

## INTRODUCTION

Manual is issued as a pilot's guide for the operation of the Navion Range Master. A concerted effort has been made to present the material in a clear and convenient manner, to the pilot to use the Manual as a ready reference check list.

Navion Range Master is a low-wing, five dual-controlled aircraft powered by a air-cooled engine. Clean aerodynamic design structural sturdiness are evident in metal, semi-monocoque construction. Res are of aluminum alloy construction designed to ultimate load factors meet F.A.A. requirements. Each of the more than 300 internal structural components are individually sprayed with zinc chromate compound assembly, to prevent rust and oxidation (one) of the various metals incorporated Navion. Navion Aircraft feels this precaution a necessity because of the aircraft's world wide operation and the fact any aircraft there are certain places where there is little or no access for maintenance.

able tricycle landing gear, steerable wheel, wing flaps, large cabin door, and a compartment on the pilot's side, and upholstered interior combine features of efficiency with private flying requirements. Luxury and convenience. Safety and control in all flight maneuvers are provided by the inherent stability and balance of

control forces characteristic of the airplane. Years of engineering experience and advanced manufacturing technique have produced these qualities in the Navion.

Your co-operation in reporting any problems concerning operation and maintenance of the Navion Range Master is solicited. Reports such as these are an important factor in rendering prompt and efficient service, and also in improving the design and operation of our aircraft.

Kemp Bourne, Vice President  
NAVION AIRCRAFT CORPORATION

Additional copies of this Manual may be purchased by writing to the Sales Division, Navion Aircraft Corporation, P.O. Box 110, Seguin, Texas 78155.

I N D E X

DESIGN FEATURES

- A. Log of Revisions
- B. Three View Drawing
- C. Specifications

Section I

page 1

2

3,4

OPERATING INSTRUCTIONS

- A. Preflight
- B. Restart
- C. Starting Procedure
- D. Taxi and Run up
- E. Before Take off
- F. Take off and Climb
- G. Cruise
- H. Before Descent and Landing
- I. After Landing
- J. Shut Down

Section II

page 1 - 7

8 - 9

10 - 11

11 - 12

13 - 14

14

15 - 16

16 - 17

17

EMERGENCY PROCEDURES

- A. Engine Failure During Take off
- B. Engine Failure During flight
- C. Hydraulic Failure
- D. Wing Flap Emergency Procedure
- E. Hydraulic Line Failure
- F. Electrical Failure

Section III

1

2

3

4

4

5

PERATING LIMITATIONS

- A. Airspeed Limitations
- B. Power Plant and Limitations
- C. Instrument Dial Markings

Section IV

1

1

1 - 2

I N D E X

OPERATING LIMITATIONS (continued) Section IV

- D. Flight Limit Load Factors
- E. Type of Airplane Operation
- F. Flight Placards

page 3

3

3 - 4

WEIGHT AND BALANCE - MISCELLANEOUS Section V

- A. Gross Weight Planning Chart
- B. Aircraft Fide Check List
- C. ATC Flight Plan

1

2

3 - 4



DESIGN FEATURES

C. Specifications

Max. Gross Wgt. - 3315  
Navion H

Engine	Continental - 10-520-B
HP & RPM	285 HP @ 2700
Gross T.O. Wgt. (lbs)	3315
Empty Wgt. Dry (average w/standard eqpt.)	2000 ± 50
Useful Load (lbs)	1300
Wing Span (ft.)	34' 9"
Wing Area (Sq. Ft.)	184.33
Length (ft.)	27' 10"
Height (ft.)	8' 6"
Prop Dia. (Max. in.)	85"
Power Loading (lbs. per Sq. Ft.)	11.63
Wing Loading (lbs. per Sq. Ft.)	18
Baggage Capacity (lbs.)	190
Fuel Capacity Main Tanks (U.S. Gal.)	39.5
(lbs.)	237
Fuel Capacity Tip Tanks (34 US gal. ea.)	68
(lbs, Total)	408
Total Fuel Capacity (US gal.)	107.5
(lbs.)	645
Top Speed (MPH)	203
Cruising Speed (73% power @ 7500 ft. MPH)	180
Best Economy Cruise (50% power @	
12000 ft. MPH)	165
Fuel Consumption (Gal/hr. @ 73% power	
7500 ft.)	14.8
Fuel Consumption (Gal/hr. @ 50% power	
12000 ft.)	10.6
Cruise Range (Miles @ 73% power 7500 ft.)*	1200
Cruise Range (Miles @ 50% power 12000 ft.)*	1500
*plus 30 min. reserve	

Stalling Speed (Flap & Gear Down MPH)	55
Best Rate of Climb Speed (MPH)	105
Best Rate of Climb (Ft. per Min.)	1200
Take Off Run (Ft.)	975
Landing Roll (Ft. Flaps Down)	950
Service Ceiling (Ft.)	20500
Absolute Ceiling (Ft.)	20000
Wheel Base (Ft.)	5' 8 1/2"
Wheel Tread (Ft.)	8' 7 1/2"
Tire Pressure (lbs. Nose)	30
Tire Pressure (lbs. Main)	40 - 50
Minimum Fuel Octane	100/300

