AirPlains Is Power

FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT

DOCUMENT 172059

FOR

CESSNA 172R

S/N 17280290 **REG.** C-GCVO

This supplement must be attached to the FAA Approved Airplane Flight Manual when **STC SA2196CE**, which increases the gross weight to **2550** lbs and **STC SA4428SW**, which installs an IO-360 Lycoming 180 HP engine, are installed.

The information contained herein supplements the information of the basic Airplane Flight Manual. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: _____

for Ronald K. Rathgeber
Manager,
Wichita Aircraft Certification Office
FAA Central Region
Wichita, KS
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ORIGINAL Attached in AC Area 29/04

LOG OF REVISIONS

REV	PAGE	DESCRIPTION	APPROVED	DATE
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2	Cover	Added Logo	[signature]	4/12/04
	31	Tire Pressure Info Section 8		
	4 -9, 16	Changed Utility Category Wt.		

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SECTION 2: LIMITATIONS

AIRSPEED LIMITATIONS

VNE	Never Exceed Speed	160 KCAS	163 KIAS
VNO	Maximum Structural Cruising	126 KCAS	129 KIAS
VA	Maneuvering Speed		
	2550 Lbs.	102 KCAS	105 KIAS
	2150 Lbs.	95 KCAS	98 KIAS
	1900 Lbs.	88 KCAS	90 KIAS
VFE	Maximum Flap Extended Speed		
	10° Flaps	107 KCAS	110 KIAS
	10° to 30° Flaps	85 KCAS	85 KIAS
Maximum Window Open Speed		160 KCAS	163 KIAS

AIRSPEED INDICATOR MARKINGS

White Arc	40 - 85 KIAS
Green Arc	48 - 129 KIAS
Yellow Arc	129 - 163 KIAS
Red Line	163 KIAS

POWERPLANT LIMITATIONS

Engine Manufacturer: Textron Lycoming.
Engine Model Number: IO-360-L2A
Maximum Power: 180 BHP rating
Engine Operating Limits for Takeoff and Continuous Operations:
Maximum Engine Speed ..... 2700 RPM

Note

The static RPM range at full throttle is 2250 - 2400 RPM

Maximum Oil Temperature ..... 245°F (118°C).
Oil Pressure, ... Minimum ..... 20 PSI
Maximum ..... 115 PSI
Fuel Grade: See Fuel Limitations.
Oil Grade (Specification): Mil-L-8082 Aviation Grade Straight Mineral Oil
Or Mil-L-22851 Ashless Dispersant Oil.

Propeller Manufacturer: McCauley Accessory Division.
Propeller Model: 1A170/CFA7660
Propeller Diameter: 76 inches.

Propeller Manufacturer: McCauley Accessory Division.
Propeller Model: 1A170/JFA7658
Propeller Diameter: 76 inches.

POWERPLANT INSTRUMENT MARKINGS

Tachometer
- Green Arc (Normal Operating) ..... 2100 - 2700 RPM
- Red Line (Maximum) ..... 2700 RPM

Oil Temperature
- Green Arc (Normal Operating) ..... 100° to 245° F
- Red Line (Maximum) ..... 245° F

Oil Pressure
- Red Line (Minimum) ..... 20 PSI
- Green Arc (Normal Operating) ..... 50 to 90 PSI
- Red Line (Maximum) ..... 115 PSI

Fuel Quantity
- Red Line (Minimum) ..... 0 (1.5 Gal Unusable Each Tank)

Fuel Flow
- Green Arc (Normal Operating) ..... 0 to 11 GPH

Suction Gage
- Green Arc (Normal Operating) ..... 4.5 to 5.5 In. Hg.

WEIGHT LIMITS

Normal Category
- Maximum Ramp Weight ..... 2558 lbs.
- Maximum Takeoff Weight ..... 2550 lbs.
- Maximum Landing Weight ..... 2550 lbs.
- Maximum Weight in Baggage Compartment
  - Baggage Area 1 - Station 82 to 108: ..... 120 lbs.
  - Baggage Area 2 - Station 108 to 142: ..... 50 lbs.

Note

The maximum combined weight capacity for baggage areas 1 and 2 is 120 lbs.

Utility Category
- Maximum Ramp Weight ..... 2108 lbs.
- Maximum Takeoff Weight ..... 2100 lbs.
- Maximum Landing Weight ..... 2100 lbs.
- Maximum Weight in Baggage Compartment:
  - In the utility category, the baggage compartment must be empty and rear seat must not be occupied.

CENTER OF GRAVITY LIMITS

Normal Category

Center of Gravity Range

Forward: 35.0 inches aft of the datum at 1950 lbs or less, with straight line variation to 41.0 inches aft of datum at 2550 lbs.

Aft: 47.3 inches aft of datum at all weights.

Reference Datum: Lower portion of front face of firewall.

Utility Category

Center of Gravity Range

Forward: 35.0 inches aft of the datum at 1950 lbs or less, with straight line variation to 37.5 inches aft of datum at 2100 lbs.

Aft: 40.5 inches aft of datum at all weights.

Reference Datum: Lower portion of front face of firewall.

FLIGHT LOAD FACTOR LIMITS

Normal Category

Flight Load Factors (Maximum Takeoff Weight - 2550 lbs.):

*Flaps Up:..... +3.8g, -1.52g

*Flaps Down: ..... +3.0g

Utility Category

Flight Load Factors (Maximum Takeoff Weight - 2100 lbs.):

*Flaps Up:..... +4.4g, -1.76g

*Flaps Down: ..... +3.0g

*The design load factors are 150% of the above, and all cases, the structure meets or exceeds design loads

PLACARDS

The following placard is changed from the original Flight Manual

9. Near Airspeed indicator:

Maneuvering Speed - 105 KIAS

SECTION 3: EMERGENCY PROCEDURES

AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure After Takeoff:
- Wing Flaps Up ..... 70 KIAS
- Wing Flaps Down: ..... 65 KIAS

Maneuvering Speed:
- 2550 lbs: ..... 105 KIAS
- 2150 lbs: ..... 98 KIAS
- 1900 lbs ..... 90 KIAS

Maximum Glide: ..... 68 KIAS

Precautionary Landing with Engine Power ..... 65 KIAS

Landing Without Engine Power
- Wing Flaps Up: ..... 70 KIAS
- Wing Flaps Down: ..... 65 KIAS

EMERGENCY PROCEDURES CHECKLIST

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF

1. Throttle - - IDLE
2. Brakes - - APPLY
3. Wing Flaps - - RETRACT
4. Mixture - - IDLE CUT OFF
5. Ignition Switch - - OFF
6. Master Switch - - OFF

