HORIZON INSTRUMENTS, INC.

Supplemental Type Certificate Permission Statement

(Individual Version)

To: Richard Mann

Horizon Instruments, Inc. hereby grants to the person(s) named above a one time only usage of Horizon Instruments, Inc.'s Supplemental Type Certificate Number **SA5822NM** to install a P-1000 Digital Tachometer in a **Cessna 182L.** A Copy of this Statement must remain attached to all copies of the Supplemental Type Certificate.

Supplemental Type Certificate installations are to be performed by the proper personnel, and must use the installation instructions, drawings and other information for reference on the Supplemental Type Certificate.

For Horizon Instruments, Inc.:

Authorized Signature

October 30, 2014

Date

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United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number SA5822NM

This Certificate issued to Horizon Instruments, Inc.
600 S. Jefferson St., Unit C
Placentia, CA 92870

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations, including Amendments 3-8 and Part 23 of the Federal Aviation Regulations, Amendment 23-41.

Original Product Type Certificate Number: 5A6

Make: Cessna

Model: 182, 182A, 182B, 182C, 182D, 182E, 182S, 182T

Description of Type Design Change: Installation of an Engine Electronic Digital Tachometer, Horizon Model P-1000, P/N P100053- (Applicability Table on continuation sheet) in Cessna 182 series aircraft, in accordance with Horizon Instruments, Inc. Master Drawing List No. P100053, Rev. N/C, dated March 12, 1992, or later FAA approved revision.

Horizon Airplane Flight Manual Supplement No. 1, dated August 12, 1992, or later approved revision is required.

Limitations and Conditions: The installation should not be incorporated in any aircraft unless it is determined that the interrelationship between this installation and any previously approved configuration will not introduce any adverse effect upon the airworthiness of the aircraft. The approval of this modification applies to the above noted airplane model series only. A copy of this STC must be included in the permanent records of the modified aircraft. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: April 8, 1991

Date of issuance: August 28, 1992

Date reissued: January 14, 2002

Date amended: January 7, 2005

By direction of the Administrator

(Signature)

Manager, Propulsion Branch
Los Angeles Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of this Supplemental Type Certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

TRANSFER ENDORSEMENT

Transfer the ownership of the Supplemental Type Certificate Number_____

to *(Name of transferee)*_____

*(Address of transfer)*_____
(Number and street)

_____
(City, State, and Zip code)

from *(Name of grantor)* *(Print or type)*_____

(Address of grantor) _____
(Number and street)

_____
(City, State, and Zip code)

Extent of Authority (if licensing agreement):_____

_____

_____

_____

Date of Transfer:_____

Signature of grantor *(In ink)*:_____

United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number SA5822NM

Applicability Table

Aircraft Model	Year	Serial Numbers	Horizon Tachometer P/N
182	1956		P100053-143
182A	1957	30640 - 30265	P100053-143
182A	1958	30266 - 31260	P100053-143
182B	1959		P100053-143
182C	1960		P100053-143
182D	1961		P100053-143
182E	1962		P100053-143
182F	1963		P100053-143
182G	1964		P100053-143
182H	1965		P100053-143
182J	1966		P100053-143
A182J	1966		P100053-143
182K	1967		P100053-143
A182K	1967		P100053-143
182L	1968		P100053-143
A182L	1968		P100053-143
182M	1969		P100053-143
182N	1970		P100053-143
A182S	1970		P100053-143
182N	1971		P100053-143
182P	1972		P100053-143
182P	1973		P100053-143
A182S	1973		P100053-143
182P	All		P100053-143
182Q	All		P100053-145
182R	All		P100053-145
T182R	All		P100053-145
R182	All		P100053-145
TR182	All		P100053-145
182S	All		P100054-132
182T	All		P100053-132

-END-

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

Horizon Instruments, Inc.
600 South Jefferson Street Unit C
Placentia, CA 92870

Document Number: 1

FAA Approved

Airplane Flight Manual Supplement

for

Installation of Horizon Instruments, Inc.
P-1000 Electronic Digital Engine Tachometer

in

Cessna 182 Series Airplanes

Reference FAA Type Certificate Data Sheet 3A13

This document supplements the FAA Approved Airplane Flight Manuals applicable to Cessna 182 Series airplanes. It describes limitations and operating procedures for the Horizon Model P-1000 Electronic Digital Engine Tachometer installed in Cessna 182 Series Airplanes in accordance with Supplemental Type Certificate SA-5822-NM.

