Series 8000 Frequency Output

This board provides an output frequency proportional to the input voltage. It outputs either a 5V voltage output that is CMOS and TTL compatible or a 24V unregulated relay drive output. It is available with either an 8-pin base, which outputs either 5V or 24V relay drive, or an 11-pin base, which outputs both 5V and 24V relay drive. Contact closure output (relay) is also available.

Specifications

Output:	5V TTL and CMOS at 10mA (15mA current limited)
	24V unregulated 30mA
	Relay output SPST, 3.1Hz maximum output,
	120VAC, 1-Amp contacts
Pulse:	1:1 ratio or selectable 90ms on-time
Frequencies:	Range Selector Switch (16 positions)
	High Range: 0-0.763Hz to 0-50kHz
	Low Range: 0-11PPH to 0-195Hz
Isolation:	1500VDC or VAC peak
Response Time:	20ms
Linearity:	0.2% of FS
Stability:	0.05% of Span/°C

Adjustments

Output Offset:	+10%
Low Cutoff:	0-10% of input

For general Series 8000 specifications, see the Series 8000 manual, which provides general information for the entire s eries.

Setup Procedure

I. Disassemble the Series 8000 unit as described on page 6 of the main manual.
II. Remove the Frequency Output Board.
III. Determine the configuration needed. If you require settings other than the standard, set up the board as described in Setup Instructions on page 70-2.
IV. Calibrate as described on page 70-4.
V. Reassemble the unit as described in the main manual, pages 4 to 6.

Setup Instructions

Output Type Selection

Pulse Output

The 1:1 ratio pulse output is the standard setting. For this setting, the SB6 and SB7 solder jumpers are set as follows:

SB6	SB7
closed	open

To select a 90msec on-time pulse, set the SB6 and SB7 solder jumpers as follows:

SB6	SB7
open	closed

For this pulse, on is low (0V) and off is high (5V).

Voltage Outputs

The 5V output is the standard setting for both 8-pin base and 11-pin base Series 8000 units. For this setting, the SB1-SB5 solder jumpers are set as follows:

SB1	SB2	SB3	SB4	SB5
closed	open	closed	open	closed

To select 24V relay drive for an 8-pin base, set the SB1–SB5 and SB12 solder jumpers as follows:

SB1	SB2	SB3	SB4	SB5	SB12
closed	closed	open	open	open	closed

Contact Closure Output

To select contact closure output (on/off contact for 8-pin base, SPST contacts for 11-pin base), set the SB1–SB5 solder jumpers as follows:

SB1	SB2	SB3	SB4	SB5
open	closed	open	closed	open

Output Frequency Range Selection

1. Determine the output frequency range required.
2. Set the SB8 and SB9 solder jumpers for low or high range as follows:

