ENSTROM 280FX OPERATOR'S MANUAL

AND

FAA APPROVED ROTORCRAFT FLIGHT MANUAL

REPORT NO. 28-AC-020

Revision 13, dated July 16, 2020, applies to the Enstrom 280FX Operator's and FAA Approved rotorcraft Flight Manual. Incorporate this revision by removing and inserting the pages listed below.

Remove pages:	Insert pages:
i through ii	i through ii
vii through x	vii through x
2-7 through 2-8	2-7 through 2-8
4-19 through 4-20	4-19 through 4-20
7-1 through 7-2	7-1 through 7-2
7-15 through 7-18	7-15 through 7-18
9-1 through 9-2	9-1 through 9-6

................................Nothing Follows...............................

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LOG OF REVISIONS

Rev. No.	Date	FAA Approved
1	Jul 12/85	G. Louser
2	Dec 14/88	P. Moe
3	May 22/89	P. Moe
4	Jan 11/91	R. Adler
5	Jun 8/07	J. Miess
6	Mar 26/12	S. Lardinois
7	Jul 9/12	J. Miess
8	Feb 11/13	J. Miess
9	Nov 26/13	R. D. McElroy
10	Jul 27/15	R. D. McElroy
11	Oct 25/17	E. Kinney
12	Mar 12/19	D. Barbini
13	Aug 14/20	R. Nelson

FAA Approved by
Manager, Southwest Flight Test Section, AIR-713
Federal Aviation Administration
Ft. Worth, TX

NOTE

All revisions are indicated by a black vertical line.

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	Jul 4/14	EASA 10049746	N/A
6	Jun 9/15	EASA 10053596	N/A
7	Jul 9/15	FAA/EASA T.I.P*	G. J. Michalik
8	Jun 9/15	EASA 10053594	N/A
9	Jul 9/15	FAA/EASA T.I.P*	G. J. Michalik
10	Feb 13/17	FAA/EASA T.I.P*	G. J. Michalik
11	Apr 5/18	FAA/EASA T.I.P*	M. Runyan
12	Mar 12/19	FAA/EASA T.I.P**	M. Javed
13	Aug 14/20	FAA/EASA T.I.P**	See FAA Approval Signature

* Section 3.2 T.I.P.

** Section 3.5.12 T.I.P. Revision 6

LIST OF EFFECTIVE PAGES

PAGE	DATE	PAGE	DATE
Cover	Feb 21/12	3-6	Nov 5/13
i	Jul 16/2020	3-7	Nov 5/13
ii	Jul 16/2020	3-8	Nov 5/13
iii	Feb 21/12	3-9	Nov 5/13
iv	Sep 20/17	3-10	Nov 5/13
v	Feb 21/12	3-11	Nov 5/13
vi	Feb 21/12	3-12	Nov 5/13
vii	Jul 16/2020	3-13	Nov 5/13
viii	Jul 16/2020	3-14	Nov 5/13
ix	Jul 16/2020	3-15	Nov 5/13
x	Jul 16/2020	3-16	Nov 5/13
1-1	Feb 21/12	3-17	Nov 5/13
1-2	Feb 21/12	3-18	Nov 5/13
1-3	Feb 21/12	3-19	Nov 5/13
1-4	Feb 21/12	3-20	Nov 5/13
1-5	Feb 21/12	3-21	Nov 5/13
1-6	Feb 21/12	3-22	Nov 5/13
1-7	Feb 21/12	3-23	Nov 5/13
1-8	Feb 21/12	3-24	Nov 5/13
2-1	Feb 21/12	3-25	Nov 5/13
2-2	Feb 21/12	3-26	Nov 5/13
2-3	Feb 21/12	4-1	Feb 21/12
2-4	Feb 21/12	4-2	Feb 21/12
2-5	Feb 21/12	4-3	Dec 3/18
2-6	Feb 21/12	4-4	Dec 3/18
2-7	Dec 3/18	4-5	Feb 21/12
2-8	Jul 16/2020	4-6	Feb 21/12
2-9	Feb 21/12	4-7	Feb 21/12
2-10	Feb 21/12	4-8	Dec 3/18
2-11	Feb 21/12	4-9	Dec 3/18
2-12	Feb 21/12	4-10	Dec 3/18
2-13	Feb 21/12	4-11	Dec 3/18
2-14	Feb 21/12	4-12	Dec 3/18
2-15	Feb 21/12	4-13	Dec 3/18
2-16	Feb 21/12	4-14	Feb 21/12
3-1	Nov 5/13	4-15	Apr 15/15
3-2	Nov 5/13	4-16	Apr 15/15
3-3	Nov 5/13	4-17	Apr 15/15
3-4	Nov 5/13	4-18	Apr 15/15
3-5	Nov 5/13	4-19	Jul 16/2020