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Airspeed - - 70 KIAS (flaps UP)
   65 KIAS (flaps DOWN)
2. Mixture - - IDLE CUT OFF
3. Fuel Shutoff Valve - - OFF (Pull Full Out)
4. Ignition Switch - - OFF
5. Wing Flaps - - AS REQUIRED
6. Master Switch - - OFF
7. Cabin Door - - UNLATCH
8. Land - - STRAIGHT AHEAD

ENGINE FAILURE DURING FLIGHT (Restart Procedures)

1. Airspeed -- 68 KIAS.
2. Alternate Air -- ON (pull control full out).
3. Fuel Shutoff Valve -- ON (push full in).
4. Fuel Selector Valve -- BOTH.
5. Auxiliary Fuel Pump Switch -- ON.
6. Mixture -- RICH (if restart has not occurred).
7. Ignition Switch -- BOTH (or START if propeller is stopped

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

1. Passenger Seat Backs - - MOST UPRIGHT POSITION
2. Seats and Seat Belts - - SECURE
3. Airspeed - - 70 KIAS (flaps UP)
   65 KIAS (flaps DOWN)
4. Mixture - - IDLE CUT OFF
5. Fuel Shutoff Valve - - OFF (Pull Full Out)
6. Ignition Switch - - OFF
7. Wing Flaps - - AS REQUIRED (30° recommended)
8. Master Switch - - OFF (when landing is assured)
9. Doors - - UNLATCH PRIOR TO TOUCHDOWN
10. Touchdown - - SLIGHTLY TAIL LOW
11. Brakes - - APPLY HEAVILY

PRECAUTIONARY LANDING WITH ENGINE POWER

1. Passenger Seat Backs - - MOST UPRIGHT POSITION
2. Seats and Seat Belts - - SECURE
3. Airspeed - - 65 KIAS
4. Wing Flaps - - 20°
5. Selected Field - - FLY OVER, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
6. Avionics Master Switch and Electrical Switches - - OFF
7. Wing Flaps - - 30° (on final approach)
8. Airspeed - - 65 KIAS
9. Master Switch - - OFF
10. Doors - - UNLATCH PRIOR TO TOUCHDOWN
11. Touchdown - - SLIGHTLY TAIL LOW
12. Ignition Switch - - OFF
13. Brakes - - APPLY HEAVILY

DITCHING

1. Radio - - TRANSMIT MAYDAY on 121.5 MHz, giving location and intentions and SQUAWK 7700
2. Heavy Objects (in baggage area) - - SECURE OR JETTISON (if possible)
3. Passenger Seat Backs - - MOST UPRIGHT POSITION
4. Seats and Seat Belts - - SECURE
5. Wing Flaps - - 20° to 30°
6. Power - - ESTABLISH 300 FT/MIN DESCENT AT 55 KIAS

NOTE

If no power is available, approach at 70 KIAS with flaps up or at 65 KIAS with 10° flaps.

7. Approach - - High Winds, Heavy Seas - - INTO THE WIND
   Light Winds, Heavy Swells - - PARALLEL TO SWELLS
8. Cabin Doors - - UNLATCH
9. Touchdown - - LEVEL ATTITUDE AT ESTABLISHED RATE OF DESCENT
10. Face - - CUSHION at touchdown with folded coat
11. ELT - - Activate
12. Airplane - - EVACUATE through cabin doors. If necessary, open window and flood cabin to equalize pressure so doors can be opened
13. Life Vests and Raft - - INFLATE WHEN CLEAR OF AIRPLANE

FIRES

DURING START ON GROUND

1. Cranking - - CONTINUE to get a start which would suck the flames and accumulated fuel into the engine
2. IF ENGINE STARTS:
3. Power - - 1800 RPM for a few minutes
4. Engine - - SHUTDOWN and inspect for damage
5. IF ENGINE FAILS TO START:
6. Throttle - - FULL OPEN
7. Mixture - - IDLE CUT OFF
8. Cranking - - CONTINUE
9. Fuel Shutoff Valve - - OFF (Pull Full Out)
10. Auxiliary Fuel Pump - - OFF
11. Fire Extinguisher - - ACTIVATE
12. Engine - - SECURE
    a. Master Switch - - OFF
    b. Ignition Switch - - OFF
13. Parking Brake - - RELEASE
14. Airplane - - EVACUATE
15. Fire - - EXTINGUISH using fire extinguisher, wool blanket, or dirt
16. Fire Damage - - INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

ENGINE FIRE IN FLIGHT

1. Mixture - - IDLE CUT OFF
2. Fuel Shutoff Valve - - PULL OUT (OFF)
3. Auxiliary Fuel Pump Switch - - OFF
4. Master Switch - - OFF
5. Cabin Heat and Air - - OFF (except overhead vents)
6. Airspeed - - 100 KIAS (if fire is not extinguished, increase glide speed to find an airspeed - within airspeed limitations - which will provide an incombustible mixture)
7. Forced Landing - - EXECUTE (as described in Emergency Landing Without Engine Power)

ELECTRICAL FIRE IN FLIGHT

1. Master Switch - - OFF
2. Vents, Cabin Air, Heat - - CLOSED
3. Fire Extinguisher - - ACTIVATE
4. Avionics Master Switch - - OFF
5. All Other Switches (except ignition switch) - - OFF

WARNING

AFTER DISCHARGING FIRE EXTINGUISHER AND ASCERTAINING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN.

6. Vents/Cabin Air/Heat - - OPEN when it is ascertained that fire is completely extinguished

If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing area:

7. Master Switch - - ON
8. Circuit Breakers - - CHECK for faulty circuit, do not reset
9. Radio Switches - - OFF
10. Avionics Master Switch - - ON
11. Radio/Electrical Switches - - ON one at a time, with delay after each until short circuit is localized

CABIN FIRE

1. Master Switch - - OFF
2. Vents/Cabin Air/Heat - - CLOSED (to avoid drafts)
3. Fire Extinguisher - - ACTIVATE

WARNING

AFTER DISCHARGING FIRE EXTINGUISHER AND ASCERTAINING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN

4. Vents/Cabin Air/Heat - - Open when it is ascertained that fire is completely extinguished
5. Land the airplane as soon as possible to inspect for damage

WING FIRE

1. Landing/Taxi Light Switches - - OFF
2. Navigation Light Switch - - OFF
3. Strobe Light Switch - - OFF
4. Pitot Heat Switch - - OFF

NOTE

Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

ICING

INADVERTENT ICING ENCOUNTER

1. Turn pitot heat switch ON.
2. Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.
3. Pull cabin heat control full out and open defroster outlets to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
4. Open the throttle to increase engine speed and minimize ice buildup on the propeller blades.
5. Watch for signs of induction icing and apply alternate air as required. An unexplained loss in engine speed could be caused by induction system ice or air intake filter ice. Lean the mixture for maximum RPM if alternate air is used continuously.
6. Plan a landing at the nearest airport. With an extremely rapid ice build up select a suitable off airport landing site.
7. With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for significantly higher stall speed.
8. Leave wing flaps retracted. With a severe ice build up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
9. Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
10. Perform a landing approach using a forward slip, if necessary, for improved visibility.
11. Approach at 65 to 75 KIAS depending upon the amount of accumulation.
12. Perform a landing in level attitude.