1. (f) Flap handle - Down  
 (g) Elevator trim - set to Zero. Check for freedom of movement  
 (h) Throttle - Full Open (in)  
 (i) Mixture - Idle cut off (out)  
 (j) Cowl flaps - Open (in)  
 (k) All radios - Off  
 (l) Turn on master switch. Check fuel indicators and landing gear for three green lights  
 (m) Turn on Turn & Bank switch. Listen and/or check for electric gyro operation  
 (n) Turn T & B and battery switch OFF  
 (o) Circuit Breakers - checked in
2. (a) Check cabin for loose objects and security of baggage door  
 (b) Check lower fuselage for cleanliness and condition
3. Check left flap and flap linkage for security and damage
4. (a) Check condition of upper wing skin  
 (b) Check left aileron for proper operation and security of hinge bolts
5. (a) Remove tip tank fuel cap and check fuel level against gauge indication  
 (b) Secure cap and tank well cover door

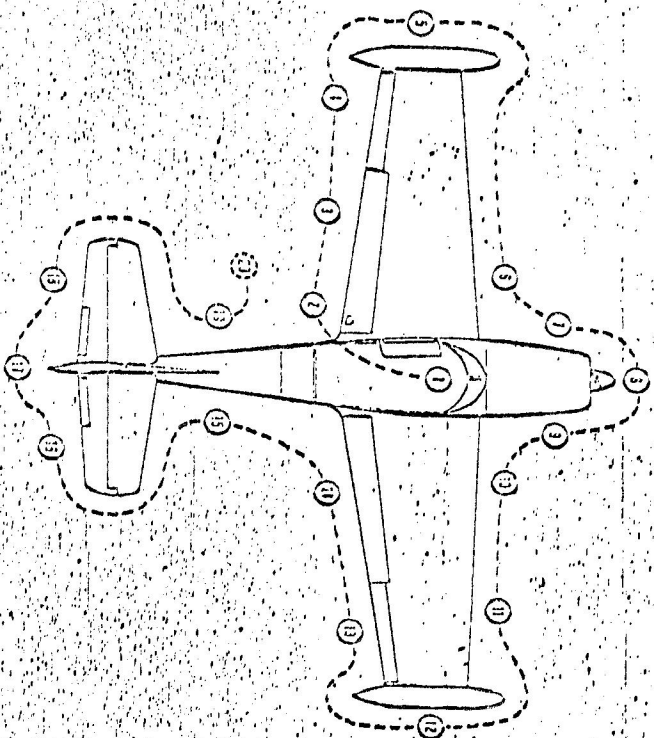


FIGURE 6A Pre-flight Checklist

OPERATING INSTRUCTIONS

A. Preflight

1. (a) Fuel selector valve - ON main tank  
 (b) Check and set Parking Brake  
 (c) Ignition switch - OFF  
 (d) Hyd power - ON (out)  
 (e) Landing gear handle - down

6. (a) Check leading edge and lower wing skin for general condition.
  - (b) Check left landing gear, air pressure in tires and landing struts, and general condition of tires (main tire pressure is 40-50 pounds, strut extension 1 5/16 in. at normal load weights). Rotate up-lock roller bushing by hand. It should turn freely.
  - (c) Check hydraulic brake lines for security and leakage.
  - (d) Check left landing gear wheel well area for loose cables, hyd. and fuel lines for leaks and general condition.
  - (e) Drain a small quantity of fuel from left tip tank line drain valve. Check for presence of water, sediment or contamination of any kind.
7. (a) Check left cowl flap door for unusual wear that would indicate improper alignment and operation. Check rod end bearings for looseness and hinge brackets for cracks.
  - (b) Open left engine cowl, check hydraulic oil reservoir and engine oil level.
  - (c) Check engine for general condition security of magneto and spark plug leads; check oil, fuel, hydraulic lines and engine accessory drive pads and gaskets for leaks.

7. (d) Check propeller governor control and mixture control linkage for security and rod end bearings for looseness and proper safetying.
8. (a) Check propeller and spinner for nicks and security check backside of propeller blades for possible oil leaks.
  - (b) In cold weather, or if aircraft has not flown for several weeks, turn prop by hand several times to loosen congealed oil, check compression and listen for unusual noises.
  - (c) Check nose wheel tire and strut for proper inflation (Tire pressure 30 lb., strut extension in excess of 1 1/2 in.).
  - (d) Check induction air filter for restrictions by dust or other foreign matter.
9. (a) Open right engine cowl, check engine for general condition, security of magneto and spark plug leads; check oil, fuel, hydraulic lines and engine accessory drive pads and gaskets for leaks.
  - (b) Check throttle control linkage for security, rod end bearing for looseness and proper safetying.
  - (c) Check battery for condition, security, and filler covers secure.

3. (d) Check right cowl flap door for unusual wear that would indicate improper alignment and operation. Check rod end bearings for looseness and hinge brackets for cracks.
- (e) Check nose gear wheel well area for general condition. Hydraulic lines for security and leaks. Check nose gear steering rods and cables for security and proper safetying. Rotate up-lock roller bushing. It should turn freely. Drain a small quantity of fuel from main tank gascolator sump, check for presence of water, sediment, or contamination of any kind.
- NOTE: If you are in doubt about octane rating contained in tanks, drain a small quantity in a bottle and cross check color of fuel with known color of desired octane.
- (a) Remove main fuel tank cap. Visually check fuel level and compare with gauge reading. Secure cap and door.
- (b) Check right landing gear air pressure in tires, landing struts, and general condition of tires. (Main gear tire pressure is 40-50 lbs Strut extension 1 5/16 in. at normal load weights.) Rotate up-lock roller bushing. It should turn freely.
- (c) Check hydraulic brake lines for security and leakage.

