PHONOGRAM AND TELEPHONE-TELEGRAM SYSTEM
Double-tier Installations—Description of Equipment

1. Scope of Instruction. This Instruction describes equipment of the " double-tier continuous panel " type used for phonogram and telephone-telegram installations. This equipment is normally installed when 16 or more operating Positions are required, and " V "-belt conveyors for carrying received messages to the circulation point are provided. It is sometimes necessary, owing to local conditions regarding accommodation, etc., to install double-tier equipment where the number of Positions required is less than 16 : in these circumstances, however, belt conveyors are not normally provided.

2. The Positions are supplied ready-wired, but, to meet the requirements of particular installations that are determined by the local exchange system, i.e. automatic or manual, it is necessary to make certain minor rearrangements to the wiring. Details of these modifications are given in this Instruction under the heading " Installation."

3. General. Suites of Positions are built up from a number of desk units which, when erected, form a double-sided table for carrying switchboard units accommodating the line lamps and jacks. Each double-sided table provides two suites, one on either side, and is assembled round a centrally-disposed " V "-belt conveyor which is accessible to the operators on both suites. The general layout of double-tier equipment is shown in drg. CD 174. In all installations, the situation of the suites is in accordance with a layout plan approved by the Telecommunications Department (Tg. B.).

3. Desks.

(*a*) *Desk units* are of two types, viz. :—

Desks, Pair, TL 1414, and
Desks, End Set, TL 1414.

(*b*) *Positions.* Each " Desk, Pair " provides two operator's Positions, one on each side of the table ; each " Desk, End Set," which completes the ends of the table, similarly provides two operator's Positions. The combination of " Desks, Pair " and " Desks, End Set " is shown in drg. EC 1794.

(*c*) *Other details.* The desk tops are fibre-covered, and the desk pedestals which support them incorporate key-shelves. Each key-shelf accommodates cord-circuit and amplifier-control keys, cord-circuit supervisory lamps and a dial for one operator's Position. The key-shelf always occupies the left-hand side of the Position. The cord-circuit plugs are situated behind the key-shelf. and the cords are accommodated in the desk pedestal.

4. Switchboards and Cable-turning Sections.

(*a*) " *Switchboards, Phonogram, Nos. 5 and 6.*" Two sizes of switchboard are in use for double-tier equipment, viz. a two-panel unit and a five-panel unit, and are known as " Switchboards, Phonogram, No. 5 " and " Switchboards, Phonogram, No. 6," respectively ; they are used in combination to provide the required number of switchboard panels on a suite. The switchboards are fixed along the centre of the table, at a height of 6 in. above the table top. They are mounted on bent iron supports that are bolted to the desk top and span the channel for the belt conveyor between adjacent suites. Jack fields are provided on each side of the switchboards. The width of the switchboards, however, is restricted to that required for one-sided access by a design which is equivalent to two single-sided switchboards mounted one above the other ; the jack field on one side being situated in the lower half of the complete switchboard, and on the other side in the upper half. On either side, the space not occupied by a jack field is fitted with removable panels which give access to the wiring of the jack field appearing on the opposite side. The removable panels also serve for the exhibition of traffic notices. With the switchboards supported 6 in. above the desk top, sufficient clearance is provided for using typewriters with continuous stationery feed without fouling cord-circuit plugs inserted in the jack field.

(*b*) " *Cable-turning Sections, Start and Finish* " are used for terminating the ends of a combination of switchboards.

5. Position-circuit apparatus units. The relays, retardation coils, condensers, etc., for the Position cord-circuits and operator's telephone circuit, are accommodated in an auxiliary-apparatus unit. The units are arranged for jacking into position underneath the desks, where they are protected from damage by removable kicking boards. The type of unit used depends upon the facilities provided, which are determined by the traffic requirements as follows :—

(*a*) " Units, A.A., TL 1643 " are used on telephone-telegram Positions with an associated " Message-distribution Position "

(*b*) " Units, A.A., TL 2041 " are used for phonogram Positions equipped with " Traffic-distribution control " lamps

(*c*) " Units, A.A., No. 74 " are used for telephone-telegram Positions *not* associated with a message-distribution Position and also for phonogram Positions *not* equipped with traffic-distribution control lamps.

