THIS IS THE F28C

Manufactured by The Enstrom Helicopter Corporation, Menominee Michigan. This manual pertains to Model F28C helicopters S.N. 418 and up or as modified in accordance with Enstrom Drawing 28-100005.

Ownership of the Turbocharged F28C Helicopter will provide you with a smooth, distinctive, and comfortable mode of flight geared to the concept of modern transportation. For business or pleasure, the field of operations is practically unlimited, as point-to-point travel can be accomplished from either prepared or unprepared areas. The distinctive appearance of the F28C is symbolic of prestige and its high performance capabilities. Under the graceful lines of the F28C is a ruggedly constructed helicopter designed for easy servicing, minimum maintenance, dependability and economical operation.

Reprint: 1994 Report No. 28-AC-017

SECTION 1 – GENERAL

SECTION 2 – LIMITATIONS – FAA APPROVED

SECTION 3 – NORMAL PROCEDURES – FAA APPROVED

SECTION 4 – EMERGENCY & MALFUNCTION PROCEDURES – FAA APPROVED

SECTION 5 – PERFORMANCE – FAA APPROVED

SECTION 6 – WEIGHT AND BALANCE

SECTION 7 – AIRCRAFT AND SYSTEM DESCRIPTION

SECTION 8 – AIRCRAFT HANDLING, SERVICING AND MAINTENANCE

SECTION 9 – OPERATIONAL INFORMATION

SECTION 10 – SUPPLEMENTS

Wet/Dry Dispersal System – Supplement No. 1

Float Landing Gear – Supplement No. 2

SECTION 1 — GENERAL

INTRODUCTION

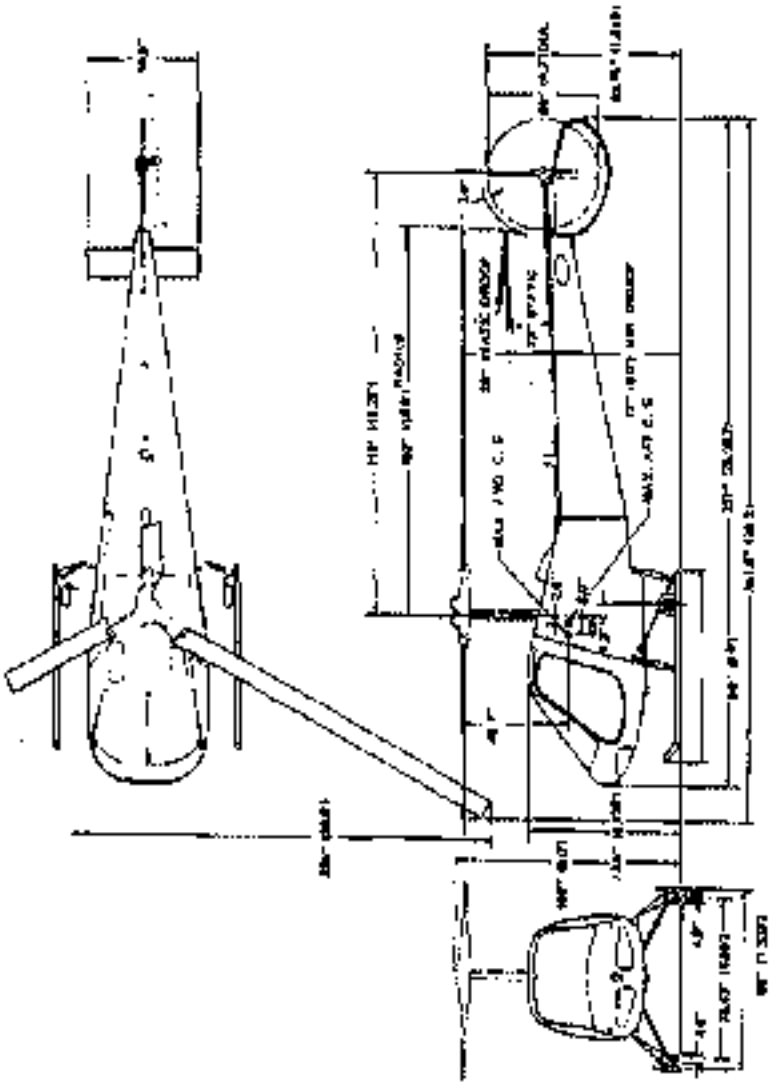
This manual meets all FAA requirements for approved data and this data is so designated. It also contains supplemental data supplied by the Enstrom Helicopter Corporation.

In addition to this manual, the Enstrom Helicopter Corporation also has available for your helicopter a Maintenance Manual and a Parts Catalog. Both of these can be obtained from your Enstrom dealer or from the factory.

Periodic revisions are made to these manuals to incorporate changes and additions. Service information is also issued to owners of record in the form of:

Service information letters (informative and advisory)
Service directive bulletin (mandatory)

PRINCIPAL DIMENSIONS OF THE ENSTROM F28C



SPECIFICATIONS

Power Plant

Type	Lycoming Opposed
Designation	HIO-360-E1AD
Cylinders	4
Normal Power	205 HP
Normal RPM	2900 RPM
Specific Fuel Consumption (Full Rich)	.68 lbs. hp/hr.
Weight	322 lbs.
Oil	10 qts. @ 16 lbs.

Performance

Maximum Speed

V_{NE} Power On	112 MPH to 3000 ft. Above 3000 ft, see FM-5-1
Power Off	Due to high rates of descent at high forward speeds, sustained autorotation speed is limited to 85 MPH to 6200 ft. Above 6200 ft., see FM-5-1.
Best Rate of Climb	57 MPH IAS at sea level; above sea level see FM-5-7
Normal Fuel Capacity	40 U.S. gal. at 240 lbs
Rate of Climb at Sea Level	1125 FPM
Hovering Ceiling – IGE	8800 ft.
Standard Day – 2350 lb. G.W. Service Ceiling	Above 16,000 ft.*

Operating RPM

Engine	2750 – 2900
Tail Rotor	2504 (at 2900 engine RPM)
Main Rotor	350 (at 2900 engine RPM)
Main Rotor Autorotation Range	332 – 385

*Maximum FAA approved operating ceiling presently limited to 12,000 ft.

Ratios

Lower to upper pulley	1:157
Main Rotor Gear Box	1:7.154
Tail Rotor Gear Box	1:1
Engine to main rotor	8.277

Dimensions

Width (overall)	28' 2"
Rotor diameter	32'
Height (overall)	9'
Length (overall)	27' 8"
Cabin width at seat	58"
Tread-Landing Gear	7' 4"

Rotor System

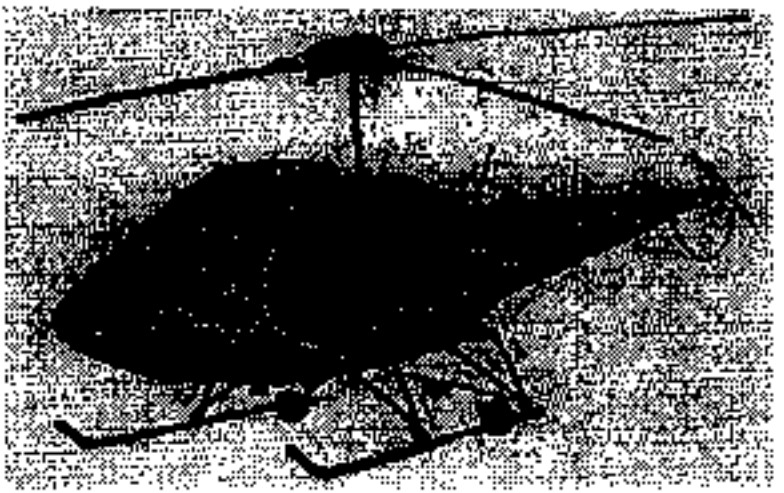
Number of blades,	
Main rotor	3
Cord-main rotor blade	9.5"
Disk area, main rotor	804 sq. ft.
Main rotor RPM	350
Tail rotor diameter	4.67"
Number of blades, tail rotor	2
Chord, tail rotor blade	4.4"

Weight

Designed gross weight	2350 lbs.
Empty weight (approx.)	1495 lbs.
Useful load	855 lbs.
C.G. travel	92" to 94.6" at 2350 lbs. 92" to 100" at 2000 lbs.

SECTION 2 - LIMITATIONS

ENSTROM MODEL F28C HELICOPTER



Type Certificate No. H1CE

Registration No. _____

Approved by _____

for Chief, Engineering and Manufacturing Branch
Flight Standards Division
Great Lakes Region
Federal Aviation Administration
April 20, 1978

NOTE: Sections 2, 3, 4, and 5 are FAA approved. Section 10 includes supplements to the type certificate which are FAA approved if so designated.

NOTE: This manual pertains to Model F28C helicopters S/N 418 and up or as modified in accordance with Enstrom Drawing 28-100005.

FAA Approval: April 20, 1978 Report No. 28-AC-017

ENSTROM F28C

LOG OF PAGES AND REVISIONS

Rev. No.	Pages	Description	Date	F.A.A. Approved*
1	FM 10-3-1 FM 10-3-2 FM 10-3-3	Revised External Load Supplement	9-5-79	
2	FM 10-2-1 thru 10-2-6	Revised Float Supplement to Add Restricted Catagory Envelope Added Supplament 5, 6, & 7	6/26/81	
3	FM 2-7 3-3 3-4 3-5	Added placard & operational information.	9/24/82	
4	FM2-2 2-4 2-7 3-1 3-3 thru 3-6	Added operation instructions, information and placards. 7-3, 9-2, 9-3	29 AUG 85	

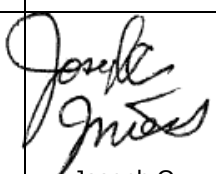
* Approved for Manager
Chicago Aircraft Certification Office
Central Region
Federal Aviation Administration

NOTE: All revisions are indicated by a black vertical line. |

FAA Approval: April 20, 1978
Revised: May 22, 1998

Report No 28-AC-017

LOG OF PAGES AND REVISIONS

Rev. No.	Pages	Description	Date	FAA Approved
5	iv FM-3-3 FM-3-4 FM-8-4 FM-8-7 FM-9-9	Added Blade Tape Added Step Minor Revision Added Blade Tape Information “ “	Feb 17/89	Pat Moe
6	II FM-4-6	Added Abnormal Vibrations Added page	Apr 18/89	Pat Moe
7	i-vi FM-2-2.1 FM-4-5 FM-4-6 FM-4-7 FM-8-9 FM-9-9	Revised Page Numbering FAA Approval Revised Emergency Procedure and Moved Text, Added Page Corrected Header Added Text	May 22/98	Joseph C. Miess
8	ii FM-2-2.1 FM-4-7 FM-4-8	Updated FAA Approval Added Lamiflex Bearing Failure Emergency Procedures	Jul 9/12	 Joseph C. Miess

* Approved for Manager
Chicago Aircraft Certification Office
Central Region
Federal Aviation Administration

NOTE: All revisions are indicated by a black vertical line.

LOG OF PAGES AND REVISIONS

Rev. No.	Pages	Description	Date	FAA Approved
9	i through viii	Updated	MAR 28 2017	ACE-117C
	FM-2-2.2	FAA Approval		
	FM-2-2.3	Log Update		
	FM-2-2.4	Log Update		
	FM-2-3	Log Update		
	FM-2-3.1	Added Fuel Check		
	FM-8-6	Revised Figure		
	FM-8-7	(blank)		
	FM-8-8	Incorporated		
	FM-8-9	Supplement 5		
	FM-8-10	Incorporated		
	FM-10-5-1	Supplement 7		
	FM-10-5-2			
	FM-10-7-1			
	FM-10-7-2	Incorporated		
	FM-10-7-3	Supplement 8		
	FM-10-7-4			
	FM-10-8-1			
	FM-10-8-2			
	FM-10-8-3			
	FM-10-8-4			
	FM-10-8-5			
	FM-10-8-6			
	FM-10-8-7			
	FM-10-8-8			
	FM-10-9-1	Incorporated		
	FM-10-9-2	Supplement 9		
	FM-10-9-3			
	FM-10-9-4			
	FM-10-11-1	Incorporated		
	FM-10-11-2	Supplement 11		
	FM-10-11-3			
	FM-10-11-4			
	FM-10-11-5			
	FM-10-11-6			

* Approved for Manager
Chicago Aircraft Certification Office
Central Region
Federal Aviation Administration

NOTE: All revisions are indicated by a black vertical line.

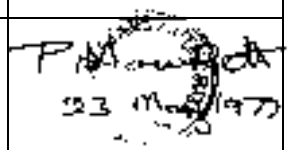
INTENTIONALLY LEFT BLANK

EASA LOG OF REVISIONS

Rev. No.	Date	EASA Approved	FAA Approval on Behalf of EASA
1	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
2	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
3	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
4	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
5	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
6	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
7	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
8	Aug 17/15	FAA/EASA T.I.P.*	G. J. Michalik
9	Aug 16/17	FAA/EASA T.I.P.*	

* Section 3.2 T.I.P.

LOG OF PAGES AND REVISIONS

Rev. No.	Pages	Description	Date	C.A.A. Approved*
1	2-2-UK 2-8-UK 3-2-UK 3-3-UK 3-4-UK 3-5-UK 5-8-UK 5-9-UK 9-9-UK	Added for CAA requirements	5-2-77	

*Approved for Civil Aviation Authority
Airworthiness Division
Redhill, Surrey
England

NOTE: All revisions are indicated by a black vertical line.

LOG OF SUPPLEMENTS

Supp. No.	Description	Date	F.A.A. Approved*
1	Wet/Dry Dispersal System	5-5-78	C. E. Arnold
2	FLOAT LANDING GEAR	6-16-78	C. E. Arnold
3	External Loads Supplement	7-28-78	C. E. Arnold
4	Snowshoe Supplement	7-28-78	C. E. Arnold
5	Right Side Pilot Configuration	6-26-81	C. E. Arnold
6	[RESERVED]		
7	Electric Clutch Actuator	6-26-81	C. E. Arnold
8	Emergency Float Landing Gear	11-20-81	C. E. Arnold
9	Throttle Correlator	6-30-81	C. E. Arnold
10	[RESERVED]		
11	Auxiliary Fuel Tank	9-23-83	W. F. Horn

* Approved for Chief, Engineering and Manufacturing Branch,
Flight Standards Division,
Great Lakes Region
Federal Aviation Agency

NOTE: All revisions are indicated by a black vertical line.

EASA LOG OF SUPPLEMENTS

Supp. No.	Description	Date	EASA Approved	FAA Approval on Behalf of EASA
1	Wet/Dry Dispersal System	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
2	Float Landing Gear	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
3	External Loads Supplement	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
4	Snowshoe Supplement	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
5	Right Side Pilot Configuration	NOT EASA APPROVED		
6	[RESERVED]			
7	Electric Clutch Actuator	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
8	Emergency Float Landing Gear	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
9	Correlator	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A
10	[RESERVED]			
11	Auxiliary Fuel Tank	Sep 28/03	Article 3, Commission Regulation (EU) 748/2012	N/A

OPERATING LIMITATIONS

NOTE: Mandatory compliance with the Limitations, Section 2, is required by law.

FAA OPERATING LIMITATIONS
POWER PLANT LIMITATIONS

Engine	Lycoming Model HIO-360E1AD with Rajay 301 E-10-2 Turbocharger
Fuel	100/130 minimum grade
Oil Viscosity	Above 60 °F ..... SAE-50 30-90 °F ..... SAE-40 0-70 °F ..... SAE-30 Below 10 °F ..... SAE20 Approved Lubricants: 50-hour break in period, MIL-L-6082B Ashless Dispersant, MIL-L-22851
Engine Limits	2900 rpm, 36.5 in. MP (205 HP)
Operating Engine RPM	2,900 maximum 2,750 minimum
Engine Idling RPM	1,500 minimum (clutch disengaged)
Manifold Pressure	36.5 in. Hg. Sea Level to 12,000 ft.
EGT	1,650 °F maximum
Oil Temperature	245 °F
Oil Pressure	60-90 psi, normal operation 25 psi, idling minimum 100 psi, starting warmup
Transmission Oil Temp.	220 °F maximum
Cylinder Head Temp.	475 °F maximum
Fuel Mixture Setting	Engine may be leaned at 28 in. MP or below to 1650 °F on rich side of peak. Never exceed 1650 °F EGT. Mixture must be enriched for landings and takeoffs requiring more than 28 in. MP. Do not exceed 1550-1575 °F EGT above 28 in. MP. Mixture must be leaned to at least 130 pph at 36.5 in. MAP for all flight conditions except hover. If richer mixture is required to maintain EGT levels below 1650 °F, practice autorotations are prohibited.

ROTOR – FLIGHT LIMITATIONS (POWER OFF)

Maximum: .....385 rpm
Minimum .....332 rpm

ROTOR – FLIGHT LIMITATIONS (POWER ON)

Minimum: .....332 rpm
Maximum .....350 normal operating

AIRSPEED LIMITATIONS

Never exceed speed:.....V_{NE}: 112 mph IAS SL to 3000 ft H_D
For variations greater than 3000 ft., see FM-5-1.

ALTITUDE LIMITATIONS

Maximum operating: .....12,000 ft. density altitude.

NOTE: (Information only) Takeoffs and landings at 2350 lbs. gross weight were demonstrated during FAA type inspection tests up to 7,000 ft. density altitude. Operators should use appropriate caution above 7,000 ft. density altitude and limit gross weight as required to insure safe takeoffs and landings.

WEIGHT LIMITATIONS

Maximum approved weight: 2350 lbs.

CENTER OF GRAVITY LIMITATIONS

Forward: .....2350 lbs. 92.0 in. station
Rearward: .....2350 lbs. 94.6 in. station
2200 lbs. 96.7 in. station
2000 lbs. 100.0 in. station
Lateral offset moment .....2350 lbs. -3250, +3700 in lbs.
below 2015 lbs. See FM-6-7

This helicopter is to be loaded in accordance with SECTION 6, LOADING INFORMATION.

NOTE: Longitudinal .....Station 0 (Datum) is located 100 inches forward centerline of main rotor hub.

Lateral .....Station 0 (Datum) is aircraft center line, lateral moment arms are positive right, negative left (looking forward)

INSTRUMENT MARKINGS

Rotor Tachometer	Red Line		385 RPM
	Red Line		332 RPM
	Green Arc		332-385 RPM
Engine Tachometer	Red Line		2750 RPM
	Red Line		2900 RPM
	Green Arc		2750-2900 RPM
Airspeed Indicator	Blue Line	(Power Off)	85 MPH
	Red Line	(Power On)	112 MPH
Manifold Pressure	Red Line		36.5 in. Hg
Oil Temperature	Red Line		245 °F
	Green Arc		120-245 °F
	Yellow Arc		60-120 °F
Oil Pressure	Red Line		100 PSI
	Green Arc		60-100 PSI
	Yellow Arc		25-60 PSI
	Red Line		25 PSI
EGT	Red Line		1650 °F
Cylinder Head Temperatures	Red Line		475 °F
	Green Arc		200-475 °F
Transmission Temperature	Red Line		220 °F
	Green Arc		0-220 °F

TYPE OF OPERATION

The helicopter is approved for operation under DAY & NIGHT – VFR – NON-ICING conditions.

Night operation authorized under visual contact flight conditions. Orientation must be maintained by ground light or adequate celestial illumination.

Instrument flight prohibited.

No aerobatic maneuvers permitted.

Cross wind and downwind: When hovering or landing, adequate flight control has been demonstrated in winds to 20 mph to 5000 ft. density altitude at 2350 lbs. gross weight. Operators should use appropriate caution above 5000 ft. density altitude in high wind conditions and limit gross weight as required to insure safe takeoffs and landings.

Operation with doors removed is approved.

PLACARDS:

"THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS SPECIFIED IN THE FAA APPROVED ROTORCRAFT FLIGHT MANUAL."

AIRSPEED LIMITATIONS
NEVER EXCEED SPEEDS – MILES PER HOUR IAS

PRESSURE ALTITUDE	OUTSIDE AIR TEMPERATURE °F						
	-20	0	20	40	60	80	100
SEA LEVEL	112	112	112	112	112	112	112
2000	112	112	112	112	112	109	104
4000	112	112	112	110	105	100	91
6000	112	111	106	101	91	82	73
8000	107	102	91	82	73	64	55
10000	94	83	73	64	54		
12000	76	66	55				

"NO SMOKING" (This placard not required when an approved ashtray is installed.)

"THIS HELICOPTER IS APPROVED FOR OPERATION UNDER DAY & NIGHT – VFR – NON-ICING CONDITIONS ONLY."

"MAXIMUM WEIGHT IN THIS COMPARTMENT 60 LBS. OBSERVE CG AND GROSS WEIGHT LIMITATIONS."

"COLLECTIVE FRICTION TO BE USED FOR GROUND OPERATION ONLY" (This placard to be placed adjacent to the collective friction device.)

"LEAN TO 130 PPH AT 36.5 IN. MAP IN FLIGHT – SEE REVISED RFM." (This placard to be placed in view of the pilot.)

"STOW FLAT ON FLOOR BEFORE FLIGHT" (This placard to be placed on clutch handle).

FOR NICKEL-CADMIUM BATTERY INSTALLATION ONLY

BATTERY TEMPERATURE ALERT

120 °F – MONITOR BATTERY TEMPERATURE (AMBER LIGHT)

130 °F – TURN OFF ALTERNATOR SW.

REDUCE ELECTRICAL LOAD. TURN ALT. SW. ON IF AMBER LT. GOES OUT IN FLIGHT.

150 °F – TURN OFF MASTER SWITCH.

(RED ARC) LAND AS SOON AS PRACTICAL. INSP. BATTERY PER MANUF. INSTR. BEFORE FURTHER FLIGHT.

EACH 250 HR. INTERVALS PERFORM FUNCTIONAL TESTS PER K.S. AVIONICS INSTRUCTIONS.

PLACARDS (Continued)

PULL FOR IDLE CUT-OFF
TURN TO LEAN

SECTION 3 — NORMAL PROCEDURES

NORMAL ENGINE STARTING PROCEDURES

1. Seat belts fastened and doors latched.
2. Fuel valve pushed in to turn on.
3. Collective full down and secured with the friction knob.
4. Heater as desired (in for OFF).
5. Cyclic stick cannon plugs secure.
6. Rotor clutch disengaged.

   CAUTION: Although starting the helicopter with the rotor clutch engaged will not damage the rotor system, it will severely overload the starter motor.

7. Check compass full of fluid, no bubbles, and with a correction card.
8. Altimeter set to field elevation.
9. Radio(s) off.
10. All switches off.
11. Master switch and alternator on (alternator off if using an APU start). Ignition switch on.
12. Throttle full open for engine prime only.
13. Mixture full rich.
14. Fuel boost pump on until the fuel pressure gauge shows a rise, then boost pump off.
15. Mixture idle cut off; throttle closed then cracked open approximately 1/16", mags on both; depress starter, when engine starts mixture in.
16. Fuel boost -- leave off during first cold start and ground run to insure proper operation of engine driven fuel pump
17. Check engine oil pressure is off the zero line within 30 seconds.
18. Check amp meter gauge indicates a charge.
19. If APU start disconnect APU cable. Then alternator switch on check for a charge indication on the amp meter.
20. Idle engine at 1450 to 1500 rpm.

21. When oil pressure is 25 psi or above clutch may be engaged.

    CAUTION: On rare occasion the engine may backfire through the induction system during a start procedure. The backfire will not cause damage to the induction system but it could cause the induction hose between the air filter and the fuel injection servo unit to be disconnected due to the backfire. It is recommended that should a backfire occur during engine starting, a visual inspection be accomplished by the pilot or mechanic to assure that the hose is securely in place before takeoff.

22. Note engine idle rpm (with boost off) and turn fuel boost on. Any difference in rpm noted indicates leaky idle mixture plates (refer to Enstrom Service Letter No. 0068). Slowly lean engine with mixture control short of cutoff position. An increase of 50 rpm indicates idle mixture improperly set (refer to Enstrom Service Letter No. 0069).

HOT DAY ENGINE COOLING AND SHUTDOWN PROCEDURE

The following procedures are recommended for hot weather operations, operations at high altitudes and when hot engine restarts are anticipated. This shutdown procedure empties the fuel lines within the hot engine compartment preventing fuel vaporization within the lines. A successful engine start should result when cool fuel is introduced into the lines immediately prior to engine cranking using the hot engine restarting procedure. Operations at high density altitudes may require a mixture control adjustment to ensure proper engine idle.

1. Collective pitch control full down and friction on.
2. Throttle idle position.
3. Fuel boost pump on.
4. Clutch disengaged, engine at full idle position.
5. Cyclic control centered with trim control.
6. Fuel shut-off valve – closed (out). Residual fuel in the lines will provide sufficient time at idle to ensure proper engine cool-down (two minutes or cylinder head temperature less than 300 °F).

