Tornado Alley Turbo
300 Airport Road
Ada, OK 74820

AFMS-550 for:
Bonanza _____

F.A.A. Approved

Airplane Flight Manual Supplement – 550

Aircraft With Turbonormalizer Systems Installed After August 1, 2000
And
Aircraft With Earlier Turbonormalizer System Installations, but Modified to Conform to Systems Installed After August 1, 2000

For

Bonanza Model _____

Registration No. _____

Serial No. _____

This Supplement must be attached to the FAA Approved Airplane Flight Manual when Tornado Alley Turbo Whirlwind™ Turbonormalizing System is installed in accordance with STC No. SA5223NM.

The information contained herein supplements the information of the FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: [redacted]

for S. Frances Cox, Manager
Special Certification Office
Southwest Region.

Dated: AUG 27 2004

LOG OF PAGES (INCLUDING REVISIONS)

(Newest Revisions in ***Italics***)

Revision	Pages	Date	Description	FAA Approved
Original	1-12	08/22/1991	Complete Supplement.	RONALD F. MAY Denver ACO
A	1-12	03/11/1992	Change "Bonanza Model A36" to "Bonanza Model_." Add log of pages. Change engine handling recommendation.	RICHARD D. JENNINGS Denver ACO
B	All	12/12/1996	Re-format. Add propeller high-pitch settings.	RONALD F. MAY Denver ACO
C	All	10/15/2002	Change Flite-Craft Turbo & Turbo-Flite to Tornado Alley Turbo Whirlwind™. Add Emerg. procedures, Oxygen system, Hartzell prop, lean of peak ops.	S. Frances Cox ASW-190
D	All	05/26/2004	Change max. gross wt. category, some flap speeds and altitude limitations on Vne, add performance notes.	S. Frances Cox ASW-190
E	All	AUG 27 2004	Corrections to placards	[redacted] _____ for S. Frances Cox Manager, Special Certification Office Southwest Region

Section 1. GENERAL

DESCRIPTIVE DATA

This AFMS Revision, applies to aircraft that have the turbonormalizing systems configured at installation or later upgraded with the current, as of August 1, 2000 or later, intercooler, induction, baffling, and fuel injector configuration. Aircraft with the earlier intercooler, induction, baffling, and fuel injector configuration will require the use of different fuel flow values than are set forth in this AFMS revision. This AFMS should not be used for aircraft with earlier configurations of this STC, that have not been upgraded to the configuration available on or after August 31, 2000. *Only aircraft that have been configured to conform to this latest revision are eligible for the gross weight increases described below.*

ENGINE

Your Bonanza is powered by one Teledyne Continental Motors corporation engine model IO-550-B, fuel-injected, direct-drive, air-cooled, horizontally-opposed, 6-cylinder, 550-cubic inch displacement, rated at 300 horsepower. This engine has been modified by the addition of an intercooled turbonormalizing system with an automatic wastegate control.

The Tornado Alley Turbo Whirlwind™ system provides a stable environment for the engine to operate within. The Tornado Alley Turbo Whirlwind™ system will provide 29.6 inches of manifold pressure to 20,000 feet or more.

PROPELLER

The following propellers are approved for installation with the Tornado Alley TurboWhirlwind™ system with the IO-550 series engines:

Propeller	High pitch at 30-inch blade station	Low pitch at 30-inch blade station	Minimum diameter	Maximum diameter
McCauley D3A32C409/82NDB	28.8º ± .5º	13.7º ± .2º	78.5	80
McCauley (1) 3A32C76/8NB	29.0º ± .5º	13.3º ± .2º	78.5	80
Hartzell PHC-C3YF-1RF/F8468A-6R	32.0º	12.0º	78	80
Hartzell PHC-C3YF-1RF/F8068	37º ± 1º	12.0º ± .2º	78	82

Note (1): Provided the IO-550-B engine is derated from 300 HP at 2700 RPM to 285 HP at 2700 RPM and 27.7" Hg of manifold pressure having 2-6th, 1-5th and 1-4th order crankshaft dampers installed.

Other STC's which approve installation of IO-550-B engines in models of aircraft approved for this STC may authorize other propeller installations, and those propellers may be used when installed pursuant those STCs.

Section 1. GENERAL (continued)

MAXIMUM CERTIFICATED WEIGHTS

Beech 35-C33A, E33A

Maximum Ramp	3642 lbs
Maximum Take-Off	3642 lbs
Maximum Landing	3600 lbs
Maximum Zero Fuel	3600 lbs
Maximum Weight in Baggage Compartment	No Change

Beech G33

Maximum Ramp	3789 lbs
Maximum Take-Off	3789 lbs
Maximum Landing	3600 lbs
Maximum Zero Fuel	3600 lbs
Maximum Weight in Baggage Compartment	No Change

Beech F33A

Maximum Ramp	3754 lbs
Maximum Take-Off	3754 lbs
Maximum Landing	3600 lbs
Maximum Zero Fuel	3600 lbs
Maximum Weight in Baggage Compartment	No Change

Beech 36, A36 S/N E-1 and up

Maximum Ramp	4000 lbs
Maximum Take-Off	4000 lbs
Maximum Landing	4000 lbs
Maximum Zero Fuel	4000 lbs
Maximum Weight in Baggage Compartment	No Change

Beech A36TC

Maximum Ramp	4000 lbs
Maximum Take-Off	4000 lbs
Maximum Landing	4000 lbs
Maximum Zero Fuel	4000 lbs
Maximum Weight in Baggage Compartment	No Change

Section 2. OPERATING LIMITATIONS

A. The Tornado Alley Turbo Whirlwind™ 550 is certified as flat-rated (maintains sea level manifold pressure) to an operating altitude of 20,000 feet when installed on this aircraft. Above 20,000 feet available power is reduced as altitude increases.

B. Propeller high pitch setting may be changed:
McCauley propellers…….34.5 ± 1° at 30 inch station
Hartzell PHC-C3YF-1RF 84 inch diameter….36 ± 1° at 30 inch station
Hartzell PHC-C3YF-1RF 76 inch diameter….38 ± 1° at 30 inch station

C. When 3A32C76/82NB propeller is installed the following operating limitation shall be affixed near the manifold pressure gage: "DO NOT EXCEED 27.7" MANIFOLD PRESSURE AT SEA LEVEL". Aircraft with this limitation are not eligible for the described gross weight increases.

D. Maneuvers – NORMAL CATEGORY:
Your aircraft has been approved for increased maximum takeoff weights and landing weights in accordance with the following chart. All operations above the original maximum weight listed in the Aircraft Flight Manual are to be NORMAL CATEGORY operations. Spins and acrobatic maneuvers are not permitted in NORMAL CATEGORY operations.

