

DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION

A-782  
Revision 51  
NAVION  
Navion (L-17A)  
Navion A (L-17B)  
(L-17C)  
Navion B  
Navion D  
Navion E  
Navion F  
Navion G  
Navion H  
March 18, 2003

AIRCRAFT SPECIFICATION NO. A-782

Type Certificate Holder	Sierra Hotel Aero, Inc. 1690 Aeronca Ln, Fleming Field South St. Paul, MN 55075
Type Certificate Holder Record	<p>North American Aviation, Inc. to Ryan Aeronautical Company (TC last dated February 3, 1949)</p> <p>Ryan Aeronautical Company to Navion, Division of Tusco Corporation (TC last dated April 2, 1958)</p> <p>Navion, Division of Tusco Corporation to Base Industries, Incorporated (TC last dated May 5, 1961)</p> <p>Base Industries, Incorporated to Navion Aircraft Corporation on November 19, 1964</p> <p>Navion Aircraft Corporation to Cedric R. Kotowicz on June 16, 1972</p> <p>Cedric R. Kotowicz to Navion Rangemaster Corporation on October 14, 1972</p> <p>Navion Rangemaster Corporation to Jimmie Thompson on February 14, 1979</p> <p>Jimmie Thompson to Charles L. Klinger on January 13, 1982</p> <p>Charles L. Klinger to Diamond Aero Enterprises, Inc. on June 17, 1982</p> <p>Diamond Aero Enterprises, Inc. to Navion Holdings, Inc. on January 9, 1995</p> <p>Navion Holdings, Inc. to Navion Aircraft Company, Ltd on January 22, 1998</p> <p>Navion Aircraft Company, Ltd. to Navion Aircraft LLC on July 14, 2001</p> <p>Navion Aircraft LLC to Sierra Hotel Aero, Inc. on March 18, 2003</p>

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I - Model Navion (Army L-17A); 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved January 28, 1947

Engine	Continental E-185-3 or -9 (See Item 139 for optional engine.)			
Fuel	80 min. octane aviation gasoline			
Engine limits	For all operations, 2,300 r.p.m. (185 hp.)			
Airspeed limits	Maneuvering	124 m.p.h.	(108 K)	True Ind.
	Maximum structural cruising	160 m.p.h.	(139 K)	True Ind.
	Never exceed	190 m.p.h.	(165 K)	True Ind.
	Flaps and gear extended	100 m.p.h.	( 87 K)	True Ind.
Propeller limits	With Item 1(a)(1) installed:			
	Diameter 84 in. max., 82.4 in. min. Static r.p.m. 2,000, operating pitch settings at 30 in. sta.; Low 14°, High 23°.			
C.G. range (gear down)	(See NOTE 5 for C.G. range with altered horizontal stabilizer angle of incidence.)			
	Utility -	(+93.9) to (+104.9)		
	Normal -	(+98.1) to (+104.9) at 2,750 lb. (+93.9) to (+104.9) at 2,350 lb. or less		
Empty weight C.G. range	Straight line variation between points given. Effect of retracted landing gear (+1,480 in. lb.) (+93.9 to +95.3) regardless of category. Range is not valid for nonstandard arrangement except that it may be used when auxiliary fuel tank per Item 110(a) or (b) is installed but not when Item 110(e) is installed. When E.W.C.G. falls within this range, computation of critical fore and aft C.G. positions is unnecessary.			
	Maximum weight	Normal - 2,750 lb. Utility - 2,350 lb.		
	No. seats	4 (2 at +96 and 2 at +132)		
Maximum baggage	180 lb. (+159)			
Fuel capacity	39.5 gal. (+103). See Item 110 for auxiliary fuel tank installation			
Oil capacity	10 qt. (+39)			
Control surface movements	Elevator	Up 30°	Down 20°	
	Elevator tab	Up 25°	Down 30°	
	Rudder (measured from centerline of fin chord):			
		Right 23°	Left 17°	
	Aileron	Up 25°	Down 17°	
	Flaps		Down 45°	
Stabilizer	Fixed			
Serial Nos. eligible	NAV-4-2 and up			
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 1(a), 1(b), 102(a), 103(a), 104(a), 105, 106(a) or (b), 201, 202, 302, 401(a).			

II - Model Navion A (Army L-17B and L-17C); 4 PCLM (Normal Category), 2 PCLM (Utility Category), Approved February 3, 1949

(Same as Model Navion except for engine installation and revised fuel system)

Model Navion airplanes may be converted to Model Navion A by installing the following:

- (1) Continental E-185-3 or -9 engine which is eligible for 205 hp. takeoff rating.
- (2) Fuel system in accordance with Ryan Dwg. 145-948021 or 154-948001 (Item 113).

Airplanes serial numbers 1566 and 1628 and subsequent were equipped with these items when delivered.

Engine	Continental E-185-3 or -9 Only engines serial numbers 5122 and up are eligible for the one minute 2600 r.p.m. (205 hp.) takeoff rating, and these engines must have dampered crankshafts. (Suffix "D" to the engine serial number indicates dampered crankshafts.) (See Item 139 for optional engine.)			
Fuel	80 min. octane aviation gasoline			
Engine limits	Takeoff (one min.), 2,600 r.p.m. (205 hp.) Maximum continuous, 2,300 r.p.m. (185 hp.)			
Airspeed limits	Maneuvering	124 m.p.h.	(108 K)	True Ind.
	Maximum structural cruising	160 m.p.h.	(139 K)	True Ind.
	Never exceed	190 m.p.h.	(165 K)	True Ind.
	Flaps and gear extended	100 m.p.h.	( 87 K)	True Ind.

Propeller limits	With Item 1(a)(1) installed: Diameter 84 in. max., 82.4 in. min. Static r.p.m. 2,300, operating pitch settings at 30 in. sta.: Low 10.5°, High 23° With Item 1(a)(2) installed: Diameter 84 in. max., 82.4 in. min. Static r.p.m. 2,325, operating pitch settings at 30 in. sta.: Low 12.5°, High 24.5°
C.G. range (gear down)	(See NOTE 5 for C.G. range with altered horizontal stabilizer angle of incidence.) Utility - (+93.9) to (+104.9) Normal - (+98.1) to (+104.9) at 2,750 lb. (+93.9) to (+104.9) at 2,350 lb. or less Straight line variation between points given. Effect of retracted landing gear (+1,480 in. lb.)
Empty weight	(+93.9 to +95.3) regardless of category. Range is not valid for nonstandard arrangement except that it may be used when auxiliary fuel tank per Item 110(a) or (b) is installed but not when Item 119 is installed. When E.W.C.G. falls within this range, computation of critical fore and aft C.G. positions is unnecessary.
Maximum weight	Normal - 2,750 lb. Utility - 2,350 lb.
No. seats	2 (+96) and 2 (+132)
Maximum baggage	180 lb. (+159) Maximum baggage permissible in Army L-17B and L-17C aircraft is 167 lb. at +159 due to the weight of radio equipment installed in these models. This is a structural limitation, and the full 180 lb. of baggage may be carried if the extra radio equipment is removed.
Fuel capacity	39.5 gal. (+103). See Item 110 for auxiliary fuel tank installations. Army L-17B aircraft were equipped with Item 110(c) when delivered, increasing the fuel capacity for those aircraft to 59.9 gal.
Oil capacity	10 qt. (+39)
Control surface movements	Elevator Up 30° Down 20° Elevator tab Up 25° Down 30° Rudder (measured from centerline of fin chord): Right 23° Left 17° Aileron Up 25° Down 17° Flaps Down 45° Stabilizer Fixed
Serial Nos. eligible	NAV-4-2 and up
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 1(a), 1(b), 102(a), 103(a), 104(a), 106(a) or (b), 113, 201, 202, 302, 401(b) or (c) depending on whether Item 409 is installed.

### III - Model Navion B; 4 PCLM (Normal Category), 1 PCLM (Utility Category). Approved March 13, 1950

Engine	Lycoming GO-435-C2 (See Item 139 for optional engine)
Fuel	91/98 min. octane grade aviation gasoline. 80/87 min. octane when equipped with modified M-4-5 Marvel-Schebler carburetors, Part No. 10-3391-1, and cowl flap extensions specified in Ryan Service Bulletin No. 20 dated March 17, 1953. Airplane Flight Manual revision, Item 401(1), required with 80/87 grade fuel.
Engine limits	Takeoff (2 minutes), 3,400 r.p.m. (260 hp.) Maximum continuous, 3,000 r.p.m. (240 hp.)
Airspeed limits	Maneuvering 124 m.p.h. (108 K) True Ind. Maximum structural cruising 169 m.p.h. (147 K) True Ind. Never exceed 190 m.p.h. (165 K) True Ind. Flaps and gear extended 100 m.p.h. (87 K) True Ind.
C.G. range (gear down)	(See NOTE 4 for C.G. range with altered horizontal stabilizer angle of incidence.) Utility - (+93.9) to (+103.5) Normal - (+98.1) to (+103.5) at 2,850 lb. (+93.9) to (+103.5) at 2,350 lb. or less Straight line variation between points given. Effect of retracted landing gear (+1,480 in. lb.)

