CHRP Schematic Scavenger Hunt

About schematic diagrams

Electrical schematic diagrams are used to describe both circuit components and the wiring that connects the components. Simple schematics usually depict circuits in which inputs flow to outputs from left to right through the components on the page. More complex schematics and digital circuits can't follow this arrangement, and may continue over many pages.

Schematic part identification

1. Identify a resistor symbol. How many resistors are there in the CHRP circuit?
2. How many different resistor values are used in the CHRP circuit?
3. Write the colour code of each unique resistor value onto your schematic diagram.
4. Identify a capacitor symbol. How many capacitors are in the CHRP circuit?
5. How many of the capacitors are polarized?
6. What do capacitors C16 and C17 connect to?
7. Identify a diode symbol. How many diodes are in the CHRP circuit?
8. How many of the diodes are LEDs?
9. What kind of diode or diode circuit is D1? What does it do?
10. What letter is used to identify integrated circuits?
11. How many integrated circuits are in the CHRP circuit?
12. What pin numbers are the power supply and ground pins for integrated circuit U5?
13. What letter is used to identify phototransistors?
14. How many phototransistors are in the CHRP circuit?
15. Identify a piezo transducer symbol. What letter is used to identify the piezo beeper?
16. What letter code is used to represent a potentiometer?
17. What kind of parts do the letters H and J represent?
18. How many switches are in the CHRP circuit?
19. Do any of the switches act as power switches for the circuit?
20. What are the two ways of powering the CHRP circuit?
21. What is the recommended voltage input for the CHRP circuit?

Circuit analysis

22. Under what conditions will LED1 illuminate?

23. Assuming a 20V input to R1, and a 1.8V drop across LED1, calculate the current flowing through LED1.

24. Assuming a 5V output to R20, and a 1.4V drop across LED2, calculate the current flowing through LED2.

25. Assuming a 5V output on pin 21 of U2, calculate the current flow through R4 when S2 is pressed (assume 0Ω resistance through S2).

26. Calculate the current flow through potentiometer VR1.

27. Assuming VR1 is set so that there is 1.2kΩ of resistance between the wiper and ground, calculate the potential at the wiper.

28. The analogue input on the microcontroller connected to VR1 can be set to sense 256 voltage levels between 0V and 5V—an 8-bit range. What voltage represents a 1-bit change?

29. Calculate the time constant of the filter circuit composed of R19 and C15.

30. How many wires control the movement of motor 1?

31. How many possible combinations of bits can be sent to control motor 1?

32. Which port pins control the two motors?

33. Which port pins control the LEDs?

34. What other devices do the LED port pins connect to?

Component research

35. Identify the manufacturer that makes PIC microcontrollers.

36. How many I/O pins does the PIC16F886 have?

37. How much program memory does the PIC16F886 have?

38. What voltage signal levels do EIA-232 transmissions use?

39. Where do the EIA-232 voltages come from in the CHRP board?

40. What does an infrared demodulator such as U6 do?

41. What carrier frequency is U6 designed for?

42. What temperature range can U7 sense?

43. As the temperature of U7 changes, how many volts correspond to each degree change?

44. What is U1?