POWER PLANT FOR TELECOMMUNICATIONS

★**1. General.**—This Instruction indicates power plants for the supply of power to various types of telecommunications equipment.

Each type of power plant is designated by a code consisting of a number followed by a letter or by a stroke and another number. The first number represents the type of power plant and the letter or second number represents the variant (e.g. capacity) of that particular type. Generally, numbers in the 100 series refer to repeater station power plant (d.c. output), in the 200 series to telephone exchange power plant, and in the 400 series to power plant with a.c. output.

The coded plants are listed in Table 1. The appropriate code numbers of the main and 50V positive standard power plants to be used for new work in telephone exchanges including S.A.X.s are indicated in Tables 2 to 4.

Power plant for repeater and radio stations is dealt with by the Eng. Dept. (P3/4) (TRANSMISSION, Telephone, A 3009 refers). Standby generating plant is dealt with by the Eng. Dept. (P3/3 and P3/4) (Machines & Switchboards, D 3910 refers) or by Regions in accordance with Machines & Switchboards, D 3905. Power plant for duties or loads not mentioned in this Instruction should be referred to the Eng. Dept. (P3/1).

2. Coded power plants.—Table 1 gives the relative descriptive and installation Instructions together with the former title, use or brief description of the plant. Where descriptive Instructions have not been issued the diagram number is quoted.

★TABLE 1.—CODED POWER PLANTS

Power Plant No.	Instructions (POWER, General) or diagram No.		Former title, use or description
	Descriptive	Installation	
101A to G	G 1101	G 3101	Previously TL 2596; l.t. and h.t. for amplifier stations
102A to E	G 1501	G 3501	Previously TL 2960; l.t. and h.t. for amplifier stations
103A to D	G 1103	—	Previously Austinlite Plant Size (B type)
104	G 9104(P)	—	Faraday T.R.S.
105	G 9105(P)	—	Oxford, Bristol and Cambridge T.R.S.s
106	Siemens Dgm. XT 10105	—	Kingsway T.R.S.
107	G 9107(P)	—	York T.R.S.
108	G 9108(P)	—	Oban T.R.S.
109	G 1109	—	T.R.S. automatic D.B.F.
110	Dgms. RP 3955-6	—	T.R.S. centralized 'B'
111	G 1111	—	T.R.S. D.B.F. (original generator type)
112	G 1112	—	T.R.S. D.B.F. (manually started generators)
113	Dgm. P/DC 182	—	Premium Bond equipment
114	S.T.C. Dgms. 279 LE1-3	—	L.T. and H.T. D.T.N. stations
115	S.T.C. Dgm. L 78824	—	80V+80V D.T.N. stations. Automatic M/G. sets

TABLE 1 (*contd.*)

Power Plant No.	Instructions (POWER, General) or diagram No.		Former title, use or description
	Descriptive	Installation	
116	Dgm. TG 2038/1	—	80V+80V D.T.N. stations. Manual M/G. sets
117	S.T.C. Dgm. 246 LU 3033	—	L.T. and H.T. large D.T.N. stations
118	S.T.C. Dgm. L 80602	—	6V standby. D.T.N. stations
119	Dgm. P/DC 151	—	T.R.S. fully-automatic D.B.F.
120	Dgm. P/DC 381	—	Power plant for T.A.S.I. (time assignment speech interpolation)
121/0.15-125	G 1121	—	Transistorized transmission equipment. Up to 125A, 12-cell (Single-phase a.c. input)
122A to D	Dgm. P/DC 198	—	Transistorized transmission equipment. Up to 50A, 10-cell
123/100-2400	Dgm. P/DC 288	—	Transistorized transmission equipment. From 100A to 2400A, 12-cell (3-phase a.c. input)
124	G 9231(P)	—	Widemouth T.R.S.
125	Dgm. P/DC 313	—	12V positive or negative d.c. supply for transistorized transmission or switching equipment
126	Dgm. P/DC 422	—	80V+80V automatic float (rectifier)
127	Dgm. P/DC 414	—	80V+80V fully-automatic plant
201A to D	F 1030	F 3030	Single-battery automatic for U.A.X.s
202A & B	F 1037	F 3037	Single-battery automatic for C.B.S. exchanges
203A & B	F 1029	F 3028	Modified P.B.A. U.A.X.s No. 13X only
203C to K	F 1029	F 3029	Modified P.B.A.
204A to H	F 1060	F 3060	Charge-discharge with automatic disconnexion of charging
205A to G	Dgm. P/DC 34	F 3904	Positive battery for A.T.E.s and U.A.X.s No. 14
206	Dgm. P/DC 35	F 3905	Positive battery, U.A.X.s No. 13 (a.c. mains)
207A to E	F 1066	—	Parallel-battery automatic for A.T.E.s
208A to D	F 1067	—	Parallel-battery automatic for U.A.X.s No. 14
209	Dgm. P/DC 10	F 3906	Positive-battery for U.A.X.s No. 13 (d.c. mains)