Empty weight C.G. range	None.		
Maximum weight	Normal Category - 2,850 lb. Utility Category - 2,350 lb.		
No. seats	2 at (+96) and 2 at (+132)		
Maximum baggage	180 lb. (+159)		
Fuel capacity	39.5 gal. (+103). See Item 110 for auxiliary fuel tank installations. Item 110(b) is installed at the factory.		
Oil capacity	12 qt. (+29.5)		
Control surface movements	Elevator	Up 30°	Down 20°
	Elevator tab	Up 25°	Down 30°
	Rudder (measured from centerline of fin chord):		
		Right 23°	Left 17°
	Aileron	Up 25°	Down 17°
	Flaps		Down 40°
	Stabilizer	Fixed	
Serial Nos. eligible	NAV-4-2B and up (Suffix "B" to the manufacturer's serial no. indicates eligibility as a Model Navion B.)		
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 4 or 5, 102(b), 103(b), 104(b), 106(b) or (d), 127, 128, 201, 202, 302, 401(e) or (f).		

IV - Model Navion D; 4 PCLM (5th Place Optional), (Normal Category), Approved April 2, 1958

Engine	Continental O-470-P		
Fuel	91/96 min. grade aviation gasoline.		
Engine limits	Takeoff (5 minutes), 2,600 r.p.m. (240 hp.)		
	Maximum continuous, 2,600 r.p.m. (240 hp.)		
Airspeed limits	Maneuvering	132 m.p.h. (115 K)	True Ind.
	Maximum structural cruising	169 m.p.h. (147 K)	True Ind.
	Never exceed	198 m.p.h. (172 K)	True Ind.
	Flaps extended	105 m.p.h. (91 K)	True Ind.
	Gear extended	100 m.p.h. (87 K)	True Ind.
	C.G. range (gear down)	(+98.0) to (+103.4) at 3,150 lb. (+93.4) to (+103.4) at 2,350 lb. Straight line variation between points given. Effect of retracted landing gear (+1,467 in. lb.)	
Empty weight C.G. range	None.		
Maximum weight	3,150 lb.		
No. seats	2 (+96) and 2 (+132) or 3 (+132) optional)		
Maximum baggage	180 lb. (+159)		
Fuel capacity	39.5 gal. (+103), 68 gal. (+107)		
Oil capacity	12 qt. total, 9 qt. usable (+32)		
Control surface movements	Elevator	Up 30°	Down 20°
	Elevator tab	Up 25°	Down 30°
	Rudder (measured from centerline of fin chord):		
		Right 23°	Left 17°
	Aileron	Up 25°	Down 17°
	Flaps		Down 40°
	Stabilizer	Fixed	
Serial Nos. eligible	NAV-4-2 and up		
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 13, 101(e), 102(c) or (d), 103(c), 104(c), 106(b) or (d), 110(h), 113(c), 122(b), 129(b), 301(d), 302(b), 401(o)		

V - Model Navion E; 4 or 5 PCLM. (Normal Category). Approved May 22, 1959

Engine	Continental IO-470-C		
Fuel	91/96 min. grade aviation gasoline.		
Engine limits	Takeoff (5 minutes), 2,600 r.p.m. (250 hp.) Maximum continuous, 2,600 r.p.m. (250 hp.)		
Airspeed limits	Maneuvering	132 m.p.h. (115 K)	True Ind.
	Maximum structural cruising	169 m.p.h. (147 K)	True Ind.
	Never exceed	198 m.p.h. (172 K)	True Ind.
	Flaps extended	105 m.p.h. ( 91 K)	True Ind.
	Gear extended	100 m.p.h. ( 87 K)	True Ind.
C.G. range (gear down)	(+98.0) to (+103.4) at 3,150 lb. (+93.9) to (+103.4) at 2,350 lb. Straight line variation between points given.		
Empty weight C.G. range	None.		
Maximum weight	3,150 lb.		
No. seats	4 or 5 (2 at +96 and 2 at +132) or (2 at +96 and 3 at +132)		
Maximum baggage	180 lb. (+159)		
Fuel capacity	39.5 gal. (+103), 68 gal. (+107)		
Oil capacity	12 qt. total, 9 qt. usable (+32)		
Control surface movements	Elevator	Up 30°	Down 20°
	Elevator tab	Up 25°	Down 30°
	Rudder (measured from centerline of fin chord):		
		Right 23°	Left 17°
	Aileron	Up 25°	Down 17°
	Flaps		Down 40°
	Stabilizer	Fixed	
Serial Nos. eligible	NAV-4-2 and up		
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 14, 101(f), 102(c) or (d), 103(c), 104(c), 106(b) or (d), 110(i), 122(b), 127(b), 129(b), 138, 301(d), 302(b), 401(p)		

VI - Model Navion F; 4 or 5 PCLM. (Normal Category). Approved September 23, 1959

Engine	Continental IO-470-H (See NOTE 6 for required structural modification)		
Fuel	100/130 min. grade aviation gasoline.		
Engine limits	Takeoff (5 minutes), 2,625 r.p.m. (260 hp.) Maximum continuous, 2,625 r.p.m. (260 hp.)		
Airspeed limits	Maneuvering	132 m.p.h. (115 K)	True Ind.
	Maximum structural cruising	169 m.p.h. (147 K)	True Ind.
	Never exceed	198 m.p.h. (172 K)	True Ind.
	Flaps extended	105 m.p.h. ( 91 K)	True Ind.
	Gear extended	100 m.p.h. ( 87 K)	True Ind.
C.G. range (gear down)	(+98.0) to (+103.4) at 3,150 lb. (+93.9) to (+103.4) at 2,350 lb. Straight line variation between points given.		
Empty weight C.G. range	None.		
Maximum weight	3,150 lb.		
No. seats	4 or 5 (2 at +96 and 2 at +132) or (2 at +96 and 3 at +132)		
Maximum baggage	180 lb. (+159)		
Fuel capacity	39.5 gal. (+103), 68 gal. (+107)		
Oil capacity	12 qt. total, 9 qt. usable (+32)		
Control surface movements	Elevator	Up 30°	Down 20°
	Elevator tab	Up 25°	Down 30°
	Rudder (measured from centerline of fin chord):		
		Right 23°	Left 17°
	Aileron	Up 25°	Down 17°
	Flaps		Down 40°
	Stabilizer	Fixed	
Serial Nos. eligible	NAV-4-2 and up (See NOTE 6 for required structural modification.)		
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 15, 101(f), 102(c) or (d), 103(c), 104(c), 106(b) or (d), 110(i), 122(b), 127(b), 129(b), 138, 301(d), 302(b), 401(q).		

VII - Model Navion G; 5 PCLM, (Normal Category), Approved May 5, 1961

Engine	Continental IO-470-H		
Fuel	100/130 min. grade aviation gasoline		
Engine limits	Takeoff (5 minutes), 2,625 r.p.m. (260 hp.) Maximum continuous, 2,625 r.p.m. (260 hp.)		
Airspeed limits	Maneuvering	132 m.p.h. (115 K)	True Ind.
(See NOTE 7)	Maximum structural cruising	169 m.p.h. (147 K)	True Ind.
	Never exceed	198 m.p.h. (172 K)	True Ind.
	Flaps extended	105 m.p.h. (91 K)	True Ind.
	Gear extended	130 m.p.h. (113 K)	True Ind.
C.G. range (gear down)	(+99.0) to (+103.4) at 3,315 lb. (+93.9) to (+103.4) at 2,350 lb. Straight line variation between points given.		
Empty weight C.G. range	None.		
Maximum weight	Takeoff - 3,150 lb. (See NOTE 7) Landing - 3,150 lb.		
No. seats	5 (2 at +96 and 2 at +132, and 1 at +164)		
Maximum baggage	176 lb. (+164) See NOTE 2(i)		
Fuel capacity	39.5 gal. (+103), 68 gal. (+107)		
Oil capacity	12 qt. total, 9 qt. usable (+32)		
Control surface movements	Elevator	Up 30°	Down 20°
	Elevator tab	Up 25°	Down 30°
	Rudder (measured from centerline of fin chord):		
		Right 23°	Left 17°
	Aileron	Up 25°	Down 17°
	Flaps		Down 40°
	Stabilizer	Fixed	
Serial Nos. eligible	NAV-4-2351G and up (For NAV 4-2351 through 2497 See NOTE 7)		
Required equipment	In addition to the pertinent basic equipment specified in CAR 3, the following items of equipment must be installed: 15(a), (b), (c); 101(g); 102(c) or (d); 103(c); 104(c); 106(b), (d), or (e); 110(i); 122(b); 127(b); 129(b); 138; 301(d) or (e); 302(b), (c), or (d); 401(s) or (u).		