Frequency Range	SB8	SB9
High	open	closed
Low	closed	open

3. Set the Range Selector Switch (16-position hexadecimal) as noted in the following table.

			Frequency Output	
Range Switch Position	Scaling Factor	Closed Solder Jumpers	High Range	Low Range
0	1	SB11	40k-50kHz	156-195Hz
0	1	SB10	30k-40kHz	117-156Hz
0	1	None	25k-30kHz	97.7-117Hz
1	2	SB11	20k-25kHz	78.1-97.7Hz
1	2	SB10	15k-20kHz	58.6-78.1Hz
1	2	None	12.5k-15kHz	48.8-58.6Hz
2	4	SB11	10k-12.5kHz	39.1-48.8Hz
2	4	SB10	7.5k-10kHz	29.3-39.1Hz
2	4	None	6.25k-7.5kHz	24.4-29.3Hz
3	8	SB11	5k-6.25kHz	19.5-24.4Hz
3	8	SB10	3.75k-5kHz	14.6-19.5Hz
3	8	None	3.13k-3.75kHz	12.2-14.6Hz
4	16	SB11	2.5k-3.13kHz	9.77-12.2Hz
4	16	SB10	1.88k-2.5kHz	7.32-9.77Hz
4	16	None	1.56k-1.88kHz	6.10-7.32Hz
5	32	SB11	1.25k-1.56kHz	4.88-6.10Hz
5	32	SB10	934Hz-1.25kHz	3.66-4.88Hz
5	32	None	781-934Hz	3.05-3.66Hz
6	64	SB11	625-781Hz	2.44-3.05Hz
6	64	SB10	469-625Hz	1.83-2.44Hz
6	64	None	391-469Hz	1.53-1.83Hz
7	128	SB11	313-391Hz	1.22-1.53Hz
7	128	SB10	234-313Hz	54.9PPM-1.22Hz
7	128	None	195-234Hz	45.8-54.9PPM
8	256	SB11	156-195Hz	36.6-45.8PPM
8	256	SB10	117-156Hz	27.5-36.6PPM
8	256	None	97.7-117Hz	22.9-27.5PPM
9	512	SB11	78.1-97.7Hz	18.0-22.9PPM
9	512	SB10	58.6-78.1Hz	13.7-18.0PPM
9	512	None	48.8-58.6Hz	11.4-13.7PPM
A	1,024	SB11	39.1-48.8Hz	9.16-11.4PPM
A	1,024	SB10	29.3-39.1Hz	6.87-9.16PPM
A	1,024	None	24.4-29.3Hz	5.72-6.87PPM
B	2,048	SB11	19.5-24.4Hz	4.58-5.72PPM
B	2,048	SB10	14.6-19.5Hz	3.43-4.58PPM
B	2,048	None	12.2-14.6Hz	2.86-3.43PPM
C	4,096	SB11	9.77-12.2Hz	2.29-2.86PPM
C	4,096	SB10	7.32-9.77Hz	1.72-2.29PPM
C	4,096	None	6.10-7.32Hz	1.43-1.72PPM
D	8,192	SB11	4.88-6.10Hz	1.14-1.43PPM
D	8,192	SB10	3.66-4.88Hz	51.5PPH-1.14PPM
D	8,192	None	3.05-3.66Hz	42.9PPH-51.5PPH
E	16,384	SB11	2.44-3.05Hz	34.3-42.9PPH
E	16,384	SB10	1.83-2.44Hz	25.7-34.3PPH
E	16,384	None	1.53-1.83Hz	21.5-25.7PPH
F	32,768	SB11	1.22-1.53Hz	17.2-21.5PPH
F	32,768	SB10	54.9PPM-1.22Hz	12.9-17.2PPH
F	32,768	None	45.8-54.9PPM	10.7-12.9PPH

PPM=Pulses Per Minute; PPH=Pulses Per Hour

Calibration

1. Set cutout adjustment fully CCW.
2. Set Fine Span Adjustment CCW.
3. Set Range Switch to desired output.
4. Set input to minimum.
5. Set Input Zero Adjustment until Zero LED lights.
6. Set input to 10% of span.
7. Adjust Output Zero for 10% output.
8. Set input to maximum. Set input span adjustment for maximum output.
9. If there is not enough adjustment in the input span adjustment, turn the fine span adjustment for maximum output.
10. Repeat steps 6 through 9 as required.
11. Set input for desired cutout frequency (max. 10% of span). Slowly adjust cutout until cutout LED lights. If no cutout is desired, leave fully CCW.

Calibration for Very Low Outputs

Very low frequency are most easily calibrated using a multiplier or scaling factor. Using this method, the output is first calibrated at a higher frequency and then, through precise digital circuitry, is divided down to the required lower pulse rate. To calibrate these outputs, follow the steps below:

1. Find range for desired output.
2. Find scaling factor for that range (see Frequency Output table).
3. Multiply output by the scaling factor:
   (Output in Hz) x (Scaling Factor) = Calibration Frequency.
4. Set Range Switch to setting 0.
5. Use calibration frequency as you would standard calibration (see example below).
6. Set Range Switch to proper setting.

Example

For 0-15PPH:

$$\frac{15 \text{ Pulses}}{\text{hr.}} \times \frac{1 \text{ hr.}}{60 \text{ min.}} \times \frac{1 \text{ min.}}{60 \text{ sec.}} = 0.0041667\text{Hz}$$

Frequency in Hertz is multiplied by the scaling factor to calculate the calibration frequency: (0.0041667Hz) x (32,768) = 136.533Hz at setting 0; 10% =13.6533Hz; maximum = 136.533Hz.

Frequency Output Board Part Locations