

**FAA APPROVED**  
**INSTALLATION and OPERATING PROCEDURE No. 402**  
**DIGITAL QUARTZ TACHOMETER**

Rev: A  
Date: 11/95  
PAGE 1 of 2

## **INDICATOR :**

### **Mounting:**

Mount the indicator in a 2.25 inch instrument panel hole using a commercially available adapter plate or a 1 x 2 inch slot in the instrument panel per drawing 420830, *panel cut-out*. Try to locate the digital quartz tachometer near the existing factory installed tachometer.

### **Wiring:**

Wire from firewall to tachometer indicator should follow existing wire bundles wherever possible. This is particularly true along the leading edge of the wings, through the fuselage and up to the instrument panel. The location of the existing wire bundles indicates the preferred routing per the aircraft manufacturer and therefore should be followed closely. Tachometer wires should be tied to the existing bundle at the same intervals as the existing ties. Avoid routing near avionics signal wires. If existing wire bundles are not followed, tachometer leads must be properly supported at 12 inch intervals. Use appropriate clamps attached to a solid structure for supporting leads. The indicator should be wired to a one amp in-line fuse or a circuit breaker per drawing 420802, *wiring diagram*. The sensor electrical cable PN 420151 is plugged into the back of the instrument. Installation should be in accordance with AC 43.13-1A & 2A for all other applications. Electrical sensor wires may be spliced.

### **Configuration:**

Shorting of the instrument input connector pins determines the engine cylinder configuration. The indicator is configured as a 4, 6, or 8 cylinder engine readout per print 420810. Pin 9 is shorted for a 8 cylinder and pin 8 is shorted for a 6 cylinder. No shorts for a 4 cylinder.

## **SENSOR:**

### **General:**

There are three different sensor mounting methods.

- Replacing the ventilator plug in magneto with a plug-sensor combination. PN 420154-1,-2
- Placing a washer under the ventilator plug that holds sensor in place. PN 420152-1,-2
- Extension bracket type, holds sensor in place using magneto screw. PN 420152-3

Several of the above method used can be used on the same magneto. The ventilator plug method is preferred on Unpressurized magnetos. If the plug is not easily assessable then an alternate method may be used. Pressurized magnetos can use only the washer type PN 420152-1,-2. Tachometer kits are available with different sensor mountings PN 400000-1 to-5 per drawing 3500. See MEL 410 for complete part number and range light limits for specific aircraft.

### **Wiring:**

Sensor wires should, if possible be passed through the aircraft firewall in existing hole whether they are empty or contain other wires. If an additional hole is necessary, it should be 1/4 inch minimum in diameter and equipped with a rubber grommet, fireproof shield or sealant, and a grommet protector. High temperature sealant, PRC from Courtlands in Dallas TX or equivalent, should be used to seal the Firewall. Wiring from pickup to firewall or first mounting point within engine compartment should have a minimum 1/2 inch slack to allow for normal engine shock mount movement. Wiring within engine compartment should be routed to avoid exhaust pipes, fuel lines and sharp protrusions which may lead to chafing.

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### **Ventilator Plug-in type**

There are two plugs found on each magneto 180 degrees apart from each other. One is vented by means of a hole and the other is solid. Per Bendix Maintenance, Overhaul Manual No x42002-1. "If hole adjacent to rotating magnet in magneto housing is to be used for a tachometer pick-up in an unpressurized magneto. Install ventilator plug, in timing hole of distributor housing and discard solid plug." This is true for Slick Magnetos also. Replace the vent plug with the JPI Hall Effect sensor vent plug PN 420815-2 Bendix and 420815-1 Slick. Apply 10-15 in-lbs of torque. This sensor to be used on Unpressurized magneto only.

### **Washer type**

The sensor has been mounted to a washer that is placed under the ventilator plug and orientated according to the proper drawing. Drawings 812, Slick 4000/6000 series and drawing 807, Bendix 1200 and 20 series. For pressurized, Slick and Bendix of the same series.

### **Extension bracket type**

The sensor has been mounted to a thin long "L" bracket. This bracket is mounted on the magneto per drawing 806 and can only be used with the Bendix 20 series magnetos. Screw No. 47 per Bendix Maintenance manual X42002-1 is removed. The bracket is placed under the screw and the screw is retorqued to 20-25 in-lbs.