VIII - Model Navion H; 5 PCLM, (Normal Category), Approved June 5, 1967

Engine	Continental IO-520-B, See Item 142 for optional engine.		
Fuel	100/130 min. grade aviation gasoline		
Engine limits	Takeoff (5 minutes), 2,700 r.p.m. (285 hp.) Maximum continuous, 2,700 r.p.m. (285 hp.)		
Airspeed limits	Maneuvering	135 m.p.h. (117 K)	True Ind.
	Maximum structural cruising	169 m.p.h. (147 K)	True Ind.
	Never exceed	203 m.p.h. (176 K)	True Ind.
	Flaps extended	108 m.p.h. (94 K)	True Ind.
	Gear extended	130 m.p.h. (113 K)	True Ind.
C.G. range (gear down)	(+99.0) to (+103.4) at 3,315 lb. (+93.9) to (+103.4) at 2,350 lb. Straight line variation between points given.		
Empty weight C.G. range	None.		
Maximum weight	Takeoff - 3,315 lb. Landing - 3,150 lb.		
No. seats	5 (2 at +96 and 2 at +132, and 1 at +164)		
Maximum baggage	176 lb. (+164) See NOTE 2(i)		
Fuel capacity	39.5 gal. (+103), 68 gal. (+107)		
Oil capacity	12 qt. total, 9 qt. usable (+32)		
Control surface movements	Elevator	Up 30°	Down 20°
	Elevator tab	Up 25°	Down 30°
	Rudder (measured from centerline of fin chord):		
		Right 23°	Left 17°
	Aileron	Up 25°	Down 17°
	Flaps		Down 40°
	Stabilizer	Fixed	
Serial Nos. eligible	NAV-4-2500H, NAV 4-2500T, and up		
Required equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following items of equipment must be installed: 16(a), (b), and (c) or 17(a), (b), and (c); 101(g); 102(c) or (d); 103(c); 104(c); 106(b), (d), or (e); 110(i); 122(b); 127(b); 129(b); 138(b); 301(d) or (e); 302(b), (c), or (d); 401(v).		

Specifications Pertinent to All Models

Datum	Fuselage station 0, located 93.25 in. forward of the forward bolt centerline (jig point), wing lower surface bolting angle.
Leveling means	External lugs on right side of fuselage at stations 58 and 89.43.
Certification basis	Type Certificate No. 782 (CAR 3 effective November 13, 1945); Model D, E, and F wing, landing gear and flight test requirements (CAR 3 effective May 15, 1956); Model G and H, all except power plant (CAR 3 effective May 15, 1956). Applied for Type Certificate November 5, 1945.
Production basis	None. Prior to original certification, an FAA representative must perform a detailed inspection for workmanship, materials, and conformity with the technical data and a check of the flight characteristics.
Equipment:	A plus (+) or minus (-) sign preceding the weight of an item indicates net weight change when that item is installed. Approval for the installation of all items of equipment listed herein has been obtained by the aircraft manufacturer except those items preceded by an asterisk (*). The asterisk denotes that approval has been obtained by someone other than the aircraft manufacturer. An item marked with an asterisk may not have been manufactured under an FAA monitored or approved quality control system. Conformity must be determined if the item is not identified by a Form FAA-186, PMA, or other evidence of an FAA production approval.

Propellers and Propeller Accessories

Eligible Model

- |   |  |             |        |             |          |  |          |
|---|--|-------------|--------|-------------|----------|--|----------|
| <p>1. (a) Propeller - Hartzell, variable pitch, hub Model Navion HC-12X20-1, -5, -7, 7B, or -7C and either: (For interchangeable blades, see NOTE 6 of Propeller Spec. P-845)</p> <p>(1) Blade Model 8428, or</p> <p>(2) Blade Model 8433 (to be used only with engines having dampered crankshafts. Suffix "D" to the engine serial number indicates dampered crankshafts.)</p> <p>Minimum clearance between the propeller hub spider and the propeller control piston Jack Plate should be 1/16 inch for the -1 and -5 propellers, and 1/8 inch for the -7 propellers. On the -7 propellers, this clearance must be determined by observation while the engine is running. Low pitch stop is on the control lever per Ryan Dwg. No. 145-44054 for the -1 and -5 propellers and on Ryan Dwg. No. 145-44060 for -7 propellers.</p> <p>The propeller counterweight length required with the above is as follows:</p> | <table border="0"> <tr> <td style="text-align: right;">62 lb. (+7)</td> <td style="text-align: left;">Navion</td> </tr> <tr> <td style="text-align: right;">65 lb. (+7)</td> <td style="text-align: left;">Navion A</td> </tr> <tr> <td></td> <td style="text-align: left;">as noted</td> </tr> </table> | 62 lb. (+7) | Navion | 65 lb. (+7) | Navion A |  | as noted |
| 62 lb. (+7)   | Navion   |             |        |             |          |  |          |
| 65 lb. (+7)   | Navion A   |             |        |             |          |  |          |
|   | as noted   |             |        |             |          |  |          |

<u>Airplane Model</u>	<u>T.O. Hp.</u>	<u>Propeller Item</u>	<u>Counterweight Length</u>
Navion	185	1(a)(1)	4 1/2 in.*
Navion	185	1(a)(2)	4 1/8 in.
Navion A	205	1(a)(1)	4 5/16 in.
Navion A	205	1(a)(2)	4 1/8 in.

\*On Model Navion airplanes equipped with propeller Item 1(a)(1), and having Continental E-185-3 engines, serial nos. 4389-D through 5110-D, or engines which have been equipped with Tri-metal front main bearing inserts and bronze thrust washers at overhaul, the counterweight length must be adjusted in accordance with Ryan Field Service Bulletin No. 5 unless the rework outlined in Continental Motors Corp. Service Bulletin No. M48-30 has been accomplished.

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|---|--------------------|
| <p>(b) Propeller control - Manual control for hydraulic unit on Hartzell Propellers, Ryan Dwg. No. 145-43020 (for Hartzell HC-12X20-1 and -5 propellers.)</p> | <p>2 lb. (+56)</p> |
|---|--------------------|

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|----|--|--------------|---|
| 2. | <p>(a) Propeller - Koppers Aeromatic, variable pitch, hub model 220 or 220-1, blade model O-85<br/>Limits:<br/>Model Navion:<br/>Diameter 85 in. max., 83.3 in. min.<br/>Static r.p.m. 2,200, operating pitch settings at 30 in. sta:<br/>Low 13.3°, high 27°<br/>Model Navion A:<br/>Diameter 85 in. max., 83.3 in. min.<br/>Static r.p.m. 2,500, operating pitch settings at 30 in. sta:<br/>Low 10.2°, high 27°<br/>Minimum allowable clearance between the propeller thrust plate and the thrust bracket screws is 0.094 in. when propeller blades are held in the full low pitch position and the control is in the full forward position. (See Koppers' approved "Installation Procedure and Operating Limitations" No. 23.)</p>   | 53 lb. (+7)  | Navion<br>Navion A<br>as noted                  |
| 3. | <p>(b) Altitude compensator - Koppers Aeromatic Model 4349-C, Ryan Dwg. 145-89100. When this item is installed on Model Navion aircraft, approved operating instructions covering operation with this item must be included in the Approved Operating Limitations (Airplane Flight Manual).<br/>(The Flight Manual page contained in Koppers' approved "Installation Procedure and Operating Limitations" No. 23 covers these instructions.)</p>   | 11 lb. (+14) |   |
| 3. | <p>Propeller - Hartzell, two-position automatic, hub model HC-52X20-1, blades model 8433-0.<br/>Eligible on model Navion with E-185-3 engine having serial no. 5122D<br/>and above only.<br/>Low pitch blade angle measured at 30 in. sta. 17.7°.<br/>Pitch range 6° equivalent to 3/16 in. gap between adjusting screws and high pitch stop. Counterweight length 3 5/8 in.<br/>Low to high pitch trip r.p.m. 2,450, high to low pitch latch r.p.m. not less than 1,700. Item 401(d), Operating Limitations Supplement, must be added to 401(a) when this propeller is installed.</p>   | 64 lb. (+6)  | Navion<br>as noted<br><br><u>Eligible Model</u> |
| 4. | <p>Propeller - Koppers Strato-Cruise, variable pitch, hub model 220H, blades model O-93, with No. 4390 pitch control assy.<br/>Diameter 93 in.<br/>Static r.p.m. at maximum permissible throttle setting:<br/>Not over 3,300, not under 3,200.<br/>No additional tolerance permitted.<br/>Operating pitch settings at 30 in. sta:<br/>Low 14° to 14.5°, control 16°, high 29.7°.<br/>Koppers' "Adjustment Instructions and Operating Limitations No. 60" pertains to the use of this propeller on Navion B airplanes.</p>  |              | Navion B  |
| 5. | <p>Propeller, Hartzell, variable pitch, hub model HC-12X20-8C, blades model 9333C, including control. Reference Ryan Dwg. 146-44002.<br/>Diameter 93 in. max., 91.2 in. min.<br/>Static r.p.m. at maximum permissible throttle setting:<br/>Not over 3,250, not under 3,150.<br/>No additional tolerance permitted.<br/>Operating pitch settings at 30 in. sta:<br/>Low 16.5°, high 31.5°.<br/>Propeller counterweight length is 4.25 in.<br/>See Hartzell Installation Instructions for this propeller. Minimum clearance between the propeller hub spider and the propeller control piston Jack Plate should be 1/16 in. This clearance must be determined by observation while the engine is running. Low pitch stop is shown on Ryan Dwg. No. 146-44002. Placard required: "Avoid Continuous Ground Operation Between 1,675 and 2,150 Engine R.P.M."</p> | 76 lb. (+7)  | Navion B  |
| 6. | <p>Propeller spinner, Hartzell Model D-164. Eligible on Hartzell HC-12X20 propeller. Hartzell "Installation and Service Instructions" dated January 6, 1951, pertains to the use of this spinner on Navion B aircraft.</p>   | 3 lb. (+7)   | Noted   |



