

## **FLIGHT 16 — CRUISE PERFORMANCE & LEANING: cards 16-1 to 16-3**

N997CZ RV-10 — **Flight 16**. Portrait; each card = a SCRIPT page then its cut-out CARD page. 16-1 = cruise set-up + cooling; 16-2 = speed-power polar (TAS vs power); 16-3 = mixture-sweep lean characterization (peak EGT / GAMI spread / LOP-ROP). Mid/fwd CG, smooth air. High-power points stay FULL RICH and the lean sweep is held to  $\leq 65\%$  power (break-in, SI 1427C). Built 2026-06-13.

### **Cruise Performance — Set-Up, Stabilization & Cooling**

#### **FT-16-1 — SCRIPT (briefing) · FLIGHT 16 — CRUISE PERFORMANCE & LEANING: cards 16-1 to 16-3**

##### **Purpose**

- Establish stable, level, trimmed cruise points so the polar (16-2) and lean sweep (16-3) run on clean, repeatable data. A point is valid only once IAS, FF, EGT and CHT have all SETTLED at a fixed altitude.

##### **Pre-conditions**

- Day VMC, SMOOTH air (turbulence corrupts the data); MID/FWD CG (record).
- CO detector ON — abort a point if  $CO \geq 5$  ppm.
- Oil temp green; note the SELECTED tank and plan a switch so neither tank runs low during the sweeps.

##### **Pick the test altitude**

- Hold ONE altitude for the whole sortie so density altitude is repeatable — suggest ~7,500-8,000 ft MSL. Record OAT and pressure altitude so DA can be computed in reduction.

##### **Stabilize a point**

- Wings level, ball centered, ALT  $\pm 50$  ft (autopilot ALT/HDG is fine and steadies the data), TRIM off all stick force.
- Hold each setting  $\geq 1$ -2 min; record only after IAS, FF and EGT stop drifting. For TAS use the G3X TAS (reads ~3 kt LOW — known static error) or a GPS ground-speed leg; the G3X log captures all of it.

##### **Engine limits & abort**

- Cruise runs cool, but keep CHT  $< 420^\circ\text{F}$ ; if any cylinder reaches  $450^\circ\text{F}$  enrich / reduce power / descend (Cyl 5 & Cyl 1 hottest). Abort a point for  $450^\circ\text{F}$ , hot oil, roughness, or  $CO \geq 5$  — enrich, level, re-stabilize.

ASI note: ASI reads LOW ~2-3 kt (F11 cal): CAS  $\approx$  IAS + 2-3 kt. Log TAS/CAS from analysis, not the indicator. Speeds: Vne 200 / Vno 156 / Va 125 (gross) / Vfe 87 / Vs1 clean ~61 / Vs0 full-flap ~52 (all KIAS, placard)

→ The cut-out CARD for this maneuver is on the NEXT page.

## FT-16-1 — FLIGHT CARD (kneeboard)

| N997CZ RV-10 · FLIGHT 16 |                      | FT-16-1 |                      |
|--------------------------|----------------------|---------|----------------------|
| Date                     | <input type="text"/> | Time    | <input type="text"/> |
| OAT °F                   | <input type="text"/> | Wt / CG | <input type="text"/> |
| Press alt                | <input type="text"/> | Wx      | <input type="text"/> |
| Fuel / tank              | <input type="text"/> | Page    | <input type="text"/> |

### CRUISE PERFORMANCE — SET-UP, STABILIZATION & COOLING

#### SET-UP (every cruise point)

- SMOOTH air · CG mid/fwd · CO ON, abort if  $\geq 5$
- ONE test altitude all sortie (~7,500-8,000 MSL) · note OAT/alt
- Wings level, ball centered, ALT  $\pm 50$  ft, TRIMMED (AP ok)
- Hold  $\geq 1$ -2 min — log only after IAS / FF / EGT settle
- Note selected TANK; plan switch so neither runs low

#### ENGINE LIMITS

- CHT keep  $< 420$  · enrich / reduce / descend if any  $\geq 450$
- Cyl 5 & Cyl 1 hottest · abort point for hot oil / rough / CO  $\geq 5$

ASI note: ASI reads LOW ~2-3 kt (F11 cal): CAS  $\approx$  IAS + 2-3 kt. Log TAS/CAS from analysis, not the indicator.  
Speeds: Vne 200 / Vno 156 / Va 125 (gross) / Vfe 87 / Vs1 clean ~61 / Vs0 full-flap ~52 (all KIAS, placard)

>✂ cut along the box — carry it on the kneeboard; keep the SCRIPT page for briefing.

