UNIT AUTOMATIC EXCHANGES NO. 13

General Description of Units, Apparatus and Wiring

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

1. General. This Instruction describes the construction of the units, the apparatus used and details of the wiring of the equipment for a U.A.X. No.13. A list of drawings, diagrams and specifications is given in G 1532.

2. The equipment is assembled in four types of unit:-

Line unit	-	Unit, Auto., No.13A
Junction unit	-	Unit, Auto., No.13B
M.D.F., I.D.F., and miscellaneous apparatus unit	-	Unit, Auto., No.13C
Auxiliary M.D.F. unit	-	Unit, Auto., No.13D

3. Unit capacity of buildings. The unit capacity of buildings used for U.A.X.s No.13 is shown in Table 1. B1 buildings will be used for all new U.A.X.s No.13.

TABLE 1

Type of building	Maximum number of units			
	A	B	C	D
B	4	5	1	1
B1	4	8	2	1

4. Constructional details of units. The cabinets which house the equipment are of sheet steel and have ½ in. cavity walls filled with corrugated cardboard for thermal insulation, and wooden battens for strengthening. When the doors to the cabinets are in position their edges fit on fabric-covered rubber cord to exclude moisture. The rack framework is of 2 in. x 2 in. x $\frac{5}{32}$ in. mild-steel angle iron and is fixed to the cabinet. The frameworks of the A and B units are similar to standard main exchange racks in that the apparatus is mounted in front, with connexion strips, cabling and wiring to the rear.

5. *The weights and dimensions of the units* are as shown in Table 2.

TABLE 2

Unit	Height		Depth		Width		Unequipped weight (approx.)
	ft.	in.	ft.	in.	ft.	in.	lb.
A	8	3	1	2½	2	6$\frac{7}{8}$	565
B	8	3	1	2½	2	6$\frac{7}{8}$	322
C	8	3	1	9	2	7$\frac{7}{8}$	562
D	8	3	1	9	1	11½	280

6. *Cable run.* The inter-unit cabling is accommodated in a separate sealed compartment in the rear of the A and B units. The entrance for the cables into the unit is via two holes in the bottom of the run, one hole at each end of the compartment. When the cables are installed these holes are sealed with "Compound No.5". There are two entrances in the C unit for the inter-unit cabling, one at the top right-hand side (unit viewed from the front) to accommodate cables from the A units and the other at the top front to accommodate cables from the B units. The B and C units are interconnected by a sealed cable trough of ½ in. cavity sheet-steel construction.

7. *The cable holes* in the C unit are sealed by hardwood covers. When extensions are provided, these covers are removed and fitted over the end of the cable runs on the last A and B units. Similarly, a wooden

gasket and packing piece supplied with each unit are fitted between abutting units and, in the case of C and first B units, between the units and the cable trough. The bottom of the C unit, directly under the M.D.F. fuse-mountings, is filled in with wooden battens. These are intended to be cut away as necessary to meet external cable requirements; the seams, spaces between cables and battens, and between battens and framework being sealed subsequently with "Compound No.5".

8. *Doors.* The top doors at the rear of the A and B units give access to the cable compartment. The door rails at the front of the A and B units, the front and rear of the C and D units, and the rail between the lower and middle doors at the rear of the A and B units are removable to give easy access to the apparatus and wiring.

9. *Window.* An air-spaced window, fitted with two sheets of 1.5 mm. transparent Rhodoid in the top front door of the C unit, permits the fault-indicating lamps to be seen (see par.21).

APPARATUS

10. The selectors are of the 100-point, 2-motion, 2000-type. The final selectors have 2/10-P.B.X. facilities (see G 1532).

11. The 3000-type relay is used for all circuits, other than the subscribers' line circuits, in which the 600-type relay is used.

12. The meters are of the 100 and 101-types.

13. Uniselectors. 25-point uniselectors are used for linefinder allotters, ringing, tone and time-pulse distribution, and in the route-restricting and route-discriminating equipment. A 50-point uniselector is used in the meter-pulse distribution circuit.

14. Unit, Auto., No.13A. This unit has a capacity of 50 subscribers' line circuits, and also contains linefinders, group and final selectors. The principal items of equipment are arranged on the shelves as detailed in Table 3.