NOTE: The red fuel system pressure low light will illuminate soon after the fuel shut-off valve is closed. This is a normal indication with the fuel shut-off valve closed even though the boost pump is still operating.

7. When engine stops – boost pump OFF.
8. Radios – OFF.
9. Magnetos – OFF.
10. Lights – OFF.
11. All switches – OFF.
12. Mixture – idle cut OFF.
13. Throttle – closed.
14. Master switch – OFF.

HOT ENGINE RESTARTING PROCEDURE

1. Seat belts fastened and doors latched.
2. Collective full down and secured with friction.
3. Rotor clutch disengaged.
4. Radios OFF.
5. All switches OFF
6. Master switch and alternator ON. (Alternator OFF if using an APU start).
7. Fuel valve on (pushed in).
   NOTE: Initiate start as soon as possible after opening fuel shut off valve.
8. Throttle – full open (for engine prime only).
9. Mixture control in full rich position.
10. Fuel boost pump on until fuel flow gauge shows a rise (approximately 5-8 seconds), then boost pump OFF.
11. Return throttle to idle position and then crack open slightly, approximately 1/16".
12. Mixture to idle cutoff position.
13. Check throttle cracked, ignition switch on, mags on BOTH position.
14. Depress starter, when engine fires, advance mixture control to full rich position and turn boost pump on immediately to preclude vapor lock.
15. Follow steps 17 through 21 of "Normal Engine Starting Procedure".

ROTOR ENGAGEMENT

1. Check collective pitch full down. Friction ON.
   CAUTION: Collective friction to be used for ground operation only.
2. Tail rotor pedal neutral position.
3. Center cyclic stick with trim switch.
4. Check aircraft vicinity clear of personnel and equipment.
5. Check engine idle set at 1450 to 1500 RPM, then leave throttle fixed in this position; do not add more throttle during engagement.
6. Slowly and smoothly engage clutch handle at 1450 to 1500 RPM, allowing the engine RPM to bleed no lower than 1200 RPM. When the rotor RPM reaches 100 RPM, fully engage clutch.
   NOTE: Clutch disengage warning light will go out when clutch is fully engaged.
7. Place clutch handle in stowed position.

ENGINE WARMUP AND GROUND CHECK

1. Advance throttle to 1800 RPM and wait for cylinder head temperature to reach low green or 200 °F.
2. After reaching 200 °F. cylinder head temperature, slowly advance throttle to 2900 RPM until oil temperature reads low yellow or 80 °F.
3. Check the magnetos using the following procedure:
   a) At flat collective pitch and 2900 rpm allow the EGT to stabilize, with mixture in full rich position.
   b) Set the E.G.T. gauge cursor red needle to the stabilized indicated temperature. (This will be a referenced temperature during the mag test).
   c) Switch from both mags position to left mag position and note RPM drop and E.G.T. rise for five seconds. The maximum allowable RPM drop is 125 RPM. The maximum allowable E.G.T. rise is 100 °F.
   d) Return magneto switch to both, allowing E.G.T. and RPM to stabilize and repeat check on the right mag position.
   e) The maximum permissible RPM differential between left and right magnetos is 50 RPM without engine roughness. A differential of greater than 50 RPM and/or a drop in RPM

greater than 125 RPM could indicate spark plug, spark plug lead wire, or magneto problems.

f) An E.G.T. rise over 100 °F. during operation on individual magneto indicates a magneto timing problem.

4. Gently close throttle to split tachometer needles to check proper operation of over running clutch.

5. Check the following before take-off.

a) Check all instruments for proper indication.

b) Seat belts and doors latched.

c) Fuel ON

d) Fuel boost ON. (Pump must be on at all times in flight).

e) Mixture FULL RICH.

f) Fuel pressure warning – green indication.

g) Clutch warning light – push to test – red light goes out when released.

h) Release collective friction

NOTE: Keep hand on collective and maintain down position when friction lock is disengaged.

i) Set throttle friction as desired.

FLIGHT INFORMATION

1. Follow normal helicopter takeoff procedures at 2900 RPM. (See height-velocity information, pages FM-5-4 and FM-5-5.) Linear interpolations may be used for operation between sea level and 7000 ft.

2. Best rate of climb speed varies with altitude, i.e., 57 MPH at sea level decreasing to 52 MPH IAS at 7000 ft., and 45 MPH IAS at 12000 ft.

3. Do not exceed 36.5 inches of manifold pressure during the takeoff maneuver.

CRUISE

Exhaust gas temperature, as shown on the Enstrom E.G.T. indicator, should be used as an aid for fuel mixture leaning in cruising flight at 75% power or less, i.e., 28 inches manifold pressure and 2900 RPM. Do not exceed V_{NE} as shown on placard and the V_{NE} versus altitude curve.

To obtain a best economy mixture, lean to 1650 °F E.G.T. To obtain a best power mixture, lean only to 1550 °F E.G.T. Do not exceed 1650 °F E.G.T. Operation on the lean side of peak E.G.T. is not approved. Also any change in altitude or power will require a recheck of the E.G.T. indication.

SPECIAL INSTRUCTIONS FOR LEANING IN FLIGHT

1. The mixture must be leaned to at least 130 PPH at 36.5 inches MAP. Do not exceed 1650 °F E.G.T.
2. If mixture greater than 130 PPH is required to prevent exceeding E.G.T. of 1650 °F, practice autorotation/power chop are prohibited.
3. With mixture leaned as prescribed in (a) above, practice autorotation/power reductions are to be performed as follows:

   a) Close throttle smoothly all the way to the closed position and hold on the stop, or;

   b) Smoothly split needles and maintain engine RPM at 2000 or above.

   c) Do not try to maintain throttle at intermediate positions between fully closed and 2000 engine RPM as this may cause inadvertent engine stoppage due to improper idle/mixture settings or faulty fuel servo.

   NOTE: Since the F28C is equipped with a full-time turbocharger, the turbocharged engine is equipped with an overboost warning light on the instrument panel to warn the pilot of an overboost condition. Transient overboost conditions which may trigger the warning light may not show as overboost conditions on the manifold pressure gauge. The manifold pressure gauge red line is the determining factor in ascertaining the magnitude of an overboost condition. Subject overboost conditions must be logged in the engine log and inspections performed per Lycoming Bulletin 369F.

DESCENT

CAUTION: Exercise care during descent to avoid exceeding V_{NE}.

RUNNING LANDING

1. Maximum recommended ground contact speed is 35 MPH. Reduce speed on rough surfaces.
2. After ground contact, the helicopter must have zero forward motion before collective pitch is fully lowered.

   NOTE: Due to the high friction characteristics of the helicopter's hardened steel skid shoes, premature lowering of the collective must be avoided as rapid deceleration and nose down pitching may result.

PRELANDING CHECKS

1. RPM – 2900
2. Fuel quantity
3. Instruments
4. Mixture full rich
5. Boost pump – check on

NORMAL ENGINE COOLING AND SHUT-DOWN PROCEDURE

1. Collective pitch full down and friction on
2. Throttle full off
3. Fuel boost pump off

   NOTE: Leave boost pump on until engine stops where temperature and attitude conditions preclude smooth idle engine operation with boost pump off.

4. Clutch disengaged, engine at full idle only

CAUTION: Clutch disengagement with throttle down will result in engine overspeed. Clutch disengagement is signaled by a red warning light on the instrument console.

5. Cyclic control centered.
6. Note engine idle RPM (with boost off) and turn fuel boost on. Any difference in engine RPM noted indicates leaky idle mixture plates (refer to Enstrom Service Letter No. 0069). Slowly lean engine with mixture control short of cutoff position. An increase of 50 RPM indicates the idle mixture is improperly set (refer to Enstrom Service Letter No. 0069).
7. Idle engine at 1800 RPM for 2 minutes or until cylinder head temperature cools to 300 °F.

8. Radios off.
9. Lights off.
10. Throttle full idle.
11. Mixture idle cut off.
12. When engine stops turning magnetos off.
13. All switches off.
14. Master switch off.
15. Fuel valve closed (out).
16. Set collective one-half way up in its travel to unload lamiflex bearings.
17. Tie down main rotor and tail rotor if wind speed is expected to go over 30 mph.

E.G.T. LEANING PROCEDURE – CRUISE CONDITION

1. Attain the desired cruise flight condition.
2. Maintain a constant altitude and manifold pressure setting.
3. Trim out cyclic forces to maintain level flight.
4. Turn mixture control to attain desired lean E.G.T. setting.

   NOTE: Do not exceed 1650 °F E.G.T. Under certain high altitudes and high O.A.T.'s, near full rich mixtures will be necessary to control cylinder head and engine oil temperatures. If the temperatures are too high, enrich in 25 °F E.G.T. increments until the temperatures remain in the green arc.

5. Any change in manifold pressure will require additional mixture adjustment.

ENGINE STARTING PROCEDURES, HOT CONDITION

1. Master switch ON.
2. Magneto switch OFF.
3. Throttle cracked.
4. Mixture control FULL RICH.
5. Turn on fuel boost pump 5 to 6 seconds.
6. Turn boost pump off.
7. Mixture control FULL LEAN
8. Throttle – FULL OPEN.
9. Engage starter 5 to 6 seconds to clear engine
10. Close throttle and crack slightly.
11. Magneto switch BOTH, Ignition switch ON.
12. Engage starter until engine fires and advance mixture slowly.
13. Fuel boost ON. (Pump must be on at all times in flight).

    NOTE: It is important to follow this procedure on hot starts so that the prolonged fuel flow in the lines will eliminate the vapor locks and cool the lines for a proper start

ROTOR ENGAGEMENT

1. Check collective pitch full down. Friction ON.

   NOTE: Maintain collective in down position with friction applied throughout starting and warm-up procedure.

2. Tail rotor pedal neutral position.
3. Center cyclic stick with trim switch.
4. Check aircraft vicinity clear of personnel and equipment.
5. Check engine idle set at 1450 to 1500 rpm, then leave throttle fixed in this position; don't add more throttle during engagement.
6. Slowly and smoothly engage clutch handle at 1450 to 1500 rpm, allowing the engine rpm to bleed no lower than 1200 rpm. When the rotor rpm reaches 100 rpm, fully engage clutch.

ENGINE WARMUP AND GROUND CHECK

1. Advance throttle to 1800 rpm and wait for cylinder head temperature to reach low green or 200 °F.

2. After reaching 200 °F., cylinder head temperautre, slowly advance throttle to 2300 rpm until oil temperature reads low green or 120 °F.
3. Increase engine RPM to 2900 rpm and check for rpm drop on right and left magnetos. A 100-rpm drop is permissible on either magneto as long as there is no engine roughness when operating on either right or left magneto.
4. Gently close throttle to split tachometer needles to check proper operation of over-running clutch.
5. Check following before take-off:
   - a. Check all instruments for proper indication.
   - b. Seat belts and doors latched.
   - c. Fuel ON.
   - d. Fuel boost ON. (Pump must be on at all times in flight.)
   - e. Mixture FULL RICH.
   - f. Fuel pressure warning — green indication.
   - g. Adjust collective and throttle friction.

   NOTE: Keep hand on collective and maintain down position when friction lock is disengaged.

FLIGHT INFORMATION

1. Follow normal helicopter takeoff procedures at 2900 RPM. (See height-velocity diagram, pages FM-5-4 and FM-5-5). Linear interpolations may be used for operation between S.L. and 7000 ft.
2. Best rate of climb speed varies with altitude, i.e. 58 mph at S.L. decreasing to 55 mph, IAS at 7000 ft.
3. Do not exceed 36.5 in. of manifold pressure during the take-off maneuver. A safety pop-up valve is incorporated in the induction system, however, and in the event of an over-boost, the relief valve will automatically limit the manifold pressure to 40 in. ± 3.5 in.

Cruise. Exhaust gas temperature, as shown on the Enstrom EGT indicator, should be used as an aid for fuel mixture leaning in cruising flight at 75% power or less, i.e. 28 inches manifold pressure and 2900 RPM in the Model 280C. Do not exceed V_{ne} as shown on placard and V_{ne} versus altitude curve.

To obtain a best economy mixture, lean to 1650 °F. EGT. To obtain a best power mixture, lean only to 1550 °F. EGT. Do not exceed 1650 °F. EGT. Operation on the lean side of peak EGT is not approved. Also any change in altitude or power will require a recheck of the EGT indication.

NOTE: Since the F-28C is equipped with a full time turbocharger, the turbocharged engine is equipped with a pop-off valve to limit manifold pressures to the engine. This valve normally starts to crack open at 36.5" to 37.0" of M.A.P. and is fully open at approximately 40.0" of M.A.P. This will vary slightly between individual engines. When this valve opens in the overboost condition, it dumps airflow overboard. Since the fuel injector or servo meters fuel partially based on mass airflow, but cannot recognize that the pop-off valve is open, the fuel/air mixture will become increasingly rich with an attendant loss of net horsepower. This is also evidenced by a drop in E.G.T. and an increase in fuel flow which is responsive to the rate of change of the pop-off valve opening (i.e. slow throttle movement causing small rates of change of pop-off valve opening will cause slow rates of change of E.G.T. and fuel flow, etc.). This normally can be observed at or below 6,000 feet density altitude.

To recover higher powers, the M.A.P. must be reduced toward normal limits (36.5" M.A.P.) to permit the pop-off valve to close, resulting in a proper fuel/air mixture for maximum power output.

Refer to FM-9-10 of the Flight Manual for the relationship of fuel flow in pounds per hour versus nozzle pressure psi to determine your actural fuel consumption.

NOTE: Collective friction should be used with caution. Friction may be applied to prevent movement of the collective control when hand is removed, but the degree of friction applied should not severely restrict use of the control.

Descent. CAUTION: Exercise care during descent to avoid exceeding V_{NE}.

Running Landing.

1. Maximum recommended ground contact speed is 35 MPH. Reduce speed on rough surfaces.
2. After ground contact the ship must have zero forward motion before collective pitch is lowered fully.

Prelanding Checks.

1. RPM – 2900.
2. Fuel quantity.

3. Instruments.
4. Mixture full rich.
5. Boost pump — check on.

ENGINE COOLING AND SHUT DOWN PROCEDURE

1. Collective pitch full down and friction on.
2. Throttle full off.
3. Fuel boost pump off.
4. Clutch disengaged, engine at full idle only.
5. Cyclic trim centered.
6. Idle engine at 1800 rpm for 2 minutes or until cylinder head temperature cools to 300 °F.
7. Radios off.
8. Lights off.
9. Throttle full idle.
10. Mixture idle cut off.
11. When engine stops turning magnetos off.
12. All switches off.
13. Master switch off.
14. Fuel valve closed (out).
15. Set collective one-half way up in its travel to unload Lam'flex bearings.
16. Tie down main rotor and tail rotor if wind speed is expected to go over 30 mph.

E.G.T. LEANING PROCEDURE — CRUISE CONDITION

1. Attain the desired cruise flight condition.
2. Maintain a constant altitude and manifold pressure setting.
3. Trim out cyclic forces to maintain level flight.
4. Turn mixture control to attain desired lean E.G.T. setting.

   NOTE: Do not exceed 1650 °F. E.G.T. Under certain high altitudes and high O.A.T.'s, near full rich mixtures will be necessary to control cylinder head and engine oil temperatures. If the temperatures are too high, enrich in 25 °F. E.G.T. increments until the temperatures remain in the green arc.

5. Any change in manifold pressure will require additional mixture adjustment.

SECTION 4 — EMERGENCY AND MALFUNCTION PROCEDURES

ENGINE FAILURE

1. Enter normal autorotation and stabilize at 58 MPH (minimum rate of descent). (See Height Velocity information, pages FM-5-4 and FM-5-5.)

   NOTE: Due to high rates of descent at forward speeds, sustained autorotation speed is limited to 85 MPH to 8200 ft. Above 8200 ft., see FM-5-1.

   Maximum glide distance in autorotation is attained at 80 mph and 332 rotor rpm. (Reduce collective to build RPM prior to touchdown.)

2. Maximum recommended ground contact speed on prepared surfaces is 35 mph. Reduce speed on rough surfaces.

3. After ground contact the helicopter must have zero forward motion before collective pitch is fully lowered.

   NOTE: Due to the high friction characteristic of the helicopters hardened steel skid shoes, premature lowering of the collective must be avoided as rapid deceleration and nose down pitching may result.

LIGHTING FAILURE

1. Landing can be made in case of landing light failure by illumination from navigation lights.

2. Instrument lighting is provided by eyebrow lights, internal lights and map light. While satisfactory landings have been demonstrated without instrument illumination, a supplemental light source (flashlight) is recommended.

FIRE

Fires may have several sources of origin. Generally they may be classified as engine compartment or cabin compartment, fuel or oil supported, or electrical.

FIRE ON GROUND

1. Shut off engine and all switches.

2. Shut off fuel valve.

3. Determine source of fire and use fire extinguisher to extinguish any flames.

   NOTE: Do not restart or fly aircraft until cause of fire is investigated and corrected.

FIRE IN FLIGHT

If the presence of odor and/or smoke is detected, proceed as follows:

1. Check instruments for correct reading.
2. Shut off master and alternator switches.
3. Unlatch doors and let them trail open.
4. If smoke and odor persist, proceed to suitable area and land aircraft.
5. If inspection of aircraft indicates presence of flames, shut off engine and fuel valve and extinguish flames with fire extinguisher.

   NOTE: If flames are present, do not attempt to start or fly aircraft until the cause of the fire has been investigated and corrected.

Severe leakage of oil onto the exhaust system may cause considerable smoke to enter the cabin. In such case aircraft should not be flown until cause of leakage is investigated and corrected.

TAIL ROTOR (Anti-Torque) SYSTEM FAILURE

There are two major possibilities for failure of the tail rotor (anti-torque) system and subsequent loss of directional control as follows:

1. Failure of any portion of tail rotor drive system that causes stoppage or physical loss of the tail rotor blades.
2. Failure of any portion of the mechanisms that cause pitch change of the tail rotor blades.

Upon loss of directional control, the pilot must immediately determine the type of malfunction that has occurred (No. 1 or 2 above) and select the proper emergency procedure.

TAIL ROTOR DRIVE SYSTEM FAILURE

During hovering flight (aircraft will rotate rapidly to the right with full left pedal):

1. Cut throttle full off immediately (aircraft will slow down or stop its rotation).

2. Complete autorotational landing.

During cruising flight (aircraft will rotate to the right with full left pedal):

1. Power full off immediately, enter autorotation.
2. Complete autorotation to nearest suitable area.

   NOTE: If no suitable area is available within autorotative distance, pilot should proceed as follows after having established stabilized autorotation with at least 60 MPH airspeed.

1. Increase collective pitch and power gradually (maintaining 60 to 80 MPH airspeed) until yaw to the right reaches approximately 45 degrees.
2. Continue flight in this fashion using cyclic stick for directional control until suitable autorotational landing area is reached.
3. When 200 ft. altitude or more over suitable area, re-establish full autorotation and land.

TAIL ROTOR CONTROL SYSTEM FAILURE

NOTE: Loss of control may be caused by failure of left pedal controls, right pedal controls or failure of pitch link to an individual tail rotor blade. On the Enstrom tail rotor, it is normal (if uncontrolled or unattended) for the blades to assume a nearly neutral pitch condition. Upon loss of ability to fully control tail rotor during cruising flight, proceed as follows:

PITCH LINK FAILURE (One tail rotor blade)

Aircraft will yaw to the right initially and will subsequently need an abnormal amount of left pedal to maintain straight and level flight since only one blade is providing anti-torque thrust.

1. Fly at low cruise power to suitable landing area and make normal power approach.
2. Complete a slow (less than 35 mph) run on landing at low power setting.

FAILURE OF LEFT PEDAL CONTROLS

The direction and amount the aircraft yaws will depend on airspeed and amount of power applied at time of failure. At high power and high airspeeds the aircraft will yaw right. At all airspeeds and low power settings below 23" Hg the helicopter will yaw left. . At low airspeeds where aerodynamic effects are negligible the helicopter will yaw left to approximately 80°, hesitate briefly, and then accelerate into 360° turns to the left. This condition can be avoided by adding power to 24" Hg and accelerating to 50 mph. The helicopter can then be flown to suitable area and landed using the procedure below.

1. Remove feet from both tail rotor pedals.
2. Maintain 24" Hg manifold pressure and 50 mph.
3. Fly to suitable area and complete a shallow power on approach at 50 mph.
4. Manipulate power and collective pitch so that aircraft touches down straight ahead at an airspeed of 0-10 mph. Reduce power and collective cautiously as skids contact surface.

   NOTE: Do not abort the emergency landing after airspeed has diminished below 40 mph.

FAILURE OF RIGHT PEDAL CONTROLS

Tail rotor control will be normal at power settings over 23" Hg. Power settings under 23" Hg will produce yaw to the left Proceed as follows:

1. Fly to suitable landing area at power setting of at least 23" Hg.
2. Complete a shallow power on approach at 50 mph (do not autorotate).
3. Manipulate power and collective pitch so that aircraft touches down straight ahead at an airspeed of 0-10 mph. Reduce power and collective pitch cautiously as skids contact surface.

   NOTE: Application of power to over 23" Hg will make aircraft more controllable. Therefore, landing attempt may be aborted and new approach initiated as many times as necessary

LANDING IN WATER (Ditching)

DITCHING WITH POWER

If ditching is unavoidable without other recourse, proceed as follows:

1. Descend to low hovering altitude over water.
2. Unlatch both doors and eject passengers.
3. Hover aircraft clear of all personnel in water.
4. Turn off master and alternator switches.
5. Complete hovering autorotation into water.
6. As collective pitch reaches full up and aircraft settles in water, apply full lateral cyclic in direction aircraft tends to roll.
7. After rotor strikes water and stops, climb out and clear aircraft.

DITCHING WITHOUT POWER

1. Turn off master and alternator switches.
2. Unlatch both doors
3. Complete normal autorotation to land in water at zero airspeed.
4. As collective pitch reaches full up and aircraft settles in water, apply full lateral cyclic in direction aircraft tends to roll.
5. After rotor strikes water and stops, exit all occupants and clear aircraft.

ALTERNATOR FAILURE

A malfunction of the alternator will be indicated by zero charge rate or constant discharge on the ammeter. To put the alternator back on line, proceed as follows:

NOTE: Use the following procedure if the alternator excite circuit breaker (ALT EXC or ALTNTR EXC) is <u>not</u> installed.

1. Alternator circuit breaker in.
2. Cycle the MASTER and ALTERNATOR switches.
3. If the alternator is not restored or goes off line again, turn off the alternator switch and all nonessential electrical equipment. Land as soon as practicable.

NOTE: Use the following procedure if the alternator excite circuit breaker (ALT EXC or ALTNTR EXC) is installed.

1. Alternator circuit breaker in.
2. Alternator excite circuit breaker in.
3. Cycle the ALTERNATOR switch.
4. If the alternator is not restored or goes off line again, turn off the alternator switch and all nonessential electrical equipment. Land as soon as practicable.

MAIN ROTOR GEARBOX

If, in normal flight, the main rotor gearbox red line temperature is exceeded, the aircraft should be landed at the next suitable landing site.

ELECTRIC FUEL BOOST PUMP

Failure of the fuel boost pump will be evidenced by illumination of the red low boost pressure warning light. In the event of a fuel boost pump failure, the helicopter engine will continue to operate in a normal manner as long as the engine driven fuel pump continues to function properly.

If the helicopter experiences a fuel boost pump failure, terminate the flight at the earliest practical time and have the malfunction corrected prior to next flight.

CAUTION: If flight is continued after the fuel boost pump failure and the engine-driven fuel pump malfunctions, the engine will stop due to fuel starvation. Gravity fuel feed is insufficient to supply fuel to the engine.

LOW ENGINE OIL PRESSURE

If low oil pressure is accompanied by normal oil temperature, there is a possibility the oil pressure gauge or relief valve is malfunctioning. This is not necessarily cause for an immediate precautionary landing. However, a landing at the nearest airport-heliport would be advisable to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field.

TURBOCHARGER FAILURE (SEIZURE)

Turbocharger seizure will be evidenced by a power loss (manifold pressure drop) if operating at manifold pressures above ambient atmospheric pressure. It should be possible to maintain level flight at reduced airspeeds and altitude as the engine will then be operating essentially as a non-turbocharged engine with manifold pressure available essentially equal to ambient atmospheric pressure. A power check should be performed to confirm power available for landing. A landing should be accomplished as soon as practicable. Plan for and perform a high altitude type (running) landing, see page FM-3-7.

