Pilot's Guide

VISION MICROSYSTEMS INC.
ADVANCED ELECTRONIC INSTRUMENTATION

VM1000C

VISION MICROSYSTEMS INCORPORATED.

Information: P. O. Box 7033
Huntington Beach, CA 92646

Factory: 3183 B Airway
Costa Mesa, CA 92626

714-557-3805

www.visionmicrosystem.com

Table of Contents

Note: Button numbers are for reference only; buttons on instrument are not labeled with numbers.

Section 1 - BASIC OPERATION

Buttons

There are five buttons on the front panel, referred to in this manual by—left to right—numbers 1 through 5. They function differently, depending on the mode of operation: normal, fueling or setup. Note: Button numbers are for reference only; buttons on instrument are not labeled with numbers.
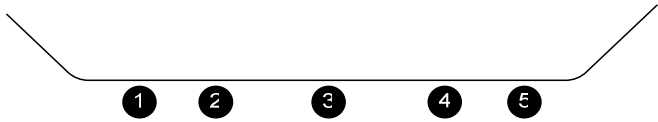
Normal mode buttons:

❶	❷	❸	❹	❺
Tap: Peak Find mode Hold: Changes between MAN and &HP display	Cycle through display of each cylinder temp, TITs and hottest	AutoTrack on or off	Fuel computer mode (ADD, GPH/LPH, REM, HRS, BRN)	Hold to save snapshot in memory

Fueling mode buttons:

❶	❷	❸	❹	❺
Decrement indicated fuel added to aircraft	Increment indicated fuel added to aircraft	Enter; accept the entered value	Exit without adding the value entered	Filled the tanks

Setup mode buttons:

❶	❷	❸	❹	❺
Decrement value being entered	Increment value being entered	Enter; accept the entered value		Exit or cancel

Display

The display is the primary interface between engine instrumentation and the pilot. See the figure at the end of the table of contents for a depiction of the display. Optional measurements that are not installed will not be on the display; they will be blank.

Dimming control

No external connection is needed for dimming. The display is auto-dimmed by a photocell. However you can adjust the *low light level* setting for your conditions. To adjust, initially hold ❹ and ❺ until the display blinks once. Then use ❶ and ❷ to adjust the brightness. After setting the new brightness level, do not press any buttons within 5 seconds and your new setting automatically is saved.

Tachometer Operation

The tachometer system provides both a full sweep graphic analog display and four place digital display. When you start the engine you will see the analog graph rise in proportion to the engine speed. Full color range marks and graphics provide you with a quick reference to monitor normal, caution and red line engine RPM.

RPM

The digital readout provides you with exact RPM information. The resolution (or incremental steps) of the digital display is 5 RPM. The high accuracy of the tachometer will allow you to follow long-term performance trends of your engine and prop, such as static maximum rpm, carburetor heat effectiveness, and typical mag drops. These can be important indicators of engine and accessory condition. Page 43

Engine Operating Hours

Another feature is the *engine hours counter*. When the engine is off, the RPM digital display shows the total accumulated engine hours to a maximum of 9999.9. Engine hours are accumulated any time RPM

is greater than 1500. The engine hour counter is initialized by
performing the ENGINE HOURS setup. Page 41

RPM Alert

A warning alert activates whenever
the engines redline is reached (as set
in ENGINE LIMITS menu). The
RPM display will flash until this
condition is corrected. Page 43

Manifold Pressure Operation

The manifold pressure system provides both a full sweep color
graphic analog display and three place digital display. The full color
range marks provide you with a quick reference to when making fast
power changes.

The digital readout provides you with precise information. This
allows very precise power settings to be achieved and is useful for
new induction system designs, or modifications to existing designs,
where repeatability and accuracy is a must.

> Note: If %HP icon is shown, then the VM1000C is in percent
> power mode. To change to the Manifold Pressure mode simply
> hold ❶ in until you see the MAN icon appear.

Manifold Pressure Alert

A warning alert activates whenever the engine's redline is reached
(as set in ENGINE LIMITS menu section 50.0 user defined engine
parameters). The display will flash until this condition is corrected.

Manifold Pressure Calibration (Optional)

Manifold Pressure can be fine-tuned to your installation in the
appropriate MISCELLANEOUS menu item.

Percent Power Operation / Calibration

The percent power system provides both a full sweep color graphic analog display and three place digital display. The full color range marks provide you with a quick reference when making fast power changes and the digital readout provides precise information. A warning alert activates whenever the %HP redline is reached (as set in ENGINE LIMITS menu). The display flashes until this condition is corrected. To activate Percent Power mode, simply hold ❶ in until you see the %HP icon appear. Note: calibration must be initially performed before use.

Oil System Operation

Both oil pressure and oil temperature are displayed continuously in two separate full sweep color graphic and digital areas.

Oil Pressure

As oil pressure rises, the graph size increases proportionately. The full color range marks let you see at a glance how close to red line oil pressure you are. The graphic changes color to match the range marks.

The digital display shows in 1 PSI increments to a maximum of 199. This is very useful for monitoring typical engine oil pressure trends. Because of the high accuracy and repeatability of this system, the oil pressure can be closely monitored for unusual trends. For example, if you are cruising in a stabilized condition, and the oil pressure starts to decrease, and oil temperature is increasing, this may indicate an impending oil system problem.

Oil Pressure Alert

A warning alert activates whenever the engines redline is reached (as set in ENGINE LIMITS menu 50.4). The display will flash until this condition is corrected.

Oil Temperature

Oil temperature is displayed both graphically and digitally. As oil temperature rises, the digital value and graph size increases proportionately. Temperature is displayed in either Fahrenheit or Celsius units (as set in the MISCELLANEOUS menu).

The full color range marks let you see at a glance how close to red line oil temperature you are.

The digital display shows in 1 degree increments to a maximum of 290 degrees F (143 degrees C). This is very useful for monitoring typical engine oil cooling system performance.

For new engine installations, you can take advantage of the high accuracy and repeatability for analyzing the engine oil cooler system efficiency. If the cooling does not seem to be effective enough, you can make changes and repeat your tests with the confidence that the next test data will reflect the results of your changes.

Oil Temperature Alert

If the oil temperature rises above redline (as set in ENGINE LIMITS menu 50.5), the display will flash until the problem is corrected.

Fuel Computer System Operation

WARNING

Improper use of the fuel flow computer or suspected erroneous or intermittent operation will give you incorrect information and may result in premature fuel exhaustion. Do not use as the primary means of fuel quantity management. Insure that you understand the operation of this system completely and carefully monitor its performance before and during flight. Verify the systems operation for your intended use by comparing actual burned fuel versus the indicated burned fuel brn.

Fuel Pressure is displayed both digitally and graphically. As fuel pressure rises, the graph rises proportionately. Full color operating range marks and graphics are provided that indicate the normal operating range of fuel pressure for your engine at a glance. The digital display allows

you to see small variations and make notations of typical fuel pressure behavior.

Fuel Pressure Alert warning system will flash should fuel pressure fall outside of the limits (as set in ENGINE LIMITS menu) for your particular engine.

Fuel Flow Computer has five modes available. The units can be set to either gallons, Imperial gallons or liters (as set in the MISCELLANEOUS menu). Fuel Flow is displayed both digitally and graphically, but all other measurements are displayed only digitally. All values are calculated based on the fuel flow sensor and your initial inputs:

 GPH or **LPH** - Fuel Flow
 ADD - **ADD** fuel to computer memory "tank"
 REM - Calculated Fuel **REM**aining onboard
 BRN - Fuel **BuRN**ed since last power-up
 HRS - **H**ou**RS** of fuel remaining

Fuel Remaining Alert occurs when the computed fuel **REM** is less than the low fuel remaining value (as set in MISCELLANEOUS) by flashing the display.

Selecting Fuel Computer Modes

Tap ❹ to select the desired fuel computer mode. The mode is displayed near the fuel flow readout. The following describes each mode:

ADD: (flashes) Default mode after powering up and reminds you to check your fuel REM and add fuel if needed. If you have added fuel to the aircraft, you must select this mode and add fuel to the fuel computer's electronic "tank." See section below on ADDING FUEL TO THE COMPUTER. Tap ❹ to leave this mode, if not needed.

GPH / LPH: This mode displays the fuel flow both digitally and graphically. The graphic section provides you with a quick reference of the current fuel flow.

REM: This mode displays the current fuel total remaining.

HRS**:** This mode displays the calculated hours of fuel remaining (sometimes referred to as endurance), as a function of the current flow rate and current fuel remaining (REM) in the computer's memory. It is digitally displayed in 0.1 hour increments.

BRN**:** This mode displays the gallons of fuel burned in flight since system power up.

Adding Fuel to the Fuel Computer

Your fuel computer has a feature that allows you to add fuel according to how much has been added to the tank(s). Follow the steps below to ADD fuel to the computer:

STEP 1.   Tap ❹ to change the fuel computer mode to show ADD. It should now be flashing.

STEP 2.   Tap ❷ to increment and ❶ to decrement the ADD value, shown in the digital display, to match the fuel that was added to the aircraft.

> NOTE: To top off the tank(s) just tap ❺ and the amount will jump to your maximum REM capacity you programmed initially in setup. Taping a second time sets value to zero.

STEP 3.   If you are satisfied with the entered value, then tap ❸ to accept it. NOTE: the new total is limited to the maximum tank capacity value (as set in MISCELLANEOUS).

> NOTE: To exit WITHOUT adding the value shown, just tap ❹.

Cylinder Watch System Operation

The *Cylinder Watch* engine analyzer system displays all cylinder information both graphically and digitally. The cylinders are depicted as a top view that makes identification easy. The numbering layout is selected for either the Continental or

Lycoming engines during setup. Full color graphics make detection of cylinder operating status easy. The digital display defaults to the hottest CHT. For example, if CHT 1 is the hottest, the digital display will show H1 periodically.

Pressing ❷ will cycle through each CHT and the hottest and allow you to select a different CHT by choosing C1, C2 etc. After power up or after a peak find operation, the digital display defaults to show the hottest CHT. Temperature is displayed in either Fahrenheit or Celsius units (as set in the MISCELLANEOUS menu).

CHT Alert: warning system will flash if a CHT limit is exceeded (as set in ENGINE LIMITS). For over temperature both the graphic and digital will flash. A lowercase h1 would identify CHT1 as exceeding the maximum redline temperature. For shock cooling a flashing lowercase c1 would identify CHT1 as exceeding the maximum cool down rate (as set in MISCELLANEOUS menu).

EGT Analyzer System Operation

The EGT ANALYZER system displays all EGTs graphically. EGT probes are periodically tested by the system and any probe that is detected as bad will be shut off. Peaking mode is not allowed if a bad probe (including a TIT probe) is detected. An EGT over-temperature (as set in ENGINE LIMITS) will cancel and disallow peaking mode until corrected.

The system can operate in either of two leaning modes: Rich of Peak or Lean of Peak. This is selected during initial system setup.

