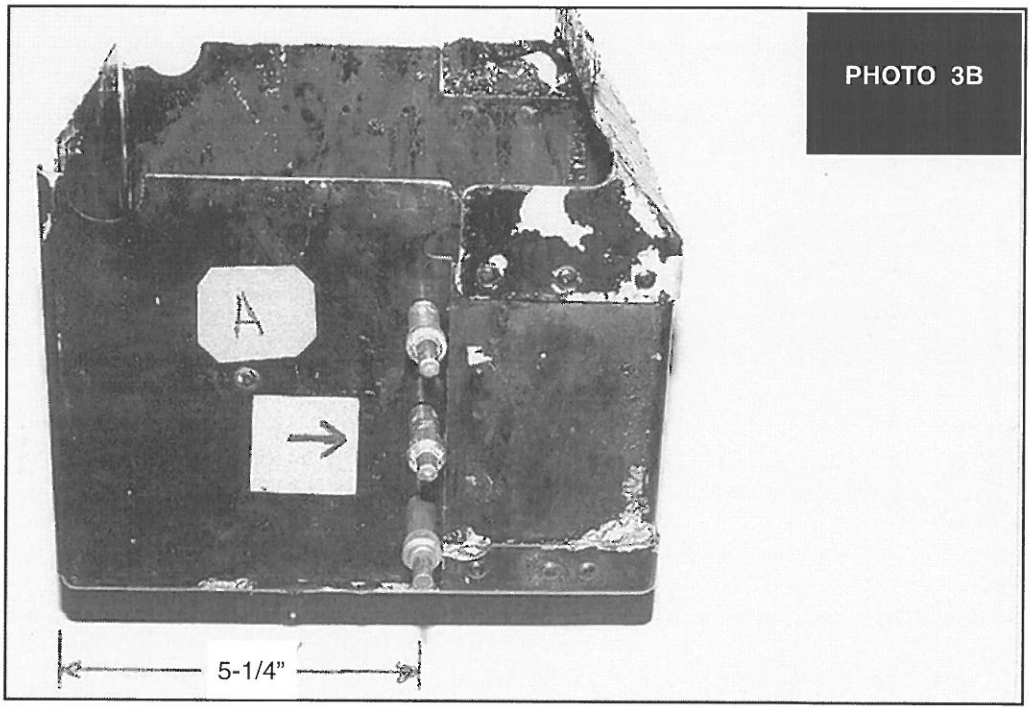
1. Separate sections A & B of the battery box and straight the two 90° tabs on the aft side. Reference Photo 3.



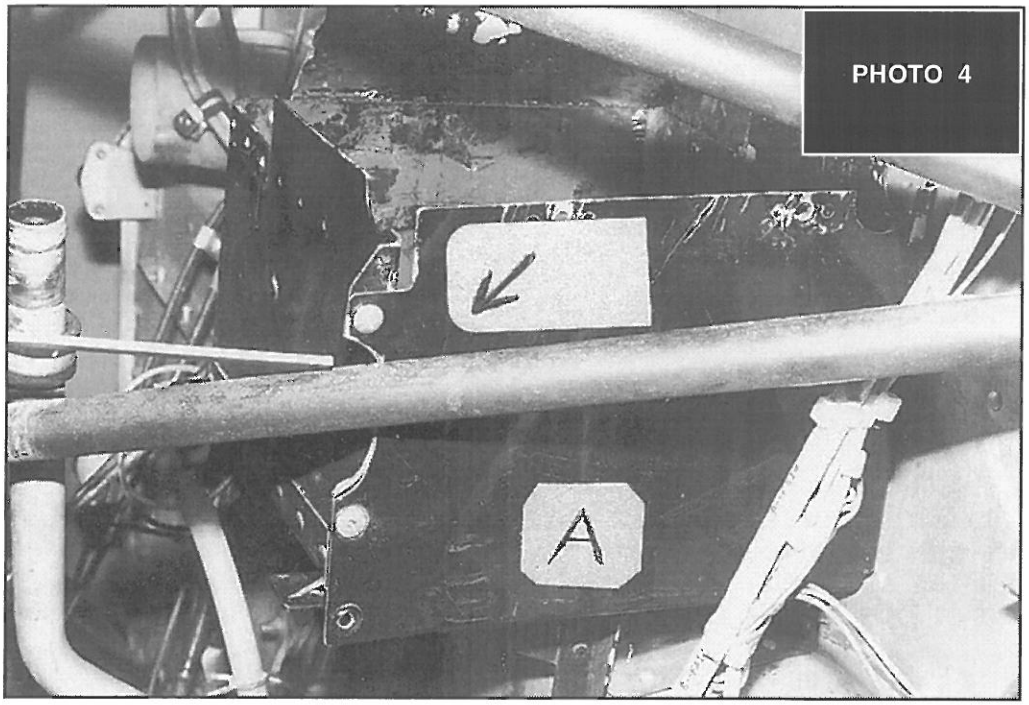
2. Cut off tab from Section A. Reference Photo 3A.