LIST OF EFFECTIVE PAGES

PAGE	DATE	PAGE	DATE
4-20	Apr 15/15	7-8	Nov 5/13
4-21	Nov 5/13	7-9	Nov 5/13
4-22	Feb 21/12	7-10	Nov 5/13
4-23	Feb 21/12	7-11	Dec 3/18
4-24	Feb 21/12	7-12	Dec 3/18
5-1	Feb 21/12	7-13	Dec 3/18
5-2	Feb 21/12	7-14	Dec 3/18
5-3	Feb 21/12	7-15	Jul 16/2020
5-4	Feb 21/12	7-16	Jul 16/2020
5-5	Feb 21/12	7-17	Jul 16/2020
5-6	Feb 21/12	7-18	Jul 16/2020
5-7	Feb 21/12	8-1	Feb 21/12
5-8	Feb 21/12	8-2	Feb 21/12
5-9	Feb 21/12	8-3	Feb 21/12
5-10	Feb 21/12	8-4	Feb 21/12
5-11	Feb 21/12	8-5	Feb 21/12
5-12	Feb 21/12	8-6	Feb 21/12
6-1	Sep 20/17	8-7	Feb 21/12
6-2	Feb 21/12	8-8	Feb 21/12
6-3	Sep 20/17	8-9	Feb 21/12
6-4	Sep 20/17	8-10	Feb 21/12
6-5	Sep 20/17	8-11	Feb 21/12
6-6	Feb 21/12	8-12	Sep 20/17
6-7	Sep 20/17	8-13	Nov 5/13
6-8	Sep 20/17	8-14	Sep 20/17
6-9	Dec 3/18	8-15	Sep 20/17
6-10	Sep 20/17	8-16	Feb 21/12
6-11	Sep 20/17	8-17	Feb 21/12
6-12	Sep 20/17	8-18	Sep 20/17
6-13	Sep 20/17	8-19	Feb 21/12
6-14	Sep 20/17	8-20	Feb 21/12
6-15	Sep 20/17	8-21	Sep 20/17
6-16	Sep 20/17	8-22	Feb 21/12
7-1	Jul 16/2020	8-23	Feb 21/12
7-2	Feb 21/12	8-24	Feb 21/12
7-3	Feb 21/12	9-1	Jul 16/2020
7-4	Apr 15/15	9-2	Feb 21/12
7-5	Apr 15/15	9-3	Jul 16/2020
7-6	Nov 5/13	9-4	Jul 16/2020
7-7	Nov 5/13	9-5	Jul 16/2020