After power up, the EGT digital display defaults to EGT 1 (unless you have enabled the TIT system - see Turbo Inlet Temperature System Operation). Periodically the digital display will identify which EGT you are seeing by showing and E followed by the EGT number, such as E1 for EGT 1. After you have successfully leaned the engine (as an example, lets assume it was EGT 2), the digital readout is locked to that EGT and E1 will change to P2 signifying that it peaked on EGT 2.

Tap ❷ to select a different EGT by choosing E1, E2, E3 etc. (Note: not available when in the peak mode). Temperature is displayed in either Fahrenheit or Celsius units (as set in the MISCELLANEOUS menu).

<div align="center">

WARNING

</div>

Refer to your engine operating manual for the proper techniques, temperature and precautions for leaning. Improper leaning may damage your engine!

Peaking Mode Operation

STEP 1: **Stabilize**

> The aircraft engine temps, throttle and rpm. Set the mixture at rich of peak by verifying all EGT values decrease a few bars when fuel flow is increased, then allow the engine to stabilize for 5 to 10 seconds.

STEP 2: **Find Peak**

> a. Tap ❶. Observe that a row of bars appear across the top of the EGT graphics area signifying peak mode is active.
>
> b. Lean the mixture smoothly so EGT is changing about 3 to 5°F per second. If significant engine roughness occurs, then a true peak cannot be found and leaning should be aborted and mixture returned to a rich value.
>
> c. When peak is found several things happen on the display:
>
> > 1. The EGT graph flashes for a short period of time and its top bar comes on identifying the peaked EGT column.
> >
> > 2. Both the EGT and DIF icon are activated.
> >
> > 3. The digital readout now shows DIFferential temperature (the peak EGT minus current EGT). A positive number means rich of peak and a negative number means you are lean of peak.
> >
> > 4. Periodically the actual EGT temperature of the peaked cylinder is displayed (DIF goes off) allowing you to monitor it as well.

STEP 3: **Final Mixture Adjustment**

    a. Now adjust the mixture differential value accordingly to which leaning mode you initially set up, rich of peak (positive DIF) or lean of peak (negative DIF).

    b. When you have completed leaning, turn off the peak mode by pressing ❶ again. The DIF icon will go out.

Electrical Monitoring System Operation

VOLTAGE is displayed both graphically and digitally. Full color range marks provide a quick reference for fast analysis of voltage levels. As voltage rises, the graph size increases proportionately.

Voltage Alert: warning system will flash should voltage fall outside of the limits (as set in ENGINE LIMITS).

AMPERAGE is displayed both graphically and digitally. Full color range marks provide a quick reference for fast analysis of amperage levels. As amperage rises, the graph size increases proportionately. The digital readout displays amperage at 1 amp resolution.

The amp system functions as an alternator load meter displaying current flow FROM the alternator TO the aircraft electrical system allowing you to see if a load (such as pitot heat) is really drawing current when turned on. You should see an increase on the amp display when you turn on a load, such as pitot heat for example. This tells you that the pitot heater is drawing power and is probably OK. By verifying that voltage remains the same, then it can be assumed that the alternator is supporting the additional load.

Amperage Alert: warning system will flash should amperage fall outside of the limits (as set in ENGINE LIMITS).

Autotrack™ System Operation

The *Autotrack* system is a breakthrough in modern engine monitoring technology. Designed to reduce the pilot's workload by assisting in the tedious and often overlooked job of monitoring engine measurements for small but significant deviations, Autotrack adds a

new level of safety to engine management: a true cockpit Early Warning System.

Subtle changes may occur in engine measurements that can precede major problems. These changes are often missed by even the most attentive of pilots. Autotrack alerts you to these changes allowing you to analyze the situation and take appropriate action.

When to Use Autotrack

- Climb - Activate during climb to alert you as measurements change as a function of the prolonged climb.

- Cruise - Activate during cruise to alert you if any measurement begins to drift from your selected starting point.

- Descent - Activate during descent to alert you to increasing manifold pressure or percent power and rising EGT due to a leaning mixture.

How to Use Autotrack

(Note: Autotrack is disabled if peak mode or alarms are active).

STEP 1.   STABILIZE the aircraft. Set up your desired power and mixture condition. Allow the engine time to stabilize (i.e., engine temps and pressures, etc.).

STEP 2.   Tap ❸. The Autotrack indicator will activate on the display and the system will begin tracking the engine's performance from this point

The Autotrack system is now armed and watching for engine deviation from the point you picked. To cancel, simply tap ❸ to extinguish the Autotrack indicator. Re-arm again at any time.

Autotrack Alert Indications

If any engine measurement deviates above or below the initial captured point by more than its allowed difference (as set in ENGINE LIMITS), the system will flash the graphic element for that measurement and the Autotrack icon to alert you of this deviation. To shut off the alert condition, either correct the reason the measurement deviated or tap ❸ to turn off the Autotrack system.

Here are a few examples of Autotrack scenarios:

Example 1:

- You arm the Autotrack system then begin a climb.
- Shortly afterwards you get an Autotrack Alert.
- The CHT graphic will flash and you see that the captured point is lower than the current CHT (temperature is rising).
- You lower the nose to increase cooling thus preventing a CHT over-temperature.
- You turn Autotrack off then back on to continue monitoring at the new conditions.

Example 2:

- Autotrack is armed and you are in steady cruise flight.
- During the flight you get an Autotrack Alert.
- You spot that the oil pressure graphic is flashing and the current oil pressure has dropped.
- The oil pressure has not reached the low redline yet, so you decide to land at the nearest safe airport and investigate the reduction in oil pressure.
- You discover that an oil line has been leaking and the loss of oil quantity caused the reduced pressure!

Flight Data Recorder System Operation

The Flight Data Recorder logs engine data at periodic intervals (your choice in MISCELLANEOUS setup) and you later download it by using EZTrends™, the powerful data graphical analysis PC program. The recorder is fully automatic and records while the engine is running. Typical storage is greater than 80 operating hours (for a 6 second logging interval). A special mode called Snapshot allows you to capture data in fast one second intervals, both 180 seconds BEFORE and AFTER the time of activation, providing detailed information. Snapshot can be set up to activate automatically on

certain alarms or manually activated by holding ❺ until the MAN
and RPM field decimal points begin blinking.

DOWNLOAD:

USB Download:

- Insert your USB Flash Drive into the VM1000C USB connector
- The VM1000C will change the display to
    - o All gauges will blank out
    - o MAN digital area will display **74.0**
    - o RPM digital area will display **NEW**
- Press and hold button 2 to switch to **ALL** flights mode.
- Press and hold button 3 to start download.
    - o Observe RPM count up as flight data recorder system is
      written to the Flash Drive.
    - o When flight data recorder information has been written
      to the drive, the VM1000C will restart.
- After data download completes, the VM1000C will restart. **Do
  not remove the USB flash media until the VM1000C restart
  is complete** (gauges are displayed).

Serial Download:

- Insert JPI serial download cable (PN **900PCCABLE)** into the
  serial download connector
- Start EzTrends
- Click **Download and Archive Data from your EDM**

- EzTrends Download should locate the VM1000C and show the
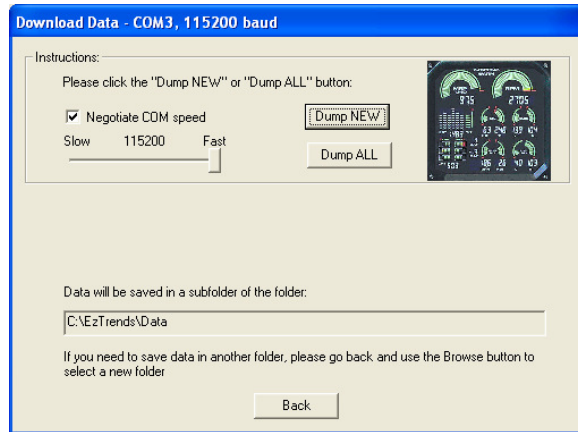
dialog below:

  - Click **Dump New** or **Dump All** to begin data download
  - All gauges will blank out
  - MAN digital area will display **74.1** or **74.2**
  - Observe RPM count up as flight data recorder system is written to the Flash Drive.
  - When flight data recorder information has been written to the drive, the VM1000C will restart.

Air Temperature System Operation

The OUTSIDE AIR TEMPERATURE (OAT) and CARBURETOR AIR TEMPERATURE (CAT) are digitally displayed in degrees C. Most true airspeed indicators have the temperature correction scale calibrated in Degrees C, making it easy to enter the temperature directly from the OAT display.

The digital displays shows in 1° C increments to a maximum of 99° C and a minimum of -50° C. For new engine installations, you can take advantage of the high accuracy and repeatability for analyzing carburetor heat effectiveness or induction air temperatures

The CAT measurement channel can be used for a cabin air temperature, cowling air temperature or induction air temperature in aircraft where there is no carburetor. . User can select °C or °F for Air Temps 42.00 or use Vision Config.

Fuel Level System Operation (Optional)

<div align="center">

WARNING

</div>

Aircraft attitude, fuel contamination and other factors can affect the accuracy of the fuel level readings and may cause premature fuel exhaustion. After installation and during operation, verify that the systems accuracy is acceptable for your intended use.

The fuel level system operates automatically, once the FUEL LEVEL SYSTEM CALIBRATION has been performed. The indicator displays a left and right digital read-out of the units of fuel remaining of up to 199 units per tank. Additionally the left and right displays are also presented graphically to show percentage of fuel remaining for quick reference.

If a probe is not functioning, or a calibration has not been done for a selected tank, or certain system sensors are malfunctioning, that tank

display will show Er. An unusual unsteady display value should be suspect and possibly disregarded as faulty operation.

Fuel Level Alert: A low fuel level alarm has been incorporated into the system which signals you when a minimum fuel level has been reached (as set in 60.0 FUEL LEVEL CALIBRATION) for a given tank by flashing and sounding an alert tone.

Turbo Inlet Temperature System Operation

IMPORTANT: Check your engine operating manual for the allowed values when programming the TIT ranges in menu code 50.0.

The TIT system is comprised of a four place digital readout (shared with the EGT digital field) and a vertical bargraph with range marks. The bargraph always depicts the hottest TIT and sweeps between the set points you defined during initial setup. The digital display shows the TIT value by default (ht1 or ht2 depicting the hottest turbo or just t1 if a single turbo). Pressing ❷ will change the digital display to the other TIT (if so equipped) and subsequent presses will step to the various EGT temps (as indicated by the illumination of the EGT icon).

TIT probes are periodically tested by the system. If any probe is detected as bad, the digital display will show Er. Peaking mode is not allowed if a bad TIT probe is detected. See section on EGT operation.

To use the TIT system, you must have first properly configured the TIT setup modes (probe selection and range limits).