ABNORMAL VIBRATIONS

Vibrations in this helicopter can usually be classified as either low frequency or high frequency. Low frequency vibrations are generally caused by the main rotor system while the high frequency vibrations usually originate from the engine, drive system, or tail rotor. Any abnormal vibrations are an indication that something is not correct and should be referred to a mechanic before further flight. If a vibration suddenly appears during a flight, it is an indication that something has suddenly changed. The helicopter should be landed as soon as practical and inspected to find the cause of the vibration. After the cause of the vibration has been identified, the pilot and the mechanic can determine whether the helicopter can be safely flown or should be repaired before further flight. An abnormal vibration is reason to get the aircraft down as soon as possible, but the pilot must also use caution and select the safest possible landing site, working around wires, people, and other obstructions.

LAMFLEX BEARING FAILURE

A lamflex bearing failure will cause a rough ride. Initially, this may be only a minor distraction, but in some cases, it can progress quickly to the point where the bearing physically comes apart. In this case, control of one blade will be stiff, the main rotor will be severely out of balance, and aircraft control may be in jeopardy. The following are indications of a lamflex bearing failure as it progresses.

1. A significant worsening of the ride quality from one flight to the next or from one day to the next for no apparent reason.
2. The aircraft cannot be trimmed at a hover or runs out of trim at maximum forward flight speed when previously there was no problem.
3. The collective suddenly ratchets when moved up and down when previously it had been smooth or the collective suddenly feels heavy.
4. The cyclic suddenly wobbles or moves in a circular motion when previously it had been smooth.
5. The cyclic suddenly starts "chucking," (moving sharply in a left rear to right forward direction in about a 3/4" amplitude with a very crisp motion) especially at high power or high airspeed.

WARNING: This last indication where the cyclic starts sharply moving may be followed within a few minutes by a total failure of the bearing.

Emergency Procedures – Impending Lamiflex Bearing Failure

The following are the procedures to be used in dealing with lamiflex failures. Refer to the preceding paragraph for the description of the failure symptoms

1. Moderate – Slight worsening in ride or not able to trim:
   a. LAND – As soon as practicable. Have all three bearings inspected before the next flight
2. Serious – Ride continues to get worse or the cyclic or collective start showing symptoms:
   a. LAND – Immediately. Have all three bearings inspected before further flight.

Emergency Procedures – Total Lamiflex Bearing Failure

The following are the procedures to be used in dealing with total lamiflex bearing failure

1. Maintain control of the aircraft
2. Collective – Lower slowly. Commence an 800-900 ft/min descent.

WARNING: Do NOT autorotate. Aircraft control at the termination of an autorotation may be questionable with a totally failed lamiflex.

3. Airspeed – Reduce to 50-60 MPH.
4. Rotor RPM – Reduce to minimum power on RPM.
5. Maneuvering – Minimize.
6. Land – Perform a running landing. Touch down at or above Effective Translational Lift (ETL) approximately 20 knots if terrain permits.

WARNING: It may not be possible to control the aircraft in a hover.

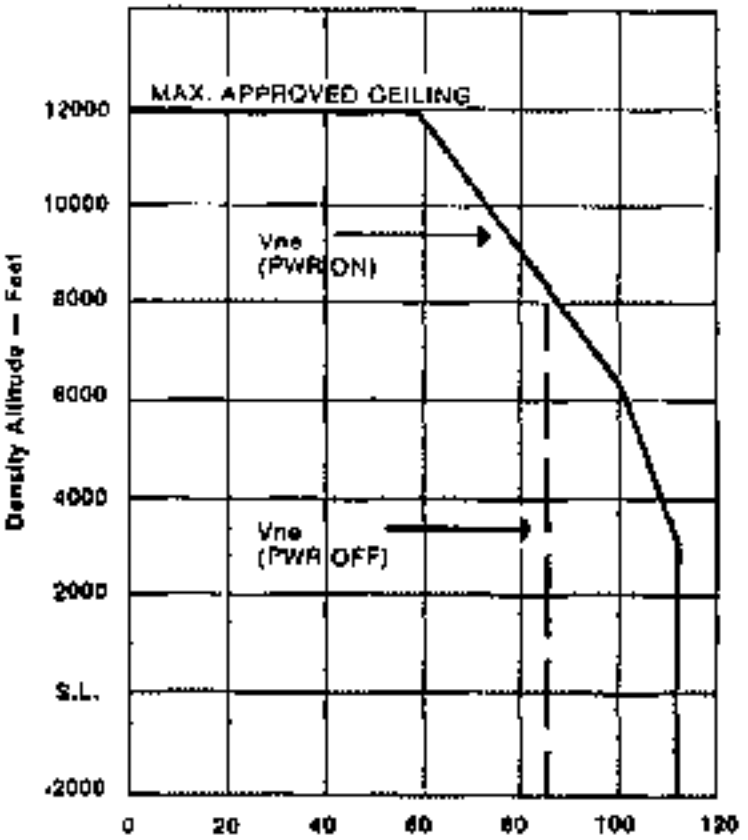
8. Shutdown – Complete.

SECTION 5 — PERFORMANCE

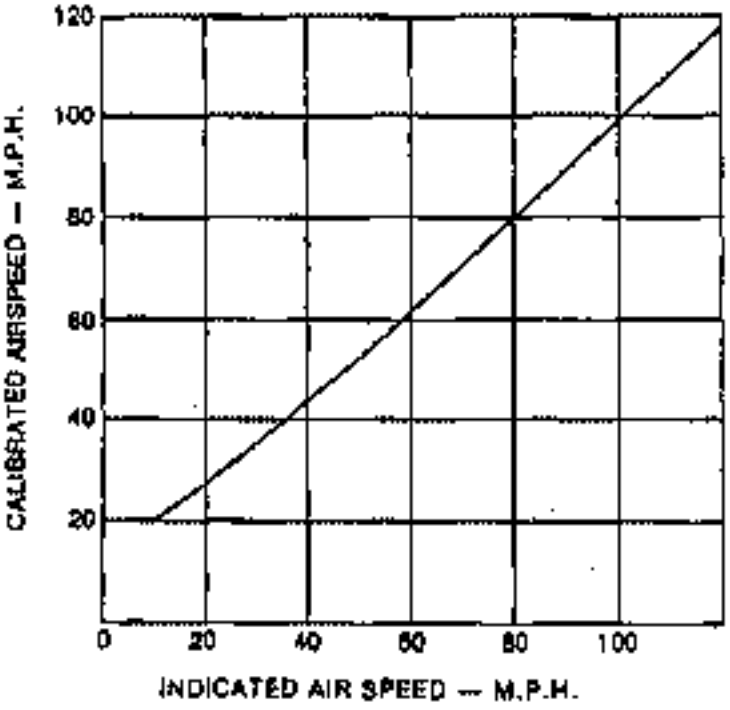
V never exceed VS. DENSITY ALTITUDE

(Vne demonstrated at 2750 engine rpm)

2350 lb. gross weight

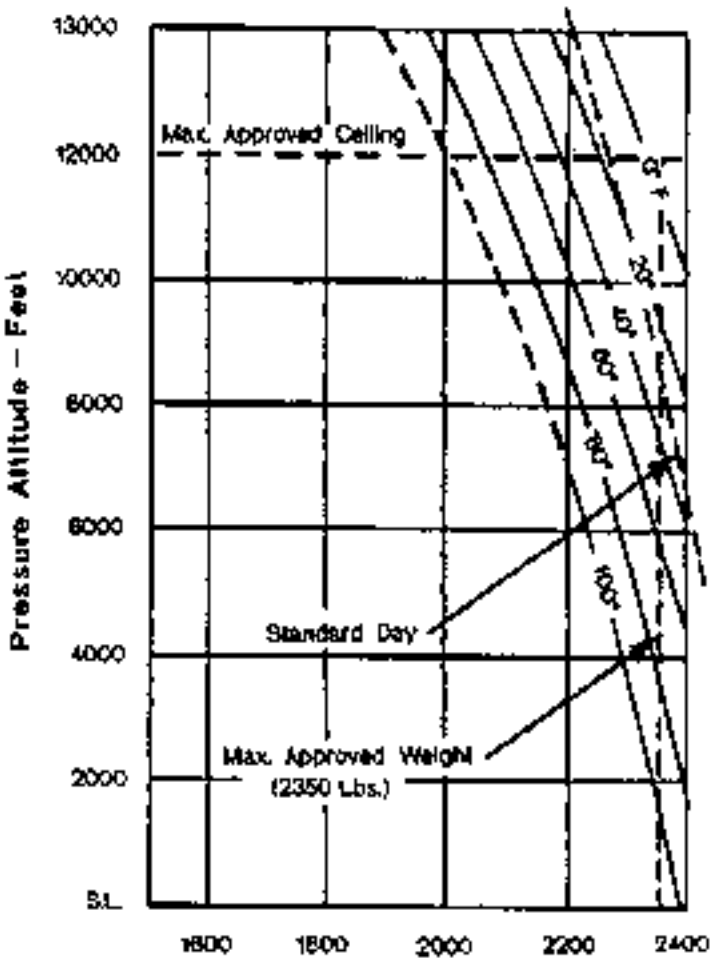


AIRSPEED CALIBRATION



NOTE: Indicated speeds below 20 MPH are not reliable.

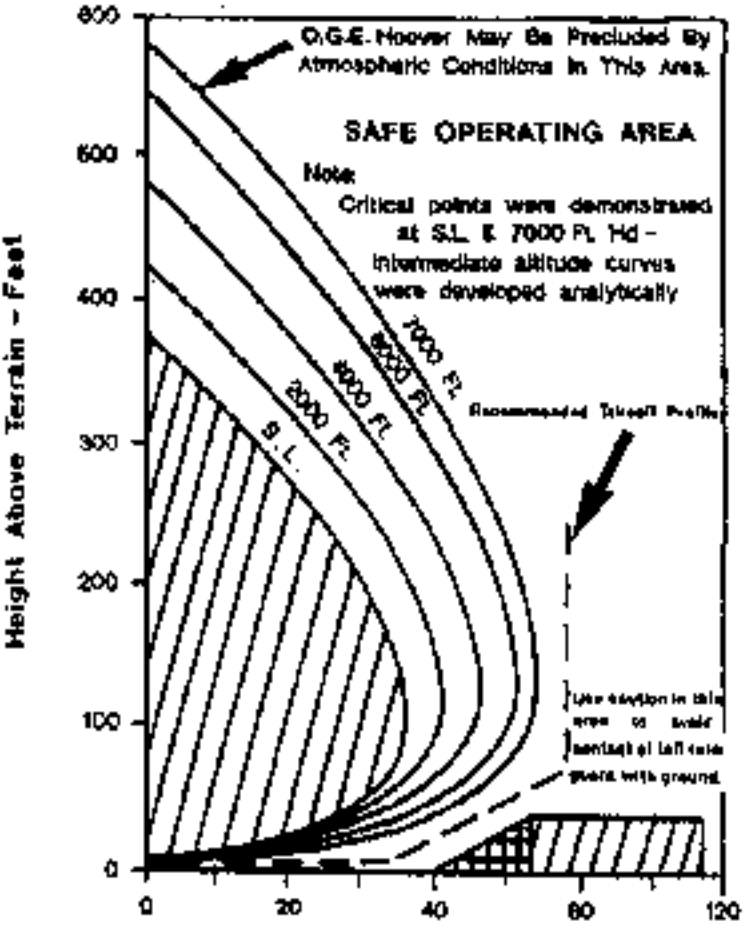
HOVER CEILING IN GROUND EFFECT
3½ FOOT SKID HEIGHT



HEIGHT VELOCITY DIAGRAM

(Tests conducted on prepared surfaces)
2350 LB. GR. WT.

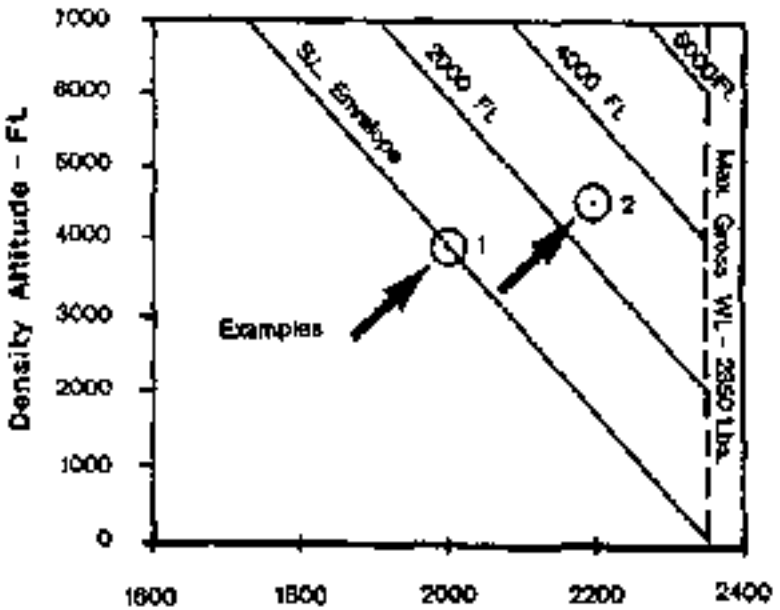
//// AVOID OPERATION IN THIS AREA



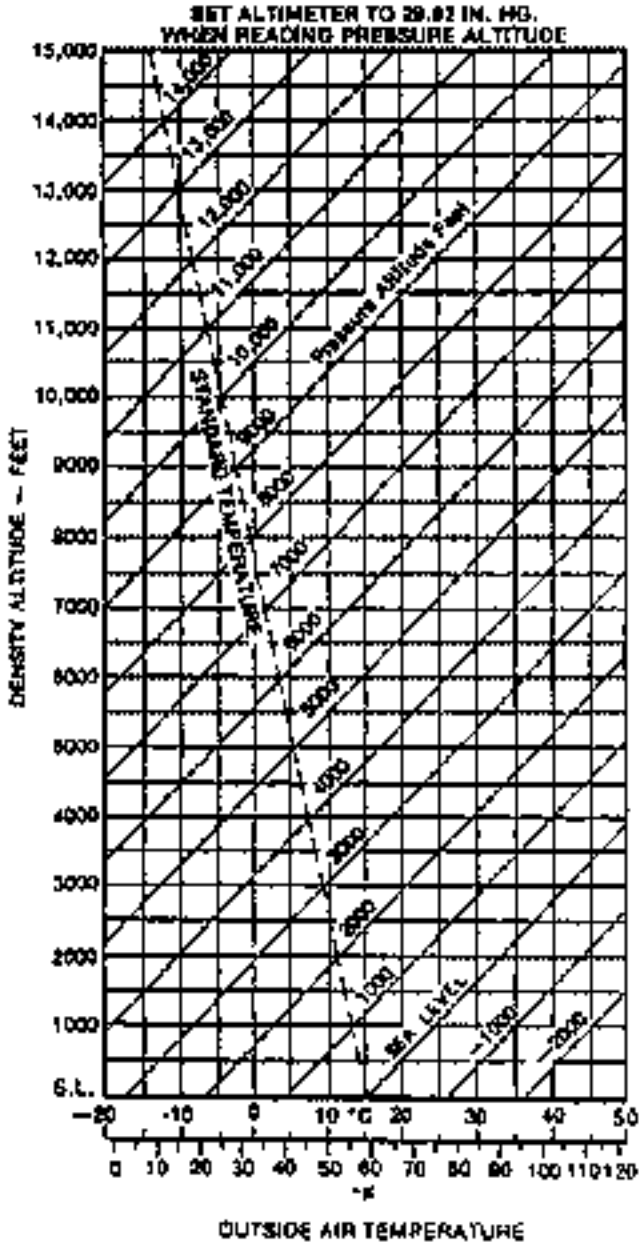
EFFECT OF OFF-LOADING ON CHOICE OF H-V ENVELOPE

The H-V envelopes shown on FM-5-4 must be used for the density altitudes shown on the curves when operating at 2350 lbs. Operations at gross weights less than 2350 lbs. can be conducted using a less restrictive H-V curve.

The chart below provides a method to select a more representative envelope. For example, a gross weight of 2000 lbs. and 3900 ft. density altitude would allow use of the S.L. envelope (i.e. see example 1). A gross weight of 2200 lbs. and 4500 ft. density altitude would require a 2800 ft. curve. To be conservative, use the next highest envelope, 4000 ft.

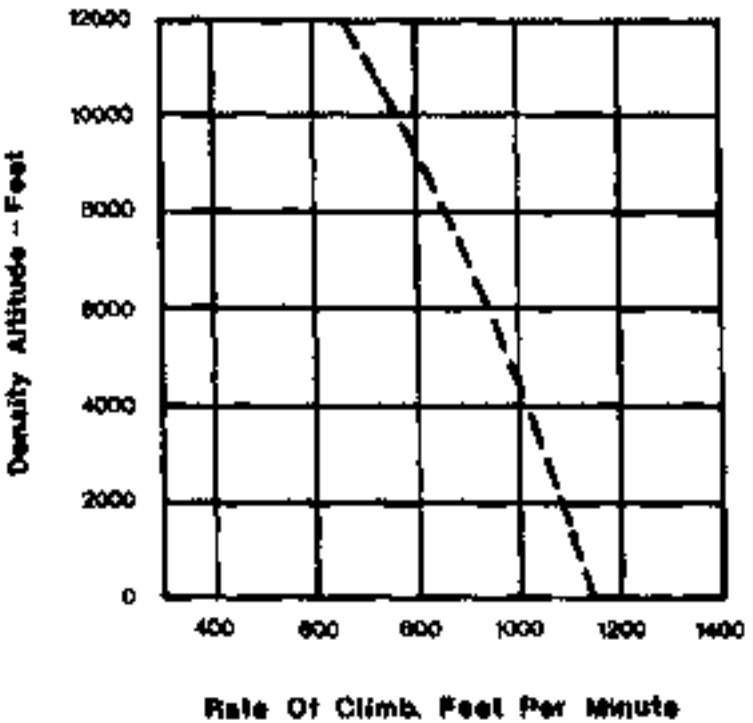


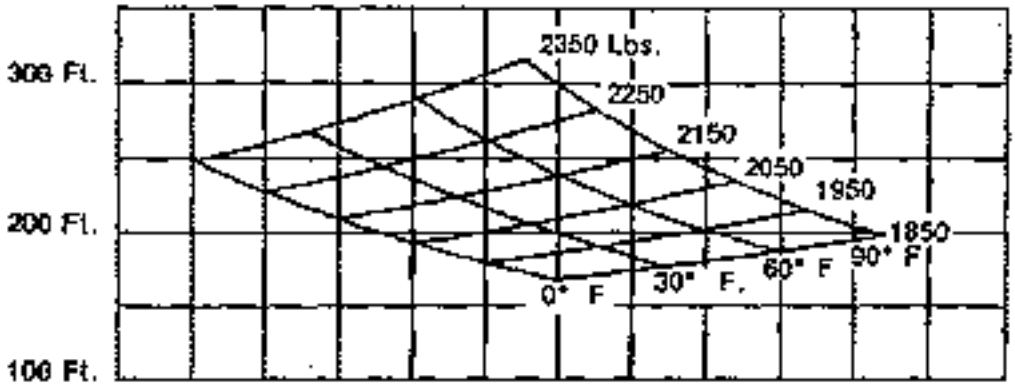
DENSITY ALTITUDE CHART



RATE OF CLIMB/DENSITY ALTITUDE
2350 LBS. GROSS WEIGHT

BEST RATE OF CLIMB SPEED VARIES WITH ALTITUDE; 57 MPH AT S.L. DECREASING TO 49 MPH, IAS AT 12,000 FT.





TAKE OFF DISTANCE TO 50 F. ALTITUDE

Note: Flight profile at 2900 engine rpm.
Observe H-V Diagram appropriate to density altitude.
Decrease distance 5 ft. for each mph of wind.

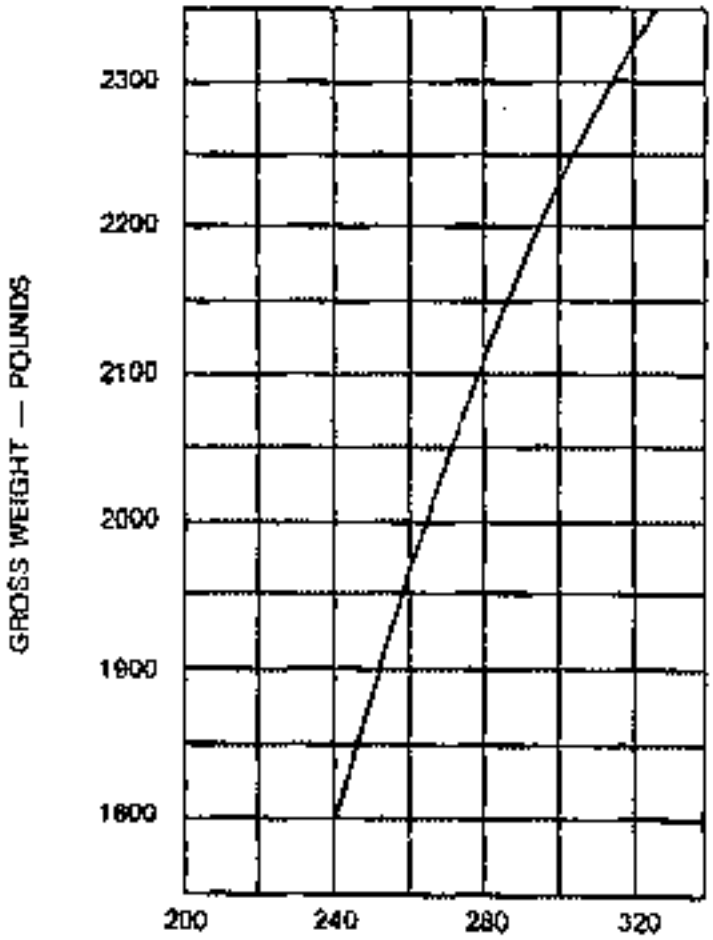
TAKEOFF OVER 50 FT. OBSTACLE
(Applicable Sea Level to 7000 Ft. D.A.)

ENSTROM F28C-UK

FM-1-9-UK

CAA Requirement

LANDING OVER A 50 FT. OBSTACLE
(Applicable Sea Level to 7000 Ft. Density Altitude)



Note:
1. 2900 engine rpm.
2. Flight profile per applicable H-V Diagram.
3. Density Altitude accounts for non-standard temperature.
4. Decrease distance 5 ft. for each mph of wind.

SECTION 6 — WEIGHT & BALANCE

INFORMATION

All helicopters are designed for certain limit loads and balance conditions. Changes in equipment which affect the empty weight center of gravity must be recorded in the aircraft and engine log book. It is the responsibility of the helicopter pilot to ensure that the helicopter is loaded properly. The empty weight, empty weight C.G. and useful loads are noted on the weight-balance sheet included in this Manual for this particular helicopter.

The longitudinal and lateral c.g. range for the Model F28C vary with gross weight. Satisfactory aircraft handling qualities have been established throughout the c.g. envelopes shown on page FM-6-7 of this manual. Although the envelopes presented cover a wide range of typical loading conditions, pilots must calculate any unusual loading conditions to insure that the aircraft c.g. remains in the approved envelope. Sample calculations are shown on pages FM-6-6 and FM-6-7 for reference.

The lateral c.g. limit is defined in terms of lateral moment in that the calculation of lateral c.g. is not part of the primary aircraft weight and balance records. Lateral moment is the algebraic summation of the left and right hand loads times their respective lateral moment arms. A sample calculation is shown on page FM-6-6 for reference. The aircraft centerline is used as the datum reference. Left lateral moment arms considered negative; right lateral moment arms are considered positive.

WEIGHT AND BALANCE

The removal or addition of fuel or equipment results in changes to the center of gravity and weight of the aircraft, and the permissible useful load is affected accordingly. The effects of those changes must be investigated in all cases to eliminate possible adverse effects on the aircraft's flight characteristics.

Maximum Gross Weight	2350 lbs
Estimated Empty Weight (no accessories, fuel or oil)	1495 lbs
Useful Load	855 lbs.
Approved Forward C.G. Limit	2350 lbs. station 92.0
Approved Aft C.G. Limit	2350 lbs. station 94.8
Approved Aft C.G. Limit	2000 lbs. station 100.0

Approved Lateral Offset Moment
@ 2350 lbs. ..... +3250, +3700 in. lbs.
Below 2015 lbs., see FM-6-7.
Centerline of aircraft is "0" lateral moment arm.

