

BELL SYSTEM PRACTICES
Teletypewriter and Manual
Telegraph Station and P.B.X.
Installation and Maintenance

SECTION P31.131
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AT&T Co Standard

REMOTE BELL AND LAMP SIGNALS FOR NOS. 14 AND 15 TELETYPEWRITERS

1. GENERAL

1.01 This section gives information concerning remote signaling arrangements of the audible and visual type for use at No. 14 and 15-type teletypewriter stations for signaling the attendant. These alarm devices are operated by regular teletypewriter signals received over the line by the machine. In the arrangements to be described, explosion-proof gongs either alone or associated with flashing lamps which may or may not be explosion proof are operated through the agency of standard auxiliary contacts which may be installed in the teletypewriter. Suitable relays and a motor driven flasher (circuit interrupter) may be required external to the machine.

1.02 Although the arrangements described are set up primarily for use in explosive atmospheres, where these explosive conditions do not exist, the same circuit arrangements may be employed using non-explosion-proof equipment.

2. FEATURES PROVIDED

2.01 **Code Signaling**—In this arrangement bell signals and lamp signals are operated at all stations each time the upper case S combination is sent. Each station is assigned a code and as a result the number of stations on any circuit is limited for practical reasons to a fairly small number. For this arrangement the "S" (bell) contacts only are required.

2.02 **Selective Signaling**—In this arrangement the bell or lamp signals respond only at the station desired, and the number of stations is limited to 25 except when this system is combined with Code Signaling. In this arrangement, the procedure for signaling a particular station is as follows:

- (a) Send "Figs" shift.

- (b) Send letter (A, B or C etc.) corresponding to that assigned to the particular station desired.
 - (c) Send S (Bell) signal. If the arrangement provides the lock up feature only one S signal is required. If the arrangement requires repeated S signals to operate the bells repeatedly, such signals should be sent.
 - (d) Send "Ltrs." signal. This unlocks the relays, restores the mechanism to normal and stops the signals, except for cases where the signals are locked up for the attendant to restore upon reaching the machine. In this case the "Ltrs." signal merely restores the machine for normal use.
- 2.03 For a No. 15 teletypewriter station employing selective signaling the parts required in the teletypewriter provide for closing a contact on one character (upper case of some letter) and opening it on some other character (Ltrs. signal) together with the regular "S" (bell) contacts. (With this arrangement, typing on the upper case selecting character may or may not be provided as desired.)
- 2.04 For a No. 14 teletypewriter station employing selective signaling it is necessary to employ a pull bar operated contact in the position for the character which designates the station. In addition the platen contact arrangement to distinguish between lower and upper case is required together with the regular upper case S or bell contact.
- 2.05 In the arrangements here covered, a single stroke bell may be employed to give repeated bell signals as the S key is operated, or continuously vibrating bells may be used either alone or with one or more flashing lamps. If desired the signals may be locked in until the attendant manually operates a release mechanism.
- 2.06 The release mechanism employed is associated with a power relay which mounts on the right side of the teletypewriter table. When the release is tripped, the signals stop.
- 2.07 Where a flashing lamp is required or where it is desired to utilize a single stroke bell operating from a flasher to simulate a vibrating bell, a motor driven flasher adjustable from 15 to 30 operations per minute may be employed. This flasher mounts in a box or cabinet and is provided with a transfer contact so that where both lamp and bell signals are used they may be made to operate alternately or together as desired. The circuit arrangements show alternate operation since this would be more desirable in case of failure of the flashing mechanism, in which case one of the signals would probably be operated.

2.08 In some of the sketches covering the connections a power connection block is shown as an optional feature. This block may be used in cases where it is desired to provide a demarcation between equipment for which the Telephone Company is responsible and that for which the customer is responsible.

2.09 The diagrams covering the installation connections show how a spare machine may be connected into the circuits to the various signaling devices. These connections will probably be made only for those cases where it is thought desirable to have the spare machine provide the same features as the working machine. When this is done the various contacts must be provided in the spare teletypewriter but a single set of external relays and signaling devices will serve.

2.10 Since at least some of the equipment for providing the signaling arrangements will be installed in hazardous locations in many cases, it will be necessary that the installation conform with the instructions of Section P31.130 and the Underwriters' rules and local regulations for the character of the atmosphere at the particular station. Equipment which is not approved for use in explosive atmospheres must be located in atmospheres which are not explosive.

3. CONNECTING DIAGRAMS

3.01 The connecting diagrams to be used with this section have been reproduced as Section P96.101. In that section the odd numbered figures apply to No. 15 teletypewriters and the even numbered figures to No. 14 teletypewriters. The lettered figures showing the lamp and bell wiring are for use with the various numbered figures as indicated. These connections represent power wiring external to the teletypewriter table. The figure numbers discussed below refer to Section P96.101.