- |       |  |               |                                |
|-------|--|---------------|--------------------------------|
| 7.    | Propeller - Hartzell, constant speed, hub model HC-12X20-7 or -8 series, and either:   |               | Navion<br>Navion A<br>as noted |
|       | (a) Blade model 8433 eligible on model Navion (185 hp. for T.O.) and model Navion A (205 hp. for T.O.)   | 65 lb. (+7)   |                                |
|       | Limits:  |               |                                |
|       | Model Navion:  |               |                                |
|       | Diameter 84 in. max., 82.4 in. min.  |               |                                |
|       | Pitch settings at 30 in. sta: Low 12.5° (governor inoperative - static 2,360 r.p.m.), high 24.5°   |               |                                |
|       | Model Navion A:  |               |                                |
|       | Diameter 84 in. max., 82.4 in. min.  |               |                                |
|       | Pitch settings at 30 in. sta: Low 10.5° (governor inoperative - static 2,480 r.p.m.), high 24.5°   |               |                                |
|       | (b) Blade model 8428 eligible on model Navion (185 hp. for T.O.) and Navion A (205 hp. for T.O.)   | 62 lb. (+7)   |                                |
|       | Limits:  |               |                                |
|       | Model Navion and Navion A:   |               |                                |
|       | Diameter 84 in. max., 82.4 in. min.  |               |                                |
|       | Pitch settings at 30 in. sta: Low 10.5° (governor inoperative - static 2,360 r.p.m.), High 23°.  |               |                                |
|       | Restrictions of Item 1(a) regarding counterweight lengths, damped crankshafts, and thrust bearings, are applicable to same hub-blade combinations. Minimum clearance between the propeller hub spider and the propeller control piston Jack Plate should be 1/8 in. for the -7 propellers and 1/16 in. for the -8 propellers. This clearance must be determined by observation while the engine is running. Low pitch stop for -7 propellers is shown on Ryan Dwg. No. 145-44060 and on Ryan Dwg. No. 146-44002 for -8 propellers. |               |                                |
|       | (c) Constant speed governor, controls, and adapter installed in accordance with Hartzell Dwg. No.  | 7 lb. (+44)   |                                |
|       | B-161 and Hartzell Installation Instructions No. 1 dated October 25, 1950. Includes Hartzell "T" Drive Adapter No. C-137 and Hartzell Governor model A-1.  |               | <u>Eligible Model</u>          |
| 8.    | Propeller - Hartzell, variable pitch, hub model HC-12X20-7B, blade model 8433-0. Eligible only on Navion aircraft equipped with Continental E-225-4 engines, Engine Item 131.  | 65 lb. (+7)   | Navion<br>as noted             |
|       | Limits:  |               |                                |
|       | Diameter 84 in. max., 82.4 in. min.  |               |                                |
|       | Static r.p.m. 2,250 to 2,390, operating pitch settings at 30 in. sta: Low 14°, high 24°.   |               |                                |
|       | Propeller counterweight length is 4 1/8 in.  |               |                                |
|       | Minimum clearance between the propeller hub spider and the propeller control piston Jack Plate should be 1/8 in. for the -7 or -7C propeller. This clearance must be determined by observation while the engine is running.  |               |                                |
| 9.    | Deleted.   |               |                                |
| 10.   | Deleted.   |               |                                |
| 11.   | Deleted.   |               |                                |
| * 12. | Propeller - Hartzell, controllable pitch, hub model HC-13X20-8D, blade model 8433-0. Eligible only on Navion B aircraft equipped with Symons downdraft engine cooling system, Symons Dwg. No. 111-2.   |               | Navion B<br>as noted           |
|       | Limits:  |               |                                |
|       | Diameter 84 in. max., 84 in. min.  |               |                                |
|       | Pitch settings at 30 in. sta: Low 16.5°, high 32°.   |               |                                |
|       | (a) Propeller - McCauley constant speed, hub model 2A36C18, blade model 90M-4. Eligible only on Navion aircraft equipped with Continental O-470-P engine.  | 62 lb. (+7)   | Noted                          |
|       | Limits:  |               |                                |
|       | Diameter 86 in. max., 84.25 in. min. (No further reduction permitted.)   |               |                                |
|       | Pitch settings at 36 in. sta: Low 11°, high 27.0°.   |               |                                |
|       | (b) Governor, Woodward 210380 or 210105-2  | 4.5 lb. (+16) |                                |
|       | (c) Spinner assembly, McCauley 2A36  | 4 lb. (+ 7)   |                                |

14.	(a)	Propeller - McCauley, constant speed, hub model C2A36C32, blade model 90M-4. Eligible only on Navion aircraft equipped with Continental IO-470-C engine.	60 lb. (+ 7)	Noted
		Limits: Diameter 86 in. max., 84.25 in. min. (No further reduction permitted.) Pitch settings at 36 in. sta: Low 11°, high 27.0°.		
	(b)	Governor, Woodward 210380 or 210105-2	4.5 lb. (+16)	
	(c)	Spinner assembly, McCauley 2A36	4 lb. (+7)	
15.	(a)	Propeller - McCauley, constant speed, hub model B2A36C31 or D2A3633, blade model 90M-4, or D2A34C49, blade model 90A-4. Eligible only on Navion aircraft equipped with Continental IO-470-H engine.	62 lb. (+ 7)	Noted
		Limits: Diameter 86 in. max., 84.25 in. min. (No further reduction permitted.) Pitch settings at 36 in. sta: Low 9.5°, high 27.5°.		
	(b)	Governor, Woodward 210380 or 210105-2	4 lb. (+16)	
	(c)	Spinner assembly, McCauley 2A36	4 lb. (+7)	
16.	(a)	Propeller - McCauley, constant speed, hub model D3A32C90, blade model 82NC-2. Eligible only on Navion aircraft equipped with Continental IO-520-B engine.	62 lb. (+7)	Noted
		Limits: Diameter 80 in. max., 78.4 in. min. (No further reduction permitted.) Pitch settings at 36 in. sta: Low 13.2°, high 30°.		
	(b)	Governor, Woodward 210452 or D210680	4 lb. (+16)	
	(c)	Spinner assembly, McCauley D3669	4 lb. (+7)	
17.	(a)	Propeller - McCauley, constant speed, hub model D2A34C58, blade model 90AT-4. Eligible only on Navion aircraft equipped with Continental IO-520-B engine.	52 lb. (+7)	Noted
		Limits: Diameter 86 in. max., 84.25 in. min. (No further reduction permitted.) Pitch settings at 36 in. sta: Low 10°, high 25.4°.		
	(b)	Governor, Woodward 210452 or D210680	4.0 lb. (+16)	<u>Eligible Model</u>
	(c)	Spinner assembly, McCauley D2771	4 lb. (+ 7)	
<u>Engine and Engine Accessories - Fuel and Oil System</u>				
101.	(a)	Starter, Delco Remy 1109658 (Eligible with Continental E-185-3 engines only)	15 lb. (+47)	Noted
	(b)	Starter, Delco Remy 1109660 (Eligible with Continental E-185-3 engines only)	21 lb. (+47)	Noted
	*	(c) Starter, Precision Machine Works, Wichita, Kansas, E-80-1001; or Eclipse E-80 modified in accordance with Continental Motors Dwg. 530983. (Eligible with Continental E-185-9 engines only. Cannot be used on airplanes equipped with Item 105.)	19 lb. (+47)	Noted
	(d)	Starter, Eclipse 397, Model 50, Style B	18 lb. (+48)	Navion B
	(e)	Delco Remy, 1109471	13 lb. (+44.5)	Navion D
	(f)	Delco Remy, 1109678	13 lb. (+44.5)	Navion E,F
	(g)	Delco Remy, 1109684/110914 starter (Eligible with Continental IO-470-H engine)	13 lb. (+44.5)	Navion G,H
	(h)	STARTER: Prestolite Model MCL6501 TCM, P/N 634592 with Continental IO-520-BA engine	18.6 lb (+44.5)	Navion G, H
102.	(a)	Carburetor air filter, Farr Company N.A.A. Dwg. No. 145-42103	1 lb. (+22)	Navion Navion A
	(b)	Carburetor air filter, Farr Company, Ryan Dwg. 146-42103	1 lb. (+22)	Navion B
	(c)	Carburetor air filter, American Air Filter Corp 56C-1377	1 lb. (+15)	Navion D, E, F, G, H
	(d)	Carburetor air filter, Air Maze P/N 120737 or P/N 123664	1 lb (+15.5)	Navion D, E, F, G, H