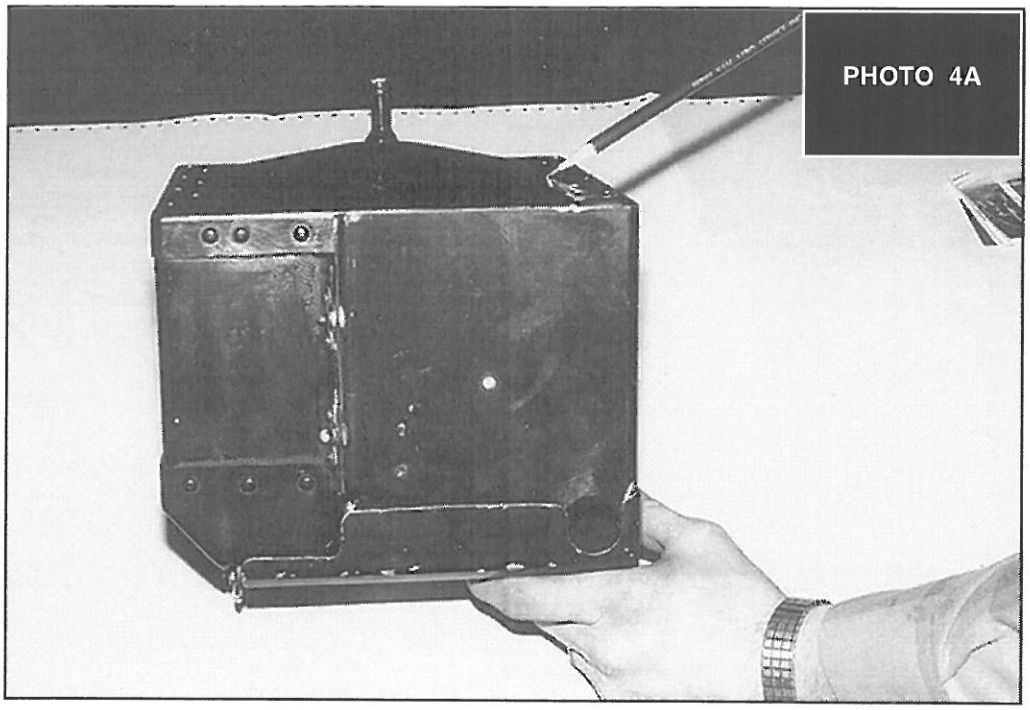
3. Reassemble Section A to Section B by riveting in the area of the remaining tab. Install 6 each AN470-AD-4-6 rivets. Rivet hole size shall be 0.1285 inch. Reference Photo 3B. The top rivet shall be 2.0" down from the top rim of the box. Rivet spacing shall be 5/8".



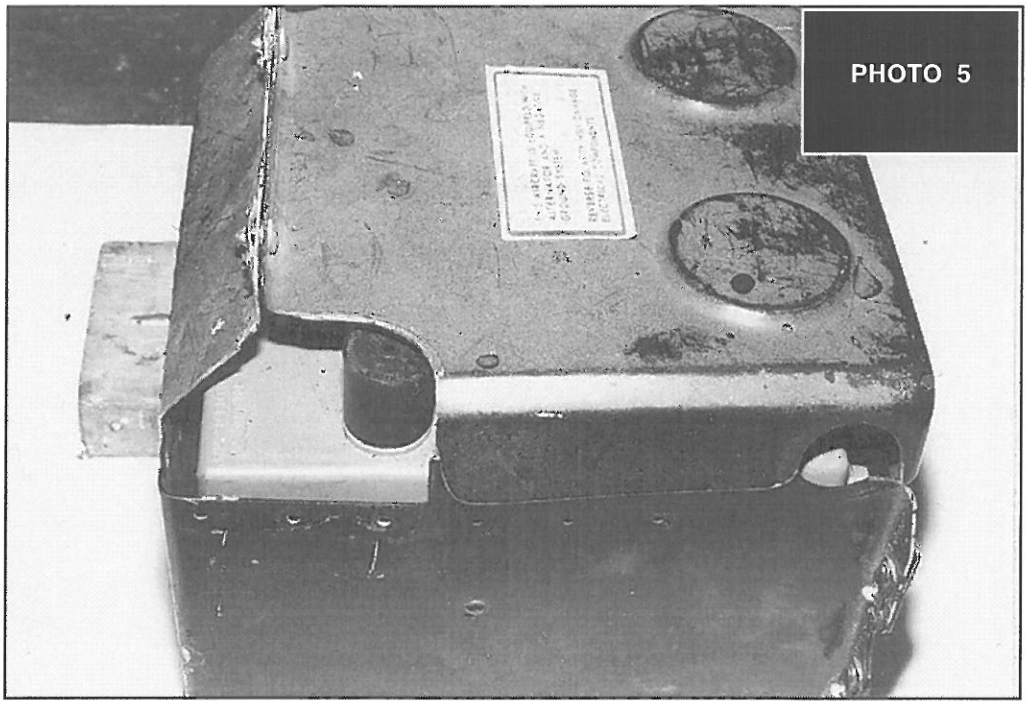
4. To facilitate moving the battery box one inch outboard, the left front portion of Section A must be trimmed to clear the diagonal engine mount tube. Approximate dimensions are 1" X 1/2" deep. Maintain 0.064 inch clearance between the box and the tube. Reference Photo 4.