STATIC SOURCE BLOCKAGE
(Erroneous Instrument Reading Suspected)

1. Static Pressure Alternate Source Valve - - PULL ON
2. Airspeed - - Consult appropriate calibration tables in Section 5

LANDING WITH A FLAT MAIN TIRE

1. Approach - - NORMAL
2. Wing Flaps - -30°
3. Touchdown - - GOOD MAIN TIRE FIRST, hold airplane off flat tire as long as possible, with aileron control
4. Directional Control - - Maintain using brake on good wheel as required

LANDING WITH A FLAT NOSE TIRE

1. Approach - - NORMAL
2. Flaps - - AS REQUIRED
3. Touchdown - - ON MAINS, hold nose wheel off the ground as long as possible
4. When nose wheel touches down, maintain full up elevator as airplane slows to stop

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

AMMETER SHOWS EXCESSIVE RATE OF CHARGE

(Full Scale Deflection)

1. Alternator - - OFF

CAUTION

WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25° MAY OCCUR.

1. Nonessential Electrical Equipment - - OFF
2. Flight - - TERMINATE as soon as practical

LOW VOLTAGE ANNUNCIATOR (VOLTS) ILLUMINATES DURING FLIGHT

(Ammeter Indicate Discharge)

NOTE

Illumination of 'VOLTS' on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM. The master switch need not be recycled since an over voltage condition has not occurred to deactivate the alternator system.

1. Avionics Master Switch - - OFF
2. Alternator Circuit Breaker - - CHECK IN
3. Master Switch - - OFF (both sides)
4. Master Switch - - ON
5. Low Voltage Annunciator - - CHECK OFF
6. Avionics Master Switch - - ON

If low voltage light illuminates again:

Alternator - - OFF

CAUTION

WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25° MAY OCCUR.

7. Nonessential Radio and Electrical Equipment - - OFF
8. Flight - - TERMINATE as soon as practical

VACUUM SYSTEM FAILURE

Left Vacuum or Right Vacuum Annunciator Light (L VAC R) illuminates.

CAUTION

IF VACUUM IS NOT WITHIN NORMAL OPERATING LIMITS, A FAILURE HAS OCCURRED IN THE VACUUM SYSTEM AND PARTIAL PANEL PROCEDURES MAY BE REQUIRED FOR CONTINUED FLIGHT.

1. Suction Gage - - CHECK to ensure vacuum within normal operating limits.

AMPLIFIED EMERGENCY PROCEDURES

ROUGH ENGINE OPERATION OR LOSS OF POWER

Induction System Icing

A gradual loss of RPM and eventual engine roughness may result from the formation of ice at the inlet to the fuel injector or on the air filter. To clear the ice, apply full throttle and pull the alternate air control knob (heated air) full out until the engine runs smoothly; then return the alternate air control to the full in position and readjust the throttle. If conditions require the continued use of alternate air in cruise flight, use the full amount of alternate air to prevent ice from forming and lean the mixture for the smoothest engine operation.

SECTION 4: NORMAL PROCEDURES

AIRSPEEDS FOR NORMAL OPERATION

Takeoff:
- Normal Climb Out ..... 75 - 85 KIAS
- Short Field Takeoff, Flaps 10°, Speed at 50 Feet.... 56 KIAS

Enroute Climb, Flaps UP:
- Normal, Sea Level ..... 75 - 85 KIAS
- Normal, 10,000 Feet..... 70 - 80 KIAS
- Best Rate-of-Climb, Sea Level ..... 74 KIAS
- Best Rate-of-Climb, 10,000 Feet ..... 72 KIAS
- Best Angle-of-Climb, Sea Level..... 62 KIAS
- Best Angle-of-Climb, 10,000 Feet..... 67 KIAS

Landing Approach:
- Normal Approach, Flaps Up ..... 65 - 75 KIAS
- Normal Approach, Flaps 30°..... 60 - 70 KIAS
- Short Field Approach, Flaps 30° ..... 61 KIAS

Balked Landing:
- Maximum Power, Flaps 20° ..... 60 KIAS

Maximum Recommended Turbulent Air Penetration Speed:
- 2550 Lbs..... 105 KIAS
- 2150 Lbs..... 98 KIAS
- 1900 Lbs..... 90 KIAS

Maximum Demonstrated Crosswind Velocity:
- Takeoff or Landing..... 15 Knots

CHECKLIST PROCEDURES

STARTING ENGINE (With Battery)

1. Alternate Air - OFF.
2. Throttle - OPEN 1/4 INCH.
3. Mixture - IDLE CUT OFF.
4. Propeller Area - CLEAR.
5. Master Switch - ON.
6. Auxiliary Fuel Pump Switch -- ON.
7. Mixture - ADVANCE to obtain 3 to 5 GPH fuel flow, then return to IDLE CUT OFF position.

NOTE

If engine is warm, omit priming procedure of step 7 above.

8. Ignition Switch - START (release when engine starts).
9. Mixture - ADVANCE smoothly to RICH when engine fires.

NOTE

If engine floods, turn off auxiliary fuel pump, place mixture in idle cut off, open throttle 1/2 to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly.

10. Oil Pressure - CHECK.
11. Auxiliary Fuel Pump - OFF
12. Navigation Lights and Flashing Beacon - ON as required.
13. Avionics Power Switch - ON.
14. Radios - ON.
15. Flaps - RETRACT.

STARTING ENGINE (With External Power)

1. Alternate Air - OFF.
2. Throttle - OPEN 1/4 INCH.
3. Mixture - IDLE CUT OFF.
4. Propeller Area - CLEAR.
5. External Power -- CONNECT to airplane receptacle.
6. Master Switch - ON.
7. Auxiliary Fuel Pump Switch -- ON.
8. Mixture - ADVANCE to obtain 3 to 5 GPH fuel flow, then return to IDLE CUT OFF position.