10. (d) Check right landing gear wheel well area for loose cables, hydraulic and fuel lines for leaks and general condition.
- (e) Drain a small quantity of fuel from right tip tank line drain valve. Check for presence of water, sediment or contamination of any kind.
11. (a) Check leading edge and lower wing skin for condition.
- (b) Remove pitot cover if installed.
12. (a) Remove tip tank fuel cap and check fuel level against gauge indication.
- (b) Secure cap and tank well cover door.
13. Check ~~fuel~~ <sup>gear</sup> aileron for proper operation and security of hinge bolts.
14. (a) Check condition of upper wing skin.
- (b) Check right flap and flap linkage for security and damage.
15. (a) Check right static pressure hole for obstructions.
- (b) Check horizontal and verticle stabilizer for nicks and dents.
16. (a) Check right elevator hinge bolts for security and proper operation.
- (b) Check right trim tab hinges for security and proper operation.

Check rudder for operation and security of attachment bolts and control cables.

- (a) Check left elevator hinge bolts for security and proper operation.
- (b) Check left Trim Tab hinges for security.
- (a) Check horizontal and verticle stabilizer for nicks and dents.
- (b) Check left static pressure hole for obstructions.

If night flight is anticipated, check operation of all navigation lights, rotating beacon and presence of a dependable flashlight.

PRE-START  
(Check List may start at this point after Initial Flight of the day, or for enroute stops.)

- 8. 1. Aircraft properly serviced for flight, fuel, oil, hydraulics, maps, charts, let down & approach plates, flight planning weight & balance.
- 2. All gas caps, oil & hyd. caps secure, tie down ropes removed.
- 3. All inspection plates & cowling secure, pitot covers removed.
- 4. Windshield - clean.
- 5. Seat & Seat belts - adjust seat so rudders can be reached for full travel - and lock seat pin.
- 6. Fuel selector - on Main.
- 7. Braakes - test pressure and set.
- 8. Hyd. emergency shut-off valve - Open (in).
- 9. Ignition - Off.
- 10. Hyd. power control - On. (out)
- 11. Gear handle - Down.
- 12. Flap Handle - Down
- 13. Trim - set on zero.



14. Throttle - open four (4) half turns.
15. Prop-Full increase RPM (IN).
16. Mixture-Full Rich (IN).
17. Alt Air Control-Off (IN).
18. Cowl Flaps-Open (IN).
19. Cabin Air Selector Wheel-as desired.
20. Cabin Heat Selector-Off (IN).
21. Flight Controls-Free & Proper Operation.
22. Instruments - check for proper static condition, set Altimeter and clock.
23. Radio switches - Off.
24. Battery master switch - ON.
25. Alternator - Off.
26. Booster Pump - Off.
27. Turn & Bank Switch - Off.
28. Check fuel quantity & landing gear for three (3) green lights.
29. Pitot heat Off - check if planning IFR flight.
30. Light switches - Off - check Nav. lights if planning night flight.

C. STARTING ~~AND~~ PROCEDURE

1. Battery Master Switch - ON.

2. Aux. boost pump switch - ON high position until needle on the fuel pressure gauge steadies, then IMMEDIATELY TURN SWITCH OFF.

"NOTE 1"

Fluctuation of the needle on the fuel pressure gauge while the pump is operating indicates there is still vapor in the system. Complete purging of vapor from the system is indicated when this needle steadies.

3. Engage starter - if engine does NOT start, repeat Step 2.

"CAUTION"

Release starter switch as soon as engine fires. Never engage the starter while the propeller is turning. If the starter has been engaged for 30 seconds, and the engine has not started, release the starter switch and allow the starter motor to cool 3 to 5 minutes before another starting attempt is made.

"NOTE 2"

The auxiliary pump delivers a continuous flow of fuel in proportion to the amount of throttle opening and length of time Aux. booster pump is operated before engaging starter. If engine is flooded, follow this sequence:

- (a) Turn auxiliary pump OFF.
- (b) Turn ignition switch OFF.
- (c) Set throttle FULL OPEN.
- (d) Set Mixture control to IDLE CUT-OFF.

- C. 3. (e) Engage starter and crank engine for about 10 seconds to clear cylinders of excess fuel.
- (f) Repeat normal engine starting procedure.
4. Check oil pressure - indication should be noted within 30 seconds in normal weather, 60 seconds in cold weather. Maintain engine speed 900 - 1000 RPM for at least one minute, in warm weather, and as required during cold weather to prevent cavitation in the pressure oil pump, and to assure adequate lubrication. Allow additional warm up time at 1200 RPM depending on ambient temperature.
  5. Alternator switch ON - check for positive charge.
  6. Fuel feed check of tip tank, check right tank as required, (check each tank for one (1) minute.)
  7. Flaps - up, observe flap movement on both wings. Check pressure.
  8. Fuel feed check of tip tank - check left tank as required.
  9. Radios ON - set and checked as required.
  10. Fuel selector - ON main tank.
- TAXI and RUN-UP
1. Engine instruments - check for green arc

- D. 1. operation. Do not run up engine unless oil temp is 23.9° C.
  2. Brakes and steering - check for proper operation.  
"NOTE 1"

The control co-ordinating system applies a slight load to the ailerons and rudder when either of the two is actuated.