Section 2 - EC100 SYSTEM OPERATION (Optional)

The EC100 system provides several categories of easily accessed information. Tap the ◄ button to choose one of the following:

AIRCRAFT: (power-up default)

Displays various aircraft operating limitations (Vx, Vy etc).

CHECKLISTS:

Displays the various checklist sub-categories, such as CLDSTART, TAXI, RUNUP, etc. Tap ▶ button to select a sub-topic. Tap ▼ or ▲ button to choose a line in the sub-topic.

VOICNOTE:

Record and play back aircraft audio.

REC begins recording audio.

PLA plays most recently recorded message

PRV or NXT select previously recorded message.

CLR erase all recorded messages.

END Stops the active function.

Note: Pressing ▶ and ▲ activates record immediately.

ENGINE INFO:

This category displays various engine information such as F COMP, CYLNDRS, etc. Tap ▼ or ▲ button to choose the desired information.

CLOCK functions:

There are several useful chronometer simultaneous functions available, such as a clock and flight time, stopwatch and approach count down timer.

EMERGENCY CHECKLISTS:

In case of an emergency, press BOTH the ◀ and ▶ buttons. Tap ▶ button to select a sub-topic. Tap ▼ or ▲ button to choose a line in the sub-topic.

EC100 reset: To quickly return to the beginning display or exit emergency mode, press both the ▼ and ▲ buttons.

ECAS:

The EC100's most valuable feature is the automatic Engine Caution Advisory System (ECAS). This system monitors engine

measurements, fuel system and user connected external inputs and alerts you if anything is in an alarm condition. When an alert/warning condition initially occurs, the EC100 annunciates the condition both visually (via the text display) and audibly (via an audio voice message). You can acknowledge the alarm by tapping any key, which mutes it for approximately two minutes. However the Master Caution enunciator (if connected) remains lit as long as an alarm condition is present. Any new alert/warning condition will override the mute period and immediately annunciate the condition. (Note: If you are in EMERGENCY CHECKLISTS mode, the warning annunciations are blocked.

EC100 Checklist Setup

To customize your checklist, you first complete the EVMASTER.XLS spreadsheet provided according to the onscreen instructions. Next you will upload the EC100_CHECKLIST.csv file into your VM1000C. To upload, follow the instructions below:

STEP 1: Make sure you performed the VM1000C RS232 setup.

STEP 2: Connect your PC to the VM1000C checklist serial port.

STEP 3: Activate TERATERM and insure all communication parameters match VM1000C RS232 parameters.

STEP 4: On VM1000C select UPLOAD CHECKLIST MODE and select option 1.

STEP 5: On TERATERM select FILE, SEND FILE and open the EC100_CHECKLIST.csv file located in the C: directory.

STEP 6: Observe that the file is sending and that the VM1000C is receiving (shows an increasing count in the RPM field).

STEP 7: If the transfer completed successfully, then you will see the checklist scrolling on the TERATERM screen.

EC100 Checklist voice Prompts setup

To record follow the steps below:

STEP 1: Hold EC100 ❶ and ❷ during a fresh power-up.

STEP 2: Use ❶, ❷ and ❹ to select the checklist item.

STEP 3: Tap ❶ to start the 2-second recording.

STEP 4: Power off when you have finished.

Section 3 - INSTALLATION

Indicator Installation

The unit is mounted to the panel from the backside by using the provided mounting screws which will accommodate panels of 0.062 to 0.050 inch thickness. For other thickness determine the screw length and test them by finger tightening them into the unit insuring that they do not bottom-out in the indicator. Mounting information is provided in the figures below.

EC100 System Installation (Optional)

Refer to the figure below for panel mounting information.

Fabricate the flat display cable (provided with your EC100 kit) per the included instructions. Connect between the VM1000C Indicator ribbon connector P7 and the EC100 connector. Note that the connectors are keyed to prevent incorrect insertion and also that the EC100 connector has small black arms that snap over the ribbon connector to lock it into position.

The EC100 audio out signal connects to the audio system of the aircraft. (Note: You should not connect the audio out/in lines of the VM1000C when using the EC100). The audio record and playback levels are adjusted via the small slotted trimmer potentiometer screws located in the back of the unit. These were adjusted at the factory to standard levels, however you may need to adjust them for your conditions. See your audio panel or radio installation manual for the proper audio input connection locations and options. Note: Be sure to select that the EC100 is installed (see SETUP MENU) and then later configure your EC100 Checklist using the Excel Checklist spreadsheet (EVMASTER.XLS). See EC100 Operation for instructions.

Various optional connections are available such as:

- Five external warning inputs (ground for either active/inactive).

- 6 discrete enunciators light driver outputs (grounds the lamp).

- Remote front panel button inputs (ground to activate).

Corner Layout Details:

1. Form rectangle by extending vertical and horizontal cutout lines

2. Locate points in 0.219" from corners and draw straight line between points.

3. Create radius tangent to lines.

0.219

R0.227

0.218

5.8

0.860

0.815

4.955

1.4

5.046

Notes: Holes are symmetrically placed around cutout.
Unit depth is approximately 5 inches.

NOTES:
1. The cut-out area is expanded by 0.025 all around.
2. Basic unit depth is 1.7" without connectors.

Routing the Wiring Harnesses

Five connectors are protruding from the rear of the instrument. Connect the five wiring harnesses to the rear of the instrument and run the cables

through the firewall into the engine compartment. Allow sufficient service loop to facilitate removal of the connectors for servicing. These wiring harnesses are labeled as follows:

Conn	Harness PN	Measurements
J1	790200	Oil temperature, Induction temperature, Carburetor temperature, Outside air temperature, Turbine inlet temperature, Turbine inlet temperature 2, Power, Engine ground, MFD input, MFD output
J2	700700 700702	CHT, EGT 6 cylinder CHT, EGT 4 cylinder
J3	790420	RPM, MAN, Oil pressure
J4	700709	Serial data to GPS, Serial data from GPS, Fuel flow transducer
J5	700719-1 no fuel level 700719-2 capacitive 700719-3 resistance	Fuel pressure, amperes Fuel pressure, amperes, capacitive fuel level option Fuel pressure, amperes, resistive fuel level option
J6	790745	External remote display
J7		EC100 ribbon cable connector

Route the wires from the connectors through the firewall using fireproof rubber grommets and flame retarding silicone. Use an existing hole if possible. All wires must be routed **away from high temperature** areas (exhaust stacks, turbochargers, etc.). Secure probe and sensor leads to a convenient location on the engine approximately 8 to 12 inches from the probe or sensor, being sure there is sufficient slack to absorb engine torque. It is essential in routing the probe wire that this wire not be allowed to touch metal parts of the air-frame or engine since abrasion will destroy this high temperature wire. Secure wires along the route to the indicator. Secure wire using original clamps, tape or tie wrap if possible.

> **CAUTION: Be sure any wiring does not obstruct the control movement under the instrument panel.**

The probe wires must **not** be tied in with **ignition**, alternator or engine cabin heater ignition wires because of potential interference with temperature measurements.

The temperature probe wiring harness is made of Chromel-Alumel alloy wire that **must not be substituted or extended with normal copper wire**. The power and ground wire are normal copper. Temperature probe leads may be spliced with additional Chromel-Alumel wire using copper butt splices.

When the installation is complete all wires should be secured using ties and carefully checked for interference, rubbing or chaffing with flight control cables or other moving parts.

Power Connection

The VM1000C automatically accommodates both 14 and 28-volt electrical systems. Using the J1 connector harness 790200, connect the power lead (red) to a **separate 5-amp circuit breaker** connected to the master power bus. **Connect the ground wire to the engine block.** No connection to the aircraft dimmer system is required because the instrument dims automatically with reductions in ambient light.

Probe and Transducer List

DISCRIPTION	Part No.	Opt	4 cyl	6 cyl
EGT probe	M-111		4	6
CHT probe	5050		4	6
TIT probe	M-111-T		1	1
OAT probe	400510		1	1
IAT probe	M-111		1	1
Carb temperature probe	400128		1	1
Oil temperature probe	400505		1	1
Fuel pressure Transmitter Carb engine Fuel pressure Transmitter Injected engine	790775 -1, -2, -3 3060-17		1	1
Ammeter shunt	MS –91586-6		1	1
Fuel Flow transducer	700900-1,-2		1	1
Fuel Level sender option	791000		1	1
Oil pressure Transmitter	306018		1	1
MAN	604010		1	1
RPM	420815-1 Slick, 420815-2 Bendix		1	1
Fuel Level Sensor (capacitance)	791000-(xx)	2		

Probe Wiring

Note: use only probes supplied with this unit. Older Vision
Microsystems probes are not compatible with this instrument.

When cutting the pair of leads to the proper length to connect to the
probes, leave enough slack in the wiring so that probe may be
interchanged to an adjacent cylinder if necessary for trouble-shooting and
servicing. Thermocouple wire length is not critical and should be trimmed
to any length as required for a clean installation.

The Temperature probe must be wired with the correct polarity. The
temperature probe connects to its temperature indicator with yellow
jacket Teflon Chromel-Alumel wire supplied. Strip the wires as shown
below—observing color-coding.
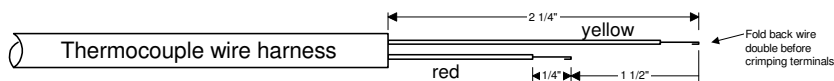
Terminate each wire with a crimp-on ring terminal, provided. The ring
terminals may be crimped with a "service-type" tool, however AMP part
number 48518 crimp tool is recommended. Verify the quality of each
crimp with a sharp tug on the wire. The terminal should be impossible to
pull off when crimped correctly.
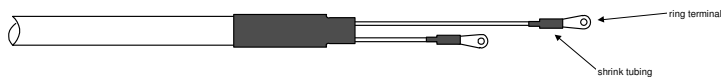
Place a ¼ x 4-inch sleeve over each pair of wires in the wiring. Connect
the wire ring lug to the probe ring lug using the supplied number 4 screws
and nuts, placing the star washer *between* the ring lugs, not against the
nut.
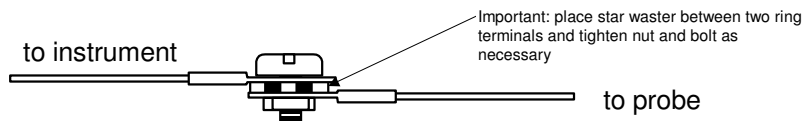
Slide the sleeve over the joint and secure with three tie-wraps.
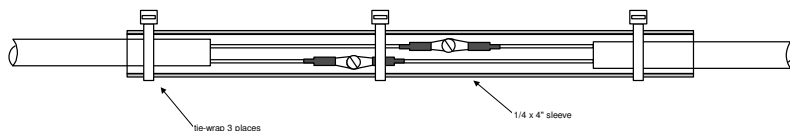
The most common installation problems are related to poor quality terminations.

Wiring Markings

The VM1000C is supplied with special Teflon insulated Chromel- Alumel factory assembled wiring harness configured for the correct number of cylinders. The wire harness is marked E1= EGT-1, C1= CHT-1, etc.

