Elite Air Taxi

Initial and Recurrent
Flight Training Handbook

Beechcraft 58 Baron

2015 revision 1

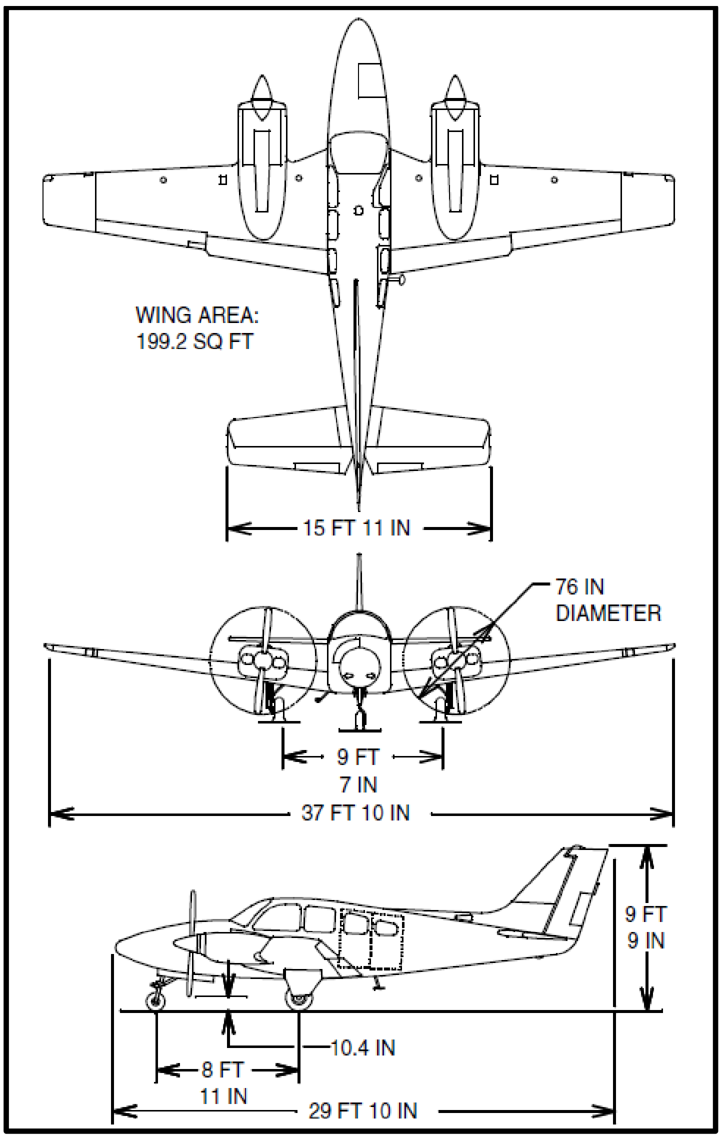
NOT FOR REAL WORLD USE

Part I. – Introduction to the Baron Fleet

Elite Air Taxi operates model B55/E55 and 58/58TC Beechcraft Barons. Downloads are available from the Download Center at www.flyelite.net. The current fleet includes the default B58G for Flight Simulator X and Prepar3D, the Carenado Baron 58 and Baron 58TC and the Milviz Baron B55/E55.

Carenado Beech Baron 58TC

The following information applies to the Beech Baron 58 series of aircraft.



DESCRIPTIVE DATA

ENGINES

NUMBER OF ENGINES
Two

ENGINE MANUFACTURER
Teledyne Continental Motors, Inc., (Mobile, Alabama)

ENGINE MODEL NUMBER
IO-550-C

ENGINE TYPE
Normally aspirated, Fuel-injected, direct-drive, air-cooled, sixcylinder, horizontally opposed, 550-cubic-inch displacement

HORSEPOWER RATING
300 H.P.

NUMBER OF PROPELLERS
Two

PROPELLER MANUFACTURER
Hartzell Propeller, Inc (Piqua, Ohio) holds the Supplemental Type Certificate (STC) for the installed propeller. Refer to supplement HPBE58-2 or AFMS 20002-1 in Section 9, SUPPLEMENTS.

NUMBER OF BLADES
Three

PROPELLER TYPE
Constant speed, full feathering, three-blade propeller using an aluminum hub and aluminum blades.