TABLE 1 (*contd.*)

Power Plant No.	Instructions (POWER, General) or diagram No.		Former title, use or description
	Descriptive	Installation	
210A to M	F 1076	—	50V automatic rectifier float up to 800A peak
211A to C	Dgm. P/DC 56	F 3908	Line signalling supply for S.S.D.C. No. 2 equipment at 22V exchanges
212	Dgm. P/DC 58	—	Positive supply for U.A.X.s, Charge/discharge from automatically-controlled main batteries
213A to N	F 1079	—	Generator D.B.F. (modern)
214A to D	F 1080	F 3080	Rectifier power plant for U.A.X.s Nos. 12 and 13
215	Dgm. P/DC 85	—	Positive supply for U.A.X.s, Charge/discharge from charge/discharge main batteries
216	Dgm. AT 4893	—	Mobile telephone exchange (M.A.X.)
217	F 1050	—	Small C.B.S. and magneto exchanges
218	Dgm. AT 4643	—	Generator float using Switch, Rotary, AT 4643
219	F 1089	—	Charge/discharge over 300Ah batteries
220	F 1090	—	Generator D.B.F. (old type)
221A to C	F 1091	F 3091	Positive battery for S.T.D.
222/850-6020	F 1092	—	Automatic float (rectifier) over 800A
223	F 1093	—	D.C. standby for S.S.A.C. No. 9
224	S 1901	—	Exchange-line isolating units
225/1000-14000	F 1095	—	50V automatic float rectifier plant for T.E.s over 800A (suite construction)
226/3-20	F 1096	—	30V fully automatic plant for P.B.X. supplies
227/5-100	F 1097	F 3097	50V fully automatic plant for U.A.X.s Nos. 12 and 13, S.A.X.s and P.A.B.X.s; up to 100A
229	P/DC 361/1	—	46V–52V positive, fully automatic rectifier plant
260	F 9001(P)	—	London Trunk exchange, Kingsway
401A to E	F 1265	—	50V battery-driven alternator
402	F 1270	—	D.C. standby for S.S.A.C. No. 1
403	Dgm. P/DC 54	—	A.C. standby for small installations of amplifiers in T.E.s or for speaking clock amplifiers
404	A 1905	—	Single-phase auto-start engine alternator (T.R.S. and radio stations)

TABLE 1 (*contd.*)

Power Plant No.	Instructions (POWER) General) or diagram No.		Former title, use or description
	Descriptive	Installation	
405	A 1905	—	Three-phase auto-start engine alternator (T.R.S. and radio stations)
406	G 1406	—	Single-phase 3-machine continuity set
407	G 1406	—	Three-phase 3-machine continuity set up to 50 kVA
408	S.T.C. Dgms. 108592–4	—	Continuity set. Telegraph installations
409	G 1409	—	Reversible motor-alternator (F type)
410	G 1410	—	Flywheel start engine set (G type)
411	G 1406	—	Three-phase 3-machine continuity set (over 50 kVA)
412	G 1412	—	Previously Austinlite 'C' type
413	G 1406	—	Three-machine continuity set (3-phase input single-phase output)
414	G 1414	—	Three-phase auto-start engine-alternator (80–230 kVA) (T.R.S.)
415	Dgm. RP 4367	—	Continuous conversion 2-machine flywheel engine set (RG type)
416	Dgm. RP 3183	—	Three-phase auto-start engine-alternator
418	G 1418	—	Two-machine continuity set single-phase. Up to 3·5 kVA
419	Dgm. P/P 182	—	Auto-start engine sets at existing TV and radio stations
420	G 1420	—	Two-machine continuity set—submarine cables
422	Dgm. P/DC 170	—	A.C. change-over equipment (with surge resistors)
424	G 1424	—	Large 2-machine continuity set with a.c. synchronization (single-phase)
425	F 1290	—	Auto-start engine-alternator, single-phase, for A.T.E.s
426	F 1290	—	Auto-start engine-alternator, 3-phase, for A.T.E.s
427	F 1291	F 3291	Auto-start engine-alternator (U.A.X.s without mains)
428	Dgm. P/DC 232	—	A.C. change-over equipment (without surge resistors)
429	G 1429	—	Large 2-machine continuity set with a.c. synchronization (3-phase)
430	G 9230(P)	—	Widemouth T.R.S. 2-machine continuity set

★3. Power plant for S.A.X.s.—For the purpose of this Instruction the term 'S.A.X.' refers to S.A.X.s and U.A.X.s Nos. 5, 6, 8, 12 and 13 unless otherwise stated. The standard plants are given in Table 2. Any proposals to depart from the standard types of plant should be referred to the Eng. Dept. (P3/1) for consideration.