NOTE: Unlike most other EGT & CHT installations **the probe wire length is not critical** and should be trimmed to any length as required for a clean installation. **Do not extend the thermocouple wire with copper wire.**

Exhaust Gas Temperature Probe (EGT) Installation

Use the J2 connector harness 700700 or 700702 labeled E1 through E4 or E6. Remove the existing EGT gage and Probe. Replace with VISION MICROSYSTEMS probe M-111 in all exhaust stacks.

EGT probe Drill no. 40 pilot hole, then no. 30 hole.

2" to 4"

exhaust stack

CHT probe
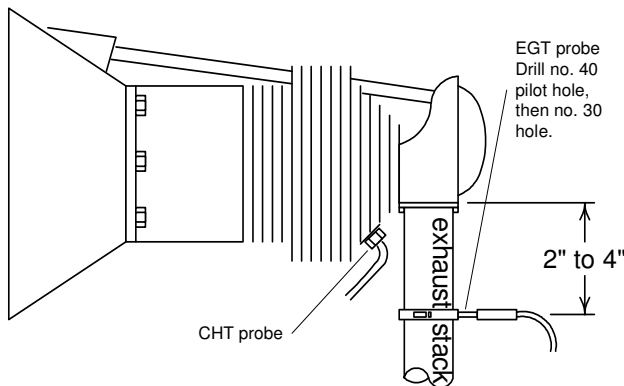
The Model M-111 Probe will fit any engines where the existing holes in the exhaust stack are 1/8" to 1/4" in diameter. If no hole exists, it will require the drilling of a 1/8" diameter hole and ream to fit. It is important that each probe be mounted the same distance from its exhaust stack flange. A nominal distance of 2 to 4 inches from the exhaust flange is recommended. **If the recommended distance is impractical** because of obstructions, slip joints or bends in the exhaust system then position the probes a uniform distance from the flange as space permits. **Do not mount probes in slip joints.** Be certain to locate all holes BEFORE

drilling to ensure that nothing interferes with the probe, clamp, screw or wire. Careful matching of probe position will provide best temperature measurements.

Insert the probe in the exhaust or previously drilled hole so that the tip of the probe is in the **center of the exhaust stream**. Tighten the stainless steel clamp to a torque of 45 in/Lbs. Cut off the excess strap close to the screw.
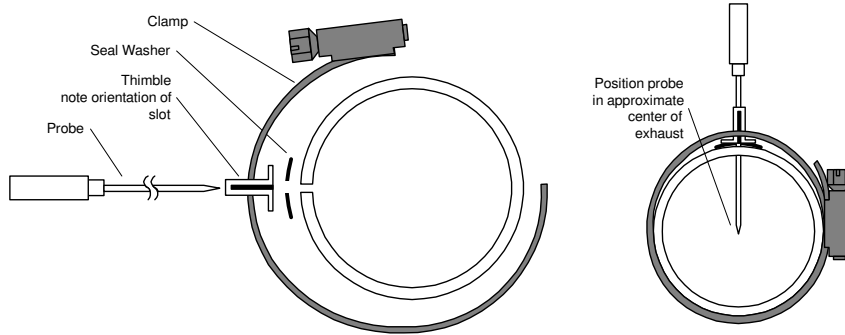

Turbine Inlet Temperature (TIT) Probe Installation (Optional)

Use the J1 connector harness 700200 and insert the yellow wire into the connector pin 16 and the red wire into pin 17. The standard TIT probe PN M111-T with a #48 clamp is placed in the exhaust stack accumulator to a maximum depth of 1/2 inch and approximately 4 inches from the turbine inlet if possible, on the waste-gate side of the turbine.

TIT for second Turbine Inlet Temperature

Use the J1 connector harness 700200 and insert the yellow wire into the connector pin 18 and the red wire into pin 17The standard VISION MICROSYSTEMS TIT probe P/N M-111-T with a special clamp is placed in the exhaust stack accumulator to a **maximum** depth of 1/2 inch and approximately four inches from the Turbine inlet if possible, on the waste gate side of the turbine.

Cylinder Head Temperature (CHT) Probe Installation

Use the J2 connector harness 700700 or 700702 labeled C1 through C4 or C6. The VISION MICROSYSTEMS probe is a bayonet probe P/N 5050-T that has a captive 3/8-24 boss that is screwed into the head of each cylinder.

For Indicator replacement, replace your existing CHT probe and adapter, a bayonet or screw in type with one supplied by VISION MICROSYSTEMS. Install the probe on the same cylinder from which you removed the original equipment probe. Your current CHT probe is installed in the hottest cylinder as determined by the airframe manufacturer. .

Outside Air Temperature (OAT) Probe Installation
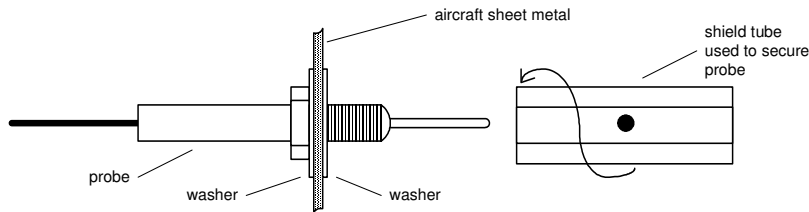
Use the J1 connector harness 700200 labeled OAT. All wiring must be type K thermocouple wire. Do not splice ordinary copper wire in any temperature probe circuits.

Install the OAT probe, PN 400510 in the airframe manufacturer's recommended location. If this information is not available, place the OAT probe in clean airflow such as in a cabin air scoop or below the underside of the wing away from engine heat or exhaust. In this case it is recommended that the installation be done similar to the antenna installation instructions of AC 43.12-2a *Acceptable Methods, Techniques and Practices*.

The outside aluminum shield tube is used to both hold the probe in place and shield it from radiated heat from the sun. OAT option is displayed as an independent digital temperature ribbon like "75".

Induction Air, CDT Probe Installation (Optional)

Use the J1 connector harness 700200 and insert the yellow wire into the connector pin 3 and the red wire into pin 4. All wiring must be type K thermocouple wire. The Induction Air Temperature probe, (IAT), is installed just after the inter-cooler and the Compressor Discharge Temperature (CDT) just before the inter-cooler. The probe is the same as an EGT probe and installed similarly to an EGT probe. A large clamp is supplied to fit around the airport leaving the inter-cooler. Alternately a 1/8 NPT fitting is available. IAT option is displayed as an independent

digital temperature like "125 IAT".   On non-turbo engines the IAT in reality is the Carburetor temperature and displayed as "34 CRB".

Carburetor (CAT) Probe Installation (Optional)

Use the J1 connector harness 700200 and insert the yellow wire into the connector pin 5 and the red wire into pin 6. All wiring must be type K thermocouple wire. Do not splice ordinary copper wire in any temperature probe circuits. Locate the access hole (1/4-24 thread) in the carburetor near the butterfly valve. Remove the screw plug now in that hole and screw the CRB probe into the carburetor throat. No drilling or machining of the carburetor is necessary.
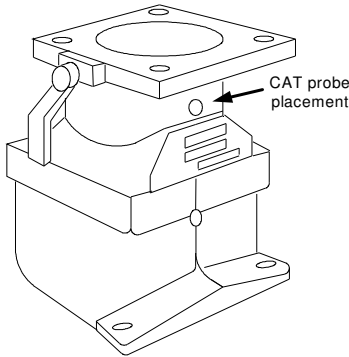
Oil Temperature Probe Installation

Follow any installation instructions included with the 5/8-18 thread probe. Before installing the transducer, twist the red and black leads together, so there is a twist approximately every ½ inch or so. The transducer is mounted on the engine using and is designed for mounting according to MS28034-1 for most USA aircraft manufactured engines. Consult your engine manual for the proper installation location and compatibility. A gasket is supplied for use with the temperature transducer. Install transducer before connecting it to the cable.
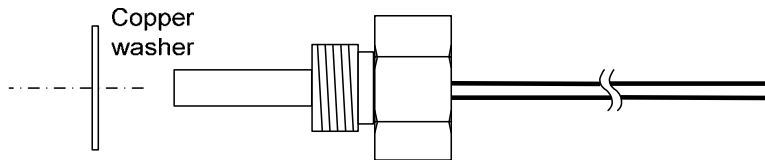
Oil Pressure Sensor Installation

Use the J3 connector harness 790420 labeled OILP. Mount the two ring terminals to the two terminals on the sensor using the hardware screws. Mount the pressure sensor to the pressure line using a 3 to 6-inch flexible hose and fittings (not supplied) as depicted in the drawing below. Use tie-wraps or Alon clamp to mount the pressure sensor to firewall. Do not mount the sensor directly to the engine. Connect the other end of the hose to the engine manufactures recommended location for oil pressure on the engine.

AN-910-1D
1/8 NPT coupling

AN-816-4D
1/8 NPT to flared

MIL-H-8794 hose
MS-24587 fitting (AEROQUIP 491, 2 req'd)

to engine fitting

pressure sensor

flexible tube 6 inch (AEROQUIP 303)

DO NOT MOUNT SENSOR DIRECTLY TO ENGINE
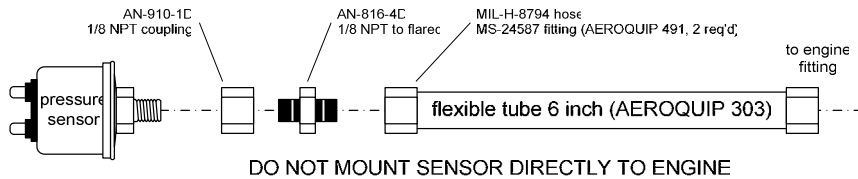
Fuel Pressure Sensor Installation

Transducer for carbureted engines:

AN-910-1D
1/8 NPT coupling

AN-816-4D
1/8 NPT to flared

MIL-H-8794 hose
MS-24587 fitting (AEROQUIP 491, 2 req'd)

to engine fitting

flexible tube 6 inch (AEROQUIP 303)

DO NOT MOUNT SENSOR DIRECTLY TO ENGINE
JPI supplied transducer, all other hardware supplied by installer

FP GND BLK
FP SIG+ WHT
FP PWR RED
FP SIG- GRN

Connect to P5 connector harness 790719-X
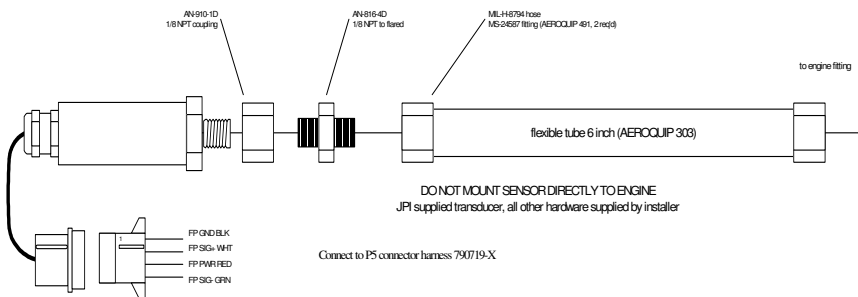
Transducer PN 3018 for injected engines:

