

CALL BELLS AND SIMPLE STREET FIRE-ALARM SYSTEMS
General Provision Procedure

* [NOTE:- As this Instruction has been completely revised, individual paragraphs have not been "starred"]

1. **Scope of Instruction.** This Instruction describes the type of call-bell or simple street fire-alarm system which can be provided by the P.O. on a rental basis. The apparatus aspect only is covered, the provision of the lines being dealt with in LINES, General, A 8391. A glossary of terms used is given in B 3003. The contents of this E.I. are as follows:-

Contents	Par.
Responsibility of T.M.	2 - 3
Type of system	4
Call-Bell systems	
Essential Components	5
Grouping of Call-bells	7 - 9
Battery-operated bell groups; Minimum current and number of calls required	10 - 15
Magneto-operated bell groups	16 - 21
Mains-operated bell groups	22 - 23
Power leads	24 - 26
Control of call-bells from more than one point	27 - 28
Additional ring-out points	29 - 31
Call-out points	32 - 33
Typical rentals	34
Choice of system	35
Temporary restrictions on choice of system	36 - 42
Simple Street Fire-Alarm Systems	
Definition	43 - 44
Types of system	45
Press-button Street Fire Alarms	46
Code-signalling Street Fire Alarms	47 - 48
Telephone Street Fire Alarms	49 - 51
Hand-generator Street Fire Alarms	52
FA Plans	53
Plans FA 1 - 15, Facilities and use	54 - 77

2. **Responsibility of T.M.** The T.M., in conjunction with the R.D., should deal with all applications for call-bell and simple street fire-alarm systems which can be met by the use of one of the standard FA Plans (see pars. 53 to 77) or a combination of these. If difficulty is experienced in meeting special requirements, full details of the case should be submitted via the R.D. to the E.-in-C. (81).

3. There is at present a serious shortage of full-time firemen, and reliance is being placed to a large extent on the services of part-time firemen who are called from their homes or from their places of employment when emergencies arise. This policy has led to an exceptional demand for call-bell systems and, therefore, restrictions have had to be placed on the types of system which the P.O. can provide. The following paragraphs give details of the full range of systems which are normally provided; the restrictions at present in force are given in pars. 36 et seq.

4. Types of System. Call-bell and simple street fire-alarm systems fall within the following categories:-

(a) Call-bell systems, in which battery or magneto type call bells are arranged in one or more groups and brought into action by the operation of a press-button or switch or hand-generator at the ring-out point.

(b) Simple street fire-alarm systems, in which fire alarms or call-points are provided in the street and are accessible to the public. The fire alarms are of the "BREAK GLASS PULL HANDLE" or "BREAK GLASS: PRESS BUTTON" type, and when actuated they give to the fire station a signal which is relayed to the call bells either by an attendant or automatically in the case of an unattended station.

CALL-BELL SYSTEMS

5. Essential Components. The essential components of a simple call-bell system with one group of bells are:-

(a) a battery or an A.C. supply from hand-generator or 50 c/s. mains

(b) a switch to close the circuit

(c) an indicator connected in series with the bell group to show that current is actually flowing to line.

(d) the omnibus circuit to the call-bell points

(e) the bells, or drop indicators and bells, at the firemen's residences, places of employment, etc.

6. Call-bell systems can be sub-divided into the following classes:-

(a) *Battery-operated* with discontinuous-ringing trembler bells at the bell points, and a switch or press-button at the ring-out point.

(b) *Magneto-operated,*

(i) with discontinuous-ringing magneto bells at the bell points and a hand-generator or A.C. 50 c/s. mains supply at the ring-out point, or

(ii) with continuous-ringing trembler bells at the bell points and hand-generator at the ring-out point.

These are subject to variations, to meet the varied requirements of renters, e.g.:-

Multiple groups

Individual and group ringing of bells

Reply facilities, to enable the individuals to acknowledge receipt of the ring

Ring-out from more than one point, etc.

7. Grouping of Call-bells. When the total number of bells (trembler or magneto) on a system is more than seven, either initially, or as a result of adding bells to an existing system, it should be recommended that they be divided into at least two groups; these should be comparable though not necessarily equal in size, with separate batteries and with an indicator in series with each group. This course is strongly advocated because it considerably enhances the reliability of the system. If all the bells are on one group there is always the possibility of a fault rendering the whole system inoperative. It is also often an advantage to be able to call out a section of the men only.