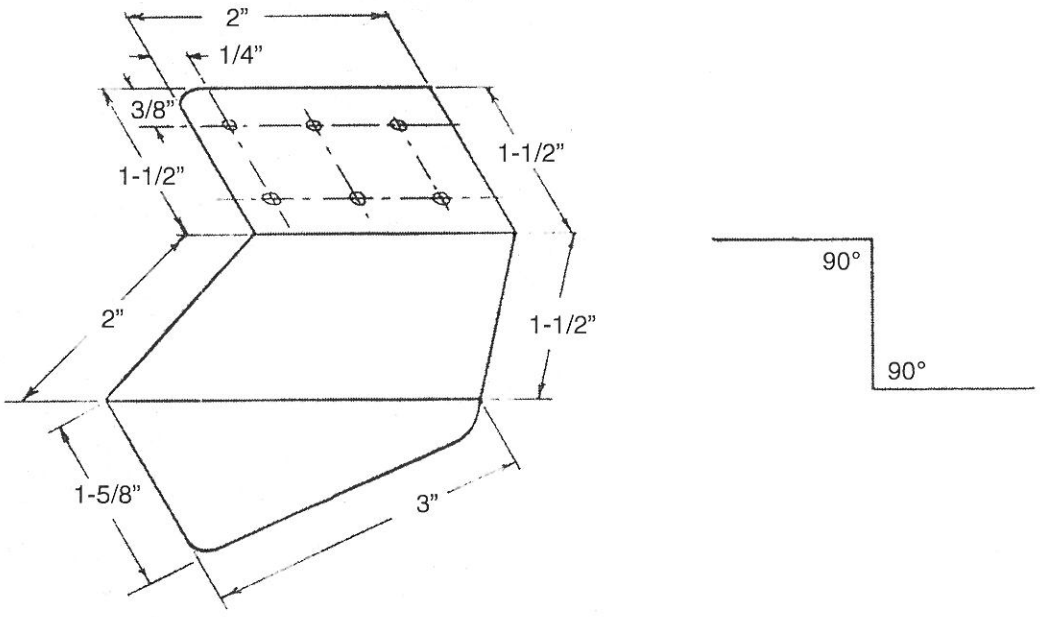
5. Since the box is being moved outboard by one inch, the outboard bottom section of the box will require flattening to provide a flat surface to attach to the outboard mounting bracket. The flattened area extends to the bottom center of the box by two and one-half (2-1/2") inches. Reference Photo 4A.



