EXAMPLE 8

Given: A 50 horse-power, 440 volt, 3-phase, 50° C. motor, Code Letter "F" without compensator.

Find: The full-load current, the branch-circuit fuse, and the current-carrying capacity required for the branch-circuit wire

SOLUTION: The full-load current, (from the table)=63 amperes (use 64 amperes). The branch-circuit fuse for a 50 horse-power, Code Letter "F" motor without compensator=300% Now set the disk to 64 amperes and read 200 amperes in the 300% window for the branch-circuit fuse. If a circuit-breaker were to be used as branch-circuit protection instead of a fuse its **maximum** rating would be 250%=175 amperes, and its **recommended** setting would be 150%=100 amperes.

In the 115% window will be found the running protection (since this motor is a 50° C. motor the running protection is only 115% of the full-load amperes)=74 amperes. The current-carrying capacity of the branch-circuit conductors from window marked 125%=80 amperes.

T. and T. Electric Mfg. Co.

975 So. Raymond Avenue

Pasadena, California

SYcamore 9-3424

Care of Your

FAST CALCULATOR

With reasonable care your FAST CALCULATOR will give you good service for many years.

Clean with soft cloth moistened in warm water with a little mild soap—use just damp —do not allow moisture to get in between plates.

Avoid excessive heat—from laying on a radiator or heater—or in closed glove compartment of a car standing in the sun—or in any closed space in direct sunlight. The FAST CALCULATOR is not guaranteed to withstand temperatures above 140° F.

Directions For Using the

T & T

FAST CALCULATOR

Simply set the moveable disks to indicate the given data, and read the answer. All directions necessary will be found on the Calculator, but a few examples are given here to indicate the ease with which your problems may be solved with THE T AND T FAST CALCULATOR.

WIRE CALCULATOR

(Based on Resistance Drop Only)

CAUTION: Always check MINIMUM SIZE wire required by reference to the Table of Allowable Current-Carrying Capacities of Conductors.

EXAMPLE 1

Given: 110 volt **single-phase** system
9 amperes
22 feet to center of load
1% drop

Find: Size of wire.

SOLUTION: Set 9 amperes on large disk (by turning disk with finger in slot at top) to 110-volt single-phase on System Index, in large circular window; then turn small disk (by pressing thumbs against it) until 1 appears in the small round window (marked

T & T Fast Calculator for Easy & Quick Solutions

Per Cent Drop). Read the answer, No. 14 (on small disk) opposite 22 feet (on large scale marked Feet One Way).

EXAMPLE 2

Given: 110 volt **single-phase** system
20 amperes
120 feet to center of load
3% drop

Find: Size of wire.

SOLUTION: Set 20 amperes to 110 volt single-phase Index; then set Per cent Drop to 3 (by turning small disk). Read the answer, No. 8, opposite 120 feet. Note that No. 8 is required for 120 feet even though the table shows that No. 12 has a safe carrying capacity of 20 amperes. With No. 12 the drop would be 7½%. Check this by setting No. 12 opposite 120 feet and read 7½ in the Per Cent Drop Window.

EXAMPLE 3

Given: 110 volt **3-phase** system
34 amperes
2% drop
No. 8 wire

Find: How far this circuit can be run.

SOLUTION: Set 34 amperes to 110 volt 3-phase Index; then turn small disk until 2 appears in Per Cent Drop Window; opposite No. 8 read the answer, 55 feet. Note that it is as easy to make calculations for 3-phase circuits with THE T AND T FAST CALCULATOR as it is for single-phase circuits.

EXAMPLE 4

Given: 220 volt **single-phase** system
50 amperes
No. 6 wire
500 feet

Find: Per Cent Drop.

SOLUTION: Set 50 amperes to 220 volt single-phase Index; then turn small disk until No. 6 wire comes opposite 500 feet. Read the answer, 9½% drop, in the round window.

EXAMPLE 5

Given: 220 volt **3-phase** system
250,000 circular mil cable
100 feet
3/4% drop

Find: The amperage that may be carried

SOLUTION: Set 250,000 circular mils to 100 feet (by turning small disk). Now turn LARGE disk until 3/4 appears in Per Cent Drop Window. Read the answer, 220 amperes at the 220 volt **3-phase Index.**

THE SMALL TABLE (on front of Calculator) gives the constant for finding amperes (single-phase or 3-phase) for unity power-factor loads (such as heaters).

EXAMPLE 6

Given: Six 2000 watt heaters to be supplied by a 2-wire (single-phase) 220 volt subfeeder 230 feet long, with a drop of 3%.

Find: size of Type R wire required.

SOLUTION: 6x2000=12,000 watts=12 KW. The table gives 4.54 as the constant for 220 volt single-phase; therefore, the current will be 12 x 4.54=54.5 amperes. Set 54.5 amperes to the 220 volt single-phase System Index; then set 3% drop in the window. Opposite 230 feet, find No. 4 Type R wire.

MOTOR CALCULATOR

By means of the disk of the Motor Calculator together with the tables, the following data applying to 3-phase 220 volt and 440 volt motors may be found:

Horse-Power

Full-Load Amperes

Running Overload Protection (Non-adjustable)

Branch-Circuit (Starting) Fuses or Circuit-Breakers

Ampere Capacity of Wire for Branch-Circuits

Recommended Circuit-Breaker Size
(If motor comes up to speed in 20 seconds)

The Amperes for given Horse-Powers may be found from the table at the top of the Calculator.

The per cent of full-load current (maximum) for branch-circuit protection may be found from the table below the window.

After having determined from these tables the full-load amperes and the per cent of full-load current to be used for branch circuit fuses or circuit-breakers, the rating of the running overload protective device and the branch-circuit protection may be found in the window. Simply set the disk so that the full load amperes appear in the window and read the Running Protection and Branch Circuit (Starting) Protection in the window opposite the per cents selected.

The amperes in the window opposite 125% will also give you the **ampere capacity** of the wire required for the branch-circuit.

The amperes shown in the window marked 150% may also be taken as the **recommended** circuit-breaker setting for 220 and 440 volt 3-phase motors which will come up to speed in 20 seconds.

(Note: The recommendations of different circuit-breaker manufacturers vary somewhat, but these values should prove satisfactory in most cases.)

EXAMPLE 7

Given: A 10 horse-power, 220 volt, 3-phase 40° C. motor marked with Code Letter "A".

Find: The full-load amperes, the maximum branch-circuit fuse, the rating of the non-adjustable running protection device, and the current-carrying capacity required for the branch-circuit conductors.

SOLUTION: From the table at the top of the Motor Calculator find the full-load amperes=27 amperes (use 28 amperes). The branch-circuit fuse for a Code Letter "A" motor=150% (from the table below the window.) Now set the disk to 28 (full-load amperes). In the window marked 150% read the branch-circuit fuse =45 amperes. Since this is a 40° C. motor the running protective device will be found in the window at 125%= 35amperes.

Note: This is also the ampere capacity of the branch-circuit wires=35 amperes (125% of full-load current).