8. For a system comprising two or more groups, no strong objections will be raised to the connexion of up to 11 bells per group. Where high line resistances are experienced, however, it may be necessary to restrict the number of bells per group to avoid exceeding the battery voltage limit quoted in par. 12. Alternatively, it may be convenient to adopt magneto working or the mains-operated system referred to in par. 22.

9. Grouping may sometimes result in the renter being charged for an additional length of line wiring, but the increased reliability justifies the extra cost.

10. **Battery-operated bell groups.** (See Plans FA 1, IA, 2, 2A, etc.). The possibility of providing a battery-operated call-bell system depends mainly on whether it can be operated satisfactorily by an economical number of primary cells; the most important factors are the number of bells in each group, and the line resistances involved. It is necessary, therefore, at an early stage to work out the number of cells required in any particular case.

11. *Minimum Bell current.* In setting-up a system, 35 mA. should be regarded as the minimum working current for a "Bell No. 40B or 17C", and it should be arranged that this value of current is available for operating the most remote bell on a group. It then follows that the bells nearer the ring-out point will be adequately supplied.

12. *Number of cells required per group.* The rental of a "Bell No. 40B or 17C" includes the annual charges for the cells normally required to operate it and is based upon an average of three cells per bell. The minimum number of cells which should be provided on a group, however, is 18 (27 volts nominal) and the maximum number is 30 (45 volts nominal upper voltage limit). These limits apply whatever the number of bells on the group. The fact that 18 cells are provided on bell groups of less than six bells is offset by the number of cases in which more than six bells are satisfactorily worked by that number of cells. To preserve an economical limit, the basis of provision should be:-

(a) The minimum of 18 cells, whenever possible; three additional cells may be provided free, except where the number of bells on a group is five or less.

(b) When the circuit conditions necessitate a higher voltage, the number of cells may be increased (subject to a limit of 30 cells) to equal three times the number of bells in the group (i.e. three cells per bell), plus three additional cells free. All cells in excess of this number should be charged for separately at standard rates, and should be clearly indicated on the Advice Note.

13. When the line resistances are low, and a small number of bells only is connected, it can often be seen at a glance that the minimum of 18 cells will be adequate for a particular group. It will usually be necessary, however, to calculate the correct number of cells required, which can be obtained from the following equation

$$n = \frac{E}{e - Ir}$$

where n = the number of cells

e = the voltage of one cell (1.5 volts)

r = the internal resistance of one cell and may be taken as 0.5 ohm

E = the voltage required at the terminals of the battery *under load conditions*

I = the total current taken by the bell group.

The quantities E and I are calculated by assuming 35 mA. through the most remote bell and working back the voltage drops and currents to the ring-out point. See the worked example in par. 15.

14. The equation in par. 13 assumes that all the bells are taking their current at the same time. Actually, oscillograph records have shown that once the bells are set in motion they continue to vibrate at their own natural periodicity, so that the instantaneous current changes as the bells operate in and out of phase; the current from instant to instant was found on test to vary from zero to a maximum of approximately two-thirds of the steady state value. The conditions are therefore a little more advantageous than the equation suggests, and allow a satisfactory margin of operation.

The resistance of the earth at the bell points is not taken into account because it should normally be low compared with the bell resistance.

15. Example:- The following is a typical case in which the suitability for battery operation would be in doubt. Five "Bells No. 403" (500 ohms) are to be provided at firemen's houses, with one ring-out point and with line resistances as shown in Fig. 1.