Units of each of the above-mentioned types are available for installations with 22-V. or 24-V., 40-V. or 50-V. power supplies.

6. Suites. Two suites are made up of one " Desk, End Set " plus the necessary " Desks, Pair," together

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with switchboards, cable-turning sections and Position-circuit units to make up the required number of Positions.

7. Belt Conveyors. The " V "-belt conveyors associated with the suites are standardized, but the construction and layout of the appropriate system is determined by local conditions. The necessary drawings and specifications for installation of these conveyors are provided by the E.-in-C. (P). It is essential that the conveyor be installed before the desks are assembled, otherwise it will not be possible subsequently to erect the conveyor supports. Woodwork to extend the table over the conveyor motor and other parts as required is arranged locally. When " V "-belt conveyors are not provided, arrangements are made for the conveyor channel to be covered-in with woodwork and the end of the table to be finished off.

8. Facilities.

(*a*) *Incoming circuits.* All incoming circuits and the incoming sides of bothway circuits are ancillaried over one or more suites, keys being provided for cutting ancillaries in or out as described in P 1121. To economize in current consumption, keys are provided for disconnecting the lamp circuits on suites that are not staffed.

(*b*) *Delayed-call flash* facilities are provided on all the above circuits, and the arrangements are described in P 1131.

(*c*) *Outgoing circuits.* A complete multiple of all outgoing phonogram circuits, and the outgoing sides of bothway phonogram circuits, is accessible to each phonogram operator. Telephone-telegram circuits are similarly multipled on all T.T. suites.

(*d*) " *Free-line signalling* " facilities are provided on all groups of 10 or more junctions outgoing to one exchange.

(*e*) " *Banking* " (i.e. repetition of circuits on end-panels of suites). So that the operator at the end of a suite may not have to reach across the adjacent operator in order to connect with a portion of the outgoing multiple, the circuits on those panels which are not within easy reach are repeated on the end-panels of the suite.

(*f*) *Single-stage valve amplifiers* are provided on the basis of one per Position and may be connected in circuit to amplify incoming speech, by the operation of a key on the key-shelf. A second key is provided to control the gain of the amplifier, by means of which the amplifier can be adjusted to give gains of 10 db. and 5 db. or a loss of 5 db. The 5-db. loss enables an operator to reduce the volume of abnormally-loud incoming speech, which may make hearing difficult.

(*g*) *Foot-switch transmitter cut-out* facilities are provided to enable operators to use both hands for typing whilst employing this facility.

(*h*) *Transfer of calls.* Two pairs of cords are provided per Position so that, if necessary, an operator may extend a call over a transfer circuit and still have a cord-circuit free to attend to other calls.

(*j*) *Cord-circuit supervisory lamps* are provided to give visual indication of the condition obtaining on a call which is extended.

(*k*) *Red and Green traffic-distribution control lamps* to assist in the distribution of outgoing traffic, are provided at each Position when required.

(*l*) *Message-distribution Position.* To facilitate the distribution of outgoing traffic to telephone-telegram operators, the switchboard of one Position in the complete installation may be equipped with a Message-distribution Panel. In conjunction with this, the key-shelf on each Position of the telephone-telegram suites is fitted with a CIRCUIT HOLD lamp and a RESET key. The function of a Message-distribution Position, and details of the panel and key-shelf equipment are given in P 1045.

(*m*) " *Dial guard.*" When the equipment is installed in a telephone area served by both auto. and manual exchanges and the local exchange is manual, a lamp provided on the key-shelf gives visual indication when the dial switching key is in the operated condition, and draws attention to failure to restore the key after dialling. This facility is not provided on a telephone-telegram Position associated with a message-distribution Position.