Utility Category operations may continue to be performed in accordance with weight and balance limitations listed in the Raytheon (Beech) Airplane Flight Manual for your airplane.

FLIGHT LOAD FACTOR LIMITS

Beech Model 35-C33A, E33A, F33A, G33

	FLAPS UP	FLAPS DOWN
UTILITY CATEGORY	4.4 positive g's 1.76 negative g's	2.0 positive g's 0 g's
NORMAL CATEGORY	3.8 positive g's 1.52 negative g's	2.0 positive g's 0 g's

Beech Model 36, A36, and A36TC

	FLAPS UP	FLAPS DOWN
UTILITY CATEGORY	4.4 positive g's 1.76 negative g's	3.0 positive g's 0 g's
NORMAL CATEGORY	3.8 positive g's 1.52 negative g's	2.7 positive g's 0 g's

Section 2. OPERATING LIMITATIONS (continued)

Weight and Balance Envelopes (C.G. Range) for Beech Aircraft with Maximum Weight Increase:

Beech 36, A36 S/N E-1 through E-2110 except E-1946 and E-2104

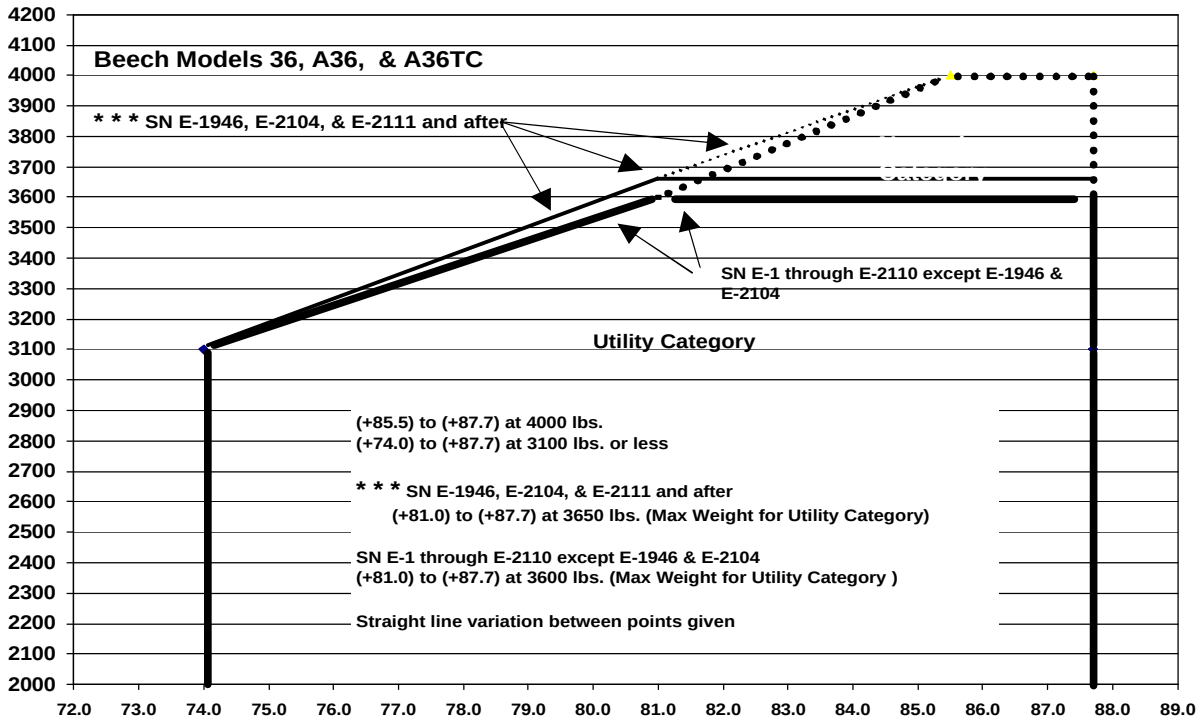
(+85.5) to (+87.7) at 4000 lbs. (NORMAL CATEGORY ONLY above 3600 lbs.)
(+81.0) to (+87.7) at 3600 lbs. (Max Weight for Utility Category)
(+74.0) to (+87.7) at 3100 lbs. or less
Straight line variation between points given

Beech A36, S/N E-1946, E-2104, E-2111 and after

(+85.5) to (+87.7) at 4000 lbs. (NORMAL CATEGORY ONLY above 3650 lbs.)
(+81.0) to (+87.7) at 3650 lbs. (Max Weight for Utility Category)
(+74.0) to (+87.7) at 3100 lbs. or less
Straight line variation between points given

Beech A36TC

(+85.5) to (+87.7) at 4000 lbs. (NORMAL CATEGORY ONLY above 3650 lbs.)
(+81.0) to (+87.7) at 3650 lbs. (Max Weight for Utility Category)
(+74.0) to (+87.7) at 3100 lbs. or less
Straight line variation between points given