AN-910-1D
1/8 NPT coupling

AN-816-4D
1/8 NPT to flared

MIL-H-8794 hose
MS-24587 fitting (AEROQUIP 491, 2 req'd)

to engine fitting

pressure sensor

flexible tube 6 inch (AEROQUIP 303)

DO NOT MOUNT SENSOR DIRECTLY TO ENGINE
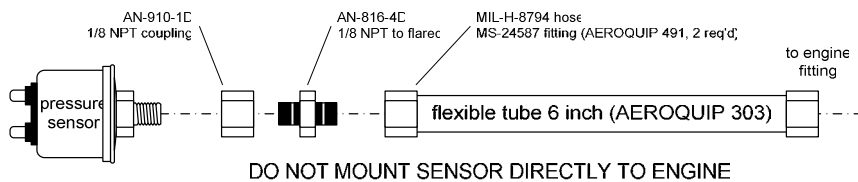
Use the J5 connector harness 790719-X labeled FUELP. Mount the pressure sensor to the pressure line using a 6-inch flexible hose and fittings (not supplied) as depicted in the drawing below. Use tie-wraps to mount the pressure sensor an engine mount structure. Do not mount the sensor directly to the engine. Connect the other end of the hose to the existing pressure line. Later, you will connect the pressure sensor to the four pressure sensor wires through the supplied 4-pin connector. Part No. 790719 required for Carburetor engines PN 306017 for injected engines

RPM Sensor installation

Use the J3 connector harness 790420 and connect the 3 leads using the supplied 3-pin connector and pins. Mount the sensor as shown in the diagram below.

Ammeter Shunt Installation

Use the J5 connect harness 790719-X labeled AMP+ and AMP-. Connect the harness leads using ring terminals to the smaller terminal screws on the side of the shunt.

Charge/Discharge configuration. The shunt can be installed between the master contactor and the main bus in which case it will be in the ammeter configuration showing battery charge and discharge. Be sure that the *positive* side of the shunt is connected to the main bus in the

ammeter configuration. The alarm will be triggered by a discharge condition.
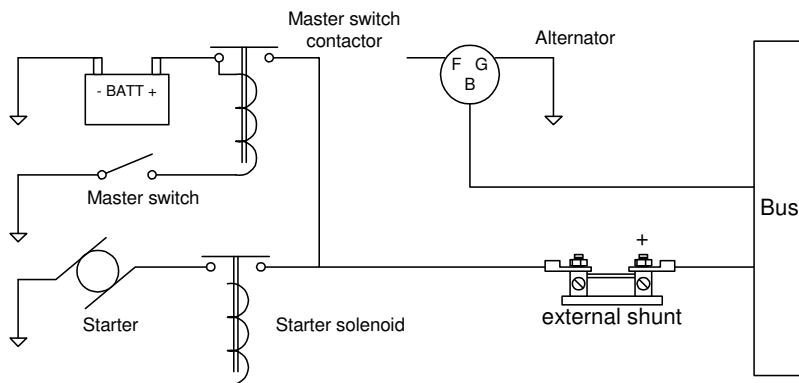
Ammeter Configuration

Load Meter configuration. The shunt must be installed between the alternator output and the main bus. Be sure that the *negative* side of the shunt is connected to the main bus in the *load meter* configuration.
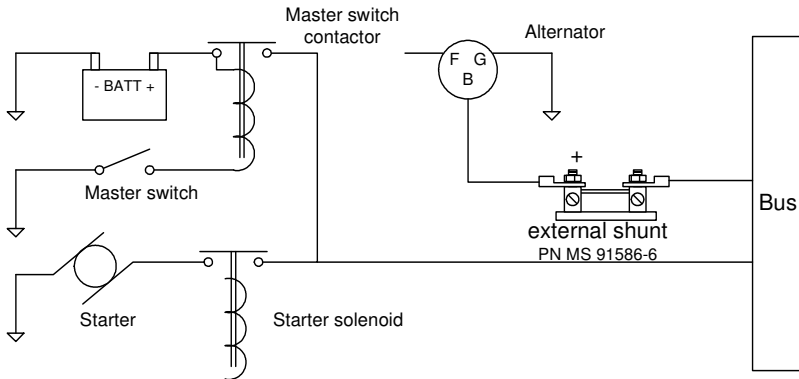
Load Meter Configuration

Capacitive Fuel Level Sender Installation

Do not install probe into metal mounting flange without first applying thread lubricant or damage will occur. Insure all threads are free from burrs and debris.

The fuel level probes are designed to be installed in virtually all types of wing tank configurations. The basic objective are to install the probe so that it can sense the fuel level change from full tank to empty tank (i.e. the probe is wetted the least at empty tank and is wetted the most at full tank) and to position it in such a manner as to allow insertion and removal.

The probe may be cut to a minimum of **16 inches** in length overall (metal end to metal end) and mounted in any direction. Internal spacers are located approximately every foot that supports the inner rod and crimp the rod to prevent it from moving.

See the drawing in illustration section for an example probe installation. These are intended as examples only. As each tank configuration may be different, it is your responsibility to design and implement a proper installation method for your aircraft.

The example shows a cross section of a typical long, flat wing tank. Typically the probe enters the tank from the inboard fuel bulkhead and angles upward so that it is wetted from empty tank to full tank proportionately. Insure that nothing interferes with the probe such as a flop tube, fuel pick-ups, vents or drains, etc.

The probe may enter a fuel tank from the bottom up or vice versa as long as the probe sees at least an 85% coverage change from full to empty.

The following notes should be observed to aid in the proper installation of the probes. See the illustration below.

NOTE 1: Mounting flange installation (Metal knurled flange).

For composite aircraft, the metal mounting flange is "potted" into the tank closeout rib at an angle as dictated by probe placement in the tank. INSURE that the flange edges are surrounded by a generous margin of the potting and that 3 layers of laminate are laminated over the potted areas. This is necessary to insure that the flange is "fuel tight", mechanically rigid and will not be cracked loose during fuel probe installation or vibration in use. For metal tanks, the mounting flange is a weldable aluminum alloy allowing many attachment options.

NOTE 2: Bushing installation (white bushing)

The probe (if longer than 48 inches) should be supported in the middle. Install a bushing in the middle rib or baffle using the fuel

probe as the alignment guide. Bond the bushing to the rib / baffle using the techniques recommended in your aircraft construction manual.

NOTE 3: End supports (white bushing)

The probe end must be supported if more than 4 inches of length remains after the last support point. Position a bushing near the end of the probe so that the edge of the probe is approximately 1/8 inch from the wing skin. Secure the bushing at the surface of the wing using potting mixture. Lay up two layers over the bushing while the potting mixture is still soft to hold the bushing in place. Use the bonding techniques recommended in your aircraft construction manual.

For final installation, prepare the pipe threads of the probe with an aviation fuel proof thread sealant/lubricant according to sealant manufacturers' directions. Insert the probe into the tank and through the bushings until the threads engage. Hand tighten the probe. Now tighten the probe with a torque wrench to 230 INCH POUNDS.
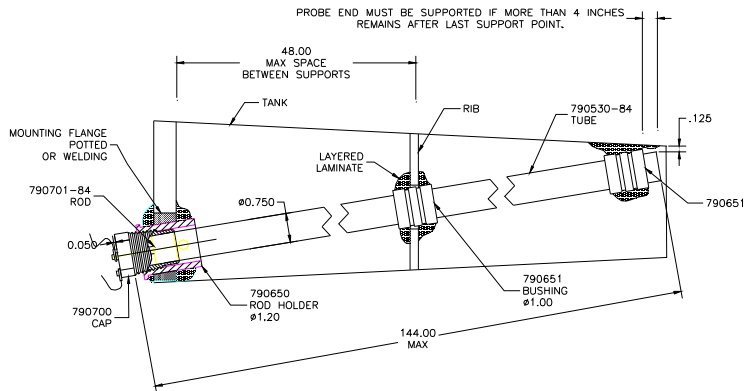
Use the J5 connector harness 700719-2 labeled LEFT TNK and RT TANK. After senders are installed, connect them to the J5 FP/FQ/AMP wiring harness as shown below (only the right tank sender is shown for illustration purposes). Trim the longest pair of gray cables labeled LEFT TNK and RT TANK to length, then crimp the three sockets onto the harness wire, and insert them into the connector housing. Connect this to the capacitive sender pod cable and connect the white wire of the pod cable to the center, insulated terminal on the sender, and

the black wire to the terminal mounted on the metal body on the sender.
Repeat for the other tank sender.
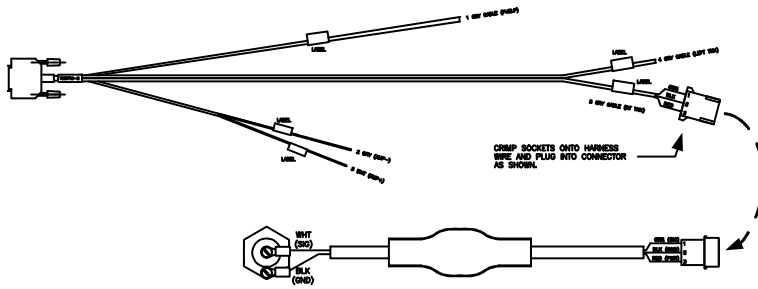
Resistive Fuel Level Sender Installation

Disconnect the fuel level senders from the aircraft's existing wiring
harness, and connect them to the VISION MICROSYSTEMS supplied
harnesses as described below. Make sure they do not have voltage on
them before connecting to the VM1000C.

Use J5 connector harness 700719-3 with two black wire pairs labeled
LEFT TNK RES and RT TANK RES. On installed sensors connect them
to the J5 FP/FQ/AMP wiring harness as shown below. Connect the white
wire to the signal terminal and black wire to the ground terminal of the
resistive fuel level sensor. Tank setup 1- Record the sender resistance at
full (top off). 2 – Burn off or remove approximately ½ tank, and record the
resistance. **For greater accuracy use the AFM to determine the
Calibration point at Zero fuel**. Now with the tank size you can create an
input table. Repeat for the other tank sender.
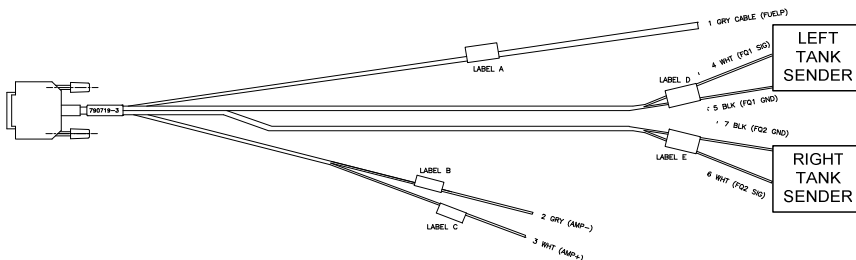
General Fuel Flow Transducer Installation

Use the J4 connector harness 700709 labeled FFSIG (white), FFPWR (red), and FFGND (black). Follow any installation instructions included with the probe. Save your K-factor tag (tied to the transducer) as you will enter the number during initial setup in the step coded 40.6. The fuel flow transducer is mounted in the pressurized side of the fuel delivery line of the engine, not on the suction side. Contact us if your engine is gravity fed. The transducer inlet and outlet are tapped ¼" NPT. Use only aircraft grade components appropriate for the plumbing.