  3. Magneto check - 1700 RPM check "R" position note engine RPM, then move switch back to "Both" position to clear the other set of spark plugs. Then move switch to "L" position, note RPM; difference between both mags should not be more than 50 RPM. Maximum drop should not exceed 150 RPM.
  4. Prop check - 1700 RPM slowly pull prop control toward low RPM position and observe tachometer reading. Engine speed should decrease. Return prop governor control to high speed position. During cold weather operation running propeller through limits several times is advisable for purging air from system, providing warm oil for lubrication, and exercising seals. (Oil temp should be at least 23.9° C.)
  5. Power check - as desired, slowly advance throttle to wide open position and observe tachometer. Maximum static RPM should be 20 - 40 RPM below red line. Minimum static RPM should not be less than 150 RPM below red line.
- "CAUTION:  
Do not operate engine at speeds in excess

5. of 1500 RPM longer than necessary. Proper cooling depends on forward speed of aircraft.

## "NOTE 2"

For additional detailed and/or supplemental information concerning engine run-up, climb or cruise, refer to current engine operators manual.

## BEFORE TAKE OFF

1. Fuel selector - ON main tank check quantity
2. Hydraulic power control - ON (out).
3. Flaps - Set for take off (17) or as desired
4. Trim - Set 0° or for load condition.
5. Prop - Full increase (IN).
6. Mixture - Full rich (IN).
7. Cowl flaps - OPEN (IN) or trail (unlocked).
8. Aux. boost pump - OFF (see note 1)
9. Turn and Bank switch - ON.
10. Beacon/Navigation lights - ON/or as desired

## sired

11. Cabin Door - closed and locked.
12. Instruments - check for green arc operation - set gyros & radios for departure.

## "NOTE 1"

Low boost pump position may be used for take-off and landings, however its use is not recommended because of the tendency toward flooding the engine at idle RPM.

## "CAUTION:"

High boost pump position is used only during the following conditions:

- (a) In the event of engine driven fuel

- E. 12. (a) pump failure (cross check fuel pressure).
- (b) To restart engine after fuel starvation due to running either tip tank dry.
- (c) During starting <sup>NOTE 2</sup> if the booster pump is used in high position for purposes other than the above listed conditions (excluding momentary operation) the engine can be flooded with resultant engine stoppage.

## F. TAKE OFF and CLIMB

1. Throttle - full power 2700 RPM/28.8"
2. Gear - up at 90 MPH/IAS; check lights out.
3. Flaps - UP
4. Hydraulic Power - OFF (in)
5. Power - set climb @ 25" 2500 RPM. For normal climb it is advisable to maintain 120 MPH/IAS for cooling benefit. For each 1000 ft. of altitude this can be decreased by one (1) MPH/IAS.

## "NOTE 1"

With high ambient temperature at ground level, a very low fluctuation in metered fuel pressure may appear in the early flight stages due to excess vapor in the lines. Momentary operation of the auxiliary fuel booster pump will generally eliminate the excess vapor.

## G. CRUISE

The following procedure is recommended for establishing best cruise speed and power after reaching altitude:

1. Cowl flaps - closed (exceed cruising altitude by 150 ft. Check engine oil and cylinder head temperatures within normal operating limits. Close cowl flaps.

2. Power - set manifold pressure and RPM for cruise power selected. Adjust mixture for best power setting.

"NOTE 1"

Your Navion Cruise-0-Matic computer has been provided for this purpose. Consult engine operators manual for % brake horse power recommended by manufacturer.

3. Place aircraft on step - by lowering nose and building up airspeed until Cruising altitude is reached. Retrim.

4. Mixture - reset. After engine temperatures have stabilized at cruise conditions (usually 5 to 15 minutes of operation), the mixture control may be reset for economy operation. If aircraft is equipped with a "EGT" gauge, use as per manufacturer's recommendations.

"NOTE"

Mixture settings must be re-established for any change in altitude or power, the same as with other leaning procedures.

"CAUTION:"

For best lateral trim during cruising, the fuel should be used alternately from each wing tip tank. The pilot should remember when operating out of wing tip tanks that up to 10 gal. per hour can be transferred to the main tanks by means of a fuel return line. Since the supply of fuel to the

G. 4. "CAUTION" continued  
engine is necessarily greater than the metered quantity required for engine operation, a fuel return line is provided in the fuel system and returns un-metered (excess) fuel to the "Main" tanks for later consumption. Because the fuel is returned to the "Main" tanks, the pilot should always operate out of the "Main" tanks until a quantity of not more than 10 gallons remain before switching to a wing tip position. This does not mean that the pilot should not check for proper flow of fuel from wing tip tanks prior to take-off; however, the fuel selector valve must be placed in "Main" position prior to take-off and remain in that position until main tank quantity has been reduced sufficiently to retain planned tip tank operation return fuel.