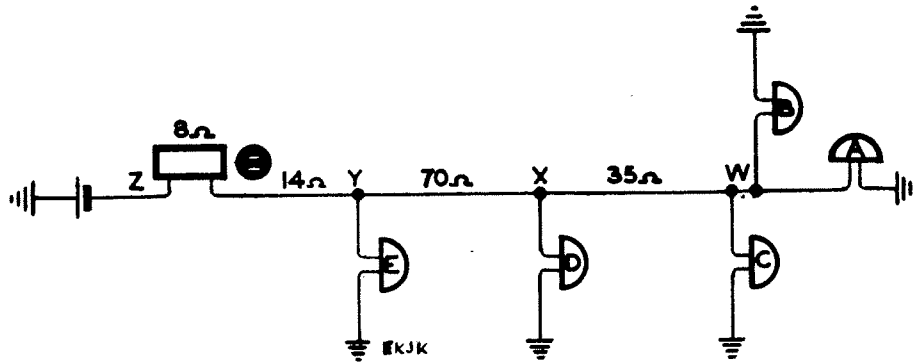


FIG. 1

Circuit Conditions	I (mA.)	Volts
Total current through bells A, B, and C at 35mA. minimum per bell.	105	
Voltage required at point W, $\frac{500}{3} \times 0.105$		17.5
P.D. across 35 ohms line resistance between points W and X (35×0.105)		3.7
Voltage required at point X		<u>21.2</u>
Current through bell D, $\frac{21.2}{500}$	42	
Total current through Bells A, B, C and D.	<u>147</u>	
P.D. across 70 ohms line resistance between points X and Y (70×0.147)		10.3
Voltage required at point Y		<u>31.5</u>
Current through bell E, $\frac{31.5}{500}$	63	
Total current through bells A, B, C, D and E	<u>210</u>	
P.D. across line (14 ohms), indicator (8 ohms) and earth (5 ohms) resistances, $[(14 + 8 + 5) \times 0.210]$		5.7
Voltage required at point Z		<u>37.2</u>

Therefore I = 210 mA.
and E = 37.2 Volts

Therefore the minimum number of cells required is given by

$$\begin{aligned}
 n &= \frac{E}{e - Ir} &= & \frac{37.2}{1.5 - (0.21 \times 0.5)} \\
 & &= & \frac{37.2}{1.395} \\
 & &= & \underline{26.5} \text{ cells - say } 27 \text{ cells}
 \end{aligned}$$

This number of cells is nine in excess of the number included in the bell rentals, and there are, therefore, three courses of action open:-

- (a) the nine additional cells may be rented at standard rates
- (b) the line resistances may be reduced by bunching - with an appropriate increase in the line rental. See pars. 12 and 18 of LINES, General, A 6391.
- (c) A magneto system may be provided.

16. Magneto-operated bell groups. *Discontinuous ringing. (See Plans FA 3, 4 and 14).*

(a) *Generators.* Magneto bell-groups operated directly from hand-generators are necessarily limited by the output of the generators. "Generators Nos. 26 AN and 13 FN" used for call-bells have been proved to ring satisfactorily 10 and 15 bells, respectively, under all normal line conditions.

(b) *Bells.* "Bell-sets No. 26" are normally specified and are connected with the 2 μ F. condenser in series to earth. There is no advantage in working the bells on loop circuits unless trouble is experienced from the tinkling of the bells due to earth currents. The condenser in series with each bell facilitates the location of earth faults.

(c) *Switches.* A tumbler switch is provided on magneto systems, and is connected in series with the generator. It is left in the OFF position between calls, to eliminate the possibility of false alarms due to the inadvertent operation of the generator.

17. In two-group bell systems, the groups are connected to a three-position key, so that they may be rung simultaneously with the lever in the central position, and separately when the lever is operated to either side. The operating procedure is to ring both groups together, and then to ring them separately. If everything is in order the first operation will have summoned all the firemen as quickly as is possible; if a fault on one group has rendered the first operation ineffective the second operation will ensure that at least one group is called.

18. If the total number of bells on the two groups exceeds the capacity of the "Generator No. 13 FN", the bells should be split into more groups and connected, in turn, to the generator by means of switches or keys.

19. *Continuous ringing - (See Plans FA 2A and 4A).* This system has the advantage of being brought into operation more expeditiously than the previous magneto system, because only a few turns of the generator handle are necessary to drop the indicators at the firemen's houses and thus bring into action the local bells, which continue to ring until restored by the men themselves. A further advantage is that the generators can operate a larger number of indicators than magneto bells. The "Generator No. 8 AN" will readily drop 20 "Indicators No. 2200A" with 2 μ F. condensers in series. The rules for grouping apply as in the previous system.

20. The disadvantages of the system are:-

- (a) it is subject to false operation due to earth potentials or lightning discharges.
- (b) the lack of discrimination between genuine and false calls.
- (c) the cost.
- (d) the risk of a continuous ring being given when a call-bell point is unattended.