LIST OF EFFECTIVE PAGES

PAGE	DATE	PAGE	DATE
9-6	Jul 16/2020	10-2-18	Feb 21/12
10-0-1	Feb 21/12	10-3-1	Feb 21/12
10-0-2	Feb 21/12	10-3-2	Feb 21/12
10-1-1	Feb 21/12	10-3-3	Feb 21/12
10-1-2	Feb 21/12	10-3-4	Feb 21/12
10-1-3	Feb 21/12	10-3-5	Feb 21/12
10-1-4	Feb 21/12	10-3-6	Feb 21/12
10-1-5	Feb 21/12	10-3-7	Feb 21/12
10-1-6	Feb 21/12	10-3-8	Feb 21/12
10-1-7	Feb 21/12	10-3-9	Feb 21/12
10-1-8	Feb 21/12	10-3-10	Feb 21/12
10-1-9	Feb 21/12	10-3-11	Feb 21/12
10-1-10	Feb 21/12	10-3-12	Feb 21/12
10-1-11	Feb 21/12	10-4-1	Feb 21/12
10-1-12	Feb 21/12	10-4-2	Feb 21/12
10-1-13	Feb 21/12	10-4-3	Feb 21/12
10-1-14	Feb 21/12	10-4-4	Feb 21/12
10-1-15	Sep 20/17	10-5-1	Feb 21/12
10-1-16	Feb 21/12	10-5-2	Feb 21/12
10-1-17	Feb 21/12	10-6-1	Feb 21/12
10-1-18	Feb 21/12	10-6-2	Feb 21/12
10-1-19	Feb 21/12	10-7-1	Feb 21/12
10-1-20	Feb 21/12	10-7-2	Feb 21/12
10-2-1	Feb 21/12	10-8-1	Feb 21/12
10-2-2	Feb 21/12	10-8-2	Feb 21/12
10-2-3	Feb 21/12	10-9-1	Feb 21/12
10-2-4	Feb 21/12	10-9-2	Feb 21/12
10-2-5	Feb 21/12	10-10-1	Feb 21/12
10-2-6	Feb 21/12	10-10-2	Feb 21/12
10-2-7	Feb 21/12	10-11-1	Feb 21/12
10-2-8	Feb 21/12	10-11-2	Feb 21/12
10-2-9	Feb 21/12	10-11-3	Feb 21/12
10-2-10	Feb 21/12	10-11-4	Feb 21/12
10-2-11	Feb 21/12	10-11-5	Feb 21/12
10-2-12	Feb 21/12	10-11-6	Feb 21/12
10-2-13	Feb 21/12	10-11-7	Feb 21/12
10-2-14	Feb 21/12	10-11-8	Feb 21/12
10-2-15	Feb 21/12	10-11-9	Feb 21/12
10-2-16	Feb 21/12	10-11-10	Feb 21/12
10-2-17	Feb 21/12	10-11-11	Feb 21/12

LIST OF EFFECTIVE PAGES

PAGE	DATE	PAGE	DATE
10-11-12	Feb 21/12		
10-11-13	Feb 21/12		
10-11-14	Feb 21/12		
10-12-1	Jan 7/13		
10-12-2	Feb 21/12		
10-12-3	Feb 21/12		
10-12-4	Feb 21/12		

2-7. Power Plant Limitations – Lycoming HIO-360-F1AD with Turbocharger

(Turbocharger installation per STC SE484GL).

<table>
<tr><td colspan="2">1. Maximum continuous power</td><td colspan="2">225 hp, 3050 RPM, 39.0 in MP, sea level to 12,000 ft</td></tr>
<tr><td colspan="2" rowspan="2">2. Engine operating RPM</td><td>Minimum</td><td>2900 RPM</td></tr>
<tr><td>Maximum</td><td>3050 RPM</td></tr>
<tr><td colspan="2" rowspan="2">3. Engine idle RPM (clutch disengaged)</td><td>Minimum</td><td>1450 RPM</td></tr>
<tr><td>Maximum</td><td>1500 RPM</td></tr>
<tr><td colspan="2">4. Manifold pressure</td><td colspan="2">39.0 in Hg maximum, sea level to 12,000 ft</td></tr>
<tr><td colspan="2">5. Cylinder head temperature</td><td colspan="2">500°F maximum</td></tr>
<tr><td colspan="2">6. EGT/TIT</td><td colspan="2">1650°F maximum</td></tr>
<tr><td colspan="4">NOTE
The maximum limit for the turbocharger turbine inlet temperature (TIT) is 1650°F. This limit was previously referred to as EGT (exhaust gas temperature).</td></tr>
<tr><td colspan="2" rowspan="2">7. Fuel</td><td colspan="2">100/130 aviation grade gasoline (green)</td></tr>
<tr><td colspan="2">100LL aviation grade gasoline (blue)</td></tr>
<tr><td rowspan="3">8. Fuel mixture setting</td><td rowspan="2">29 in MP or below</td><td colspan="2">Maximum fuel flow
- full rich</td></tr>
<tr><td colspan="2">Minimum fuel flow
- leaned to 1650°F rich side of peak</td></tr>
<tr><td>29 in MP to 39.0 in MP</td><td colspan="2">Full rich</td></tr>
<tr><td colspan="2">9. Oil temperature</td><td colspan="2">245°F maximum</td></tr>
<tr><td rowspan="3">10. Oil pressure</td><td colspan="2">Maximum starting and warm-up</td><td>100 psi</td></tr>
<tr><td colspan="2">Normal operating</td><td>60-90 psi</td></tr>
<tr><td colspan="2">Minimum idling</td><td>25 psi</td></tr>
</table>

2-8. Transmissions Limitations

1. Transmission oil temperature

Maximum	225°F

2-9. Restrictions

1. Instrument flight is prohibited.
2. Aerobatic maneuvers are prohibited.
3. Hovering IGE above 10,000 ft density altitude is limited to five minutes.
4. The aft landing light must not be used for ground or hover in ground effect operations.