103. (a)	Carburetor air intake system (less filter) N.A.A. Dwg. No. 145-42201	4 lb. (+26)	Navion A
(b)	Carburetor air intake system (less filter) Ryan Dwg. No. 146-42206	4 lb. (+24)	Navion B
(c)	Carburetor air intake system Navion Dwg. No. 147-30009	1.5 lb. (+19.5)	Navion D E, F, G, H
104. (a)	Oil cooler with pressure control valve, Harrison AV-79C, AV-86C, or AV-87C.	12 lb. (+43)	Navion Navion A
(b)	Oil cooler with thermostatic control valve VAP type DV-5, Harrison AV-79C, AV-86C, or AV-87C.	12 lb. (+43)	Navion B
(c)	Oil cooler, Harrison Radiator Div. AP10AU08-02 or -04	5 lb. (+17)	Navion D, E, F, G, H
105.	Fuel pump installation - either: (Eligible in lieu of Item 113 or 116 on Model Navion only)		Navion
(a)	Two Carter engine-driven fuel pumps, Models 624-S and 625-S (Continental P/N 50375)	5 lb. (+42)	
(b)	Two Carter engine-driven fuel pumps, Models M687-S and M688-S (Continental P/N 530509)	5 lb. (+42)	
(c)	One Adel electric fuel booster pump (connected in series with one Carter engine-driven fuel pump) (Ryan Dwg. No. 145-948020)	4 lb. (+59)	
* (d)	Two Carter engine-driven fuel pumps, series connected, with modified Auto-pulse electric booster pump in accordance with Instructions and Installation Kit No. CJKM 115, Neo Air, Inc., Torrence Municipal Airport, Lomita, California	7 lb. (+63.5)	
106. (a)	Hydraulic pump assembly, engine-driven, Ryan Dwg. No. 145-58010	2 lb. (+46)	Navion Navion A
(b)	Hydraulic pump, engine-driven, New York Airbrake Model No. 67A025	2 lb. (+46)	Navion Navion A, D,E,F,G,H
		2 lb. (+45)	Navion B
* (c)	Hydraulic pump, Paul T. Arnold Dwg. No. 102, Paul T. Arnold, Culver City, California	6 lb. (+46)	Navion Navion A
(d)	Hydraulic pump, engine-driven, Pesco P/N 1P677	1.5 lb. (+46)	Navion D, E, F, G
(e)	Hydraulic pump, engine-driven, Eastern Industries, Inc., Model No. 102-HBG-Type 219A	2.3 lb. (+46)	Navion D, E, F, G, H
(f)	Hydraulic pump, engine-driven, Eastern Industries, Inc., Model 1235-HBG-Type 263	2.2 lb. (+46)	Navion Navion A <u>Eligible Model</u>
(g)	Hydraulic pump, engine-driven, Eastern Industries, Inc., Model 1213-HBG-310 with Continental IO-520-BA engine.		Navion H
107. (a)	Vacuum system, Ryan Dwg. No. 145-89008	6 lb. (+46)	Navion Navion A Navion B
(b)	Pesco engine-driven pump 3P-194-FA or 3P-194-F	4 lb. (+46)	Navion D, E, F, G, H
(c)	Airborne Mechanism dry vacuum pump model 10-113 (Eligible as alternate to 107(b), system changes required combined moment change 2 lb. (+51.5))	4 lb. (+46)	Navion D, E, F, G, H
(d)	Airborne Mechanism dry vacuum pump model 200 CW or 212 CW with Continental 10-520-BA engine	1.8 lb (+46)	Navion H
108.	See Item 105(d).		
*109.	Engine fire extinguishing system, Walter Kidde 5 lb. CO <sub>2</sub> fixed system in accordance with drawings by Van's Air Service St. Cloud, Minnesota.	17 lb. (+51)	

110.	Auxiliary fuel tank installation (when installed, approved operating instructions covering operation with this item should be included in the Approved Operating Limitations (Airplane Flight Manual.))		Noted
*	(a) 20 gal. installation in accordance with dwgs. 1, 2, 3, 4, 5, and 34 and approved installation instructions prepared by Toth Aircraft and Accessories Co., Kansas City, Mo., Substitute following for baggage placard: "Maximum baggage compt. load: Aux. fuel tank empty, 170 lb. Aux. fuel tank full, 50 lb. Add following placard in front and in clear view of the pilot: "Aux. fuel tank to be used in level flight only."	10 lb. (+159)	Navion Navion A
(b)	20 gal. installation per Ryan Dwgs. 145-48201A and 145-48225A Substitute following for baggage placard: "Maximum baggage compt. load: Aux. fuel tank empty, 161 lb. Aux. fuel tank full, 41 lb. Add following placard in front and in clear view of the pilot: "Aux. fuel tank to be used in level flight only."	19 lb. (+151)	Navion Navion A
(c)	20.4 gal. installation in accordance with Ryan Dwg. No. 145-89067 Add following placard in front and in clear view of the pilot: "Aux. fuel tank not to be used for takeoff or landing."	20 lb. (+130)	Navion Navion A
*	(d) 20 gal. installation in accordance with Dwg. and Installation Kit No. CJKM 3100, Neo Air, Inc., Metropolitan Airport, Van Nuys, California. Add the following placard in front and in clear view of the pilot: "Aux. fuel tank to be used in level flight only."	14 lb. (+132)	Navion Navion A
*	(e) 20 gal. installation in accordance with Dwgs. 503A, 503B, 503C, and "Instructions for Installing Long Beach Aeromotive Auxiliary Fuel Tank Kits in North American Navion," Long Beach Aeromotive, Long Beach, CA. Add the following placard in front and in clear view of the pilot: "Aux. fuel tank to be used in level flight only."	12 lb. (+132)	Navion Navion A
*	(f) 20 gal. installation in accordance with Symons Engineering Dwg. No. SY-102, and installation instructions. Add the following placard in front and in clear view of the pilot: "Aux. fuel tank to be used in level flight only."	10 lb. (+130)	Navion Navion A
*	(g) Two 20 gal. wing tip tank installation per Brittain Aircraft Enterprises Installation Manual TT1-2, Dwgs. 607A and 608A. When installed, approved operating instructions covering operation with this item should be	35 lb. (+100.5)	Noted
	included in the approved Operating Limitations (Airplane Flight Manual). Add the following placard in front and in clear view of the pilot: "Aux. fuel tank to be used in level flight only. To preclude possibility of unsymmetrical fuel flow when operating from both tanks (cross feed selector switch 'on'), select each tank individually for approximately one minute prior to opening cross feed valve."		<u>Eligible Model</u>

Eligible on the following models:

Navion and Navion A: Maximum weight and C.G. range  
(Normal Category only);

Tip Tanks Empty: Same as original model except if  
airplane is modified in accordance with  
NOTE 5. If so, C.G. limits in NOTE 5 apply.

Tip Tanks Full: Same as Tip Tanks Empty except that  
rear C.G. limited to (+102.0).

