

The following practices and conventions are recommended as leading to greater clarity in circuit diagrams.

General.

1. Explanatory wording on diagrams is useful and should be freely adopted, provided that technical dissertations proper to the text do not appear on the diagram.
2. Diagrams should always be drawn so that the main sequence of cause to effect goes from left to right. The input (e.g. aerial of receiver) should always be on the left, and the output (e.g. aerial of transmitter) on the right.
3. Subsidiary circuits (e.g. local oscillator, automatic gain-control) should be drawn outside the main signal circuit and may be shewn in the lower part of the diagram.
4. An exception to recommendations Nos. 3 and 7 is the case of push-pull amplifiers, in which the two halves should be shown as mirror images separated by the earth line. A two-channel amplifier should not be so drawn.
5. The left-to-right direction of cause-to-effect may be reversed in the case of subsidiary circuits, and in such cases the direction may be shown by arrowheads on one or more conductors. It may sometimes be desirable to indicate the purposes of such conductors (e.g. A.G.C., synchronising pulse) by coded arrowheads.
6. Components closely associated with any one valve, such as decoupling condensers and resistors, bias resistors and grid "stoppers", should normally be drawn grouped in association with that valve; components which couple one valve to another should be well spaced from the associated valves.
7. Frequently-occurring groupings of symbols should be drawn in standard recognised forms. Examples of some such groups are given in para. 17 and following.

Conductors.

8. The earth or chassis line should be a straight horizontal line drawn much thicker than any other conductor.
9. The principal voltage supply lines should be parallel to the earth line, and in order of their potential difference from it, positive lines being drawn above it, and negative lines below it.

10. Where a large number of wires are shown as parallel lines, they should never be spaced equally, but always in small groups according to their functions, with wider spacing between groups.

11. Wires need not always be drawn as vertical and horizontal lines; it is sometimes preferable to show a connection between two points by a single oblique line.

12. It is helpful to the reader to round off (by arcs of small circles) the corners where wires change their directions, instead of letting the lines meet at sharp angles.

13. Two discontinuities in a line representing a wire should never be drawn at the same point, e.g. a line should not change direction at a point where it crosses another line, also a line should not cross over a junction between other lines.

14. In a complicated diagram it is preferable to join some components, such as screen and anode decoupling condensers, to individual earth or chassis symbols, instead of to the main earth line, in order to obviate unnecessary lines and cross-overs.

15. Similarly, each heater lead leaving a valve may be terminated by a small arrowhead and a reference letter, the heater supply pairs being terminated with corresponding arrowheads and letters.

16. It is not always necessary to draw the leads connecting two multi-point plugs or sockets; short lengths may be drawn adjacent to each plug or socket and pointing towards the other, each group of ends being bracketed together with a word or code letter. If the sequence of connections at one end is not the same as at the other end, the connections should be coded individually.

17. The chassis or earth-connection line should not be used to represent part of a box or case, but the method of earthing such box or case should be shown.

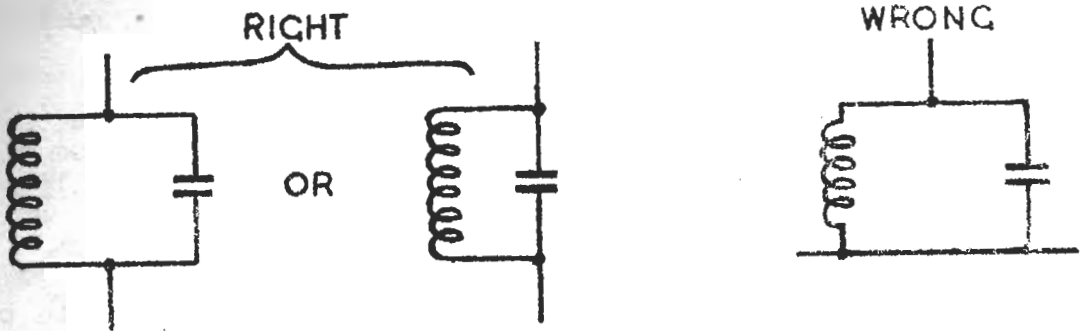
Components.