FUEL

APPROVED ENGINE FUELS
Aviation Gasoline Grade 100LL (blue)
Aviation Gasoline Grade 100 (green)
Aviation Gasoline Grade 115/145 (purple)
Chinese Aviation Gasoline RH-95/130
Chinese Aviation Gasoline RH-100/130

FUEL CAPACITY
STANDARD SYSTEM
Total Capacity . . . . .200 Gallons
Total Usable . . . . .194 Gallons

OPTIONAL SYSTEM
Total Capacity . . . . .172 Gallons
Total Usable . . . . .166 Gallons

MAXIMUM CERTIFICATED WEIGHTS
Maximum Take-off Weight . . . . 5500 lbs
Maximum Landing Weight . . . . 5400 lbs
Maximum Ramp Weight . . . . 5524 lbs

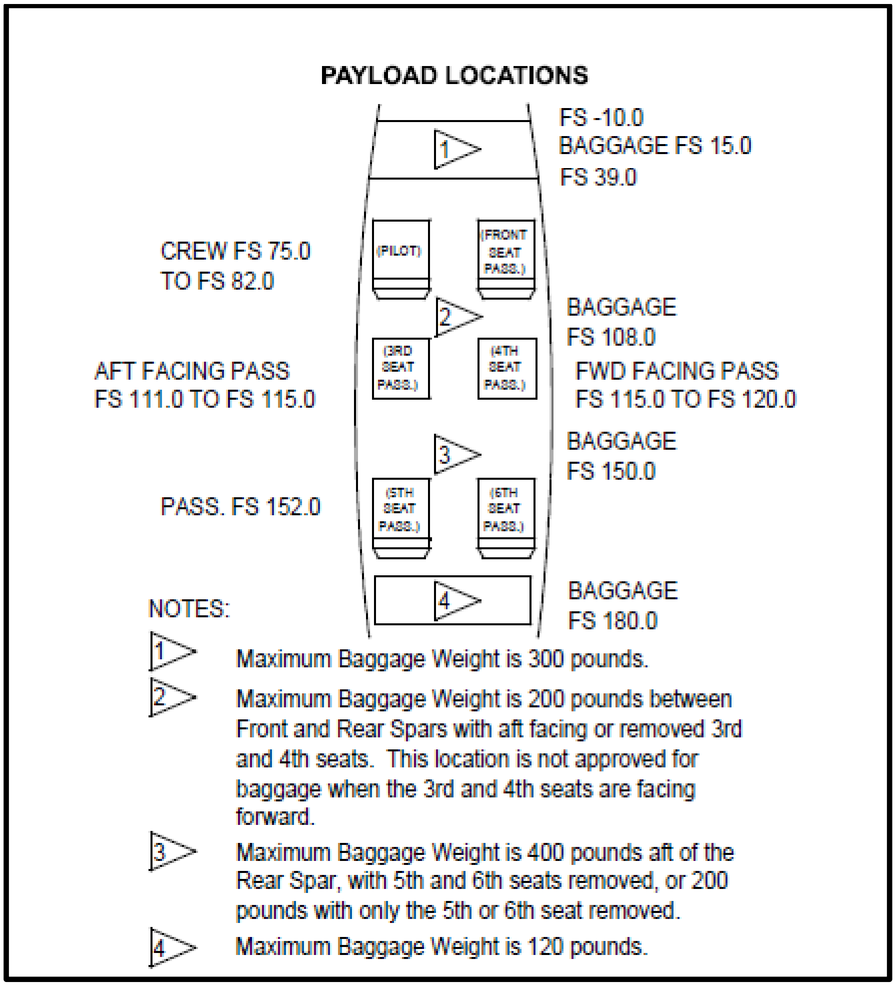
AIRSPEED LIMITATIONS

SPEED	KCAS	KIAS	REMARKS
Never Exceed (V_{NE})	223	223	Do not exceed this speed in any operation.
Maximum Structural Cruising (V_{NO} or V_C)	195	195	Do not exceed this speed except in smooth air and then only with caution.
Maneuvering (V_A)	156	156	Do not make full or abrupt control movements above this speed.
Maximum Flap Extension/ Extended (V_{FE}) Approach (15°) Full Down (30°)	 152 122	 152 122	Do not extend flaps or operate with flaps extended above this speed.
Maximum Landing Gear Operating/ Extended (V_{LO}/ V_{LE})	152	152	Do not extend, retract or operate with gear extended above this speed.
Single-Engine Minimum Control Speed (V_{MCA})	83	84	Minimum speed for directional controllability after sudden loss of engine.
Maximum With Utility Doors Removed	174	174	Utility door removal kit must be installed.

