

APPENDIX I

PREPARATION OF PIN AND LUG SETTINGS

1. PIN SETTINGS.

a. Prepare a table of the key wheels by listing, in alphabetical order, the letters appearing on the face of each wheel: the first wheel, A to Z; the second wheel A to Z, omitting W; the third wheel A to X, omitting W; the fourth wheel A to U; the fifth wheel A to S; and the sixth wheel A to Q.

b. Prepare a set of 156 lettered cards, 78 of which are marked R (right) and the remainder L (left). Shuffle the cards thoroughly and draw one at a time. Start with A on wheel number 1, and prepare the key list in accordance with the cards drawn: if a card bears an L, cross out the letter; if a card bears an R, do not cross out the letter. Only letters with effective pins are then shown in the key list (table I, page 13). More than six consecutive effective or noneffective pins on any wheel must be rearranged in order to prevent use of such a sequence. A random arrangement, in which from 40 to 60 per cent of the pins are in the effective position is assured by this method.

2. LUG SETTINGS. To prepare a table of favorable lug settings, proceed with the following steps in the order given:

a. *Selection of Numbers.* Select a set of six numbers from either group A or group B in appendix II. Sets of numbers selected from group B must not exceed 10 per cent of the

total sets selected. The sets are selected at random from the table, and a set is not used a second time as long as other unused sets are available. Sets of numbers from group B should be used at irregular intervals and should not succeed each other in a key list.

b. *Rearrangement of Numbers.* Rearrange the numbers so that they appear in random order.

c. *Distribution of Overlaps.* When the two lugs on a bar are both placed in effective positions, an *overlap* results. The total overlap is found by subtracting 27 (the number of bars on the drum) from the total of the six numbers in a set. The overlaps required for each set of numbers have been calculated, and are given with the sets appearing in appendix II. Distribute the overlaps among the numbers according to the following four rules:

- (1) Most of the six numbers should be involved.
- (2) Overlaps should include numbers which are separated, and numbers which are side by side.
- (3) Several small overlaps should be used in preference to one large overlap.
- (4) There must not be more than four overlaps between any two numbers. It is permissible, however, for a number to have a combined overlap of more than four. (The number 12 in subpar. *h* below has a combined overlap of five).

The above rules offer a general guide for overlap distribution, but some deviation can be made from all but the rule appearing in subparagraph (4) above, which must always be followed.

d. *Checking Placement of Overlaps.* The overlaps must be so placed that a single number, or the sum of any two, three, four, five, or all six of the numbers, yields all the values from 1 to 27, inclusive. Remember that the result of two effective