18. Components functionally in parallel should be drawn as in Fig. 1.

19. Two-terminal networks should be drawn with the terminals at the same end, Fig. 2.

20. Four-terminal networks, such as filters, smoothing circuits, attenuators and phase-shift networks should be drawn as ladder networks, Fig. 3.

21. Bridge circuits should be drawn in the diamond shape, Fig. 4.

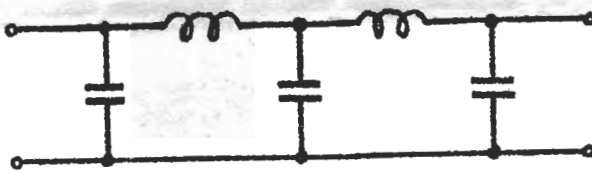


COMPONENTS IN PARALLEL
FIG. 1.



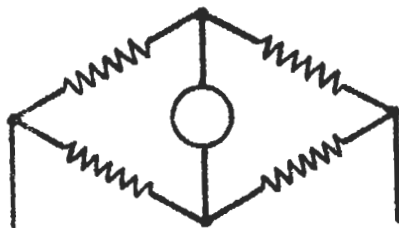
TWO TERMINAL NETWORK

FIG. 2.



FOUR TERMINAL NETWORK

FIG. 3.



BRIDGE CIRCUIT

FIG. 4.

22. Where there is a standing potential difference between the ends of a resistor, due to current from the power supply, it should normally be drawn vertically with the positive end uppermost.

23. The chain of resistors from which the supply voltages of a cathode ray tube are tapped off should be drawn straight and vertical, close to the tube, with the positive end uppermost.

24. Each wafer or floor, or part of a wafer of a multiple rotary switch should be drawn near to the part of the circuit associated with it.

25. Where a circuit is intentionally designed so that a "stray" quantity (e.g. the grid-anode capacity in a valve) performs a useful function, the stray quantity should be shown by the appropriate circuit symbol drawn dotted, with an explanatory note.

Valves.

26. Key diagrams showing the arrangements of connections to valve sockets should be drawn on circuit diagrams, where convenient.
27. Where two or more electrodes are connected together, they should still be drawn separately, but shown connected.
28. Where the two "halves" of a "double" valve are associated with different parts of the circuits not adjacent in the diagram, the envelope and cathode should be drawn in two halves, with A and B suffixes to the valve numbers. Fig. 5. shows a double diode with separate cathodes.
29. Connections should never be shown as made to more than one point of an electrode in a valve, unless in the actual valve both ends are brought out through the envelope, e.g. heater or filament, or the anode and grid connections of some VHF valves.
30. Two or more valves in parallel may be drawn as one, with a note of the number, provided the paralleling is at the valve electrode connections.
31. Rectifier circuits should preferably be drawn with the rectifying device horizontal, the reservoir condenser vertical. No output to be taken from the part of the lead between the diode and the reservoir (or smoothing condenser) Fig. 6.
32. A cathode-input resistor should be connected to the left hand end of the cathode, Fig. 7.
33. A cathode-follower output resistor should be connected to the right hand end of the cathode, Fig. 8.
34. Potential dividers providing voltage supplies or bias to valves should be drawn straight and vertical, Fig. 9.
35. In a multivibrator or "flip-flop" circuit, the coupling condensers should be drawn as in Fig. 10.
36. The "Transitron" circuit should be drawn as in Fig. 11.

