## Aircraft Data Sheet

**Name:**

**Aircraft Make and Model:** BEECHCRAFT TRAVELAIR BE 95

**Engine:** 4 CYLINDER HORIZONTALLY OPPOSED, ASPIRATED, CARBERATED

**Engine Type:** LYCOMING 0-360 180 HP

**Oil Capacity:** 6-8 QUARTS 50 WT

**Fuel Octane:** 100 LL  
**Capacity:** Main Tanks 25  
**Aux Tanks** 31

**Cabin Heater Type:** JANITROL 27000 BTU COMBUSTION HEATER

### Airspeed (MPH)

| Maneuvering | (Va) | 160 |
| Max Cruise | (Vno) | 185 |
| Never Exceed | (Vne) | 240 |
| Flap Extended | (Vfe) | 130 |
| Gear Extended | (Vle) | 150 |
| Best Rate | (Vy) | 100 |

### Gross Weight

- **Gross Weight:** 4000

### Empty Weight

- **Empty Weight:** 2745

### Useful Load

- **Useful Load:** 1255

### Single Engine Performance

| Best Angle | (Vx) | 90 | Vmc | 84 | Red Line |
| Normal Climb | | 120 | Vxse | 90 |
| Glide Speed | | 100 | Vyse | 100 | Blue Line |
| Stall Speed | (Vso) | 70 (Vs) | 80 |
| Service Ceiling | | 19300 | Single Engine Service Ceiling | 6800 |
AIRCRAFT DATA SHEET

NAME. ____________________________________________

AIRCRAFT MAKE AND MODEL: ____________________________________________

ENGINE: _________________________________________________________________

ENGINE TYPE: ___________________________________________________________

OIL CAPACITY: ___________________________________________________________

FUEL OCTANE: ___________ CAPACITY: MAIN TANKS ___________ AUX TANKS ___________

CABIN HEATER TYPE: _______________________________________________________

AIRSPEEDS (MPH)

MANEUVERING (Va) ______ GROSS WEIGHT ______

MAX CRUISE (Vno) ______ EMPTY WEIGHT ______

NEVER EXCEED (Vne) ______ USEFUL LOAD ______

FLAP EXTENDED (Vfe) ______

GEAR EXTENDED (Vle) ______

BEST RATE (Vy) ______ SINGLE ENGINE PERFORMANCE

BEST ANGLE (Vx) ______ Vmc ______ RED LINE

NORMAL CLimb ______ Vxse ______

GLIDE SPEED ______ Vyse ______ BLUE LINE

STALL SPEED (Vso) (Vs) ______

SERVICE CIELING ______ SINGLE ENGINE SERVICE CIELING ______
### 2712Y WEIGHT & BALANCE

<table>
<thead>
<tr>
<th>Case</th>
<th>WT</th>
<th>X</th>
<th>ARM</th>
<th>MOMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASIC EMPTY WEIGHT</td>
<td>2745</td>
<td>76.15</td>
<td></td>
<td>209031.00</td>
</tr>
<tr>
<td>FULL FUEL MAINS (50 GALS)</td>
<td>300</td>
<td>75.0</td>
<td></td>
<td>22500.0</td>
</tr>
<tr>
<td>FULL FUEL AUXS (62 GALS)</td>
<td>372</td>
<td>93.0</td>
<td></td>
<td>34596.0</td>
</tr>
<tr>
<td>PILOT/ FRONT PASSENGERS</td>
<td></td>
<td></td>
<td>85.0</td>
<td></td>
</tr>
<tr>
<td>REAR PASSENGERS</td>
<td></td>
<td></td>
<td>121.0</td>
<td></td>
</tr>
<tr>
<td>FORWARD BAGGAGE</td>
<td></td>
<td></td>
<td>31.0</td>
<td></td>
</tr>
<tr>
<td>REAR BAGGAGE</td>
<td></td>
<td></td>
<td>140.0</td>
<td></td>
</tr>
</tbody>
</table>
GENERAL CHARACTERISTICS OF LIGHT TWINS

Typically more complex, but not excessively.
They require more:
  cockpit management
  memorized procedures esp. ENGINE OUT PROCEDURES

ADVANTAGES OF LIGHT TWINS
Increased performance

Increased safety for competent pilots who know the engine out procedure. Those multiengine pilots who do not know the engine out procedure off hand or have a lackadaisical attitude toward the procedure are not competent multiengine pilots.
KNOW THE PROCEDURE

CERTIFICATES AND DOCUMENTS REVIEW
  A irworthiness
  R egistration
  O perating limitations
  W eight and balance

INSPECTIONS: Annual, 100 hour

MEL: Minimum Equipment list
  List of equipment you can fly without
BE-95 SYSTEMS

ELECTRICAL SYSTEM
28 Volt system
25 AMP/hour battery
2 alternators at 55 amps each

The BE-95 has two buss bars. One is 12 volts for the avionics and the other is 24 volts for all other electrical equipment ie. gear, flaps, lighting etc.