NOTE

If engine is warm, omit priming procedure of step 8 above.

9. Ignition Switch - START (release when engine starts).
10. Mixture - ADVANCE smoothly to RICH when engine fires.

NOTE

If engine floods, turn off auxiliary fuel pump, place mixture in idle cut off, open throttle 1/2 to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly.

11. Oil Pressure - CHECK.
12. Auxiliary Fuel Pump - OFF
13. External Power - DISCONNECT from airplane receptacle.
14. Navigation Lights and Flashing Beacon - ON as required.
15. Avionics Power Switch - ON.
16. Radios - ON.
17. Flaps - RETRACT.

BEFORE TAKEOFF

1. Parking Brake -- SET.
2. Passenger Seat Backs - MOST UPRIGHT POSITION.
3. Seats and Seat Belts - CHECK SECURE.
4. Cabin Doors - CLOSED and LOCKED.
5. Flight Controls - FREE and CORRECT.
6. Flight Instruments - CHECK and SET.
7. Fuel Quantity - CHECK.
8. Mixture - RICH.
9. Fuel Selector Valve - RECHECK BOTH.
10. Elevator Trim - SET for takeoff.
11. Throttle - 1800 RPM.

a. Magnetos - CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
b. Alternate Air Control - CHECK (slight RPM drop).
c. Suction Gage - CHECK.
d. Engine Instruments and Ammeter - CHECK.

12. Annunciator Panel - Ensure no annunciators are illuminated.
13. Throttle - 1000 RPM or less.
14. Throttle Friction Lock - ADJUST.
15. Strobe Lights - AS DESIRED.
16. Radios and Avionics - SET.
17. Autopilot (if installed) - OFF.
18. Wing Flaps - SET for takeoff (0° - 10°).
19. Brakes - RELEASE.

TAKEOFF

NORMAL TAKEOFF

1. Wing Flaps – 0° - 10°.
2. Throttle - FULL OPEN.
3. Mixture - RICH (above 3000 feet, LEAN to obtain maximum RPM).
4. Elevator Control -- LIFT NOSE WHEEL (at 55 KIAS).
5. Climb Speed - 70 - 80 KIAS.

SHORT FIELD TAKEOFF

1. Wing Flaps – 10°.
2. Brakes - APPLY
3. Throttle - FULL OPEN.
4. Mixture - RICH (above 3000 feet, LEAN to obtain maximum RPM).
5. Brakes - RELEASE.
6. Elevator Control - SLIGHTLY TAIL LOW.
7. Climb Speed - 56 KIAS (until all obstacles are cleared).

EN ROUTE CLIMB

1. Airspeed - 70 - 85 KIAS.

NOTE

If a maximum performance climb is necessary, use speeds shown in the Rate of Climb chart in Section 5 of the FAA Approved Flight Manual.

2. Throttle - FULL OPEN.
3. Mixture - RICH (above 3000 feet, LEAN to obtain maximum RPM).

CRUISE

1. Power - 2100 - 2700 RPM (no more than 75% is recommended).
2. Elevator Trim - ADJUST.
3. Mixture - LEAN.

DESCENT

1. Power - AS DESIRED.
2. Mixture - ADJUST for smooth operation (full rich for idle power).
3. Alternate Air - ON (if conditions are present for icing to exist).
4. Fuel Selector Valve - BOTH.

BEFORE LANDING

1. Pilot and passenger Seat Backs - MOST UPRIGHT POSITION.
2. Seats and Seat Belts - SECURED AND LOCKED.
3. Fuel Selector Valve - BOTH.
4. Mixture - RICH.
5. Alternate Air - ON (if conditions are present for icing to exist).
6. Landing/Taxi Lights - ON.
7. Autopilot (if installed) - OFF.

LANDING

NORMAL LANDING

1. Airspeed - 65 - 75 KIAS (flaps up).
2. Wing Flaps - AS DESIRED (0° - 10° below 110 KIAS, 10° - 30° below 85 KIAS).
3. Airspeed - 60 - 70 KIAS (flaps down).
4. Touch - MAIN WHEELS FIRST.
5. Landing Roll - LOWER NOSE WHEEL GENTLY.
6. Braking - MINIMUM REQUIRED.

SHORT FIELD LANDING

1. Airspeed - 65 - 75 KIAS (flaps up).
2. Wing Flaps - FULL DOWN (30°).
3. Airspeed - 61 KIAS (until flare).
4. Power - REDUCE to idle after clearing obstacle.
5. Touchdown - MAIN WHEELS FIRST.
6. Brakes - APPLY HEAVILY.
7. Wing Flaps - RETRACT.

BALKED LANDING

1. Throttle - FULL OPEN.
2. Alternate Air - OFF (if pulled).
3. Wing Flaps - RETRACT TO 20°.
4. Climb Speed - 60 KIAS.
5. Wing Flaps – 10° (until obstacles are cleared).
   RETRACT (after reaching a safe altitude and 65 KIAS).

AMPLIFIED NORMAL PROCEDURES

TAKEOFF

Power check

The engine should run smoothly and turn approximately 2250 - 2350 RPM.

CRUISE

Normal cruising is performed between 55% and 75% power.

CRUISE PERFORMANCE

	75% POWER		65% POWER		55% POWER	
Altitude	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG
2500 Feet	116	11.6	109	12.4	101	13.3
5500 Feet	119	11.9	112	12.7	103	13.6
8500 Feet	122	12.2	114	13.0	105	13.9
Standard Conditions				Zero Wind		

LEANING WITH AN EGT GAGE.

The exhaust gas temperature (EGT) may be used as an aid for mixture leaning in cruising flight at 75% power or less.

COLD WEATHER OPERATION

FLIGHT OPERATIONS

The Alternate air control provides an alternate path for induction air to enter the engine. This alternate air is also heated to provide a means to eliminate induction system ice that collects on the air impact tubes of the throttle body.

NOISE CHARACTERISTICS AND NOISE REDUCTION

The certificated noise level for the 172R at 2550 pounds maximum weight with the Lycoming IO-360-L2A engine rated at 180 Hp with either the 1A170/CFA or the 1A170/JFA propeller installed has been determined to not exceed 75.1 dB(A).

SECTION 5: PERFORMANCE

Unless otherwise addressed in this flight manual supplement the **Performance Numbers** covered in the FAA Approved Flight Manual are considered to be equal to or better than the listed numbers.

Stall Speeds at 2550 lbs.

