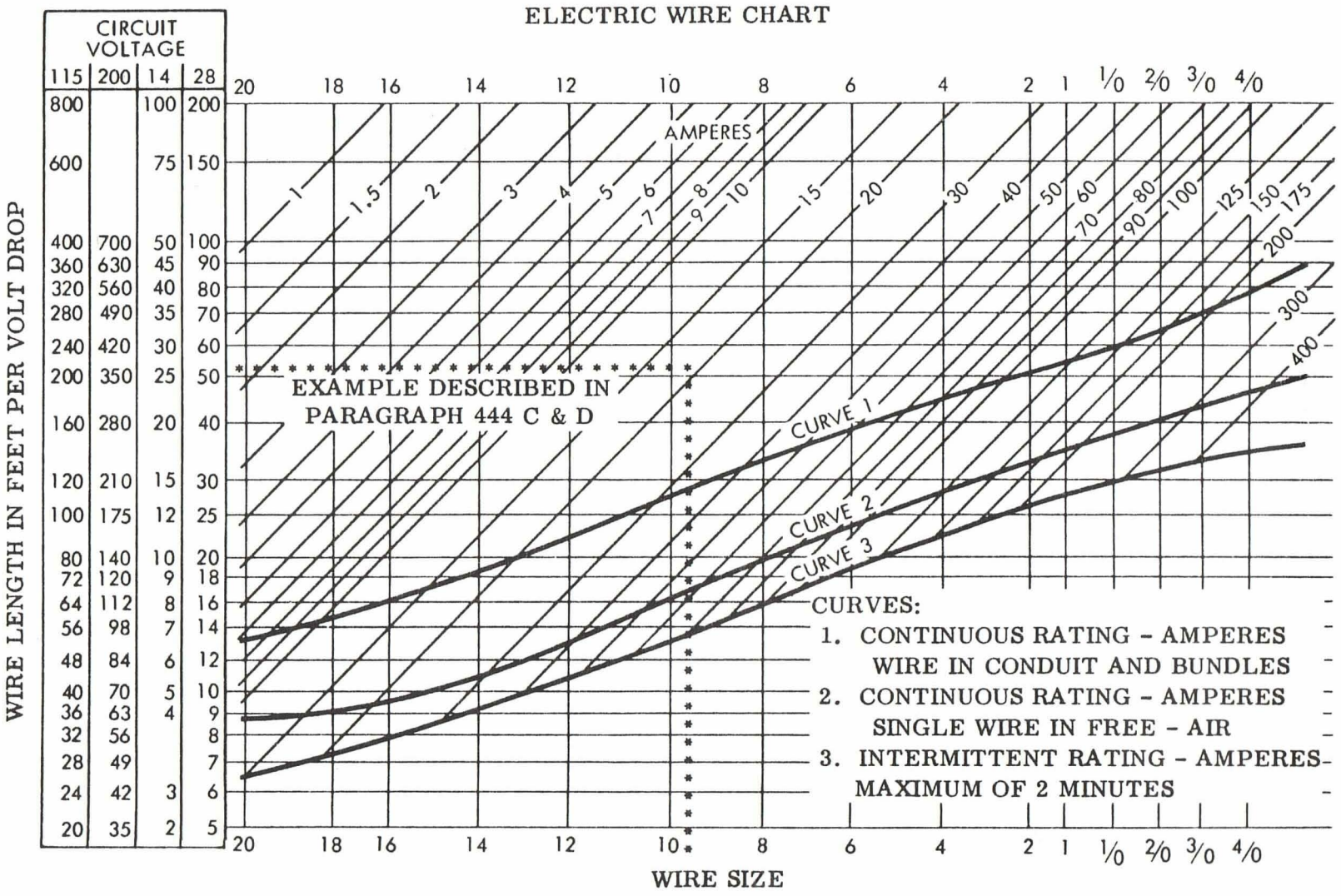

Figure 11.7

444. INSTRUCTIONS FOR USE OF ELECTRIC WIRE CHART. The chart is based on copper conductor wire meeting Specification MIL–W–5086. Curves 1, 2, and 3 are plotted to show the maximum ampere rating for the specified wire in size and under specified conditions shown.

a. In order to select the correct size of electric wire for equipment, two major requirements must be met:

(1) The size must be sufficient to prevent an excessive voltage drop while carrying the required current over the required distance.

(2) The size must be sufficient to prevent overheating of the wire while carrying the required current.

b. To simplify these determinations an electric wire chart (figure 11.7) may be used. In order to use this chart properly for the selection of wire we must know:

(1) the length in feet of the actual wire "run" from the bus to the equipment;

(2) the number of amperes of current it must carry;

(3) the amount of voltage drop permitted (see tabulation, paragraph 442a); and

(4) whether the current carried will be intermittent (maximum 2 minutes) or continuous, and if continuous, whether it is a single wire in free air, in a conduit, or in a bundle.

Nominal system voltage	Allowable voltage drop continuous operation	Intermittent operation
14	0.5	1
28	1	2
115	4	8
200	7	14

c. Assume that we wish to install a 50-foot length of wire from the bus to the equipment in a 28-volt system. By referring to the "allowable voltage drop table" (paragraph 442a), we find that we are permitted a 1-volt drop for continuous operation. Now referring to the "electrical wire chart" (figure 11.7), we find along the left side values numbered 5 to 200 showing the number of feet a wire may be run while carrying a given current, with a 1-volt loss or drop. Place a pointer on the horizontal line shown opposite the number 50.

d. Assuming that the current required by the equipment is 20 amperes, place another pointer at the top of the table on the diagonal line numbered 20 amperes. Now follow this diagonal line downward until it intersects the horizontal line number 50. From this point, drop straight downward to the bottom of the chart and we find that a wire size between a No. 8 and a No. 10 is required to prevent a greater drop than 1 volt. Since we are between these two numbers, select the larger size, No. 8. This is the smallest size which should be used to meet requirement a(1).

e. For requirement a(2): (1) Disregard the length of the wire, the numbers along the left side of the chart, and the horizontal lines for this determination; (2) Assume that the wire is to be a single wire in free air carrying continuous current; (3) Place a pointer at the top of the table on the diagonal line which is numbered 20 amperes; (4) Follow this line until the pointer intersects the diagonal line marked "curve 2;" and (5) Drop pointer straight downward to the bottom of the chart and we are between the number 16 and 18. As the results are again between sizes, select the larger No. 16 wire. This is the smallest size wire acceptable for carrying 20-ampere current in a single wire in free air without overheating.

f. Compare the wire sizes selected. Use a cable no smaller than No. 8 in order to satisfy requirement (a) and no smaller than a No. 16 in order to satisfy requirement (b). Since we must meet both requirements, select the larger No. 8.

g. In this particular instance, the voltage-drop requirement was more critical because it required a larger size than the heat-dissipation requirement. This is usually true when a relatively light current is carried over a relatively long distance. However, when a short wire and/or a heavy current is required, the heat-dissipation capabilities of the wire may become the critical factor and may dictate the size of the wire to be used.

h. The tabulation referenced in paragraph 442a shows several values of voltage drop which is allowable for various systems and conditions when selecting wire for use from the bus to the equipment. Additionally, the voltage drop permissible in wires from the generator to the bus and from the battery to the bus will vary with the regulated voltage of the system i.e., nominal 14 V., 28 V., 115 V., etc.

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