ELECTRICAL FIRE PROCEDURE
1. Master switch off
2. All electrical components off
3. Master switch on
4. Only items needed should be turned back on

GEAR SYSTEM
The gear system is 100% electric. There are no hydraulics involved. A squat switch is located on the left main gear strut which prevents inadvertently retracting the gear on the ground.

MANUAL GEAR EXTENSION PROCEDURES
1. Gear Handle Down
2. Pull Gear Circuit Breaker
3. Slow to 100 mph
4. Crank Counter Clockwise Until Handle Stops
5. Circuit Breaker Back In To Verify Green Lights

FUEL SYSTEM
4 Fuel Tanks
112 Gallon Capacity (Fuel Burn 20 Gallons Per Hour)
4 Fuel pumps 2 engine driven and 2 electrical boost pumps
8 Fuel Drains: One for each tank. one for each crossfeed (two crossfeeds), and one for each low point (two low points)

Crossfeed Procedure
1. Boost Pumps On
2. Select Tank on Sending Side
3. Select crossfeed on Destination Side
PROPS
Type: Full Feathering hartzell
High oil pressure drives the props to a flat pitch (high RPM). Complete loss of oil pressure drives the props to feather. When the engines are reduced below 800 RPM lock pins prevent the props from feathering when the engines are shut down. A nitrogen driven oil accumulator on each engine supplies oil pressure to each prop for unfeathering when restarting the engines from a feathered position in flight. The accumulators are needed because the engine driven oil pump is not supplying pressure if the engine is stopped.

AIR START PROCEDURE
1. Airspeed at least 115mph
2. Mags on
3. Prop Control full forward to engage the oil accumulator. Once the prop windmills pull the prop lever to the midrange to prevent prop overspeed.

VACUUM PUMPS

2 vacuum pumps 1 for each engine

FLAPS: plain flaps. one light for up and one for down
PRIMARY AND SECONDARY FLIGHT CONTROLS: Pulley and Cable
HYDRAULIC SYSTEMS - Brakes and Props
FLIGHT INSTRUMENTS - Attitude Indicator
Vertical Speed Indicator
Directional Gyro
Turn co-ordinator
Altimeter
Airspeed indicator

Navigation Instruments
VOR With Glide slope
NDB
DME
Loran
Longer Arm from prop to center of gravity = BAD
Shorter Arm from prop to center of gravity = NOT AS BAD
SINGLE ENGINE OPERATIONS

With the loss of an engine you lose 50% of your total power and 80% to 90% of total climb performance.

\( V_{mc} \) is the slowest speed at which directional control can be maintained if the critical engine is suddenly made inoperative.

**CRITICAL ENGINE:** The engine that if failed would most adversely affect the aerodynamical control of the aircraft. On most U.S. manufactured aircraft the engines rotate clockwise making the left engine critical.

The left engine is critical due to **P-Factor**

**P-Factor:** The descending blade produces more thrust than the ascending blade of each prop.

This creates a longer lever arm from the CG to the descending blade on the right engine.

**\( V_{mc} \) AND CG LOCATION**

As the CG is moved backwards the lever arm between the CG and the rudder becomes shorter. This causes the rudder to become less effective and \( V_{mc} \) increases.

**\( V_{mc} \) AND DENSITY ALTITUDE**

As density altitude increases, power output of the engines is less. With less power we have a lower \( V_{mc} \) because the engine is not yawing the aircraft as much. If the aircraft does not yaw as much then less rudder is needed to hold a heading.

Indicated Stall Speed remains the same with density altitude. It is possible for \( V_{mc} \) to drop below stall speed.

**BANK INTO THE GOOD ENGINE**

3 to 5 degrees To stop the side slip with horizontal component of lift.
**Definitions**

**$V_{MC}$**: The slowest air speed at which directional control can be maintained with the critical engine inoperative.

**Critical Engine**: The engine that if made inoperative most adversely affects the aerodynamics.

---

**Why is the left engine critical?**

- **P-factor**
- Accelerated slip stream
- Spiraling slip stream
- Torque

When explaining why these 4 factors make the left engine critical, you must not only define each item you also must explain the effect of these four things to the right side of the aircraft vs. the left side of the aircraft and then draw a conclusion! Said conclusion should reinforce/reiterate the definition of “critical engine”.