For carburetors the transducer is typically located between the engine driven pump and carburetor. See the fuel pressure installation section for special installation requirements.

For injected applications it is typically located between the fuel flow servo and flow divider or, between the engine driven pump and fuel flow servo. Check with the airframe/engine manufacturer for the proper location.

IMPORTANT NOTES:

- Do not mount the transducer where 'upstream turbulence' may exist. A desired straight or smooth curved path of 5 inches minimum of inlet fuel line is recommended.

- Transducer orientation: If the transducer is not oriented properly (with respect to level) a significant accuracy error can occur. See diagrams for the proper orientation.

- After installation, we recommend wrapping the transducer with a blanket of heat barrier material such as 'FIRE SLEEVE'. Make sure the material is properly secured using standard aircraft practices and procedures.

- Calibration can be performed if needed on the flow transducer by adjusting the K-Factor. See the Set up mode.

The diagram shows a fuel flow transducer installation with the following labels:
- Aeroquip 900591B Clamp
- MS 21919 Clamp as required
- Cut slit in fire sleeve
- Transducer
- up
- Fittings 1/4 NPT. Do NOT use aluminum fittings
- Aeroquip 303 hose
- to carburetor, flow divider, or fuel injector
- 6 inches maximum from support
- Aeroquip Fire Sleeve AE102/62-24
- from fuel tank, throttle body or engine driven fuel pump.

The fuel flow transducer receives signal from any installed 201 or 231 transducer with either of these part numbers embossed on to the top of the transducer**.**

Installing the Fuel Flow Transducer

The transducer output port should be mounted lower or even with the carburetor inlet port (or fuel servo on a fuel injected engine). If this is not possible, a loop should be put in the fuel line between the Fuel Flow Transducer and the carburetor or fuel servo (see diagram below).

Do not remove the caps on the flow transducer until the fuel hoses are ready to be installed.

The flow of fuel through the transducer must follow the direction marked on the transducer.

SIDE VIEW

If the transducer is higher than the carburetor or fuel servo, put a loop between the transducer and carburetor or servo

carburetor or servo
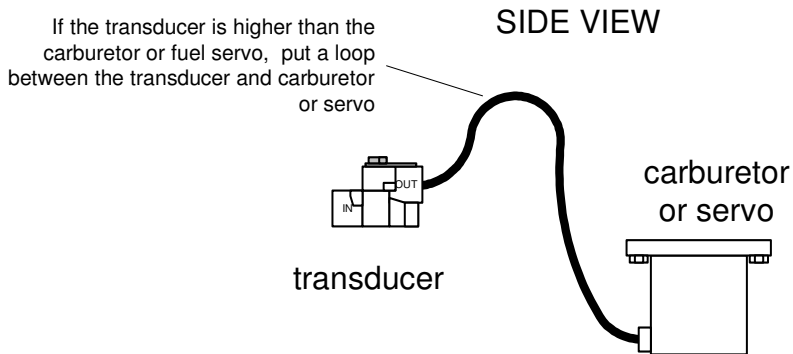
transducer

The flow transducer must be mounted so the wires exiting the transducer are pointing up.

Before connecting any hoses, thoroughly clean them and insure they are free of any loose material. High air pressure may be used. **However, do not allow high air pressure to pass through the fuel flow transducer.**

Route the Fuel Flow Transducer Wires

Route the thermocouple and fuel flow wires from the probes through the firewall using fireproof rubber grommets and flame retarding silicone. Use an existing hole if possible. Following the existing wiring harness and connect to the indicator marking each lead with the cylinder number. All wires must be routed **away from high temperature** areas (exhaust stacks, turbochargers, etc.). Secure Probe leads to a convenient location on the engine approximately 8 to 12 inches from the probe, being sure there is sufficient slack to absorb engine torque. It is essential in routing the probe and fuel flow transducer wires not be allowed to touch metal parts of the air-frame or engine since abrasion will destroy this wire.

After running the engine, check the fuel hoses, transducers and fittings for leaks.

Section 4 - INITIAL SYSTEM SETUP

System Setup

There are two ways to configure the parameters of the VM1000C: use the provided *VisionConfig* program running on a PC or directly using the built in setup menus.

VisionConfig Setup

Overview

The VisionConfig assists you in configuring the VM1000C. The VM1000C has numerous parameters that control the operation of the unit. All the user parameters can be modified by using VISIONCONFIG. VISIONCONFIG provides a MSWindows™ based utility that facilitates modifying these parameters in a user friendly way.

Installation

On your PC, execute VISIONCONFIG setup.exe. Follow the instructions to install the program. The default installation directory is "C:\Program Files\J.P. Instruments\VISIONCONFIG".

Data Communications

VISIONCONFIG can use any available serial port. When you start the program by clicking VISIONCONFIG.exe, the program will search all COM ports on your PC automatically, and list all COM ports in the COM port combo box. You can select any one that is connected with VM1000C. The default baud rate value is 19,200. There are two modes for transfer: Download and Upload. Download mode transfers the configuration data from VM1000C to your PC. Click the Start button. The window will display the number of bytes received. Save the configuration data in a file at the completion of downloading. Upload mode transfers configuration data from your PC to VM1000C. Click the Start button. The program will display the number of bytes sent.

Configuring your VM1000C using your PC
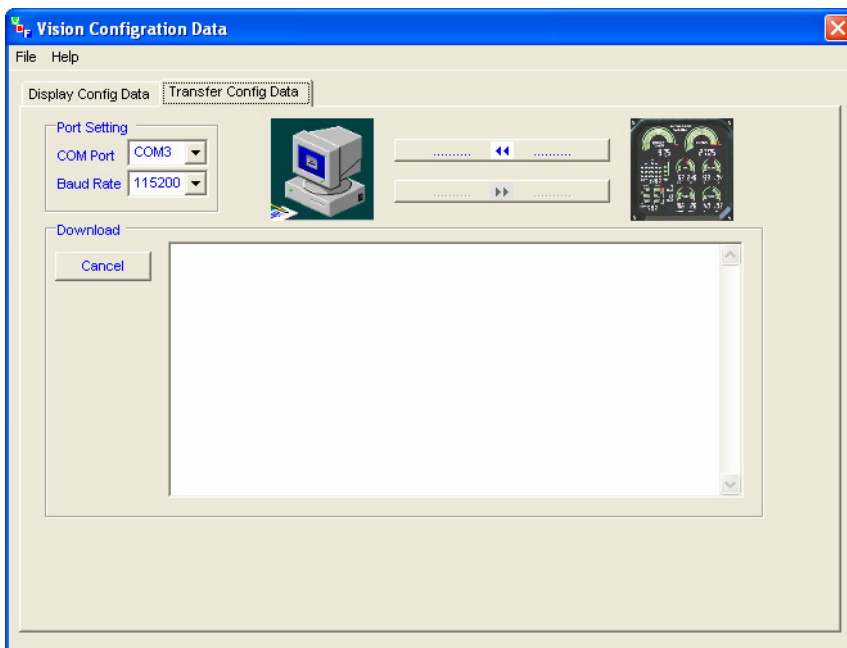
To download the current configuration in the VM100C:

- Start Vision Configuration program.
- When Vision Configuration program starts, click on the **Transfer Config Data** tab.
- Select the desired COM port and transfer speed.
- Click the upper button between the two images

  | ....   ◀◀   .... |

- The system will request data from the VM100C and display the number of bytes transferred in the **Download** status box.

After the configuration data has been downloaded from the VM100C, the program should switch to the **Display Config Data** tab to begin editing the VM configuration.
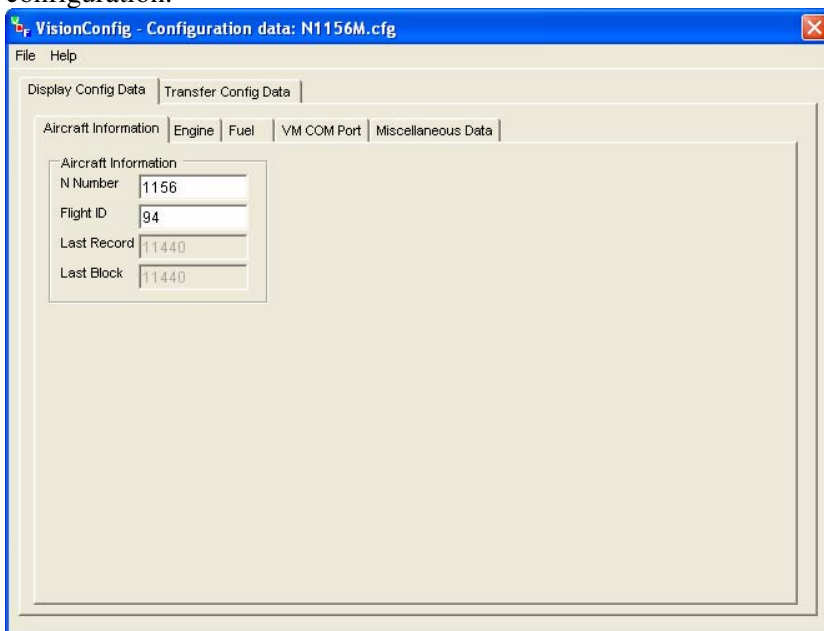
Aircraft Information Tab

- o The only thing you can change here is the aircraft 'N' number. Must be all digits (no alpha characters).

Engine Tab

- o Use this tab to tell the VM1000C about your aircraft's engine an transducers used to monitor the engine.
- o Correct transducer selection is required for proper system operation.
- o Clicking on **User Definable Engine Parameters** will allow you to enter information about specific limits for your engine, such as maximum RPM, Oil Temp, minimum Oil Pressure, etc.