TOOLS AND EQUIPMENT

Tape Measure..... Commercial
Scale (two) ..... 1000 lbs. capacity
Scale – tail (one) ..... 100 lbs. capacity
Level – bubble-type..... Commercial
Work stand..... As required

DETAILED PROCEDURE FOR WEIGHING F28C SERIES HELICOPTER

a. Thoroughly clean helicopter.

b. Helicopter will be weighed inside a closed building to prevent errors in scale readings due to wind. Helicopter will be placed in a level flight attitude.

c. Check for proper installation of all accessory items. Check to determine if the scales that are being used have been calibrated recently, and check to see that the scales will zero out before weighing helicopter.

d. The helicopter will be weighed without fuel, but the weight and balance record will reflect corrections to indicate the amount of unusable fuel 2 U.S. gallons. The helicopter may be weighed with full oil or without oil, but the weight and balance report should be corrected accordingly.

e. Tare will be noted when helicopter is removed from the scales.

NOTE: Check oil level of main transmission and tail rotor transmission. Check to see that the main rotor blades are in uniform position, 120° apart.

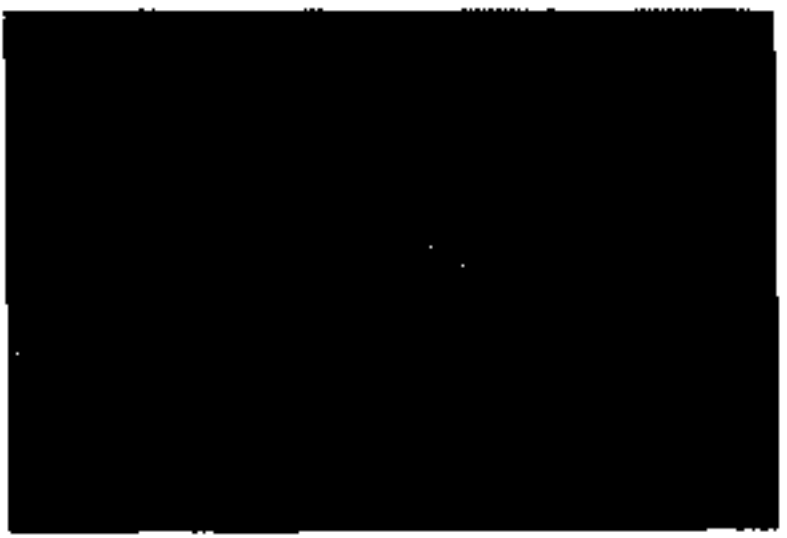
f. Close and secure both doors, left and right hand sides.

g. Hoist or jack helicopter clear of ground.

h. Position two main scales beneath the skids.

i. Position a pipe nipple in the center of left and right hand scales at 17.7 inches aft of the center line of the forward 3-inch diameter aluminum landing gear cross beam assembly. (Detail No. 1) The 17.7 inch dimension must be taken perpendicular to the centerline of the helicopter.

In order to simplify defining the fulcrum position, Enstrom tool T-1784 is shown below. This tool may be purchased through the Enstrom Customer Service Department.



WEIGHT AND BALANCE
TOOL POSITIONING

Detail No. 1

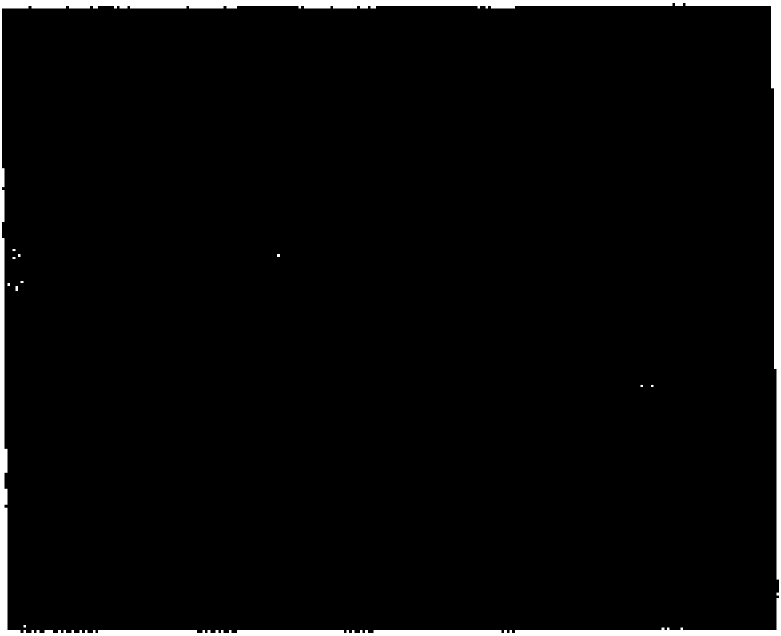


Fig. 1

j. Height of tail to be adjusted for level.

k. Level for and aft to be taken at lower pylon tube, left side, so identified. (Detail No. 2). Fig. 1.

l. Lateral level taken at lower forward pylon tube

m. Small scale will be located under tail rotor at the center line of the tail rotor output shaft, Fig. 2.

n. Using jack, raise or lower tail as required to level the aircraft along the longitudinal axis, paying attention to the level on the longitudinal and lateral pylon tubes.

o. Read and record weight from each of three scales.

p. Calculate weight and center of gravity on attached form, with weight data. Empty weight will be "dry weight."

q. All items added or subtracted will be listed on the attached form with weight, arm, and moment.

Fig. 2

CAUTION: Weight and measurement headings are critical. Double check results.

r. Remove helicopter from scales.

CAUTION: Do not remove curbing, jack, nipples, blocks, etc., from scales. These items constitute tare weight.

s. Read and record tare weight from each of the three scales. An official weight and balance report is prepared in connection with each helicopter presented for air-worthiness certification at the Enstrom Corporation. All these reports are marked "actual weight."

t. This weight and balance report, and equipment list will be prepared and supplied with each helicopter.

u. Use Form No. F-165 (page FM-6-9) Basic Weight and Balance Report to give you a continuous history of weight changes throughout the life of your helicopter.

LOADING INFORMATION

NOTE: It is the responsibility of the helicopter pilot to insure that the helicopter is loaded properly. The empty weight, empty weight c.g. and useful load are noted on the weight and balance sheet included in this manual for this helicopter.

C.G.

Range: Variable with Gross Weight ..... 92.0 to 100

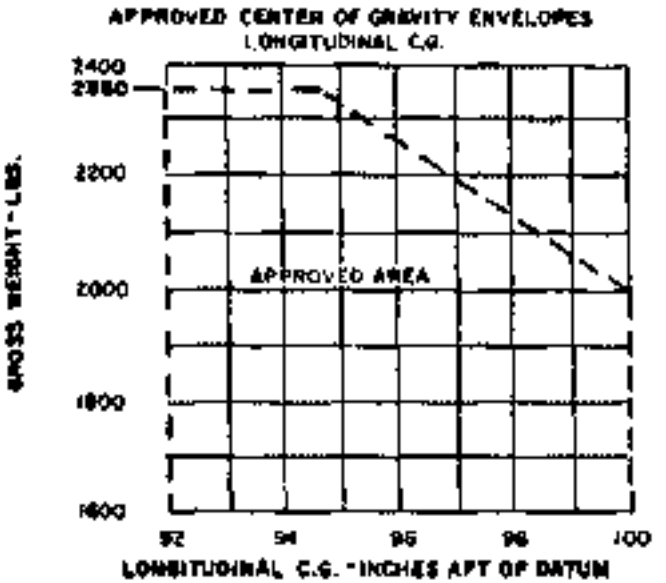
Maximum Gross Weight ..... 2350 lbs.

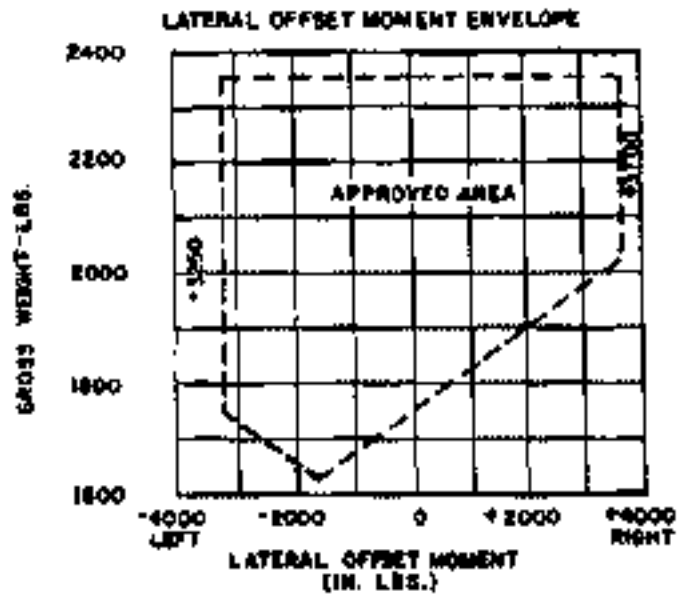
TYPICAL LOADING – F28C

Rearward C.G.	Weight (lbs.)	Arm (in.)	Moment (in. lbs.)
Empty Weight (including undrainable engine oil, gearbox oil and unusable fuel)	1495.0	101.4	151593.0
Baggage Box	10.0	135.0	1350.0
Engine Oil	15.0	100.0	1507.5
Pilot	120.0	62.0	7440.0
Baggage	60.0	135.0	8100.0
	1700.0	99.99	169990.5

Forward C.G.	Weight (lbs.)	Arm (in.)	Moment (in. lbs.)
Empty Weight	1495.0	101.4	151593.0
Baggage Box	10.0	135.0	1350.0
Additional Panel Instr.	20.0	36.0	720.0
Engine Oil	15.0	100.5	1507.5
Fuel, 40.0 Gal.	240.0	96.0	23040.0
Pilot & Passengers	530.0	62.0	32860.0
40 lbs. of Baggage	40.0	135.0	5400.0
	2350.0	92.11	216470.5
Lateral Offset Moment			
Pilot (left seat)	190	-13.5	-2565.0
Copilot (right seat)	130	+12.12	+1575.6
			-989.4

(Centerline of aircraft is "zero" lateral moment arm)





ENSTROM F28C EQUIPMENT LIST

Serial No. ____________________

FAA Assigned Registration No. ____________________ Date ________

Check Gear On	Check Gear Off	Item	Item	Wt	Arm
			INSTRUMENTS — REQUIRED		
			Altimeter	1.7	36
			Airspeed	.6	34
			Tachometer	1.3	36
			Manifold — Fuel Pressure	1.6	36
			Instrument Cluster	2.0	36
			Oil Temperature		
			Oil Pressure		
			Gear Box Temperature		
			Cylinder Temperature		
			Fuel Quantity		
			Ammeter		
			Compass	1.0	40
			OAT Gauge	0.6	55
			Ball Bank Indicator*		
			E.G.T. Gauge*	0.6	36
			OPTIONAL EQUIPMENT		
		1	Night lighting equipment (including combination strobe and position lights, internally lit instrument cluster)		
		2	Map light (Req'd for night flight)	.6	50
		3	Map case	.5	38
		4	First aid kit	70	44
		5	Soundproofing		
		6	Defroster — F28A, F28C		
		7	Strobe lights — F28A		
		8	Float build up		
		9	Center audio console (F28A, F28C)		
		10	Cargo hook		
		11	Extra head set	2.0	60
		12	Cabin heater & defroster combination F28A, F28C	3.5	44
		13	[illegible]	18.0	100.0
		14	Cabin heater (F28A, F28C)	4.1	38.0
		15	Baggage compartment	10.0	130.0
		16	[illegible]		
		17	Dual controls	12.0	50
		18	Floor carpet, [illegible]	8.0	66.0
		19	[illegible]	11.3	79
		20	Utility kit — single	24.0	*100.0
		21	King KT 76 transponder	4.0	34.0
		22	Shoulder harness w/reel — single	3	89
		23	Shoulder harness w/reel — double	6	82
		24	Float kit	3.7	135
		25	[illegible]	1.0	37.0
		26	Fire extinguisher	5.7	60.0
		27	External power unit (APU)	1.0	75.0
		28	Narco Com 11 [illegible]	4.6	34.0
		29	Narco Nav 11	3.1	32.0
		30	Narco ADF — 140	4.3	33.0
		31	Narco DME 190	6.0	34.0
		32	Narco AT50A transponder	4.0	34.0
		33	King KR86 ADF	3.9	34.0
		34	[illegible] Horizon model [illegible] — 24	3.4	32.0
		35	[illegible] directional gyro	2.3	32.0
		36	King KX175B NAV/COM	7.0	34.0
		37	ADF 140 loop & sense antenna	5.1	138.0
		38	[illegible]	8.0	60.0
		39	Instantaneous vertical speed indicator	1.5	34.0
		40	Aim 205 directional gyro	3.8	34.4
		41	Antenna [illegible]	1.3	184.0
		42	Narco DGO-10	2.7	32.0
		43	Dual landing light (Req'd for night flight)	3.3	28.0
		44	King KR 86 [illegible] indicator	7.0	34.0
		45	[illegible]		
		46	Ground handling wheels	13.0	166.7
		47	King KI-[illegible] indicator	1.3	34.0
		48	Narco NAV 11	[illegible]	34.0
		49	Narco ELT	3.3	135

*Standard equipment not required by FAA.

*Standard equipment not required by FAA.

BASIC WEIGHT AND BALANCE RECORD

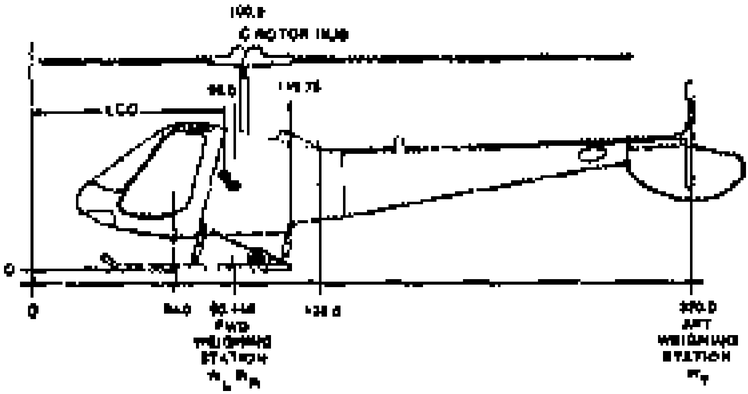
Model No. ______________ Serial No. ______________ Reg. No. ______________

Continuous history of changes in structure or equipment affecting weight and balance

Item No.	Date	Item In	Item Out	Description of article or modification	Weight added (+) Weight	Weight added (+) Arm	Weight added (+) Mom.	Weight removed (−) Weight	Weight removed (−) Arm	Weight removed (−) Mom.	Running basic total Weight	Running basic total C.G.	Running basic total Mom.
				ACTUAL DELIVERED WEIGHT AND BALANCE DATA									

Form No. F-155

WEIGHT AND BALANCE REPORT



Model ______________ Serial No. ______________ Registration No. ______________

Weigh point	Scale—lbs.	Tare	Net wt.	Arm	Moment ÷ 1000
Left gear			(W_L)		
Right gear			(W_R)		
Tail			(W_T)		
Total					

$$LCG = \frac{W_T(290.0) + (W_L + W_R)(93.148)}{W_T + W_L + W_R} = \_\_\_\_\_\_\_\_\_\_$$

Date ______________ Weighed by ______________

Form No. F-158 Report No. 28-AC-017

AIRCRAFT ACTUAL WEIGHT REPORT

Model _____ Serial No _____ Reg. No. _____

Standard equipment not installed at weighing			
Item No.	Wt.	Arm	Moment ÷ 1000 in.-lbs.
Total			

Optional & surplus equipment in aircraft at weighing			
Item No	Wt	Arm	Moment ÷ 1000 in.-lbs.
Total			

Weighing witnessed by _____ Date _____

Form No. F-163

AIRCRAFT WEIGHT AND C. G. CALCULATION

Model _____ Serial No. _____ Reg. No. _____

		Weight lbs.	Arm in.	Moment 1000 in./lbs.
Weight (as weighed)				
Less: optional & surplus weight				
Plus: missing std. equipment				
Total — weight empty — std. aircraft	Computed			
	Actual			
Plus: engine oil				
Plus: optional equipment & kits				
Total basic weight				

Form No. F-168

SECTION 7 — AIRCRAFT AND SYSTEM DESCRIPTION

One of the first steps in obtaining the utmost performance, service, and flying enjoyment from your F28C, is to familiarize yourself with its equipment, systems, and controls.

The Enstrom F28C Helicopter is designed for high performance, mechanical simplicity, and maximum versatility. By virtue of component longevity and minimum maintenance requirements, the F28C enjoys the lowest operating cost of any helicopter. The rugged, patented rotor head, combined with the (51 lbs. each) rotor blades, gives unheard of stability and excellent autorotational characteristics.

INTERIOR ARRANGEMENT

The cabin interior is a full, three-place, side-by-side seating arrangement with a spacious 61" width for maximum pilot and passenger comfort and safety. The instrument panel is on the vertical plane for more natural scanning and is conveniently located for dual pilot viewing. Excellent visibility is offered throughout the tinted Plexiglas windshield and doors with overhead and lower deck windows. Extra-width, swing-open doors close securely with simple-to-operate safety lock handles. The helicopter can be flown with either left, right, or both doors off.

AIR INDUCTION SYSTEM

The air induction system consists of a filtered non-ram air intake located within the engine compartment. It incorporates a spring-loaded, automatic alternate air source.

POWER PLANT

An Avco Lycoming HIO-360-E1AD 205 hp engine is used in this helicopter. The engine is a direct drive, four cylinder, fuel injected, horizontally opposed, air cooled engine. This engine incorporates features for turbocharging. Platinum spark plugs are supplied with the engine.

NOTE: It is recommended that the appropriate Lycoming Operator's Manual be consulted prior to any adjustment or repair to the engine.

OIL SYSTEM

The Lycoming engine employs a wet sump lubrication system having a capacity of 8 quarts. The engine oil pump circulates the oil through a remote mounted oil cooler to provide cooling.It is located on the right-hand side of the engine compartment. A thermostatic bypass and pressure relief valve are supplied as standard equipment. Restricted pressure engine oil is also circulated through the turbocharger bearing housing. A separate engine scavenge pump returns the oil to the engine sump. A bayonet-type oil quantity gauge with graduated markings is part of the oil filler cap and is accessible through the left fuel drain access door.

The total oil system has a capacity of 10 quarts. This includes the oil in the engine, oil filter, oil cooler, and oil lines.

Oil System Indicators-Oil Temperature and Pressure Gauges. Standard type gauges are provided for both the engine oil temperature and oil pressure indications. Both gauges are marked to provide visual engine operating limitations and are located on the instrument panel.

ENGINE CONTROLS

Throttle. A twist-grip type throttle is located on the collective pitch control stick for direct control of engine power. It is manually connected to the fuel servo-throttle valve on the engine.

Mixture Control. A vernier mixture control knob is provided on the instrument console. This vernier control incorporates the features of a standard push-pull cable. Full rich is in the "in" position. Full lean is in the "out" position. The vernier feature allows a screw type of adjustment to fine tune any preset mixture position.

Magneto Switch. The magneto switch is a key-operated switch located on the left side of the switch circuit breaker panel. For starting, place the switch in the "Both" position.

Ignition Safety Switch. This switch closes the circuit to the starter button on the collective control.

Starter Button. The starter button is located on the end of the collective control. Push to engage.

Master Switch. The master switch is located on the left side of the switch circuit breaker panel. It is a single-throw, two-position switch.

TURBOCHARGER

The turbo unit has only one moving part, a rotating shaft with a turbine wheel on one end, a compressor impeller on the other, all precision balanced and each contained in its own housing. The turbine wheel, driven by exhaust gas energy, drives the impeller which compresses intake air to a density equivalent of near sea level and delivers it to the engine intake. This increased volume of air allows the engine to "breath" with the same volumetric efficiency that it does at low levels. The engine can produce the equivalent power at all altitudes up to12,000 feet density altitude.

EXHAUST GAS TEMPERATURE SYSTEM

The exhaust gas temperature, as shown on the panel mounted indicator, is used as an aid for fuel mixture leaning in cruising flight. The panel indicator is red-lined at 1650 °F. The exhaust temperature probe is located on the exhaust stack just before the inlet to the turbocharger. This allows an actual temperature measurement of the exhaust gases that are delivered into the turbocharger unit.

CABIN HEAT

The cabin heat control is located at the left-hand side of the pilot's seat, on the floor. By moving the control in or out, the operator regulates the amount of cabin heat through the output louvers located in the center of the floor under the instrument panel.

CLUTCH ENGAGING LEVER

The clutch engagement lever is located at the right side of the pilot's seat on the forward face of the seat structure. The clutch lever is provided as a means of engaging and disengaging the rotor drive system. The rotor drive system is engaged by pulling the clutch lever upward and rearward until the lever hits the stop and the warning light goes out. The handle can then be stowed by lifting it straight up and pivoting it down to the floor. When it is in the stowed position, the handle should lie flat on the floor. If it does not lie flat on the floor in the stowed position, the clutch rigging should be checked as described in Section 8 of the Maintenance Manual. The clutch lever must be stowed whenever the rotor drive system is engaged.

FUEL SYSTEM

The system consists of two interconnected 20 US gallon fuel tanks, which feed simultaneously to the engine. The tanks are located on the left and right side of the aircraft over the engine compartment. The tanks have a total fuel capacity of 40 US gallons, with a total of two gallons unusable fuel, one gallon unusable fuel in each tank. Each tank is gravity fed to a central

distributing line which connects to the electric boost pump and engine driven pump. The fuel control valve is an off-on type and is located on the firewall next to the pilot's left shoulder. Each tank has an individual drain valve in the bottom. There is also a main gascolator filter located aft of the firewall in the engine compartment. The control is on the right-hand side of the engine compartment and extends beyond the side panel.

Auxiliary Fuel Pump Switch The fuel boost pump switch and fuel pressure warning lights are located on the switch circuit breaker panel. The green warning light will stay illuminated as long as the fuel boost pump is operational. The red light will illuminate at any time the fuel boost pump is shut off or fails to function properly.

Fuel Quantity Indicator. The fuel quantity gauge continuously indicates the total quantity of fuel. It is hooked up through a simple type liquidometer float located in the right-hand fuel tank. A translucent strip on each tank provides a direct, visual indication of fuel level.

Fuel Flow-Fuel Preasure Indicator. The fuel pressure provides pounds per hour and pressure readings of the fuel as delivered to the flow divider. The indicator is marked for normal operating range from 0 to 160 pounds per hour and 0 to 25 psi index lines in 6 psi increments.

TRANSMISSION SYSTEM

The main transmission unit provides an 8.277 reduction ratio between the engine and the main rotor. The transmission incorporates a free-wheeling unit in the upper pulley assembly which is mounted on the pinion input shaft. The free-wheeling unit provides a disconnect from the engine in the event of a power failure and permits the main and tail rotors to rotate in order to accomplish safe autorotation landings. Six pints of S.A.E. 90 wt. E.P. gear oil are used in the transmission. The main rotor transmission has a sight gauge which is located on the aft right-hand side and is visible through an opening in the baggage compartment or the right access panel.

Main Rotor Transmission Temperature Indicator. A main rotor transmission gauge is located on the instrument panel and is redlined at 220 °F.

Tail Rotor Transmission. The tail rotor transmission, mounted at the aft end of the tail cone, supports and drives the tail rotor. The tail rotor transmission is equipped with a self-contained lubricant supply and level gauge at the rear of the housing and magnetic plug can be removed to inspect for metal particles. Its

capacity is 5 ounces of S.A.E. 10 wt. non-detergent motor oil.

ROTOR SYSTEM

Main Rotor. The main rotor is a three-blade, fully articulated system. The fully articulated system in the F28C Helicopter provides smooth control responses in all modes of flight; and due to the kinetic energy stored in the heavy rotor blades, allows for easy-to-perform, safe autorotation landings in the event of power failure. The rotor assembly consists of three all-metal bonded blades, upper and lower rotor hub plates, universal blocks, blade grip assemblies, and lead lag hydraulic dampers.

Tail Rotor. The tail anti-torque rotor counteracts the toque of the main rotor and functions to maintain or change the helicopter heading. The tail rotor is a two-bladed, teetering, delta-hinge type assembly.

Rotor Tachometer. The rotor RPM indicator is part of a dual-purpose tachometer which also reads engine RPM.

FLIGHT CONTROLS

Cyclic Control. The cyclic control stick is similar in appearance to the control stick of a fixed-wing aircraft. The direction of stick movement results in a change of the plane of rotation of the main rotor and will produce a corresponding directional movement of the helicopter through the longitudinal and lateral modes of flight. The stick grip incorporates a trigger-type switch used for radio transmissions and intercom. A trim switch is also located on the cyclic stick grip to control the longitudinal and lateral trim motion.