![Diagram](image)

The lever arm between the descending propeller blade and the center of gravity is longer on the right hand side than the same lever arm between the descending blade and the center of gravity on the left hand side. Therefore if the left engine is inoperative there will be a greater yawing moment. (Notice how the arm was defined by the two points it connects, a left vs. right comparison was made and a conclusion was drawn.)
Torque

Newton’s 3rd law: For every action there is an equal and opposite reaction.

Keeping Newton 3rd Law in mind, consider: The propellers rotate clockwise making the engine tend to rotate counter clockwise behind it (equal and opposite). If the right engine is inoperative (1) the torque from the left engine goes opposite the yaw created by the p-factor of the left engine. Whereas if the left engine is inoperative (2) the torque of the right engine goes in the same direction as the yaw created by the p-factor of the right engine making two forces going to the left. Therefore it is worse when the left engine is inoperative.

\[ p = p\text{-factor yaw} \]
\[ T = \text{Torque roll} \]

Opposing forces

2 forces same direction
Accelerated Slip stream

Bernoulli principle “The faster a fluid moves the less pressure it has.” The air directly behind the descending blade is the faster air over the wing, hence the least pressure and therefore greatest lift. Accelerated slip stream makes the left engine critical because the lever arm between the center of gravity and the center of pressure on the right hand side (1) is longer than the lever arm between the center of gravity and the center of pressure on the left hand side (2). Therefore if the left engine is inoperative there will be a greater rolling moment.

Spiraling Slip Stream

When the right engine is inoperative (1) the spiral from the propeller wash from the left engine hits the rudder giving the rudder more effectiveness, whereas if the left engine is inoperative (2) the spiral from the right engine spirals away from the rudder, giving no additional benefit and thereby making it worse to lose the left engine.
CG. LOCATION vs. VMC

Airplanes revolve around their center of gravity. The point where the 3 axis' (vertical, horizontal and longitudinal) intersect.

The force generated by a deflected control surface by the pilot is the sum (moment) of the pressure (weight) of the air moving past the control surface and it's distance from the center of gravity (arm).

**WEIGHT X ARM = MOMENT**

With the left engine in-op, the plane would yaw to the left, ball goes right, right rudder would be applied to stop the yaw. The distance, *lever arm*, between the center of gravity and the rudder in Figure 1, is longer than the *lever arm* between the center of gravity and the rudder in Figure 2.

With a shorter *lever arm* the rudder loses authority and control is lost (VMC) at a higher airspeed. VMC increases.

**Question:** What happens to VMC if you and your instructor load passengers in the rear seat?
**Answer:** VMC would increase, because loading passengers in the rear would cause the CG to move aft; thereby causing the rudder to lose effectiveness/authority and I would lose control (VMC) at a higher airspeed.
FAR 23 standardizes the testing of manufacturers determination of Vmc. This is the configuration the aircraft must be tested in:

1. Prop of the critical engine WIND MILLING or feathered if the aircraft has autofeather.
2. FULL power on the good engine at sea level conditions
3. Most rearward CG.
4. Aircraft TRIMMED for TAKEOFF.
5. FLAPS in the TAKEOFF position.
6. Cowl flaps OPEN.
7. Aircraft weight at MAX gross.
8. Landing gear UP (less stable)
9. Airborne and out of GROUND EFFECT.
10. Aircraft bank angle max 5 degrees into the good engine.

**VMC DEMONSTRATION**

1. Full Power
2. Critical engine idle.
3. Slow aircraft until nose yaws
4. **POWER TO IDLE ON GOOD ENGINE**
5. Pitch for blue line
6. Add power on good engine to stop descent.
ENGINE OUT PROCEDURES

POWERUP
1. Fly the airplane – blue line
2. MIXTURES FORWARD
3. PROPS FORWARD
4. THROTTLES FORWARD

CLEAN UP
1. Fly the airplane-blue line
2. BOOST PUMPS ON
3. FLAPS UP
4. GEAR UP

FEATHER
1. Fly the airplane-blue line
2. IDENTIFY (DEAD FOOT DEAD ENGINE)
3. VERIFY (PULL BACK THE DEAD THROTTLE)
4. FEATHER (PULL BACK THE DEAD PROP)

FLY THE AIRPLANE

PRE TAKE-OFF BRIEFING
Engine failure on the runway or just after lift off and the gear is down abort the takeoff and stop straight ahead.

Once the gear is up then we are committed to go in most cases.

TAKE-OFF PROFILE
Never rotate below Vmc
climb at Vy
At a safe single engine maneuvering altitude transition to a cruise climb.

