UNIT AUTOMATIC EXCHANGES USING " UNITS, AUTO., No. 13 "

Installation of U.A.X. No. 13X

★[*NOTE.—As this Instruction has been completely revised, individual paragraphs have not been " starred "*]

1. General.—This Instruction, which is supplementary to G 3530, deals with the provision of an increased multiple capacity beyond the 200 lines, which is the standard maximum for a U.A.X. No. 13. The paragraphs which follow describe what is necessary for:—

(*a*) the extension of an existing U.A.X. No. 13 to become a U.A.X. No. 13X, and

(*b*) the initial provision of a U.A.X. No. 13X.

2. The U.A.X. No. 13X is developed from the normal U.A.X. No. 13 by the provision of an additional " Unit, Auto., No. 13C ", and from one to four additional " Units, Auto., No. 13A ", thus increasing the subscribers' multiple capacity from 200 to a maximum of 400 lines using group selector levels 2, 3, 4 and 5. Levels 4 and 5 will be brought into use for extensions to existing U.A.X.s.

3. Junctions.—The total number of I/C., O/G. and B/W. junctions which can be accommodated is 80 and the maximum number of junction groups will be four or five, depending upon the ultimate subscribers' multiple required, i.e.

(*a*) Ultimate 300 multiple; five groups using group selector levels 5, 6, 7, 8 and " 9 & 0 ".

(*b*) Ultimate 400 multiple; four groups using group selector levels, 6, 7, 8 and " 9 & 0 ".

4. Except for the differences described in this Instruction, the installation of the U.A.X. equipment should be in accordance with G 3530.

5. Layouts.—The location of the units within the buildings should be in accordance with the Exchange Sketches detailed below:—

(*a*) Existing buildings	..	ES 5817 or 5820
(*b*) Extended ,,	..	ES 5818 (Cable trench 5 ft. 7 in.) or ES 5819 (Cable trench 8 ft. 0 in. or 8 ft. 5 in.)
(*c*) New buildings	..	ES 5373/1 (Brick or Stone) or ES 5864 (Timber).

6. Extensions of equipment where additional accommodation is not required.

(*a*) *' B '-type Buildings.* To enable units A5–A8 to be located in the position indicated in Dgm. ES 5817 or ES 5820, the existing ' B ' units should be moved to the other end of the suite with the growth towards the ' A ' units.

To facilitate the moving of the ' B ' units, interruption cables should be run between unit C1 (existing unit) and the ' B ' units, entry to the latter being through the rear of unit B1 (top door removed).

The cable trough between units B1 and C1 should be removed and, after unit C2 (additional unit) has been installed, as described in par. 11, open-type cable runways should be provided as indicated in Dgm. ES 5817 or ES 5820.

The ' B ' units should be cabled to unit(s) C1 and/or C2 by types of cable specified in par. 17.

(*b*) *' B1 '-type Buildings.* Units A5–A8 will be located in the position normally occupied by the second suite of ' B ' units. If any ' B ' units exist in this suite, they should be moved to the other end, with the growth towards unit A5.

To facilitate the moving of the ' B ' units, interruption cables should be run between unit C1 and these units, entry to the latter being through the rear of the first ' B ' unit in the suite (top door removed).

The cable trough between the two suites of ' B ' units should be removed and after unit C2 has been installed, as described in par. 11, open-type cable runways should be provided, as indicated in Dgm. ES 5817 or ES 5820.

The ' B ' units should be cabled to unit(s) C1 and/or C2 by types of cable specified in par. 17.

7. Extension of equipment when additional accommodation is required.

(*a*) *' B ' and ' B1 '-type building existing.* When the extension of accommodation is provided by enlargement of the existing building, the additional ' A ' units (A5–A8) should be installed in line with units A1–A4, with a gap of 2 ft. between units A4 and A5, as indicated on Dgm. ES 5818.

An open-type cable run-way should be provided between unit C2 and unit A5.

(*b*) *Additional building.* When a second building is provided the additional units should be installed there, as indicated on Dgm. ES 5818. An open-type cable run-way should be provided for each building to carry the cables from unit C2 to units A5–A8. The arrangements to be made between the two buildings are described in par. 17.