Stabilizer. An all-metal, fixed-position stabilizer is installed on the tail cone assembly for longitudinal trim.

Collective Pitch Control. The collective pitch control lever is located to the left of the pilot's position and controls the vertical mode of flight. A rotating, grip-type throttle is located at the end of the collective control.

Directional Control Pedals. The directional control pedals are located in the cabin forward of the pilot and/or co-pilot. When moved, these adjustable pedals change the pitch of the tail rotor blades and thereby provide the method of changing directional heading.

FLIGHT INSTRUMENTS

The standard flight instruments which are installed in the F28C as basic equipment comply with the requirements under visual flight rules for day or night operation. The panel arrangement provides ease of visual observance and includes space provisions for installation of additional instruments to meet individual requirements.

Airspeed Indicator. The single-scale airspeed indicator is calibrated in MPH and provides an indicated airspeed reading during forward flight. The pitot tube, which provides air pressure source, is located below the cabin nose section. Static air pressure for instrument operation is derived from two static vents located on either side of the tail cone assembly. The openings in the pitot tube and static vent ports must be maintained obstruction-free and clean at all times for proper instrument operation.

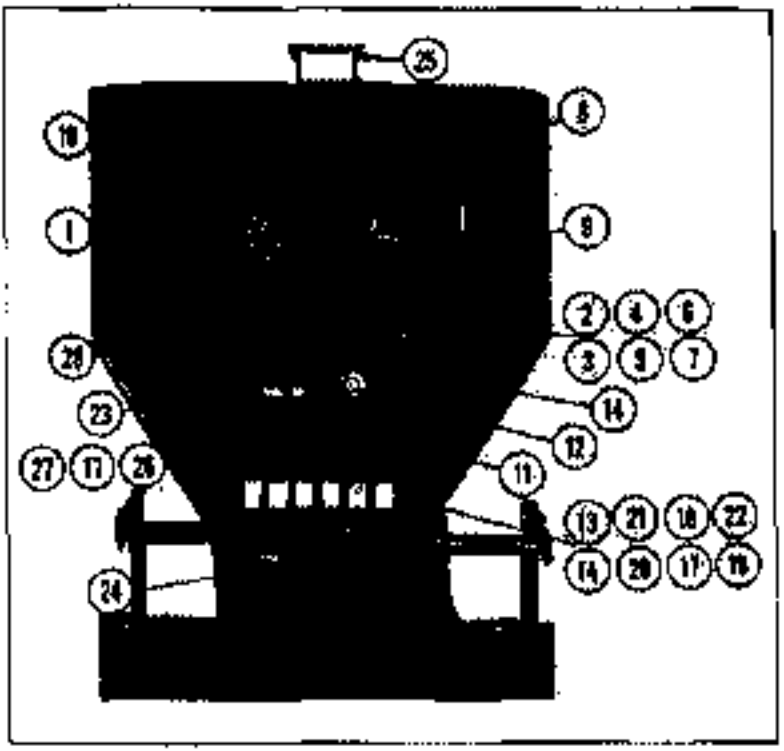
Altimeter. The altimeter is a sensitive type that provides distance-height readings from 0 to 25,000 feet. The long hand in a single complete sweep of the dial totals 1,000 feet, and the short hand totals the thousands of feet altitude. The instrument is vented to the same static port vents as the airspeed indicator.

Compass. A standard aircraft quality magnetic compass is mounted on the center windshield support within easy sight of pilot or co-pilot. It is to be used in conjunction with a compass correction card located adjacent to the instrument.

Free Air Temperature Indicator. The free air temperature indicator is a direct reading, bi-metallic instrument with a stainless steel probe. This instrument provides ambient temperature information which, when utilized, will assist in determining performance capabilities of the helicopter at the existing climatic condition. The indicator is located in the top of the cabin.

ELECTRICAL POWER SUPPLY SYSTEM

Direct Current Power System. The basic power supply system is a 12-volt direct current system, with a negative ground to the helicopter structure. A belt-drive 70 amp alternator is located on the aft part of the engine. One 12 volt battery is located in the right-hand side of the pilot's compartment and serves as a stand-by power source supply power to the system when the alternator is inoperative.



F28C INSTRUMENT PANEL

1. Manifold pressure/fuel flow
2. Fuel quantity
3. Oil pressure
4. Main rotor-gear box
5. Oil Temperature
6. Ammeter
7. Cylinder temperature
8. Altimeter
9. Airspeed
10. Rotor/engine tachometer
11. Panel light dimmer switch
12. Ignition switch
13. Master switch and circuit breaker
14. Fuel pressure indicator and boost pump switch.
15. Engine hour meter (not shown)
16. Clock (not shown)
17. Instrument lights
18. Navigation lights
19. Anti-collision lights
20. Landing light
21. Alternator switch
22. Panel light circuit breaker
23. Bank indicator
24. Mixture control
25. Compass
26. Ignition safety switch
27. Trim motor switch
28. EGT gauge

Electrical Power Panel. The following switches/combination circuit breakers are located on the switch circuit breaker panel mounted on the instrument console within easy reach of pilot or co-pilot: magneto key switch, master switch, alternator switch and alternator circuit breaker, boost pump switch, navigation position lights switch, anti-collision light switch, landing light switches, panel light switch, starter switch, and trim motor switch.

LIGHTING EQUIPMENT

The helicopter lighting kit includes the required lights necessary for VFR night operation plus additional lighting equipment for utility and convenience purposes. The electrical panel on the right-hand side of the instrument console contains the protective circuit breakers and control panels for the lighting equipment.

Position Lights. Two position lights are located one on either side of the forward cabin structure and two lights are located aft of the stabilizer on the tail cone.

Anti-Collision Lights. The anti-collision lights have a rotating, flashing action that privides for adequate identification of the helicopter. One anti-collision light is located on top of the fuselage aft of the cabin, and the other light is located forward of the cabin structure under the pilot's compartment. They are operated by the anti-collision switch located on the panel.

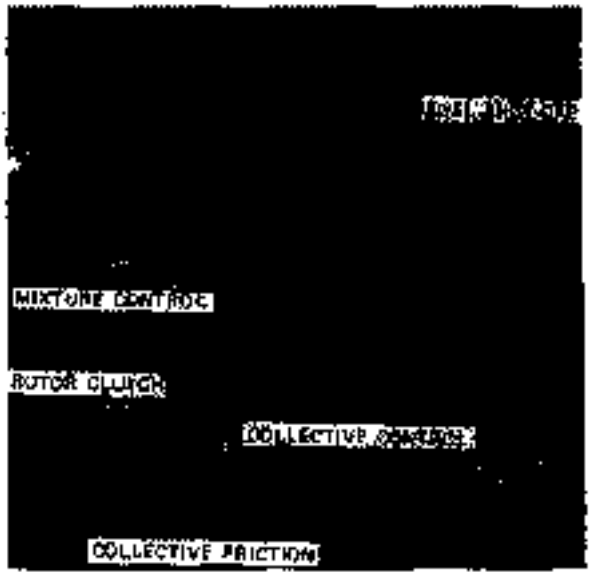
Landing Lights. The landing lights are of the permanent extend type, one is mounted on the nose and the other on the underside of the aircraft and set in the desired angle for the best forward and down illumination. The switches for operation of the landing lights are located on the instrument panel in the electrical console section. The light on the underside of the aircraft is primarily designed to provide illumination while hovering.

GROUND HANDLING WHEELS

Each landing gear skid tube has a manually operated over-centering device to lower the wheels or retract them for flight. The ground handling wheels should be retracted and the helicopter allowed to rest on the skids when engine run-up is being performed or when helicopter is parked.

BAGGAGE COMPARTMENT

The compartment for storage of baggage is provided in the area aft of the engine compartment. Access is through a single door located on the right-hand side which has a lock for external locking. The capacity of the compartment is approximately 10 cu. ft. and has an allowable loading capacity of 60 lbs. at Station 135.



SECTION 8 — AIRCRAFT HANDLING, SERVICING AND MAINTENANCE

If you wish to obtain maximum performance and dependability from your F28C Helicopter, certain inspection and maintenance requirements must be followed. It is always wise to follow a planned schedule of lubrication and maintenance based on the climatic and flying conditions encountered in your locality. Keep in touch with your Enstrom dealer and take advantage of his knowledge and experience. Your dealer is ready and willing to assist you and to keep you abreast of all changes, whether it be maintenance or periodic servicing of the helicopter.

GROUND HANDLING

To lower the ground handling wheels, insert the slotted handle facing forward. While applying a constant pressure to handle, release pin. Pull up and aft with a lifting motion until the holes line up. Insert the locking pin. Keep a firm grip on the handle until pin is in place.

CAUTION: 1. Keep your feet from under the skids.
2. Stay on outside of skid, do not straddle.

MOORING

Although it is not generally necessary to tie down the helicopter, a nylon rope can be attached to the landing gear cross tube at the oleo attach points. One blade should be placed parallel to tail cone and tied to tail cone.

TRANSPORTING

If transporting helicopter on trailer or truck, skids may be secured to bed of trailer allowing oleo's to function.

a. Remove three main rotor blades and store in blade box.

b. Secure tail rotor.

c. Disconnect battery.

STORAGE

The metal-fiberglass construction of your F28C makes outside storage practical, although inside storage will increase its life just as inside storage will increase the life of your car. If your F28C must remain inactive for a time, cleanliness is probably the most important consideration. It is suggested that a canvas or nylon cover be placed over the rotor head. If storage is for an extended period, see your Lycoming Manual for preservation information.

HOISTING

To lift the entire helicopter, the use of a nylon sling of approximately 3,000 lbs. capacity is required. The nylon sling is placed around each grip assembly.

JACKING

It is possible to jack up the helicopter inboard of upper oleo attach points on forward and aft cross tubes.

CAUTION: Support the tail cone at extreme end.

EXTERIOR PAINT

The finish of your helicopter should be kept clean. It requires no special care. When washed, however, water should not be sprayed directly into any bearings. Any good grade of car wax will help to maintain the condition of the factory finish. It is very important that the main rotor blades be kept clean and free of dirt. After all, the blades are an airfoil, and to get maximum lift, they must be clean.

WINDOWS AND DOORS

The windows and doors are made from a fine grade of acrylic plastic. These surfaces can be scratched if dirt, bugs or other foreign material are not removed promptly. If the windshield is excessively dirty, a water and mild soap solution will help lift the dirt.

CAUTION: Never take a rag to wipe dirt from the glass areas on your helicopter. There are many good products made especially for the cleaning of acrylic plastic surfaces.

UPHOLSTERY AND CARPETS

No special care is required to keep the interior of your helicopter clean. A good stiff broom will help remove the imbedded dirt; vacuum the interior whenever possible. Any good upholstery cleaner can be used on the carpets and seats, but a word of caution when cleaning the seat belts. They are nylon, and certain cleaning agents will destroy the material used in their construction.

LANDING GEAR SHOCK STRUTS

The oleo struts are of the air-oil type and require little maintenance. It is suggested that the oleo be wiped off frequently to keep the abrasive action of dirt and oil to a minimum.

AIR CLEANER OR FILTER

The air cleaner is an important part of your engine's induction system. If it becomes dirty or clogged, your engine will use more fuel and will not produce maximum power. Excessively dirty filters will allow particles of dirt to be sucked into the cylinders, causing major damage. If your helicopter is operated in any dusty and high grass areas, check the air filter more frequently.

LIGHTS

Check the electrical system of the helicopter daily and always before night flying is planned. Keep the light lens clean for maximum brilliance.

BATTERY

The battery will normally require only routine maintenance. However, if you should operate in a warm climate, an occasional check for fluid level is recommended. Keep the battery terminals and battery compartment free of corrosion.

DAMPERS-MAIN ROTOR

To check for lead-lag operation, raise the blade off its droop stop and move each blade fore and aft by gripping blade at tip. A resistance indicates damper operation. There should be no undamped motion.

TRANSMISSION-MAIN

The transmission requires no special attention other than checking the sight gauge on the rear of the transmission on the right-hand side.

TRANSMISSION-TAIL ROTOR

The transmission requires no special attention other than checking the oil level by sight gauge.

LUBRICATION

Lubrication information is included in the Maintenance Manual. It is imperative that the correct lubricants be used and trained personnel do this job properly. Each item should be serviced at prescribed intervals. At the same time, all other items requiring more frequent service should receive attention. The intervals stated on the lubrication diagram should be considered maximum for average service. If your helicopter is operated under abnormal conditions, check these items more frequently.

EXCESSIVE GREASE

After a helicopter is returned from a routine inspection, the rotor head, tail rotor, and the tail rotor drive shaft will throw out grease. To keep the helicopter finish bright, remove this grease as soon as possible to prevent its sticky surface from collecting dirt.

MAIN ROTOR AND TAIL ROTOR BLADES

Preflight inspection of the main and tail rotor blades for nicks and an occasional wiping with a clean cloth to remove bugs and stains, coupled with regular lubrication of the hubs, will assure long, troublefree service. Never use an alkaline cleaner on the rotors; remove grease and dirt with carbon tetrachloride, Stoddard solvent, or any other mild solvent that will not attack the adhesive bonding of the blade.

In coastal areas where the air is salt-laden or if pitting of the blade leading edge is noted, use polyurethane tape on the leading edge for protection. This tape may be obtained from the Enstrom Customer Service Department. If the helicopter is equipped with this tape, the tape must be inspected before each flight. Look for holes, bubbles, blisters, or separation of the tape. If any defects are found, the tape must be removed or replaced before further flight. The tape should be kept clean in the same manner as the rest of the blade, except that it should be cleaned only with soap and water. Do not use solvent on or around the blade tape.

FUEL

As you will note, the fuel tanks on your helicopter are placarded for quantity and octane of fuel to be used. The engine requires 100/130 minimum grade aviation fuel. The use of other types of fuel such as automobile or lower octane aviation fuel will cause severe engine damage and will void the engine warranty. Be certain that fuel contamination due to worn out and inoperative filtration system, dirty fuel hose nozzles, rain or any other foreign material does not enter your helicopter's fuel system.

OIL

The engine manufacturer has recommended the (see Engine Operator's Manual) types of oil to be used in the different temperature ranges. These recommendations should be followed to aid in cold weather starting and proper hot weather lubrication of your helicopter engine. Care should be taken when adding oil that oil spouts are free of dirt and foreign material, oil can tops

are clean before installing oil spout, and when removing oil filler cap, dirt does not enter the oil sump. When installing the engine oil filler cap, check it for security and cleanliness.

COOLING SYSTEM

If unusually high oil temperature is encountered, remove oil cooler shroud and check for foreign matter.

REQUIRED F.A.A. FORMS

Miscellaneous data, information, and licenses are a part of the aircraft file. The following is a checklist for that file. In addition, a periodic check should be made of the latest Federal Aviation Agency Regulations to assure that all data requirements are met.

A. To be carried in the helicopter at all times.
   1. Aircraft Airworthiness Certificate Form ACA 1362
   2. Aircraft Registration Certificate Form ACA 500A
   3. Aircraft Radio Station License
   4. Weight and Balance Report
   5. Aircraft Equipment List
   6. Flight Manual

B. Since the regulations of other nations may require other documents and data, owners of exported aircraft should check with their own aviation officials to determine their individual requirements.

C. Inspection Periods: FAA Regulations require that all aircraft have a periodic (annual) inspection as provided by the administration, and performed by a person designated by the administration. In addition, 100-hour inspections by an "appropriately rated mechanic" are required if the aircraft is flown for hire. The manufacturer recommends the 100-hour inspection for your helicopter. A copy of the sample inspection forms, including the 50, 100, periodic and lubrication guides are included in the Maintenance Manual.

PREFLIGHT INSPECTION

After familiarizing yourself with the equipment of your F28C the primary concern will be its operation.
This checklist is designed to be used as a reference guide while performing the preflight inspection. Detailed information is found in the Handbook of Maintenance Instructions. Thoroughly familiarize yourself with this Manual before utilizing this checklist. Prior to starting the complete preflight inspection, check the following items in the cockpit: master switch OFF, magneto switch OFF, all other switches OFF, fuel valve ON.

FUEL MANAGEMENT

1. Left fuel tank drain – Drain sample into jar. Verify the fuel grade, check the cleanliness, and check that fuel is free of water.

WARNING: Sample the left and right fuel tank sumps before checking the fuel filter.

NOTE: Aircraft should be level or slightly nose down. Rock the aircraft by moving the tail up and down to displace any water or contaminants to the tank sumps. If water is found, rock the aircraft and re-sample. Check the other tank. Repeat until no water is found. Then check the fuel filter.

2. Right fuel tank drain – Drain sample into jar. Verify the fuel grade, check the cleanliness, and check that fuel is free of water.
3. Fuel filter – Secure and drain fuel sample into jar. Verify the fuel grade, check the cleanliness, and check that fuel is free of water.

EXTERIOR

CAUTION: Remove all covers and locking devices.

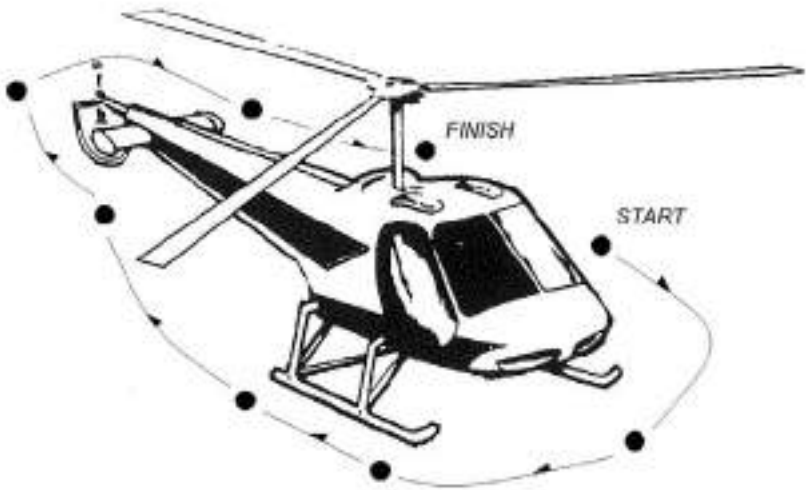
1. Check left hand door for security.
2. Check windshield for cracks.
3. Check pitot tube for obstructions.
4. Check landing lights for operation and security.
5. Check induction intake scoop for obstructions.
6. Check right hand shock strut – piston extension should be 3/4” to 1-3/4” from red line – struts clean and tires properly inflated.

7. Check right hand landing gear for security. (Ground handling wheels secured.)
8. Check right hand door for security.
9. Check right hand engine compartment.
10. Check induction hose clamps on the air filter and fuel injector for security.
11. Check air intake scoop for obstructions.
12. Check right hand fuel tank – FULL – 100/130 octane – cap secured.
13. Check main gear box oil level.
14. Check baggage door – locked.
15. Check right hand static port – opening unobstructed.
16. Check tail cone for general condition.
17. Check tail rotor drive shaft for security.
18. Check left and right position lights for operation and security.
19. Check stabilizer for security.
20. Check tail rotor pitch links for binding or looseness. Check tail rotor blade for security and leading edge for nicks, bonding separation and general security. Check tail rotor teeter stop to insure rubber bumpers are intact. Check tail rotor strike tabs for security and damage.
21. Check tail rotor guard for damage and security. Check tail rotor gear box oil level.
22. Check left hand static port – opening unobstructed.
23. Check main rotor blades for nicks, bonding separation or looseness. If blade tape is installed, inspect tape for holes, bubbles or blisters, or separation and lifting.
24. Check main rotor pitch links for binding or looseness.
25. Check cyclic and collective walking beams for security.
26. Check blade dampers for proper security and oil level.
27. Check left hand fuel tank – FULL – 100/130 octane – cap secured.
28. Check engine oil – 6 quarts minimum, 8 quarts maximum.

29. Check fuel system for leaks.
30. Check exhaust manifold for cracks and looseness.
31. Check engine for oil leaks.
32. Check turbocharger exhaust inlet and outlet clamps for security.
33. Check turbocharger air inlet clamps for security.
34. Check turbocharger oil lines for leaks.
35. Check turbocharge mount bracket for security.
36. Check drive belt system.
37. Check left hand shock struts – piston extension should be 3/4” to 1-3/4” from red line – struts clean and tires properly inflated.
38. Check left hand landing gear for security.
39. Check operation of all lighting for night flight.

Interior

1. Check and adjust rudder pedals.
2. Check seat belts fastened.
3. Doors latched.
4. Set collective full down and friction on.
5. Check clutch disengaged.
6. Check throttle CLOSED.
7. Check mixture IDLE CUT OFF.
8. Check fuel valve ON.
9. Check magneto switch OFF.
10. Radio switches OFF.
11. Set master switch ON.
12. Check fuel quantity.
13. Check fuel pressure warning light (press to test).
14. Check trim motors for operation.
15. Check controls for freedom of operation.
16. Set altimeter.



EXTERIOR INSPECTION

INTENTIONALLY LEFT BLANK

SECTION 9 — OPERATIONAL INFORMATION

The operating data and information contained herein is not intended to provide flight instructions, but to present a verbal picture of the helicopter handling qualities and control application through the various phases of the flight regime. Also discussed are flight characteristics which are common to most helicopters, and the special features pertinent to the Model F28C helicopter.

SOLO FLIGHT

Solo flight is permitted from the left side only.

TAXIING

Taxiing, as literally interpreted, is not possible as the helicopter is equipped with skid-type landing gear. Movement of the helicopter from one ground position to another can be accomplished by ground personnel, when the rotors are not turning, with the use of quickly installed ground handling wheels or by the pilot flying the helicopter from one location to another at an altitude in close proximity to the ground surface.

TAKEOFF – TYPES OF TAKEOFF

The known factors which must be considered prior to take-off include gross weight, temperature, density altitude, and the area from which operations are to be conducted. With this knowledge and the ability of the Model F28C to operate from either prepared or unprepared areas and surfaces, the type of take-off can be easily determined.

NORMAL TAKEOFF TO HOVER

A normal lift-off to a hovering altitude within ground effect is the most common type of takeoff and should be used whenever possible. Normal lift-off can be accomplished at moderate altitudes and at average operating gross weights. In this type of takeoff, the safety factor is high because the helicopter is lifted from the ground vertically to height of 3 to 5 feet where the flight controls and engine may be checked for normal operation before starting a forward speed climb. A normal takeoff is made in the following manner:

a. Increase throttle to 2900 RPM, with the collective pitch full down.

b. Place cyclic control in the neutral position or to a position which places rotor plane parallel to horizontal if helicopter is sitting on a slope.

c. Increase collective pitch control slowly and smoothly until a hovering altitude of 3 to 5 feet is obtained, applying anti-torque pedal to maintain heading as collective pitch is increased.

d. As the helicopter breaks ground, minor corrections of the cyclic control may be required to insure vertical ascent, and directional heading maintained by the use of the appropriate anti-torque control pedal.

NORMAL TAKEOFF FROM HOVER

Hover briefly to determine and insure that the engine and flight controls are operating properly. From a normal hover altitude of 3 to 5 feet, apply forward cyclic stick to accelerate smoothly into effective translational lift. Maintain hovering altitude with an application of collective pitch until translational lift has been obtained and the ascent has begun. Then slowly lower nose of helicopter to an attitude that will produce an increase of airspeed to best climb speed. Adjust controls and power as required to establish the desired rate of climb.

MAXIMUM POWER TAKEOFF

Hover helicopter to 3 to 5 feet altitude – 2900 RPM. Apply forward cyclic smoothly. As forward motion increases, apply collective and throttle until 36.5 inches of manifold pressure is attained at 2900 engine RPM. Do not exceed 36.5 inches of manifold pressure during the takeoff maneuver. Do not increase collective pitch beyond this point (overpitching) as this will cause engine and rotor RPM to decrease.

CAUTION: All "C" models are equipped with a full-time turbocharger and an overboost warning light on the instrument panel to warn the pilot of an overboost condition. Transient overboost conditions which may trigger the caution light may not show as overboost condition on the MAP indicator. The MAP indicator red line is the determining factor in ascertaining the magnitude of an overboost condition and must be logged in the engine log and inspections performed per Lycoming Bulletin 369F.

Maintain 3 to 5 feet altitude by the use of cyclic control. As translational lift speed is reached (15-20 MPH), apply aft cyclic to seek climb angle that will allow the helicopter to climb and accelerate to the best rate of climb speed. Maintain heading during takeoff by coordinate use of directional control pedals and cyclic.