VR (All weights)	V2 (All Weights)	VYSE	VENR
95 KIAS	100 KIAS	101 KIAS	105 KIAS
VREF 5400	VREF 5000	VREF 4600	VREF 4000
95 KIAS	91 KIAS	87 KIAS	81 KIAS

Part II. – Weight & Balance and Load Limits

Multi-engine airplanes are inherently more sensitive to lateral and longitudinal movement of the center of gravity.



1. The diagram above is not exactly to scale.

2. “Average FS” means ***average fuselage station***, as measured in inches from the datum plane. For example, the average fuselage station for cargo area C (the aft cargo compartment) is 180. Cargo area C extends from FS 170 (170 inches aft of the datum plane) to FS 190 (190 inches aft of the datum plane).

3. All cargo in areas 2 and 3 must be fully secured using the cargo net so that it cannot shift under all normally anticipated flight conditions. (§135.87)

4. All cargo in area 4 must be secured behind the webbing retainer to prevent it from falling into area 3.

5. Area 1 (in the nose) is an approved baggage compartment and so cargo placed there does not have to be tied down.

6. The weight limits for each area are *maximum structural capacities only*, meaning that they pertain to the strength of the deck and *not* to the center of gravity. It is possible to load the airplane within the limits for each area but still be outside the CG limits. It is also possible to load the airplane within the CG limits but exceed the maximum structural capacity for one or more of the cargo areas.

7. The maximum structural capacity for the deck is 100 pounds per square foot, *except* for the area between the front and rear spars, where the maximum structural capacity is only 50 pounds per square foot.

8. The dividing line between areas 2 and 3 crosses the rear wing spar box.

9. It is usually impossible to carry a full cargo load *and* a full fuel load; achieving the maximum possible useful load may require going with reduced fuel. Conversely, going with full fuel usually greatly reduces useful load.

10. Exceeding CG limits or maximum gross takeoff weight limits can be extremely dangerous, particularly in terms of the pilot's ability to deal with an engine failure, ice encounter, stall, unusual attitude or other emergency.

MAXIMUM RAMP WEIGHT:	**5,524 lbs.**
MAXIMUM TAKEOFF WEIGHT:	**5,500 lbs.**

Part III. – Managing the Baron's Engines in Operations

The Baron comes in two sizes. The Baron 58 is the "long" version, and the 55 is the "short." Beechcraft's Model 95-55 Baron was introduced in 1961, and it was basically a modified Model 95 Travel Air that had a swept tail and redesigned nacelles covering new 260-horsepower Continental IO-470 engines.

Beechcraft's basic-model Baron 58 is the last piston twin still built and one of only four piston models still made by Beech. Born in 1969, the Baron 58 increased the Baron 55's cabin length by two feet, creating a six-seat "conference"-style cabin arrangement, and adding 50 horsepower. The Baron also uses the Bonanza's dual cargo/entry doors on the aft right side. The Baron 58 has greater carrying ability, speed, and gross weight, but climb rate remains the same. Later versions of the 58 included more horsepower, turbocharging (Model 58TC), and pressurization (Model 58P). The Model 58TC and 58P were introduced in 1976 and produced until the mid-1980s. In 1984, both engine and panel were changed; the new compact panel resembles the King Air panel, with twin vertical engine instruments. All Barons were originally equipped with 520-cubic-inch Continental engines, but the normally aspirated Baron switched to the Continental IO-550-C in 1984.

Induction air for the engine was available from either filtered ram air or unfiltered alternate air. Alternate air will be supplied to the engine through a spring-loaded door if the normal air intake becomes obstructed by a blockage (such as ice).

When operating in conditions conducive to the development of an air filter blockage, a drop in manifold pressure is a sign or symptom that the pilot might observe to indicate that one has occurred.

MIXTURE CONTROL AND LEANING PROCEDURES

From a pilot's point of view, probably the most important contributing factor to achieving long engine life and avoiding costly repairs is control of the fuel-air ratio. The "ideal" fuel-air ratio in terms of producing the maximum amount of heat during the combustion process – also known as peak cylinder head temperature -- is 15 pounds of air to 1 pound of fuel or 6⅔%.