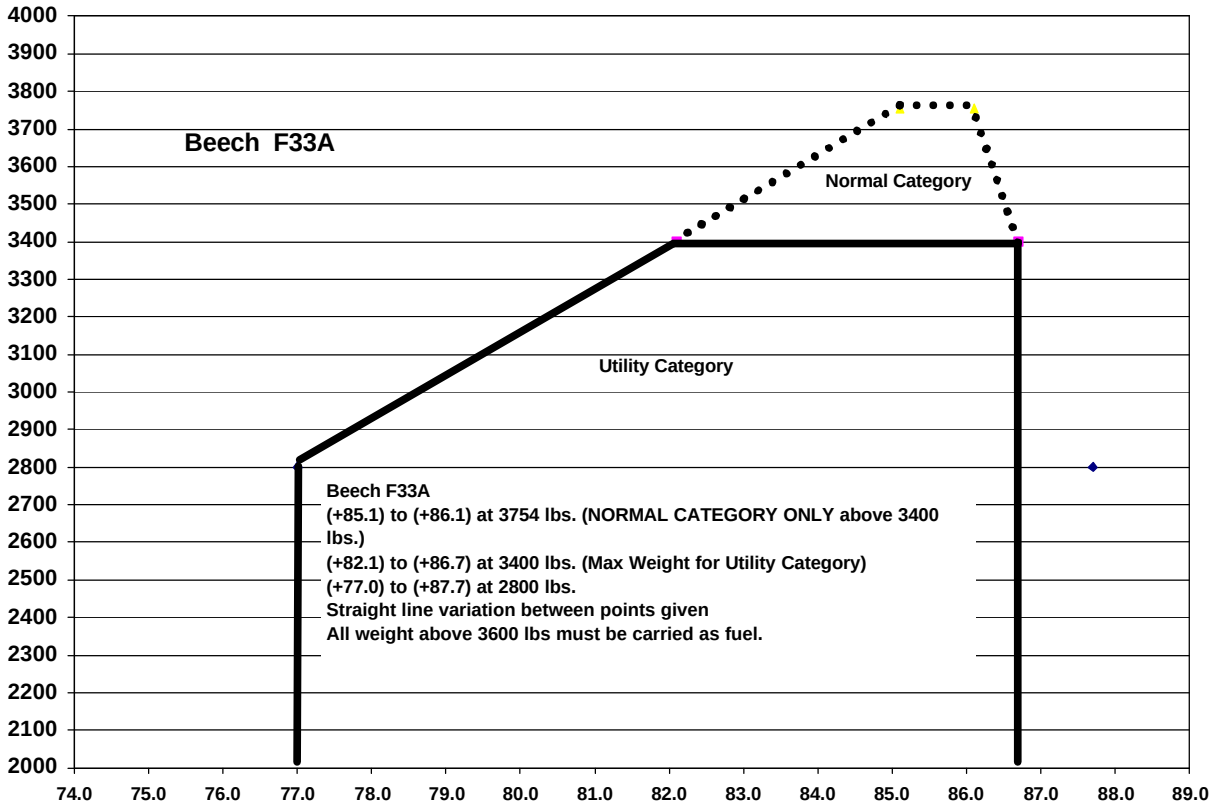


Section 2. OPERATING LIMITATIONS (continued)

Weight and Balance Envelopes (C.G. Range) for Beech Aircraft with Maximum Weight Increase:

Beech F33A

(+85.1) to (+86.1) at 3754 lbs. (NORMAL CATEGORY ONLY above 3400 lbs.)
(+82.1) to (+86.7) at 3400 lbs. (Max Weight for Utility Category)
(+77.0) to (+87.7) at 2800 lbs.
Straight line variation between points given
All weight above 3600 lbs must be carried as fuel.

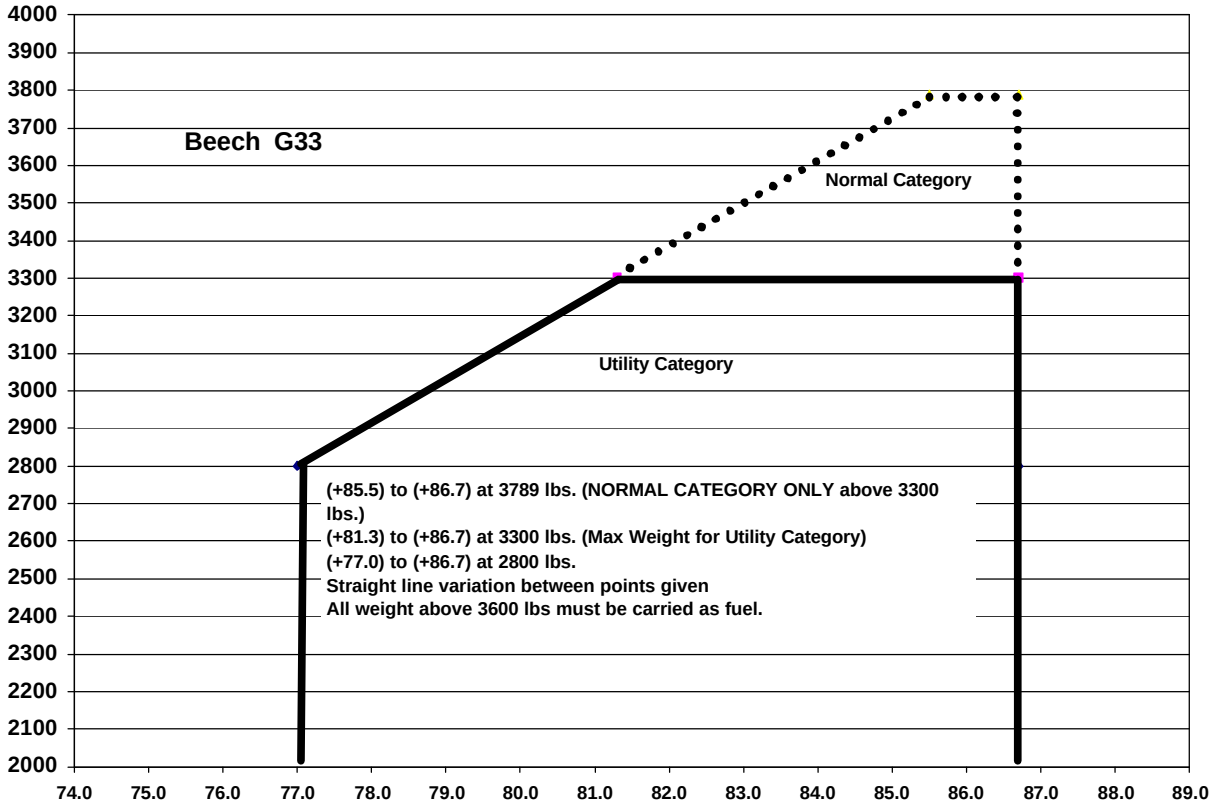


Section 2. OPERATING LIMITATIONS (continued)

Weight and Balance Envelopes (C.G. Range) for Beech Aircraft with Maximum Weight Increase:

Beech G33

(+85.5) to (+86.7) at 3789 lbs. (NORMAL CATEGORY ONLY above 3300 lbs.)
(+81.3) to (+86.7) at 3300 lbs. (Max Weight for Utility Category)
(+77.0) to (+86.7) at 2800 lbs.
Straight line variation between points given
All weight above 3600 lbs must be carried as fuel.