8. Modification of units C1 and C2.—To permit ready access for cabling and jumpering between the M. & I.D.F. on unit C1 and that on unit C2, it will be necessary to make certain modifications, and briefly these are as follows:—

(*a*) Substitute the closed end-panel of unit C2, by an open wooden framework similar in formation to the open end of unit C1

(*b*) Provide suitable wooden gaskets to fit between the openings in the wooden framework and those in the end of unit C1 when the doors are removed, and

(*c*) Remove the bolts and wing nuts (or handles) from the end of unit C1 so that the two units can be bolted together.

The wooden framework, two wooden gaskets, and screws and bolts for fixing the framework to unit C2

and those for bolting the two 'C' units together, will be supplied as a complete item from the Supplies Dept. The description for requisitioning purposes is " End Panel for Unit, Auto., No. 13C ".

9. *Detailed modifications to be made to unit C2* are as follows:—

(*a*) Remove the door panels and the horizontal support from the front and rear of the unit

(*b*) Remove from the roof five woodscrews which secure it to the closed end-panel. (These screws will be required later to secure the wooden framework)

(*c*) Remove three No. 2BA screws from the right-hand side of the fixed top-panel which has the cable-trough aperture. (These screws engage in tapped holes in the mild-steel plate joining the fixed panel to the closed end-panel)

(*d*) Remove the No. 2BA screws and nuts (flat) from the top and bottom of the uprights of the closed end-panel (four screws and three nuts in all)

(*e*) Remove two countersunk No. 2BA screws from the left-hand side of the cable-hole framing on the closed end-panel

(*f*) Starting with the lowest, remove the five $\frac{5}{16}$ in. bolts and nuts which secure the closed end-panel to the rack upright. The panel can now be removed, with the mild-steel plate (for fixing to the fixed panel), and the brackets (which normally support the front and rear centre-rails) still attached to it

(*g*) Drill out the $\frac{3}{8}$ in. tapped hole (situated about $5\frac{1}{2}$ in. from the top of the upright) to give a $\frac{3}{4}$ in. clear hole

(*h*) Remove the two wooden gaskets and the protective battens from the top and bottom of the wooden framework; the protective battens are nailed on and should be knocked off, not levered off

(*j*) Place the wooden framework in position on the unit and secure the top and bottom of the uprights to the top and bottom of the unit, by means of the four $1\frac{1}{2}$ in. Rd. Hd. No. 8 woodscrews and washers provided. It will be found that the framework overhangs the footing by approx. $\frac{1}{4}$ in.; this is in order. Secure the top of the unit to the top rail of the framework by means of the five woodscrews which were removed under (*b*). Secure the front fixed panel to the wooden framework by three 2 in. Rd. Hd. No. 8 woodscrews which should be passed through the three holes [vacated by the three No. 2BA screws removed under (*c*)] and screwed into the block at the top of the upright. When a mains supply is not available and unit doors have to be fitted (see par. 35), two further operations are necessary as follows:—

(i) From the uprights of the closed end-panel, detach the rubber seatings together with the mild-steel angle strips which retain them in position, by removing the wood-fixing screws. Refix the rubber seatings and angle strips in the corresponding positions on the uprights of the wooden framework.

(ii) Fill the small gaps between the top of each upright of the wooden framework and the top of the unit with " Compound No. 8 ".

10. *Detailed modifications to the open end-panel of unit C1* are as follows:—

(*a*) Remove the two door panels from the end of the unit

(*b*) If the unit is in service, remove the service telephone and supporting bracket and provide temporary wiring to the service telephone through the front of the unit. When a mains supply is not available, fill the bracket-fixing and wiring holes with wooden pegs or " Compound No. 8 "

(*c*) If the unit is in service, remove the press-button and suspend it temporarily inside the unit and reconnect the wiring. When a mains supply is not available fill the fixing and wiring holes with wooden pegs or " Compound No. 8 "

(*d*) Remove the eight $\frac{1}{4}$ in. bolts and wing nuts (or handles) which normally hold the two door panels in position

(*e*) Drill two $\frac{7}{16}$ in. holes in the channel-iron footing to correspond with the two similar holes in the footing on unit C2

(*f*) Drill four $\frac{3}{8}$ in. holes in the rack upright of the unit to correspond with the four similar holes now showing in the rack upright on unit C2. When drilling the holes in the top half of the upright, the main wiring form (which lies in the angle of the upright) should be eased slightly out of position and protected

(*g*) To carry and protect inter-unit jumpers on the I.D.F. a number of " Rings, Jumper, No. 9 " (depending on the requirements) will be needed; holes for these rings should be drilled in the unit framework in convenient places before the units are joined together.