MAXIMUM POWER TAKEOFF FROM CONFINED AREAS

Conditions may occur in which the helicopter must be operated from confined areas in which take-off distances (from hover to best rate of climb speed) are not sufficient to clear obstacles that may be in the flight path (trees, buildings, wires, etc.). In order to clear such obstacles safely, the climb portion of the take-off must utilize the best angle of climb airspeed (30 MPH side side of height velocity curve). This angle of climb will substantially shorten the distance required to clear obstacles. To accomplish this type of take-off, hover helicopter at 3 to 5 feet altitude and 2900 RPM. Apply forward cyclic smoothly. As the helicopter begins to accelerate forward, apply collective and throttle until 36.5 inches of manifold pressure is obtained at 2900 engine RPM. (See preceding caution note). Do not increase collective beyond this point (overpitching) as this will cause engine and rotor RPM to decrease. Maintain 3 to 5 feet altitude by use of cyclic control. As translational speed is reached (15-20 MPH) apply aft cyclic to seek climb angle that will maintain 30-35 MPH (refer to height-velocity diagram in flight manual). After clearing all obstacles at this airspeed, apply forward cyclic and readjust collective and throttle as desired for further flight.

NOTE: If RPM is lost due to overpitching, it may be regained by maintaining 36.5 inches of manifold pressure, lowering collective slightly and applying some aft cyclic.

In both preceding conditions it is imperative that the helicopter has accelerated a little beyond translational speed in order to accomplish these maneuvers. Therefore, good judgement must be used to determine the rate at which the helicopter is accelerated from hover to translational speed and to determine if sufficient distance is available to clear obstacles under the existing density altitude conditions.

Crosswind Takeoff. In the event a crosswind takeoff is required, normal takeoff procedures are to be followed. However, as the helicopter leaves the ground, there will be definite tendency to drift downwind at a rate proportionate to the wind velocity. This tendency can be corrected by moving and holding the cyclic stick sufficiently in the direction of the wind to prevent downwind drift. During crosswind takeoff, it is advisable to keep open areas to windward side of flight path to facilitate emergency landing if it should be necessary.

NORMAL APPROACH FOR LANDING

The object of a normal approach is to fly the helicopter to a hover over the selected spot prior to touchdown. To accomplish this objective, the cruise airspeed is decreased gradually to 50 MPH and engine speed is maintained at 2900 RPM. Control rate of descent with collective and throttle (manifold pressure); airspeed with cyclic control. As the selected landing area is approached, the airspeed and rate of descent are decreased until a zero ground speed hovering altitude is attained at approximately 3 to 5 feet altitude.

STEEP APPROACH

Steep approach procedure requires a precision power control approach and is used to clear obstacles in the flight path when accomplishing a landing in a confined area. The airspeed in a steep approach should be 30 to 35 MPH (safe side of H/V curve) and the rate of descent should be as low as possible for the desired angle of descent. Since a relatively high amount of power will be required to control the rate of descent, a minimum amount of additional power will be required to accomplish a hover. The aiming point to spot of intended hover in ground effect should be as near as possible after clearing final obstacles. This will allow an over-run to get helicopter stopped in case power setting should occur during slowdown from 30 MPH down to 0 airspeed. During descent, the airspeed is controlled by appropriate cyclic stick application and the rate of descent is controlled by proper application of collective pitch and throttle. In the final stages of approach, the collective pitch is increased gradually as the cyclic stick is adjusted to reduce the airspeed from 30 to 35 MPH to 0 groundspeed. This should be accomplished in a way which will reduce the rate of descent and groundspeed to zero the moment the hovering altitude is reached.

LANDING-LANDING SITE EVALUATION

The versatility of the helicopter permits safe operation from unfamiliar and unprepared sites, such as open fields, mountain knolls and ridges, beaches, snow, and iced areas. Any selected landing site in the afore-mentioned areas must be properly evaluated and the pilot must use proper techniques to effect landings and takeoffs from these sites. Although the helicopter is designed for and is capable of operation from restricted areas, the final analysis of the situation on the decision to land must be determined by the best professional judgement of the pilot. Prior to attempting operation of the helicopter from unprepared areas,

the pilot must consider certain basic factors and evaluate by a low speed pass into the wind over the intended landing site. Generally, the landing site should be near level, and depending on existing density, altitude and gross weight conditions, should meet the obstacle clearance requirements set forth in this Manual. The pilot must also consider personal proficiency, wind and terrain roughness when evaluating the suitability of the landing area.

WIND DIRECTION AND VELOCITY

The effects of wind on takeoff and landings are important factors and should be considered in the operation of the helicopter; however, in planning critical helicopter operations, the effects of winds can be relied upon to assist in accomplishing landings and takeoffs from unobstructed areas. If the helicopter were riding a gust of wind on the final approach and the gust should decrease as the helicopter was approaching a hover, the helicopter would probably rapidly "settle" if the wind factor was planned on to execute the landing. This condition will also hold true during the initial phase of takeoff. If an operation is dependent on wind conditions, all other conditions being marginal, the helicopter gross weight should be reduced. When a landing area is determined to be marginal, the pilot, exercising good judgment, should select another site. Another effect of wind that must be considered is the "lee" effect of the wind over hills, ridges, and obstacles. The downdrafts resulting from these conditions particularly affect the initial phase of takeoff or final phase of landing.

NORMAL LANDING

After completion of the normal approach to a hover altitude, maintain engine RPM and decrease collective pitch sufficiently to affect a constant, smooth rate of descent until touchdown. During final descent, make necessary corrections with directional pedals and cyclic control to maintain a level attitude and constant heading to minimize movement on ground contact. After ground contact, continue to decrease collective pitch smoothly and steadily until the entire weight of the helicopter is ground supported and then decrease collective pitch to minimum.

CROSSWIND LANDING

Crosswind landings generally can be avoided in helicopter operations. Occasionally, when operating from unprepared areas, such as plowed or furrowed fields, ridges and upslope or downslope surfaces, necessity may require that crosswind landings be performed. When conditions demand and terrain features

dictate, a crosswind landing is also utilized to preclude the necessary of landing on a high, tilting angle or a dangerous tail low altitude. Prior to accomplishing the crosswind landing, the pilot should evaluate the climatic conditions, including wind velocity and the terrain, and then proceed as follows: Engine RPM maximum, approach landing spot from crosswind direction if possible, and hover. Hold cyclic control into direction of wind to prevent side drift, and reduce collective pitch and descend as in normal landing.

FLIGHT CHARACTERISTICS -- HANDLING AND STABILITY

The flight characteristics of this helicopter in general are similar to other single rotor helicopters. The particularly noticeable difference is the handling ease and additional stability that is evident during takeoff, hovering, and all modes of flight. To obtain or increase helicopter forward speed, simultaneously apply forward control stick and increase main rotor pitch, and maintain power through constant flight condition. Altitude is maintained through-out the entire range of forward and rearward flight speeds by fore and aft movement of the cyclic control stick in coordination with collective pitch application. Directional heading is controlled by the application of lateral cyclic control and appropriate directional control pedal. Blade stall can only occur during flight and is caused by high angle attack on the retreating blade and occurs at the inboard section of the blade area. This condition cannot be encountered when the helicopter is operated within the specified operating limits as stated in the Flight Manual. Blade stall is the result of numerous contributing factors such as gross weight, low rotor RPM, airspeed acceleration and altitude. The condition is most likely to occur at higher airspeeds and low operating RPM; it also follows that the condition will occur sooner with high values of altitude, gross weight, and angle of bank. The major warnings of approaching retreating blade stall conditions in the order in which they will generally be experienced are:

1. Abnormal 3 per revolution vibration.
2. Pitchup of the nose.
3. Tendency for the helicopter to roll in the direction of the stalled (left) side.

At the onset of blade stall vibration, the pilot should take the following corrective measures:

1. Reduce collective pitch.
2. Increase rotor RPM.

3. Reduce forward airspeed.
4. Descend to lower altitude.
5. Minimize maneuvering.

MANEUVERING FLIGHT

Movement and response of the flight controls while conducting flight maneuvers is normal at all times when the helicopter is operating within the limitations set forth in the Flight Manual. Throughout the entire realm of flight, it will definitely be noted that minimum effort is required by the pilot for control of movement, and by use of trim system, a near zero control force effect effort is required, regardless of the gross weight or CG location.

HOVERING FLIGHT

The hovering capabilities of the Model F28C Helicopter for both in and out of ground effect hovering will allow flight operations to be excellent.

It should be remembered, however, that the performance of all helicopters is affected by numerous factors such as climatic conditions, altitude, temperature, and gross weight. It is a known fact that "in ground effect" hovering performance is better than "out of ground effect" performance for reason of the helicopter being in part supported by a cushion of air being provided by the rotor downwash when the helicopter is in close proximity to the ground. Additional performance will also be realized when operating at low temperatures, which is the equivalent of atmospheric density, and wind, which represents airspeed. Either of these conditions or a combination of both increases performance since low temperatures allow the engine and rotor to provide more lift and wind reduces the power required.

STUDENT TRAINING

Autorotation practice should be carried out over terrain suitable for full autorotational landing in case of inadvertent engine stoppage. Sudden power cuts to idle position are not recommended since the fuel injector is quite sensitive to improper adjustment of idle mixture, idle rpm and sudden power reductions.

CAUTION: Rapid throttle movement during practice autorotation may decrease the life of the over-running clutch.

NOISE ABATEMENT

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pilots to minimize the effect of aircraft noise on the public.

We, as helicopter pilots, can demonstrate our concern for environmental improvement by application of the following suggested procedures, and thereby tend to build public support for aviation:

1. Pilots operating helicopters over outdoor assemblies of persons, recreational land park areas, and other noise-sensitive areas should make every effort to fly not less than 2,000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

2. During departure from or approach to an airport or heliport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

NOTE: The above recommended procedures do not apply where they would conflict with ATC clearances or instructions, or where, in the judgment, an altitude of less than 2,000 feet is necessary for him to adequately exercise his duty to see and avoid other aircraft.

LEANING WITH AN ENSTROM ECONOMY MIXTURE INDICATOR (EGT)

Exhaust gas temperature, as shown on the Enstrom EGT indicator, should be used as an aid for fuel mixture leaning in cruising flight at 75% power or less, i.e. 28 inches manifold pressure and 2900 RPM in the Model F28C.

To obtain a best economy mixture, lean to 1650 °F. EGT. To obtain a best power mixture, lean only to 1550 °F. EGT. Do not exceed 1650 °F. EGT. Operation on the lean side of peak EGT is not approved. Also any change in altitude or power will require a recheck of the EGT indication.

COLD WEATHER OPERATION

The use of an external preheater and an external power source (APU) is recommended whenever possible to reduce wear and abuse to the engine and the electrical system. Preheat will thaw the oil trapped in the oil cooler which probably will be congealed prior to starting in extremely cold temperatures. When using an external power source, the position of the master switch is the ON position while the alternator switch is left in the OFF position until the APU plug is disconnected from the helicopter.

In very cold weather, the engine should be warmed up without the rotor system engaged for a period of 2 to 5 minutes at 1500 RPM.

Remove all accumulation of snow and ice prior to flight. Failure to remove ice and snow accumulations can result in serious aerodynamic and structural effects when and if flight is attempted.

BLADE TAPE

Polyurethane leading edge tape can be installed on the main rotor blades. If the tape is installed, it should be inspected before each flight for holes, blisters, bubbles, separation, and security of attachment. If any defects are noted, the tape must be removed or replaced before the next flight. If the helicopter is operated in rain, the tape life may be shortened considerably. Separation of part or all of the blade tape can cause an extremely rough rotor system. In this event the helicopter should be landed as soon as practical and the rotor system, blades, and blade tape inspected prior to further flight.

LOSS OF TAIL ROTOR EFFECTIVENESS

Loss of tail rotor effectiveness (LTE) is a phenomenon which can occur in any single main rotor/anti-torque tail rotor helicopter. Although the F-28C has a very effective tail rotor and does not exhibit any tendencies for LTE, the pilot should be aware that the potential for LTE, however small, does exist. As such, pilots should be aware of the causes and recovery techniques.

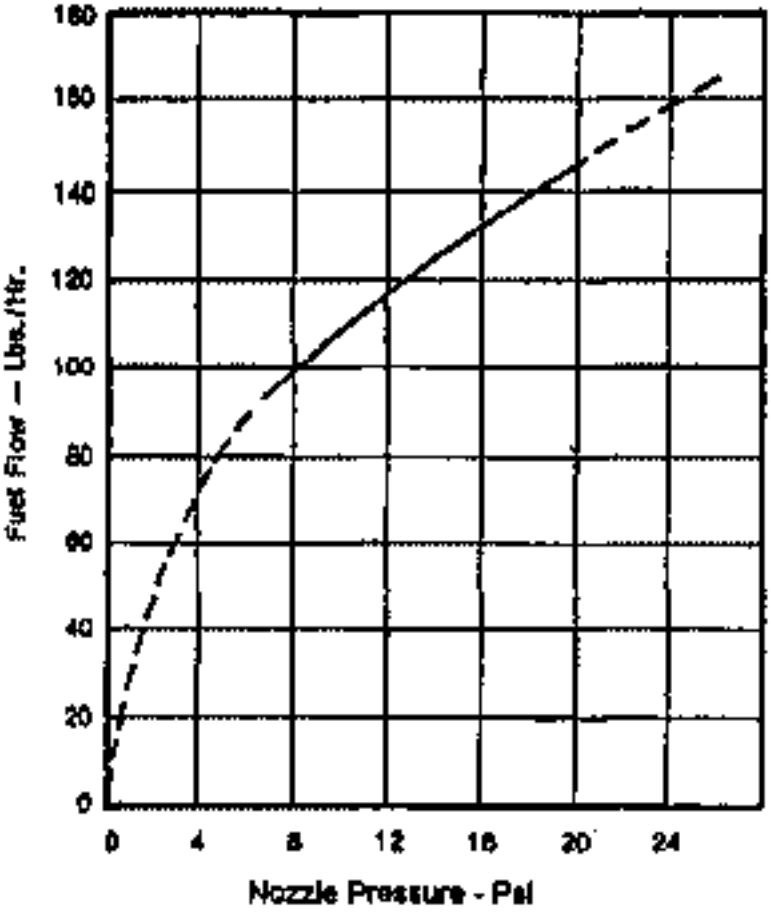
There are a number of factors which reduce the effectiveness of the tail rotor or increase the thrust required from the tail rotor. These factors include high power settings, low airspeeds, left crosswinds or tailwinds, and right, yawing turns. Under exactly the right conditions, these factors can combine to make the tail rotor virtually ineffective. This LTE can be recognized by an uncommanded right yaw which can not be stopped using the tail rotor pedals alone. Recovery from LTE can be accomplished by increasing forward speed, lowering the collective if altitude permits, and applying left pedal. The longer corrective actions are delayed, the more difficult it will be to recover from LTE.

FUEL FLOW VS. NOZZLE PRESSURE

Lycoming Model HIO-360-E1AD

With

Bendix RSA-SABI Injector



ENSTROM F-28C

AVERAGE CRUISE PERFORMANCE 2900 R.P.M. EXTENDED RANGE AND RICH MIXTURE

180 Lbs. AND 240 LBS. FUEL (NO RESERVE) G.W. 2200 Lbs. SEA LEVEL D.A.

M.P.	%H.P.	TAS MPH	P.P.H. RICH	P.P.H. LEAN	E.G.T. LEAN / RICH	NOZZ. P.S.I. R.–L.	ENDURANCE HOURS 240 lbs. R.–L.	ENDURANCE HOURS 180 lbs. R.–L.	RANGE STATUTE MI. 240 lbs. R.–L.	RANGE STATUTE MI. 180 lbs. R.–L.
20	51	91	60	54	1650 / 1425	4 –2.8	3.9 4.4	2.6–3.3	213 268	158 201
22	57	72	70	61	1650 / 1495	5 –3.2	3.1–3.9	2.3–2.9	221–281	164–209
24	63	82	80	67	1650 / 1475	6 –3.8	2.8–3.5	2.1–2.7	229–295	172 222
26	68	92	94	75	1650 / 1505	7.2–4.6	2.5–3.2	1.9–2.4	229–281	167 211
28	75	101	107	82	1650 / 1525	8.3–5.4	2.3–2.9	1.8–2.2	232 285	169–222
30	80	105	109	94	1650 / 1525	9.4 –7.2	2.2–2.8	1.6–1.9	231–262	168–199
32	88	107	118	NA	1535	10.6	2.1	1.5	225	168
34	92	109	123	NA	1550	11.8	1.8	1.4	207	159
35.5	100	112	135	NA	1550	13.8	1.9	1.3	201	140

DEFINITION OF ABBREVIATIONS

M.P. = Manifold pressure inches of mercury.
%H.P. = Percent of rated brake horsepower.
TAS MPH = True airspeed miles per hour.
P.P.H. = Pounds per hour fuel flow rich mixture.
RICH
P.P.H. = Pounds per hour fuel flow lean mixture.
E.G.T. = Exhaust gas temperature at lean mixture.
LEAN also called T.I.T. turbine inlet temp.
NOZZ. P.S.I. = Fuel injector nozzle pressure in pounds per square inch.
R. = Rich mixture.
L. = Lean mixture.
G.W. = Gross weight.
D.A. = Density altitude.
NA = Not approved mixture setting.

WET/DRY DISPERSAL SYSTEM SUPPLEMENT NO. 1

SECTION 1 — GENERAL

This supplement must be attached to the approved flight manual when the wet/dry dispersal system is installed. Operation in compliance with Section 2 of the Approved Flight Manual is mandatory except as modified by this flight manual supplement. Other approved sections and supplemental data are recommended procedures.

This aircraft is approved for restricted category operations when agricultural spray equipment is installed in compliance with Enstrom Helicopter Drawing 28-22620. (Initial installation of electrical components, pump, clutch control, rails, drive system, boom attach fittings and upper tank attach fittings must be performed by certified mechanic and entered in airframe log.) After initial installation, removal or installation of wet/dry dispersal system may be accomplished by owner or operator.

SECTION 2 — LIMITATIONS

Airspeed Limitations:	Maximum operating speed 85 MPH IAS at S.L. power on and power off, linear decrease to 80 MPH IAS at 6000 ft. H_D.
Altitude Limitations:	6000 ft. density altitude.
Weight Limitations:	Maximum gross weight: 2600 lbs. Maximum load per dispersal tank: 350 lbs.
Center of Gravity Limitations:	Forward: 96.5 in. Rearward: 98.0
Lateral Offset Moment: (Above 2350 Lbs.)	-3180 in-lbs. to -1865 in-lbs.
Type of Operation:	Approved for restricted category operations under provisions of FAR 137.
Placards:	On Tank: "Restricted" "Agricultural Operations Only" "Max. Load Per Dispersal Tank - 350 lbs." In View of Pilot: Restricted category never exceed speeds - MPH IAS

PRESSURE ALTITUDE	OUTSIDE AIR TEMPERATURE °F						
	– 20	0	20	40	60	80	100
SEA LEVEL	85	85	85	85	85	85	85
1000	85	85	85	85	85	83	82
2000	85	85	85	84	83	82	81
3000	85	85	84	83	82	81	80
4000	85	84	83	82	81	80	
5000	84	83	82	81	80		
6000	83	82	81	80			

SECTION 3 — NORMAL PROCEDURES

PREFLIGHT CHECK

1. Check sprayer system controls. Clutch control handle and spray "on" and "off" switch on cyclic stick.
2. Check spray tank booms for security.
3. Check spray tank for security and freedom of movement against springs.
4. Pump belts and mounting hardware.

Before takeoff lift guard on emergency dump switch.

HOVER CHECK Hover check system at G.W. for proper damper operation.

SECTION 4 — EMERGENCY AND MALFUNCTION PROCEDURES

4.1 Liquid jettison – Jettison liquid by actuating dump valve switch on cyclic stick. A slight pitch up can be anticipated. Adjust cyclic control accordingly.

NOTE: Jettison tests were performed with one dump valve inoperative to produce maximum lateral load and the demonstration showed negligible effect on lateral control.

4.2 Loss of power – enter autorotation, jettison load immediately and follow normal flight manual procedures.

4.3 Loss of tail rotor – enter autorotation, jettison load immediately and follow normal flight manual procedures.

4.4 In the event of sudden onset of a severe 1/rev. vibration, jettison load immediately and land helicopter. Check and or repair M/R dampers as appropriate before further flights.

4.5 Spreader malfunction – If increasing cyclic displacement is required for hover or forward flight, land immediately and check loading situation and spreader operation.

SECTION 5 — PERFORMANCE

Figure 5-1 Vne vs. D.A.

Figure 5-2 Hover I.G.E. curve extended to 2600 lbs.

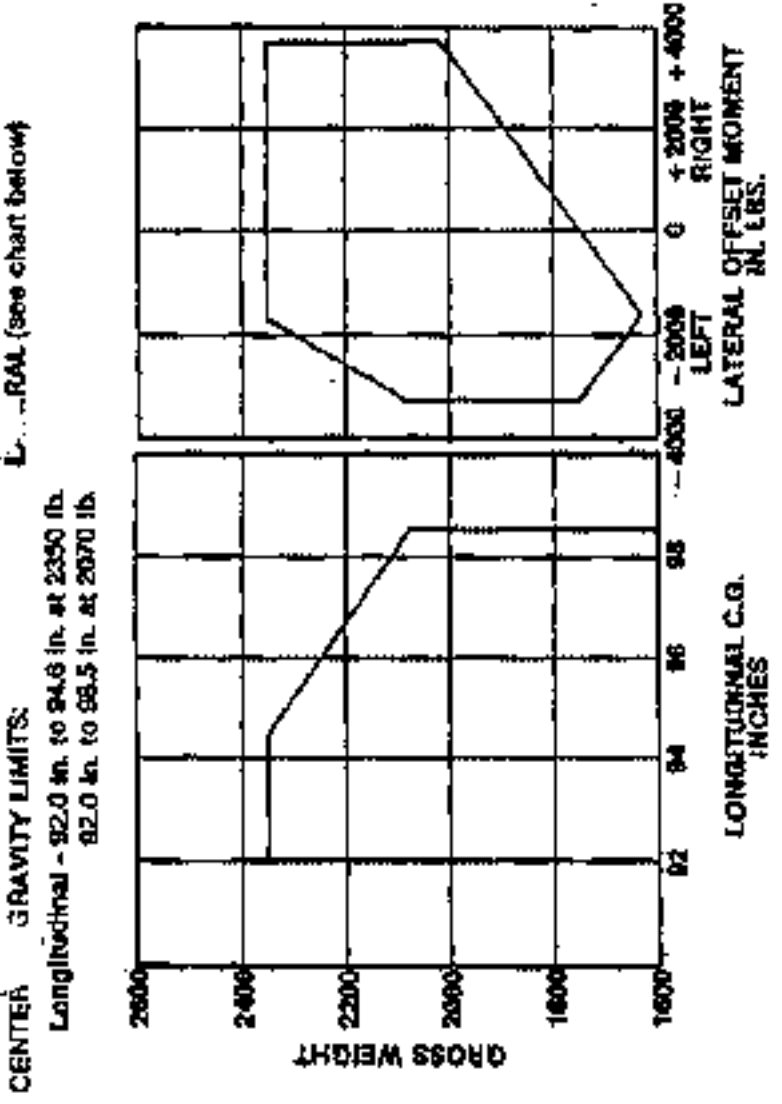
Figure 5-3 Airspeed calibrated vs. Indicated

Figure 5-4 Height velocity diagram

SECTION 6 — WEIGHT & BALANCE

A new weight and balance should be calculated per the instructions in Section 6 of the basic Flight Manual using the following information:

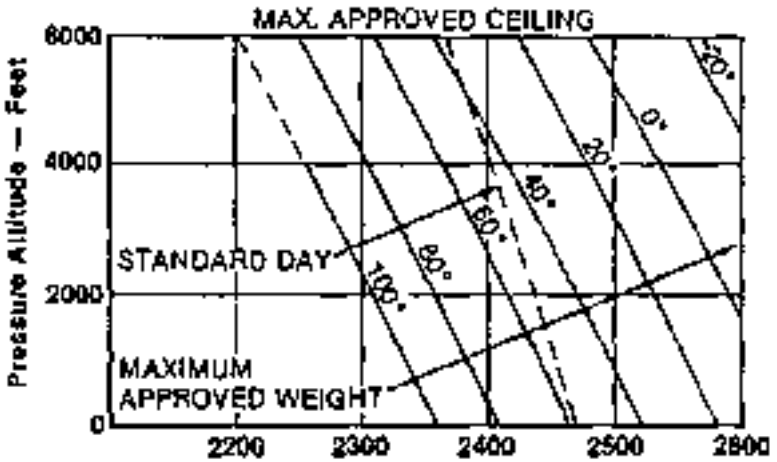
OPTIONAL EQUIPMENT	WT.	ARM	MOMENT
Float landing gear	75.0 lbs.	107 in.	8025 in.-lbs.



