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Supplement Number: 1

FAA-Approved
Airplane Flight Manual Supplement
For
The New Piper Aircraft, Inc. (Piper Aircraft Corporation)
PA28-140, PA28-150, PA28-151, PA28-160, PA28-161, PA28-180,
PA28-235, PA28-236, PA28R-180, PA28-181, PA28R-200, PA28-201,
PA28-201T, PA28RT-201, and PA28RT-201T Aircraft
Ref: Type Certificate: 2A13

Airplane Reg. No. N6527J Airplane S/N 28-4965

This supplement must be attached to the applicable FAA Approved Airplane Flight Manual when the airplane is modified by the installation of a Horizon Instruments Inc.'s Model P-1000 Electronic Engine Digital Tachometer in accordance with STC SA5842NM.

The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED:

Patrick Power

Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office
Transport Airplane Directorate

Date: 10-19-05

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AFM Supplement to
 Piper PA28 Series
 (See AFMS page 1 for model listing)
 FAA STC SA5842NM

Revision Number	Pages Attached	Description	FAA Approved
--	1-8	Original Issue	<u>Donald Armstrong</u> Mgr: Flight Test Branch, ANM-160L FAA, Los Angeles, ACO Transport Airplane Directorate Date: <u>9/14/1992</u>
A	1-8	Addition of -403, -602, -603, -608, and -406 Tachometers, revision of headers and footers	<u>Donald Armstrong</u> Mgr: Flight Test Branch, ANM-160L FAA, Los Angeles, ACO Transport Airplane Directorate Date: <u>1/04/1993</u>
B	1-7	Minor text and font changes and new address listed. Added table of contents. Added new part number due to AD 2002-09-08 listing new restricted range marking. Refer to Tachometer Part Number P100-070-463-00 for further details.	<u>Thomas A. Enyart</u> Manager, Propulsion Branch ANM-140L FAA, Los Angeles ACO Transport Airplane Directorate Date: <u>5/02/2003</u>
1	1-7	Reissue of complete supplement for Horizon Instruments, Inc. address change and several minor editorial revisions	<u>Patrick Power</u> Manager, Flight. Test Branch FAA, Los Angeles ACO Transport Airplane Directorate Date: <u>10-18-05</u>

Section I. General: No Change

Section II. Limitations:

This table lists each engines operating range by the lowest RPM within the operating range. Ranges are listed in order from the highest (engine Red-line) on the left side of the table to the lowest on the right side. Note that an RPM range with no colored marking is denoted as a black, or "BLK", range.

RPM ARC PLACARDING									
Tachometer Part Number	Top Arc		Arc 2		Arc 3		Arc 4		C Y L
	RPM	COLOR	RPM	COLOR	RPM	COLOR	RPM	COLOR	
P100-070-401	<u>2700</u>	RED	<u>2699</u> 2200	GRN	<u>2199</u> 2000	RED	<u>1999</u> 500	GRN	4
P100-070-402	<u>2700</u>	RED	<u>2699</u> 2350	GRN	<u>2349</u> 2150	YEL	<u>2149</u> 500	GRN	4
P100-070-403	<u>2700</u>	RED	<u>2699</u> 2650	YEL	<u>2649</u> 500	GRN	----	----	4
P100-070-463 [⊃]	<u>2700</u>	RED	<u>2699</u> 2350	GRN	<u>2349</u> 2000	RED	<u>2099</u> 500	GRN	4
P100-070-407	<u>2700</u>	RED	<u>2699</u> 1950	GRN	<u>1949</u> 1500	YEL	<u>1499</u> 500	GRN	4
P100-070-408	<u>2700</u>	RED	<u>2699</u> 500	GRN	----	----	----	----	4
P100-070-602	<u>2400</u>	RED	<u>2399</u> 500	GRN	----	----	----	----	6
P100-070-603	<u>2575</u>	RED	<u>2574</u> 500	GRN	----	----	----	----	6
P100-070-608	<u>2700</u>	RED	<u>2699</u> 500	GRN	----	----	----	----	6
P100-070-609	<u>2575</u>	RED	<u>2575</u> 2200	GRN	<u>2199</u> 2000	YEL	<u>1999</u> 500	GRN	6

⊃ Note: Due to AD 2002-09-08, Amendment 39-12741, Docket No. 2000-NE-08-AD which supersedes AD 77-12-06R2, Amendment 39-3097; all Piper PA28R-200 aircraft models have a new restricted range marking on the tachometer. The engine tachometer face or bezel is to be remarked with a red arc for a restricted engine speed range between 2000 and 2350 rpm as per AD 2002-09-08. Refer to "Instruments Panel Modifications" (c) (1) & (c) (3).

PLACARDS

The face of the P-1000 tachometer is placarded with the Engine RPM Operating Range information that normally appears on the face of a mechanical tachometer. This includes the RED (restricted), YELLOW (cautionary or transient) and GREEN (normal) operation RPM ranges.