11. Joining units C1 and C2 together.—When the modifications detailed in pars. 9 and 10 have been completed, the two 'C' units should be placed in position with the wooden gaskets in the openings between them. These gaskets should be fitted so that the side with the rubber strip attached is towards unit C2. The two units should now be bolted together, with the bolts and nuts provided. The sequence of fixing, detailed below, must be followed:—

(*a*) By two 2 in. × $\frac{3}{8}$ in. bolts and nuts, between the unit footings

(*b*) By four $3\frac{1}{2}$ in. × $\frac{5}{16}$ in. bolts and nuts, between the two rack uprights. (The heads of the bolts should be against the rack upright in unit C1)

(*c*) By seven $4\frac{1}{2}$ in. × $\frac{1}{4}$ in. bolts and nuts, between the uprights of the two 'C' units. (These bolts and nuts should not be over-tightened as damage to the wooden framework may result.)

12. Exchange earth.—Where an existing U.A.X. No. 13 is extended to become a U.A.X. No. 13X, the exchange earth should be extended from unit C1 to the earth-bar on unit C2 by means of " Wire, Copper, Soft, Stranded, 19/16 ". On new installations, the exchange earth should be terminated on unit C2 and extended to unit C1 as described above.

13. Line plant terminations.—Termination of the external cables on units C1 and C2 should, wherever

possible, commence on the right-hand vertical of each unit (as viewed from the ' line ' side of the unit) to minimize cross-jumpering between the M.D.F. verticals.

14. Cable runway supports.—The cable runways between the ' C ' units and the suites of 'A' and ' B ' units should be supported by means of 1½ in. angle iron, erected between the suites and the end wall (see relative Exchange Sketches). The lengths of angle iron should be fixed to the roof of the units at one end and, at the other end, bolted on to an angle-iron support fitted on the wall.In brick and stone buildings, a short length of angle iron only (approx. 1 ft.) will be needed on the wall, but in timber buildings, a longer length, as shown on Dgm. ES 5864, should be fixed to the building uprights which are spaced approximately 2 ft. apart. The uprights which are behind the plasterboard lining can be located by the position of the nail-heads.

15. Cabling.—Cabling between units C1 and A1–A4 should be in accordance with Dgms. ES 5901 and ES 5902. Cabling between units C2 and A5–A8 should be in accordance with Dgms. ES 5906 and ES 5907.

16. The length of each cable run from unit C1 to units A1–A4 is shown on Dgms. ES 5901 and ES 5902 and those from unit C2 to units A5–A8 in an existing ' B ' or ' B1 '-type building are shown on Dgms. ES 5906 and ES 5907. Where units A5–A8 are installed in an extended building or in a separate building, the lengths of the cable runs have not been given because the lengths may vary in individual U.A.X.s but the dimensions can be calculated by using the figures given on the above diagrams, subtracting that part of the run shown on the layout drawing which is not required, and adding the length of the run between unit C2 and unit A5.

17. When the units are installed in one building or in two buildings with a communicating lobby, " Cable, Swbd., P.V.C., S.L.—. . . W./9¼ " should be used for all general cabling. " Cable, 250V., V.I.R., B and C, 0·0225 sq. in." should be used for the power leads from unit C2 to units A5–A8 and from unit(s) C1 and/or C2 to the first unit in each suite of ' B ' units. The cable should be looped to the other ' B ' units in the suite.

When two buildings are concerned and a connecting lobby cannot be erected, a pipe or ductway should be provided to carry the cables between them. " Cable, E.S.W.Q., N-pair/10 and N-pair/20 " should be used for general cabling and " Cable, 250V., V.I.R.L.C., Single, 0·0225 sq. in." for the power leads.