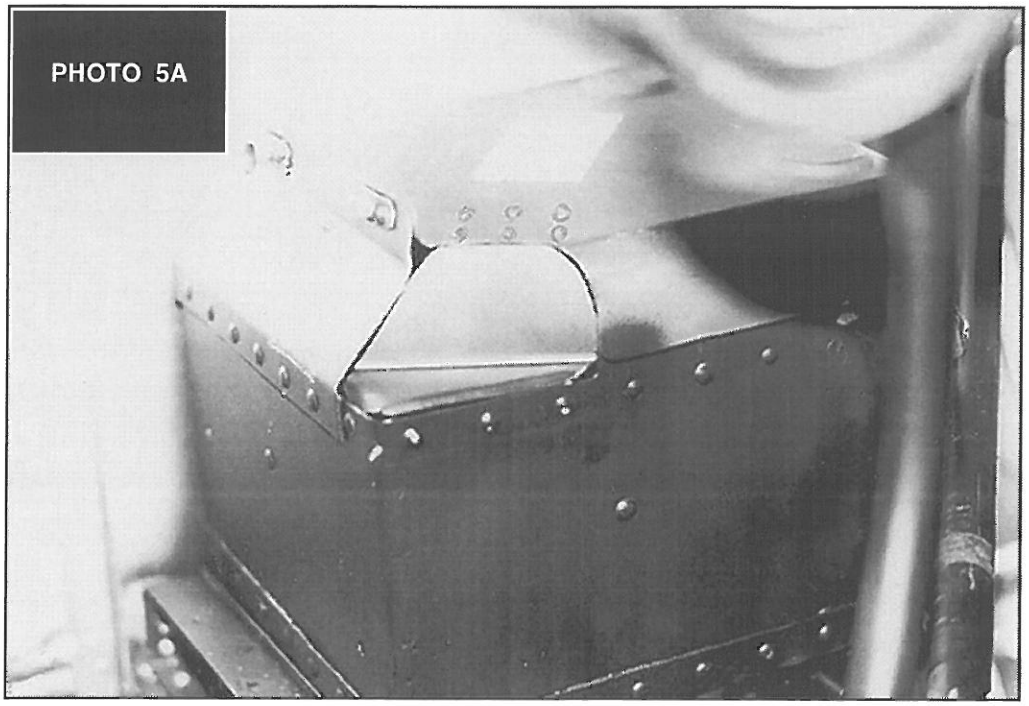
6. To insure adequate clearance for the left magneto, the right front corner of the battery box and box cover needs to be cut away. Reference Photo 5. Left mag should be retimed one tooth clockwise. It may be necessary to grind hold down clamp.



7. Make a cover from 0.032 - 2024T3 aluminum per the following sketch:



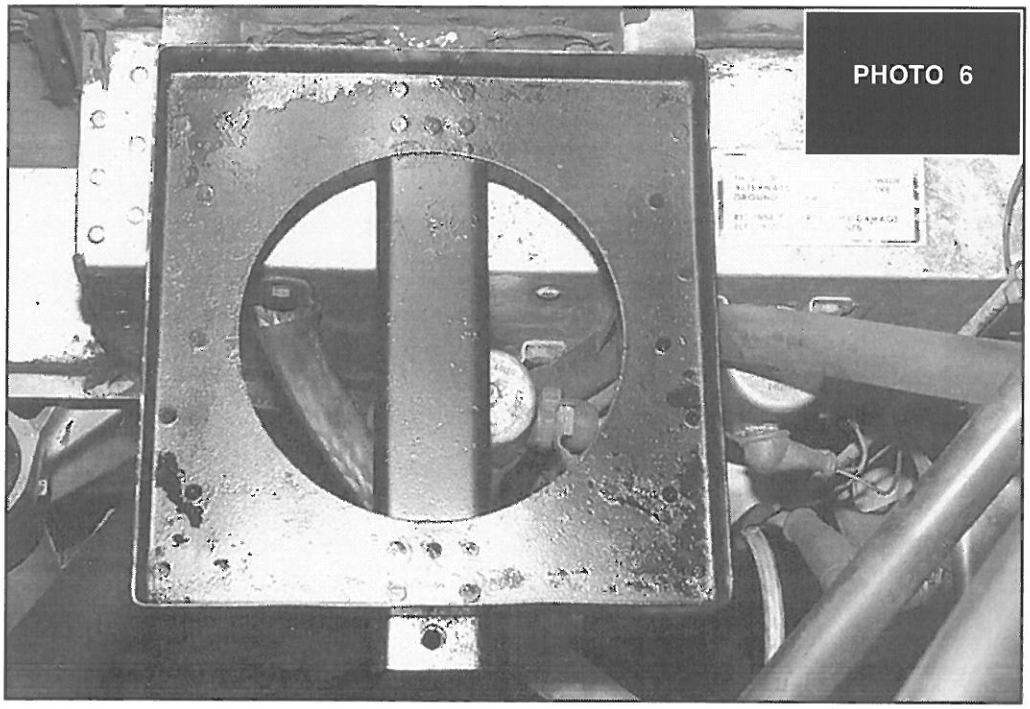
Both bends are 90°. Rivet it to the original battery cover using 6 each AN470-AD-4-4 rivets, two rows 3/4" spacing. First rivet to be 3/8" from top edge and 1/4" from end. All rivet hole sizes are to be 0.1285". Reference Photo 5A (next page) and Sketch (above).