User Definable Engine Parameters

Clicking on a User Definable Engine Parameter name will bring up a
dialog that allow you to set the specific parameters for that gauge. For
example, clicking on **RPM** would bring up a dialog like this:
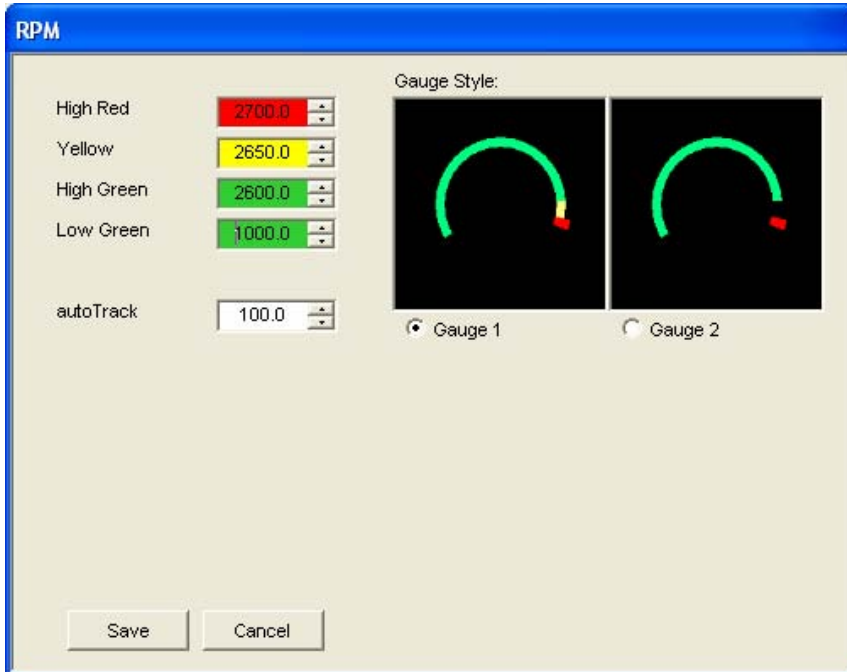
The **High Red, Yellow, High Green** and **Low Green** values describe
where the gauge sweep should begin and end for the particular color.
High Red (and **Low Red** for some gauges) signifies the engine's
"redline" limit and are used to set the VM1000C's alarm values.

Fuel Tab

The **Fuel Tab** allows you to select gallons or liters as your preferred fuel measurement. This tab is also where you tell the VM1000C what the **K-Factor** of your Fuel Flow transducer is. In addition, you can view your fuel table information.

VM COM Port TAB

The **VM COM Port** tab allows you to specify communications
parameters when communicating with other instruments in your aircraft.
Once configured, these values are rarely change.

Miscellaneous Data Tab
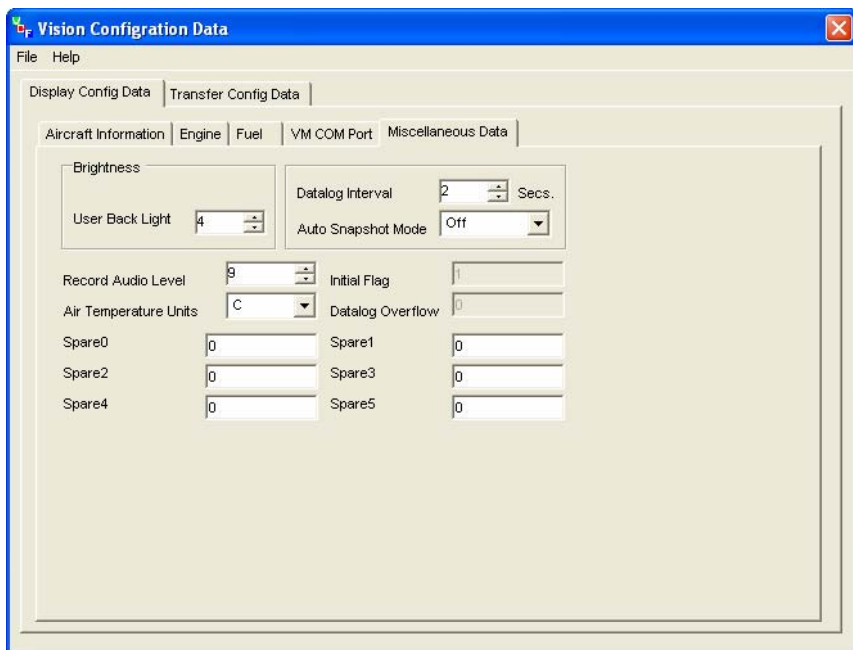
The **Miscellaneous Data** tab allows you to control these major functions:

- Brightness – Display brightness from 1 to 9
- Datalog Interval – controls how often engine values are stored in the Datalog.
- Air Temperature Units – selects Fahrenheit or Celsius **OAT** and **CAT** gauges.

Sending Data Back to VM1000C
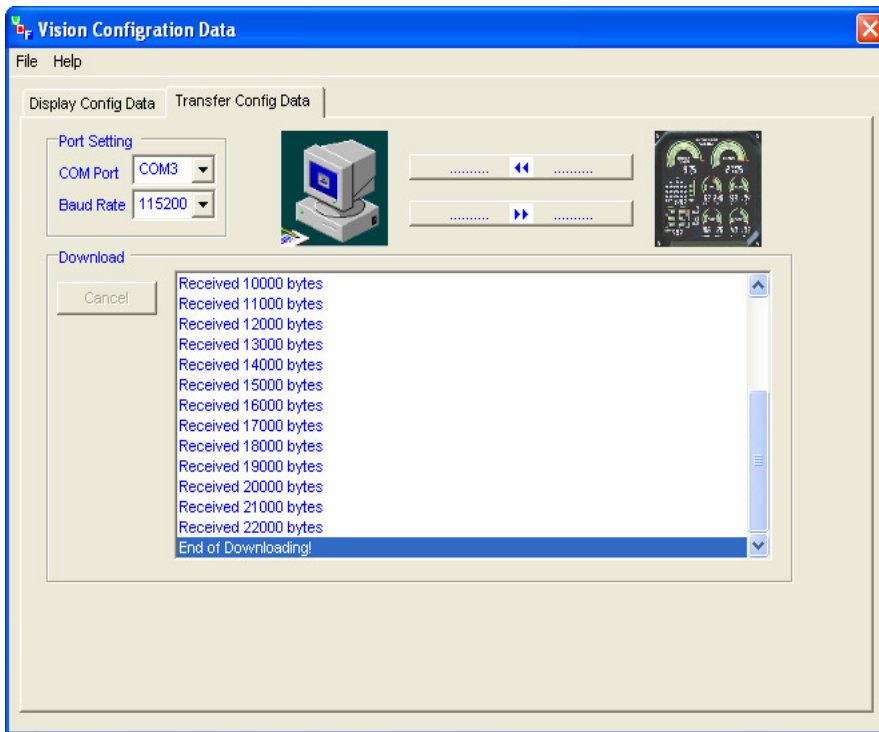
To save your changes to the VM1000C configuration, click on the lower button between the two images [image]   The Vision Configuration program will send the modifications to the VM1000C and when complete the VM1000C will restart with the new values.

After you have finished any modifications, you can save the configuration data as a file by clicking the File menu item and then click Save Config data to a File. Select a file name of enter a new file name.

Command Line Format

When the programs detects the parameters defined on the command line, it will read the command line, transfer configuration data and save them in the specified file automatically. There are total four parameters on the command line:

1. /FILE: the full path of the configuration file.
2. /AUTO: the transfer mode.
3. /PORT: COM port name.
4. /BAUD: the baud rate.

The format of the parameters is as the following:

/file=c:\VISIONCONFIG\test.cfg
/auto=download (or upload)
/port=com1
/rate=19200

They are non case sensitive.

Built-in VM1000C Setup

Setup the VM1000C by performing various steps in the Setup Menu or use Vision Config. All steps within the *Mandatory Setup* section must be accomplished first. Next, verify your actual engine limits agree with the instrument limits by stepping through all of the ENGINE MENU limits. Adjust any displayed graphics/values/limits to match the requirements for your engine/airframe. Finally perform any optional setup, such as fuel level calibration, dimming adjustment, amps zero, manifold calibration, datalog interval, RS232 setup for GPS, data log, VMFPS data ports, EC100 checklist download.

IMPORTANT: Test your datalog port connections using a communications program such as Teraterm or Hyperterm.

During setup, the MAN field displays the current menu item. Accept it (by pressing ❸). In many cases, the RPM field shows an associated value, except ENGINE MENU where gauge range marks and the associated limit values are shown.

To operate the Setup Menu

A. After power has been off for a minimum of 2 minutes, power back up and hold ❶ until you see the first menu code displayed: 10.0.

B. Tap ❶ or ❷ to select to the desired menu code (example: 40.0). Tap ❸ to change values in this category (or ❺ to quit).

C. Tap ❶ or ❷ to select the desired sub-code item, (example: 40.8). Tap ❸ to accept this item (or ❺ to quit).

D. Tap ❶ or ❷ to select the desired value or option and ❸ to accept it. In some cases, pressing ❺ will exit the option without changes.

Mandatory Setup

Code	Sub-code	Category	Values
_10.0_		ENGINE CONFIGURATION	
	_10.1_	Engine Code	1 = Lycoming O360
			2 = Lycoming IO360
			3 = Lycoming O540
			4 = Lycoming IO540
			5 = Continental IO360
			6 = Continental IO550
_20.0_		CLOCK	
	_20.1_	Month	1 .. 12
	_20.2_	Day	1 .. 31
	_20.3_	Year	2004 .. 2199
	_20.4_	Hour	0 .. 23
	_20.5_	Minutes	00 .. 59
	_20.6_	Seconds	00 .. 59
_30.0_		ENGINE HOURS	
	_30.1_	engine hours	

40.0		MISCELLANEOUS	
	40.1	Lycoming or Cont CHT numbering.	1 = Lycoming cylinder number front (2,1), middle (4,3), rear (6,5). 2 = Continental cylinder number front (6,5), middle (4,3), rear (2,1)
	40.2	Magneto or Electronic Ignition.	1 = Magneto Ignition 2 = Electronic Ignition
	40.3	Fuel Pressure Type	1 = CRB 2 = Injected. 3 = Kavlico 4 = UMA 5 = Invensys (Ratiometric)
	40.4	Fuel units.	1 = US gallons 2 = liters 3 = UK gallon
	40.5	Fuel level type	0 = none 1 = floats 2 = capacitance
	40.6	Flow sensor K factor (embossed on transducer)	1000 .. 8700
	40.7	Max fuel total limit	1 .. 400
	40.8	Low fuel total alarm	0 .. 400
	40.9	Temperature units.	1 = F ° 2 = C °
	41.0	Lean method	1 = rich of peak 2 = lean of peak
	41.1	Datalog interval in seconds	6 .. 720
	41.2	Alarm volume level	0 .. 100
	41.3	Auto Snapshot Mode	0 = off 1 = on

41.4	MAN transducer	1 = Standard 2 = Kavlico 3=UMA
41.5	FADEC option.	0 = no fadec 1 = fadec
41.6	Number of TIT probes	0 = none 1= one TIT 2 = two TITs
41.7	Engine rated HP from that set in engine setup	85 .. 900
41.8	User Shock Cooling rate alarm	15 .. 120 °/min
41.9	Oil Pressure Type	1 = VDO only
42.0	OAT Units	1 = F ° 2 = C °