As the pilot *leans* the mixture beyond the peak cylinder head temperature, excess *air* will have an immediate cooling effect on the engine. Likewise, as the pilot *enriches* the mixture beyond the peak cylinder head temperature, excess *fuel* will also have an immediate cooling effect on the engine.

Best *power* is achieved at a mixture setting slightly richer than peak CHT. At best power, airspeed is maximized per pound of fuel burned. Leaning too much or too fast can cause the engine to starve and stop running and leads to: high temperatures, pre-ignition and detonation.

Operating the engine with an excessively *rich* mixture setting, on the other hand, can lead to high fuel consumption, ignition fouling, loss of power and engine roughness. So the pilot's job is to find a balance between these two extremes. Two of the simple keys to finding this balance are *always to adjust the mixture slowly* and also *pay attention to the engine's behavior!*

Detonation occurs when the fuel-air mixture explodes suddenly instead of burning evenly and progressively in the cylinder. It is analogous to hitting the piston with a sledgehammer instead of pushing it down with your hand.

Three signs or symptoms may suggest that detonation is occurring (aside from the noise, which may be masked by normal engine, prop and wind sounds): a slight loss of power, high cylinder heat temperature and high exhaust gas temperature. If detonation is occurring, you may be only moments away from complete engine failure!

The uncontrolled firing of the mixture before the normal spark ignition point is called pre-ignition. It can lead to excessive pressures within the engine. Three of the principal causes of this problem are glowing spark plug electrodes, valve faces or edges heated to incandescence and carbon or lead particles glowing within the cylinder.

After climbing up to your cruising altitude and leveling off, you should always wait at least two minutes before you even begin to lean the mixture. This is because it allows the engines to adjust to the higher airspeed and gives their temperatures a chance to stabilize.

Moreover, while leaning, movement of the mixture control levers should be *slow!*

The primary instrument to which you should refer for proper mixture control is the EGT gauge. A secondary instrument you can use to back it up is the fuel flow gauge. (In Barons, the probe for the EGT gauge is installed in the exhaust stack.)

In general, the leaning process should be accomplished in the cruise configuration at power settings of 75% or less.

The official Elite Air Taxi company policy on mixture management is a conservative compromise between **performance**, **engine longevity** and **fuel economy**.

Poor mixture management practices can lead to engine damage and engine damage can lead to power failures. Power failures are something that we all want to avoid!

First, do not lean the mixture *AT ALL* at or below 3,000 feet MSL. Just leave the mixture fully rich all the time below this altitude.

At cruising altitudes above 3,000 feet MSL, *WAIT* at least two to five minutes before you even *start* to lean the mixture. Give the engine temperature a chance to stabilize first.

When you do begin to lean, *LEAN SLOWLY*.

Lean until you identify the peak exhaust gas temperature. Then pause to allow the temperature (and temperature indications) to settle.

Now enrich slowly and smoothly until you are operating at 100 degrees F cooler (richer) than peak EGT. When taking-off from a high altitude airport, such as our headquarters in Centennial, you will need to lean on the ground. To do this, after completing the magneto check, set power to 15" MP then lean per the above guidance.

When descending, maintain a normal cruise power setting (24" MP / 2,400 RPM) and a moderately higher airspeed if possible. Avoid steep, fast, diving descents at low power settings.

During your cruise descent, slowly and smoothly enrich the mixture to compensate for increasing atmospheric density while slowly and smoothly retarding the throttle to maintain 24" MP.

Plan your rate of enrichment so that you are operating at nearly fully rich by the time you reach about 3,000 feet MSL.

DO NOT bring the mixture all the way forward all at once as you descend.

DO NOT forget to enrich the mixture as you descend.

DO NOT forget to reduce throttle as you descend.

In Barons that do not have EGT gauges, use the following procedure.

1. Consult the cruise performance chart in section V of the POH to determine the expected fuel flow based on the altitude and conditions.

2. Lean until fuel flow is approximate for that power setting.

3. As always, be sure to lean ***SLOWLY*** and ***SMOOTHLY*** to avoid placing excessive thermal stress on the engine. Remember that repetitive thermal stress is *cumulative*. Eventually it can lead to a major failure.

