White's Surfmaster PI schematic diagram

White's **Surfmaster PI** is a good quality, fully waterproof, lightweight metal detector with an exceptional depth in saltwater or mineralized ch beaches, in the surf or shallow diving. It works inland too, but such use is not advised as -- like all PI (Pulse Induction) designs -- there is no effective discrimination of ferrous objects. Runs on eight

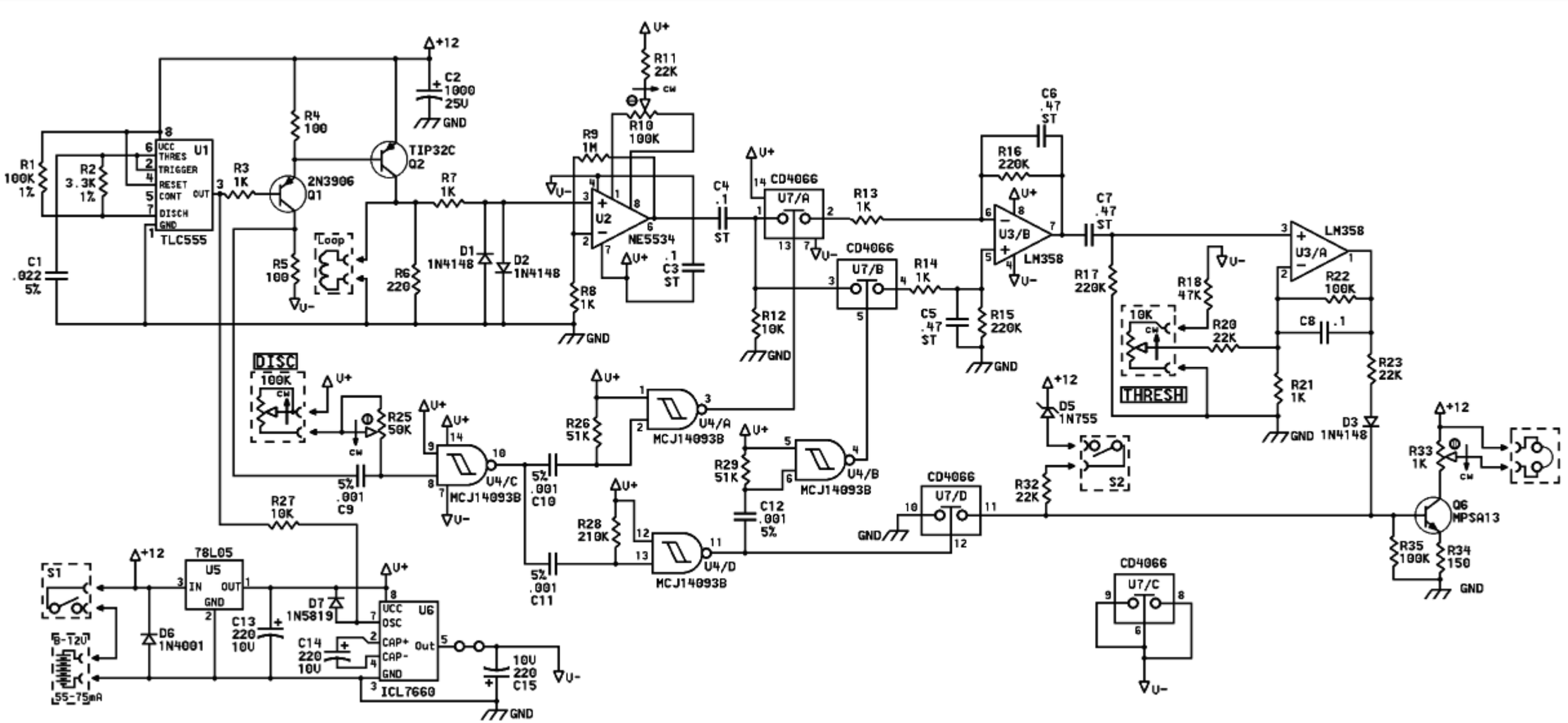

Fig. 1: White's Surfmaster PI metal detector schematic diagram - (2000x935 PNG)

- Nominal capacitor range of 0.001-0.39uF = polyester film.
- Nominal capacitor range of 0.047-1uF = stacked polyester film.
- ST = Stacked polyester (Panasonic "V" series) +/-5%.
- Simple mod: If TIP32C (Q2) gets excessively hot, use an IRF9640 MOSFET instead. Experiment with different values for R6 to find the optimal value (I use a 390 ohm resistor). Temporarily substitute R6 for a trim potentiometer (470Ω or 1kΩ) to find the optimal dumping resistor for your coil.

Fig. 2: White's Surfmaster PI metal detector

More metal detector schematics:

Heathkit Cointrack Gd-1190 Metal Locator
Heathkit Groundtrack GR-1290 VLF metal detector
White's Classic I metal detector schematic
Simple BFO metal detector schematic diagram

- R1, R10, R22, R35: 100kΩ
- R2: 3.3kΩ
- R3, R7, R8, R13, R14, R21, R33: 1kΩ
- R4, R5: 100Ω
- R6: 220Ω 1/2 W
- R9: 1MΩ
- R11, R20, R23, R32: 22kΩ
- R12, R27: 10kΩ
- R15, R16, R17: 220kΩ
- R18: 47kΩ
- R26, R29: 51kΩ
- R28: 210kΩ
- R34: 150Ω
- R25: 50kΩ trim potentiometer
- R10: 100kΩ trim potentiometer
- R33: 1kΩ trim pot. (Volume control)
- P1: 10kΩ potentiometer (THRESH)
- P2: 100kΩ potentiometer (DISC)

Coil:

Note: It's best to use the original Surfmaster coil for optimal performance, but you can experiment with different turns, wire gauge and coil diameters, shielding...

A reasonable depth and sensitivity can be obtained with a 23cm diameter coil, 20 turns made with 0.5mm (24 gauge) standard copper enamel coated wire.

- C1: 22nF
- C2: 1000uF/25V electrolytic
- C3, C4, C8, C16: 100nF
- C5, C6, C7: 470nF
- C9, C10, C11, C12: 1nF
- C13, C14, C15: 220uF/10V electrolytic

Transistors:

- Q1: 2N3906 (PNP silicon transistor)
- Q2: TIP32C (PNP silicon power transistor)
- Q6: MPSA13 (NPN Darlington transistor)

Diodes:

- D1, D2, D3: 1N4148 (Switching diodes)
- D6: 1N4001 (Rectifier diode)
- D7: 1N5819 (Schottky Barrier Rectifier)
- D5: 1N755 (7.5V Zener diode)

Integrated circuits:

- U1: TLC555 (LinCMOS timer IC)
- U2: NE5534 (Single Low Noise Op Amp)
- U3: LM358 (Low Power Dual Op Amp)
- U4: MC14093B (Quad Schmitt trigger)
- U5: 78L05 (5V Positive Voltage Regulator)
- U6: ICL7660 (CMOS switched-capacitor voltage converter)
- U7: CD4066 (Quad Bilateral Switch)

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