21. At the call-bell points, "Bells No. 40A or 41A" (with coils in parallel) and three "Cells, Leclanche, Air-tight, No. 2" are connected to the local contacts of the indicator unless otherwise specified. The rental for a continuously-ringing bell includes the indicator and three cells.

22. *Mains-operated bell groups. (See Plan FA 15).* Where a number of groups of magneto bells is required on a large system, the necessity for ringing each group separately (as indicated in par. 19) can be avoided by operating the system from an A.C. 50 c/s. mains supply, if available. A mechanical time-switch can also be used with the accompanying advantages described in par. 35.

23. There are disadvantages, however, as follows:-

- (a) There is no alternative to using small bells (2½ in. gongs) which are the only type to operate satisfactorily at 50 c/s.
- (b) Even these bells must be carefully readjusted for operation at 50 c/s. (see also par.77).
- (c) It is still necessary to provide a hand-generator to cover the possibility of mains failure.

24. **Power Leads.** For a single-group system, the provision of a battery power-lead from the nearest exchange - instead of a battery of primary cells - is not recommended because of its higher fault liability. On a system comprising more than one group of bells, however, a power-lead from the exchange battery may be used if convenient and economical (e.g. when the ring-out point is actually at an exchange) to operate one of the groups, but all other groups should be operated by primary cells.

25. It should be remembered that the rental for a battery-operated bell includes the normal battery power supply (see par. 12) and it is, therefore, not economical to the Dept. to provide a power-lead having higher annual charges than the corresponding battery of primary cells.

26. A ringing power-lead may be provided, if desired, but it must be rented at tariff rates, since the rental for magneto bells does not include the source of supply. The ringing lead facilitates operation and enables a mechanical time-switch to be used, but it is essential that a standby hand-generator should be provided as indicated in par. 23 for a mains-operated system.

27. **Control of call-bells from more than one point.** There are two methods of controlling call-bells from more than one point, i.e. by means of

- (a) additional ring-out points, or
- (b) call-out points.

It is necessary to understand clearly the meaning of these terms and also what is meant by local control and remote control, as defined in B 0003.

28. The choice between (a) and (b) will usually be a matter of economics, unless the fire service has expressed a definite preference. When doubt exists, method (a) should be preferred as it has a lower fault liability.

29. **Additional ring-out points.** The provision of two or more ring-out points involves the installation of a similar set of controlling apparatus at each point with their external connexions teed in the most convenient manner to each of the call-bell groups. A typical example is shown in Plan FA 13 on Dgm. FA (L) 198.

30. In the case of battery-operated systems, an additional rental should be charged for the cells provided at all ring-out points, other than the first. The number of cells required at each ring-out point will not necessarily be the same, and will usually have to be calculated separately for each point.

31. Each ring-out point should also be a call-bell point, so that each may be warned when calls are originated by one of the others.

32. **Call-out points.** The provision of one or more call-out points means that each will be connected by a direct private circuit, or an omnibus circuit, or by exchange lines to the ring-out point. A signal sent from the call-out point operates a relay at the ring-out point, which directly or indirectly connects the power supply to the call-bell groups.

33. Typical examples are shown in Plans FA 6 and 13 A, but these *should not be used* for new work. Further details of superseding arrangements will be given in later instructions, as soon as the necessary apparatus is available.

34. Typical rentals. It frequently happens that the type of call-bell system which an applicant chooses will depend on its annual rental. The following worked-out examples are therefore given as a basis for comparison. In each case, ten bells are arranged in two groups of five bells, with one ring-out point.

(a) Battery system

	<i>Apparatus</i>	<i>Annual Rent</i>		
		<i>£.</i>	<i>s.</i>	<i>d.</i>
	1 "Switch, Time, Mechanical, No. 2"	1	8	0
	2 "Indicators No. 401 DN"		10	0
†	10 "Bells No. 40B"	5	0	0
	36 "Cells, Leclanché, Airtight, No. 2"	No charge		
		<hr/>	<hr/>	<hr/>
		£6	18	0

† The smaller "Bells No. 17C" @ 8/- each can be substituted if required.