4. 50V positive battery power plant for all telephone exchanges.—The power plant should be in accordance with Table 3.

★5. New installations in telephone exchanges other than S.A.X.s.—

(*a*) Standard types of power plant for new installations in telephone exchanges other than S.A.X.s are listed in Table 4. In all new telephone exchanges except S.A.X.s the main reserve to cover failure of a public supply will be provided by means of an automatically started engine generating set.

(*b*) The total battery capacity to be provided will be that necessary to operate the exchange for the busy hour without the voltage falling below the minimum voltage applicable to the system. For 50V Strowger type exchange equipments, the total capacity to be provided will be as follows:—

(i) $2\frac{1}{2}$ times the busy hour load for Cells, Secondary, Nos. 22/... and 23/....

(ii) 3 times the busy hour load for Cells, Secondary, Nos. 12 to 14

(iii) $3\frac{1}{3}$ times the busy hour load for Cells, Secondary, Nos. 15 and 16.

All other cases must be referred to the Eng. Dept. (P3/1) to determine the capacity required.

(*c*) When a Power Plant No. 210 is installed, two rectifiers each capable of supplying not less than half of the ultimate peak load must be provided initially.

★TABLE 2.—MAIN POWER PLANT FOR S.A.X.s

Peak load (*amp*)	Power Plant No.	
	A.C. supply	No supply
5	227/5	214D and 427
10	227/10	214D and 427
20	227/20	–
40	227/40	–

★TABLE 3.—POSITIVE BATTERY POWER PLANT FOR ALL EXCHANGES

Type of exchange	Daily load or peak load	Approx. No. of metering sets	Power Plant No.		
			A.C. supply	D.C. supply	No supply
U.A.X.s Nos. 12 and 13	1 Ah	—	206	—	205G
	2 Ah	—	—	—	—
S.A.X.s (excluding U.A.X.s)	5 Ah	—	205C	—	—
50V (other than S.A.X.s) from which S.T.D. traffic does not originate	1 Ah	—	205B†	205E	—
	5 Ah	—	205C†	205F	—
50V (other than S.A.X.s) from which S.T.D. traffic originates	5A	220	221A	—	—
	10A	650	221B	—	—
	20A	1500	221C	—	—

† When a Power Plant No. 402 is being provided for S.S.A.C. No. 1 equipment it should also be used to supply the exchange positive-battery load at exchanges where a Power Plant No. 205B or C would otherwise have to be provided. The exchange positive-battery load should be added to the standby 50V positive load of the S.S.A.C. No. 1 equipment to determine the size of Power Plant No. 402 required.

★TABLE 4.—MAIN POWER PLANT FOR TELEPHONE EXCHANGES OTHER THAN S.A.X.S

Battery voltage	Ultimate daily load (*Ah*)	Ultimate peak load (*A*)	Power Plant No.	
			A.C. supply	D.C. supply
22V, 24V, 40V, 50V† and 60V†	100—200	—	203C	203G
	200—400	—	203D	203H
	400—600	—	203E	203J
	600—800	—	203F	203K
50V Strowger type exchange	—	25	210A or D	—
	—	50	210B or E	—
For other installations and voltages, the case should be referred to the Eng. Dept. (P3/1) for consideration	—	75	210C or F	—
	—	125	210G	—
	—	150	210S	—
	—	175	210H	—
	—	300	210J	—
	—	400	210K	—
	—	600	210L	—
	—	800	210M	—
	—	1000	225/1000	—
	—	1500	225/1500	—
	—	2000	225/2000	—
	—	2500	225/2500	—
	—	3000	225/3000	—
	—	4000	225/4000	—
	—	5000	225/5000	—
	—	6000	225/6000	—
	—	7000	225/7000	—
	—	8000	225/8000	—
	—	9000 ‡	225/9000	—
	—	10000 ‡	225/10000	—
	—	11000 ‡	225/11000	—
	—	12000 ‡	225/12000	—
	—	13000 ‡	225/13000	—
	—	14000 ‡	225/14000	—
30V (C.B.S. exchanges without lamp signalling)	Up to 60	—	202A	—
	60 to 100	—	202B	—

† 50V and 60V versions of Power Plant No. 203 can be used as a temporary measure.

‡ For installations where power plants larger than 225/8000 are required, the Eng. Dept. (P3/1) should be consulted.

★6. Existing installations in telephone exchanges other than S.A.X.s.—

(*a*) *Provision of engine sets.*—Provision of automatically started engine sets at existing Zone and Group Centres will be initiated by the Eng. Dept. (P3/4). Provision of engine sets to bring other existing exchanges into line with the new standards should be initiated when renewal of the complete power plant or renewal of the batteries is necessary. When difficulty is experienced in making accommodation available for the engine set the case should be referred to the Eng. Dept. (E3/3).