# Cruise Performance — Speed-Power Polar

**FT-16-2 — SCRIPT (briefing) · FLIGHT 16 — CRUISE PERFORMANCE & LEANING: cards 16-1 to 16-3**

## Objective

- Map cruise TAS and fuel economy versus power at a FIXED altitude. The result is the airplane's speed-power curve: TAS vs % power and nm/gal vs TAS, from which best-range and best-endurance speeds fall out. Use the 16-1 set-up for every point.

## Config

- Flaps UP, fixed test altitude, prop FULL FORWARD or a fixed cruise RPM (pick one and keep it constant across the sweep), ball centered, mid CG.

## Mixture during the polar

- Keep the polar MIXTURE consistent so power points are comparable: FULL RICH at the high-power points (break-in), and a fixed, modest lean ONLY at the lower-power points if you want best-economy numbers — note exactly what mixture each point was flown at. The dedicated lean characterization is card 16-3.

## Procedure

- Step the THROTTLE / MAP from the highest you can hold at this altitude DOWN through ~5 settings (e.g. WOT, then ~-2 inHg steps, or named ~75 / 65 / 55 / 45% power points — keep the top ones full rich).
- At EACH setting stabilize per 16-1 ( $\geq 1-2$  min, altitude  $\pm 50$  ft), then record: MAP/RPM set, IAS, TAS (G3X, ~3 kt low) or GPS GS legs, fuel flow, max CHT, OAT.
- Optionally fly the most important points on RECIPROCAL headings and average the GPS ground speeds to remove wind for a clean TAS.
- Reduce later: TAS vs % power and nm/gal (= TAS / FF) vs TAS — the peak of nm/gal is best range; the lowest FF that holds level is near best endurance.

## Watch

- Hold altitude precisely — a 100 ft climb/descent skews TAS and FF. Let the speed fully settle at the low-power points (they take longest). Keep CHT <420; honor the 16-1 limits.

ASI note: ASI reads LOW ~2-3 kt (F11 cal): CAS  $\approx$  IAS + 2-3 kt. Log TAS/CAS from analysis, not the indicator. Speeds: Vne 200 / Vno 156 / Va 125 (gross) / Vfe 87 / Vs1 clean ~61 / Vs0 full-flap ~52 (all KIAS, placard)

→ The cut-out CARD for this maneuver is on the NEXT page.

**FT-16-2 — FLIGHT CARD (kneeboard)**

|                                 |  |                |  |
|---------------------------------|--|----------------|--|
| <b>N997CZ RV-10 · FLIGHT 16</b> |  | <b>FT-16-2</b> |  |
| Date                            | <input style="width: 150px; height: 20px;" type="text"/> | Time           | <input style="width: 150px; height: 20px;" type="text"/> |
| OAT °F                          | <input style="width: 150px; height: 20px;" type="text"/> | Wt / CG        | <input style="width: 150px; height: 20px;" type="text"/> |
| Press alt                       | <input style="width: 150px; height: 20px;" type="text"/> | Wx             | <input style="width: 150px; height: 20px;" type="text"/> |
| Fuel / tank                     | <input style="width: 150px; height: 20px;" type="text"/> | Page           | <input style="width: 150px; height: 20px;" type="text"/> |

**CRUISE PERFORMANCE — SPEED-POWER POLAR**

- Flaps UP · ONE altitude · fixed RPM · mid CG
- Top points FULL RICH (break-in); note mixture at every point
- Step MAP/throttle high→low, ~5 settings; stabilize each ≥1-2 min
- Record set / IAS / TAS (G3X ~3kt low or GPS legs) / FF / CHT / OAT
- Hold ALT ±50 ft · reciprocal GPS legs on key points