### **OPERATION :**

The tachometer has a **Hall Effect** magnetic sensor that sends out a pulse each time the magneto permanent magnet pole passes by the sensor. The permanent magnet's in the magneto will rotate and activate the sensor **even when the magneto is shorted**. The tachometer counts each pulse with its quartz clock. The tachometer indicator is factory calibrated and therefore is not affected by lead length variations or magnetic influence within the particular installation. Recalibration after installation is not required. The tachometer is either reading accurately or the fail-safe mode is displaying all zero's. As the tens digit of the tachometer is just displayed it is Accurate to 1 RPM, but reads in ten (10) RPM resolution. The system can be tested by placing the sensor near a 60 HZ transformer like in a stereo degaussing tool. One can check the operation of the tachometer per drawing 804.

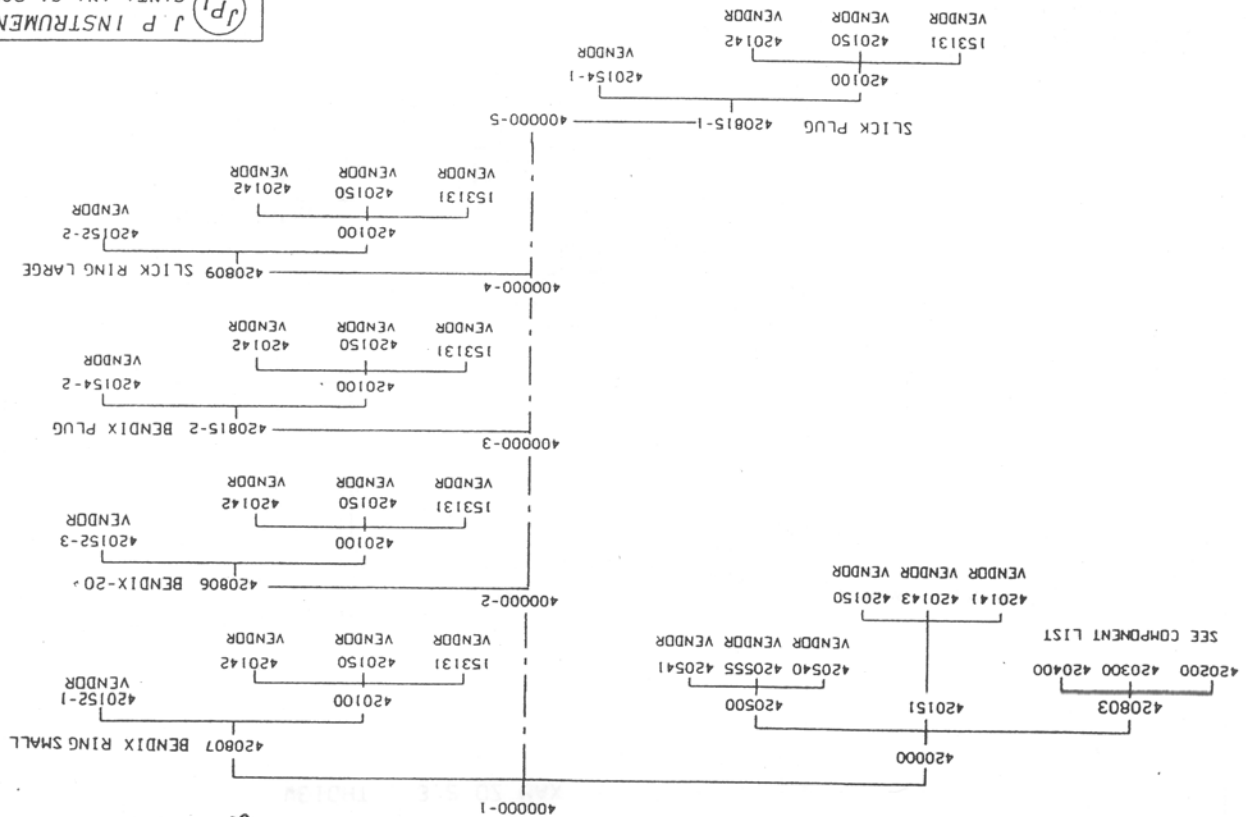
Electrical:	
Voltage	12 or 24 VDC
Current (max.)	0.15 Amperes at 12 or 24 Volts
Weight:	
Indicator	0.19 Lbs.
Pickup sensor (max.)	0.13 Lbs