INSTALLATION

9. Suite equipment. Table 1 indicates the main items required to build up suites of various numbers of Positions.

10. Assembly. The desk units and switchboards are assembled on site, as shown in drgs. 9434 and EC 1794. The individual desks are screwed to iron frameworks, which are in turn screwed to the floor. Where necessary, the desks are levelled by means of hardwood strips inserted between the base and the floor.

11. Wiring of Desks. The cord-circuit RING AND DIAL keys, and their connexions, on both phonogram and telephone-telegram Positions, vary according to whether the installation is situated in a telephone area which includes both manual and auto. exchanges or an area which is wholly manual. In the circumstances, these keys are provided and wired locally. The wiring of the Desks and End Sets, as issued from stock, is shown in dgm. PF 195 and is so arranged that a minimum of work is necessary to provide the required facilities. Table 2 indicates the wiring diagrams and layout drawings to be followed in various circumstances.

TABLE 1. "DOUBLE-TIER" PHONOGRAM AND TELEPHONE-TELEGRAM INSTALLATIONS. ITEMS AND QUANTITIES

Desks and Switchboards	† No. of Positions in one complete double table							
	16	18	20	22	24	26	28	30
Desks, Pair, TL 1414	7	8	9	10	11	12	13	14
Desks, End Set, TL 1414	1	1	1	1	1	1	1	1
Switchboards, Phonogram, No. 5	—	4	—	4	—	4	—	4
do. do. No. 6	4	3	5	4	6	5	7	6
do. do. No. 6, C.T.S. Start	1	1	1	1	1	1	1	1
do. do. No. 6, C.T.S. Finish	1	1	1	1	1	1	1	1

Equipment	Type of Position	Conditions	No. per Position
Units, Auxiliary Appts. :—			
No. 74, A, B or C	Phonogram	‡Without T.D.C. lamps ...	1
	Telephone-Telegram	§Without M.D. facilities ...	1
TL 2041, 22-V., 40-V. or 50-V.	Phonogram	With T.D.C. lamps ...	1
TL 1643, 22-V., 40-V. or 50-V.	Telephone-Telegram	With M.D. facilities ...	1
Lamp Fittings No. 1 ...	Phonogram	With T.D.C. lamps	1
Lamps, No. 12, ...V., Red ...	Telephone-Telegram	With M.D. facilities	1
do. do. do. Green			1
Switches, Foot, No. 1 ...	Phonogram and Telephone-Telegram	All Positions	1
Dials, Auto., SS. No. 10 ...			1
Mountings, Dial, Auto., No. 12	ditto	Where the local exchange is auto.	1
Keys, No. 199, Black ...			2
do. No. 72, Red			1
do. No. 171, Black ...	ditto	Where the local exchange is manual	2
do. No. 207 or No. 68, Red			1
do. No. 171, Black ...	ditto	Where the area is wholly manual	2
Jacks, Lamps No. 10 ...	Phonogram and Telephone-Telegram	For 'dial guard,' when required	1
Lamps No. 2, ...V.			
Ticket Trays No. 9	ditto	All suites	1
do. No. 14 ...	Telephone-Telegram	ditto	1 per two Positions
do. No. 15 ...	Phonogram	ditto	1 per two Positions
Clips No. 41	Phonogram and Telephone-Telegram	When required	1
Jacks No. 310 BN or 320 BN	Phonograms	All Positions	Quantity determined by traffic requirements
Jacks, Lamp, No. 19A, or No. 17	Telephone-Telegram	Without M.D. facilities	
Jacks, No. 810 BN	Telephone-Telegram	With M.D. facilities	
Jacks, Lamp, No. 19A ...			
Lamps, No. 2, ...V.	Phonogram and Telephone-Telegram	All Positions	
Caps, Lamp, No. 1			
Strips, Designation, No. 22	ditto	Where Jacks No. 320 B.N. are used	

NOTES. † Each complete double table provides two suites (see par. 2)

‡ Traffic Distribution Control

§ Message Distribution

‖ "Keys No. 68, Red" are required only for telephone-telegram installations equipped with a Message-distribution Position

