Advanced Avionics Workshop

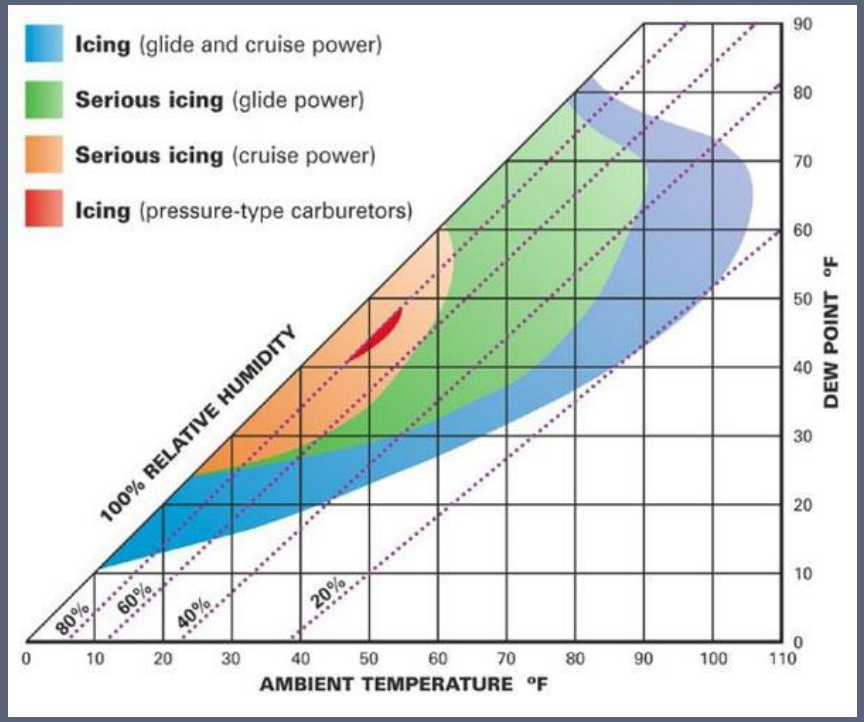
Engine Management

Presentation Outline

- Carburetor Probes
  - Carburetor icing review
  - Types of probes
  - Usage
- CGR 30P Engine Analyzer
  - “Knobology”
  - Useful Features
- Practical Examples

Carburetor Probes

Carb Icing – A Quick Review



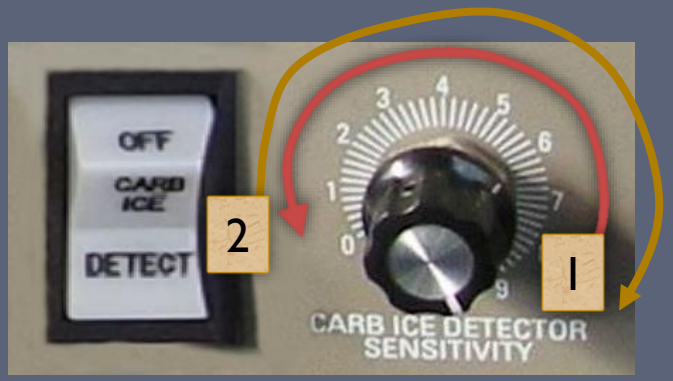
- Carburetor icing is most likely to occur during <u>mid-to-low power settings</u> when there is <u>high relative humidity</u>
  - Taxiing / Run-up
  - Low cruise
  - Traffic pattern / landing
- Most likely between OATs of 20 - 70F (-6C – 20C) and temp/dewpoint spread is ≤ 27F (15C)

Carb Temp Gauge

- Displays the temperature inside the carburetor venturi
- Keep the temperature either **below -15C (5F)** or **above 5C (41F)** when carb icing conditions exist
  - With a carb temp gauge, partial carb-heat is allowed

- Temperature is not accurate below ~1500 RPM / 20" MP
  - In this case, use only FULL carb heat if carb heat is needed

Carb Ice Detector



- Probe consists of a light emitter and a light sensor.
  - When carb ice forms, it develops on the probe tip, reducing the light received by the sensor and activating the annunciator.
    - Probe is not accurate below ~1500 RPM
- Calibrating the sensor
  1. Rotate the sensitivity knob fully counterclockwise so the carb ice light is on
  2. Rotate the sensitivity knob clockwise until the carb ice light just goes out

CGR-30P Engine Analyzer

CGR-30P Knobology

Primary Gauges

Selection Indicator

Selectable Screen Display

Primary gauge annunciators

Change Screen

Rotary Knob – Move cursor / change digits / select function

Exit / Cancel

CGR-30P Screens

Main & Secondary Screens

- Default screen
- Press and hold E from any page to get back to here
- Always start the engine on this screen!

- Secondary screen
- Displays less-critical data

Fuel Screens

Used to set fuel quantity before flight

Displays fuel usage

When a GPS destination is set, it also calculates fuel to/at destination

Usage Tips

- **Always set the fuel quantity during preflight**
- **Wait for the display to finish booting up before starting the engine**
- Set the EGT/CHT bar graph to "Hottest" mode

- During the run-up and mag check, verify:
  - Each mag that is turned off displays the "MAG" annunciation on the appropriate side of the RPM gauge
  - There is an EGT rise when one mag is selected, followed by a drop when both mags are re-selected
  - The carb temp gauge shows a rise when carb heat is applied, and a drop when carb heat is turned off

Practical Examples

Abnormal Conditions (1)

- **SYMPTOM**: During the run-up, you notice the engine runs rough on one magneto
- **DIAGNOSTICS:** Check the EGT/CHT bar graph. If you see one of the blue EGT bar graphs significantly lower than the others, it indicates a bad spark plug.
- **ACTION**: Switch to both mags, run up to 2200 RPM, and lean the mixture for maximum observed RPM. Run for one minute, then repeat the normal mag check.
  - If it runs smoothly, you are good to go
  - If it's still running rough, abort the flight and squawk the aircraft

Abnormal Conditions (2)

- **SYMPTOM**: During takeoff or cruise, you notice the CHT on one (or more) cylinders is significantly higher than the others and rapidly climbing

- **ACTION**: Immediately reduce power and pitch down for more engine airflow!
  - You may be experiencing symptoms of pre-ignition, which requires immediate action to prevent engine damage

Abnormal Conditions (3)

- **SYMPTOM**: During flight, the engine begins to run rough and is losing power.

- **DIAGNOSTICS:**
  - Observe the CHT and EGT bar graphs, and note if one or more are significantly different than the others, or if they are all reasonable similar.
  - Check the carb temp (secondary page) or carb ice detector

- **ACTION**: Apply carb heat if you are in the carb icing range. Perform a mag check if conditions don't improve after a minute or two.

More Information

- Flying 20 Club "Library"
  - CGR-30P Manual

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