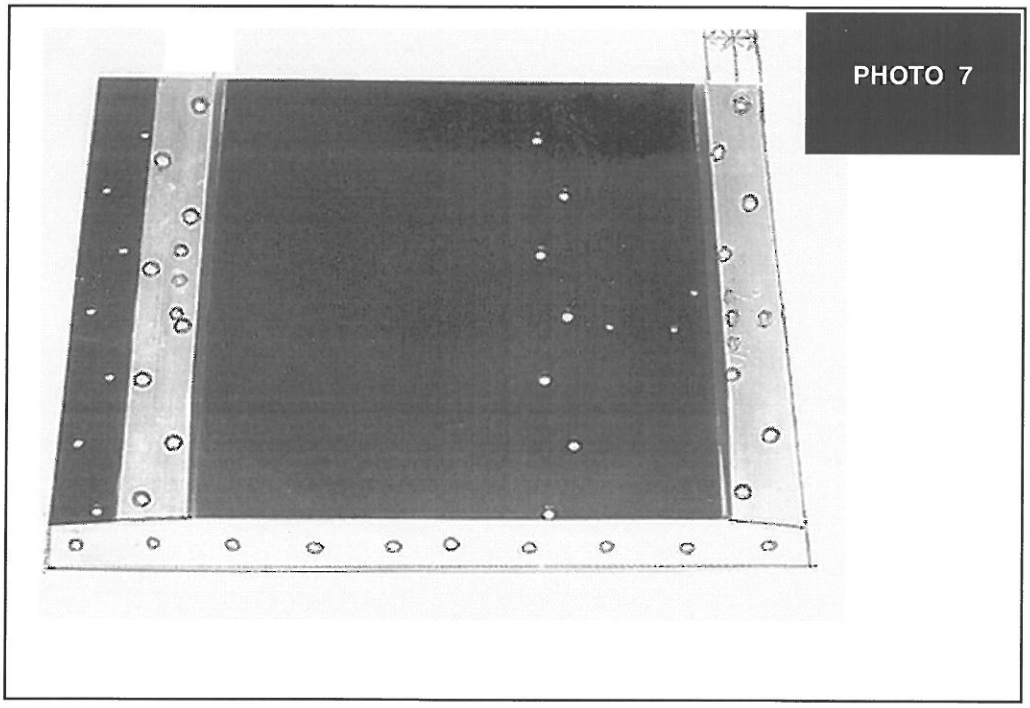
8. Reinstall the modified box on the mounting rackets locating it one inch (1) outboard to the right from its original location.

9. A manifold vented battery is installed in certain aircraft and does not utilize a separate battery box enclosure. However, it does require relocation.

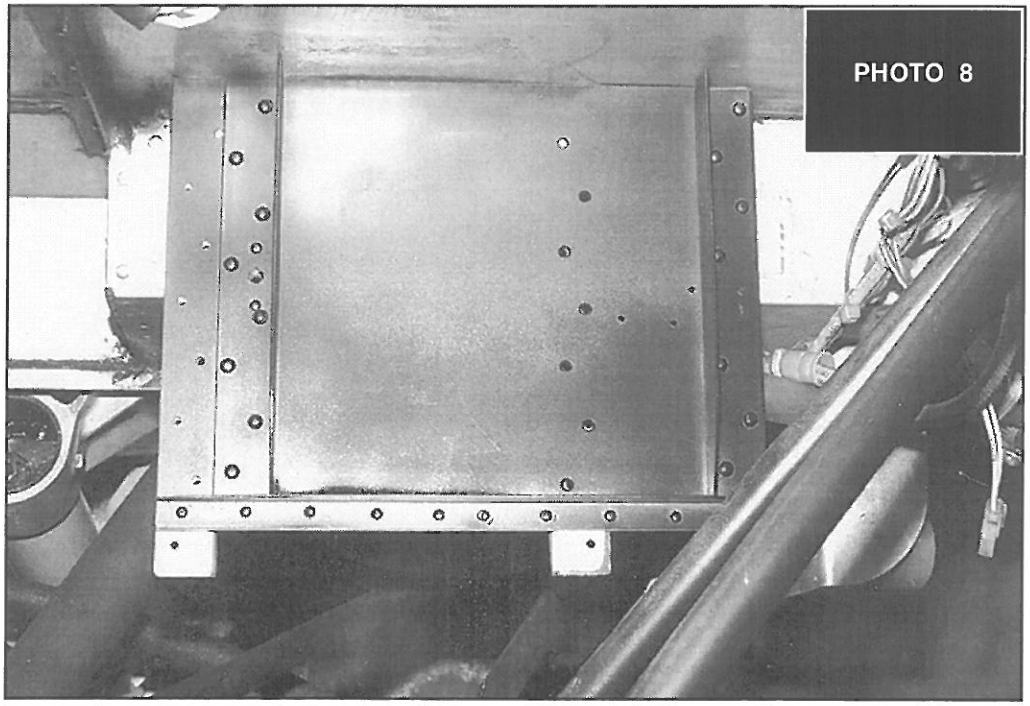
A. Remove the battery from its tray assembly. B. Remove the tray assembly from the firewall mounting brackets. Reference Photo 6.