The apparatus for equipping a Message-distribution Position is detailed in P 1045 (when available)

TABLE 2

Area	Local exchange	Wiring diagram	Layout drawing
(a) Phonogram Positions and Telephone-Telegram Positions NOT associated with a Message-distribution Position.			
Auto. & manual ...	Auto. ...	PF 56	CD 152
Auto. & manual ...	Manual ...	PF 58	CD 151
Manual only ...	Manual ...	PF 60	CD 161
(b) Telephone-Telegram Positions associated with a Message-Distribution Position			
Auto. & manual ...	Auto. ...	PF 80	CD 172
Auto. & manual ...	Manual ...	PF 88	CD 173
Manual only ...	Manual ...	PF 101	CD 222

In all the above instances, the engravings of the key-mountings are as shown in the relative key-shelf layout drawing.

12. Foot-switch. The location of the foot-switch transmitter cut-out is shown in drg. CD 163. Arrangements are made for the cable between the foot-switch and the desk to be protected by wood capping or other suitable means.

13. Line circuits.

(a) Installations not equipped with a Message-distribution Position.

(i) *Phonogram and exchange telephone-telegram circuits.* These circuits are arranged to dgm. PF 48, which provides for outgoing, incoming and bothway circuits. Outgoing circuits are wired to Fig. 1 and the outgoing sides of bothway circuits to Fig. 4 of this diagram ; incoming circuits and the incoming sides of bothway circuits are wired to Fig. 2.

(ii) *Direct telephone-telegram circuits* are arranged to dgm. PF 52. Fig. 2 of this diagram shows the apparatus and wiring required for the incoming sides of these circuits, whilst the apparatus and wiring for outgoing circuits and the outgoing side of bothway circuits are shown in Figs. 1 and 3, respectively.

(b) Installations equipped with a Message-distribution Position.

(i) *Phonogram circuits* are arranged as stated in (*a*) (i) above.

(ii) *Exchange telephone-telegram circuits* are arranged to dgm. PF 89, which includes the arrangements made for bothway and unidirectional circuits.

(iii) *Direct telephone-telegram circuits* are arranged to dgm. PF 62.

14. Apparatus. The apparatus, as detailed in the relative diagrams, is strip-mounted on the apparatus rack.

15. Apparatus racks. " Racks, Apparatus, No. 15 " are used for accommodating the line and miscellaneous circuit apparatus. This apparatus introduces some noise ; it is, therefore, situated in a position, preferably in a separate room, where the noise does not interfere with telephone reception. Where the only accommodation available for the apparatus is in the phonogram room, however, arrangements are made for its enclosure by a suitable structure.

16. Distribution frames.

(*a*) *M.D.F.* When the phonogram and telephone-telegram installation is situated in the same building as a telephone exchange, the line circuits pass through the exchange M.D.F. ; otherwise, a " Frame, M.D., $\frac{0}{240}$ or $\frac{0}{480}$ " is provided and equipped as required.

(*b*) *I.D.F.* A " Frame, M.D., $\frac{0}{240}$ or $\frac{0}{480}$ " as required, modified in accordance with drg. EC 1327, is equipped with connexion strips for use as an I.D.F.

17. Cabling and Wiring. The cabling is concealed in floor chases, and connexion strips are provided in the desks for terminating switchboard and lead-covered cables. The connexions concerned, and the cables and wires used, are detailed in Table 3.