(b) Magneto system (discontinuous ringing)

	<i>Apparatus</i>	<i>Annual Rent</i>		
		<i>£.</i>	<i>s.</i>	<i>d.</i>
	1 "Generator No. 8 AN"		6	0
	2 "Indicators No. 401 HN"		10	0
	10 "Bell-sets No. 26"	2	0	0
	1 "Key No. 212"		4	0
	1 "Switch, Tumbler, No. 1M"		4	0
		<hr/>	<hr/>	<hr/>
		£3	4	0

(c) Magneto system (continuous ringing)

	<i>Apparatus</i>	<i>Annual Rent</i>		
		<i>£.</i>	<i>s.</i>	<i>d.</i>
	1 "Generator No. 8 AN"		6	0
	2 "Indicators No. 401 HN"		10	0
	10 "Bells No. 40A" with "Indicator No. 2201 AP"	8	0	0
	1 "Key No. 212"		4	0
	1 "Switch, Tumbler, No. 1M"		4	0
		<hr/>	<hr/>	<hr/>
		£9	4	0

Further details of the appropriate apparatus rentals are given in T.S.I. B⁴/V/2(b) to which reference should be made in all cases for assessment purposes.

35. Choice of system. When the line conditions permit and when the renter has not expressed a definite preference for a magneto system, the P.O. normally recommends the battery-operated system employing a "Switch, Time, Mechanical, No. 2" and "Bells No. 40B" (500 ohms) with 4-in. gongs, for the following reasons:-

(a) the bells can be actuated with the minimum delay.

(b) the switch sends out a distinctive ring, which cannot be confused with a false ring due to a fault.

(c) once operated, the switch will continue to send out a ring for a period of one minute without further attention on the part of the person who operated it, whereupon it automatically restores and is ready for the next call.

(d) where police officers are concerned they are thus able to attend to their own duties during a period of some stress.

(e) trembler-bell systems can readily be associated with street fire-alarms or call-out points, whereas it is difficult to provide a satisfactory housing for a generator when used as a street fire alarm in association with a magneto call-bell system (see also par. 52).

(f) a mechanical time-switch is preferable to an ordinary switch because, in the excitement of the occasion, the necessity for restoring the switch may be overlooked. A new call may thereby be lost or the bell batteries unnecessarily depleted.

(g) The 4-in. bells emit a sound of generous volume, suitable for alarm purposes. (Trembler bells with larger or smaller gongs may sometimes be specified to suit local conditions or, in the case of small gongs, to assist in obtaining an economical annual rent.)

36. Temporary restrictions on choice of system. Until further notice (see also par. 2) all applications for new call-bell systems should be divided into three classes:-

(a) Systems involving local control only, with one or more ring-out points not at telephone exchanges.

(b) Similar to (a) but with a ring-out point at a telephone exchange.

(c) Systems which are to be remotely controlled from a call-out point, either via a private wire or exchange lines.

37. Applications for systems in class (a) should be met by the provision of magneto apparatus only. The standard circuit diagrams FA (L) 186, 187 and 199 should be used if applicable, but "Bell-set No. 1" should be used in place of "Bell-set No. 26".

38. Systems in class (b) should be battery-operated using a mechanical time-switch as specified in T.S.I. G1/1V/10. Plans FA 1A and 2A apply, as shown on Dgms. FA (L) 184 and 185.

39. In urgent cases, and when it appears that there will be a considerable delay in obtaining the mechanical time-switch, a simple switch or key may be substituted temporarily as in Plans FA 1 and 2, also on Dgms. FA (L) 184 and 185. If any other components of a non-essential nature (e.g. "Indicators No. 401 DN") are in short supply, every effort should be made to give temporary service, and to add the remaining items later when available.

40. Where high line resistances would involve the provision of an excessive number of cells (see par. 12 et seq), and a 50 c/s. mains supply is available at the exchange, the Plan FA 15 to Dgr. FA (L) 202 should be fitted. It is essential that "Bell-sets No. 26" only should be used with this diagram, as these incorporate the "Bell No. 59A" which is the only type to operate satisfactorily at 50 c/s. Other apparatus shown on the diagram should be amended as follows:-

Transformer:- Up to 15 bells use "Transformer No. 69C" (60-volt output)

Over 15 bells use "Transformer No. 98A".

Standby Generator:- Use "Generator No. 26AN" for any number of bells but provide keys or switches so that each group of bells may be rung independently.