TABLE 3. EQUIPMENT OF A UNIT

Item	Location	Capacity	Equipped as supplied by Supplies Dept.
Subscribers' calling equipments (L, K & P relays)	Shelf A	50	30
Linefinder allotters (Uniselectors No.84 AN)	A	2	2
Control relay-sets	B	2	2
Linefinders	B & C	8	0
Subscribers' meters (Meters No.100A)	D	50	30
Linefinder overflow meters (Meters No.101A)	D	1	1
Group selector level-overflow meters (Meters No.100C)	D	10	0
Group selectors	E & F	8	0
Final selectors	G	5	0
Connexion strips for terminating shelf wiring are mounted at the rear of shelves C, E, F and G			

Battery jacks; test jacks; connexion strips for terminating tones, pulses and ringing; fuse panels to accommodate alarm-type fuses; routine test keys and lamps are also provided.

15. Units, Auto., No.13B. The Unit, Auto., No.13B accommodates the junction strip-mounted sets and auxiliary equipment (see G 1532) and is supplied unequipped, the necessary terminating and auxiliary equipments being requisitioned separately and fitted locally. The number of sets which may be fitted in one unit depends upon the types of equipment. The method of determining the number of B units required for a given exchange and the arrangement of the equipment on the units is described in G 3533.

16. The rack is drilled to accommodate 29 single, horizontal, mounting plates (Mountings F151/20AM) or their equivalent. The direction of growth of the junction equipment on the racks is upwards.

17. When common multi-metering equipments (dgm. AT 3944) are required, they are, where possible, mounted in the first B unit of the suite and, for this purpose, a channel-type shelf is requisitioned and fitted locally. The shelf has a capacity for five relay-sets and is mounted at the bottom of the framework, where drillings are provided for that purpose.

18. Battery jacks, fuse panels, and connexion strips for terminating tones, pulses and ringing are fitted on all B Units.

19. Unit, Auto., No.13C. This unit accommodates the M.D.F., I.D.F., alarm-locating and line-testing equipment, and relay-sets containing the ringing, tone, time-pulse and meter-pulse equipment.

20. *The M.D.F.* has an ultimate capacity for 12 "Protectors, H.C. & T. 40B", and either 16 "Fuse-mountings No.4001" or 12 "Fuse-mountings No.4001" and 4 "Fuse-mountings No.4028, complete." Six protectors are supplied with each unit, and on these, subscribers' numbers 200 to 299 and junctions 1 to 20 are terminated. The fuse-mountings are requisitioned and fitted locally as required. They are fitted in such a position that the length of the jumper wires is a minimum.

21. *Testing equipment.* Mounted immediately above the protectors is a terminal strip to which the line testing cord is connected, and a "Jack No.310 BN" for the connexion of N.U. tone to T.O.S. and faulty lines. A suspension hook is fitted on the right-hand vertical to accommodate the N.U. tone cords when not in use. The line testing equipment consists of test keys, a dial-speed relay and terminals for a "Tester No.43" and a "Detector No.4". The alarm-locating lamps, of which there are 21, are so mounted that they and their designations are visible when the doors of the unit are in position. A press-button fitted on the outside of the unit, when pressed, lights the locating lamp connected to any unit on which a fault exists. The C unit is wired for a test telephone ("Telephone No.162F" with "Bell-set No.25") which is mounted on the combined bracket and writing desk fitted on the end of the unit.

22. *Common equipment.* The relay-sets containing the common equipment, i.e. ringing, meter pulses, tones and time pulses, together with the fuse panels, tone transformers, ringing transformers and choke, are mounted behind the testing equipment.

23. *I.D.F.* The I.D.F. is mounted above the testing equipment and relay-sets, the multiple and local sides being at the front and rear of the unit, respectively. Five verticals are provided on each side of the I.D.F., and connexion strips are arranged, as far as practicable, to give a straight jumpering scheme. "Strips, Connexion, No.26" for connecting the tones, pulses, ringing, positive battery etc., are mounted above the local side of the I.D.F.

24. *Distribution of power.* Mounted inside the cabinet, over the I.D.F., is a common distribution point for the 50-V. negative power supply and return; this consists of two copper bars for the supply and return, each fitted with ten lugs to accommodate "Cable, I.R.V., 7/.064". In addition, the return feed for the positive battery is connected to the earth bar. The negative busbars and lugs are prevented from coming into accidental contact with the framework by an insulating strip.

25. *The main items of equipment on the C unit* are listed in Table 4.

TABLE 4. EQUIPMENT OF C UNIT

Equipment	Capacity	Equipped
Protectors, H.C. & T., 40 B	12	6
Fuse-mountings No.4001	12	–
Fuse-mountings No.4028, complete	4	–
Relay-set No.2/3411 (ringing and meter-pulse equipments)	1	1
Strips, Connexion, No.41A (6X20) (I.D.F. multiple side)*	15	Equipped as required
Strips, Connexion, No.97 (8X25) (I.D.F. local side)	15	
Strips, Connexion, No.26	16	16
Transformers No.95 B (Ringing)	1	1
Transformers No. 42 A (Tones)	4	4

26. Unit, Auto., No.13D. This is a general purpose unit and is used mainly to terminate cables in excess of the capacity of the C unit and to accommodate "Units, Terminating" and associated equipment. It

is designed to be fitted adjacent to the C unit and, consequently, the cabinet has open ends. Installation instructions for this unit are contained in G 3536.