NOTE: Maximum weight of 2,850 lb. allowed for Navion A if landing gear meets requirements  
outlined in Brittain Aircraft Enterprises Installation Manual TT1-2. In such case,  
C.G. range same as above except that rear C.G. in tip tanks empty condition limited to  
(+104.0) at 2,850 lb. gross weight, straight line variation to (+104.9) at 2,750 lb.

Navion B: Maximum weight and C.G. range (Normal Category only);

Tip Tanks Empty: Same as original model except if airplane is modified in accordance  
with NOTE 4. If so, C.G. limits in NOTE 4 apply.

Tip Tanks Full: Same as Tip Tanks Empty except that  
rear C.G. limited to (+102.0).

NOTE: The 34:1 fuel to oil ratio for this installation is approved.

(h)	Two 34 gal. wing tip tanks manufactured by Fletcher Aircraft Company. Installation in accordance with Navion Dwg. 147-30003 and 147-30012. Placards forward of fuel selector on floor between pilot's and copilot's chairs: "Tip Tanks (to be used in) Level Flight Only" "Do Not Use Tips with More Than 20 Gal. in Main"	47 lb. (+107)	Navion D
(i)	Two 34 gal. wing tip tanks manufactured by Fletcher Aircraft Company. Installation in accordance with Navion Dwg. 147-30003 and 147-30012. Placards forward of fuel selector on floor between pilot's and copilot's chairs: "Tip Tanks (to be used in) Level Flight Only" "Do Not Use Tips with More Than 10 Gal. in Main"	47 lb. (+107)	Navion E F, G, H
*111.	Peterson-Jones oil cooler shutter model B2 installed in accordance with Peterson-Jones Dwg. 1A.	neglect weight	Navion Navion A Navion B
*112.	Southern Ohio Aviation controllable oil shutter in accordance with Dwg. SOAC-361-1, -2, -3, -4.	neglect weight	Navion Navion A Navion B
113.	One Adel electric fuel booster pump, connected in series with one of the following engine-driven pumps: (Eligible in lieu of Item 105 on Model Navion and required on Model Navion A)	4 lb. (+66)	Navion Navion A B, D
(a)	Romec Model 7750-1 or 7790, Ryan Dwg. No. 145-948021 (Reference: Ryan Kit Dwg. No. 145-89068 and Ryan Special Instruction No. 37).	3 lb. (+42)	
(b)	Thompson model TFB-1100, Ryan Dwg. Nos. 145-948021 or 154-948001	1 lb. (+42)	
(c)	One Lear engine-driven pump RG-15980, Navion Dwg. No. 147-30005	1 lb. (+45)	Navion D
114.	See Item 113(a).		
*115.	Modified exhaust system, Long Beach Aeromotive Dwg. and installation Instructions No. LB504	2 lb. (+42)	Navion Navion A Navion B
116.	Fuel pump installation (Eligible in lieu of Items 105 and 113 on Model Navion only.)		Noted
*	(a) One engine-driven fuel pump, Long Beach Aeromotive Dwg. No. LB510 (Installation to be made in accordance with Long Beach Aeromotive "Installation Instructions for LB510 Fuel Pump"), Long Beach Aeromotive, Long Beach, California; and	4 lb. (+42)	
*	(b) One fuel booster pump, Long Beach Aeromotive Dwg. Nos. 502A, 502B, and 502C (Installation to be made in accordance with Long Beach Aeromotive "Instructions for Installation - Booster Fuel Pump No. 502"), Long Beach Aeromotive, Long Beach, California.	8 lb. (+73)	<u>Eligible Model</u>

117. See Item 116(a).		
*118. Cowl flaps - Long Beach Aeromotive Dwg. and Installation Instructions No. 509	5 lb. (+50)	Navion Navion A Navion B
119. See Item 110(e).		
120. Controllable oil shutter, Ryan Dwg. No. 154-47001	neglect weight	Navion
122. * (a) Modified exhaust system and cabin heater, Symons Engineering Installation Instructions and Dwg. SY-103	no wt. change	Navion Navion A Navion B
(b) Hanlon and Wilson Co. Dwgs. 492-1 and 492-7 Installation in accordance with Navion Dwg. 147-30001	6 lb. (+47)	Navion D E, F, G
(c) Hanlon and Wilson Co. Dwgs. 492-23 and 492-55 Installation in accordance with Navion Dwg. 147-30001	6 lb. (+47)	Navion H
*123. Oil cooler shutter, Long Beach Aeromotive Dwg. and Installation Instructions No. 508A	neglect weight	Navion Navion A Navion B
*124. Manually controllable oil cooler shutter, Neo Air, Inc., Dwg. No. CJKM-4900	neglect weight	Navion Navion A Navion B
*125. Fram F30-W oil filter, installed in accordance with Fram Instructions No. 62336-1 and Fram Dwg. No. 62337. (Eligible only on Continental E-185-3 or -9 engines, equipped with No. 530696 large capacity oil pump. Engine serial no. 6003 and above were so equipped at the factory.)	10 lb. (+55)	Noted
*126. Davis Model 190-CN exhaust silencer installed in accordance with Davis Silencer Co. No. 320.	5 lb. (+37)	Navion Navion A Navion B
127. (a) Cowl flaps installed in accordance with Ryan Dwg. 146-31510 through 146-31515 and 145-89071	5 lb. (+53)	Navion Navion A
(b) Cowl flaps installed in accordance with Ryan Dwg. 146-31510 through 146-31515 and 146-51006	5 lb. (+53)	Navion B D,E,F,G,H
128. Navion B fuel system in accordance with Ryan Dwg. No. 146-48001 and incorporating the following fuel pumps connected in series:		Noted
(a) Adel Model 23067 electric fuel pump	4 lb. (+59)	
(b) Romec Model RD7790-A2N engine-driven fuel pump	3 lb. (+45)	
129. * (a) Downdraft engine cooling system, manufactured and installed in accordance with Symons Engineering Dwgs. SY-107 and -107A, B, C, D, E, F, G, H, and I. This installation requires cowl flaps. Items 118, 127, or Symons Dwg. 103 called for in Item 122. (Eligible on Navion, Navion A, and on Navions equipped with Engine Item 131.)	No wt. change	Noted
(b) Downdraft engine cooling system. Installed in accordance with Navion Dwg. No. 147-30011.		Navion D E, F, G, H
*130. Fletcher Aviation Corp. engine cooling system. (Downdraft type with exhaust augmenters.) Reference Fletcher Part Nos. SK6601 through SK6674, installed in accordance with Fletcher Aviation Corp. instructions. (Eligible on Navion, Navion A, and on Navions equipped with Engine Item 131.)		Noted
131. Continental E-225-4 engine (Interchangeable with Continental E-185-3 and -9) Limits: For all operations, 2,600 r.p.m., F.T., 224 hp. NOTE: Although the engine rating is 225 hp. at 2,650 r.p.m., the tachometer must be redlined at 2,600 r.p.m. because of propeller vibration limitations. Aircraft must also be placarded "Do Not Exceed 2,600 R.P.M." This engine approved only in accordance with either of the following: *(a) Symons installation with the following required: Engine cooling system, Item 129; cowl flaps in accordance with Items 118, 127 or cowl flaps specified in Item 122; cylinder head temperature gauge; propeller, Item 8; and fuel system Item 113(a); Airplane Flight Manual Supplement Item 401(h).	No wt. change	Noted