41. Systems in class (c) should also be battery-operated with or without a mechanical time-switch for local control, according to the renter's specification. Temporary arrangements for giving service should be made where desirable as for class (b).

42. Plan FA 15 should not normally be provided on remotely-controlled systems owing to the risk of mains failure. If the line resistances are too high for battery operation, however, the use of 50 c/s. working (as indicated in par. 40) may be unavoidable.

SIMPLE STREET FIRE-ALARM SYSTEMS

43. **Definition.** If a press-button or other calling device is fitted in a position accessible to the public on the outside wall of a fire station or ring-out point, so that no external wiring is involved in the connexion to it, then such a device is regarded as part of the internal apparatus at that point, and an apparatus rental only is assessed.

44. On the other hand, if the calling device is fitted on a post on the kerb in front of the ring-out point or fire-station so that the connexion to it does involve external wiring, then this device is regarded as a normal street fire-alarm or call-point, and a rental is chargeable for both apparatus and wiring. See also LINES, General, A 6391, par. 2.

45. **Types of System.** The simple street fire-alarm or call-point systems provided by the P.O. can be divided into the following classes according to whether the apparatus used for signalling is:-

- (a) A press-button
- (b) A code-signalling mechanism
- (c) A telephone
- (d) A hand-generator.

46. *Press-button Street Fire-Alarms.* A typical scheme is shown in Plan FA 3 on Dgn. FA (L)191. Although protection is not given against false operation by line faults, this may not be a serious disadvantage in areas where the lines are short and are not often disturbed. This system will then commend itself for its simplicity and cheapness.

47. *Code-signalling Street Fire-Alarms.* The only new system provided by the P.O. on rental terms is an open-circuit system, using plain-sector boxes known as "Boxes FA No. 8", which are illustrated and described in B 1010. The system is described under Plan FA 7 and 7A and shown on Dgn. FA (L) 190.

48. Its advantages are that false alarms due to line faults can be distinguished from genuine calls and, since each box has a different code which can be relayed to the call-bells, it is possible for the firemen to recognise from which fire alarm the call has originated - by counting the number of pulses on the bells.

49. *Telephone Street Fire-Alarms.* The system of telephone call-points to be recommended is the P.O. Standard Police Telephone and Signal system, described in TELEPHONES, Stations, P 0003 et seq.

50. When required, however, a simpler and cheaper system can be provided to meet purely fire-alarm needs; this consists of weatherproof telephones connected by direct circuits to the fire station. At present, all applications for this system should be forwarded to the E.-in-C. (S1).

51. Any existing systems using "Telephones No. 97 or 99" in Boydell Heads may continue to be used, if giving satisfactory service, but no new systems of this type should be installed.

52. *Hand-generator Street Fire-Alarms.* The P.O. does not willingly provide a rameto generator as a street fire-alarm, because of the difficulty of mounting it satisfactorily. A suitable standard box cannot be supplied from stock and, if a renter insists on this type of system, he should be requested to provide a suitable housing to the satisfaction of the Area Engineer. The type preferred is one having a small glazed compartment containing the key to a larger container for the generator itself. If a single glazed box is provided, the renter should be informed that he must accept all responsibility for personal injury to callers from the broken glass.

