

"The Straight Word"

Beechcraft 90 King Air

B90 Series

I. FLIGHT PROCEDURES:

COCKPIT PREPARATION

| | |
|---------------------------|----------------------|
| Heading Bug | Set QFU |
| HSI Course Indicator | Set Course |
| Altimeters | Set QNH |
| Power Levers | Idle |
| Propeller Levers | Max RPM |
| Condition Levers | Cutoff |
| Trims | Set for Takeoff |
| Cabin Altitude Controller | Set Cruise Level + 1 |

BEFORE START

| | |
|---------------|-------------------|
| Parking Brake | Apply |
| Battery | On, Check Voltage |
| Beacon | On |

ENGINE START

These are the items to be repeated for each engine start.
The normal start sequence is 2-1. Auto-Ignition may be armed a few seconds prior to engine start, to allow the two glowers to warm up for a better start.

| | |
|-----------------|-------|
| Fuel Boost Pump | On |
| Starter Switch | Start |

Once N1 has stabilised at a minimum of 12%, fuel may be opened. Engine light-off should occur about 3 seconds thereafter – abort after 10 seconds if no light-off. Maximum ITT during engine start is 1090°C:

| | |
|---------------------------|---------------------|
| Condition Lever | Low Idle, Check ITT |
| At 50% N1, Starter Switch | Off |
| Generator | On, Check Output |

The generator may be assisted by putting the Condition Lever at High Idle until the second engine is running.

AFTER START

| | |
|------------------------|--------------------|
| Propeller Levers | High RPM |
| Fuel Transfer Pumps | On |
| Crossfeed | Auto |
| Inverter | 1 or 2 |
| Avionic Master | On |
| Taxi Light | On |
| Cabin Signs | On |
| Ice Protection | As Required |
| Inertial Separators | As Required |
| Flaps | Set Up or Approach |
| Cabin Fan | High |
| Cabin Temperature Mode | Auto |

TAXIING

| | |
|--------------------|---------|
| Parking Brake | Release |
| Flight Instruments | Check |
| Brakes | Test |
| Flight Controls | Check |

BEFORE TAKE-OFF

| | |
|------------------|-----------|
| Auto-Ignition | Arm |
| Landing Lights | On |
| Taxi Light | Off |
| Condition Levers | High Idle |

AFTER TAKE-OFF

The normal takeoff torque is 1315 lb-ft, with an ITT limitation of 750°C. Rotation occurs at 97 KIAS with flaps up. Once positive rate of climb is obtained:

| | |
|----------------|-----|
| Landing Gear | Up |
| Landing Lights | Off |

A speed above the V₂ of 101 KIAS must be maintained for the initial climb. Then, upon reaching the takeoff safety altitude (ASD):

| | |
|------------------------|---------------------------|
| Flaps | Up |
| Climb Power | Set 1000 lb-ft & 2000 RPM |
| Propeller Synchroniser | On |
| Altimeters | Set Standard |

A climb speed of 130 KIAS shall then be taken for normal climb.

DESCENT

| | |
|---------------------------|---------------------------|
| Cabin Altitude Controller | Set Field Elevation + 500 |
| Altimeters | Set QNH |

BEFORE LANDING

The normal arrival technique calls for the following steps:

- Flaps Approach.
- Landing Gear Down.
- Flaps Landing.
- Propellers High RPM (Propeller Synchroniser Off).
- Inertial Separators as Required.

A speed of ____ KIAS shall be maintained in the approach environment. The required torque to maintain a Vref of 120 KIAS (flaps up) normally stands around 450 lb-ft.

AFTER LANDING

| | |
|---------------------|----------|
| Condition Levels | Low Idle |
| Auto-Ignition | Off |
| Landing Lights | Off |
| Taxi Light | On |
| Ice Protection | Off |
| Inertial Separators | Off |
| Flaps | Up |

ENGINE SHUTDOWN

| | |
|------------------------|---------|
| Fuel Transfer Pumps | Off |
| Crossfeed | Off |
| Avionic Master | Off |
| Inverter | Off |
| Propellers | Feather |
| Condition Levers | Cut Off |
| Fuel Boost Pumps | Off |
| Generators | Off |
| Beacon | Off |
| Cabin Fan | Off |
| Cabin Temperature Mode | Off |
| Battery | Off |

II. SYSTEMS DESCRIPTION:

FLIGHT CONTROLS

Mechanical flight controls, actuated by rods and cables.