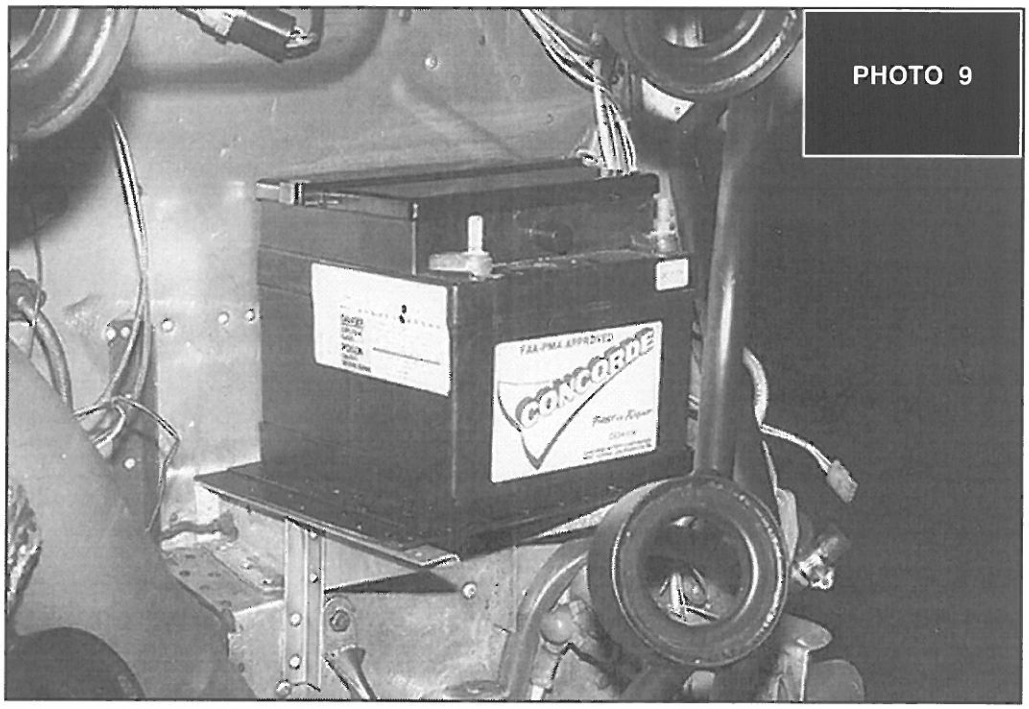
C. Fabricate a new battery tray from a piece of 2024-T3, 0.060 aluminum sheet 10-1/16" X 7-13/16". Using two (2) pieces of 1" X 7-15/16" 2024T3 X 0.063 aluminum angle and one (1) piece of 1/2" X 10-1/16" 2024T3 X 0.063 aluminum angle. The aluminum angles are riveted to the aluminum sheet to form an enclosure 7-1/8" wide X 7-5/16" deep for the base of the battery. The 1/2 front angle is to be installed with 10 rivets beginning 1/2" from one end and spacing the rivets 1" apart. Both side angles are installed using a double row pattern as illustrated. Rivet spacing is to be 2" alternate spacing as shown. First rivet is to begin 1/2" from the aft end of each angle. All rivets are to be AN470-AD-4-6. Rivet hole sizes are to be 0.1285 inches. Install anchor nut AN36. 6F-428B. Reference Photo 7.



D. Mount the new battery tray to the existing firewall mounting brackets. Note the new tray mounts flush with the right edge of the right firewall bracket and overlaps the left by approximately three (3) inches. Install AN426-AD-4-6 rivets using original rivet holes in the brackets. Reference Photo 8 (next page).



E. The battery is rotated 90° clockwise from its original position, is set in the new tray with terminals facing toward the nose and secured using original hold down bolts threaded into anchor nuts on either end of the new tray. Reference Photo 9.



5. Install the O-320-D series engine on the existing tubular mount per Cessna 172P, Parts and Service Manual S/N 17274010 and up.