20" at 2900 RPM

Safe altitude
25" at 2500 RPM
120mph

Climb Vy
100

Rotate 90 mph
Full power
ACCELERATE AND STOP DISTANCE

DECISION SPEED
VS
DISTANCE

GROSS WEIGHT
4000 LBS.
FLAPS UP

DISTANCE — 1000 FEET

MINIMUM CONTROL SPEED

OPTIMUM SINGLE ENGINE CLimb

DECISION SPEED — TIAS MPH
NORMAL TAKE-OFF

0 WIND

GROUND ROLL APP. 82%
TOTAL TAKE-OFF DISTANCE FLAPS UNDEFLECTED
TAKE-OFF SPEED 85 MPH
GROSS WEIGHT 4000 LBS.

TOTAL TAKE-OFF DISTANCE — 100 FEET
MINIMUM RUN TAKE-OFF
NO WIND

TAKE-OFF DISTANCE VS ALTITUDE
GROSS WEIGHT 4000 LBS.

CLEAR 50 FEET
GROUND ROLL APP. 80%
TOTAL TAKE-OFF DISTANCE
TAKE-OFF SPEED 70 MPH
FLAPS DEFLECTED 20 DEGREES

TOTAL TAKE-OFF DISTANCE — 100 FEET
CRUISE OPERATION

4000 LBS. LOAD

*GUARANTEED @ 65% POWER AT 10,000 FT.

CRUISE OPERATION CHART AT 4000 LB. LEAN MIXTURE ABOVE 5000 FT.

Revised November 10, 1958
MINIMUM RUN LANDING
NO WIND

LANDING DISTANCE VS ALTITUDE
GROSS WEIGHT 4000 LBS.

TOTAL LANDING DISTANCE — 100 FEET

GROUND ROLL APP. 63%
TOTAL LANDING DISTANCE

FLAPS DEFLECTION 33 DEGREES
APPROACH SPEED 82 MPH TIAS
TOUCHDOWN SPEED 74 MPH TIAS

OVER 50 FEET
NORMAL LANDING
NO WIND

LANDING DISTANCE VS ALTITUDE
GROSS WEIGHT — 4000 LBS.

GROUND ROLL APP. 66%
TOTAL LANDING DISTANCE
FLAPS DEFLECTED 33 DEGREES. APPROACH SPEED 91 MPH; TIAS
TOUCHDOWN SPEED 72 MPH

TOTAL LANDING DISTANCE — 100 FEET
RATE OF CLIMB VS. TEMPERATURE AND ALTITUDE — SINGLE-ENGINE

RATE OF CLIMB — FT/MIN

PRESSURE ALTITUDE — 1000 FEET

STD TEMP

100 75 50 25 0 °F
BEECH TRAVELAIR MANEUVERS
CLEARING TURNS PRIOR TO ALL MANEUVERS

SLOW FLIGHT
POWER: 15"
GEAR DOWN: BELOW 150mph
FLAPS DOWN: BELOW 130mph
MIXTURE/PROPS: FORWARD
POWER: 19” TO MAINTAIN DESIRED ALTITUDE
AIRSPEED: 90mph

PITCH CONTROLS AIRSPEED
POWER CONTROLS ALTITUDE

RECOVERY
POWER UP: FULL POWER
CLEAN UP: FLAPS/GEAR UP
CLIMB UP: BLUE LINE

POWER OFF STALL
POWER: 15"
GEAR DOWN: BELOW 150mph
FLAPS DOWN: BELOW 130mph
MIXTURE/PROPS FORWARD: BELOW 110mph
POWER IDLE: @ 90mph, MAINTAIN ALTITUDE

RECOVERY
POWER UP: FULL POWER
NOSE JUST BELOW HORIZON
CLEAN UP: FLAPS/GEAR UP
CLIMB UP: BLUE LINE

POWER ON STALL
POWER: 15"
MIXTURE/PROPS: FORWARD BELOW 110mph
NOSE JUST BELOW HORIZON

RECOVERY
POWER UP: FULL POWER
NOSE JUST BELOW HORIZON
CLIMB UP: BLUE LINE

STEEP TURNS
POWER: 20” @ 2300RPM
45°-50° OF BANK: +/- 5°
TWO 360° TURNS, ONE IN EACH DIRECTION

VMC DEMONSTRATION
POWER FULL: MIXTURES, PROPS, THROTTLE, (SMOOTHLY)
CRITICAL ENGINE IDLE (GUARD THE GOOD)
SLOW AIRCRAFT UNTIL LOSS OF DIRECTIONAL CONTROL
POWER: REDUCED “SUFFICIENTLY”
PITCH FOR BLUE LINE
ADD POWER ON GOOD ENGINE AT BLUE LINE
MAINTAIN AIRSPEED AND DIRECTIONAL CONTROL