ENGINES & PROPELLERS

Two Pratt & Whitney PT6A-20, 550 shp each.

Engine limitations:

- Torque : 1315 lb-ft.
- Propeller : 1800-2200 RPM.
- ITT : 725°C (continuous), 750°C (takeoff), 1090°C (start).

Autoignition system should be Armed during flight. A green light indicates proper functioning. When torque drops below 425 lb-ft, ignition goes on.

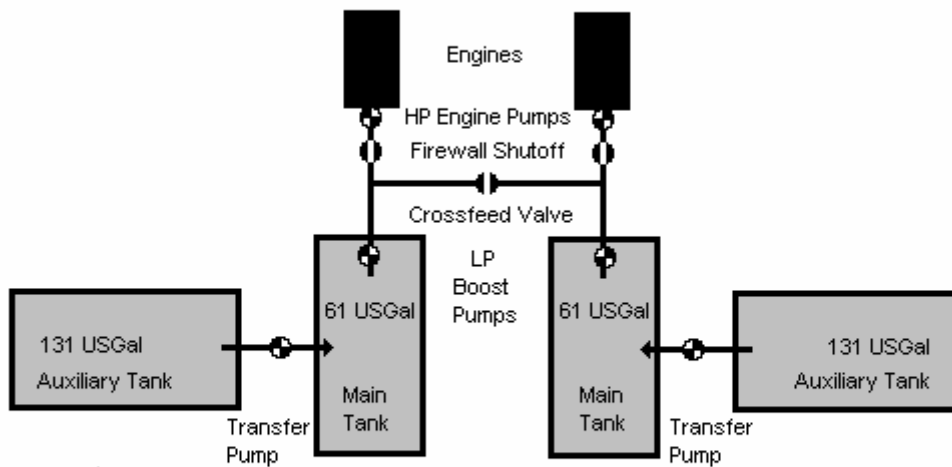
Inertial Separators, mechanically actuated, prevent ingestion of ice or debris by the engines and must be On when operating in heavy precipitation or on unimproved runways. They cause a slight torque loss.

The propellers are controlled by three governors: one primary (standard type) and two secondary (standard overspeed and FCU restrictor). Reverse is optional, but there is no autofeathering device.

FUEL SYSTEM

Four fuel tanks in the following configuration:

- | | | |
|---------------------------|----------------|---------------------|
| - Mains ("Nacelles") : | 2 x 61 USGal | (2 x 400 lbs) |
| - Auxiliaries ("Wings") : | 2 x 131 USGal | (2 x 854 lbs) |
| - Total : | 384 USGal | (<u>2508 lbs</u>) |
| | = 1459 litres. | |



Each engine feeds from its main tank via an electrical LP boost pump plugged on the hot battery bus. The engine only has an engine-driven HP fuel pump. If the electrical LP pump fails, the engine HP pump will keep the engine running, for a maximum period of 10 hours.

Fuel can be transferred from an auxiliary to a main tank using an electrical transfer pump. When selected On, the transfer pump flow is controlled by a float switch which prevents overfilling the main tank. Once transfer is complete (auxiliary tank empty), a pressure switch will cut the transfer pump and activate a signal on the annunciator panel. If the transfer pump is unserviceable, all auxiliary fuel but 28 USGal will transfer to the main tank by gravity.

A crossfeed valve can be manually opened or closed to feed any engine from any main tank. In the Auto position, the crossfeed valve is closed until a pressure differential is sensed between the two engine fuel lines.

ELECTRICAL SYSTEM

28 VDC system:

- One battery of 40 amp-hour in the central right wing section.
- Two starter generators of 200 amps

Two inverters, which may be selected independently, convert 28 VDC into 115 VAC, 400 Hz.

PNEUMATIC SYSTEM

The 16 psi pneumatic system works off regulated bleed air from both engines. It powers the deice boots, the pressure instruments, and the autopilot servomotors.

ENVIRONMENTAL SYSTEMS

Pressurisation is run by an air compressor driven off the left engine. The maximum Ap of 4.7 psi allows flights up to FL250. In case of left engine fire, the system provides a Compressor Fire Shutoff Valve which may be closed to prevent smoke from entering the cabin.

Cabin heating is achieved by a gas heater feeding from the left main fuel tank. Cabin cooling is achieved by a refrigerator. On the ground, one engine is sufficient to run the cabin heater, and the cabin refrigerator for a maximum of 5 minutes.