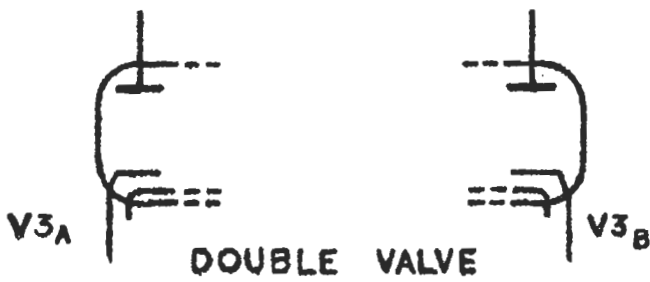
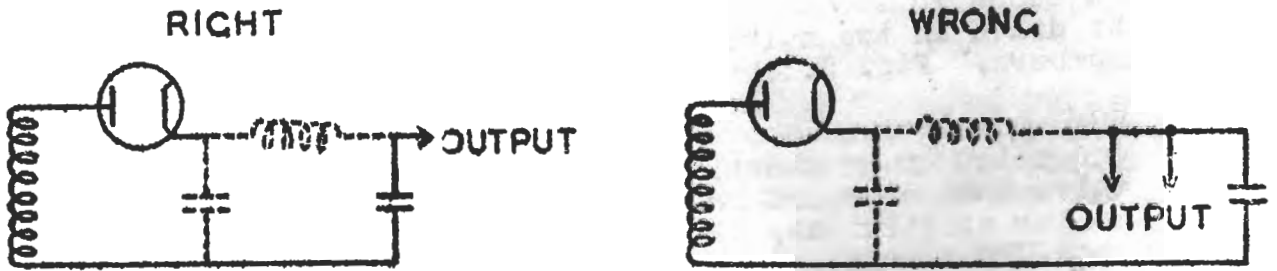


FIG. 5.



RECTIFIER CIRCUIT

FIG. 6.

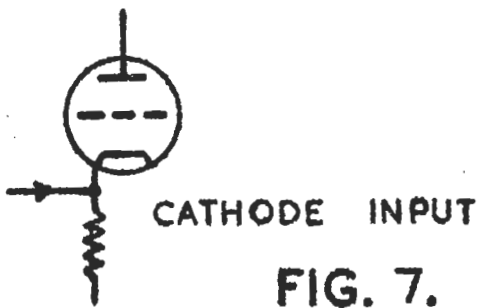


FIG. 7.

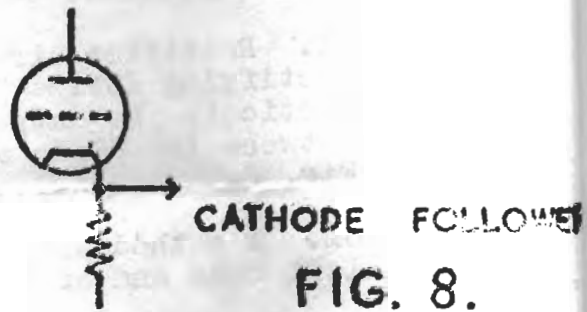


FIG. 8.

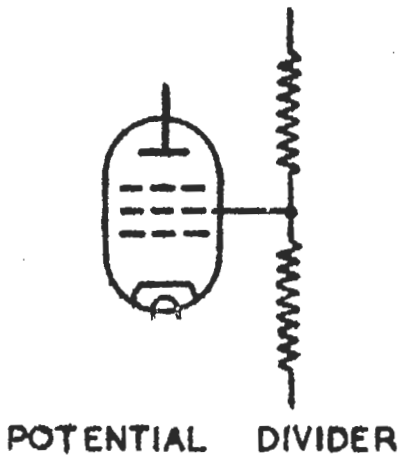


FIG. 9.

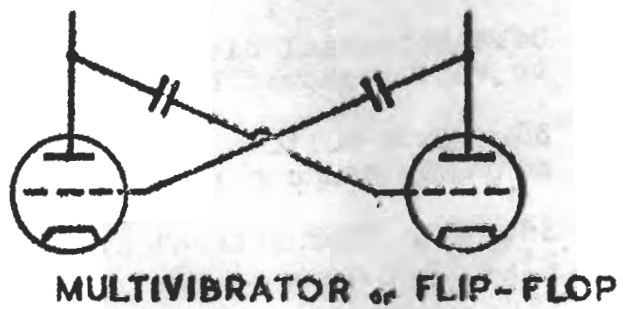


FIG. 10.