TACHOMETER KITS / TACHOMETER ASS'Y PLUS SENSOR TYPE

400000-1	1	1				
400000-2	1		1			
400000-3	1			1		
400000-4	1			1		
400000-5	1					1
PART NO	420000	420807	420806	420815-2	420809	420815-1
	ASS Y	B/1200	B/20	B/P	S/6000	S/P

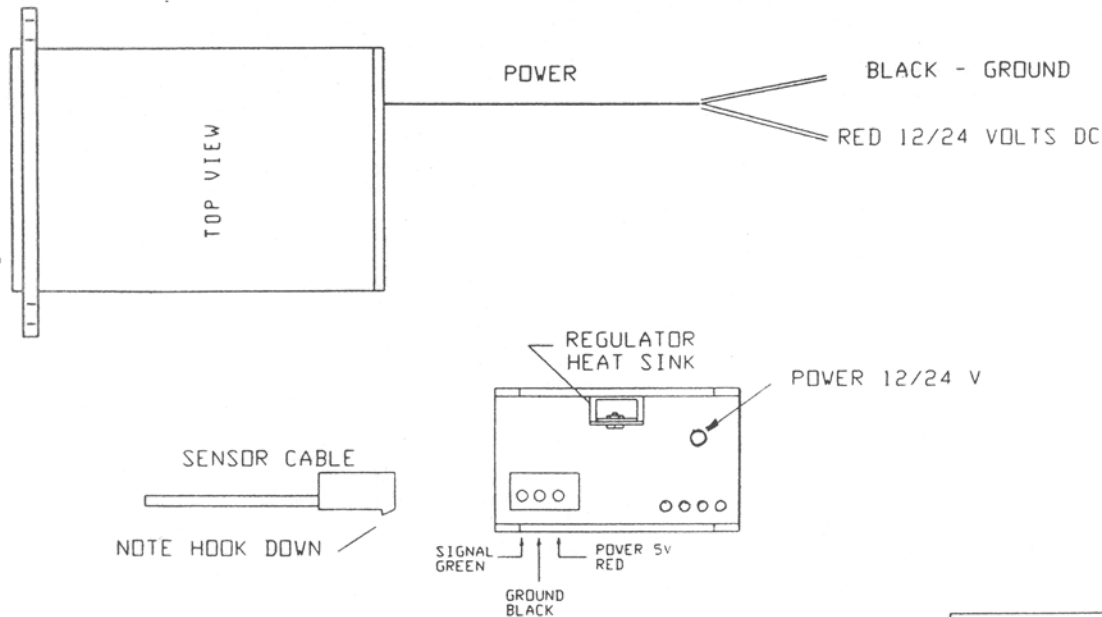
TACHOMETER  
KITS

TAC-KIT



PRODUCTION RELEASE 9/94

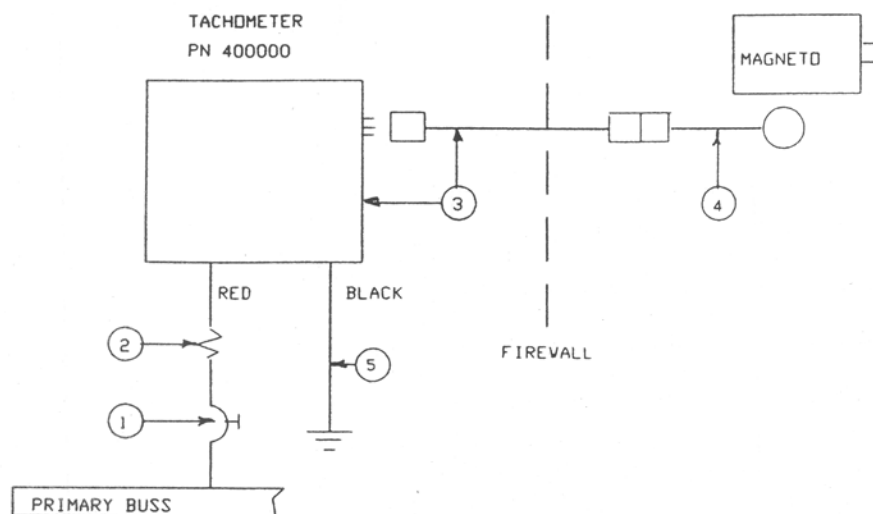
SPECIFICATIONS: POWER... 0.2 AMP MAX  
WEIGHT... 3.2 OZ MAX