Conditions: Power Off

Most Rearward Center Of Gravity

Angle of Bank
30°

Flap Setting	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	48	53	52	57	57	63	68	75
10°	42	50	45	54	50	59	59	71
30°	40	48	43	52	48	57	57	68

Most Forward Center Of Gravity

Angle of Bank
30°

Flap Setting	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	48	53	52	57	57	63	68	75
10°	43	51	46	55	51	61	61	72
30°	40	48	43	52	48	57	57	68

Notes:

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

SHORT FIELD TAKEOFF DISTANCE AT 2550 POUNDS

Conditions:

Flaps 10°
Full Throttle Prior to Brake Release
Paved level, dry runway
Zero Wind
Lift Off: .....51 KIAS
Speed at lift off:.....56 KIAS

	0°C		10°C		20°C		30°C		40°C	
Press Alt In Feet	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst
S.L.	860	1465	925	1575	995	1690	1070	1810	1150	1945
1000	940	1600	1010	1720	1090	1850	1170	1990	1260	2135
2000	1025	1755	1110	1890	1195	2035	1285	2190	1380	2355
3000	1125	1925	1215	2080	1310	2240	1410	2420	1515	2605
4000	1235	2120	1335	2295	1440	2480	1550	2685	1660	2880
5000	1355	2345	1465	2545	1585	2755	1705	2975	1825	3205
6000	1495	2605	1615	2830	1745	3075	1875	3320	2010	3585
7000	1645	2910	1785	3170	1920	3440	2065	3730	2215	4045
8000	1820	3265	1970	3575	2120	3880	2280	4225	2450	4615

Notes:

1. Short field technique as specified in Section 4
2. Prior to takeoff from fields above 3000 ft. 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 tail winds up to 10 knots, increase distances by 10% for each 2 knots.
4. For operation on dry, grass runway, increase distances by 15% of the ground roll figure.

Maximum Rate-Of-Climb At 2550 Pounds

Conditions:
Flaps Up
Full Throttle

Press Alt FT	Climb Speed KIAS	-20°C	0°C	20°C	40°C
S.L.	74	855	785	710	645
2000	73	760	695	625	560
4000	73	685	620	555	495
6000	73	575	515	450	390
8000	72	465	405	345	285
10,000	72	360	300	240	180
12,000	72	255	195	135	-----

Note:
1. Mixture leaned above 3,000 feet for maximum RPM.

Time, Fuel and Distance to Climb at 2550 Pounds

Conditions:
Flaps Up
Full Throttle
Standard Temperature

Press Alt Ft	Climb Speed KIAS	Rate Of Climb FPM	Time In Min	From Sea Level Fuel Used Gal	Dist NM
S.L.	74	73	0	0.0	0
1000	73	695	1	0.4	2
2000	73	655	3	0.8	4
3000	73	620	4	1.2	6
4000	73	600	6	1.5	8
5000	73	550	8	1.9	10
6000	73	505	10	2.2	13
7000	73	455	12	2.6	16
8000	72	410	14	3.0	19
9000	72	360	17	3.4	22
10,000	72	315	20	3.9	27
11,000	72	265	24	4.4	32
12,000	72	220	28	5.0	38

Notes:
1. Add 1.4 gallons of fuel for engine start, taxi and takeoff allowance.
2. Mixture leaned above 3,000 feet for maximum RPM
3. Increase time, fuel and distance by 10% of each 10°C above standard temperature.
4. Distances shown are based on zero wind.

CRUISE FUEL CONSUMPTION
(Not FAA Approved)

Conditions:
2550 Pounds
Recommended Lean Mixture

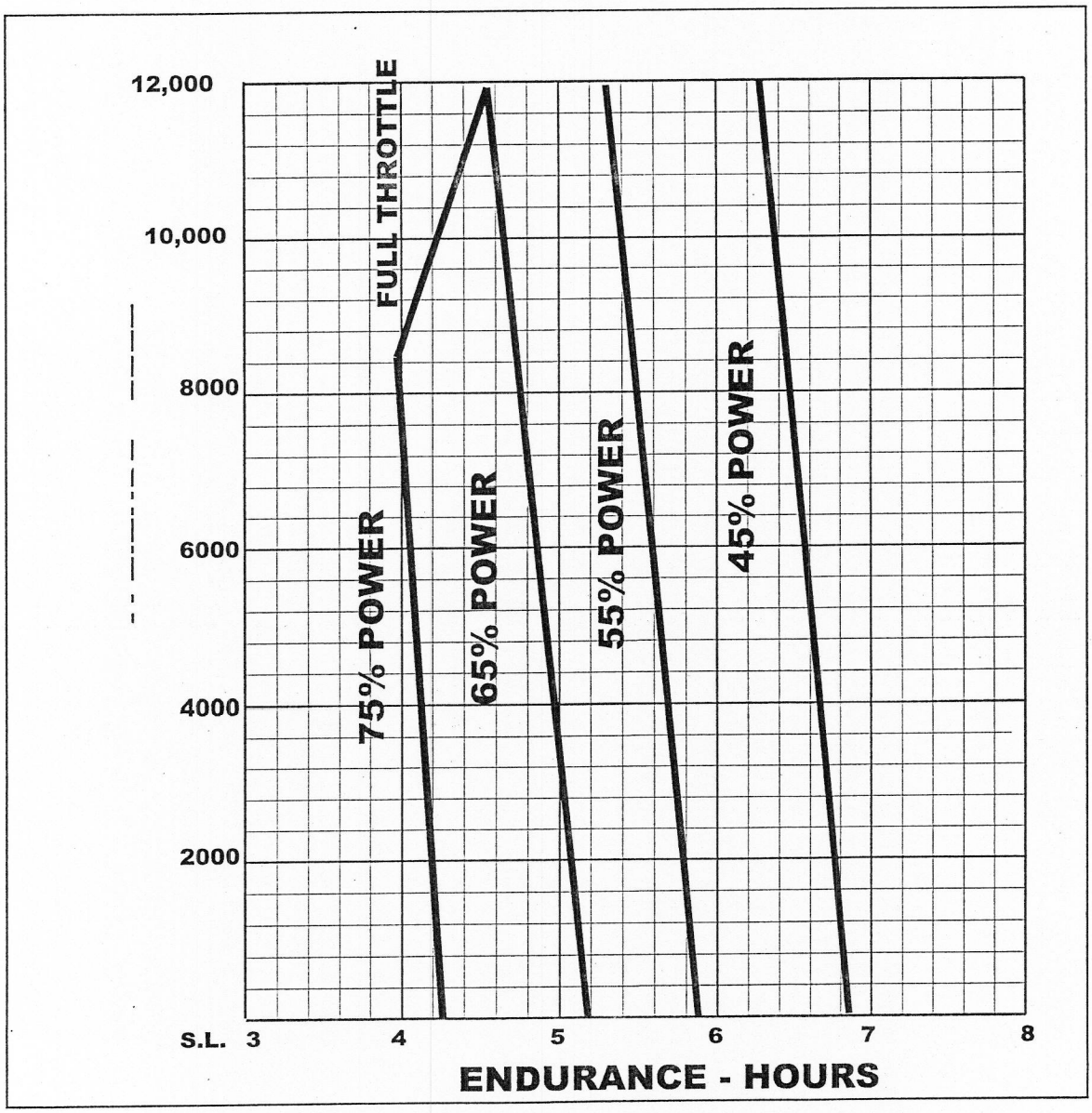
		20°C Below Standard Temp.		Standard Temperature		20° C Above Standard Temp	
Pressure Alt Feet	RPM	% BHP	GPH	% BHP	GPH	% BHP	GPH
2000	2550	---	---	76	10.2	72	9.6
	2500	77	10.3	72	9.6	68	9.1
	2400	69	9.2	64	8.7	61	8.3
	2300	61	8.3	58	7.9	55	7.6
	2200	55	7.5	52	7.2	49	6.9
	2100	49	6.8	46	6.6	43	6.3
4000	2600	---	---	76	10.2	72	9.6
	2500	73	9.7	68	9.2	65	8.7
	2400	65	8.8	62	8.3	58	8.0
	2300	58	8.0	55	7.6	42	7.3
	2200	52	7.3	49	6.9	47	6.6
	2100	46	6.6	44	6.3	41	6.1
6000	2650	---	---	76	10.1	72	9.6
	2600	77	10.3	72	9.6	68	9.1
	2500	69	9.3	65	8.8	62	8.4
	2400	62	8.4	59	8.0	56	7.6
	2300	56	7.7	53	7.3	50	7.0
	2200	50	7.0	57	6.7	44	6.4
8000	2700	---	---	76	10.1	71	9.5
	2600	73	9.8	69	9.2	65	8.7
	2500	66	8.8	62	8.4	59	8.0
	2400	59	8.1	56	7.7	53	7.3
	2300	53	7.4	50	7.0	47	6.7
	2200	47	6.7	45	6.4	42	6.1
10,000	2700	77	10.2	72	9.6	68	9.1
	2600	69	9.3	65	8.8	62	8.4
	2500	63	8.5	59	8.1	56	7.7
	2400	57	7.8	53	7.4	50	7.0
	2300	51	7.1	48	6.8	45	6.5
12,000	2700	69	9.3	65	8.8	62	8.4
	2600	66	8.9	62	8.4	59	8.0
	2500	60	8.2	56	7.7	53	7.4
	2400	54	7.5	51	7.1	48	6.7
	2300	48	6.8	45	6.5	42	6.2