A placard is provided to label the newly installed circuit breaker for operation with the P-1000 tachometer. This placard is placed on the circuit breaker panel. Refer to Figure 1.

Tachometer

Figure 1, Circuit Breaker Placard

Section III. Emergency Procedures: No Change

Section IV. Normal Procedures:

The operation of the P-1000 Electronic Digital Engine Tachometer is straightforward. After power is supplied to the Tachometer, the engine is started, self-tests are performed, and the default display of engine RPM appears on the display. The default display is insured by the use of internal timers that will restore the display to the current RPM even in the event that one of the panel buttons becomes stuck or defective.

Internally, independent tachometers watch the pulses received from each magneto. Each tachometer is accurate to less than 1 RPM and can be individually enabled/disabled via buttons on the face of the Tachometer. Refer to items K and I on page 5 of 7.

Engine operating ranges are indicated on the large green, yellow, and red LEDs (Light Emitting Diode). See page 7, items D, E, and F. Three small LED magneto system *alert* indicator lights are located within the "**Status**" area on the upper left corner of the Tachometer face. See items A, B, and C on page 7, figure 2. The left and right red LED *alert* indicator lights, when illuminated, indicate, because of a loss of the ignition signal to the Tachometer, a possible malfunction of the respective left or right magneto ignition system.

While performing a magneto check during engine run-up, the red *alert* indicator lights will illuminate, thus identifying the grounding of the respective right or left magneto systems.

IGNITION SWITCH POSITION	TACHOMETER MAGNETO ALERT INDICATOR LIGHTS	
	LEFT STATUS LED	RIGHT STATUS LED
Both OFF	ON	ON
Left ON, Right OFF	OFF	ON
Right ON, Left OFF	ON	OFF
Both ON	OFF	OFF

Between the left and right red magneto ignition system *alert* indicators is a yellow "**RPM Synchronization**" indicator. This small yellow indicator is illuminated when there is a difference of more than 80 RPM between the right and left tachometers. This indicator also may flicker during extreme RPM excursions of the engine.

There are three panel buttons (see items J, K, and I on page 7, figure 2). Each button has two modes of operation:

- ❖ Press-and-hold,
- ❖ Press-and-release.

Press-and-hold button operations instruct the Tachometer to perform a *specific operation* when a button is pressed and held for more than 2/3 of a second. Press-and-hold button operations are placarded on the face of the Tachometer above each button.

Similarly, press-and-release button operation instructs the Tachometer to perform a specific operation when a button is pressed and released in less than 2/3 of a second. Press-and-release button operations are placarded on the face of the Tachometer below each button.

PRESS AND HOLD OPERATIONS

The left button, K, upon depression, will cause the Tachometer to display the non-fractional portion (0000.) of the current accumulated engine hours. When the button is released, the fractional part of the engine hours (.00) is displayed for a short period of time. The clock is started whenever the engine RPM exceeds 800 RPM and is recorded in real hours.

The right button, I, upon depression, will cause the Tachometer to display the current contents of the RPM **trap**. This trap records the highest engine RPM achieved before the button was pressed. The middle button, J, upon depression, clears the RPM trap and the RPM trap is zeroed. When the button is released, the trap will record the current engine RPM.

PRESS AND RELEASE OPERATIONS

During normal operation, the Tachometer presents the average of the left and right internal tachometers on the display. However, a mechanism exists to **mask** either tachometer from the display, leaving the remaining tachometer to display its RPM.

The regular flashing of the right or left signal loss status indicator LEDs indicates a masked tachometer. This feature is handy when attempting to determine magneto/ignition problems.

Quickly pressing and releasing the left button, K, causes the Tachometer to mask or un-mask the left internal tachometer.

Quickly pressing and releasing the right button, I, causes the Tachometer to mask or un-mask the right internal tachometer.

An internal interlock prevents masking both internal tachometers at the same

time, therefore preventing total loss of RPM indication.

If the tachometer is masked, pressing the button will un-mask it and allow its RPM to show on the display; and conversely, if the tachometer is un-masked, pressing the button will mask it from the display.

Quickly pressing and releasing the center button, J, causes the Tachometer to alternately dim or brighten the LED indicators.

The LED indicators, see items A thru F, are bright enough to overcome daylight washout conditions. However, during night operations the large green, yellow, and small red and yellow LEDs are **dim-able**. The large red LED still operates at full intensity to maximize the possibility of gaining pilot attention during excursion into restricted RPM ranges.

Section V. Performance: No Change

Section VI. Weight & Balance and Equipment List: Negligible Change

Section VII. System Description

The Horizon Instruments' Model P-1000 Electronic Digital Engine Tachometer is an electronic replacement for an existing mechanical cable-driven tachometer.