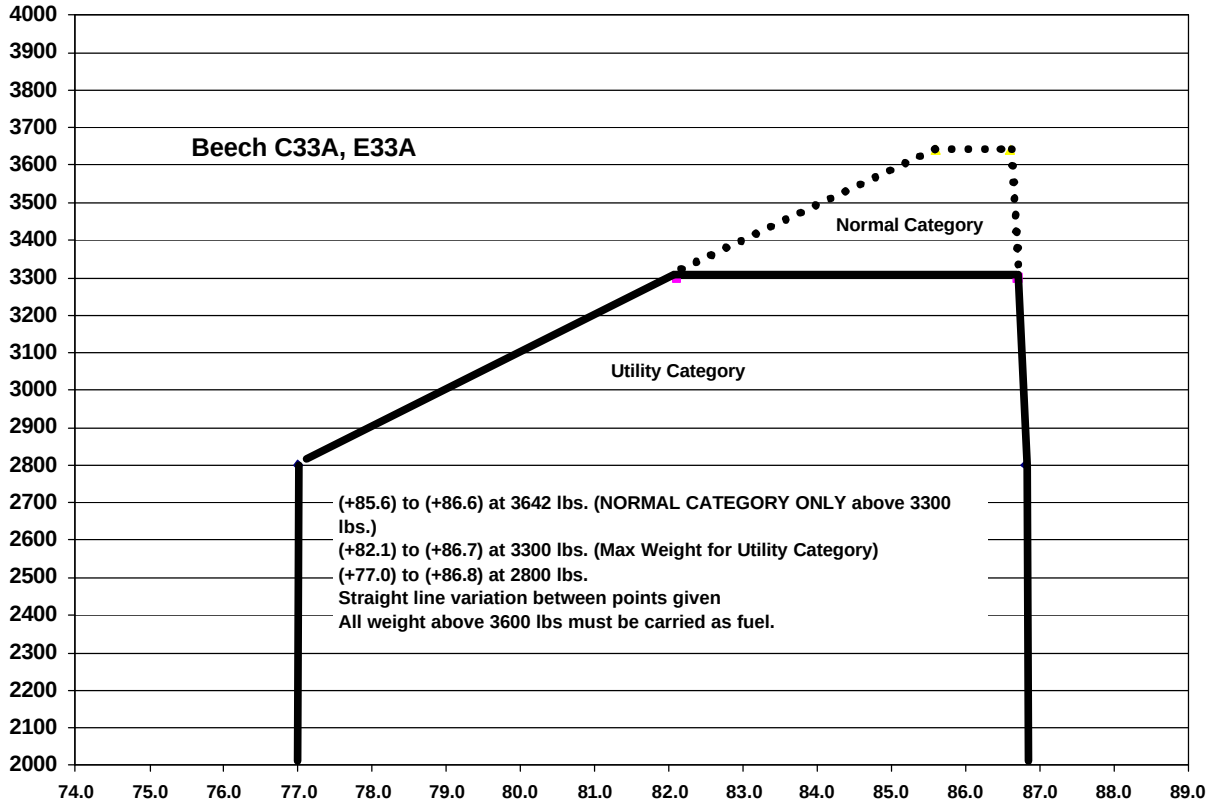


Section 2. OPERATING LIMITATIONS (continued)

Weight and Balance Envelopes (C.G. Range) for Beech Aircraft with Maximum Weight Increase:

Beech 35-C33A, E33A

(+85.6) to (+86.6) at 3642 lbs. (NORMAL CATEGORY ONLY above 3300 lbs.)
(+82.1) to (+86.7) at 3300 lbs. (Max Weight for Utility Category)
(+77.0) to (+86.8) at 2800 lbs.
Straight line variation between points given
All weight above 3600 lbs must be carried as fuel.



Section 2. OPERATING LIMITATIONS (continued)

PLACARDS

A. NORMAL CATEGORY PLACARD

The appropriate placard (below) to be installed in addition to existing UTILITY CATEGORY limitations placard, In Full View of Pilot:

Beech 35-C33A, E33A (S/N CE-1 thru CE-248)

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING …….132 KTS (152 MPH)
MAX. FLAPS DOWN SPEED …… 102 KTS (117 MPH)
MAX. STRUCTURAL CRUISE ……..165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED …….195 KTS (225 MPH)
DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT ……143 KTS (165 MPH)
- ABOVE 20,000 FT …….129 KTS (148 MPH)

Beech 35-C33A, E33A (S/N CE-249 and up)

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 132 KTS (152 MPH)
MAX. FLAPS DOWN SPEED ..... 111 KTS (127 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 195 KTS (225 MPH)
DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Section 2. OPERATING LIMITATIONS (continued)

PLACARDS (continued)

Beech G33

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 132 KTS (152 MPH)
MAX. FLAPS DOWN SPEED ..... 106 KTS (122 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 195 KTS (225 MPH)
DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Beech F33A (S/N CE-290 thru CE815)

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 132 KTS (152 MPH)
MAX. FLAPS DOWN SPEED ..... 110 KTS (127 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 195 KTS (225 MPH)
DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Section 2. OPERATING LIMITATIONS (continued)

PLACARDS (continued)

Beech F33A S/N CE816 and up:

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 132 KTS (152 MPH)
MAX. APPROACH FLAPS - 15º ..... 137 KTS (158 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
MAX. FULL DOWN FLAPS ..... 110 KTS (127 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 195 KTS (225 MPH)
DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Beech 36, A36 S/N E-1 thru E2110 except E-1946 and E2104:

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 139 KTS (160 MPH)
MAX. APPROACH FLAPS - 15º ..... 137 KTS (158 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
MAX. FULL DOWN FLAPS ..... 110 KTS (127 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 203 KTS (234 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Section 2. OPERATING LIMITATIONS (continued)

PLACARDS (continued)

Beech 36, A36 S/N E-1946, E2104, E2110 and up:

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 139 KTS (160 MPH)
MAX. APPROACH FLAPS - 12º ..... 137 KTS (158 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
MAX. FULL DOWN FLAPS ..... 110 KTS (127 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 203 KTS (234 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Beech A36TC:

NORMAL CATEGORY AIRPLANE

* WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS. [SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR LOADING LIMITS]
* NO ACROBATIC MANEUVERS OR SPINS WHEN IN NORMAL CATEGORY. [FLIGHT MANEUVER LOAD FACTOR: FLAPS UP 3.8 G, FLAPS DOWN 2.0 G]

NORMAL CATEGORY AIRSPEED LIMITATIONS:

MANEUVERING ..... 139 KTS (160 MPH)
MAX. APPROACH FLAPS - 15º ..... 137 KTS (158 MPH)
- ABOVE 20000 FT. ..... 125 KTS (144 MPH)
MAX. FULL DOWN FLAPS - 30º ..... 112 KTS (129 MPH)
MAX. STRUCTURAL CRUISE ..... 165 KTS (190 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. -
NEVER EXCEED ..... 203 KTS (234 MPH)
- DECREASE 3 KNOTS (3.5 MPH) PER 1000 FT. ABOVE 16000 FT. –
MAX. LANDING GEAR OPERATION:
- BELOW 20,000 FT. ..... 152 KTS (175 MPH)
- ABOVE 20,000 FT. ..... 137 KTS (158 MPH)

Section 2. OPERATING LIMITATIONS (continued)
PLACARDS (continued)

B. INSTRUMENT PANEL PLACARD

Per the below applicable airplanes, place the following placard on the instrument panel near the airspeed indicator.