ENDURANCE PROFILE

45 Minutes Reserve
53 Gallons Usable Fuel

Conditions

2550 pounds
Recommended lean mixture for cruise at all altitudes
Standard Temperature
Zero Wind



Short Field Landing Distance
At 2550 Pounds

Conditions:
- Flaps 30°
- Power Off
- Maximum Braking
- Paved Level, dry runway
- Zero Wind
- Speed at 50 Ft: 61KIAS

Press Alt In Feet	0°C		10°C		20°C		30°C		40°C	
	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst	Grd Roll Ft	Total Ft to Clear 50 Ft Obst
S.L.	545	1290	565	1320	585	1350	605	1380	625	1415
1000	565	1320	585	1350	605	1385	625	1420	650	1450
2000	585	1355	610	1385	630	1420	650	1455	670	1490
3000	610	1385	630	1425	655	1460	675	1495	695	1530
4000	630	1425	655	1460	675	1495	700	1535	725	1570
5000	655	1460	680	1500	705	1535	725	1575	750	1615
6000	680	1500	705	1540	730	1580	755	1620	780	1660
7000	705	1545	730	1585	760	1625	785	1665	810	1705
8000	735	1585	760	1630	790	1670	815	1715	840	1755

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

SECTION 6: WEIGHT AND BALANCE / EQUIPMENT LIST

New Aircraft Weight and Balance data following installation of STC SA2196CE.

Aircraft Gross Weight ..... 2550 lbs.

Aircraft Empty Weight..... _____ lbs.

Aircraft Useful Load..... _____ lbs.

Aircraft Empty C. G. ..... _____ Inches

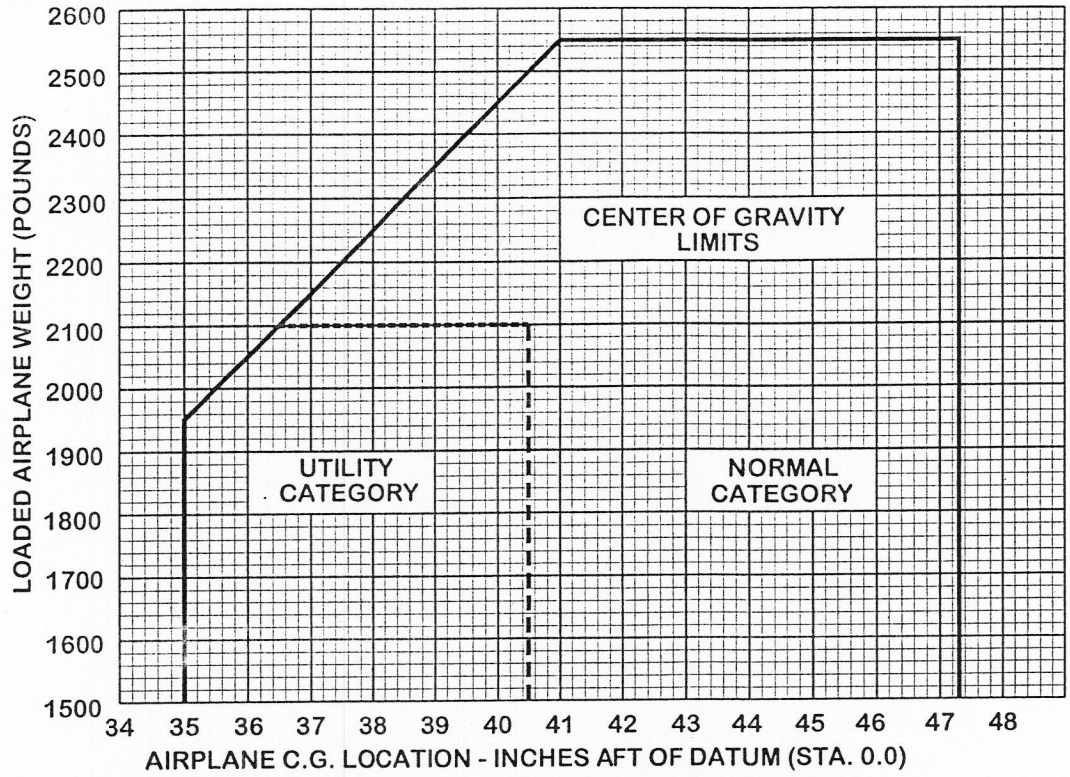
Moment (lb-ins / 1000) ..... _____ Moment