F.A. PLANS

53. These F.A. Plans are typical of systems actually in existence. They are intended to form a basis upon which simple fire-alarm systems can be built, and should materially assist officers in satisfying the specified requirements of renters. When special facilities are required which cannot readily be determined from the Plans, the matter should be referred to the E.-in-C. (31).
54. **Plans FA 1 and 1A.** Dgm. FA (L) 184. Single-group battery-operated call-bell systems using "Bells No. 40B or 17C" (500 ohms), and controlled by a "Switch Tumbler, No. 1" or "Key No. 68" with "Key-mounting NAA" (Plan FA 1) or alternatively by a "Switch, Time, Mechanical, No. 2" (Plan FA 1A). The "Press-button, G, Black" is provided without charge for testing purposes.
55. **Plans FA 2 and 2A.** Dgm. FA (L) 185. Two or more bell-group battery-operated systems, using "Bells No. 40B or 17C" (500 ohms) and controlled by simple switches or keys (Plan FA 2) or, alternatively, by a "Switch, Time, Mechanical, No. 2" (Plan FA 2A). With a single time-switch the number of bell groups is limited to three; each bell group having its own battery of primary cells. When there are more than three groups, one or more relays should be added; these are operated by the time-switch, and actuate the bell groups via their contacts. Each bell group should have its own battery, as for the time-switch alone, but a separate battery should be provided for operating the relays, and the cells for this battery should be rented. The "Press-buttons, G" are provided without charge for testing purposes.
56. **Plans FA 3 and 3A.** Dgm. FA (L) 186. Single-group magneto systems, using a "Generator No. 26 AN" with "Bell-sets No. 26" or "Bells No. 53A", for discontinuous ringing (Plan FA 3), or alternatively, "Indicators No. 2201 AP" with "Bells No. 40A or 41A" (coils in parallel) and three "Cells, Leclanche, Airtight, No. 2" for continuous ringing (Plan FA 3A). The 2 μ F. condenser, in series with the magneto bell or indicator, facilitates testing when locating earth-faults on the system. The "Switch, Tumbler, No. 1" is normally left in the OFF position, to prevent false alarms due to inadvertent operation of the generator.
57. **Plans FA 4 and 4A.** Dgm. FA (L) 187. Two-group magneto systems using "Bell-sets No. 26" or "Bells No. 53A" for discontinuous ringing (Plan FA 4) or alternatively, "Indicators No. 2201 AP" with "Bells No. 40A" or "Bells No. 41A" (coils in parallel) for continuous ringing (Plan FA 4A). The "Key No. 212" enables the bell groups to be rung separately or together.
58. **Plan FA 5.** Dgm. FA (L) 188. A battery-operated call-bell system using "Press-buttons, Locking, E.A.No. 1 or 2" with "Bells No. 40B or 17C" (500 ohms). Each bell point is a ring-out point, and all bells can be rung from any point with, or without, a central indicator board to identify the ring-out point. This system is suitable for a private works and where the number of bells does not exceed ten, but difficulty may be experienced with voltage-drop in the line.
59. **Plan FA 6.** Dgm. FA (L) 189. A battery-operated call-bell system of two or more groups with remote control and telephone facilities between the ring-out point and the call-out point. This scheme should not be used for new work (see also par. 33).
60. **Plans FA 7 and 7A.** Dgm. FA (L) 190. A battery-operated call-bell system, associated with code-signalling street fire-alarms - "Boxes, E.A.No. 8" - which code ring the call-bells direct.
61. In Plan FA 7, the "Boxes, E.A.No. 8" are arranged on omnibus circuits. This is, of course, the more economical scheme, but it has the disadvantage that a permanent record of the call is not given at the fire station and it is necessary for the firemen to count the pulses of ringing on the bells to determine from which box the call has originated. This Plan is therefore suitable for systems where a small number of boxes only is required - say three or four.
62. In Plan FA 7A, direct circuits are provided to each box, and a drop indicator is inserted in each line termination. Thus, although the pulses of ringing are received on the bells as in Plan FA 7, a record of the call is given by the drop indicator, until this is restored by hand.
63. The cells required to operate the relay are rented separately; the "Press-buttons G, Black" are for testing purposes, and are not chargeable. Although the fire station may be normally unattended, it is recommended that a bell be provided there to warn firemen who may happen to be present at the station.

64. Plan FA 8. Dgm. FA (L) 191. A street fire-alarm system, non-code signalling, using "Press-buttons, Locking, F.A., No. 1" housed in "Boxes, F.A. No. 7" or in "Posts, F.A., 'Brown', Large" at the call-points. The lines are terminated at the fire station on "Indicators No. 2200 A", which are mounted in a "Case, Switch and Indicator, D 9735", - supplied without charge. The first indicator is rented at the continuous-ringing bell rate, the remainder at the tariff rate for special apparatus, i.e. an indicator with local contacts in use. The cells for operating the call-points are rented.

65. A call-bell system to one of the Plans FA 1 - 4 would be provided separately, as required. The fire-station would normally be attended.

66. Plan FA 9. Dgm. FA (L) 192. A battery-operated call-bell system, arranged for individual and collective ringing. This system uses a "Switch, House-bell, F.A. No. 145" and is recommended when the renter wishes to summon firemen singly or in groups. Each call-bell is connected to a key, which performs the following functions:-

UP (locking) disconnects bell from the alarm system
 NORMAL connects bell to its group for operation by the time-switch
 DEPRESSED (non-locking) rings the bell individually

Grouping is arranged by cross-connecting tags on terminal strips.