27. The uprights of the unit are drilled on both faces with 24 holes at 3½-in. spacings. These drillings are primarily intended for the fitting of "Units, Terminating" and line transformers but, by the addition of suitable ironwork provided locally, fuse-mountings, protectors and connexion strips may be accommodated. To facilitate jumpering between the C and D units, jumper rings may need to be fitted.

28. Schedule of equipment. The main items of equipment, with the exception of the power plant, required for a U.A.X. No.13 are listed in G 3531. The power plant items are scheduled in POWER, General, F 3030 and F 3040.

CABLING AND WIRING

29. M.D.F. and I.D.F. Cabling for the full capacity of protectors is provided and, where the protectors are fitted, both ends of the cables are terminated. Where the protectors are not fitted, one end of the cable is terminated on the connexion strips on the multiple side of the I.D.F. and the skinners (negative, positive and P-wires) of the other end are fed through the holes in the protector fanning-strips and wrapped round a wire which is stretched vertically between the protector mounting details.

30. Linefinder multiple. The linefinder multiple is terminated on connexion strips, mounted at the rear of shelf C, and is wired as shown in Table 5.

TABLE 5. LINEFINDER MULTIPLE

Level	Subrs.' Line-relays and Meters	Circuits
1 and 2	–	Wired for junctions 1–10 +, – and M-wires of levels strapped on connexion strips
3	1–10 Mounting plate 1	Ordinary subrs.
4	1–10 " " 2	" "
5	1–10 " " 3	" "
6	1–10 " " 4	Meters wired via connexion strip
7 and 8	1–10 " " 5	Levels strapped on connexion strip. Contacts L1 and L22 wired to connexion strip for coin-box or ordinary subscriber working
9 and 0	–	Wired to connexion strip only

31. The wiring for the vertical marking banks of the linefinders, and the level connexions to the routine-test keys, are terminated on the linefinder multiple connexion strips. Associated levels of each vertical marking bank are commoned by means of 20-lb. bare tinned-copper wire.

32. The subscribers' line circuits are terminated on the same connexion strip tags as the multiple wiring (levels 3–7 inclusive). The meters for the subscribers' circuits terminated on levels 3, 4, 5 and 7 are wired direct to the associated L and K relays, and the meters for the subscribers' circuits terminated on level 6 are wired to the associated L and K relays via tags on the final-selector multiple connexion strips and connected by means of straps of bare tinned-copper wire.

33. Relay springs L1 and L22 for subscribers' line circuits connected to levels 7 and 8 (10 circuits only), and the ordinary and coin-box connexions of the vertical marking bank, are wired to tags on the final-selector multiple-connexion strips.

34. The full complement of wiring for subscribers' line circuits and meters is provided, but where the apparatus is not fitted initially, the wires are formed out behind the respective positions and sufficient length of wire is allowed for making connexion to the apparatus when fitted.

35. Group-selector multiple. The group-selector multiple is terminated on a 120-circuit connexion-strip, mounted at the rear of shelf E, and is wired as shown in Table 6. The multiple for levels 1–8 inclusive is continuous for selector shelves E and F, but that for levels 9 and 0 is brought out separately

to the connexion strip from each shelf. The negative, positive and P-wires of level 9 and 0 are strapped on the connexion strip. The separate E and F shelf outlets are strapped at the I.D.F.

TABLE 6. GROUP-SELECTOR MULTIPLE

Level	Circuit
1	Wired to connexion strip only
2	Final selectors for subscribers 200-299
3	Final selectors for subscribers 300-399
4-8	Non-parent junctions
9	Parent exchange junctions
0	

36. Allotter bank connexions. The connexions of the allotter bank and linefinders to group selectors are shown in Table 7.

37. Final-selector multiple. The final-selector multiple (100 circuits, subscribers only) is terminated on a connexion strip, mounted at the rear of shelf F.