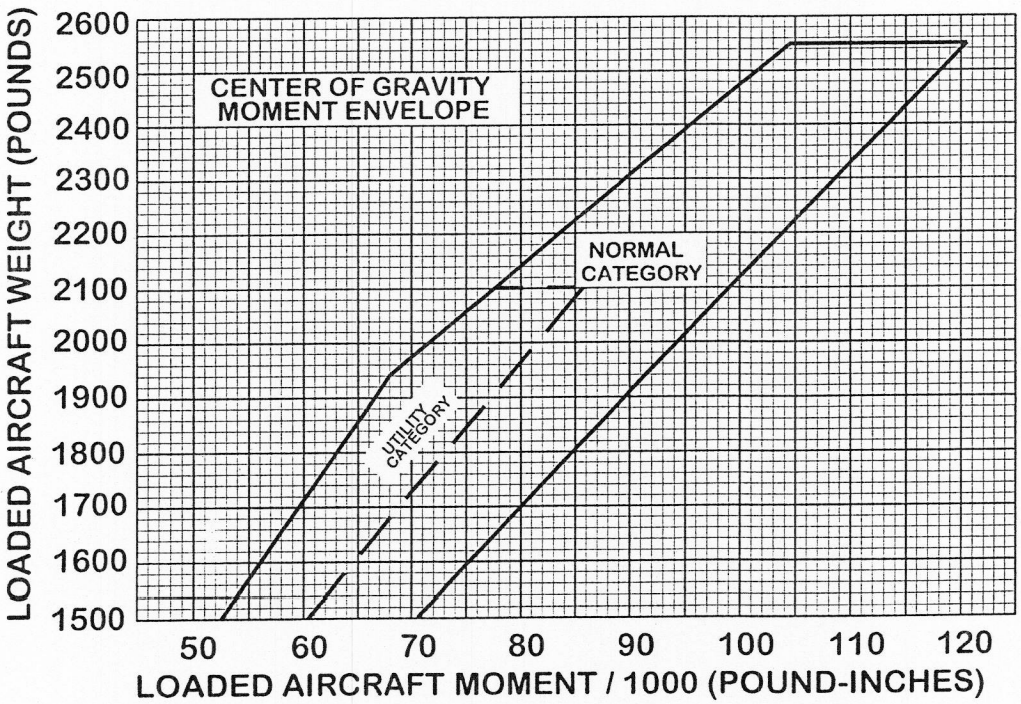
Equipment list is amended by the following:
Removal of 1C235/LFA7570 Propeller
Installation of ____1A170/CFA 7660 propeller or ___ 1A170/JFA 7658 propeller.

Date:_____

Signed:_____

Weight and balance computed by the following method:
Computed:_____ Weighed:_____


LOADED AIRPLANE WEIGHT (POUNDS)
2600
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
CENTER OF GRAVITY LIMITS
UTILITY CATEGORY
NORMAL CATEGORY
34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
AIRPLANE C.G. LOCATION - INCHES AFT OF DATUM (STA. 0.0)


LOADED AIRCRAFT WEIGHT (POUNDS)
2600
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
CENTER OF GRAVITY MOMENT ENVELOPE
NORMAL CATEGORY
UTILITY CATEGORY
50 60 70 80 90 100 110 120
LOADED AIRCRAFT MOMENT / 1000 (POUND-INCHES)

SECTION 7: AIRPLANE SYSTEMS AND DESCRIPTION

Engine

The engine is a Lycoming Model IO-360-L2A and is rated at **180 HP** at 2700 RPM.

Air Induction System

The engine air induction system receives ram air through an intake on the lower front portion of the engine cowling. The intake is covered by an air filter which removes dust and other foreign matter from the induction air. Airflow passing through the air filter enters an air box. After passing through the air box, induction air enters a fuel/air control unit which is under the engine, and then is ducted to the engine cylinders through intake manifold tubes. In the event induction ice is encountered, or the intake air filter becomes blocked, alternate heated air can be obtained from a shroud around an exhaust riser through a duct to a valve, in the air box, operated by the alternate air control located on the instrument panel. Unfiltered heated air is drawn from the lower cowl area around an exhaust riser through the shroud into a duct on the air box. Use of full alternate air will result in a loss of approximately 75 to 150 RPM.

Propeller

The air plane is equipped with a two-bladed, fixed pitch, one piece forged aluminum alloy propeller which is anodized to retard corrosion. The propeller is 76 inches in diameter.