For example, if you were cruising at an altitude of 8,000 feet on a STANDARD DAY, the POH gives the following values for the following power settings:

CRUISE POWER SETTINGS

20°C RICH
OF PEAK EGT

RECOMMENDED CRUISE POWER
23 IN. HG (OR FULL THROTTLE)
@ 2300 RPM (5200 LBS.)

	PRESS. ALT.	OAT		MAN. PRESS.	FUEL FLOW /ENGINE		AIR-SPEED	
	FEET	°C	°F	IN. HG	PPH	GPH	KIAS	KTAS
ISA - 20° C (ISA - 36° F)	SL	-5	23	23	81	13.5	176	170
	2000	-9	16	23	84	14.0	178	176
	4000	-13	9	23	87	14.5	179	182
	6000	-17	2	23	91	15.2	180	188
	8000	-21	-6	22	89	14.8	177	190
	10,000	-25	-13	21	84	14.0	169	188
	12,000	-29	-20	19	78	13.0	162	185
	14,000	-33	-27	18	73	12.2	154	182
	16,000	-37	-34	17	68	11.3	146	178
STANDARD DAY (ISA)	SL	15	59	23	78	13.0	171	171
	2000	11	52	23	79	13.5	173	177
	4000	7	45	23	85	14.2	174	183
	6000	3	38	23	88	14.7	175	190
	8000	-1	30	22	87	14.5	171	192
	10,000	-5	23	21	81	13.5	164	189
	12,000	-9	16	19	76	12.7	156	186
	14,000	-13	9	18	71	11.8	149	183
	16,000	-17	2	17	66	11.0	140	178
ISA + 20° C (ISA + 36° F)	SL	35	95	23	76	12.7	166	171
	2000	31	88	23	79	13.2	168	178
	4000	27	81	23	82	13.7	169	184
	6000	23	74	23	85	14.2	169	191
	8000	19	66	22	84	14.0	166	193
	10,000	15	59	21	78	13.0	159	190
	12,000	11	52	19	73	12.2	151	187
	14,000	7	45	18	68	11.3	143	182
	16,000	3	38	17	64	10.7	135	178

NOTES:
1. Full throttle manifold pressure settings are approximate.
2. Shaded area represents operation with full throttle.
3. Fuel flows are to be used for flight planning only and will vary from airplane to airplane. Lean using the EGT.

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We operate with a cruise power setting of 23" Hg and 2,300 RPM. Therefore . . .

After waiting at least two minutes after leveling off in cruise you would begin to *slowly* and *smoothly* lean the mixture until your fuel flow gauge indicated a flow rate 14.5 GPH. *When in doubt, try to err on the rich side.*

Running with an excessively rich mixture does not hurt the engine. In fact, it helps to keep it cool and extend its life. Running with an excessively lean mixture dramatically increases wear, however, and should be avoided. Rapid changes to the fuel-air ratio – *in either direction* – should likewise be avoided.

Part IV – Elite Air Taxi Company Flows, Procedures and Checklists

(Lists of numbered items are ***flows***. A flow is a memorized series of immediate action items.)

CLEARED ONTO THE RUNWAY

1. Strobe lights – ON
2. Taxi and landing lights – ON
3. Transponder – MODE C
4. Wing flaps – UP
5. Cowl flaps – OPEN
6. Fuel – BOTH SIDES ON

CLIMB

1. Mixtures – RICH
2. Props – 2500 RPM
3. Throttles – 25" MP (or full, whichever is less)
4. Wing flaps – UP
5. Gear – UP
6. Lights – as needed (usually ON)
7. Cowl flaps – OPEN

CRUISE

1. Mixtures – TO DO (*See below*.)
2. Props – 2400 RPM
3. Throttles – 24" MP (or full, whichever is less)
4. Wing flaps – UP
5. Gear – UP
6. Lights – as needed (usually OFF)
7. Cowl flaps – CLOSED

After completing the CRUISE checklist, lean.

IN-RANGE

1. Mixtures – ENRICH SMOOTHLY AND GRADUALLY THROUGHOUT DESCENT.
2. Props – 2400 RPM
3. Throttles – 17" MP (until slowed to desired instrument or initial visual approach speed.)
4. Wing flaps – APPROACH
5. Gear – TO DO
6. Lights – as needed
7. Cowl flaps – CLOSED

BEFORE LANDING

1. Time – START at FAF
2. Brakes – CHECK
3. Gas – BOTH SIDES ON
4. Undercarriage – DOWN
5. Mixtures – RICH
6. Props – FORWARD
7. Switches – lights on or off as needed, including pilot-controlled airport lights, if applicable
8. Seatbelts – ADJUSTED AND SECURE
9. Heater – OFF
10. Radar – OFF

AFTER LANDING

DO NOT CLEAN UP THE AIRPLANE UNTIL YOU COME TO A COMPLETE STOP CLEAR OF THE RUNWAY!