3.02 As stated previously single stroke bells, vibrating bells, single stroke bells operating from a flasher or interrupter and lamps similarly operated may be provided either singly or in various combinations. In some cases the signaling equipment such as bells and lamps will have to be duplicated in various places in order to cover a greater area.

3.03 Figs. 1 and 2 for the No. 15 and No. 14 teletypewriters respectively may be employed with Fig. A, B, C or F. When employed with Fig. A, the bell or bells should be of the vibrating type. This arrangement will provide a continuous bell signal until the manual release is operated. When Fig. 1 or 2 is employed with Fig. B continuously vibrating bell signals and continuously flashing lamp signals will be provided until manu-

ally released. When Fig. C is employed either single stroke or vibrating bells may be used and intermittent bell signals with flashing lamp signals will be given until the manual release is operated. When Fig. F is employed either single stroke or vibrating bells may be used and intermittent bell signals alone will be given until the manual release is operated. It will be noted in Fig. F that an arrangement is shown for connecting on additional signaling equipment of the same character as shown in the other figures which the customer may desire to provide. If equipment substantially different from that shown in the figures is desired, the matter should be referred for approval through the lines of organization.

3.04 When Fig. 3 or 4 is employed with Fig. A, the bells should be of the single stroke type. This arrangement will provide a single bell signal each time the bell key lever is operated from the sending keyboard.

3.05 When Fig. 5 or 6 is employed with Fig. D one or more single stroke bells will be required. This combination provides single bell signals with each operation of the bell key lever on the keyboard and continuously flashing lamp signals until the manual release is operated.

3.06 When Fig. 7 or 8 is associated with Fig. E only one single stroke bell should be used. This arrangement will provide a single bell signal each time the bell key lever on the keyboard is operated. If additional bells are required the arrangement described in 3.04 above should be employed.

3.07 In order to show in tabular form the various possibilities provided by the different combinations of figures in B.S.P. P96.101 the following table has been prepared. By variations in some of the details other combinations may be made as required. Further, in some cases it may be desired to use an approved howler in place of a bell or lamp. Such substitution can easily be made locally.

TABLE

	Single Stroke Bells on each S-Signal	Intermittent Single Stroke or Vibrating Bells From Flasher Manual Release	Continuously Vibrating Bells Manual Release	Flashing Lamps Manual Release	Figures to be Used (see P96.101)
For No. 15 Teletypewriters					
1.			X		1 & A
2.			X		1 & B
3.		X		X	1 & C
4.		X			1 & F
5.	X (More than 1)				3 & A
6.	X (1 or More)			X	5 & D
7.	X (Only 1 Bell)				7 & E
For No. 14 Teletypewriters					
8.			X		2 & A
9.			X		2 & B
10.		X		X	2 & C
11.		X			2 & F
12.	X (More than 1)				4 & A
13.	X (1 or More)			X	6 & D
14.	X (Only 1 Bell)				8 & F

4. EQUIPMENT REQUIRED FOR VARIOUS CASES

4.01 In addition to the regular teletypewriter equipment at the station, auxiliary contacts, relays and flashers will be required as indicated below.

A. 15 Teletypewriter

4.02 For Fig. 1 the following will be required.

- 1—93073M Resistance Assembly.
- 1—96807M Set of Parts to close contacts on upper case ——— and open on "Ltrs." (Insert proper letter in blank space.)
- 1—95088M Set of Parts for Bell Contacts.
- 1—KS-7993 Cord or equivalent Cord to fit Outlet.
- 1—R1C-H2 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
- 1—M2BM Cord 2'-6".
- 1—M2CF Cord 2'-6".

Note: If a spare machine is to be similarly equipped with the signaling parts, the above will need to be duplicated excepting the R1C Relay and the KS-7993 Cord.

•Indicates items referred to in later paragraphs.

4.03 For Fig. 3 the items starred in 4.02 will be required together with the following:

- 1—M2BM Cord 2'-6".
- 1—M2CF Cord 2'-6".
- 1—A7-H1 Signal Engineering Relay for operation on 115 V 60-cycle a-c.

Note: If a spare machine is to be similarly equipped with the signaling parts, the above will need to be duplicated excepting the A7-H1 Relay and the KS-7993 Cord.

4.04 For Fig. 5 the items starred in 4.02 will be required together with the following,

- 1—93073M Resistance Assembly.
- 1—A7-H1 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
- 1—R1C-H2 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
- 1—M3M Cord 2'-6".
- 1—M3Y Cord 2'-9".
- 1—KS-7993 Cord or equivalent Cord to fit Outlet.

Note: If a spare machine is to be similarly equipped with the signaling parts, the above will need to be duplicated excepting the two relays and the two KS-7993 Cords. Also an M2BM Cord and a M2CF Cord should be substituted for the M3M and M3Y Cords.