H. BEFORE DESCENT and LANDING

"NOTE"

Before starting descent from cruising altitude, switch fuel selector valve to "Main Tanks" position, and set mixture control at "best power setting" or richer before reducing power for descent. The before landing check list has been listed in the form of a memory aid. G-HUMP-F

G-HUMP-F

1. G (gas) - fuel selector on main tanks
2. H (Hydraulic horn) - hyd. power control (out) check pressure, retard throttle and check horn, slow to 105 MPH/IAS

- H. 3. U (under carriage) - gear handle down, check 3 green lights. Do not exceed 130 MPH/IAS gear extended.
4. M (mixture) - mixture rich or as required to secure power i/a/w field elevation.
5. P (prop) - prop full increase RPM
6. F (flaps) - wing flaps as desired. Do not exceed 108 MPH/IAS with flaps fully extended. 105 MPH/IAS on downwind: 95 MPH/IAS on base: 85 MPH/IAS on final are recommended for short field approaches and landings.

## I. AFTER LANDING

1. Cowl flaps open - (IN)
2. Flaps - Up
3. Beacon - OFF

## J. SHUT DOWN

1. Flaps - Down
2. Radios - Off
3. Mixture - Cut off @ 1000RPM
4. Ignition - Off
5. Master Battery Switch - Off
6. Alternator - Off
7. Turn & Bank switch - Off
8. All lights - Off
9. Tie down & check aircraft - cabin secure.

## "NOTE:

If aircraft is to be parked in the hot sun for extended period of time, parking brakes should be released.

## EMERGENCY PROCEDURES

## A. ENGINE FAILURE:

During take off - if engine should fail, immediately after take off, act quickly as follows:

1. Boost pump on HIGH position.
2. Fuel selector MAIN tanks.
3. Mixture RICH.
4. If engine fails to start, maintain air speed above 80 MPH by lowering nose of aircraft immediately after engine failure.
5. If able to land on remainder of runway, or terrain ahead is suitable for a "wheels down" landing, land straight ahead; change direction only enough to miss obstacles. If surface appears very rough, raise gear handle to UP position (hydraulic power must be on). Sufficient hydraulic pressure to start the gear up may be available if propeller is still windmilling. Even if only unlocked and starting to retract, the gear will collapse on landing.
6. If time permits, flaps can be lowered with Hand Pump (hydraulic power ON).
7. Turn fuel selector OFF and cut switches. DON'T TRY TO STRETCH YOUR GLIDE!

## B. ENGINE FAILURE DURING FLIGHT:

## 1. Boost pump on HIGH position.

NOTE: Use only if engine driven fuel pump failure is suspected. Cross check fuel pressure gauge.

## 2. Mixture FULL RICH.

3. Fuel selector on main tank. If engine cannot be restarted, select a suitable field, fasten seat belts, and prepare for emergency landing.

NOTE: If icing conditions are suspected, pull alternate air control knob open.

4. If landing area selected appears smooth and there is sufficient time and altitude to properly plan an approach, pull hydraulic power control ON and lower landing gear using hand pump if necessary. If there is any doubt as to suitability of terrain chosen for landing KEEP LANDING GEAR UP. You will stand less chance of injury and damage to aircraft by landing GEAR UP in rough terrain.
5. Lower flaps as required. If engine is windmilling, the engine driven pump will supply sufficient pressure to slowly operate flaps. Use hand pump to speed up operation if necessary. If necessary to prevent over-shooting, the Navion can be effectively side slipped. Be certain to maintain 90 MPH (flaps up) or 85 MPH (flaps down)

~~Section III - P-3~~

- B. 5. and recover with ample time to establish a normal glide.
- 6. Fuel selector, mags and all electrical switches OFF ~~Power To Tower Down~~

C. HYDRAULIC FAILURE:

Failure of landing gear to lower normally -  
 NOTE: If the red warning light indicating UNSAFE condition goes off at any time during normal or emergency landing gear lowering procedure, or one or even two green lights do not light, it is possible that the inoperative green or red light is burned out. This can be checked by unscrewing the doubtful lights and replacing with another green light that is operating and known to be good. The red light can be substituted if it is known to be good. All gear lights can be checked for continuity by press to test operation.

- 1. Check hydraulic power control ON (pull handle all the way out).
- 2. Gear handle in FULL DOWN and locked detent position.
- 3. If gear will not lower or gear handle is locking in UP position, do not force it. Proceed to next step.
- 4. Hydraulic power OFF.
- 5. Push emergency landing gear handle DOWN and hold until all three landing gear lights are ON.
- 6. If gear fails to lock down, yaw plane

~~Section III - P-4~~

- C. 6. to lock main gear and bring airplane to near stall (80 MPH) while working rudder pedals to lock nose gear.
- 7. Push landing gear control lever DOWN.
- 8. Pull hydraulic power control ON.
- 9. Apply hydraulic pressure with hand pump.

NOTE: If flaps are required for landing they should be operated before hydraulic power is turned OFF to facilitate above emergency procedure.

D. WING FLAP EMERGENCY PROCEDURE

- 1. Hydraulic power control ON.
- 2. Place flap control in DOWN position.
- 3. Supply hydraulic pressure by use of hand pump.