2-10. Minimum Crew

1. One pilot.
2. Solo from left seat only.

2-11. Instrument Markings

1. Rotor tachometer

334 RPM	red line
334-385 RPM	green arc
385 RPM	red line

2. Engine tachometer

2900 RPM	red line
2900-3050 RPM	green arc
3050 RPM	red line

3. Maximum airspeed

85 MPH (Power off)	blue line or red cross-hatched line
117 MPH (Power on)	red line

reduce throttle slightly in anticipation of this increase. After this adjustment, the pilot should not need to "chase" the RPM.

5. When effective translational lift has been attained, adjust throttle as necessary to maintain RPM within the normal operating range. Establish a positive rate of climb. Refer to the Height-Velocity Diagram, Figure 5-5 or Figure 5-7, for recommended takeoff profile.

4-14. Maximum Performance Takeoff

1. Stabilize at 2 ft hover aligned with desired takeoff course. Check hover power.

2. Smoothly apply forward cyclic to begin acceleration into effective translational lift.

3. As the helicopter begins forward movement, increase collective pitch to maintain 2-5 ft skid height and 3050 RPM.

CAUTION

DO NOT exceed 39.0 inches of manifold pressure.

NOTE

Since the 280FX is equipped with a full-time turbocharger, the aircraft is equipped with an OVERBOOST warning light to warn the pilot of a potential overboost condition. Transient overboost conditions that may trigger the warning light may not show as overboost conditions on the manifold pressure gauge and the overboost light may come on slightly before the red line on the manifold pressure gauge. The manifold pressure gauge, not the warning light, is the determining factor in ascertaining the magnitude of an overboost condition. Valid overboost conditions must be logged in the engine log and inspections performed per the latest revision of Lycoming Service Bulletin 592.

4. After attaining translational lift, adjust throttle as necessary to maintain RPM at 3050 RPM. Continue level acceleration to 35 MPH, then apply aft cyclic to allow the helicopter to climb and accelerate to best rate of climb speed. Maintain constant airspeed. Climb at best climb speed to clear barrier.

4-15. [Reserved]

4-16. Cruise

1. Maintain 3050 RPM and 29 inches manifold pressure, or less, in level flight.
2. Set cyclic trim.
3. Lean fuel mixture to approximately 90 lb/hr at 29 inches manifold pressure.
4. Monitor TIT.

NOTE

Allow a few minutes for temperature to stabilize. DO NOT exceed 1650°F TIT. Make fine adjustments to attain desired fuel flow and cross check cylinder head temperature and oil temperature. If temperatures are too high, enrich mixture until temperatures remain within limits.

5. Any increase in power setting above 29 inches should be accompanied by setting the mixture to full rich.

CAUTION

Avoid maneuvers that require full pedal travel or rapid pedal reversals.

SECTION 7. AIRCRAFT AND SYSTEM DESCRIPTION

TABLE OF CONTENTS

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1. Position Lights

   The position lights are located on either side of the vertical stabilizers. Each light assembly contains either a red or green light, as appropriate, and a white tail position light.

2. Anti-Collision Lights

   The anti-collision lights have a flashing action that provides for adequate identification of the helicopter. They are operated by the anti-collision switch/circuit breaker located on the panel. The lights are located on the vertical stabilizers.

3. Landing Lights

   The helicopter is equipped with two landing lights, a forward landing light in the nose and an aft landing light on the belly.

   The aft landing light is aimed downward for steep approaches and autorotations. Prior to S/N 2168, the aft light is mounted on the belly panel below the engine. On S/N 2168 and subsequent, the aft landing light is mounted on a removable access panel on the belly of the cabin. When on or near the ground, the aft landing light can cause glare from the ground and reflections in the cabin. This is significantly worse on aircraft with the aft light under the cabin (i.e. S/N 2168 and subsequent).