- 4.05 For Fig. 7 the following will be required:
- 1—96807M Set of Parts to close contacts on upper case ——— and open on "Ltrs." (Insert proper letter in blank space.)
 - 1—95088M Set of Parts for Bell Contacts.
 - 1—KS-7993 Cord or equivalent Cord to fit Outlet.

Note: If a spare machine is to be similarly equipped with the signaling parts, the above will need to be duplicated excepting the KS-7993 Cord.

B. 14 Teletypewriter

- 4.06 For Fig. 2 the following will be required:
- 1—99343M Platen Contact Assembly.
 - 1—99345M Set of Parts for Mounting Pull Bar Contacts.
 - 1—99460M Pull Bar.
 - 1—97140M Contact Assembly (for Y and P selections)
or
 - 1—97125M Contact Assembly (for all other selections).
 - 1—104479M Bell Contact Assembly.
 - 1—93073M Resistor Assembly.
 - 1—82629M Bracket.
 - 1—82631M Insulator.
 - 1—2669M Lockwasher.
 - 1—34-4M Nut.
 - 1—M3M Cord 2'-6".
 - 1—M3Y Cord 2'-9".
 - 1—M4K Cord 2'-6".
 - 1—M4N Cord 3' with 7351 Hubbell Body.
 - 1—A7-H1 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
 - 1—R1C-H2 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
 - 1—KS-7993 Cord or Cord to fit Outlet.

•Indicates items referred to in later paragraphs.

Note: If a spare machine is to be similarly equipped with the signaling parts, the above will need to be duplicated excepting the 2 relays, the M3M and the M3Y Cords, and the KS-7993 Cord.

4.07 For Fig. 4 the items starred in Paragraph 4.06 will be required together with the following:

- 1—M4K Cord 2'-6".
- 1—M4N Cord 3' with 7351 Hubbell Body.
- 1—M3M Cord 2'-6".
- 1—M3Y Cord 2'-9".
- 2—A7-H1 Signal Engineering Relays for operation on 115 V 60-cycle a-c.
- 1—KS-7993 Cord.

Note: If a spare machine is to be similarly equipped with the signaling parts, the above will need to be duplicated excepting the 2 relays, the M3M and M3Y Cords and the KS-7993 Cord.

4.08 For Fig. 6 the items under Paragraph 4.07 will be required and the following in addition:

- 1—R1C-H2 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
- 1—KS-7993 Cord.

Note: If a spare machine is to be similarly equipped, the identical equipment as called for under the note of Paragraph 4.07 will be required.

4.09 For Fig. 8 the items starred in Paragraph 4.06 will be required together with the following:

- 2—M2BM Cords 2'-6".
- 2—M2CF Cords 2'-6".
- 1—M3M Cord 2'-6".
- 1—M3Y Cord 2'-9".
- 1—A7-H1 Signal Engineering Relay for operation on 115 V 60-cycle a-c.
- 2—768 Bryant Connectors.
- 1—KS-7993 Cord.

Note: If a spare machine is to be similarly equipped, the equipment required will be those items starred in 4.06 and the following in addition:

- 1—M2BM Cord 2'-6".
- 1—M2CF Cord 2'-6".
- 1—M3M Cord 2'-6".
- 1—M3Y Cord 2'-9".

4.10 For Fig. A one or more signal bells selected from Section P31.130 will be required. An outlet to fit the cord from the signaling devices on the teletypewriter will be required together with the power wiring shown.

4.11 For Figs. B, C and D in addition to the bells and wiring mentioned for Fig. A, a 3-61A2 Sangamo Flasher with Hinged Cabinet and a lamp or lamps (see Paragraph 4.14) will be required. For Fig. D, two wall outlets are required. If a demarcation connection block is to be provided, the following may be used for this purpose.

- 1—Crouse Hinds CB1124 Connection Block.
- 1—Graybar 52151 Outlet Box.
- 1—Graybar 52C1 Cover.

4.12 For Fig. E only one bell (see Section P31.130) will be required in addition to the wiring and outlet shown in the figure. If more bells are required other figures should be used.

4.13 For Fig. F the following will be required in addition to the wiring and outlet shown in the figure:

- 1—Crouse Hinds CB1124 Connection Block.
 - 1—Graybar 52151 Outlet Box.
 - 1—Graybar 52C1 Cover.
 - 1—Sangamo 3-61A2 Flasher with Hinged Cabinet.
- Bells per B.S.P. Section P31.130.

The connection block provides demarcation facilities for connecting to customer owned or other signaling devices.

4.14 The lamps to be used should meet the safety requirements for the atmospheres in which they are to be used and the requirements as to visibility. For explosive atmospheres defined as Class I of Group D a number of lamps have been approved as listed in the Underwriters' List of Inspected Electrical Equipment. (Atmospheres in this class include those containing gasoline, petroleum, naphtha, alcohols, acetone, benzine, lacquer solvent vapors and natural gas.)