E. HYDRAULIC LINE FAILURE (Ruptured line and loss of fluid)

- 1. Pull emergency hydraulic shut-off control.
- 2. Push landing gear EMERGENCY handle down and hold until all three landing gear lights ON (100 MPH or below).
- 3. Place landing gear control handle in DOWN position.
- 4. If gear fails to lock down, yaw aircraft to lock main gear and bring aircraft to near stall (80 MPH) while working rudder pedals to lock nose gear.

Navion

SECTION III R-5

E. 4.

NOTE: If one or both main gear fail to lock down after all emergency procedures have been attempted, land aircraft gear up to keep damage to a minimum.

F. ELECTRICAL FAILURE

Day or night there is no set emergency procedure prescribed when an electrical failure is experienced. Since many variable factors must be considered, such as density of aircraft traffic, distance to nearest landing field, weather and flight conditions, etc., the pilot should realize that after the generator has failed, the battery is still available for a limited period of time and possibly at its peak of capacity, at time of electrical failure. In colder temperatures, the pilot should not expect the battery to remain at its maximum capacity as long as in warmer temperatures if the battery is pulling any electrical load at all. Most pilots prefer to turn off all electrical switches that are not absolutely necessary and save the battery for electrical requirements when entering controlled zones or requesting control tower instruction. Do NOT use your radio transmitter more than absolutely necessary since this is the largest intermittent load the battery can be subjected to. Land the aircraft as soon as possible.



OPERATING LIMITATIONS  
MODEL H

A. AIRSPEED LIMITATIONS

1. Never exceed speed 203 mph TIAS
2. Maximum structural cruising speed 169 mph TIAS
3. Maneuvering speed 135 mph TIAS
4. Maximum speed with gear extended 130 mph TIAS
5. Maximum speed with flaps extended 108 mph TIAS

B. POWER PLANT and LIMITATIONS

1. Continental, Model IO-520B
2. Take off maximum continuous operation 2700 rpm/285 HP

C. INSTRUMENT DIAL MARKINGS

- Airspeed 61-108 mph White arc-flap  
Operating range
- Airspeed 71-169 mph Green arc-normal  
Operating range
- Airspeed 169-203 mph Yellow arc-caution
- Airspeed 203 mph Red line- do NOT exceed
- Tachometer 2200-2700 rpm Green arc-normal  
Operating range
- Tachometer 2700 rpm Red line - do NOT exceed

C. Cylinder head temperature

- 100 degrees C. (212 degrees F.)  
237.8 degrees C. (460 degrees F.)  
Green arc-normal  
Operating range
- 237.8 degrees C. (460 degrees F.)  
Red line - do NOT exceed
- Oil Temperature
- 23.9 degrees C. - 107.2 degrees C.  
(75 degrees F.) Green arc-normal  
(225 degrees F.)
- 23.9 degrees C. (75 degrees F.)  
Red line-minimum
- 115.5 degrees C. (240 degrees F.)  
Red line-maximum
- Oil pressure 30 - 60 psi Green arc-normal
- Oil pressure 10 psi Red line-minimum
- Oil pressure 60 psi Red line-maximum
- Fuel pressure 1.5 to 17.5 psi  
Green arc-normal  
Operating Range
- Fuel Pressure 1.5 psi Red line-minimum
- Fuel pressure 18 psi Red line-maximum

## D. FLIGHT LIMIT LOAD FACTORS

1. Flaps Up 3.8 G's - 1.52 G's (at take off weight)

## E. TYPE OF AIRPLANE OPERATION

1. Normal category

NOTE: No acrobatic maneuvers including spins are approved.

## F. FLIGHT PLACARDS

1. Placard on cabin wall at left side of instrument panel.

(a) This airplane MUST BE OPERATED as a normal category airplane in accordance with the operating limitations stated in the form of placards, markings, and manuals.

(b) NO acrobatic maneuvers (including spins) are approved.

(c) Maximum take off weight 3315 pounds  
Maximum landing weight 3150 pounds

(1) All weight in excess of 2950 pounds MUST be fuel in tips.

(2) Take off weight MUST be limited to insure fuel consumption is such as to limit arrival at destination at a landing weight of 3150 pounds or less.

NOTE: In the event of emergency landing in excess of 3150 pounds, consult insert labeled "Inspection Procedure For Overweight Landings".

F. 2. Placard forward of fuel selector on floor between pilot's and co-pilot's chairs.

(a) Tip tanks (to be used in) level flight ONLY.

(b) Do NOT use tips with more than 10 gal. in main. This is required to provide wide space in mains for fuel and vapor return.

GROSS WEIGHT PLANNING CHART

SS TAKE-OFF WEIGHT

3315 (1) 211 lbs

WIGHT (DRY) (Operating Handbook)

(lbs)

W (1 qt = 1.835 lbs)

225

AL FUEL MAIN TANK (O. REQ'D)

60.0

ERS and/or CARGO

(150 lbs. max)

This column not to exceed 495.0 lbs.

GLE LBS. FUEL (subtract (2) from (1))

408 lbs. fuel tips and put remainder in main tanks, if under distribute this amount equally in each wing tip tank

408 lbs. = 408 ÷ 6 = 68 U.S. gallons

408 lbs. = 408 ÷ 6 = 68 U.S. gallons

AIRCRAFT FILE CHECKLIST

These are miscellaneous data, information and licenses that are a part of the airplane file. The following is a check list for that file. In addition, a periodic check should be made of the latest Civil Air Regulations to insure that all data requirements are met.