Beech 35-C33A, E33A, F33A, G33, 36, A36, and A36TC

AIRSPEED INDICATOR MARKINGS FOR UTILITY CATEGORY OPERATIONS ONLY. SEE NORMAL CATEGORY LIMITATIONS PLACARD FOR NORMAL CATEGORY AIRSPEED LIMITATIONS.

C. NORMAL CATEGORY PLACARD

For all models, place the following placard in the baggage compartment, or on the inside of the baggage compartment door, in full view:

NORMAL CATEGORY: WHEN LOADED TO WEIGHTS ABOVE UTILITY CATEGORY LIMITATIONS LISTED IN FAA APPROVED AIRPLANE FLIGHT MANUAL, THE WEIGHT AND BALANCE SHOULD BE CAREFULLY EVALUATED BY THE PILOT AS LOADING MAY BE MORE CRITICAL [THE PERMISSIBLE CENTER-OF-GRAVITY ENVELOPE AT THE HIGHER GROSS WEIGHT IS NARROW AND SHOULD BE CHECKED.] VERIFY LOADING WITH FULL TANKS, AND AFTER PLANNED FUEL BURN. SEE FAA APPROVED TORNADO ALLEY TURBO AIRPLANE FLIGHT MANUAL SUPPLEMENT, AFMS-550 FOR WEIGHT AND BALANCE LIMITATIONS FOR **NORMAL CATEGORY** LIMITATIONS.

Section 3. EMERGENCY PROCEDURES

RETARDING THROTTLE TO IDLE

Retarding the throttle to idle at or near full rich mixture setting may cause engine combustion to cease, depending on auxiliary fuel pump operation and altitude. At altitudes below 18,000 feet, merely advancing the throttle should cause resumption of normal engine operation. Above 18,000 feet, if the windmilling engine does not restart, the following procedure should be used:

1. Auxiliary Fuel Pump – OFF
2. Throttle – 1/2 OPEN
3. Propeller – HIGH RPM
4. Mixture Control – LEAN until engine starts, then slowly advance to FULL RICH
5. Throttle, Mixture and Auxiliary Fuel Pump – RESET for desired operation

Retarding the throttle to idle at or near very lean mixture setting may cause engine combustion to cease. This problem is most likely to occur when the pilot fails to enrichen the mixture before landing.

UNEXPECTED LOSS OF MANIFOLD PRESSURE

If, for any reason, the aircraft experiences an unexpected loss of normal manifold pressure, the aircraft will, typically, revert to operation similar to a normally aspirated aircraft at approximately the same altitude. However, in this situation, continued flight should only be conducted to the nearest suitable landing place in order to investigate the cause of the unexpected loss of normal manifold pressure. The two most likely causes of this condition are:

1. A leak or rupture at an induction system coupling or a loose or failed hose clamp. This condition does not usually present a significant hazard and can usually be repaired promptly at most repair facilities.
2. A significant leak in the exhaust system. This condition **may present an immediate hazard** to continued safe flight, including a possible fire hazard. Because it is difficult to distinguish between an induction system leak and an exhaust system leak, all unexpected losses of normal manifold pressure should be treated as being caused by an exhaust leak until proven otherwise.

In the event of an unexpected loss of manifold pressure the pilot should immediately:

1. Reduce power to the minimum power setting required for continued flight to a suitable landing.
2. Pull the cabin firewall air control knob aft, to the closed position.
3. Open the cowl flaps.
4. Declare an emergency.
5. Descend to the minimum safe altitude from which a landing may be most safely and expeditiously accomplished.
6. Remain alert for the possibility of a fire in the engine compartment. In the event of a fire in the engine compartment, shut off the fuel at the fuel valve and follow the Beech-Raytheon emergency procedure for an inflight fire as described in the AFM.

Section 4. NORMAL PROCEDURES

PREFLIGHT

Per Pilots Operating Handbook. In addition, prior to the first flight of the day, while the engine is cold, grasp the end of the tailpipe where it exits the lower left cowl area and firmly attempt to wiggle the tailpipe. If there is any indication that the tailpipe is not fully secure, it must be repaired before further flight. DO NOT FLY THE AIRCRAFT WITH A LOOSE TAILPIPE.

Also, if flight above 12,500 feet MSL is anticipated, be sure supplemental oxygen requirements per FAR 91.211(a) can be met by checking oxygen quantity and verifying masks and/or cannulas as required are available for all occupants.

BEFORE STARTING

(See aircraft POH)

STARTING

CAUTION

Do not engage starter for more than 30 seconds in any 4 – MINUTE time period.

COLD STARTS

1. Mixture – FULL RICH
2. Propeller – HIGH RPM
3. Throttle – FULL OPEN
4. Auxiliary Fuel Pump Switch – HI to prime engine. Operate just until fuel flow peaks (about 3 seconds)
5. Auxiliary Fuel Pump – OFF
6. Throttle – CLOSED, THEN OPEN APPROXIMATELY ½ INCH
7. Magneto/Start Switch – START position; release to BOTH position when engine starts
8. Throttle – ADVANCE while cranking until engine starts, then promptly retard the throttle to idle (1000 to 1200 rpm) after start

FLOODED ENGINE

If the engine has not started by the time the throttle has been advanced to full open, it may be flooded. Proceed as follows:

1. Mixture – IDLE CUT-OFF
2. Propeller – HIGH RPM
3. Throttle – ½ OPEN
4. Magneto/Start Switch – START position; release to BOTH position when engine starts
5. Throttle – REDUCE TO IDLE as engine starts and ADVANCE MIXTURE to FULL RICH

Section 4. NORMAL PROCEDURES (continued)

HOT STARTS

1. Mixture – IDLE CUT-OFF
2. Propeller – HIGH RPM
3. Throttle – CLOSE
4. Auxiliary Fuel Pump Switch – HI for 60 – 90 seconds, then OFF
5. Mixture – FULL RICH
6. Throttle – WIDE OPEN
7. Auxiliary Fuel Pump – HI 1 – 2 seconds after fuel flow has peaked, then OFF
8. Throttle – CLOSE, then OPEN approximately ½ inch.
9. Magneto/Start Switch – START position; and slowly advance the throttle as if making a normal cold start. Release to BOTH position when engine starts.
10. Retard throttle to idle.
11. Auxiliary Fuel Pump – HI may be used momentarily after starting to assist in obtaining normal fuel flow, then OFF

AFTER STARTING

1. Throttle – 1000 to 1200 rpm
2. Oil Pressure – ABOVE the lower red radial (10 psi) within 30 seconds
3. Mixture – Lean until RPM rises to a maximum value. Leave the mixture in this position during taxi and until runup
4. START Annunciator (if installed) – CHECK; should be illuminated during start and extinguished after start
5. LOW BUS VOLTS Annunciator – CHECK; should be illuminated during start and extinguished after start
6. ALT LOAD – CHECK; load should decrease below 25 amps (at 1000 – 1200 rpm) after two (2) minutes with no additional electrical equipment turned on
7. BUS VOLTMETER – Indicated voltage should be 24 volts before start and 28.5 volts after start (24 volt systems). Indicated voltage should be 12 volts before start and 14.2 volts after start (12 volt systems).
8. All Engine Instruments – CHECK

CAUTION

Engine oil temperature should be 24°C (75ºF) or above and oil pressure in the green arc prior to engine run-up above 1200 rpm.