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J P INSTRUMENTS SANTA ANA CA 92704	
TITLE: ELECTRICAL WIRING	
PART NO: 420810	REV A
DATE: 6/94	SHEET 1 OF 1

PRODUCTION RELEASE 7/94



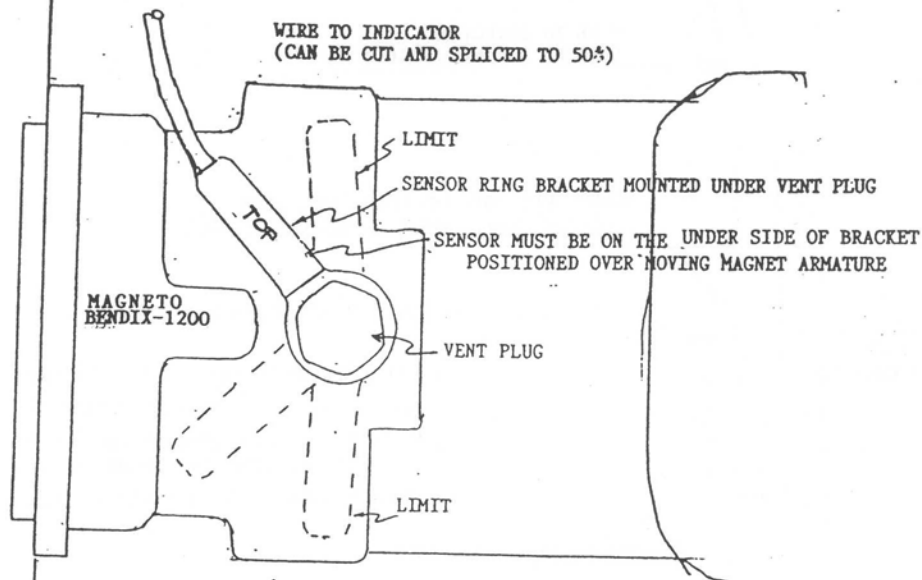
- NOTES: 1-  
2- FOLLOW EXISTING ELECTRICAL WIRE BUNDLE FROM INSTRUMENT  
PANEL TO EXISTING CIRCUIT BREAKER AVOID ROUTING NEAR  
AVIONICS SIGNAL WIRE  
3- REF: INSTRUMENT PIN NUMBERS AND FUNCTION

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QTY	PART NO	DESCRIPTION	ITEM
1	AR	20GA MILV2279	5
1	400001	SENSOR/MAG	4
1	420000	TACH V/CABLE	3
1	AR	15 OHM 5V RES	2
1	AR	1AMP CB/FUSE-HD	1