End of initial mandatory setup

User Setup

45.0	Backlight low level.	2 .. 150
45.1	GAMI HP constant	0 .. 16.0 (only change this if you have GAMI injectors and are knowledgeable on them)
45.2	Amps Sensor Type	Always 100 Amps
45.3	Manifold Pressure correction	Manifold adjustment +/- 3.0 inches of Hg.
45.4	(function reserved)	
45.5	Software revision number	Read-only. Cannot be changed
45.6	Aircraft Id#	0000-9999
45.7	EC100 status	0 = not present 1= present 2=EC150 with voice

50.0		User definable engine parameters	* **If chosen** in "range marks desired" section
	50.1	Percent power	• range marks desired • low green • high green • high red (if chosen*) • Autotrack tolerance • Alarm tolerance
	50.2	Manifold pressure	• range marks desired • low green • high green • high red (if chosen*) • Autotrack tolerance • Alarm tolerance
	50.3	RPM	• range marks desired • low green • high green • high red • Autotrack tolerance • Alarm tolerance
	50.4	Oil pressure	• Idle low red (idL) • low red (nor) • low green • high green • high red • Autotrack tolerance • Alarm tolerance
	50.5	Oil temperature	• range marks desired • low red (if chosen*) • low green • high green • high red • Autotrack tolerance • Alarm tolerance

50.6 Volts
- low red
- low green
- high green
- high red
- Autotrack tolerance
- Alarm tolerance

50.7 Amps
- range marks desired
- low red (if chosen*)
- low green
- high green
- high red (if chosen*)
- Autotrack tolerance
- Alarm tolerance

50.8 Fuel computer
- range marks desired
- low red (if chosen*)
- low green
- high green
- high red (if chosen*)
- Autotrack tolerance
- Alarm tolerance

50.9 Fuel pressure
- range marks desired
- low red (if chosen*)
- low green
- high green
- high red (if chosen*)
- Autotrack tolerance
- Alarm tolerance

51.0 CHT
- 6 or 4 cylinder engine
- low green
- high green
- high red
- Autotrack tolerance
- Alarm tolerance

51.1	EGT	• bottom segment
		• top segment
		• Autotrack tolerance
		• Alarm tolerance
51.2	TIT	• low green
		• high green
		• high red (tithi)
		• low red (titln)
		• Autotrack tolerance
		• Alarm tolerance
60.0	Fuel Level Calibration	
60.1		• range marks desired

Perform the following steps for each tank you are using:

1. **Add desired unit of fuel (we recommend 2 gallon increments) (do a 0 cal first)**

2. **Hold ❷ or ❶ to set the current total of fuel in tank. (displayed on fuel indicator)**

3. **Calibration number will change as fuel level change (RPM display)**

4. **Tap ❸ to accept this data point. (value will increment to next minimum allowed)**

5. **Repeat 1 thru 4 until the tank is full and final data point accepted then tap ❺ next**

If a Calibration has already been done, it must be erased before performing the calibration again. See page 49

60.2	**PRIMARY left fuel tank cal**
60.3	**PRIMARY Right fuel tank cal**

60.4	**PRIMARY left tank alarm (cant set the alarms unless a cal has been done)**	
60.5	**PRIMARY right tank alarm**	
60.6	**SECONDARY (GROUND) left tank cal**	
60.7	**SECONDARY (GROUND) right tank cal.**	
60.8	**SECONDARY (GROUND) left tank alarm**	
60.9	**SECONDARY (GROUND) right tank alarm**	
61.0	**Erase PRIMARY left tank cal (❶ ❸ ❹ held down to erase) ❺ will exit**	
61.1	**Erase PRIMARY Right tank cal**	
61.2	**Erase SECONDARY (GROUND) left tank cal**	
61.3	**Erase SECONDARY (GROUND) right tank cal**	
70.0	**RS232 Setup**	
70.1	**Port A (TTY0) baud rate**	9600, 19200, 38400, 57600
70.2	**Port B (TTY1) baud rate**	4800, 9600, 19200, 38400, 57600

70.3	**Port B (TTY1) output mode**	0 = none 1 = Shadin generic 2 = Shadin Mode S
70.4	**Download Data**	1 = files since last download 2 = all files
70.5	**Send test message to both ports.**	
70.6	**EC100 upload**	
		1 = upload EC100 checklist from PC (use Teraterm to send) 2 = download the EC100 that is currently in VM1000C (use log option in Teraterm)
70.7	**Download System Configuration to PC**	
70.8	**Upload system configuration from PC**	
70.9	**Erase All Flights.**	Hold ❶❸❹ simultaneously to erase, ❺ to exit mode. The WARN enunciator will flash until you either tap ❺ to escape or ❶❸❹. WARN will remain on until erasure is complete.

Percent Power Operation / Calibration

Calibration steps on the ground

> STEP 1: Set MISCELLANEOUS: LEANING MODE to Rich of
> Peak.

STEP 2: Set MISCELLANEOUS: ENGINE HORSEPOWER to your engines rated horsepower.

STEP 3: If you have a GAMI Horsepower Constant calculated, then enter it in MISCELLANEOUS: GAMI HORSEPOWER CONSTANT.

STEP 4: Using your engine operation manual, determine the RPM, MAN and desired Altitude to obtain 75% power. Write these three down for reference later.

Calibration steps in the air

STEP 5: Setup the 75% power RPM & MAN and altitude from STEP 4. Correct this percentage for the outside air temperature and note it.

STEP 6: Perform a leaning operation to 50° Rich of Peak.

STEP 7: Enter the %HP calibrate mode by holding ❶ and ❷ until the MAN and %HP icons alternately flash.

STEP 8: Tap ❶ or ❷ to adjust % HP to the corrected %HP noted from STEP 5.

STEP 9: Tap ❸ to save the calibration or ❺ to cancel the mode.

Fuel Level System Calibration

The VM1000C supports either single or dual fuel tank monitoring. Each monitored tank must have a PRIMARY CALIBRATION performed. For aircraft having a significantly different calibration reading in cruise vs. on the ground, such as taildraggers, you may optionally perform a SECONDARY CALIBRATION. The VM1000C will then automatically switch between PRIMARY (airborne) and SECONDARY (ground) calibrations as needed. See FUEL LEVEL CALIBRATION for the commands on fuel level calibration. Note: Any previous tank calibration must be erased before performing the new calibration.

First, prepare the tank for calibration by draining it to UNUSABLE fuel and positioning the aircraft in the desired calibration attitude - cruise attitude for the PRIMARY (required) or ground attitude (optional) for SECONDARY.

These are the basic steps for each tank calibration

STEP 1. With UNUSABLE fuel in the tank and fuel level indicator showing zero quantity, Tap ❸ to save this data point.

STEP 2. Add desired increment of fuel (we recommend 2 gallon (8 liter) increments).

STEP 3. Tap ❶ or ❷ to set the fuel level quantity indicator to agree with the usable fuel in the tank.

STEP 4. Tap ❸ to accept this calibration data point. The fuel sensor signal output is shown in the RPM field (note that it changes when fuel is added). Write the value down and the current fuel quantity. Repeat from STEP 2 until your tank is full.

STEP 5: Tap ❺ to exit the fuel tank calibration.

Section 5 - CONNECTOR PIN ASSIGNMENTS

P1 Options 25-pin connector

Pin no.	Pin no.	Probe or function
yel 1	red 2	OIL
yel 3	red 4	IND
yel 5	red 6	CARB*
yel 14	red 15	OAT
yel 16	red 17	TIT-1
yel 18	red 19	TIT-2
	gry 12	Remote alert T,V
	red 13	+ Power
	wht 11	data in
	wht 24	data out
	blk 25	Engine ground

P3 MAN-RPM 9-pin connector

Pin no.	Function/ sensor pin
grn 1	RPM sig /1
blk 2	RPM grd /2
red 3	RPM pwr /3
red 4	MAN pwr /3
blk 5	MAN grd /1
6	OIL P sig
7	OIL P grd
wht 8	MAN sig+ /2
grn 9	MAN sig- /4

P4 Fuel Flow 15-pin connector

Pin no.	Function
1	out to GPS
2	in from GPS
3	
wht 4	FF signal
red 5	FF power
blk 6	FF ground
10	R Fuel Low Switch
11	remote FF alarm
wht 12	FF2 signal
13	L Fuel Low Switch
14	AMPS 2 +
15	AMPS 2 -

*Displays as CRB if IAT probe is not present; displays as CDT is IAT if present.

P2 EGT CHT 25-pin connector

Pin no.	Pin no.	Probe or function
yel 1	red 2	CHT 1
yel 3	red 4	CHT 2
yel 5	red 6	CHT 3
yel 7	red 8	CHT 4
yel 9	red 10	CHT 5
yel 11	red 12	CHT 6
yel 14	red 15	EGT 1
yel 16	red 17	EGT 2
yel 18	red 19	EGT 3
yel 20	red 21	EGT 4
yel 22	red 23	EGT 5
yel 24	red 25	EGT 6

P5 FP/FQ/AMP 15-pin connector

Pin no.	Function
1	FQ 1 (res)
2	FQ 2 (res)
3	FQ grd
4	FP Sig+
5	FP Sig-
6	FP pwr
7	FP grd
8	
9	FQ1 sig (cap)
10	FQ2 sig (cap)
11	FQ1 pwr (cap)
12	FQ2 pwr (cap)
13	Volts 2 sense
14	AMPS +
15	AMPS -

View facing rear of instrument

P2   P1   P5   P4   P3

EGT / CHT

Options, power

FP / FQ / Amps   female connector

FF / GPS

RPM / MAP / OP

Remote
Display Unit
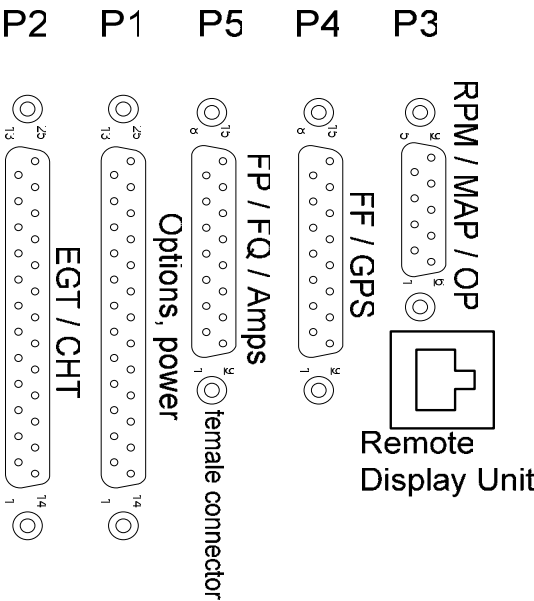
Section 6 - TECHNICAL SUPPORT

Website: http://www.visionmicrosystems.com/

Email support: support@visionmicrosystems.com

Index