**Record (one row per power point)**

| MAP / RPM | IAS | TAS | FF gph | CHT mx | OAT |
|-----------|-----|-----|--------|--------|-----|
|           |     |     |        |        |     |
|           |     |     |        |        |     |
|           |     |     |        |        |     |
|           |     |     |        |        |     |
|           |     |     |        |        |     |

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 Speeds: Vne 200 / Vno 156 / Va 125 (gross) / Vfe 87 / Vs1 clean ~61 / Vs0 full-flap ~52 (all KIAS, placard)

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# Mixture Sweep — Lean Characterization (Peak EGT / GAMI / LOP)

**FT-16-3 — SCRIPT (briefing) · FLIGHT 16 — CRUISE PERFORMANCE & LEANING: cards 16-1 to 16-3**

## Objective

- At ONE fixed, moderate cruise power, lean slowly while the G3X logs per-cylinder EGT and FF to: (a) find the FF at which each cylinder peaks EGT — the span from the first to the last cylinder to peak is the GAMI spread; (b) characterize rich-of-peak vs lean-of-peak; (c) pick a repeatable cruise lean target for the rest of Phase 1.

## Break-in / power limit

- Hold the sweep at  $\leq 65\%$  power (~22-23 inHg here). Leaning is sanctioned below ~65-75% power — satisfies SI 1427C and keeps CHTs in hand as the mixture passes peak EGT (the hottest-CHT region).
- IO-540, LEFT conventional mag + RIGHT SDS CPI-2 electronic ignition: the EI advances timing, so peak EGT may fall at a slightly different mixture than a dual-mag engine — record what the data shows.

## Config

- Same altitude as the polar, fixed RPM, throttle for  $\leq 65\%$  power, flaps UP, smooth air, ball centered, trimmed.

## Procedure

- Note the starting FF, then lean in SMALL steps (~0.5 gph), pausing ~20-30 s each so EGTs stabilize before advancing.
- Cylinders peak ONE AT A TIME — note the FF where the FIRST (leanest) and LAST (richest) cylinder peak; that span = GAMI spread.
- Continue until clearly lean-of-peak (EGTs falling / first roughness) or a CHT limit nears, then ENRICH. Per-cylinder EGT is in the G3X log; on the card track FF, max CHT, and observations.

## Watch / abort

- Peak EGT is the hottest-CHT region — if any cylinder reaches 450°F ENRICH immediately. Abort for roughness you cannot smooth, hot oil, or  $CO \geq 5$ . Re-richesten fully before maneuvering or descending.

ASI note: ASI reads LOW ~2-3 kt (F11 cal): CAS  $\approx$  IAS + 2-3 kt. Log TAS/CAS from analysis, not the indicator. Speeds: Vne 200 / Vno 156 / Va 125 (gross) / Vfe 87 / Vs1 clean ~61 / Vs0 full-flap ~52 (all KIAS, placard)

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**FT-16-3 — FLIGHT CARD (kneeboard)**

**N997CZ RV-10 · FLIGHT 16**

**FT-16-3**

|             |                      |         |                      |
|-------------|----------------------|---------|----------------------|
| Date        | <input type="text"/> | Time    | <input type="text"/> |
| OAT °F      | <input type="text"/> | Wt / CG | <input type="text"/> |
| Press alt   | <input type="text"/> | Wx      | <input type="text"/> |
| Fuel / tank | <input type="text"/> | Page    | <input type="text"/> |

**MIXTURE SWEEP — LEAN CHARACTERIZATION  
(PEAK EGT / GAMI / LOP)**

- ≤65% power (break-in) · fixed alt / RPM · flaps UP
- Lean ~0.5 gph steps, pause ~20-30 s; let EGTs settle each step
- Note FF where EACH cyl PEAKS (first=leanest, last=richest = GAMI)
- Go until clearly LOP / first roughness, then ENRICH
- ANY CHT ≥450 → ENRICH now · re-richest before maneuvering

**Record (FF step; per-cyl EGT from the G3X log)**

| FF gph | RPM/MAP | CHT mx | Notes (cyl peaking / rough) |
|--------|---------|--------|-----------------------------|
|        |         |        |                             |
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