J P INSTRUMENTS SANTA ANA CA 92704	
TITLE: WIRE DIAGRAM, TACH	
PART NO: 420802	REVNC
DATE: 6/94	SHEET 1 OF 1

ENGINE

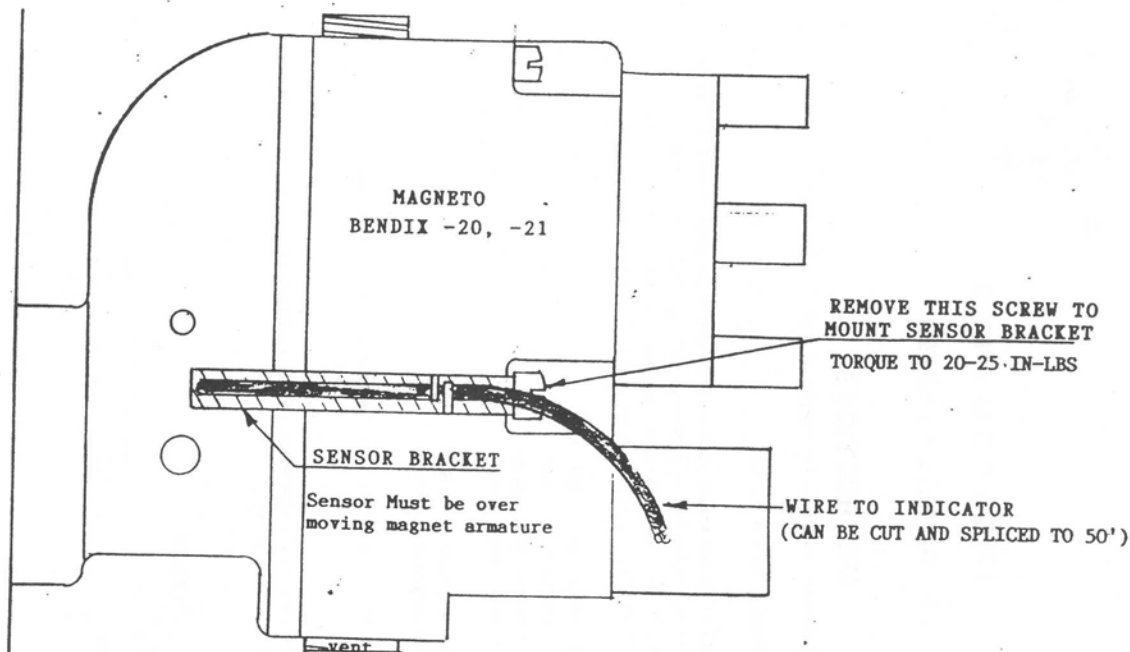


- 1) MOUNT SENSOR TO THE LEFT OR RIGHT MAGNETO
- 2) REMOVE THE VENT PLUG NEAREST ENGINE
- 3) MOUNT SENSOR RING BRACKET UNDER VENT PLUG WITH SENSOR ON UNDER SIDE OF RING BRACKET

CONFIDENTIAL  
PROPRIETARY INFORMATION  
OF J.P. INSTRUMENTS

J. P. INSTRUMENTS			
SANTA ANA CA 92705			
TITLE: SENSOR MOUNTING TO BENDIX 20 AND 1200 SERIES			
DRAWING NUMBER: 807		REV: NC	
SCALE:	DRN: JP	APPR: [Signature]	DATE: 07/90
			SHT 1 OF 1

ENGINE



- 1) MOUNT SENSOR TO THE LEFT OR RIGHT MAGNETO
- 2) REMOVE MAGNETO SCREW INDICATED.
- 3) MOUNT SENSOR BRACKET ON SCREW AND REPLACE SCREW IN MAGNETO RETORQUE TO 10 IN-#

CONFIDENTIAL  
PROPRIETARY INFORMATION  
OF J.P. INSTRUMENTS

J. P. INSTRUMENTS			
SANTA ANA CA 92705			
TITLE: SENSOR, LOCATION BENDIX-20			
DRAWING NUMBER: 806		REV:	
SCALE:	DRN: JP	APPR: [Signature]	DATE: 07/90
			SHT 1 OF 1



# J. P. INSTRUMENTS

## TACHOMETER TESTER

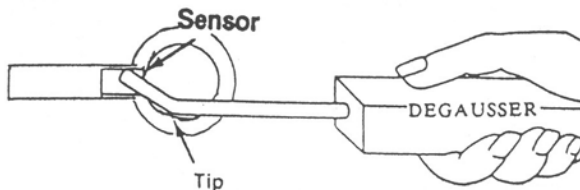
### INSTRUCTIONS

- 1- Connect the frequency generator to an outlet supply of 110v, 60 Hz only.
- 2- Depress and hold the generator power switch.
- 3- Slowly bring tip of generator to the sensor mounted on the tachometer bracket. Move the tip around until a reading is displayed. A jumping reading is ok. The sensor is located on the tip of the long bracket and near the vent hole on the circular bracket. The generator is stronger without the tip and in some cases the tip may have to be removed

- 5-
- |                            |          |
|----------------------------|----------|
| 4 cylinder units read..... | 3600 rpm |
| 6 cylinder units read..... | 2400     |
| 8 cylinder units read..... | 1800     |
| 9 cylinder units read..... | 1600     |
| 4 cyl. Dual magneto .....  | 1800     |
| 6 cyl. Dual magneto.....   | 2400     |

This generators purpose is to check out the system continuity and calibration. A jumping reading is ok.

Do not exceed two minutes of continuous operation of the Generator. Allow 15 minutes of cooling time after two minutes of operation.



A CASSETTE HEAD DEGAUSSER WILL WORK