1. Strobe lights – OFF
2. Taxi, landing and nav lights – as needed
3. Transponder – STANDBY
4. Wing flaps – UP
5. Cowl flaps – OPEN

EMERGENCY AIRSPEEDS (5500 LBS)

One-Engine-Inoperative Best Angle-of-Climb (VXSE)	95 kts
One-Engine-Inoperative Best Rate-of-Climb (VYSE)	101 kts
Air Minimum Control Speed (VMCA)	84 kts
One-Engine-Inoperative Enroute Climb	101 kts
Emergency Descent	152 kts
One-Engine-Inoperative Landing (5400 lbs):	
Maneuvering to Final Approach	107 kts
Final Approach (Flaps Down) (30°)	95 kts
Intentional One-Engine-Inoperative Speed (VSSE)	88 kts
Maximum Range Glide	115 kts

<u>ENGINE FAILURE DURING GROUND ROLL</u>

1. Throttles	CLOSED
2. Braking	AS REQUIRED TO ACHIEVE STOPPING DISTANCE

If emergency shutdown is warranted:

3. Fuel Selectors	OFF
4. Magnetos	OFF
5. Alternators	OFF
6. Batteries	OFF

<u>ENGINE FAILURE AFTER LIFTOFF AND IN FLIGHT</u>

Fly the airplane! Maintain aircraft control!

1. Landing Gear and Flaps	UP
2. Throttle (inoperative engine)	CLOSED
3. Propeller (inoperative engine)	FEATHER
4. Power (operative engine)	AS REQUIRED
5. Airspeed	MAINTAIN SPEED AT ENGINE FAILURE (101 kts

MAX.) UNTIL OBSTACLES ARE CLEARED

After positive control of the airplane is established:

6. Secure inoperative engine:

a. Mixture Control	CUT OFF
b. Fuel Selector	OFF
c. Fuel Boost Pump	OFF
d. Magnetos	OFF
e. Alternator	OFF
f. Alt Load	MONITOR
g. Nonessential Electrical Equipment (to reduce load on operative alternator)	OFF AS REQUIRED
h. Alternator (ties the side with the functional alternator to the inoperative side)	BUS TIE
i. Alt Load	MONITOR
j. Nonessential Electrical Equipment (maintain load limits of operative alternator)	ON AS REQUIRED
k. Cowl Flap	CLOSED

<u>ENGINE FIREON THE GROUND</u>

1. Mixture Controls	CUT OFF
2. Starter (affected engine)	CONTINUE TO CRANK
3. Fuel Selector Valves	OFF
4. Magnetos	OFF
5. Alternators	OFF
6. Batteries	OFF

7. Exit airplane and move to a safe distance.

ENGINE FIRE IN FLIGHT

Shut down the affected engine according to the following procedure and land immediately. Follow the applicable one engine inoperative procedures ABOVE.

1. Fuel Selector Valve	OFF
2. Mixture Control	CUT OFF
3. Propeller	FEATHERED
4. Fuel Boost Pump	OFF
5. Magnetos	OFF
6. Alternator	OFF

BEFORE TAKEOFF MULTI-ENGINE BRIEFING (*example*)

Temperature __________° C

MSA in this area is __________ feet within __________ nautical miles of __________.

Altimeter Setting __________" Hg

Major obstacles in this area include: __________ __________ __________ __________

Available Runway Length __________ feet

Computed accelerate-and-stop distance is: __________ feet

Computed accelerate-and-go distance is: __________ feet (*to clear a 50' obstacle*)

Computed single-engine service ceiling is: __________ feet

Engine failure prior to V_R – ABORT

Engine failure after V_R with sufficient runway remaining – LAND

Engine failure after V_R with insufficient runway remaining – Pitch for V_{YSE} ("blue line") 100 KIAS, maintain aircraft control and execute engine failure procedures. Advise ATC (if applicable) and return for a landing.