SECTION 8: AIRPLANE HANDLING , SERVICE & MAINTENANCE

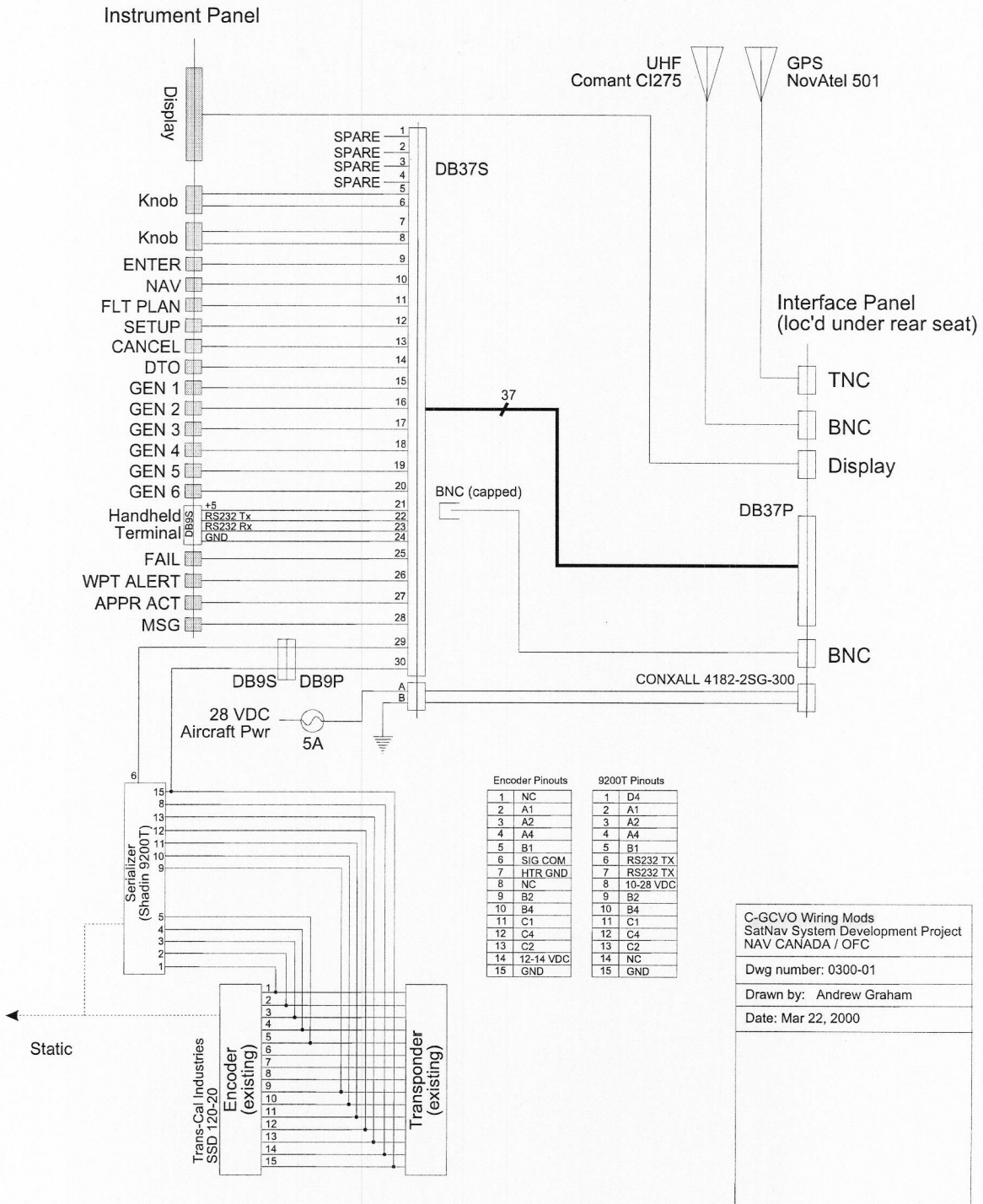
Engine

During Normal scheduled inspections the induction air box, ducting, shrouds, and controls should be checked for security of the installation and proper operation of the system.

Tires

To operate at the 2550 gross weight, the aircraft must be equipped with 6ply tires on both the main wheels and nose wheel on all models.

- Tire Pressure should be:
  - Nose Gear..... 45psi
  - Main Gear 38psi



Encoder Pinouts

1	NC
2	A1
3	A2
4	A4
5	B1
6	SIG COM
7	HTR GND
8	NC
9	B2
10	B4
11	C1
12	C4
13	C2
14	12-14 VDC
15	GND

9200T Pinouts

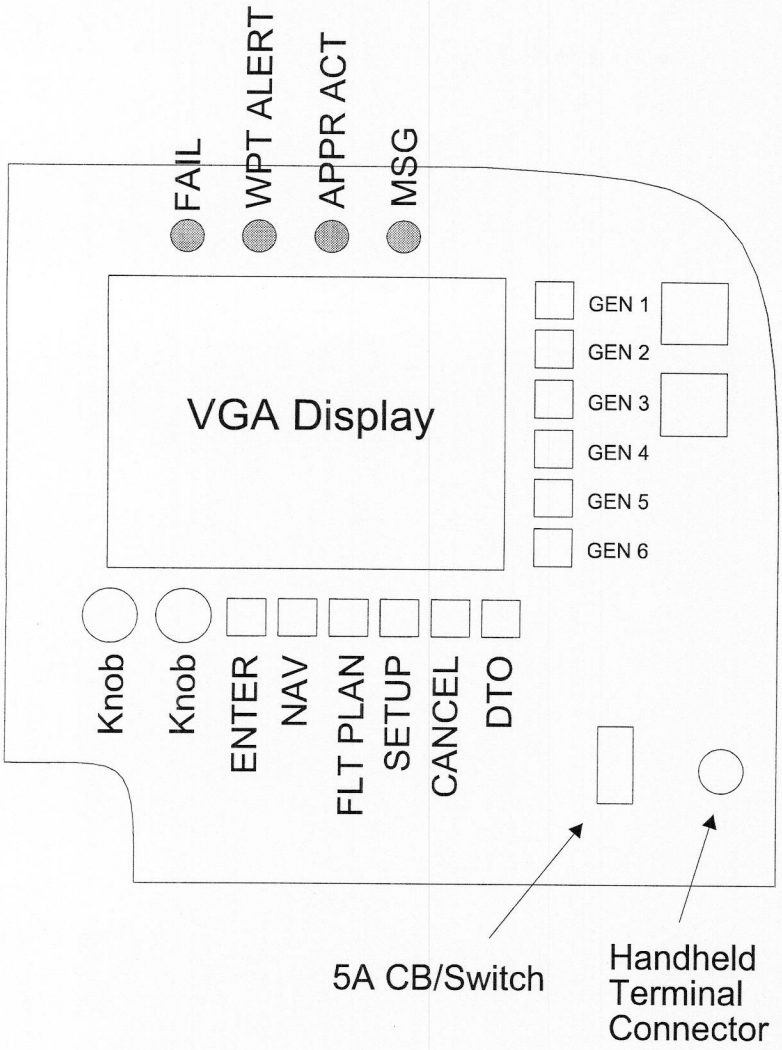
1	D4
2	A1
3	A2
4	A4
5	B1
6	RS232 TX
7	RS232 TX
8	10-28 VDC
9	B2
10	B4
11	C1
12	C4
13	C2
14	NC
15	GND

C-GCVO Wiring Mods
SatNav System Development Project
NAV CANADA / OFC

Dwg number: 0300-01

Drawn by: Andrew Graham

Date: Mar 22, 2000



C-GCVO Instrument Panel Layout SatNav System Development Project NAV CANADA / OFC
Dwg number: 0300-02
Drawn by: Andrew Graham
Date: Mar 8, 2000