   On early production helicopters, the forward and aft landing lights are turned on by circuit breaker-type switches on the instrument panel. For helicopters manufactured through S/N 2166, the forward landing light is controlled by push button switch located on the pilot's cyclic. The aft landing light is controlled by the panel switch LDG LT AFT. For S/N 2167 and subsequent, the forward and aft landing lights are controlled by the FWD LDG LT and AFT LDG LT switches located on the collective switch box. The forward landing light switch also has a setting for pulse.

NOTE

For S/N 2166 and prior, the panel switch must be on for the aft landing light to operate. On early production helicopters, both panel switches must be on.

7-15. Landing Gear System

1. Skid Landing Gear

   The main landing gear consists of two tubular aluminum skids attached to the airframe by means of the forward and aft cross tubes through four pivoting legs and four nitrogen-oil oleo struts. The struts prevent ground resonance as well as cushion ground contact during landing. Drag struts give the gear stability and strength and prevent fore and aft movement during ground contact maneuvers. Replaceable hardened steel skid shoes are installed on each skid to resist skid wear on hard surfaces.

2. Tail Rotor Guard

   A tubular tail rotor guard is installed on the aft end of the tailcone. It acts as a warning to the pilot upon an inadvertent tail-low landing and aids in protecting the tail rotor from damage.

3. Ground Handling Wheels

   Each landing gear skid tube has a manually operated overcentering 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 the helicopter is parked. If the aircraft has optional removable Brackett® wheels, they should be removed before the engine is run-up. The wheels and brackets can be removed for flight, or they can be secured in the up position. The wheels weigh 13 pounds and are attached to the skids at station 104.7. The weight and balance for each flight must account for the location of the wheels. If the wheels are left on the skids, the cruise speed will be approximately 2 MPH lower, with a corresponding reduction in range.

7-16. Baggage Compartment

A 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 6.3 cubic feet and it has an allowable loading capacity of 108 lb at Station 135.

7-17. Rotor RPM Warning System

The Rotor RPM Warning System uses a magnetic pick-up in the main rotor transmission to measure rotor RPM. A control unit activates a light and a warning horn when the main rotor RPM is below 334. This system is armed by the same switch that operates the clutch disengaged warning light. Neither the low rotor RPM light nor the warning horn will operate when the clutch is disengaged. A switch installed on the collective torque tube disarms the warning horn so that the light will operate, but the horn will not operate when the collective is on the down stop.

On aircraft S/N 2136 and subsequent, the Hi/Low Rotor RPM Warning System provides a visual and audio indication of low and high rotor RPMs. This system is essentially identical to the low rotor RPM warning system except it also indicates when the rotor RPM exceeds the upper limit. The activation points on this system are fixed and cannot be adjusted in the field. As with the low rotor RPM system, the horn is silenced when the collective is fully down. Thus, the horn will not sound if the RPM limit is exceeded during an autorotation with the collective fully down; the light will still illuminate.

Some earlier S/N aircraft may have been modified with the Hi/Low Rotor RPM Warning System.

7-18. Annunciator Panel

All of the warning and caution lights are contained in an annunciator panel, which is located at the top of the instrument panel. On early production helicopters, the warning lights include LOW ROTOR RPM, CLUTCH ENGAGE, and LOW FUEL PRESS; the caution lights include OVERBOOST, MRGB CHIP, and TRGB CHIP. On later production helicopters, STARTER RELAY is added to the warning lights and LOW VOLTAGE is added to the caution lights. Further information about these lights is contained elsewhere in this section and in Section 3, "Emergency and Malfunction Procedures".

For aircraft equipped with the Hi/Low Rotor RPM Warning System, ROTOR RPM replaces LOW ROTOR RPM in the annunciator panel.

SECTION 9. OPERATIONAL INFORMATION

TABLE OF CONTENTS

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SECTION 9

SUPPLEMENTAL INFORMATION

SECTION I. GENERAL OPERATION

9-1. Slope Landings

1. Slope landings have been demonstrated with the slope 90° either side of the nose up to a maximum of 15°.

CAUTION

Caution must be exercised when landing on slopes that available cyclic travel is not exceeded. Also, if any droop stop pounding is encountered as the collective is lowered the landing must be aborted and a slope with less angle selected.