HOVER CEILING IN GROUND EFFECT
3½ FOOT SKID HEIGHT

WITH AG. KIT

FIGURE 5-2

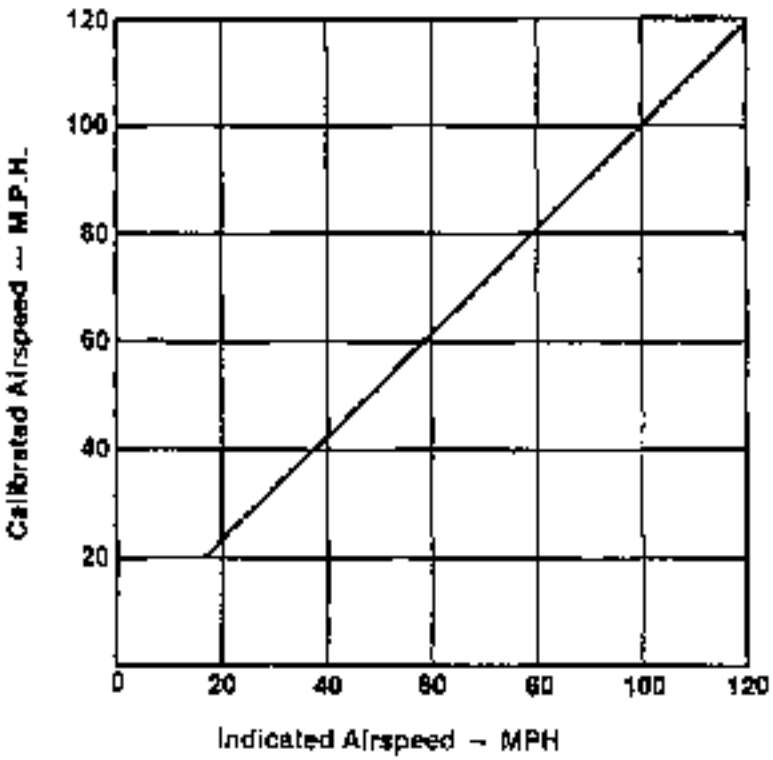


AIRSPEED CALIBRATION

2600 LB. GR. WT.

AG TANKS AND BOOMS

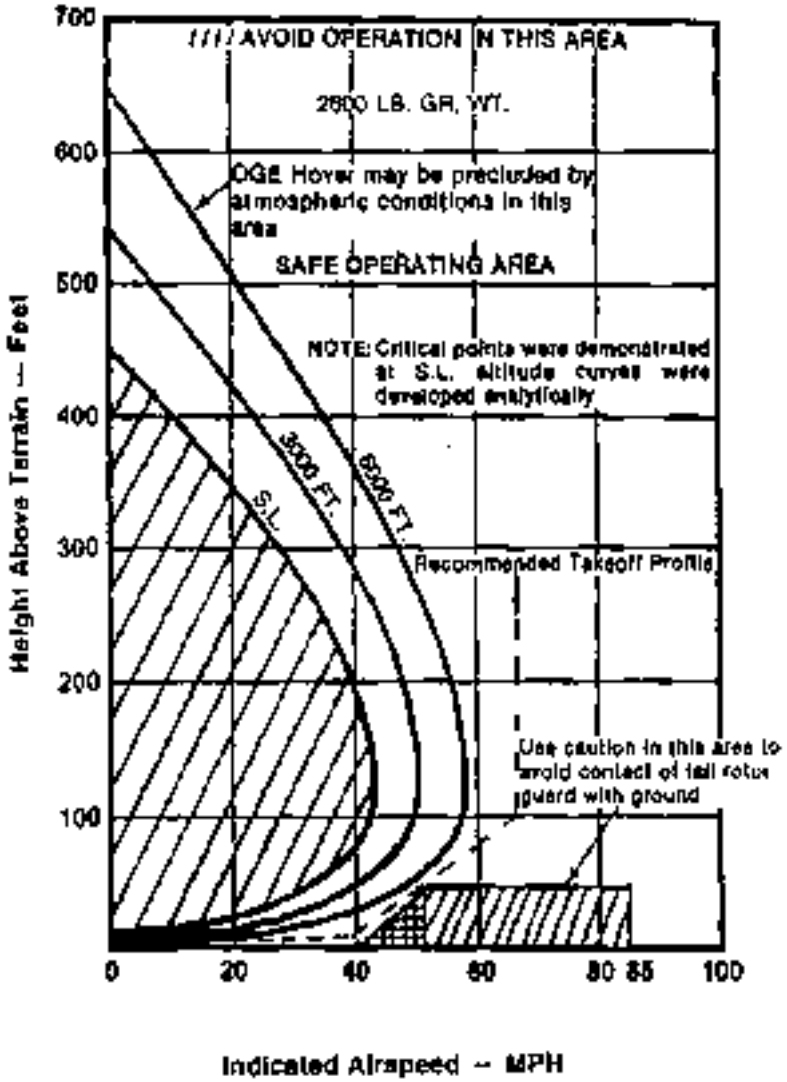
FIGURE 5-3



NOTE: Indicated speeds below 20 MPH are not reliable.

HEIGHT VELOCITY DIAGRAM

FIGURE 5-4



SECTION 6 — WEIGHT AND BALANCE

Items to be used with basic Flight Manual Form No.'s F-165, F-166, F-167 and F-168 for helicopter weight and C.G. calculations.

ITEMS	WT.	ARM	MOMENT
Wet system — removable portion	113.65	107.77	12,247.59
Dry system — removable portion	71.35	97.80	6,963.47
Items remaining on helicopter (Normal category)	13.25	89.94	1,191.12
Dispersal tank load		95.00	

SECTION 7 — SYSTEM DESCRIPTION AND INSTALLATION INSTRUCTIONS

Initial installation — see Enstrom drawing 28-22020 and handbook "Installation Instructions and Parts List Combination Wet/Dry Ag Kit 831000."

The following dispersal system items may remain on the helicopter for normal category operations.

1. Rail assembly
2. Power take-off assembly
3. Strut fittings and upper tank fittings
4. Pressure gage
5. Clutch control
6. Electrical harness and switches

Installation Procedures Wet Dispersal System

1. Position tanks on rails and secure with (4) clevis pins (upper and lower).

   NOTE: Check internal tank mounting. Isolation mount spring should be in free state (no preload with tank empty). Check nut should be 1.00 in. from end of threaded rod.

2. Position wet center section on rails and secure with clevis pins.
3. Attach cross feed assembly to spray tanks, secure with over center latch and safety wire, and install 2 hoses to center section.
4. Attach clutch control cable.
5. Remove tape securing belt to jack strut and place belt on power take-off.

5. Connect pressure sender valve motor and emergency dump motor electrical plugs.
7. Attach spray booms and safety.
8. Inspect system and perform operational check.
9. Make log book entry, wet dispersal system installed. Helicopter approved for restricted category operations only.

Wet System Removal – Steps 1 through 7.

Installation Procedures Dry Dispersal System

1. Position tanks on rails and secure with (4) clevis pins

   NOTE: Check internal tank mounting. Isolation mount spring should be in free state (no preload with tank empty). Check nut should be 1.00 in. from end of threaded rod.

2. Install rt. side spreader under tank and secure with over-center latch (butterfly valve all) and safety wire. Connect electrical plug to valve motor.
3. Install left spreader under tank.
4. Install and adjust linkage between butterfly valves.
5. Install angle drive using 2 clevis pins and safety.
6. Install "V" belt and adjust tension.
7. Install left and right take-up assemblies.
8. Install long "V" belt to each spreader (lower to rt. spreader) and adjust tension.
9. Inspect system and perform operational check.
10. Make log book entry. Dry dispersal system installed, helicopter approved for restricted category operations only.

Dry System Removal – Reverse Steps 1-8.

To return helicopter to normal category remove wet or dry dispersal system per above instructions and:

1. Cap electrical plugs, fasten ends to rail or cross tube with tape or bundle ties.
2. Fasten clutch cable to cross tube.
3. Tape "V" belt to Jack Strut.
4. Inspect Helicopter.

NOTE: Possible deterioration of rubber parts and corrosion of helicopter structure may occur when certain dispersants are used. Inspection intervals and cleaning procedures should be modified to prevent possible damage.

5. Make log book entry, wet/dry dispersal system removed except for allowance provisions remaining on helicopter Helicopter approved for normal category operations.

FLOAT LANDING GEAR SUPPLEMENT NO. 2

SECTION 1 — GENERAL

This supplement must be attached to the basic flight manual when the Enstrom Float Landing Gear Kit No. 28-17326 is installed. Operation in compliance with Section 2. OPERATING LIMITATIONS of the basic manual is mandatory except as modified by this supplement. Other approved section and supplemental data are recommended procedures.

The 28-17326 FLOAT LANDING GEAR KIT consists of two multi-cell (5 compartment) AIR CRUISERS NO. D 24760 inflatable floats, attachment fittings, relocated pitot tube, lengthened universal blocks and modified horizontal stabilizer installation.

SECTION 2 — OPERATING LIMITATIONS

TYPE OF OPERATIONS:

This helicopter is approved for operation under day and night – VFR – non-icing conditions only.

AIRSPEED LIMITATIONS

NEVER EXCEED SPEEDS: V_{ne} 100 mph I.A.S. to 3000 feet h_d. For variations greater than 3000 feet H_d, see Placard and Figure 5.1.

ALTITUDE LIMITATIONS

SEE SECTION 3 BASE ALTITUDE CHANGE

CENTER OF GRAVITY LIMITATIONS

SEE FIGURE 6.1 for approved C.G. limits and lateral offset moment.

PLACARDS:

Never exceed speeds (Vne) miles per hour I.A.S.

PRESSURE	OUTSIDE AIR TEMPERATURE F°						
ALTITUDE	– 20	0	20	40	60	80	100
SEA LEVEL	100	100	100	100	100	100	100
2,000	100	100	100	100	100	97	93
4,000	100	100	100	97	93	88	82
6,000	100	96	94	88	82	75	68
8,000	95	90	82	75	68	62	55
10,000	84	77	69	62	55		
12,000	70	63	55				

SECTION 3 — NORMAL PROCEDURES

ROTOR ENGAGEMENT (on water)

Prior to engaging the rotor, the helicopter should either be secured or set adrift in an area sufficient to make at least one complete rotation due to engagement rotor torque. Allowance should be given to helicopter drift.

Follow normal engagement procedures until needles marry, then smoothly advance throttle until tail rotor becomes effective (approximately one helicopter revolution or 1800 engine RPM)

FLIGHT INFORMATION

Taxi at slow speeds with partial collective to prevent float bows from nosing under. Safe taxiing has been demonstrated in waves up to 18 inches (trough to crest).

RUNNING LANDING

1. Maximum recommended water contact speed is 30 MPH. Reduce speed on rough water.
2. After water contact, avoid rapid lowering of collective pitch.

   NOTE: To avoid possible float damage on land use minimum ground contact speed.

BASE ALTITUDE CHANGE

Before flight check float pressure. Normal pressure is 1.5 PSIG.

1. For flights to lower altitude – over inflate at base altitude .5 PSIG per 1000 feet anticipated altitude change. (6.5 PSIG maximum inflation pressure).

   NOTE: This includes the normal ambient temperature variations associated with changes in altitude.

2. For flights to higher altitude – 12,000 feet differential altitude permitted (provided float pressure is not more than 1.5 PSIG at takeoff).
3. For variations in ambient air temperature and/or water temperature at a given base altitude use the following procedure: When an ambient air temperature or water temperature colder than the temperature at initial inflation is anticipated, over inflate, .5 PSIG above normal for each 15 °F decrease in temperature anticipated.

SECTION 4 — EMERGENCY PROCEDURES

ENGINE FAILURE DURING FLIGHT (above 80 mph)

1. Maintain heading with antitorque pedals and apply aft cyclic to reduce airspeed while simultaneously lowering collective pitch.
2. Stabilize at 58 mph.

   NOTE: Night operation — turn on landing light.
3. At about 75 feet above ground/or water, apply aft cyclic to reduce forward speed.
4. When about 20-25 feet above surface, begin to level helicopter and apply collective pitch as necessary to cushion a level landing.

WARNING

Touchdown speeds should be kept below 20 mph for emergency autorotating water landings, especially with forward c.g.

ENGINE FAILURE DURING FLIGHT (below 80 mph)

1. Enter normal autorotation and stabilize at 58 mph.

   NOTE: Night operation — turn on landing light.
2. Use same procedure as steps 3 and 4 of above procedure.

SECTION 5 — PERFORMANCE

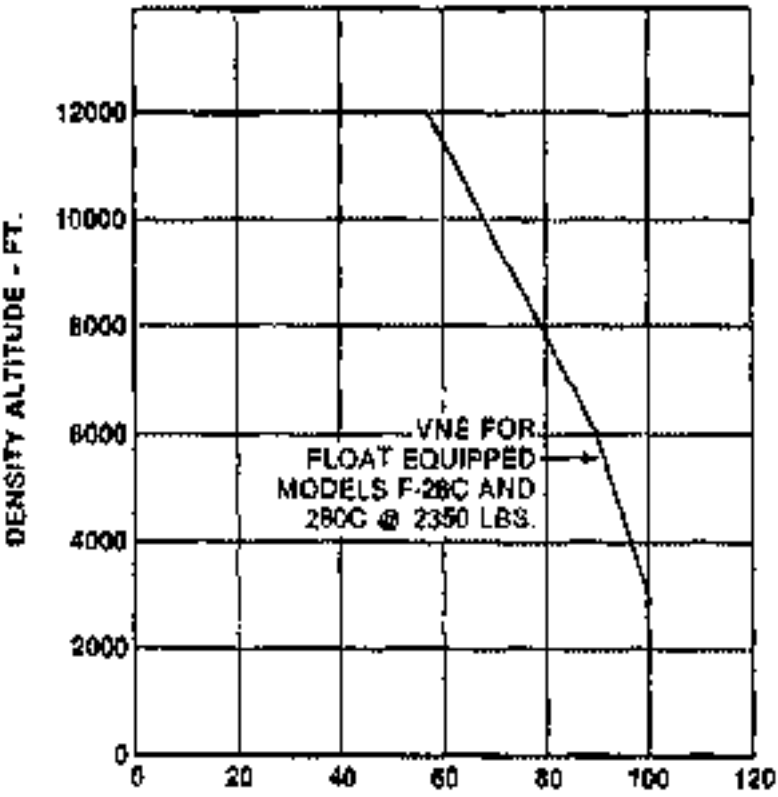
No change from basic manual except as indicated in the following charts.

Figure 5.1 V never exceed vs. density altitude.

Figure 5.2 Airspeed calibration

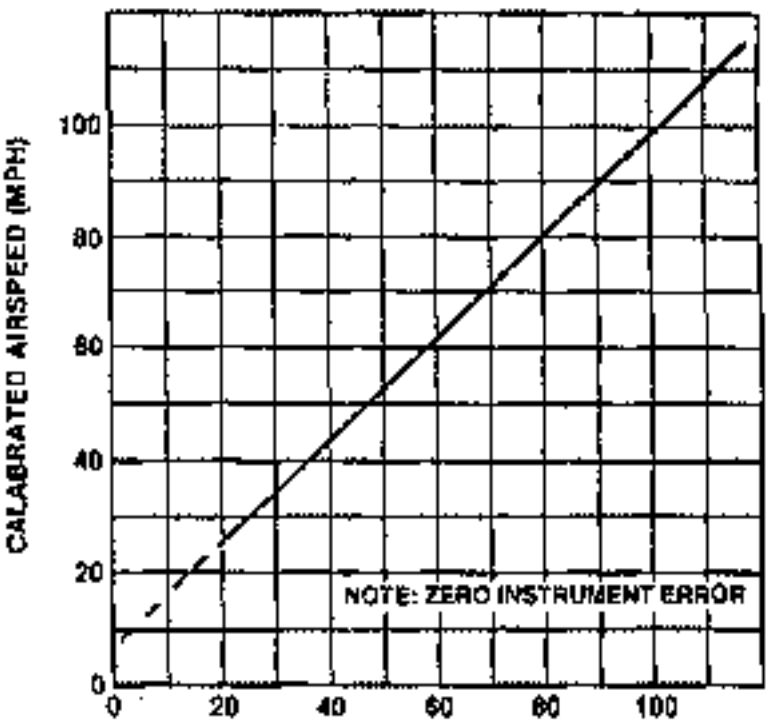
RATE OF CLIMB: Reduce rate of climb by 150 feet per minute from that obtained from Page FM-5-7 of the basic manual.

Figure 5.1 – V never exceed vs. density altitude



AIRSPEED CALIBRATION

MODEL F28C
2350 LBS.
WITH FLOATS



COCKPIT INDICATED AIRSPEED (MPH)
(PITOT TUBE INSTALLED IN NOSE)

INSTRUMENT ERROR ZERO

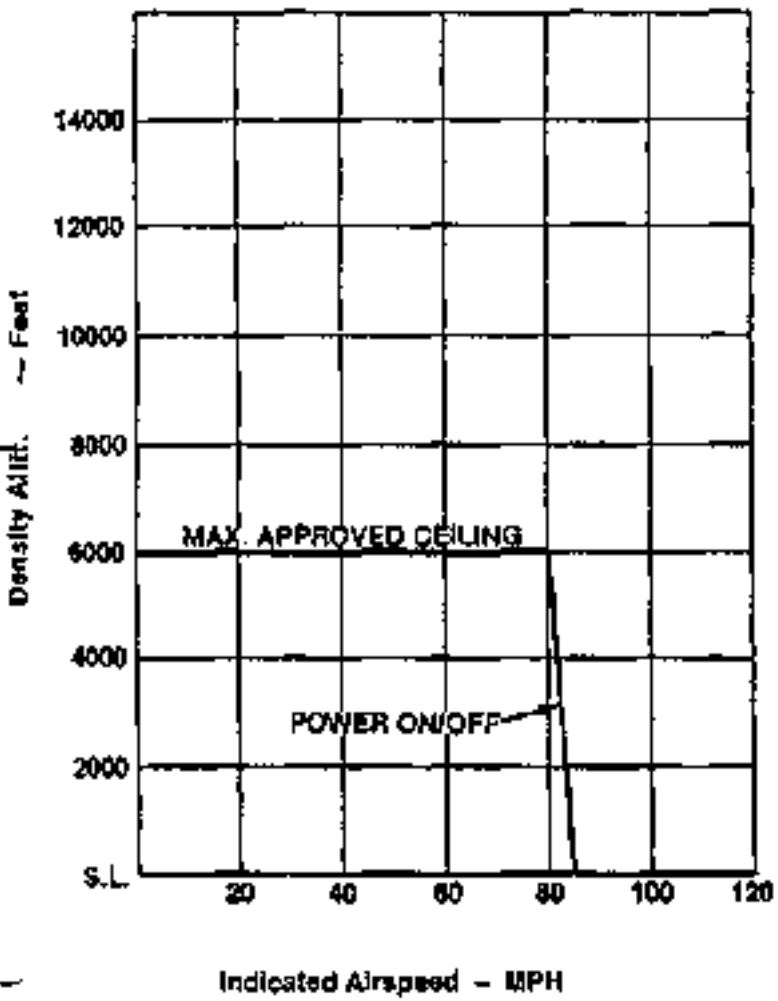
FAA Approval: April 26, 1978
Revised: Feb. 10, 1989
Report No. 28-AC-017

SECTION 5 — PERFORMANCE

V never exceed VS. DENSITY ALTITUDE

Vne demonstrated at 2750 engine rpm
2600 lb. gross weight

FIGURE 5-1



EXTERNAL LOADS SUPPLEMENT NO. 3

SECTION 1 — GENERAL

This supplement must be attached to the Basic Flight Manual when the Enstrom Cargo Hook Kit No. 28-22000 is installed and utilized for transportation of external cargo. Operation in compliance with Section 2 — Operating Limitations of the Basic Manual is mandatory except as modified by this supplement. Other approved sections and supplemental data are recommended procedures.

This aircraft is certified for multiple certificate operation at gross weight up to 2600 lbs for restricted category cargo hook operation when in or converted to the 2350 lbs. configuration (I/A/W Enstrom Drawing 28-100005). A log book entry shall be made when changing category of operation.

The Cargo Hook Kit incorporates electro-mechanical cargo release features.

SECTION 2 — OPERATING LIMITATIONS

ENGINE LIMITS – 2900 RPM, 36.5 In. M.A.P. (205 H.P.)

AIRSPEED LIMITATIONS

Do not exceed approved flight manual speeds.

CAUTION

The maximum safe airspeed for satisfactory handling characteristics is dependent on many variables, i.e. aerodynamic shape load, c.g. of load, length of sling, location of suspension points and rate of climb or descent. Caution should be exercised as the onset of unsatisfactory handling characteristics may be abrupt.

Restricted category operations 2350 lbs. to 2600 lbs. maximum operating speed 85 mph IAS at sea level power on and power off, linear decrease to 80 mph IAS at 6000 feet density altitude.

ALTITUDE LIMITATIONS

For Gross Weights up to 2350 lbs.: See Approved Flight Manual. Restricted category operations 2350 lbs. to 2600 lbs.: 8000 feet density altitude.

WEIGHT LIMITATIONS

Do not exceed approved flight manual weight limitations. Restricted category operations: The total weight of the helicopter and load combination shall not exceed 2600 lbs. See FAR 133, Subpart D.

Maximum External Load – 1,000 lbs.

CENTER OF GRAVITY LIMITATIONS

For weights 2350 lbs. and under: See Approved Flight Manual.
Restricted Category operations above 2350 lbs.: Forward 86.5 in., rearward 98.0 in.
Lateral offset moment: For weights 2350 lbs. and under: See Approved Flight Manual.
Restricted category operations above 2350 lbs.: – 3180 in. lbs. to – 1855 in. lbs.

TYPE OF OPERATIONS

Approved for multiple certificate operations under provisions of FAR 133 for Class B Rotorcraft-Load Combinations when in the 2350 lbs. configuration.

Normal operations under CAR Part 6 (FAR Part 27) can be conducted with the cargo hook installed, providing external cargo is not being transported.

PLACARDS

Approved for Class B Rotorcraft-Load Operation. Occupancy limited to flight crew member when carrying external load.

(Installed on instrument panel).

In view of Pilot; Restricted category never exceed speeds mph. IAS.

PRESSURE ALTITUDE	OUTSIDE AIR TEMPERATURE °F						
	– 20	0	20	40	50	60	100
SEA LEVEL	85	85	85	85	85	85	85
1000	85	85	85	85	85	83	82
2000	85	85	85	84	83	82	81
3000	85	85	84	83	82	81	80
4000	85	84	83	82	81	80	
5000	84	83	82	81	80		
6000	83	82	81	80			

EXTERNAL LOAD LIMIT 1,000 LBS.: (Installed on Cargo Hook)

SECTION 3 — NORMAL PROCEDURES

Preflight Operation Check

1. Check Electrical Release System
   a. Turn master switch on
   b. Place instrument panel cargo release arming switch to the on position

c. Place a load (3 lbs. Min.) on cargo hook beam

d. Press upper switch on pilots cyclic grip and the beam will release. If the momentary release switch is held in the on position the cargo hook beam will not relatch. After the switch is released check to see if beam automatically relatches.

2. Check Mechanical Release System (Emergency Release)

a. All switches off

b Place load (3 lbs. Min.) on cargo hook beam

c. Activate Emergency Release by pulling the "T" handle mounted on the pilots cyclic stick. Approximately 1.5 inches of travel is required to release the cargo hook beam.

d. After load releases push "T" handle in and check hook beam for automatic relatching.

STATIC ELECTRICITY DISCHARGE

Provide ground crew with instructions as follows: Discharge helicopter static electricity before attaching cargo by touching the airframe with a ground wire or if a metal sling is used, the hook-up ring can be struck against the cargo hook. If contact has been lost after initial grounding, the helicopter should be electrically regrounded and, if possible, contact maintained until hook-up completed.

CARGO HOOK OPERATION

Position instrument panel CARGO RELEASE arming switch (circuit breaker) to OFF when attaching cargo, then move switch to ON as desired during approach for release. When cargo release is desired press upper switch on pilots cyclic grip.

SECTION 4 — EMERGENCY PROCEDURES

Pull mechanical manual release handle located on the pilots cyclic stick just forward of the cyclic grip, to drop cargo in the event of an electrical failure.

NOTE

The cargo mechanical release will function regardless of position of CARGO RELEASE arming switch.

SECTION 5 — PERFORMANCE DATA

Use approved flight manual data.