18. Lead covered cables external to the building should be bonded to the exchange earth, suitable clips, purchased locally, being used for the connexion to the lead sheaths.

19. Group - selector multiple. — The group-selector multiples terminated in units C1 and C2 should be connected together on the I.D.F. by means of " Cable, Swbd., P.V.C., S.L.— . . . W./9¼ ".

20. Overflow meters.—The overflow meter tags on the local side of the two I.D.F.s should be connected together by means of " Cable, Swbd., P.V.C., S.L.—12W./9¼ ".

21. Service telephone and testing set.—As the two ' C ' units will be installed adjacent to each other, only one service telephone and testing set will be necessary for the complete exchange. The telephone should be mounted on the end of unit C2 where space permits, and wired to final-selector number 290, and the positive and negative terminals of the testing set on unit C1 (in some exchanges the testing set in unit C2 has been used). Where the space between unit C2 and the end wall is restricted, the telephone should be fitted in a similar manner to that adopted in a U.A.X. No. 13 when a " D " unit is installed.

22. To enable tone vibrator adjustments to be made whilst listening on the service telephone, a longer hand-set cord should be fitted. The present cord should be changed for a " Cord, Inst., No. 3/62B, Brown, 72 in.".

23. Supervisory panels: press-button facilities. The press-button should be fixed by means of wood-screws to the adjacent unit uprights on the front of units C1 and C2. The wires from the supervisory lamp panels on units C1 and C2 should be commoned, and connected to one terminal of the press-button. The negative lead from unit C1 should be connected to the other terminal of the press-button and the corresponding negative lead from unit C2 (being live) should be carefully insulated and secured.

24. Test number and common equipment relay-sets.—The design of the ringing vibrator is such that it can handle, with safety, only that number of simultaneous " ringing out " calls which can be expected from five 'A' units. For this reason, each suite of four 'A' units, i.e. 1–4 and 5–8 must be served from a separate set of common equipment. (Two sets of common equipment will involve the use of two test numbers, i.e. 299 and 499). The CF lead from the power panel should be connected to the common equipment on unit C1.

25. Final-selector routine test.—Subscribers' circuits 490, 590 and 599 should be reserved as long as possible as these numbers are used, in addition to 499, for final-selector routine-test purposes. Where 490 or 590 is the last line of a P.B.X. group, the P2 tag should be left disconnected (G 3530 refers).

26. Routine test jacks on ' B ' units.—Where routine-test jacks are required on ' B ' units, they

should be provided in accordance with G 3530.

27. Marking.—Marking of the units should be in accordance with G 3535, with the exception of unit C2 which should be altered, where necessary, to agree with the equipment fitted.

28. Power plant.—The power plant to be installed is given in POWER, General, A 0902.

29. A positive battery supply should be provided. The equipment to be installed is given in POWER, General, A 0902.

30. The location of the power plant should be in accordance with the relative Exchange Sketches (see par. 5).

31. Where a petrol-engine charging set exists, it will be necessary to outhouse it and to re-site the power panel at the end of the batteries.

32. Negative and positive battery feeds.—Separate leads should be provided from the power panel to unit C2.

33. Distribution of the power leads to the 'B' units should be on the basis of one per five units.

34. Heating.—Where a mains supply is available, heating should be provided in accordance with POWER, Heating, B 3101.

35. Removal of doors.—When the heating installation (see par. 34) has been brought into use and the floor covering has been laid, all unit doors can be removed and disposed of, as indicated in par. 37. The doors must be retained in position when a mains supply heating installation cannot be provided.

36. Unit handles.—When the doors have been recovered, the handle assembly and striking plates on the unit uprights (not wing nuts) will serve no useful purpose and can be removed and refitted on units in U.A.X.s No. 13 at present equipped with wing nuts. When the number of recovered handles is limited, it is suggested the wing nuts on 'C' units only should be replaced by recovered handles.

★**37. Disposal of recovered items.**—The recovered doors, door rails, unit ends and telephone bracket should be disposed of locally to the best advantage.

38. The surplus press-button ("Press-button G") should be returned to the Supplies Dept. in the normal manner.

References:—G 3530, G 3535
(E1/4) POWER, General, A 0902
POWER, Heating, B 3101

END

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