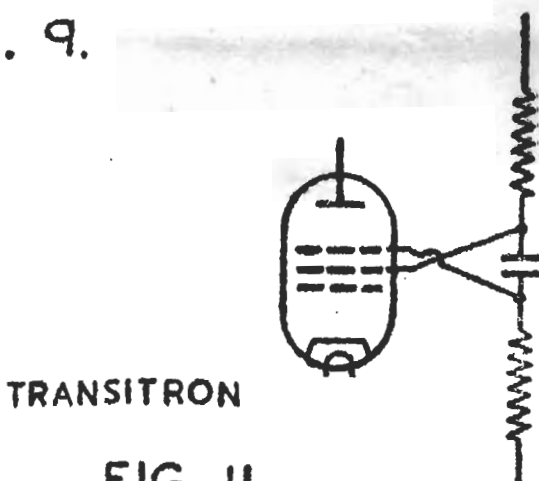


FIG. 11

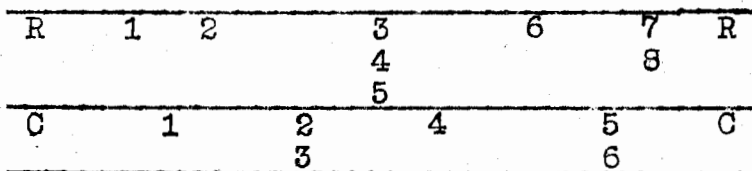
37. The switching valve in a certain type of timebase circuit should be drawn as in Fig. 12, the resistor and condenser being in a straight line. (The recommended arrangement suggests that the valve shunts the condenser.)

38. Where a condenser is connected between anode and grid of a valve in order to increase the Miller effect, its plates should be drawn parallel to the grid and anode, Fig. 13. (The condenser plates are parallel to the "condenser" formed by grid and anode).

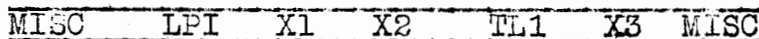
39. A retroaction coil should be drawn coaxial with the coil to which it is coupled, Fig. 14.

Component location.

40. To enable any given component to be found quickly in a diagram or line illustration, the coded references (e.g. R2, C5) should be written beside the components. For each common class of component, a horizontal strip should be drawn across the top of the diagram. At each end of this strip, should be shown the reference letter, and in the strip the reference number of each component of that class, vertically above the component, thus:-



41. Components of which only a few of a kind appear should be shown all on one line marked "MISC".; and in this case (only) the full coded reference of each component should be shown, including X symbols, thus:-



42. In very long diagrams, the reference letters may be inserted at intervals in the horizontal strips, as well as at the ends.

43. In the case of photographs, the coded references should be in the margins around the photograph, and be connected with their respective components by straight lines terminated in indication spots. Where the component is concealed by another component, the line is shown broken, as though it disappeared behind the second component.

44. Referring to paragraph 28, the components closely associated with each valve of a number in parallel (such as stopper resistances) should have separate coded references, all of them being shown beside the relevant single component on the drawing.

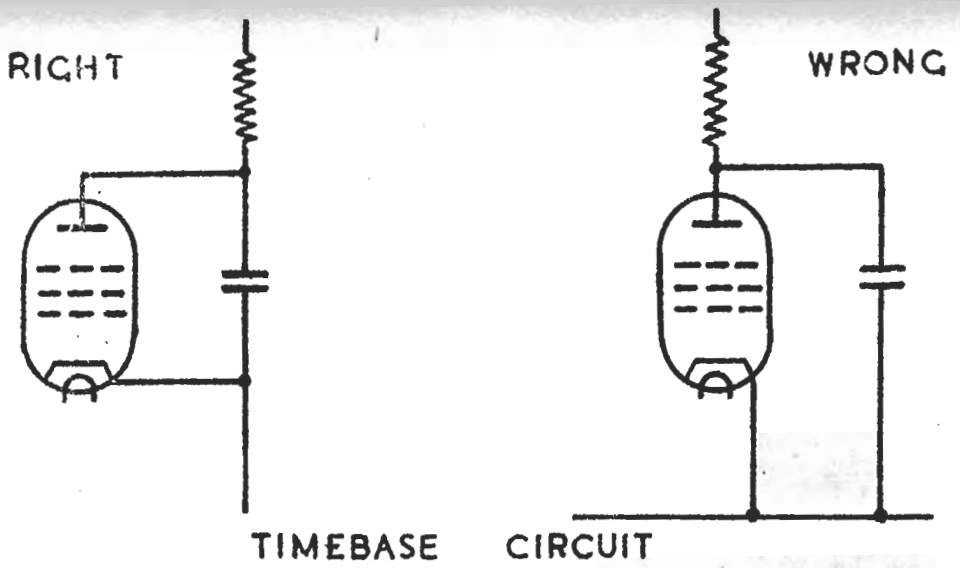


FIG. 12.