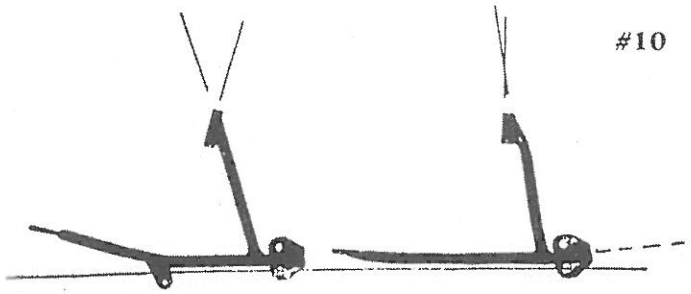
6. Oil coolers on the N model aircraft were originally mounted on the firewall. Later N models had the cooler mounted on the right rear baffle. We require the cooler to be mounted on the firewall if it isn't already. Clearance is required for the dip stick. Baffle cracking will be eliminated and the cooler is subject to less vibration. If you relocate the cooler a new 0550334-1 duct will be required. Install new ½" oil hoses.

The rear engine baffle from the "H" engine can be modified to fit around the crankcase of the D series engine. Replacement baffling may also be fabricated. However, it must conform to Cessna dimensions and material specifications.

7. The top cowling must be modified by relocating the oil filler/fuel sump drain access door. Remove the door and hinge assembly from its present location. Fabricate and install a flush patch at the old location. Reinstall the door and hinge assembly in its new location as shown on drawing #1723. Relocate the fuel sump drain actuator so it may be operated through the access door.

8. If the engine that you are installing has only one impulse mag on the left side, the 172 N ignition switch must be modified to ground the right mag during engine starting. Remove the switch retainer that secures the switch to the instrument panel. Remove the switch and let it hang below the panel. Remove the protective cover to expose the wire terminal "R" to terminal labeled "GRD" that is located next to terminal "R". Using an ohm meter at the mag end of the "P" leads, test the leads before connecting them to the mags. Insure that the switch functions properly and that the right mag grounds when the ignition switch is in the "start" position. Reinstall the protective cover on the switch and reinstall it in the panel.

9. The throttle bracket from the H2AD engine must be reformed to provide adequate clearance from the mixture control and to fit the contour of the D series engine sump. The bracket can be "cold" formed when removed from the engine or heated and formed on the engine. Caution is advised when using the torch near the engine. The horizontal leg is reformed as nearly as possible into a straight leg. Straightening the horizontal leg will allow the vertical leg to clear the aft face of the sump. The angle of the tube at the end of the vertical leg will also need to be changed to align with the mounting bolt hole in the sump flange. Ref. Photo #10.



10. Flap travel is limited to 30° maximum + 0°, 2° by adjusting the flap down limit switch in the right wing. Follow the instructions for adjusting the flaps as directed in the current Cessna Service Manual.

Install a placard adjustment to the flap position selector switch on the instrument panel. Placard must read "Maximum Flap Travel is 30°".

11. The aircraft must be equipped with a 5.00 X 5, 6 ply nose wheel tire. Most 172's already have 6 ply tires. Inspect the nose tire to insure that a 6 ply tire is installed. If it doesn't have one, replace the nose tire with a 5.00 X 5, 6 ply tire in accordance with the maintenance manual.

12. A major repair and alteration form 337 should be completed and contain the following statement:

This aircraft has been modified by removing the original O-320-H2AD engine and installing an O-320-D series engine. See instructions contained in the aircraft records for work performed. All work completed in accordance with the STC instructions, AC43, 13-1A and the manufacturer's current manuals and instructions. Aircraft take-off gross weight increased to 2400 lbs.

13. The moment and the weight of the O-320-H2AD engine that is being removed is -19.7" forward of the datum (firewall) and 253 pounds respectively.

The O-320-D1A and D2J both weigh 255 pounds. The O-320-D2G weighs 251 pounds. (Ref. TCDS)

Complete new weight at a balance computations and record the data in the aircraft records.

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14. For 172N model aircraft S/N's 17267585 thru 17271034, install the Supplemental Airplane Flight Manual in the aircraft.

For 172N model aircraft S/N's 17271035 thru 17274009, install the Supplement to the Pilots Operating Handbook and the FAA Approved Flight Manual.