The Tachometer differs from a mechanical tachometer in the following areas:

The Tachometer is fully electronic and uses timing information from the primary leads ("P-Leads") of both the left-hand and right-hand magneto ignition systems, operating the P-1000's internal left and right tachometers, to determine engine rpm instead of a rotating cable driving a magnetic slip-clutch analog type display.

The Tachometer uses super bright LED indicators to indicate normal range engine operation (Green LED), cautionary range operation (Yellow LED), and do-not-exceed or restricted range RPM (Red LED) as substitutes for the ranges normally painted on the tachometer dial.

The primary display consists of four 1/2" high characters on a backlit Liquid Crystal Display (LCD), easily and clearly visible in daylight and night flying.

Diagnostic features available include: *alert* indication of loss of magneto signal, indication that both magnetos are reporting different RPM, and the ability to mask RPM from either magneto.

Magneto test, via the ignition switch, is indicated by the illumination of the grounded magneto system's *alert* light and the display of the amount of RPM that the engine has slowed. This is indicated as a negative number on the display (number is preceded by a leading hyphen or minus sign).

LED indicators are dim-able (except the restricted or red-light indicator) to reduce pilot annoyance during night flying.

A specific engine hour is preset at the factory to accommodate Tachometer changes on non-zero-time engines. Only Horizon Instruments, Inc may change engine time.

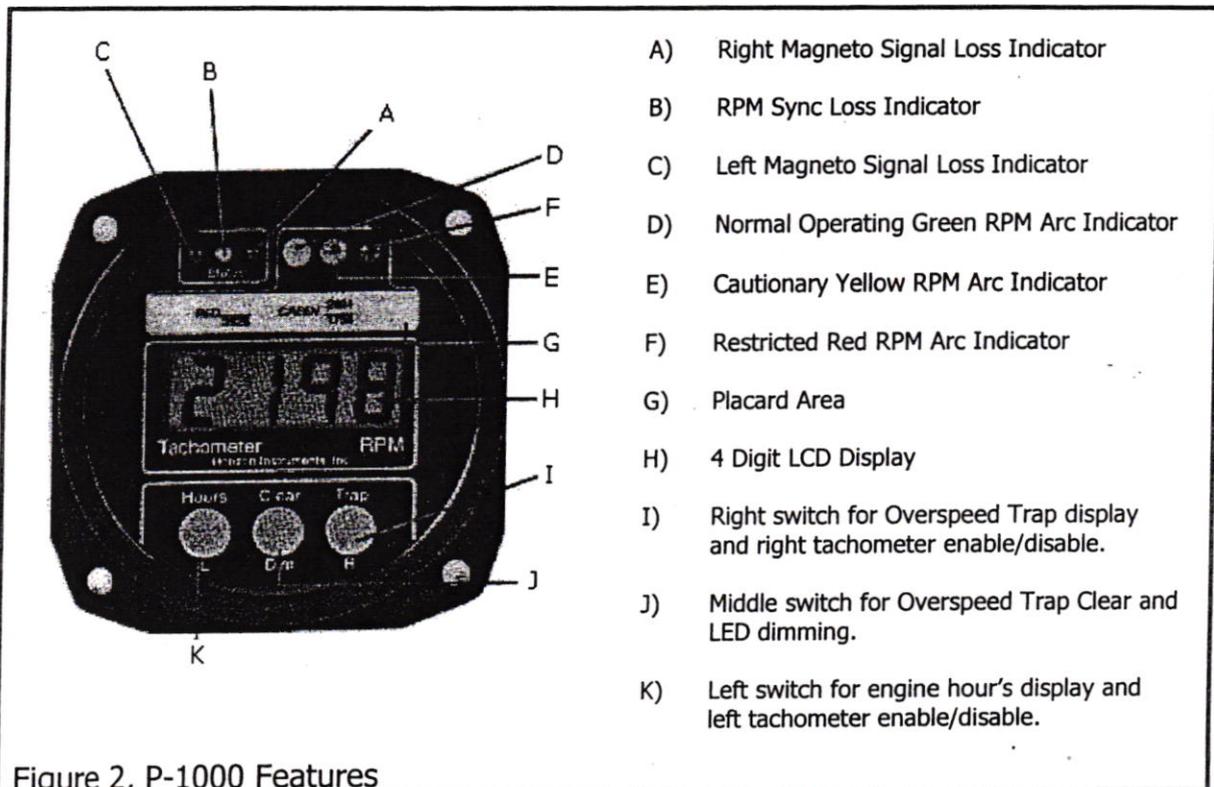


Figure 2, P-1000 Features

Section VIII. Additional Information

For additional information about the operation and installation, refer to Horizon Instruments, Inc. Document Number P103050 Horizon Instruments, Inc. Model P-1000 Installation & Instruction Manual.

A dataplate with all pertinent operational and configuration information is attached to the exterior of the P-1000.