SECTION 6 — WEIGHT & BALANCE

A new weight and balance should be calculated per the instructions in Section 6 of the Basic Flight Manual using the following information:

OPTIONAL EQUIPMENT	WT. (LBS.)	ARM (IN.)	MOMENT (IN.-LBS.)
Cargo Hook Installation	15	96.50	1432.5
Hook Load		95.94	

SNOWSHOE SUPPLEMENT NO. 4

SECTION 1 — GENERAL

This supplement must be attached to the Basic Flight Manual when the Enstrom Snowshoe Kit No. 28-22400 is installed. Operation in compliance with Section 2 — OPERATING LIMITATIONS of the Basic Flight Manual is mandatory except as modified by this supplement. Other approved sections and supplemental data are recommended procedures.

The Snowshoe Kit consists of four snowshoe pads, two on each skid tube, and will permit landings in various snow conditions.

SECTION 2 — OPERATING LIMITATIONS

AIRSPEED LIMITATIONS – Same as Basic Flight Manual

WEIGHT LIMITATIONS – Same as Basic Flight Manual

CENTER OF GRAVITY LIMITATIONS – Same as Basic Flight Manual

SECTION 6 — WEIGHT & BALANCE

A new weight and balance should be calculated per the instructions in Section 6 of the Basic Flight Manual using the following information:

OPTIONAL EQUIPMENT	WT. (LBS.)	ARM (IN.)	MOMENT (IN.-LBS.)
Snowshoe Kit	18.0	100.9	1816.2

NOTES

RIGHT SIDE PILOT CONFIGURATION SUPPLEMENT NO. 5

SECTION 1 – GENERAL

Introduction

This supplement is attached to the basic flight manual when the aircraft is configured for the pilot flying from the right hand seat. Operation in compliance with the Basic Flight Manual is mandatory except as modified by this supplement. Other approved sections and supplemental data are recommended procedures.

Description

The right seat pilot configuration consists of a starter button located on the right hand collective control, a reverse orientation of flight instruments from standard, and the fuel shut-off (manual) located between the seats on the rear bulkhead, relocated battery position, and a manual clutch located on the right side of the pilot seat.

SECTION 2 – LIMITATIONS

Airspeed Limitations – Same as Basic Flight Manual

Weight Limitations – Same as Basic Flight Manual

Center of Gravity Limitations – Same as Basic Flight Manual

INTENTIONALLY LEFT BLANK

ELECTRIC CLUTCH ACTUATOR SUPPLEMENT NO. 7

SECTION 1 – GENERAL

Introduction

This supplement is attached to the Basic Flight Manual when the aircraft is equipped with an electric clutch for engagement of the rotor. Operation is in compliance with the Basic Flight Manual except as modified by this supplement. Other approved sections and supplements which bear on this section are recommended procedures.

Description

The electric clutch is a jack screw arrangement which automatically tightens the drive belt and engages the rotor when activated from the cockpit. A three-position switch is located in the cockpit which controls the action of the actuator. The three positions are “up” for engaged, “center” for off, and “down” for disengaged. An engagement light (green) is located in the control panel signifying that the clutch is fully engaged. When the disengage position is actuated, the yellow light will come on, and go out when the clutch is fully disengaged.

SECTION 2 – OPERATING LIMITATIONS

Same as Basic Flight Manual

SECTION 3 – EMERGENCY AND MALFUNCTION PROCEDURES

I. Green Engagement Light Not ON

A. On the ground: DO NOT TAKE OFF. Shut down and determine cause.

B. In flight: no rotor decay: LAND AS SOON AS PRACTICABLE and determine cause.

WARNING: Select a safe flight path and be prepared to autorotate at any time should the clutch disengage.

C. In flight: rotor decay: AUTOROTATE. Follow procedures set forth in Section 4, Basic Flight Manual.

II. Electrical Failure

Since the electric clutch is a jack screw arrangement, an electrical failure will not affect rotor engagement if the rotor is engaged. Disengagement will not be possible until electrical power is restored. Land and shut down engine in normal manner. DO NOT RESTART until the malfunction has been corrected.

SECTION 4 – NORMAL PROCEDURES

I. Preflight Inspection

A. Check that the drive belt is disengaged during the preflight inspection.

B. Complete the preflight as specified in the Basic Flight Manual.

II. Starting Procedures

A. Prior to starting the engine, cycle the electric clutch switch to the disengaged (down) position to ensure the rotor is fully disengaged. Note that all lights (yellow and green) are “out.”

B. Complete the engine starting procedures in accordance with the Basic Flight Manual.

III. Rotor Engagement

A. Check collective down and frictioned.

B. Check pedals in the neutral position.

C. Center cyclic.

D. Check the area for personnel and obstructions.

E. Maintain the throttle in idle (1450-1500 rpm) and move the electric clutch switch to ENGAGE position; the yellow light will come on.

NOTE: The electric clutch should pull the engine to approximately 1000 rpm. If the engine goes below 1000 rpm, cycle the engagement switch to OFF (center) and then ON (up) in order to keep the engine rpm at not less than 1000.

F. When the GREEN engagement light illuminates, the rotor is fully engaged

CAUTION: DO NOT take off until the green light is ON.

G. Close the safety cover on the engagement switch.

EMERGENCY FLOAT LANDING GEAR SUPPLEMENT NO. 8

SECTION 1 – GENERAL

Introduction

This supplement must be attached to the Basic Flight Manual when the Enstrom Float Landing Gear Kit No. 28-17301 is installed. Operation in compliance with Section 2, Operating Limitations, of the basic manual is mandatory except as modified by this supplement. Other approved sections and supplemental data are recommended procedures.

The 28-17301 Float Landing Gear Kit consists of two multi-cell, Air Cruisers No. D24409, inflatable floats, attachment fittings, relocated pitot tube, lengthened universal block and modified horizontal stabilizer installation.

The Emergency Float Landing Gear kit is intended ONLY for emergency water landings.

SECTION 2 – OPERATING LIMITATIONS

I. Type of Operation

This helicopter is approved for operation under day and night – VFR, non-icing conditions only. Intentional water landings and takeoffs are prohibited. Emergency water landings up to a maximum of 2350 lb are permitted.

II. Airspeed Limitations

NEVER EXCEED SPEEDS: Never exceed speed (V_{NE}) is 100 mph IAS from SL to 3000 feet density altitude (H_d). For variations above 3000 ft H_d, see Placard in Paragraph V and Figure 10.8.1.

III. Altitude Limitations

A. The maximum operating altitude is 12,000 feet density altitude.

B. See Section 4, Item I for maximum altitude variation from takeoff base altitude.

IV. Center of Gravity Limits

A. Reference Section 6, Paragraph II, of this Supplement for approved c.g. limits and lateral offset moment.

V. Placards

NEVER EXCEED SPEEDS - MILES PER HOUR I.A.S.							
PRESSURE ALTITUDE	OUTSIDE AIR TEMPERATURE °F						
	-20	0	20	40	60	80	100
SEA LEVEL	100	100	100	100	100	100	100
2000	100	100	100	100	100	97	93
4000	100	100	100	97	93	88	82
6000	100	98	94	88	82	75	68
8000	95	90	82	75	68	62	55
10000	84	77	69	62	55		
12000	70	63	55	FLOATS INSTALLED			

NOTE: Airspeeds intentionally left blank represent density altitudes above approved maximum altitudes.

SECTION 3 – EMERGENCY AND MALFUNCTION PROCEDURES

I. Engine Failure During Flight (above 80 mph, IAS)

A. Maintain heading with antitorque pedals and apply aft cyclic to reduce airspeed while simultaneously lowering collective pitch.

B. Stabilize at 58 mph, IAS.

NOTE: Night operation – turn on landing light.

C. At about 75 feet above ground or water, apply aft cyclic to reduce forward speed.

D. When about 20-25 feet above the surface, begin to level helicopter and apply collective pitch as necessary to cushion a level landing.

WARNING: Touchdown speeds should be kept below 20 mph for emergency autorotative water landing, especially with forward c.g.

II. Engine Failure During Flight (below 80 mph, IAS)

A. Enter normal autorotation and stabilize at 58 mph, IAS.

NOTE: Night operation – turn on landing light.

B. Use the same procedure as steps C and D above.

SECTION 4 – NORMAL PROCEDURES

I. Base Altitude Change

Before flight, check float pressure. Normal pressure is 1.5 psig.

A. For flights where descent is to be below takeoff altitude – over-inflate at base altitude .5 psig per 1000 feet anticipated altitude change (6.5 psig maximum inflation pressure).

NOTE: This includes the normal ambient temperature variations associated with changes in altitude.

B. For flights to higher than takeoff altitude – 10,000 feet differential altitude permitted (provided float pressure is not more than 1.5 psig at takeoff).

C. For variations in ambient air temperature and/or water temperature at a given base altitude, use the following procedure: when an ambient air temperature or water temperature colder that the temperature at initial inflation is anticipated, over-inflate, .5 psig above normal for each 15° F decrease in temperature anticipated.

SECTION 5 – PERFORMANCE

I. No change from the basic flight manual except as indicated below:

Figure 10.8.1 V_{NE} vs Density Altitude

Figure 10.8.2 Airspeed Calibration

II. Rate of Climb

Reduce rate of climb by 150 feet per minute from that obtained from page FM-5-7 of the basic flight manual.

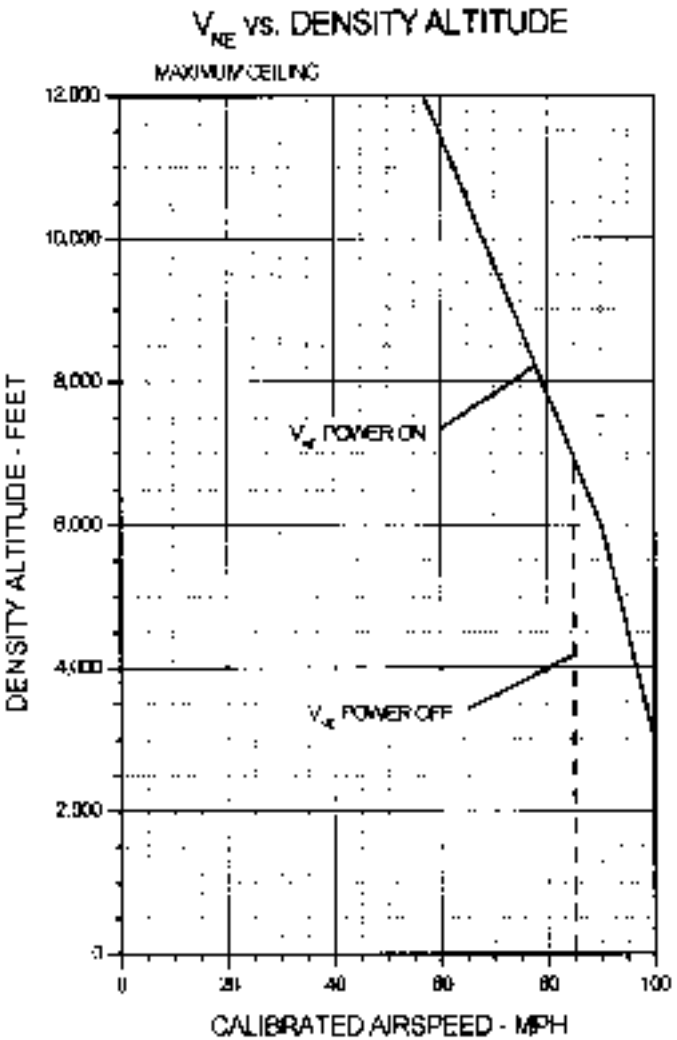


Figure 10.8.1. V_{NE} vs Density Altitude
Emergency Float Configuration

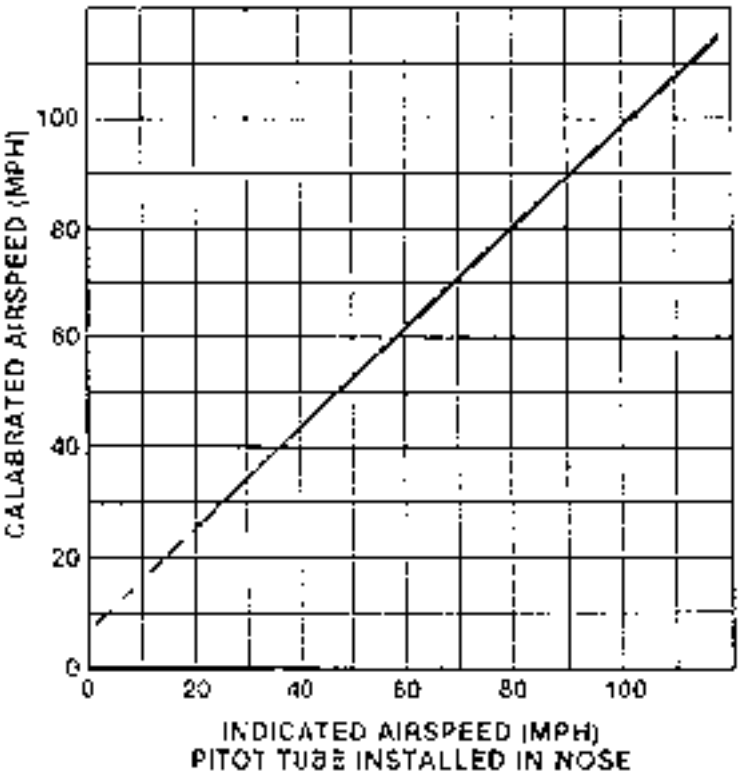


Figure 10.8.2. Airspeed System – Calibration Curve

Emergency Float Configuration

Instrument Error Zero

SECTION 6 – WEIGHT AND BALANCE

I. General

A new weight and balance should be calculated per the instructions in Section 6 of the basic flight manual using the following information:

OPTIONAL EQUIPMENT	WEIGHT	LONGITUDINAL ARM	LONGITUDINAL MOMENT
Float landing gear	75.0 lb	107 in	8025 in-lb

II. Center of Gravity Limits

A. Longitudinal

1. 92.0 in. to 94.6 in. at 2350 lb
2. 92.0 in. to 98.5 in. at 2070 lb

B. Lateral – see Figure 10.8.3

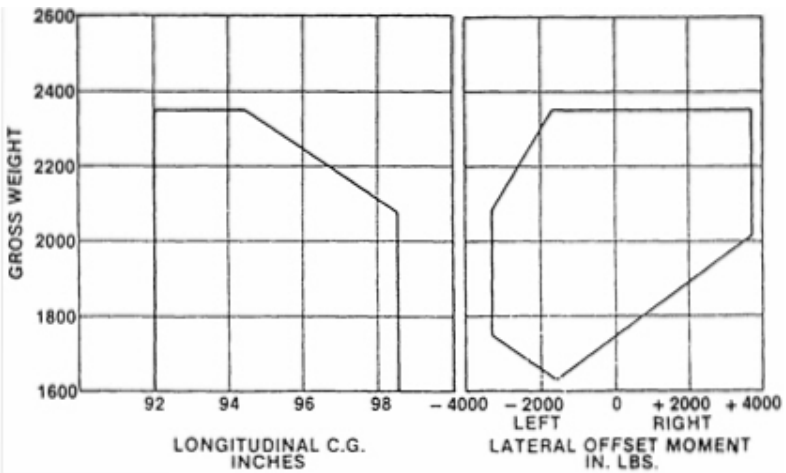


Figure 10.8.3. Longitudinal and Lateral Offset Moment

INTENTIONALLY LEFT BLANK

THROTTLE CORRELATOR SUPPLEMENT NO. 9

SECTION 1 – GENERAL

Introduction

The twist grip-type throttle, located on the collective pitch control stick, is connected to a mechanical throttle correlation device which coordinates throttle control for changes in collective pitch settings. The throttle correlation linkage is connected to the fuel servo throttle valve on the engine. The correlator is designed to help the pilot keep the rotor/engine rpm within the desired green band for the majority of flight maneuvers.

Because it is a correlator, not a governor, the pilot must monitor the RPM and maintain the RPM in the normal operating range using the throttle twist grip.

The round head rivet mounted on the forward end of the twist grip is used for a start position index.

SECTION 2 – OPERATING LIMITATIONS

Same as the Basic Flight Manual

SECTION 3 – EMERGENCY AND MALFUNCTION PROCEDURES

Same as the Basic Flight Manual

SECTION 4 – NORMAL PROCEDURES

I. Normal Engine Starting Procedures

A. Under the heading *Normal Engine Starting Procedures* on page FM-3-1, omit Step 15 and perform the following:

1. Mixture control to idle cut off.
2. Throttle closed.
3. Then open to start position (i.e., index up).

CAUTION: Excessive throttle opening on starting will result in an engine overspeed which results in severe engine damage.

4. Ignition switch ON to both.
5. Engage starter button. When engine fires, release the starter button and push mixture control to full rich.

B. Proceed with Step 16 on Page FM-3-1.

II. Takeoff to Hover

A. Page FM-3-5, prior to *Flight Information,* perform the following:

1. Cyclic in neutral position.
2. Set engine rpm to 2900 rpm with collective full down.
3. Slowly and smoothly increase collective pitch and adjust throttle as required to maintain rpm in the green arc while raising collective to lift helicopter off the ground.

NOTE: This helicopter is equipped with a mechanical throttle correlation device. The correlator will compensate for changes in collective pitch when manifold pressure is above 25 inches Hg and will maintain rpm within the normal operating range for normal hover maneuvering.

B. Proceed with *Flight Information* on Page FM-3-5.

SECTION 5 – PERFORMANCE

Same as the Basic Flight Manual

SECTION 6 – WEIGHT AND BALANCE

Same as the Basic Flight Manual

INTENTIONALLY LEFT BLANK

AUXILIARY FUEL TANK SUPPLEMENT NO. 11

SECTION 1 – GENERAL

I. Introduction

This supplement must be attached to the Basic Rotorcraft Flight Manual when the aircraft is equipped with an Enstrom Auxiliary Fuel Tank Kit No. 28-01009. Operation must be in compliance with the Basic Rotorcraft Flight Manual except as modified by this supplement. Other approved sections and supplements to this Flight Manual are recommended procedures.

This installation can only be made on F-28C with normal gross weights of 2350 lb or above and 108 lb capacity baggage compartments.

II. Description

The auxiliary fuel tank is a 13-gallon tank with 12.7 gallons of usable fuel and 0.3 gallons of unusable fuel. It consists of a foam-filled, neoprene bladder inside an aluminum case. It is installed in the baggage box with a line running to the main fuel tanks. The auxiliary fuel tank is equipped with a 12-volt electric pump which is used to transfer the fuel from the auxiliary tank to the main tanks. The auxiliary fuel tank is designed to be quickly installed and removed.

Fuel transfer is controlled by a switch on the lower right switch panel. Turning the switch on transfers the fuel from the auxiliary tank to the main tanks. An indicator light near the fuel transfer switch will illuminate when all of the fuel in the auxiliary fuel tank has been transferred to the main tanks. The fuel must be in the main tank to supply the engine. This system is not designed to run the engine directly from the auxiliary fuel tanks. The fuel transfer rate is approximately 25 gallons per hour, and takes approximately one-half hour to complete.

Because certain passenger load/fuel load combinations may move the center of gravity outside of the approved envelope, provisions have been included for storage of the ground handling wheels in a forward internal location. In addition to allowing a greater variety of loading, the internal storage of the ground handling wheels should increase the cruise speed by approximately 2%.

The wheels have been designed to mount immediately ahead of the instrument console and the wheel bar can be stowed in the baggage box. Stowage of the ground handling wheels internally

is optional; however, the pilot must ensure that operation within the approved gross weight/c.g. envelope is maintained with other baggage or ballast as required.

SECTION 2 – OPERATING LIMITATIONS

I. Type of Operation – See Basic Flight Manual

II. Airspeed Limitations – See Basic Flight Manual

III. Altitude Limitations – See Basic Flight Manual

IV. Weight and Balance – See Basic Flight Manual

V. Placards

The following placards must be attached as described when the auxiliary fuel tank is installed in the aircraft:

A. On the auxiliary fuel tank near the filler cap:
(Placard P/N's 28-12433-1 and 28-22565-11)

FUEL 100/130 OCT

And

13 GAL

B. On the instrument panel below the transfer switch:
(Placard P/N 28-22560-11)

TRANSFER FUEL BELOW 180 LBS

C. On the instrument panel below the transfer complete indicator light:
(Placard P/N 28-22559-13)

AUX FUEL EMPTY

SECTION 3 – EMERGENCY AND MALFUNCTION PROCEDURES

I. Engine Failure

A. Follow the procedures in Section 4 of the Basic Flight Manual.

B. If time permits and a forced landing is imminent: Auxiliary Fuel Transfer Switch – OFF.

II. Ditching With Power

A. Auxiliary Fuel Transfer Switch – OFF.

B. Follow the procedures in Section 4 of the Basic Flight Manual.

III. Fire in Flight

A. Auxiliary Fuel Transfer Switch – OFF.

B. Follow the procedures in Section 4 of the Basic Flight Manual.

SECTION 4 – NORMAL PROCEDURES

I. Fueling

A. Use only 100/130 or 100LL avgas.

B. After securing the filler cap, make sure the area around the filler is dry. If any fuel has spilled, it must be cleaned up.

C. Ventilate the baggage box thoroughly after refueling.

II. Preflight Inspection

The following items are added to the preflight inspection (fuel management) as described in Section 8 of the Basic Flight Manual:

A. Baggage Box

1. Check security of fuel tank and transfer pump.
2. Check fuel quantity and fuel tank cap security.
3. Check fuel lines for leaks.
4. Drain fuel sample into jar and check fuel grade, and check for impurities.

III. Before Starting Engine

A. Transfer Pump – OFF.

B. Complete Preflight inspection checklist as described in Section 8 of the Basic Flight Manual.

IV. Fuel Transfer

A. When the fuel quantity in the main tanks reaches approximately 180 lb, turn Fuel Transfer Switch ON.

B. When the “Aux Fuel Empty” indicator illuminates, turn Fuel Transfer Switch OFF.

NOTE: If there is insufficient room in the main tanks to hold the fuel transferred from the auxiliary tank, the excess fuel will be dumped overboard through the fuel tank vents.

V. Trim

Because use of the auxiliary fuel tank will tend to move the center of gravity toward the aft limit, it may be desirable to increase the forward cyclic trim authority. This may be accomplished by readjusting the longitudinal bias spring under the right hand seat. Refer to Maintenance Manual, Cyclic Trim Rigging Procedure, MM-22-7.

VI. Internal Ground Handling Wheel Storage

A. After the wheels have been raised and the helicopter is on its skids, remove the latch pins on the inboard end of the axle by pulling upward.

B. Remove the washer on the inboard end of the axle and remove the wheel from the skid by pulling outward.

C. Replace the washer and latch pin on the axle.

D. Remove a handle from the wheel bracket on the instrument console and slide this handle through the center of the wheel, from the outside of the wheel inward.

E. Slide the handle into the bracket and turn the handle until it slides into the detent in the tube. Then, while still pushing, turn the handle approximately one-quarter turn clockwise to lock.

F. Check to assure that the handle is locked in place. The spring on the side of the bracket should also be slightly compressed.

G. Repeat steps A-F with the remaining wheel.

H. To remove the handles from the bracket, push inward and turn the handle counterclockwise until it stops, approximately one-quarter turn, then pull straight out on the handle.

SECTION 5 – PERFORMANCE

There is no change to the performance section of the Basic Rotorcraft Flight Manual. Internal stowage of the ground handling wheels should yield approximately a 2% increase in cruise speed for a given power setting. All limitations listed the Basic Rotorcraft Flight Manual remain in effect for this configuration.

SECTION 6 – WEIGHT AND BALANCE

When an Enstrom auxiliary fuel tank kit No. 28-01009 is installed, a new weight and balance should be computed as described in Section 6 of the Basic rotorcraft Flight Manual, incorporating the following information:

Item	Weight lb	Arm in	Moment in-lb
Fixed lines and provisions	2.3	79.1	182.0
Auxiliary fuel tank	20.3	135.0	2740.5
Unusable fuel in auxiliary tank	2.0	135.0	270.0
	24.6		3192.4

Center of Gravity Limits – See Basic Rotorcraft Flight Manual

Note that the typical data points shown use 170 lb as the minimum weight pilot. Certain solo lightweight pilot configurations may require additional ballast in the cockpit to remain within the approved c.g. envelope.

Typical Load Condition:

Item	Weight lb	Arm in	Moment in-lb
Basic aircraft	1620	100.5	162,810
Auxiliary fuel tank with unusable fuel	25		3,192
	1645	100.91	166,022
Pilot and passenger	388	62.0	24,056
Full fuel	240	96.0	23,040
Auxiliary fuel	74	135.0	9,990
	2347	95.05	223,088
Relocate ground handling wheels	-12	104.7	-1,256
	+12	16.6	+199
			-1,057
Stow wheel bar	3	52.5	+157
Wheels relocated	2350	94.55	222,188