TABLE 7. CONNEXION OF ALLOTTER AND LINEFINDERS TO GROUP SELECTORS

Allotter bank-contact No. (Arcs 1 to 7 only-Arc 8 spare)	Linefinder No.	Group-selector No.
1, 9, 17 (multiplied)	1	1
2,10, 18 (")	5	5
3,11, 19 (")	2	2
4,12, 20 (")	6	6
5,13, 21 (")	3	3
6,14, 22 (")	7	7
7,15, 23 (")	4	4
8,16, 24 (")	8	8
25,earthed (arc 3 only)	-	-

38. Overflow meters. The overflow meters for each of the levels 1-0 inclusive of the group selectors are terminated on the group-selector multiple connexion strip.

39. Multi-metering circuits. On the multi-metering equipments, there is a cross-connexion field which permits variation of the discriminatory conditions applied to the code tags. A single-sided connexion strip (8 x 25) is provided on each equipment and the uniselector banks are terminated, one arc of the uniselector on each vertical row of tags. The bank connexions are terminated on the innermost notch of the tags, leaving the remainder of each tag free for strapped connexions.

40. Spare-code wiring. In the common multi-metering equipment the spare-code tags appear on the bottom row of the connexion strip, and the strappings are made vertically with "Wire, Copper, Tinned, No.25 S.W.G." in the notches at the extremity of the tags.

41. On the multi-metering equipment, the spare-code tag is tag 25 on row 1 on the connexion strip and connexions are made to this tag by a combination of horizontal and vertical straps.

42. In each case where code tags are to be passed by a spare-code strap, the connexions from the spare-code tags adjacent to code tags are made by means of insulated wire.

43. Miscellaneous circuits. The ringing, pulses, tones and miscellaneous circuits are terminated on "Strips, Connexion, No.26", mounted at the rear of shelf G in the A units, at the top front of the B units, and above the local side of the I.D.F. in the C units.

44. Cables and wires. The cables and wires specified for use in U.A.X.s No.13 are shown in Table 8.

TABLE 8. CABLES AND WIRES

Circuit	Cables and Wires
Selectors and relay-sets	Wire, Switchplate, Enamelled (25 S.W.G.) 6½-lb., to Specn.CW 45
Multiple bank loops	Wire, Switchboard, Enamelled (single silk and cotton covered, waxed) (25 S.W.G.) 6½-lb., to Specn.CW 115 type 2
Shelf-to-shelf multiple wiring and tails from multiple to connexion strips	Wire, Switchboard, Enamelled (double silk and cotton covered waxed) (25 S.W.G.) 6½-lb., to Specn.CW 115 type 8
Vertical marking banks to connexion-strips	Wire, Switchboard, Enamelled (double silk, cotton covered, waxed) (27 S.W.G.) 4½-lb., to Specn. CW 115 Type 8
Allotter-bank wiring and wiring from bank to control relay-sets	Wire, Switchboard, Enamelled (double silk and cotton covered, waxed) (23 S.W.G.) 9½-lb., to Specn. CW 115 type 8
Strip-mounted sets and auxiliary sets, and local straps on subrs.' L, K & P relay mountings	Wire, Switchplate, Enamelled (25 S.W.G.) 6½-lb., to Specn. CW 45
† Ringing, pulses, tones and miscellaneous circuits	Cable, Switchboard, I.R. (tinned, rubber, cotton and wool covered; cotton braided overall and flame-proofed) (20 S.W.G.) 20-lb., to Specn. CW 21
† Ringing, pulses, tones and miscellaneous circuits (local wiring on B unit)	Wire, F.P., I.R.V. (20 S.W.G.) 1M/20-lb. and 1 pr/20-lb.
† Charge-fail lead	Wire, F.P., I.R.V. (20 S.W.G.) 1M/20-lb.
† Inter-unit cables and cables to I.D.F.	Cable, Switchboard, Enamelled (double acetylated cotton lapped, braided overall and flameproofed) (23 S.W.G.) 9½-lb., to Specn. CW 59
† Jumpering on I.D.F.	Wire, E. & F.F. (tinned, enamelled, double acetylated-cotton covered and lacquered) (22 S.W.G.) 12½-lb., to Specn. CW 56
Battery and earth leads:-	
† 50V. negative battery supply and return feed between distribution bar on C unit and fuse panels on other units	Cable, E.L., 250-V. (I.R. vulcanized, braided and compounded) 0.0225 sq. in. (7/.064), black for supply, red for return
50V. positive battery supply and return between "Strips, Connexion, No.26" on C unit and fuse panel	Cable, E.L., 250V. (I.R. vulcanized braided and compounded) 0.0020 sq. in. (3/.029), red for supply, black for return.
† These wires and cables are required for installation	

References:- G 1532, G 3531, G 3533, G 3536
(Tp3/7) POWER, General, F 3030
" " F 3060

END