		<u>Eligible Model</u>
* (b) Fletcher Aviation Corp. installation with the following required: Engine cooling system, Item 130; propeller, Item 8; fuel system 113(a); Airplane Flight Manual Supplement Item 401(i).		
* (c) Neo Air, Inc., installation with the following required: Engine cooling system, Item 136; propeller, Item 8; fuel system 113(a); Airplane Flight Manual Supplement Item 401(k).		
132. Deleted.		
133. Deleted.		
134. Deleted.		
135. Deleted.		
*136. Neo Air, Inc., Torsion cooling system (Downdraft type); installed in accordance with Neo Air Dwgs. CJKM-6002 and CJKM-6003, installation instructions. (Eligible on Navion, Navion A, and on Navions equipped with engine Item 131.)	No wt. change	Noted
137. Deleted.		
138. (a) Weldon electric fuel pump P/N 4020-A2A or P/N 4020-A4A, connected in series with Continental fuel injection pump, Navion Dwg. 147-30001, Sheet 4 of 4.	3 lb. (+66)	Navion E F, G
(b) Dukes Astronautics electric fuel boost pump P/N 4140-00-17N connected in series with Continental engine IO-520-B or IO-520-BA injection fuel pump, Navion Dwg. 161-30001, sheet 2 of 4.	2.5 lb. (+66)	Noted
139. Continental IO-470-H engine installed per Navion Report Nav-TU-113. Fuel 100/130 octane aviation gasoline Engine limits: All operations 2,625 r.p.m. (260 hp.) The following items of equipment are required in lieu of their respective components as shown for the model receiving the installation: Items 15; 102(c) or (d); 103(c); 104(c); 106(b) or (d); 122(b); 127(b); 129(b); 138; 302(b); 401(c), or (f) and (r).		Navion Navion A, B
140. Continental O-470-P engine installed in accordance with Dwg. 147-30001. Fuel 91/96 octane aviation gasoline Engine limits: All operations 2,600 r.p.m. (240 hp.) Required equipment items: Items 13(a), (b), and (c); 102(c) or (d); 103(c); 104(c); 106(b) or (d); 122(b); 127(b); 129(b); 138; 302(b); 401(x).		Navion A
141. Continental IO-520-B engine installed in accordance with Dwg. 161-30001. Fuel 100/130 octane aviation gasoline. Engine limits: All operations 2,700 r.p.m. (285 hp.) Additional required equipment: Items 16(a), (b), and (c) or 17(a), (b) and (j); 401(w).		Navion A B,D,E,F,G
142. Continental IO-520-BA engine installed in accordance with Dwg. 161-30001 Fuel 100/130 octane aviation gasoline Engine limits: All operations 2,700 r.p.m. (285 hp.) Additional required equipment: Items 16(a), (b), and (c); 101(h); 106(g); 107(d); 301(f); 304(d); 401(y).		Navion H
<u>Landing Gear and Floats</u>		
201. Main Landing Gear - 7.00-8 4-ply rating tires and Type III 7.00-8 wheel brake assemblies, either: (Eligible on Navion, Navion, A, B, D, E, F, and Navion G at 3,150 lb.) Main Landing Gear tires - 6.50-8 6-ply sidewall inflated tubeless required on Navion G and H with gross weight on 3,315 lbs.		Noted
(a) Goodrich Model 6057MD	20.5 lbs. (+114)	Navion G, H
(b) Firestone Model DFA234	50 lb. (+114)	
(c) Goodrich Model G-14-720-MD-1	50 lb. (+114)	
(d) Goodyear 9532135 wheel assy.	50 lb. (+114)	Navion G, H
(e) Goodyear 9541868 brake assy.	17.5 lb. (+114) 16.0 lb. (+114)	Navion G, H

202. Nose Wheel - 6.00-6 4-ply rating tire and Type III 6.00-6 wheel, either:		All Models
(a) Firestone Model 6C-5	14 lb. (+46)	
(b) Goodrich Model D-3-609-MD-1	14 lb. (+46)	
(c) Goodyear 9532112 nose wheel assy. (+46)		All Models <u>Eligible Models</u>
*203. Tennes-Navion landing gear-wheel fairing kit. Landing gear fairing fabricated and installed in accordance with Dwg. Nos. T-100 and T-101, and wheel fairing fabricated and installed in accordance with Dwg. No. T-200-FI for Firestone wheels, or wheel fairing fabricated in accordance with Dwg. Nos. C-T-200-G and T-200-GI for Goodrich (Hayes) wheels.	8 lb. (+114)	All Models
*204. Nose gear enclosure	6 lb. (+60)	All Models
Main wheel enclosures, both wheels	5 lb. (+114)	
Installed per Long Beach Aeromotive Dwg. LB505A and LB505B		
205. Landing gear fairing installation, Ryan Dwg. No. 145-33301		
(a) Nose gear fairing	6 lb. (+114)	All Models
(b) Main gear fairing	5 lb. (+114)	
*206. Landing gear fairing installation, Symons Engineering installation Dwg. Nos. SY-105-A and -B; Symons Engineering, Box 2262, El Segundo, California		All Models
(a) Nose gear fairings	3 lb. (+50)	
(b) Main gear fairings	4 lb. (+114)	
207. Toe brake master cylinders Paramount Machine Co. P/N V1-15-750-4	2.0 lb. (+65)	Navion G, H
<u>Electrical Equipment</u>		
301. Generator or DC alternator		
(a) Delco Remy 25 amp.	15 lb. (+47)	Navion Navion A
(b) Ryan Dwg. No. 146-40100	22 lb. (+49)	Navion B
* (c) 50 amp., Lear Dwg. A43977	15 lb. (+47)	Navion Navion A
(d) Delco Remy, 12 volt, 50 amp., 1101909 or 1101912	16 lb. (+44.5)	Navion D E, F, G Navion G, H
(e) Delco Remy, 12 volt, 70 amp., alternator 1100715 (Eligible on Navion G and H models with IO-520-B Continental engine)		
(f) Prestolite 12 volt, 70 amp. alternator ALX-9405 TCM, P/N 634785 with Continental IO-520-BA engine	11.4 lb. (+47)	Navion H
302. (a) Battery (Exide 6-TAS-9B) and battery case, NAA Dwg. 145-54020	37 lb. (+151)	Navion Navion A, B
(b) Battery, re-bat type R-33	30 lb. (+151)	Navion D
(c) Battery, Exide AC 66	30 lb. (+52)	E, F, G, H
(d) Battery, Exide AC 78	26 lb. (+51)	Navion G, H
303. Landing light (G.E. 4509) and bracket, NAA Dwg. 145-54007	27 lb. (+51)	Navion G, H
304. Voltage regulator	3 lb. (+114)	All Models
(a) Delco Remy 1118340	neglect weight	Navion Navion A
(b) Leece-Neville 3038-R6	neglect weight	Navion B
(c) Leece-Neville 3038-RB-6	3 lb. (+53)	Navion D
(d) Prestolite VSF72035 or 7204	0.8 lb. (+53)	Navion H



Interior Equipment

401. CAA or FAA Approved Airplane Flight Manual (Approved Operating Limitations)		Noted
(a) Issue dated 6-3-47. Required for Model Navion airplanes.		
(b) Issue dated 2-3-49. Required for Model Navion A airplanes if item 409 is installed.		
(c) Issue dated 7-26-49. Required for Model Navion A airplanes if Item 409 is not installed.		
(d) Supplement to Item 401(a), dated 4-20-49. Required with Item 3.		
(e) Issue dated 3-13-50. For Model Navion B airplanes equipped with propeller Item 4.		
(f) Issue dated 7-17-50. For Model Navion B airplanes equipped with propeller Item 4 or 5.		
* (g) Supplement to Airplane Flight Manual dated 10-24-51. Required for airplanes with automatic pilot. Item 412(a). Revision 9-2-52 (Lear No. 96122) required when altitude controller installed; revision dated 12-1-54 permitted with 974R attitude gyro installed. Revision dated 6-18-54 required with approach coupler.		
* (h) Supplement to Airplane Flight Manual dated 8-21-52. Required for airplanes equipped with engine Item 131(a) (Symons Installation).		
* (i) Supplement to Airplane Flight Manual dated 6-26-52. Required for airplanes equipped with engine Item 131(b) (Fletcher Airplane Installation).		
* (j) Deleted.		
* (k) Supplement to Airplane Flight Manual dated 4-14-53. Required for airplanes equipped with engine Item 131(c) (Neo Air Installation).		
(l) Revision No. 2 dated 3/27/53 to Item 401(f) Airplane Flight Manual. Required with 80/87 octane fuel on Model Navion B.		
(m) Deleted.		
(n) Deleted.		
(o) Issue dated 4-2-58. Required for Model Navion D airplanes.		
(p) Issue dated 5-1-59. Required for Model Navion E airplanes.		
(q) Issue dated 9-23-59. Required for Model Navion F airplanes.		
(r) Supplement to Airplane Flight Manual dated 10/25/62. Required for aircraft equipped with Item 139.		
(s) Issue dated 5-5-61. Required for Model Navion G airplanes S/N 2351 through 2400. Required for S/N 2401 through 2497 if NOTE 7 has not been complied with and maximum gross weight is 3,150 pounds.		
(t) Airplane Flight Manual Supplement dated 11-1-62. Required when Item 412(f) ARC512A or B automatic pilot is installed.		
(u) Issue dated 10-25-62. Required for Model Navion G airplanes S/N 2498 and up and S/N 2401 through 2497 with a maximum gross weight of 3,315 pounds.		
(v) Issue dated 6-5-67 required for Model Navion H airplanes.		
(w) Supplement to AFM dated 8/3/66, required for Model Navion G (3,315 pounds) airplanes equipped with Item 141. Supplement dated 8-23-66 required for Models Navion A, B, D, E, or F airplanes equipped with Item 141.		
(x) Supplement to AFM dated 11/14/67. Required for aircraft equipped with Item 140.		
(y) Issue dated 6-5-67, revised 12-27-74, required when Item 142 is installed.		
404. Flare installation		
(a) 3 International MK-1 parachute flares and Kilgore Mfg Co. Model R3M-1 switch panel.	16 lb. (+188)	All Models
(b) Mounting bracket, NAA Dwg. 145-89002		All Models
407. Heater Installation, NAA Dwg. 145-89006	12 lb. (+47)	Navion Navion A Navion B

