Solutions Calculator Club

Product Development

USER MANUAL

**USER MANUAL** …………………………………………………………………

**Master Sheet** ……………………………………………………………………..

The Master Sheet is the Record of all the Modules Higher order Blocks with the relationships of the inputs and outputs.

**Clock Module:**

**Circuit Function** ……………………………………………………………………

The Clock Module uses combinational logic to connect 3 separate 555 timer circuits. The First timer circuit is the Astable Clock that runs the clock trigger for the other ICs in the other modules. The second is the Mono Stable configuration of the 555 timer that is the manual trigger of the clock pulse. The third 555 timer Circuit is the Bi Satable mode that toggles between the two other modes Astable and MonoStable.

There is a potentiometer that controls the RC time constant of the Astable Clock. This can vary the Pulse to a maximum of 300 hz. It is advisable to run the clock in manual mode unless the program in memory will run automatically.

**Circuit Schematic** ………………………………………………………………….

**Parts List** ……………………………………………………………………………

**Testing and Troubleshooting** ……………………………………………………..

**Registers and ALU Module:**

**Circuit Function** ……………………………………………………………………

Registers A and B Hold 8 Bit values that are either sumed or subtracted by the ALU.

Register A and B get the values off the BUS following Control Signals (RO, A,I BI). Addresses in the RAM hold stored values.

The ALU takes the value of Register B and performs one of two operations to the value held in Register A. If the operation is Subtraction The B Reg value is XORed with the value of pin 7 on the carry out the LSB on the (B) 4Bit ADDER. The limit of the ALU can handle a zero sum with the Zero Flag. However, a negative value can only be displayed by toggle the OUTPUT display to 2’s Complement. The minimum value is -128 to + 127. In the normal Binary conversion setting the minimum is 0 the maximum is 255.

The other operation is add this simply sums the A Bit with the B Bit rippling the carries to the next bits. If the MSB ends up carry an overflow bit the Flag Register will show the carry.

**Circuit Schematic** ………………………………………………………………….

**Parts List** …………………………………………………………………………….

**Testing and Troubleshooting**  ……………………………………………………

**Mar, RAM Program Counter Module:**

**Circuit Function** ……………………………………………………………………

The MAR is responsible for Selecting the ADDRESSES when instructed in RUN Mode.

The MAR’s transceiver chip receives Control signal (MI) memory in and Data from the program counter in. When in Program Mode the Address can be assigned along with a value. The data in the ADDRESS can be an OPT Code or a binary coded value used in the ALU. The RAM is the actual storage of the DATA.

**Circuit Schematic** ………………………………………………………………….

**Parts List** ……………………………………………………………………………

**Testing and Troubleshooting**  ……………………………………………………

**OUTPUT and Control Logic Module:**

7 Segment Displays

This Module contains a total of 3 EEPROMS

2 of the EEPROMS are used in the Control logic to reduce the amount of combinational logic. They are coded in 1 of two ways: the Control Logic circuit is coded with the use of an Arduino Uno and two shift registers. The other is the Manual Programer Circuit (Display EEPROM).

**Circuit Function** ……………………………………………………………………

**Circuit Schematic** ………………………………………………………………….

**Parts List** ……………………………………………………………………………

**Testing and Troubleshooting**  ……………………………………………………

**Presentation** ……………………………………………………………………….

**Plan B** ………………………………………………………………………………

555 Timer from discrete components BJT, Resistors and the outer circuit in the Astable configuration.