



## MODEL SS-2 SHAFT SENDER INSTALLATION

### Introduction:

The Aetna Engineering Model SS-2 shaft sender functions as a sensing device for the Aetna Engineering line of Precision Sensitive Digital Tachometers. The SS-2 gives an output pulse whenever a metallic object comes close to the sensing face of the SS-2. The SS-2 may be mounted in a position so that it senses the passage of bolts, gear teeth or "Tach-Tape" on a crankshaft pulley, propeller shaft or transmission coupling. The pulses created by the passage of these metallic objects are then processed by the tachometer to generate accurate RPM information. In addition, the SS-2 determines the rotational direction and provides a signal to Aetna Engineering Precision Sensitive Digital Tachometers with the directional indicating modification to indicate "F" or "R" for forward or reverse.

1. The SS-2 should be mounted in a position so that the metallic objects pass in a "slide by" configuration with a clearance distance of approximately one sixteenth of an inch. The maximum distance allowable is a function of the material type, size and depth of protrusion. The minimum distance is limited to that spacing which will assure that no contact will occur between the sensor and the protrusion when allowances are made for runout, end play, vibration and eventual paint build-up or corrosion of the protrusion.  
*Caution: any physical contact with the sensing surface of the Model SS-2 by the rotating equipment may cause permanent damage to the sensor and is not covered under warranty.*
2. The maximum RPM which may be indicated will be limited by the minimum period of time the protrusion is within the actuating distance of the sensor. For the model SS-2 the minimum time required for actuation is one-half millisecond. It follows that protrusions with a larger surface area or closer to the axis of rotation will permit operation at higher RPM. For example, a 1/2" bolt on a 7" diameter bolt circle at 0.05" slide by spacing would function to slightly over 2500 RPM.
3. The tachometer must be matched to the number of pulses (protrusions) per revolution. Our standard tachometers will give the correct indication when there are two, three, four, six or eight pulses per revolution. Aetna Engineering can supply custom tachometers for other pulse ratios. The protrusions should be evenly spaced throughout the rotation to provide an even pulse train during operation.
4. The SS-2 sensor should be mounted by positioning it in a 1/8" hole in a customer furnished bracket. The bracket should be of sufficient rigidity to prevent vibration or movement which would cause erroneous readings or permit the sensor to contact the rotating equipment. Preferably the bracket should be mounted to the structure of the rotating machinery in order to minimize movement in relative position between the sensor and the machinery being measured. Use very little force (less than 8 foot-



pounds) when tightening sender fittings. The sender must be rotated so that the 'Orientation groove' is aligned with the direction of travel of the rotating surface. Some minor field adjustment of the orientation may be necessary for best performance.

- The cable for the Model SS-2 should be securely dressed to a clean dry location where the five conductors may be joined in junction block to a four conductor 18 gauge (or heavier) shielded cable which is routed to the Precision Sensitive Digital Tachometer(s). The sensor draws 35 mA and is rated at 9.0 to 15 Volts D.C. The electrical connections should be made from the sensor to the tachometer as follows:

Sensor wire -----	(connects to)	Tachometer terminal -----
Red		+12V (IGN.)
Green		POINTS (SIG.)
White		DIRECTION
Black		GROUND (NEG.)
Shield (drain)		No Connection to tach.

Caution: Note: be extremely cautious that all connections are made correctly as listed above. Even momentary incorrect connection may permanently damage the sensor.

The connections should be made using accepted standard practice for shipboard wiring and should be well insulated and protected from any accumulation of dirt or moisture. The wiring shields should be connected together and attached to the vessels ground at one point only!

- The 9-15 volt power should be connected into the system at the tachometer. If an installation includes two tachometers, the tachometers should be connected in parallel; Ground to Ground, Points to Points, Direction to Direction, and +12V to +12V with power connected into just one of the tachometers. The SS-2 sensor will drive four tachometers in parallel.
- After the sensor and tachometer(s) are installed and wired, the system may be checked and adjusted. Apply power to the tachometer without starting the machinery. The function of the sensor may be checked by observing the output of the signal (green) terminal using a voltmeter. It should alternate between ground and the + voltage as a protrusion passes the face of the sensor by slowly rotating the machinery. If the sensor fails to give any indication with this test, adjust the gap and the orientation for optimum response. Should no response be noted, remove the sensor from the bracket and slide the round shaft of a small screwdriver along the face of the sensor in a direction aligned with the orientation groove. The output on the green wire should toggle as this test is performed. If not, check the wiring and voltage supplied to the sensor. If these are correct, the sensor is faulty and must be replaced.



SPECIFICATIONS

ELECTRICAL

Vcc: +12Vdc ± 12%  
 Icc: 35mA MAX.  
 IOL: 3.6mA MAX.  
 VOL: .65V MAX. @ I < 1.2mA  
 VOH: 3.9V MIN., 5.5V MAX.  
 FREQUENCY: 0 TO 12KHZ  
 Vcc OVERVOLTAGE: 20Vdc  
 Vcc REVERSE VOLTAGE: -60Vdc  
 LOAD DUMP: 60 VOLTS  
 SHORT CIRCUIT PROTECTION:  
 ANY LEAD TO ANY LEAD  
 DUTY CYCLE: 40% TO 60%

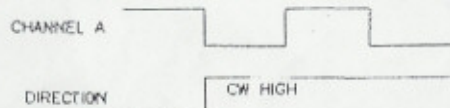
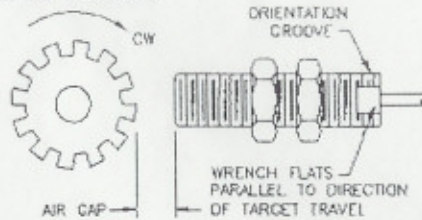
ENVIRONMENTAL

TEMPERATURE: -40°C TO +125°C  
 RH: 0 TO 100%

MECHANICAL

CASE AND NUT MATERIAL: 303 STAINLESS STEEL  
 TARGET: FERROMAGNETIC GEAR, XC #196,  
 TOOTH SPACING 0.197"  
 AIR GAP: .059" MAX. DEPENDING ON TARGET

ORIENTATION



TOLERANCE UNLESS NOTED	
.XX	+01 -01
.XXX	+005 -005
.XXXX	+0005 -0005
DRILLED HOLES	+003 -000
FORMED ANGLES	+1/2 -1/2

UNLESS OTHERWISE SPECIFIED

ALL DIMENSIONS ARE IN INCHES AND INCLUDE PLATING WHEN SPECIFIED.

ALL MACHINED SURFACES TO BE 63 FINISH.

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES .005R OR CHAM.

ALL DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R. UNLESS NOTED.

REDRAWN	J.C.	DATE	01-23-97
CHECKED		DATE	
APPROVED	B.F.D.	DATE	05-10-94
APPROVED		DATE	
CUST. P/N	SS-2		
PREV DWG. NO.			

AETNA Engineering Grand Rapids, MI 49544		SIZE	DWG. NO.	REV.
		A		D
APPLICATION		SCALE: NONE	SHEET 1 OF 1	

Drawing Approval Signature: *[Signature]*  
 Company: AETNA Eng  
 Date: 8 AUG 00

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	05-10-94	A.G.
B	ECN 3382	04-28-95	J.C.
C	ECN 3476: CASE AND NUTS WERE ALUM. ALLOY. CABLE WAS 72" DWG. WAS 'B' SIZE	01-24-97	J.C.
D	ECN 3605: THREAD WAS M14	07-25-00	J.C.