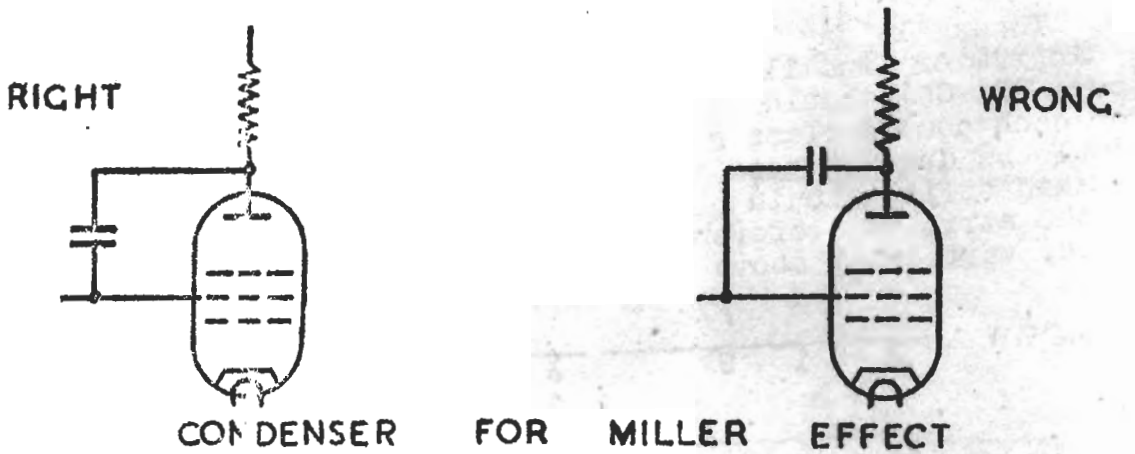


FIG. 13.

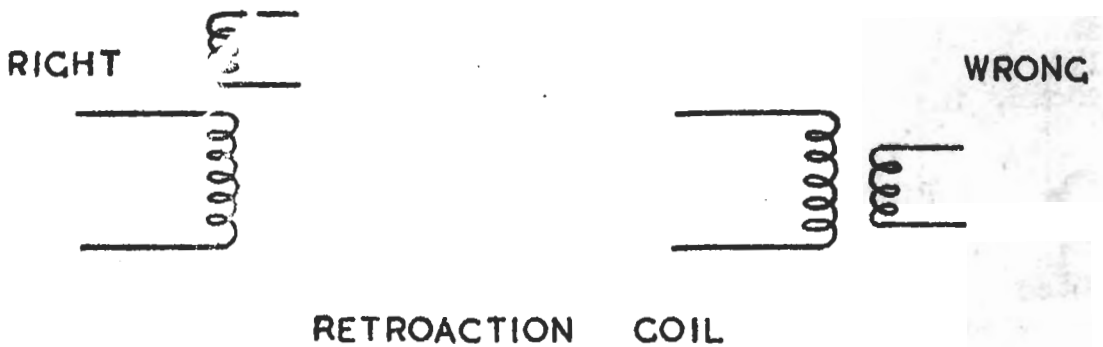


FIG. 14.

Marking ends of components.

45. In testing, it is often necessary to distinguish between the two ends of a component shown in an illustration. In diagrams prepared for servicing purposes, one end of each component (preferably the end more clearly visible in the actual equipment) should therefore be distinguished in the illustration by some common indication, such as a wedge-shaped mark. The same mark must appear against the corresponding end of each component in the circuit diagram. An excess of such marks may be avoided by drawing some of the connecting wires, especially in those line illustrations which also serve as wiring diagrams.

Switches.

46. Key diagrams of switches showing engraving and coding may, with advantage, be drawn at the foot of a circuit diagram.