To be displayed in the airplane at all times:

- (1) Aircraft Airworthiness Certificate (Form ACA 1362).
- (2) Aircraft Registration Certificate (Form ACA 509A).

To be carried in the airplane at all times:

- (1) Airplane Radio Station License (if transmitter installed).
- (2) Weight and Balance Report or latest copy of the Repair and Alteration Form (Form ACA 337).
- (3) Airplane Equipment List.
- (4) Airplane Log Book.
- (5) Engine Log Book.



OPERATING LIMITATIONS

MODEL H

A. Airspeed Limitations

- 1. Never exceed speed . . . . . 203 mph TIAS
- 2. Maximum structural cruising speed . . . . . 169 mph TIAS
- 3. Maneuvering speed . . . . . 135 mph TIAS
- 4. Maximum speed with gear extended . . . . . 130 mph TIAS
- 5. Maximum speed with flaps extended . . . . . 108 mph TIAS

B. Power Plant and limitations

- 1. Continental, Model IO-520-B
- 2. Take-off maximum continuous operation - 2700 RPM/285 hp

C. Propeller

The following is for McCauley two-bladed propeller:

- 1. Part No. D2A34C58
- 2. Prop diameter, maximum 86.0 inches  
minimum 84.25 inches
- 3. Pitch settings at 36.0 inch station  
low 9.4 degrees  
high 25.4 degrees

The following is for McCauley three bladed propeller:

- 1. Part No. D3A32C90
- 2. Prop Diameter maximum 80.0 inches  
minimum 78.4 inches
- 3. Pitch settings at 36.0 inch station  
low 13.2 degrees  
high 30.0 degrees

D. Governor

- 1. Woodward, part number K 210452

**E. Instrument Dial Markings**

Airspeed	61-108 MPH	White arc-flap Operating range
	71-169 MPH	Green arc-normal Operating range
	169-203 MPH	Yellow arc-caution
	203 MPH	Red line-do not exceed
Tachometer	2200-2700 RPM	Green arc-normal Operating range
	2700 RPM	RedLine-do not exceed
Cylinder head temperature		
	100 degrees C. (212 degrees F.)	
	237.8 degrees C. (460 degrees F.)	Green Arc-Normal Operating Range
	237.8 degrees C. (460 degrees F.)	Red Line-Do Not Exceed
Oil Temperature		
	23.9 degrees C. - 107.2 degrees C (75.°F) (225°°F)	Green Arc-Normal Operating Range
	23.9 degrees C. (75°°F)	Red Line-Minimum
	115.5 degrees C. (240°°F)	Red Line-Maximum
Oil Pressure	30-60 psi	Green Arc-Normal
	10 psi	Red Line-Minimum
	60 psi	Red Line-Maximum
Fuel Pressure	1.5 to 17.5 psi	Green Arc-Normal Operating Range
	1.5 psi	Red Line-Minimum
	18 psi	Red Line-Maximum

**FLIGHT LIMIT LOAD FACTORS**

1. Flaps Up 3.8 -1.52 (At take-off weight)

**TYPE OF AIRPLANE OPERATION**

1. Normal Category

- NOTE -

No acrobatic maneuvers including spins are approved.

**FLIGHT PLACARDS**

1. Placard on cabin wall at left side of instrument panel.
  - a. THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN ACCORDANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS.
  - b. NO ACROBATIC MANEUVERS (INCLUDING SPINS) ARE APPROVED.
  - c. MAXIMUM TAKE-OFF WEIGHT 3315 POUNDS.  
MAXIMUM LANDING WEIGHT 3150 POUNDS.
    1. ALL WEIGHT IN EXCESS OF 2950 POUNDS MUST BE FUEL IN TIPS.
    2. TAKE-OFF WEIGHT MUST BE LIMITED TO INSURE FUEL CONSUMPTION IS SUCH AS TO LIMIT ARRIVAL AT DESTINATION AT A LANDING WEIGHT OF 3150 POUNDS OR LESS.

- NOTE -

In the event of emergency landing in excess of 3150 pounds consult insert labeled "Inspection Procedure For Overweight Landings."

2. Placard forward of fuel selector on floor between pilot's and co-pilot's chairs.
  - a. TIP TANKS (to be used in) LEVEL FLIGHT ONLY.
  - b. DO NOT USE TIPS WITH MORE THAN 10 GAL. IN MAIN.

This is required to provide space in mains for fuel and vapor return.

Gross Weight and C. G. Limitations

Normal Category

The following chart shows the maximum permissible loading of the airplane for given C.G. locations.