9. Lights – AS REQUIRED
10. Avionics Equipment – ON, AS REQUIRED
11. Brakes – RELEASE AND CHECK

CAUTION

Never taxi with a flat shock strut.

Section 4. NORMAL PROCEDURES (continued)

BEFORE TAKEOFF

1. Brakes - HOLD
2. Seat Belts and Shoulder Harnesses – CHECK
3. Avionics – CHECK AND SET
4. Engine Instruments – CHECK (within operating range)
5. Flight Instruments – CHECK AND SET

NOTE

To ensure proper gyro operation maintain engine RPM sufficient to maintain a value of 4.3 in. HG on the instrument air gauge.

6. ANNUNciator TEST Push-button – PRESS (All annunciators, landing gear position lights, and flap position lights should illuminate)
7. Mixture – FULL RICH
8. Throttle – 1700 RPM
9. Propeller – EXERCISE to obtain 300 to 400 rpm drop, then return to high rpm
10. Magnetos – CHECK at 1700 rpm on each magneto (variances between individual magnetos should not exceed 50 rpm; maximum drop should not exceed 150 rpm)
11. Instrument Air Gauge – CHECK
12. Standby Generator (if installed) – CHECK
13. Throttle – IDLE
14. Auto-pilot and Electric Trim (if installed) – CHECK
15. Trim – SET
    a. Aileron – NEUTRAL
    b. Elevator – 3° NOSE UP (6° nose up if only front seats are occupied)
16. Flaps – CHECK OPERATION, SET FOR TAKEOFF
17. Windows – SECURE
18. Doors – SECURE (on later model aircraft check cabin door lock indicator – CLOSED)
19. Flight Controls – CHECK FREEDOM OF MOVEMENT AND PROPER DIRECTION OF TRAVEL
20. Mixture – AS REQUIRED (Lean as for taxi, unless expecting immediate takeoff)
21. Auxiliary Fuel Pump – OFF
22. Instruments – CHECK (Make final check of manifold pressure, fuel flow, oil pressure, and rpm at the start of the takeoff)
23. Parking Brake – RELEASE

Section 4. NORMAL PROCEDURES (continued)

TAKEOFF

Take-Off Power……FULL THROTTLE at 2700 rpm
Minimum Recommended Take-Off Oil Temperature……...24°C (75°F)

1. Brakes – HOLD
2. Manifold Pressure – 25 IN. Hg or more
3. Mixture – FULL RICH
4. Propeller – HIGH RPM
5. Oil Pressure - CHECK
6. Manifold Pressure – FULL THROTTLE (29.6)

NOTE

MP may increase to 30 – 32 in. Hg. on first flight of the day due to colder oil temperatures. This is acceptable under these conditions but normal full throttle should be 29.6 in. Hg.

7. Auxiliary Fuel Pump - OFF Below 5,000' Density Altitude (D.A.)
   - ON LO above 5,000' D.A.
8. Fuel Flow – 35.0 gph If fuel flow exceeds 35 gph manually lean the mixture to 35.0 gph

WARNING

Use of the auxiliary fuel pump in the HI position may cause an excessively rich mixture and severely reduce available engine power or even cause the engine to cease combustion completely. The HI position should not be used during take-off unless there is a failure of the engine driven fuel pump.

9. Oil Pressure – within operating range
10. Brakes – RELEASE to begin takeoff roll
11. Airspeed – ACCELERATE TO AND MAINTAIN TAKEOFF SPEEDS
12. Landing Gear – RETRACT (after positive rate of climb is established)
13. Airspeed – ESTABLISH 115 – 120 KTS CLIMB SPEED (when clear of obstacles)
14. *Rpm – Reduce to 2650 RPM for noise abatement as soon as climb airspeed and terrain clearance allow.*

Section 4. NORMAL PROCEDURES (continued)

CRUISE CLIMB

1. Power – SET 29.6 in Hg Manifold Pressure
2. RPM - 2700
3. Mixture - FULL RICH (35 GPH)
4. Airspeed – 115-120 KTS
5. Auxiliary Fuel Pump – Use LO above 5,000' D.A.
   Use HI above 10,000' D.A.
   If fuel flow exceeds 35 GPH, then lean as required to obtain 35 GPH.
6. Monitor Turbine Inlet Temperature if installed. A normal climb TIT should be 682°C - 715°C (1260°F - 1310°F). TIT should not exceed 715ºC (1310ºF). If TIT exceeds this value, and to avoid an excessive rise in CHTs, Auxiliary Fuel Pump set LO or set HI if above 10,000' D.A. If the problem persists, and CHTs increase from normal climb values, lower the nose and increase indicated air speed as required.
7. Monitor Cylinder Head Temperature. If any CHT exceeds 193ºC (380ºF) verify full rich fuel flow, using the boost pump as described in 6 above. If fuel flow is inadequate to keep all CHT's below 193ºC (380ºF), use HI Auxiliary Fuel Pump (regardless of D.A.) and lean mixture (if required) to 35.0 gph for the duration of the climb. Verify cowl flaps are full open. Lower the nose and increase airspeed as required to maintain the hottest CHT at or below 193ºC (380ºF).
8. Oxygen – ON as required (above 12,500' daytime, above 5000' night time recommended). CHECK masks for proper flow.

MAX PERFORMANCE CLIMB

Same as the CRUISE CLIMB procedure, above, except use Vy for airspeed and monitor cylinder head temperatures closely – return to CRUISE CLIMB as soon as practical.

CRUISE

WARNING

Retarding the throttle to idle at or near full rich mixture setting may cause engine combustion to cease, depending on auxiliary fuel pump operation and altitude. At altitudes below 18,000 feet, merely advancing the throttle should cause resumption of normal engine operation. Above 18,000 feet, if the windmilling engine does not restart, follow the procedures entitled "RETARDING THROTTLE TO IDLE" in the Emergency procedures section.