4.15 In general the lamp signal which will be found most satisfactory will be of the floodlight projector type, arranged either for wide or narrow beam as desired. These are available for use in explosive or non-explosive atmospheres. In some situations the use of obstruction type lamps will be satisfactory, but these are ordinarily not available for explosive atmospheres. In some cases it may be desirable to select a lamp which may be arranged to produce a red light. Because of the varying conditions at different stations, it will be necessary to select a lamp to meet a particular customer's requirements. Examples of lamps which may be found satisfactory are:

- (a) For explosive atmospheres (Floodlight Projector)
RCDE-8 Crouse Hinds Explosion Proof Floodlight.
(For detailed ordering information see manufacturer's catalog.)
- (b) For non-explosive atmospheres (Floodlight Projector)
ADE-12 Crouse Hinds Floodlight Projector. (For detailed ordering information see manufacturer's catalog.)
- (c) For non-explosive atmospheres (Obstruction light)
VAW Crouse Hinds Boundary or Obstruction Light.
(For detailed ordering information see manufacturer's catalog.)

5. INSTALLATION INFORMATION

5.01 The 95088M contacts for the No. 15 teletypewriter (upper case S or bell contacts) are installed according to Paragraph 2 of Section P36.477. The 104479M bell contact assembly for the No. 14 teletypewriter is installed as stated in P35.466. This bell contact assembly is an improved assembly and supersedes the 88894M assembly now covered by P35.466. The new parts include a 102877M pull bar, a 99036M typebar with pallet and a 7634M spring. These parts should be installed in the machine in the bell position of the segment and they serve to lengthen the closure of the "S" contacts. The wiring of the contacts is given in each case by the figure of P96.101 which applies.

5.02 Installation information for the 96807M parts for No. 15 teletypewriters to provide the auxiliary contacts required to select the proper station is given in Section P36.479. For the No. 14 teletypewriter it will be necessary to mount the 99345M parts for accommodating pull bar contacts above the code bars, to mount the contacts in their proper position and install the pull bar at the particular position in the arc to correspond to the character assigned for signaling that station. The connections should be made according to the connecting figure which applies.

5.03 Installation information for the 99343M platen contact assembly for the No. 14 teletypewriter is given in specification S-5344.

5.04 The 93073M resistance assemblies are installed vertically on top of the No. 15 teletypewriter bases. If only one assembly is to be installed on a 15C base the rearmost tapped hole of the two provided near the rear edge (approximately halfway between the side edges) for mounting such resistors should be used. If two resistors are to be mounted the second mounting hole provided should be used if no line relay

is required. If a line relay is to be used a new hole should be drilled for the second resistor 1-1/2 inches to the left of the first hole, using a No. 21 drill. The hole should be tapped with a 10-32 tap. If 15A or 15B bases are to be used, tapped holes for the resistors will have to be provided using a No. 21 drill and a 10-32 tap. The first hole should be located 1 inch forward from the top curved rear edge of the base and 7-1/2 inches from the right edge. If a second hole is required it should be located 1-1/2 inches further to the left and 1 inch from the top of the rear edge. On the No. 14 teletypewriter the resistor is to be mounted horizontally in the cavity of the base under the motor in the assembly provided for the motor governor resistors. To do this, the 82629M bracket with its insulator should be substituted for one of the 70707M brackets which mounts one end of the governor resistors. The 93073M assembly then mounts in the extra hole of the new bracket by means of the long screw and 34-4M nut.

5.05 The RIC-H2 Signal Engineering and Manufacturing Co. relay should be mounted at the right side of the teletypewriter table with the release button down so as to be convenient to the attendant for operating the mechanical release. The A7-H1 relay may be mounted vertically on the right side of the table or in any other convenient location.

5.06 The Sangamo 3-61A2 flasher should be mounted near the power wiring outlet into which the teletypewriter contact and relay circuits connect so that the lengths of power wiring will be as short as possible. The flasher must not be installed in hazardous atmospheres. Refer to Paragraph 2.10.

5.07 The bells and lamps should be installed with due regard to the rules and regulations set up for hazardous atmospheres. See Underwriters' rules and Section P31.130.

5.08 Where a demarcation connection block is used it should be installed in non-hazardous atmosphere in any convenient location for the purpose.

6. ADJUSTMENT OF A7 SIGNAL ENGINEERING RELAY

6.01 Standard adjustments apply to all equipment involved in the alarm devices covered in this section. However, where the A7 Signal Engineering Relay closes the contacts which operate the bell (Figs. 5 and 6), it may be found that better bell signals are given with somewhat reduced contact gaps. Where this is the case the armature stop may be adjusted to reduce the contact gaps provided the separation at the upper contacts with the armature unoperated is not reduced below 1/8 inch.