408. Venturi tube accessory Kit installation, Ryan Dwg. 145-89066.	4 lb. (+60)	All Models
409. Intermediate flap setting provisions (Valve Assembly, Flap indicator line, flap indicator light installation) in accordance with Ryan Dwg Nos. 145-58012-J, 154-00010-E, 145-540001-K, and 145-54076. (Item 401(b) may be used only in those airplanes in which item 409 is installed.)	Neglect Weight	All Models
410. Deleted 6/13/61.		
411. Safe Flight indicator installation in accordance with Ryan Dwg. No. 145-89111.	1 lb. (+78)	All Models
412. Automatic pilot installations		
* (a) Lear Model L-2B according to Lear Dwgs. 82984 and 43654 and Model 1404 or 2203 altitude controller (opt. equip.) according to Lear Dwg. 82894.	33 lb. (+160)	Navion Navion A
Model 1350A-2 approach coupler (opt. equip.) according to Lear Dwg. 82984.	1.5 lb. (+222)	B, D, E, F
Model 937A controller (replaces 1049A).	7.5 lb. (+151)	
	2.5 lb. (+77)	
		<u>Eligible Model</u>
Items 301(c), 304(a), and 401(g) or 301(b), 304(b), and 401(g) or 301(d), 304(c), and 401(g) are also required. Servo stall torque measured at the servo on the ground: Aileron 40 in. lb., elevator 40 in. lb., rudder 55 in. lb. The following placard shall be installed near the autopilot controller: "(1) When Using Autopilot in Cruise Configurations, Minimum Terrain Clearance is 500 feet. "(2) When Using Autopilot in Approach, Minimum Terrain Clearance is 300 feet. (Minimum Altitudes Do Not Override any Higher Operational Altitudes.) (3) Do Not Override Autopilot to Increase Angle of Bank." (b) Deleted.		
* (c) Javelin A-2 or A-3 Single Axis autopilot according to Javelin Dwg. 724, Revision B1, and instructions dated 5/10/55.	18 lb. (+192)	Navion Navion A Navion B
* (d) Lear Arcon rudder control per Lear Dwg. No. 703767	15 lb. (+160)	Navion Navion A Navion B
* (e) Mitchell Industries, Inc., Model AK045 automatic pilot in accordance with Mitchell Bulletin No. 109 and supplement dated 1-19-56 (weight does not include gyros).	10 lb. (+55)	Navion Navion A B, D, E, F
(f) Aircraft Radio Corporation Model ARC512A or B installed in accordance with Navion Dwg. 161-70002, Revision "C." Servo actuator assembly No. 29720 torque adjustment is 45±3 in. lb. Item 401(t) required.	12 lb. (+97.35)	Navion G

NOTE 1. Current weight and balance report, including list of equipment included in certificated weight empty, and loading instructions when necessary, must be in each aircraft at the time of original certification and at all times thereafter (except in the case of air carrier operators having an approved weight control system).

NOTE 2. The following placards must be displayed:

- (a) In front and in clear view of the pilot:  
    "This airplane must be operated in compliance with FAA Approved Operating Limitations."
- (b) In front and in clear view of the pilot:
- (1) For Navion airplanes. "Normal Category Only (G.W. 2,750 lb.). No acrobatic maneuvers, including spins, approved."
  - (2) For Navion A airplanes. "Normal Category Only (G.W. 2,750 lb.). No acrobatic maneuvers, including spins, approved." When incorporating wing tip fuel tanks and with landing gear meeting the requirements outlined in Brittain Aircraft Enterprises' Installation Manual TTI-2, placard should specify G.W. 2,850 lb.
  - (3) For Navion B airplanes. "Normal Category Only (G.W. 2,850 lb.). No acrobatic maneuvers, including spins, approved."
  - (4) Deleted.

- (5) Navion, Navion A, and Navion B airplanes (except Navions incorporating wing tip fuel tanks). "Utility Category (G.W. 2,350 lb.). No acrobatic maneuvers, including spins, approved except those listed below:

<u>Maneuver</u>	<u>Entry Speed</u>
Steep turns (up to 60° only)	110-150 m.p.h. TIAS
Chandelles	150-160 m.p.h. TIAS
Lazy 8's	130-150 m.p.h. TIAS
Stalls (except whip stalls)	
straight flight, power off,	
Gear and flaps up	69 m.p.h. TIAS (64 IAS)
Gear and flaps down	55 m.p.h. TIAS (50 IAS)"

- (6) On Navion D airplanes. "G.W. 3,150 lb.). No acrobatic maneuvers, including spins, approved."  
 (c) On Navion, Navion A, and Navion B: "Do not enter or leave airplane while engine is running."  
 (d) On all models with a canopy, on the left hand canopy rack, 7 1/2 inches from windshield and in clear view of occupants: "Do not open enclosures beyond this point while in flight except for emergency."  
 (e) In front and in clear view of the pilot:  
 (1) With items 110(a), 110(b), 110(d), 110(e), and 110(f): "Aux. fuel tank to be used in level flight only."  
 (2) With item 110(c): "Aux. fuel tank not to be used for takeoff and landing."

Eligible Model

- (3) With item 110(g): "Aux. fuel tanks to be used in level flight only."  
 "To preclude the possibility of unsymmetrical fuel flow when operating from both tanks (cross feed selector switch 'on'), select each tank individually for approximately one minute prior to opening cross feed valve."  
 (f) On Navion B airplanes only, in front and in clear view of the pilot:  
 "When one or more seats are unoccupied, ballast is required. See Approved Flight Manual."  
 (g) On Navion B airplanes equipped with propeller item 5 only, in front and in clear view of the pilot:  
 "Avoid Continuous Ground Operation Between 1,675 and 2,150 Engine R.P.M."  
 (h) On Navion D airplanes, the placards specified in the Airplane Flight Manual, item 401(o), must be displayed in front and in clear view of the pilot:  
 (i) On Navion G and H airplanes on left side of bulkhead closure at Sta. 179: "Max. capacity 176 lb. passenger or cargo with seat installed; 190 lb. when seat removed."  
 (j) For aircraft incorporating tip tank, the following placard is to be located forward of the fuel selector valve on the floor between the pilot and copilot's seats:  
 "Tip tanks to be used in level flight only. Do not use tip tanks with more than 10 gal. in mains." This is required to provide space in main tanks for fuel and vapor return.

NOTE 3. Deleted. Information pertinent to twin-engine Navions now covered in Aircraft Specification 2A1.

\*NOTE 4. The horizontal stabilizer angle of incidence may be altered on all Navion B model airplanes when accomplished in accordance with Palo Alto Airport, Inc., "Instructions for Modifying Navion Tail Assemblies." The following C.G. range will apply:  
 Utility - (+94.8) to (+103)  
 Normal - (+98.1) to (+103) at 2,850 lb.  
 (+94.8) to (+103) at 2,350 lb. or less  
 Straight line variation between points given. Effect of retracted landing gear (+1,480) in. lb.

\*NOTE 5. The horizontal stabilizer angle of incidence may be altered on all Navion A model airplanes when accomplished with the following:  
 (a) Palo Alto Airport, Inc., "Instructions for Modifying Navion Tail Assemblies" or  
 (b) Symons Engineering Dwg. SY-108 "Installation Instructions for Navion Stabilizer Change."  
 The following C.G. range applies for both (a) and (b):  
 Utility - (+94.8) to (+104.9)  
 Normal - (+98.1) to (+104.9) at 2,750 lb.  
 (+94.8) to (+104.9) at 2,350 lb. or less  
 Straight line variation between points given. Effect of retracted landing gear (+1,480) in. lb.

NOTE 6. Fuselage structural reinforcing in accordance with Navion Dwg. 143-31001-700 required with installation of Continental IO-470-H engine on all models through Navion F.

NOTE 7. Airplane S/N 2351 through S/N 2400 maximum weight is 3,150 lb. takeoff and landing. Takeoff weight may be increased to 3,315 lb. on S/N 2401 through S/N 2497 with modifications per Navion Dwg. No. 161-00002-3. S/N 2498 and up, takeoff weight is 3,315 lb. Airspeed limits at 3,315 lb. are as follows:

Maneuvering	135 m.p.h. (117 knots) True Ind.
Maximum structural cruising	169 m.p.h. (147 knots) True Ind.
Never exceed	203 m.p.h. (176 knots) True Ind.
Flaps extended	108 m.p.h. ( 94 knots) True Ind.
Gear extended	130 m.p.h. (113 knots) True Ind.

...END...