DRAG DEMONSTRATION
POWER FULL: MIXTURES, PROPS, THROTTLE, (SMOOTHLY)
CRITICAL ENGINE IDLE (GUARD THE GOOD)
GEAR DOWN BELOW: 150mph
FLAPS DOWN BELOW: 130mph
MAINTAIN BLUE LINE – NOTE V.S.I.
GEAR UP – BLUE LINE – NOTE V.S.I.
FLAPS UP – BLUE LINE – NOTE V.S.I.
SIMULATE FEATHER 12” BLUE LINE
NOTE V.S.I.

EMERGENCY DESCENT
CHOP: POWER IDLE
DROP: GEAR DOWN
PROP: FULL FORWARD
PITCH FOR 150mph (BANK AWAY FROM BURNING ENGINE)

ENGINE FAILURE ON RUNWAY
ABORT! ABORT! ABORT!!!!!!!
CHOP: POWER IDLE
MAINTAIN DIRECTIONAL CONTROL
BRAKES AS REQUIRED
Instrument Acronyms

**Req’d Day VFR Equipment: 91.205**
- T – Tachometer
- O – Oil Temp Gauge
- M – Manifold pressure gauge
- A – Airspeed Indicator
- T – Temp Gauge (Liquid cooled engines)
- O – Oil Pressure Gauge
- F – Fuel Gauge
- L – Landing Gear Position Indicator
- A – Altimeter
- M – Magnetic Compass
- E – ELT
- S – Safety Belts

**Req’d Night VFR Equipment: 91.205**
- F – Fuses (3 of each type or a set)
- L – Landing Light (for hire only)
- A – Anti-Collision Lights
- P – Position Lights
- S – Source of Power (Battery, Alt, Gen)

**Req’d IFR Equipment: 91.205**
*In addition to all VFR req’s*
- G – Generator or Alternator
- R – Radios : Nav/Comm
- A – Altimeter (Sensitive)
- B – Ball (slip/skid indicator)
- C – Clock (with seconds hand)
- A – Attitude Indicator
- R – Rate of Turn Indicator
- D – Directional Gyro

**Req’d Inspections: Part 91**
- A – AD’s (One-time, recurring, conditional)
- V – VOR Check (every 30 days if IFR)
- 1 – 100 HR (for commercial use)
- A – Annual
- T – Transponder (24 Calendar months)
- E – ELT (12 calendar months, 1/2 life of battery, 1 hour cumulative use)
- S – Static Pitot System (24 calendar months)

**Preperation for Approach**
- W – Weather
- A – ATIS/ASOS/AWOS
- R – Radios Set
- N – Nav frequency set, tune/id, set OBS
- B – Brief the approach
- I – Intentions (full stop, missed, etc)
- F – Flow (before landing checklist)

**Instrument Currency: 61.57**

**66-HIT Rule:** You cannot act as PIC of an IFR flight unless within the preceding 6 calendar months you have performed 6 instruments approaches with Holding, Intercepting and Tracking radials.
- 1st 6 Months: Current
- 2nd 6 Months: Cannot act as PIC of an IFR flight. But you can fly with a qualified safety pilot to regain currency

**Missed Approach:**
- C – Cram (full throttle)
- C – Climb (Vy)
- C – Clean (flaps, landing gear up)
- C – Communicate (going MISSED)

**Lost Communications: 91.185**
If VMC: Squak 7600, land at nearest airport. Cancel IFR by phone.
If IMC: Squak 7600, Continue as follows:
- **Route:** (In this order)
  - A – Assigned
  - V – Vectored
  - E – Expected
  - F – Filed
- **Altitude:** (Highest Altitude)
  - M – Mea
  - E – Expected
  - A – Assigned

**IFR Mandatory Reporting Points**
- M – Missed Approach
- A – Airspeed change 5% or 10kts
- R – Radio Nav/Comm Failure
- V – VFR-On-Top Altitude change
- E – ETA change of +/- 3 minutes
- L – Leaving or Entering Holds
- O – Outer Marker
- U – Unforecasted Weather
- S – Safety of Flight in Jeopardy
- V – Vacating an assigned Altitude
- F – Final Approach Fix
- R – Rate of Climb less than 500’/min

**Copy Clearance:**
- C – Clearance Limit
- R – Route
- A – Altitude
- F – Frequency (Departure Control)
- T – Transponder squawk code