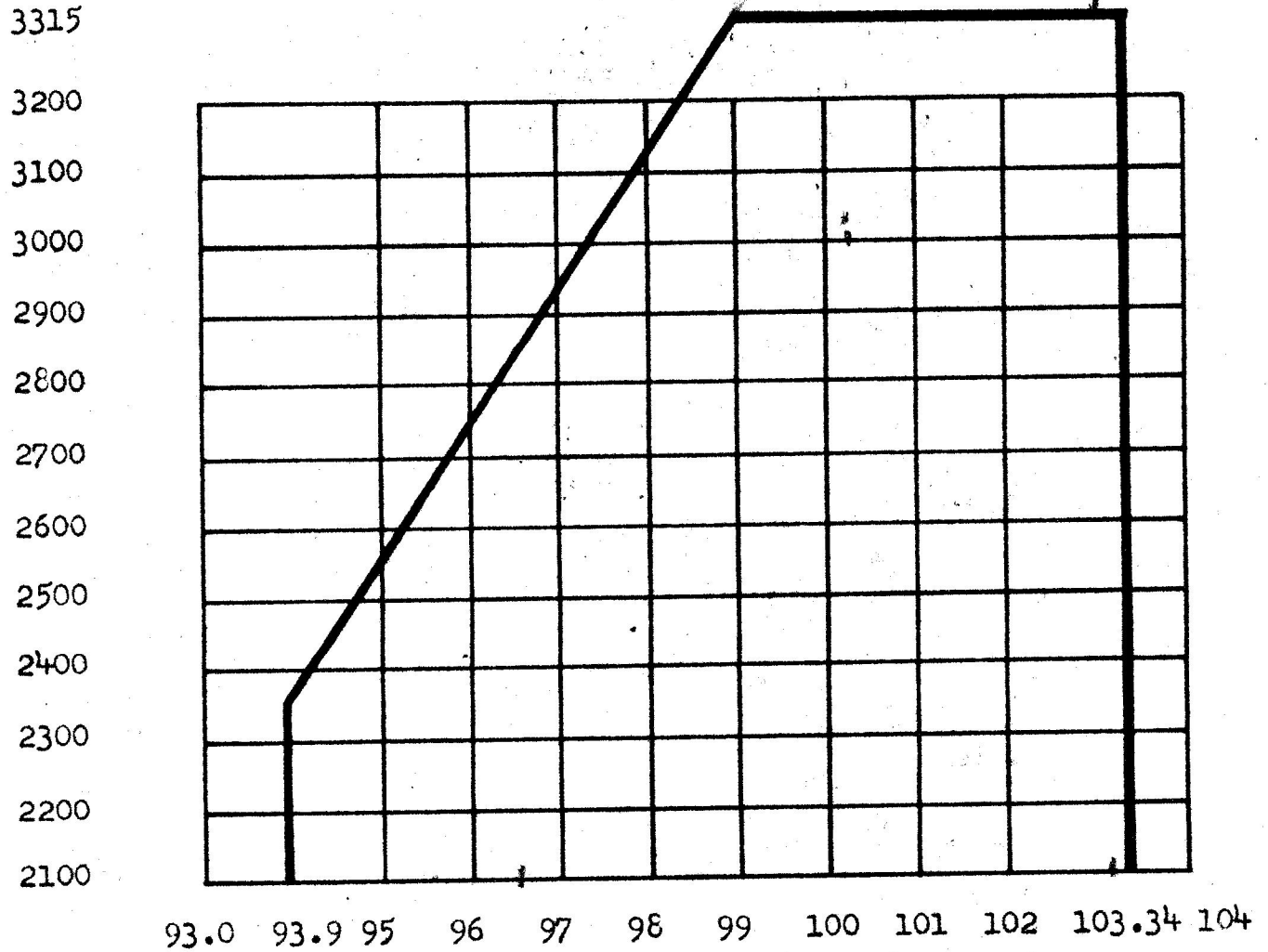


Chart shows gear down condition;  
 Gear up condition approximately  
 1/4 inch aft of values shown by line.

1. Maximum Take-off Weight at Sea Level = 3315 lbs.
2. Maximum Gross Weight with No Tip Fuel = 2950 lbs.



### EMERGENCY PROCEDURES

- A. Failure of landing gear to lower normally
  - 1. Turn hydraulic power (OFF)
  - 2. Push Landing Gear Emergency Handle (DOWN), and hold until all three green, gear position lights are on.
  - 3. If gear fails to lock down, yaw airplane to lock main gear and bring airplane to near stall while working rudder pedals to lock nose gear.
  - 4. Landing Gear Control Lever in (GEAR DOWN).
  - 5. Hydraulic power turned (ON).
- B. If landing gear will not stay down and locked
  - 1. Flaps (DOWN), if required.
  - 2. Hydraulic power (OFF).
  - 3. Repeat above emergency procedure.

## INSPECTION PROCEDURE FOR OVERWEIGHT LANDINGS

In the event of a landing at a gross weight in excess of 3150 pounds, the following items should be visually inspected for structural damage.

1. Main Landing Gears
  - a. Oleo strut
  - b. Side brace and retracting link
  - c. Main gear-wing attachment trunion
  - d. Retracting cylinder attachment to wing
  - e. Wing structure should be inspected for web wrinkles at gear attach points.
2. Nose Landing Gear
  - a. Oleo strut
  - b. Drag brace, retracting link and retracting cylinder
  - c. Nose gear - fuselage attachment trunion
  - d. The two beams forming the sides of the nose gear well should be inspected for web wrinkles or cracks
3. The wing surfaces should be inspected for skin wrinkles paying particular attention to the bottom skins in the area just outboard of the main gear and also along the lower mold line of the rear spar. If wing skin wrinkles are evident, the wing closeout panel in the lower surface should be removed and wing stringers and ribs inspected for any damage.
4. The airplane should be placed on jacks and the landing gear retraction mechanism checked by raising and lowering the gears several times.