The 3-position Ventilation Fan switch (Off, Lo, Hi) and the Cabin Temperature Mode button (Off, Auto, Manual Heat, Manual Cool) may be left in any position for takeoff and landing. However, in order to avoid overheating of the thermal resistance, the Lo position of the Vent Fan should be avoided at all times.

LANDING GEAR & WING FLAPS

Electrical landing gear, actuated by a motor and chains. A safety Down Lock prevents the gear handle from being moved when the squat switch senses that the airplane is on the ground.

A Landing Gear Warning Horn activates every time one of the throttle levers is pulled back (can be cancelled) and every time one of the wing flaps extends further than the Approach position (cannot be cancelled).

The emergency landing gear extension involves actuating a handle located on the left side of the centre pedestal.

Electrical wing flaps have three positions:

- Up 0%
- Approach 35%
- Down 100%

Note that the Approach position serves as Off position for intermediate settings between 35 and 100%. In order to raise the flaps from Down to Approach, the flap handle must be raised to Up, then placed to Approach.

FIRE PROTECTION

Two Firewall Shutoff Valves, and two optional fire extinguishers – one shot for each engine.

ICE PROTECTION

The following ice protection devices are switch activated and must be turned on at all times during flight:

- Fuel Control Unit Deice: prevent icing of FCU fuel lines.
- Fuel Vents Heat: electrical.
- Pitot Heat: electrical.
- Windshield Heating: electrically heat the left or both windshields.

The following ice protection devices must only be turned on when flying into icing conditions:

- Engine Inlet Deice: electrically heats engine inlet lips.
- Propeller Deice: electrical, four 30-second cycles (LI, LO, RI, RO).
- Surface Deice Boots: pneumatic, when ice grows over 1 in. thick.

III. PERFORMANCE:

TAKEOFF

Normal takeoff: 1315 lb-ft torque, 2200 RPM, flaps up.

Use a Vr of 97 KIAS. For a paved field at 2000 ft elevation, ISA + 20°C, no wind, MTOW and inertial separators off, expect a TODR of 1000 metres.

Short-field takeoff: 1315 lb-ft torque, 2200 RPM, flaps approach.

Use a Vr of 97 KIAS. For a clean dirt field at 2000 ft elevation, ISA + 20°C, no wind, MTOW and inertial separators on, expect a TODR of 800 metres.

CLIMB

Normal climb: 1000 lb-ft torque, 2000 RPM, 705°C max ITT.

Use a 130 KIAS cruise climb speed, and expect a MTOW rate of climb of 700 fpm at MSL.

CRUISE

Normal cruise: 800 lb-ft torque, 1900 RPM, 705°C max ITT.

Expect to cruise at 180 KTAS, with a fuel consumption of 220 LPH around FL170. For flight planning purposes, an overall consumption of 250 LPH may be used.

LANDING

Normal landing: flaps down, full brakes and reverse on impact.

Use a Vref of 95 KIAS. For a paved field at 2000 ft elevation, ISA + 20°C, no wind and MLW, expect an LDR of 650 metres.

N-1 PERFORMANCE

Single-engine climb: 1315 lb-ft torque, 2200 RPM, 725°C max ITT.

Use a 110 KIAS climb speed, and expect a MTOW rate of climb of 200 fpm at MSL.

IV. WEIGHT & BALANCE:

LIMITATIONS

MTOW 9,650 lbs
MLW 9,168 lbs

USEFUL LOADS

| | |
|-------------------------------|----------|
| APS Weight (5V-TTD, 2 crew) | 6750 lbs |
| Maximum Fuel Load (384 USGal) | 2500 lbs |
| Full Fuel Useful Load | 400 lbs |

V. SPEEDS:

| | | | |
|-----------|----------|--------|-----------------|
| Vso = | 74 KIAS | Vx = | ___ KIAS |
| Vsi = | 89 KIAS | Vy = | 115 KIAS |
| Vmca = | 92 KIAS | Vxse = | ___ KIAS |
| V2 = | 101 KIAS | Vyse = | 110 KIAS |
| | | Vsse = | ___ KIAS |
| Vfe/app = | 174 KIAS | Va = | 169 KIAS @ MTOW |
| Vfe/dn = | 130 KIAS | Vmo = | 208 KIAS |
| Vlo/up = | 130 KIAS | | |
| Vlo/dn = | 156 KIAS | | |