TABLE 3

Connexion(s) concerned	Cable and Wire used
Local I.D.F. to Apparatus Rack	Cable, Switchboard, 9¼ lb.
Multiple I.D.F. to Apparatus Rack	
Local I.D.F. to connexion strips on Desks	Cable, E.S. and W. Core, or Cable, P.C.Q.L. terminated with Cable, E.S. and W. Core
Connexion strips in Desks to Incoming jacks ...	Cable, Switchboard, 9¼ lb.
,, ,, ,, ,, ,, Outgoing jacks ...	
,, ,, ,, ,, ,, Lamp jacks	
Connexions between switchboard panels on same suite	
Keys No. 238 to Lamp jacks	Wire, Switchboard, 9¼ lb., or Cable, Switchboard, 9¼ lb., as required
	Cable, I.R.V., ... Core, 40 lb.
Battery and Earth leads from Fuse-panel to Desks and Apparatus	
Battery leads between Desks and Switchboards	Wire, F.P., I.R.V., 1-wire/20, Black, or Cable, Switchboard, 9¼ lb. with other battery leads
Earth leads between Desks and Switchboards	Wire, F.P., I.R.V. 1-wire/20, Red, or Wire, Switchboard, Red, 9¼ lb., in wiring form
17-cycle ringing supply between Fuse-panel and Desks	Cable, I.R.V., ... Core, 40 lb.
General wiring	Wire, Switchboard, 9¼ lb.
NOTE. All speaking leads are twisted pairs.	

★18. Miscellaneous equipment.

(*a*) *Operators' telephone instruments.* "Receivers, Headgear, No. 10A" and "Transmitters No. 23A" with "Plugs No. 404 (Mark 4)" are provided.

(*b*) "*Ticket Trays No. 9.*" One ticket tray is provided per Position for holding messages that have to be forwarded. The trays are fixed to the base of the switchboard, as shown in drg. CD 169.

(*c*) "*Ticket Trays Nos. 14 and 15.*" One "Ticket Tray No. 14" is provided per two operators on telephone-telegram suites for holding inquiry dockets, and one "Ticket Tray No. 15" per two operators on phonogram suites for holding inquiry dockets and Post Office Guide. The trays are fitted in the place of a spare panel in the switchboard. The situation of these trays is determined by traffic requirements.

(*d*) "*Clips No. 41.*" In the absence of belt-conveyor facilities, one "Clip No. 41" is provided at each Position for holding received messages awaiting collection. The clips are fitted in the same manner as for single-tier equipment, as described in P 1030.

(*e*) *Message-Distribution Test Jack.* In order that each operator may test the operation of the Message-distribution circuit, a test jack is fitted in the multiple on a basis of one per multiple appearance. The items required per test jack are :—

1 "Key-mounting PD"
1 "Key No. 228"
1 "Resistor, Coil, No. 12—30 ohms"
1 "Resistor, Coil, No. 12—3000 ohms" .
(22 V. and 24 V.)
[or 5000 ohms (40 V. and 50 V.)]

One multiple jack is wired to dgm. PF/PFW 3023 and beneath it, in the "Key-mounting PD," is mounted the "Key No. 228."

(*f*) *Cord Test Circuit.* Cord- and Ring-test Jacks are fitted in the multiple on a basis of one Cord-test jack and one Ring-test jack per multiple appearance. The items required per multiple appearance are:—

1 "Resistor, Spool, No. 1—200 ohms"
1 "Resistor, Spool, No. 1—800 ohms"
1 "Resistor, Spool, No. 1—1000 ohms"
1 "Resistor, Spool, No. 1—4 ohms
(22 V. and 24 V.)
[or 30 ohms (40 V. and 50 V.)]
1 "Resistor, Spool, No. 1—30 ohms
(22 V. and 24 V.)
[or 50 ohms (40 V. and 50 V.)]
1 "Coil, Induction, No. 18A"
(at some installations are fitted "Coil, Induction, No. 14," which is obsolete)
1 "Rectifier Element No. 1/12A"
1 "Condenser, M.C. No. 103"
1 "Relay No. 129C"

The jacks are wired to dgm. PF55.

19. Drawings and Diagrams. A summary of the drawings and diagrams relative to double-tier phonogram and telephone-telegram installations not equipped with a message-distribution Position is given in P 1041 ; P 1045 applies where a distribution Position is provided.

References :—P 1030, P 1041, P 1045, P 1121, P 1131 (Tg)

END

Distribution :—52, 58, 112

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