Section 4. NORMAL PROCEDURES (continued)

OPERATIONS AT CRUISE POWER WITH THE MIXTURE SET RICH OF PEAK TIT OR PEAK EGT:

Maximum Cruise Power…….26.0 in. Hg at 2400 rpm
Recommended Cruise Power…….25.0 in. Hg at 2500 rpm
Economy Cruise Power……..23.0 in. Hg at 2200 rpm

1. Power –SET AS DESIRED
2. Aux Pump OFF If fuel flow fluctuates, select LO.
3. Mixture – Use the TIT (preferred) or EGT system to lean the fuel/air mixture when cruising at 75% power setting or less in the following manner:
   Slowly lean the mixture and note the point on the indicator where the TIT or EGT temperature peaks and starts to fall.
4. Increase the mixture until the TIT (or EGT if no TIT is installed) reaches its maximum value and begins to decline. Note the maximum value of the TIT or EGT. Slowly enrichen the mixture until the TIT or EGT is a least 52ºC (125ºF) below the noted maximum value.

NOTE

Changes in altitude and power settings require the peak TIT or EGT to be rechecked and the mixture reset.

OPERATIONS AT CRUISE POWER WITH THE MIXTURE SET LEAN OF PEAK TIT OR PEAK EGT (PREFERRED):

Maximum Cruise Power……Wide Open Throttle (WOT) at 2500 rpm
Economy Cruise Power…….Wide Open Throttle (WOT) at 2200 rpm

1. Power – WOT at 2700 RPM and FULL RICH Mixture for one to two minutes in level flight at desired altitude. Verify the hottest CHT is less than 193ºC (380ºF)
2. Cowl Flaps – CLOSED
3. Power – Reduce RPM to 2500 or as desired
4. Auxiliary Fuel Pump – OFF if fuel flow is stable or LO if fuel flow is unstable
5. Mixture – Initially RICH, then:
6. Mixture – Smoothly REDUCE in a period of 4 to 6 seconds, to a fuel flow of approximately:
   13.5 to 15.5 gph at 2200 RPM
   15.5 to 17.0 gph at 2500 RPM

NOTE

When this reduction in fuel flow is performed as described, the pilot will notice a slight deceleration of the aircraft as the mixture passes from rich of peak TIT (EGT) to lean of peak TIT (EGT).

7. Cylinder Head Temperature – CHECK If any CHT exceeds 193ºC (380ºF), LEAN mixture further in 0.25 gph increments. If all CHT's are under 193ºC (380ºF), mixture may be increased in 0.1 to 0.2 gph increments.
8. Auxiliary Fuel Pump – after one half hour cruise, OFF. If fuel flow fluctuates, return to LO. Mixture may need to be reset as in 1-7 above.

Section 4. NORMAL PROCEDURES (continued)

DESCENT

1. Altimeter – SET
2. Mixture – AS REQUIRED FOR ALTITUDE
3. Cowl Flaps – CLOSED
4. Flaps – AS APPROPRIATE
5. Power – AS APPROPRIATE (Avoid prolonged idle settings. Maintain a Cylinder Head Temperature of 116°C (240°F) or greater.).

Optional procedure is to retard the throttle (less than 24 in. Hg) as the airplane descends to maintain a desired manifold pressure and adjust the mixture control to maintain peak TIT (EGT).

6. Windshield Defroster – AS REQUIRED (ON before descent into warm, moist air).

RAPID DESCENT

1. Altimeter – SET
2. Throttle – Smoothly REDUCE Manifold Pressure to 17 to 20 in. Hg
3. Propeller – Smoothly REDUCE RPM to 1800 to 2100 RPM
4. Mixture – RESET to obtain peak TIT or EGT
5. Cowl Flaps – VERIFY CLOSED
6. Airspeed – as appropriate within green arc. Use maneuvering speed in rough air.
7. Throttle – Maintain MAP in 17 to 20 in. Hg range during descent
8. Windshield Defroster – AS REQUIRED (ON before descent into warm, moist air)

BEFORE LANDING

1. Seat Belts & Shoulder Harnesses – FASTENED; Seat Backs – POSITION FOR LANDING
2. Fuel Selector Valve – SELECT FULLER MAIN TANK (feel for detent and visually check)
3. Fuel Boost Pump - OFF
4. Cowl Flaps – AS REQUIRED
5. Mixture – AS REQUIRED FOR ALTITUDE AND THROTTLE SETTING.
6. Landing Gear – DOWN and CHECKED (Check AFM for correct Landing Gear extension airspeed.)
7. Landing Lights – AS REQUIRED
8. Flaps – DOWN (Observe maximum extension airspeeds)
9. Airspeed – ESTABLISH NORMAL APPROACH SPEED
10. Propeller – HIGH RPM

Section 4. NORMAL PROCEDURES (continued)

BALKED LANDING

1. Power
   a. Mixture – FULL RICH
   b. Propeller – HIGH RPM
   c. Throttle – FULL OPEN
2. Airspeed – Vx until clear of obstacles, then trim to normal climb speed
3. Flaps – UP (0°) after positive rate of climb established
4. Landing Gear – RETRACT after positive rate of climb established
5. TRIM – RESET as required
6. Cowl flaps – OPEN

AFTER LANDING

1. Clear the active runway and hold short line
2. BRAKES – STOP the aircraft
3. Cowl Flaps – OPEN
4. Flaps – UP (0°)
5. Landing, Taxi, and Strobe Lights – AS REQUIRED
6. Trim Tabs – RESET for normal takeoff
7. Mixture – LEAN to obtain maximum idle RPM

SHUTDOWN

1. Parking Brake – AS APPROPRIATE
2. Electrical Switches and Avionics Equipment – OFF
3. Throttle – 1000 rpm
4. Mixture – IDLE CUT-OFF
5. Magneto/Start Switch – OFF after engine stops
6. Battery and Alternator Switches – OFF
7. Control Locks – INSTALL
8. Wheel Chocks – INSTALL; Parking Brake – RELEASE

Section 4. NORMAL PROCEDURES (continued)

OXYGEN SYSTEM (Optional)

PREFLIGHT

1. Check Oxygen Pressure Gage for pressure reading. Panel gage requires electrical power.
2. Determine if oxygen cylinder has enough capacity for the intended flight. (See Oxygen Duration Table.)
3. Plug in all masks or cannulas that will be used during flight. Turn the oxygen system ON and CHECK the flow indicator of each mask/cannula.
4. Shut oxygen OFF until inflight use is required.

WARNING
NO SMOKING when using oxygen.

IN FLIGHT

The use of oxygen is recommended to be in accordance with current FAR operating rules.