(*b*) When an automatically started engine set(s) already exists, it is essential to ensure that the capacity of the existing engine set(s) is adequate for the exchange load, in addition to the forecast loads of other equipment connected to it. The case should be referred to:—

(i) The Regional Power Engineer when the responsibility for engine set provision is devolved. (Machines & Switchboards, D 3905 refers).

(ii) The Eng. Dept. (P3/4) in all other cases.

(*c*) When an automatically started engine set is provided at an installation where:—

(i) a Power Plant No. 210, 222 or 225 of adequate size already exists, the batteries should not be changed to the size specified in par. 5 (*b*) until renewal becomes necessary.

(ii) a power plant other than a Power Plant No. 210, 222 or 225 exists, the case should be referred to the Eng. Dept. (P3/1) before any extension of the power plant or renewal of the batteries is proposed.

(*d*) *Power plant renewals.*—When renewal of the entire power plant is necessary due to increase in load, or accommodation difficulties of such magnitude arise that changing the power plant will free valuable space, the replacement plant should be a standard plant in accordance with par. 5 and provision of an automatically started engine set should be initiated.

(*e*) *Power plant extensions.*—The procedure given in (i) and (ii) below should be adopted where increased load demands can be met by installing additional motor-generators or rectifiers.

(i) *Power Plant No. 210.*—Irrespective of the capacity of the existing rectifier the second rectifier to be provided should be capable of meeting not less than half of the ultimate peak load.

(ii) *Power plants other than Nos. 210, 222 and 225.*—Only items from the Surplus Equipment Register may be used and cases where a suitable item is not available should be referred to the Eng. Dept. (P3/1). Some measure of automatic working can be introduced on Power Plants Nos. 213, 218 and 220 and the Eng. Dept. (P3/1) should be consulted when this is required.

(*f*) *Battery renewals.*—When batteries require renewal the requirements of par. 5 should be met and the program arranged so that the installation of the engine set is completed before the batteries are renewed. When the associated power plant is a Power Plant No. 210 each existing Rectifier No. 75 or 76 having an output of less than half of the ultimate peak of the plant should be changed to comply with par. 5 (*c*). When the power plant is other than a Power Plant No. 210, 222 or 225 and it is not intended to bring the installation into line with par. 5 the case should be referred to the Eng. Dept. (P3/1).

(*g*) *Building extensions.*—Where building extensions are being planned but power plant or battery renewals are not contemplated, the only action necessary is to obtain adequate engine room accommodation. The Eng. Dept. (P3/4) should be consulted at the planning stage.

(*h*) In any case of difficulty the Eng. Dept. (P3/1) should be consulted.

7. D.C. standby supplies for S.S.A.C. No. 1 and S.S.A.C. No. 9 equipment.—When main automatic start standby generating plant is not installed, standby supplies for S.S.A.C. No. 1 and S.S.A.C. No. 9 should be provided as follows:—

(*a*) *S.S.A.C. No. 1 equipment.*—Power Plant No. 402 should be provided in accordance with Table 5.

TABLE 5

Type of exchange equipment rack	Maximum No. of S.S.A.C. No. 1 racks served	Power Plant No.
8 ft. 6½ in.	6	402A
10 ft. 6½ in.	9	402B

When there is spare capacity on a Power Plant No. 221 the 50V positive standby supply for S.S.A.C. No. 1 equipment may be taken from the Power Plant No. 221 up to the limits shown in Table 6 and only the l.t. portion of Power Plant No. 402 need then be provided.

TABLE 6

Power Plant No.	Maximum load for S.S.A.C. No. 1 equipment (*amp*)
221A	0·4
221B	0·7
221C	Nil

(*b*) *S.S.A.C. No. 9 equipment.*—Power Plant No. 223 should be provided when not more than four racks of S.S.A.C. No. 9 are to be installed. If not more than four racks of S.S.A.C. No. 9 are to be installed at an installation where S.S.A.C. No. 1 and a Power Plant No. 402 is existing, the l.t. portion of Power Plant No. 402 should be enlarged, if necessary, and the h.t. portion only of Power Plant No. 223 provided.

(*c*) *S.S.A.C. No. 1 and S.S.A.C. No. 9 equipment.*—For a mixed installation of not more than four racks of S.S.A.C. No. 1 and S.S.A.C. No. 9 a Power Plant No. 402 and the h.t. portion of Power Plant No. 223 should be provided.

8. If the loads are greater than those stated in par. 7 and a main automatically started standby plant is not provided the matter should be referred to the Eng. Dept. (P3/1).

References:—See Table 1
(P3/1) Machines & Switchboards, D 3905, D 3910
TRANSMISSION, Telephone, A 3009

END

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