SECTION II. FLIGHT CHARACTERISTICS

9-2. Retreating Blade Stall

1. Blade stall occurs at higher forward speeds when a portion of the retreating blade stalls because of the reduced relative velocity of airflow over the blade at high blade angles. When the airspeed of the tip of the retreating blade falls below a predetermined value, or when a relative blade angle exceeds a predetermined value, blade stall will be experienced. If blade pitch is increased (as with increased collective or forward cyclic control), or if the forward speed is increased, the stalled portion of the rotor disc increases, and the stall progresses from the tip toward the root of the retreating blade. During maneuvers that increase the g-load, such as sharp turns or high-speed flares from diving descents, where rapid application of collective or cyclic pitch control is involved, severe blade stall may be encountered. Severe blade stall may also be encountered in turbulent air by gust-induced load factors or corrective control applications by the pilot. In the stall condition, each main rotor blade will stall as it passes

through the stall region, creating a three per rev vibration. When significant blade stall is encountered a mild roughness will be noted along with some cyclic control feedback that will cause the cyclic to have a tendency to displace aft of the trimmed position. The vibration due to the blade stall will increase as blade stall progresses, as will the requirement for forward force to maintain the cyclic in the initial trimmed position. Both of these cues should provide adequate warning that blade stall is being encountered. Severe turbulence or abrupt control movement at this point will increase the severity of the stall but will not cause any loss of control to occur. In this helicopter, there is not as pronounced a tendency for the fuselage to pitch up and roll left in response to the rotor stalling as may be experienced in other helicopters, but if the rotor is held in a stalled condition and the blade stall is aggravated, the helicopter will eventually exhibit this pitch and roll tendency. Even though blade stall may be encountered, the helicopter is fully controllable even in severe blade stall because of the blade design and the high rotor control power inherent in this rotor design. Blade stall may be eliminated by any or all of the following actions:

a. Gradually decrease the severity of the maneuver.

b. Gradually decrease collective pitch.

c. Gradually decrease airspeed.

d. Increase the rotor speed to maximum power on RPM by beeping the engine to 103% N_2.

9-3. Vortex Ring State (Settling With Power)

CAUTION

Flight conditions causing Vortex Ring State should be avoided at low altitudes because of the loss of altitude necessary for recovery.

1. Vortex Ring State may occur when a helicopter is flown at low airspeeds using a relatively high power setting and at relatively low rates of descent. Under this condition, the helicopter is descending through the air displaced by its

own rotor system. The downwash then recirculates through the helicopter rotor system and results in reduced rotor efficiency. This condition can be recognized by increased roughness accompanied by a rapid build-up in rate of descent. Increasing collective pitch alone only tends to aggravate the situation. The Vuichard technique is very effective at recovering from settling with power. This technique uses the tail rotor thrust and the cyclic to move the advancing blade into clear air, at which point the vortex ring will dissipate. Recovery can be completed with much less altitude loss than with traditional techniques.

2. The Vuichard technique can be performed as follows: Simultaneously, apply sufficient right cyclic to cause a 10° to 20° bank, apply left pedal to maintain heading, and increase collective.

3. During approach for landings at high gross weights, conditions associated with Vortex Ring State should be avoided.

9-4. Loss of Tail Rotor Effectiveness

1. Loss of tail rotor effectiveness (LTE) is a phenomenon which can occur in any single main rotor/anti-torque tail rotor helicopter. Although the 280FX 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, low rotor RPM, 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 cannot be stopped using the tail rotor pedal 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.

9-5. Ground Resonance

1. Ground resonance is an aerodynamic phenomenon associated with fully articulated rotor systems. It developes when the rotor blades move out of phase with each other and cause the rotor disc to become unbalanced. The chance of encountering ground resonance in the 280FX is very remote; however, the potential does exist if the main rotor dampers or oleo struts are severely degraded or damaged.

2. If severe vibrations are encountered on the ground when bringing the main rotor rpm up to operating speed, immediately turn the throttle to the flight idle position. If severe vibrations are encountered when the main rotor rpm is at operating speed, immediately hover the aircraft and allow the vibrations to dampen. Attempt to land the aircraft. If severe vibrations are encountered again, immediately hover the aircraft, allow the vibrations to dampen, and perform a hovering autorotation.