1. Oxygen valve or switch – ON
2. Mask or cannula – INSERT FITTING, DON MASK OR CANNULA (adjust mask or cannula for proper fit)
3. Oxygen – CHECK EACH INDICATOR FOR FLOW

AFTER USING

1. Discontinue use by unplugging mask/cannula from outlet.
2. Oxygen valve or switch – OFF

OXYGEN DURATION TABLE

Duration in hours with full bottle at the following altitudes:

Cyl Vol	No of Persons Using	10,000 Feet		15,000 Feet		20,000 Feet	25,000 Feet
		mask	cannula	mask	cannula	mask	mask
77 Cubic Feet	1	36.3	109.0	24.2	66.6	18.2	14.5
	2	18.2	54.5	12.1	33.3	9.1	7.3
	3	12.2	36.6	8.1	22.2	6.1	4.8
	4	9.1	27.2	6.1	16.6	4.5	3.6
	5	7.3	21.8	4.8	13.3	3.6	2.9
	6	6.1	18.2	4.0	11.1	3.0	2.4
115 Cubic Feet	1	54.3	162.8	36.2	99.5	27.1	21.7
	2	27.1	81.4	18.1	49.7	13.6	10.9
	3	18.1	54.3	12.1	33.2	9.0	7.2
	4	13.6	40.7	9.0	24.9	6.8	5.4
	5	10.9	32.6	7.2	19.9	5.4	4.3
	6	9.0	27.1	6.0	16.6	4.5	3.6

Duration times are based upon flows of standard 1.0 liters/minute per 10,000 feet or masks. Duration times for cannulas are based upon the use of Nelson adjustable A3 or A4 flow meters using the scale calibrated for cannulas. Duration times listed are based upon all occupants using either masks or cannulas, but not a mixture of the two devices.

EXPANDED NORMAL PROCEDURES

OPERATIONS AT CRUISE POWER WITH THE MIXTURE SET LEAN OF PEAK TIT OR PEAK EGT:

When the engine is operating in a stable condition, and as a check on the mixture setting, the pilot may verify that the engine is operating lean of peak as follows:

Cowl Flaps – OPEN
Verify no CHT exceeds 193ºC (380ºF)
Mixture – Slowly (increase mixture while observing the TIT or EGT increase in value towards peak TIT (EGT).

NOTE

When operating lean of peak TIT or EGT, increasing fuel flow will cause the TIT or EGT to rise towards its maximum or peak value. This is the opposite effect than when operating rich of peak TIT (EGT).

When the TIT (EGT) reaches its maximum value, note that value (typically between 860ºC and 888ºC (1580ºF and 1630ºF) and then promptly lean the mixture so that the TIT (EGT) is at least 33ºC (60ºF) below the observed maximum (peak) value.

CAUTION

This procedure should not take more than 2 minutes to complete. Operations at high power near peak EGT or TIT for extended periods will cause excessively high CHT's.

Cowl Flaps – After the CHT's have returned below 193ºC (380ºF) then CLOSE the cowl flaps.

NOTE

In warm or hot weather, the fuel flow at 33ºC (60ºF) lean of peak will be as much as 0.5 to 0.75 gph less than it will be at the same 33ºC (60ºF) lean of peak during cold weather.

If any CHT consistently operates in climb or cruise at temperatures in excess of 193ºC (380ºF) then the aircraft engine and baffling should be inspected for discrepancies by a competent mechanic knowledgeable of the system.

When operating the engine lean of peak TIT (EGT) the horsepower may be estimated by the following simple formula:

HP = fuel flow (gph) x 14.9

Example: Fuel flow = 15 gph. HP = 15 x 14.9 = 223 horsepower

This formula is not valid for mixture settings rich of peak TIT (EGT). This formula is not valid for other than the Continental IO-520/IO-550.

Section 5. PERFORMANCE (Performance Section is not FAA Approved)

The performance of this airplane equipped with the Tornado Alley Turbo Whirlwind™ Turbonormalizing System is equal to or better than the performance as listed in the original Flight Manual *when operated in the Utility Category*.

When using noise abatement procedures for climb (rpm reduced to 2650), climb rate is not appreciably affected.

However, when operating at the increased weights authorized when operations are conducted in the NORMAL CATEGORY expect:

A. Increased Takeoff Distance of up to: 30%

B. Decreased Rate-of-Climb of up to: 13%

C. Increased Stall Speed of up to: 7%

D. Increased Landing Distance of up to: 15%

E. Increased Takeoff and Approach Speeds: Increase 2 Kts.

F. Increased Vx and Vy speeds: Increase 2 Kts.

Section 8. HANDLING, SERVICING AND MAINTENANCE
(Handling, Servicing and Maintenance Section is not FAA Approved)

OXYGEN SYSTEM (This section only applies to oxygen system with light-weight oxygen bottles installed per STC SA5223NM. For standard oxygen systems installed by Beech or oxygen systems per other STC use instructions of Beech Airplane Flight Manual or STC's AFMS as appropriate.)

To service the oxygen system, use the following procedures:

NOTE

When filling the oxygen system, only use 99.99% pure oxygen to be sure that it does not contain moisture which can cause the oxygen valve to freeze.

WARNING

Keep hands, tools, clothing, and oxygen equipment clean and free from grease and oil. KEEP FIRE AND SPARKS AWAY FROM OXYGEN. Use only recommended leak testing soaps (i.e. castile soap and water solution).

1. Read the pressure gage for the oxygen system.
2. Gain access to the filler port for the oxygen system. Remove the cap from the filler valve and attach the recharging outlet. (On aircraft with the oxygen cylinder located ahead of the front spar, the cylinder may be removed for recharging if desired. Carefully disconnect the electrical connector and low pressure oxygen line from the valve on the end of the cylinder before removing cylinder from the aircraft.)
3. Slowly fill the cylinder to 1850 ± 50 psi at a temperature of 70ºF. This pressure may be increased an additional 3.5 psi for each degree of increase in temperature. Similarly, for each degree of drop in temperature, reduce the cylinder pressure 3.5 psi.
4. Remove the recharging outlet, and replace the filler valve cap.
5. Reinstall components removed to gain access to the filler valve. (Place oxygen cylinder in holder and reconnect electrical connector and low pressure oxygen line if cylinder was removed for servicing. Close cover.)

OXYGEN CYLINDER RETESTING

The oxygen cylinders are Kevlar® wrapped aluminum specifically designed for aviation use. They must be hydrostatic tested every 3 years and must be retired from service after 15 years.

Keep oxygen cylinder manufacturer's instructions with this AFMS for future reference.