15. Make appropriate log book entries.

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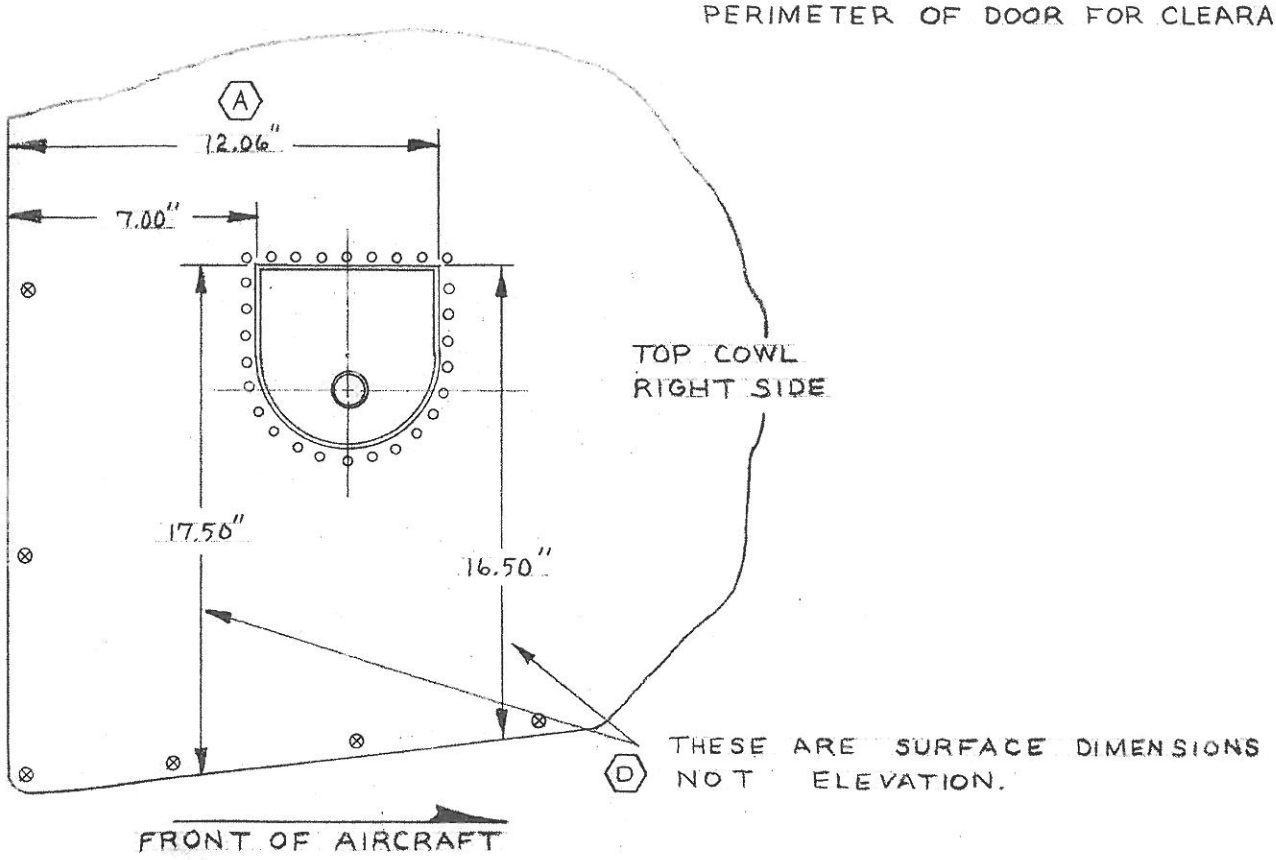
REMOVE EXISTING DOOR ASSEMBLY.
USE REINFORCING PLATE AS REMOVED FOR A TEMPLATE TO PROVIDE ORIGINAL RIVIT SPACING. INSTALL MS20426AD-4-4 RIVETS AS REQUIRED.
REF. 43.13-1A SECTION 3.

RELOCATE DOOR AS SHOWN. TRACE AROUND DOOR TO OBTAIN OPENING SIZE. ALLOW 1/32" GAP AROUND PERIMETER OF DOOR FOR CLEARANCE.



REVISION INDEX.			
REV.	DESCRIPTION:	DATE.	INT.
A	ADDITION OF 12.06" DIMENSION FOR LOCATION OF OIL DOOR.	11-84	SAS
B	CHANGED DRAWING FROM HALF TO QUARTER SCALE.	1-86	SAS
C	CLARIFIED TITLE OF DRAWING.	1-86	SAS
D	NOTE ADDED FOR CLARIFICATION.	1-86	SAS
E			

PENN YAN AERO SERVICE INC.	
CESSNA 172N MODEL ONLY.	
RELOCATION OF OIL DOOR.	
SCALE = QUARTER	PAGE 1 OF 1.
TOLERANCE .03/2"	DRAWING # 1723
BY: STEVEN A. SMART	DATE 5-16-83

DH 65/34 08