Basic Function Generator

- Using ICL8038 IC's, we can create a function generator capable of producing sine, square, and triangle waves.
  - This IC contains various oscillators that generate the set (above) waveforms.
  - I have previous experience using these for generating square waves used to drive stepper motors
- Ideally, we'd all end up with our own F.G. for future school and lab work
- Should be relatively low cost to build
- May need Andrew's approval; it would feature a microcontroller (ESP32) but not sure if the remaining components could classify as at least one sensor and one actuator.
  - Maybe include some relay to control some feature to count as an actuator
  - Maybe include measured voltage with respect to the set amplitude of the waveform amplitude to count as a sensor

Function Generator Features

- Input - 120V 60Hz AC
- Output - BNC or banana plug connections for F.G.
- Function – Generate desired output waveform based on user adjustable features.
  - LCD display of some kind to display key information
    - Waveform Type
    - Set Amplitude
    - Measured Amplitude
    - Frequency
    - Waveform Offset
  - Potentiometers and Switches/Buttons for physical controls/settings
  - ESP32 Feather V2 to act as the “brain”
  - LED indicator lights? Power ON or waveform type?

HARRIS Semiconductor

ICL8038

September 1998 **File Number 2864.3**

Precision Waveform Generator/Voltage Controlled Oscillator

The ICL8038 waveform generator is a monolithic integrated circuit capable of producing high accuracy sine, square, triangular, sawtooth and pulse waveforms with a minimum of external components. The frequency (or repetition rate) can be selected externally from 0.001Hz to more than 300kHz using either resistors or capacitors, and frequency modulation and sweeping can be accomplished with an external voltage. The ICL8038 is fabricated with advanced monolithic technology, using Schottky barrier diodes and thin film resistors, and the output is stable over a wide range of temperature and supply variations. These devices may be interfaced with phase locked loop circuitry to reduce temperature drift to less than 250ppm/°C.

Features

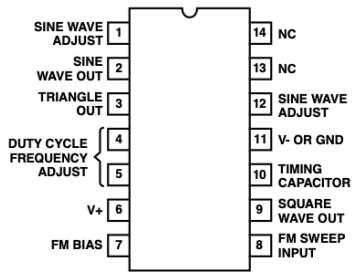
- Low Frequency Drift with Temperature . . . . . .250ppm/°C
- Low Distortion. . . . . 1% (Sine Wave Output)
- High Linearity . . . . . .0.1% (Triangle Wave Output)
- Wide Frequency Range . . . . . 0.001Hz to 300kHz
- Variable Duty Cycle . . . . . 2% to 98%
- High Level Outputs. . . . . TTL to 28V
- Simultaneous Sine, Square, and Triangle Wave Outputs
- Easy to Use - Just a Handful of External Components Required

Ordering Information

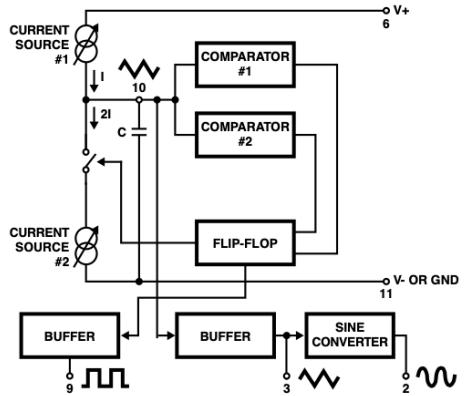
PART NUMBER	STABILITY	TEMP. RANGE (°C)	PACKAGE	PKG. NO.
ICL8038CCPD	250ppm/°C (Typ)	0 to 70	14 Ld PDIP	E14.3
ICL8038CCJD	250ppm/°C (Typ)	0 to 70	14 Ld CERDIP	F14.3
ICL8038BCJD	180ppm/°C (Typ)	0 to 70	14 Ld CERDIP	F14.3
ICL8038ACJD	120ppm/°C (Typ)	0 to 70	14 Ld CERDIP	F14.3

Pinout

ICL8038
(PDIP, CERDIP)
TOP VIEW



Functional Diagram



ICL8038 Datasheet front page

Open frame P.S. to power microcontroller, potential relay, etc.

IEC C14 120VAC 60Hz connector; inside the enclosure, the open frame power supply would be powered by 120VAC and provide DC voltages of whatever level we'd need

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Maybe ditch button/switch controls and move them all to a touchscreen LCD?