The "Switch, House-bell" is equipped for two groups initially, and the charge is applicable per working way. The "Switch, Time, Mechanical, No. 2" is rented separately.

67. Plan FA 10. Dgm. FA (L) 193. A battery-operated call-bell system, using a "Switch, House-bell, FA.No. 154" arranged for individual or collective ringing in two groups with individual reply signals. It is recommended when the renter wishes to have the assurance of receipt of the alarm by each fireman.

68. Each bell is connected by a direct line to a key on the switch, and is rung over the A-wire and earth. The acknowledgement signal, transmitted by earthing the B-wire through a "Press-button, G, Black" at the fireman's residence, operates an "Indicator No. 2200 A" at the fire station.

The keys perform the following functions:-

UP (locking) disconnects bell from the alarm system
 NORMAL connects bell to its group for operation by the group-ringing key
 DEPRESSED (non-locking) rings the bell individually.

The bells are connected to the group-ringing keys via cross-connecting tags on terminal strips; a time-switch is not normally associated. The switch is rented per working way, and the press-button at each fireman's house is rented at tariff rate.

69. Plans FA 11 and 11A. Dgm. FA (L) 194. A battery-operated omnibus call-bell system, arranged for collective ringing with individual reply signals, and suitable only for one, two or three call-bells. Alternative arrangements are made for 'loop' working (Plan FA 11) or 'earth' working (Plan FA 11A), with reply signals received on a common signal bell, and identified by code rings. It is limited to three bells maximum, because of the possibility of overlapping reply signals. The press-button or key at the ring-out point and the reply signal press-buttons at the bell points are rented at tariff rates.

70. Plans FA 12 and 12A. Dgm. FA (L) 195. Telephone street fire alarm systems using "Telephones No. 97" (Plan FA 12) or "Telephones No. 99" (Plan FA 12A) on direct circuits. These schemes should no longer be used for new work (see also par. 51).

71. Plans FA 13 and 13A. Dgm. FA (L) 198. Battery-operated multiple call-bell groups ("Bells No. 40B or 17C") with an additional ring-out point. Plan FA 13A, in which the bells are remotely controlled by D.C. signals over a private circuit, should no longer be used for new work (see also par. 33).

72. In Plan FA 13 duplicate controlling apparatus is provided at each ring-out point; the mechanical time-switches may, of course, be substituted by simple 2-way switches, or keys, if desired as in Plan FA 1. The "Press-buttons, 3, Black" are provided without charge for testing purposes.

73. It is desirable that each ring-out point should be a call-bell point, so that each may be warned when calls are originated by the other.

74. **Plan FA 14.** Dgm. FA (L) 199. Magneto-operated multiple call-bell groups, discontinuous ringing, with an additional ring-out point. "Bell-sets No. 26" or "Bells No. 53A" are used and a bell on each group is provided at both ring-out points, so that each may know when the other originates a call. The "Keys No. 72" are necessary to ensure that the bell groups are not normally connected together (as they are in Plan FA 4) which would prevent either ring-out point from operating the groups separately.

75. **Plan FA 15.** Dgm. FA (L) 202. Magneto-operated multiple groups, using 50 c/s. A.C. mains with "Bell-sets No. 26". At least 30 bell-sets may be rung simultaneously by using this Plan.

76. The "Resistor, Bulb, No. 3" is provided to reduce to a safe value the fault current which would flow if an earth fault should develop near the ring-out point. The bulb also glows under these conditions as a warning that such a fault exists.

77. When issued, the "Bell-sets No. 26" are adjusted for operation at 17 c/s., and it is essential, if satisfactory operation at 50 c/s. is to be obtained, that they should be carefully re-adjusted in accordance with the instructions contained in TELEPHONES, Stations, A 3113, Table 2, Note 4 or in Note 5 on Dgm. FA (L) 202.

References:- B 0003, B 1010
 (S1) LINES, General, A 6391
 TELEPHONES, Stations, A 3113, P 0003
 T.S.I. B⁴/V/2(b)
 T.S.I. G¹/N/10

E N D