The information in this document supplements or supersedes the Airplane Flight Manual only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the Airplane Flight Manual. Both the Airplane Flight Manual and this Supplement must be carried in the airplane at all times

FAA APPROVED: Patrick Power

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

Original Approval Date: 8/12/1992

Revision A Date: January 5, 2005

Horizon Instruments, Inc.
600 South Jefferson Street, Unit C
Placentia, CA 92870
Document Number: 1

AFM Supplement to
Cessna 182 Series Airplanes
FAA STC SA-5822-NM

Revision Number	Pages Attached	Description	FAA Approved
Original	1-7	Original Issue	*Donald Armstrong* Manager, Flight. Test Branch, ANM-160L FAA, Los Angeles ACO Transport Airplane Directorate Date: 8/12/1992
A	1-7	Change of address, added a new tachometer part number, minor text changes.	Patrick Power Manager, Flight Test Branch, ANM-160L FAA Los Angeles ACO Transport Airplane Directorate Date: 1-5-2005

Section I. General

No Change

Section II. Limitations

This table of Tachometer Part Numbers applicable to the engines specified for all Cessna 182 Series Airplanes lists each engine operating range by the lowest RPM within that 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		LOWEST ARC		CYLS
	RPM	COLOR	RPM	COLOR	RPM	COLOR	RPM	COLOR	RPM	COLOR	
P1000053-143	2600	RED	2450	BLK	2200	GRN	–	–	–	–	6
P1000054-145	2400	RED	2100	GRN	--	–	–	–	–	–	6
P1000054-132	2400	RED	2000	GRN	–	--	–	–	–	–	6

Placards:

The face of the P-1000 tachometer is placarded with the Engine RPM Operating Range information that normally appears on the face of the 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. See Figure 1.

TACHOMETER

Figure 1

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 and the self-tests are performed, the default display of engine RPM appears on the display. The default display is insured via 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, two 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.

Engine operating ranges are indicated on the large green, yellow, and red LEDs. (See page 7, items D, E, and F.)

Three small LED magneto systems *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 LIGHT	
	RIGHT	LEFT
OFF	On	On
R	Off	On
L	On	Off
BOTH	Off	Off

Between the left and right red magneto ignition systems *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 I, J, and K 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 (**Hours**) pressed and held, 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 (**Trap**) pressed and held, 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 (**Clear**) pressed and held, clears the RPM trap. During depression of this button, 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 (**L**) causes the Tachometer to mask or un-mask the left internal tachometer.

Quickly pressing and releasing the right button (**R**) 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 (**Dim**) causes the Tachometer to alternately dim or brighten the LED indicators.

The LED indicators, (See, items A through 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 / Equipment List

Negligible change

Section VII Airplane & Systems Description

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

The Tachometer differs from the existing 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.

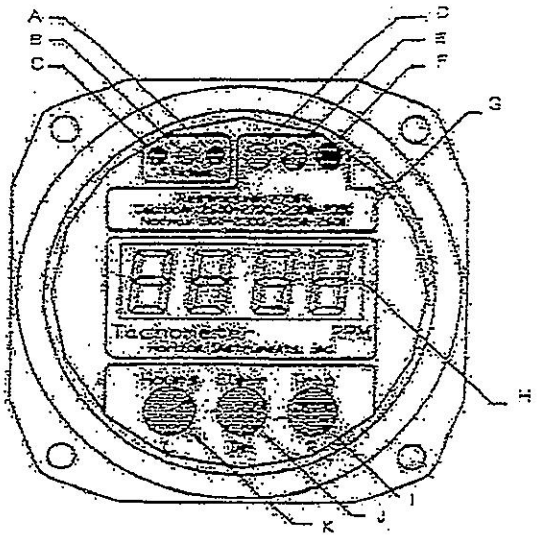
Diagnostic features available include: *alert* indication of loss of magneto signal, *alert* indication that both magnetos are reporting different rpm, and the ability to mask RPM indications from either magneto.

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.

A. Right Magneto System *Alert* Indicator
B. RPM Sync Loss *Alert* Indicator
C. Left Magneto System *Alert* Indicator
D. Normal Operating Green RPM Range Indicator
E. Cautionary Yellow RPM Range Indicator
F. Restricted Red RPM Range Indicator
G. Example of Placecard Area, consult STC and Section for limitations specific to your aircraft
H. 4 Digit LCD Display
I. Right Button for Overspeed Trap display and right internal tachometer enable/disable
J. Middle Button for Overspeed Trap Clear and LED indicator dimming
K. Left Button for Engine Hours display and left internal tachometer enable/disable



Section VIII Additional Information

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

The exterior of the P-1000 is nameplated with all pertinent operational and configuration information.

EXAMPLE

Horizon Instruments, Inc
600 South Jefferson Street, Unit C
Placentia, CA 92870, USA
Model P-1000 Digital Tachometer
H/W P/N: P100053-143
S/W P/N: P132001, Vers, 1.06
6-30 VDC, 150ma max, ½ lb
Serial Number: ——
Red Arc Upper Limit: 2600
Black Arc: 2450
Green Arc: 2200
Cylinders: 6
Parent Number: 4,811,255