

SECTION 4.

BUILDING REQUIREMENTS

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1. GENERAL.

1.1 Metropolitan and country exchange buildings are designed for single, dual or multi purpose.

A single-purpose building provides for the installation of two types of equipment, such as an automatic exchange, C.B. manual exchange, or long line installation.

A dual-purpose building provides for the installation of two types of equipment, such as a subscriber's automatic local exchange, with sleeve control trunk exchange and associated rack equipment.

A multi-purpose building provides for the installation of various groupings of equipment, including automatic, long line, manual and semi-automatic trunk switching equipment, etc.

The types of plant installed in metropolitan and country exchange buildings include:-

- Group 1. Automatic plant for subscribers' services now in common use, including pre-200 and 2000 type equipment, Siemen's No. 16 and 17 systems and such other equipment which may be subject to field trial.
- Group 2. Automatic trunk switching equipment, including semi-automatic manual positions, transit switching and 2 V.F. signalling equipment.
- Group 3. Long Line equipment, including single and multi-channel telephone and multi-channel V.F. telegraph systems.
- Group 4. Manual operating positions and associated terminating equipment of automatic or semi-automatic types.
- Group 5. Radio terminal equipment for international, intra and interstate communication systems.
- Group 6. Junction carrier equipment for multi-junction systems in the automatic network.

2. METROPOLITAN AREAS.

2.1 General. The major space requirement of a building in the metropolitan area is for the positioning and installing of equipment (listed in Group 1) to provide subscribers' exchange services. For this reason, most buildings, particularly for branch exchanges and, in many instances, main exchanges, have been designed specifically for that purpose.

In some instances, metropolitan buildings will be required to provide space for the installation of other classes of equipment such as that listed in Groups 2, 3, 4 & 6, and a number of functional groupings are shown in Fig. 1 to show the arrangement of areas in these buildings. Figs. 2, 3 and 4 include details of the positions used to locate additional equipment other than exchange equipment in buildings where additional areas as outlined in Fig. 1 have not been added for this purpose. Where multi-purpose buildings are to be erected and in which all of the groups of equipment listed are to be installed, the controlling factors have been included in Section 3 which also details the positioning of the various groups in order to obtain the most economical arrangements and to provide economy in installation methods and material and also to aid in the maintenance and service aspects.

2.2 The guiding principles associated with the determination of areas for exchange equipment racks in City Main or Co-Main Exchanges, Metropolitan Suburban Main Exchanges and Branch or Satellite Perimeter Exchanges are as follows:-

City Main or Co-Main Exchanges. The area to be provided for the installation of exchange equipment should be based on the provision of:-

- (i) one or more 10,000 line units if subscribers' equipment;
- (ii) the 20-year trunking and junction requirements;
- (iii) 25% additional floor area to meet post 20-year development, or changes in type of plant which may occur during the period of planning.

Where more than one 10,000 line unit is to be included in the building, an additional 25% floor area shall be provided for each 10,000 line unit, and its associated trunking requirements.

Metropolitan Suburban Main Exchanges. The floor area provided for the exchange equipment racks should be designed on a 10,000 line subscribers' equipment area plus an area designed on a 20-year plan for trunking and junction equipment together with a 25% additional floor area to meet post 20-year development or changes in equipment types, unless the subscribers apparatus is included in a building separate from the main trunking or tandem switching centre when special individual consideration will apply.

Branch Exchanges. Branch exchanges are not related to the 20-year planning period but to the floor area required to provide for the installation of either 4,800 or 9,600 lines of equipment. The floor area to be provided should be related to the 20-year development figures, that is, an area for 4,800 or 9,600 lines respectively shall be provided where the 20-year figures fall close to that range. Where the 20-year development figures are less than 20% above 4,800 lines and no special features warrant the provision of the additional space the initial provision of half size building is to be made.

Minor Exchanges. These exchanges are provided to meet either a 300 or 1,200 line installation capacity.

Portable Exchanges (Fig. 5) are provided for comparatively short terms, to meet subscribers' development:-

- (a) where development will not exceed 1,000 lines, i.e., 300 to 1,000 lines portable exchanges may be used in lieu of Garage type buildings;
- (b) wherever possible as standard unit serving 300 or less lines in the 20-year period and can replace Small Exchange Buildings.
- (c) where sites are available and where delays in obtaining the permanent building apply.

They should be located on the site in a position which will not restrict the erection of the permanent building. The underground cabling entry should also be planned for its correct position in relation to the permanent building.

2.3 Type and Use of Buildings.

Small Exchange Buildings. Fig. 6 shows the floor plan of a building erected to provide for a maximum of 300/400 lines of subscribers' automatic equipment. This type of building is generally sited on the outskirts of the network or in areas where relatively slow development takes place. The equipment installed includes subscribers' line equipment, junction equipment to the parent exchange and incoming junction equipment. The buildings have a low ceiling height and, for this reason, generally utilise earlier types of equipment.

Garage Type Buildings (Fig. 7) are provided on sites in such a position that they will eventually be used as a garage associated with the ultimate exchange building. These buildings can be single, double or triple type units and the ceiling heights should not exceed 12 ft. Apart from the provision of sufficient area to meet the

requirements of exchange equipment, minor service amenities are provided for the maintenance staff. A section of the internal area can be partitioned to house the exchange batteries. Sanitary facilities are generally erected as outhouses remote from the main building. The quantity of subscribers' equipment to be installed determines whether a one, two or three unit garage is provided. Mixed groups of equipment can be installed in garage type buildings if, e.g. a two or three unit building would meet the needs of both the telephone equipment and the long line requirements. If, however, additional space beyond that provided by a three-unit type is required, a suitably designed building shall be provided.

Branch Exchange Buildings have been standardised as three main types:-

- (i) a single-storey structure;
- (ii) a single-storey buildings with part-mezzanine treatment; and
- (iii) a two-storey structure.

Figures illustrating the layout of exchange equipment in each type are included in Section 10 of this Instruction.

The physical dimensions and contour conditions of the site determine the type of building to be used. From the viewpoint of building economics, the standard single storey and mezzanine types are much preferred to the two storey structure and shall be adopted wherever practicable.

Single-Storey and Part-Mezzanine. In single-storey and part-mezzanine type buildings, the switch floor area can be provided to the capacity of lines to be installed and buildings of this type are erected for either a 2,400, 4,800 or 9,600 line floor space requirement. The layout of exchange equipment in these buildings follows the principles detailed in the Section 10 describing exchange layouts. These buildings are normally erected for exchange equipment but, where equipment from Groups 2-5 is to be installed, considerable care must be exercised in determining the location of an additional area for this equipment and the manner in which the buildings are planned to provide for future increased area requirements is outlines in Fig. 1 (a) to (f).

Where manual exchanges, required for sub-metropolitan trunk areas are to be included, that is, exchanges near the boundary of the main network, the location and co-ordination of the various male and female amenity services area should be so arranged that they do not disturb the orderly development and the layout of the exchange equipment.

Where long line equipment is also to be installed in single and mezzanine type branch exchange buildings, the additional area may be provided by either extending the length of the main switchroom, or, where a limited amount of equipment is installed by using the area available at the end of the M.D.F.

Two-Storey Buildings. Where long line or junction carrier equipment is required in a two-storey building, it is best sited on the ground floor and in the area adjacent to the main frame (see Fig. 1e).

The changes in design and development of power plant and the reduced floor areas now required for this class of plant tend, in the case of a single-storey building, to make available a portion of the power and battery room areas originally provided for location of additional groups of equipment and, in the case of a two-storey building, to make available a large floor area on the ground floor. No difficulty should be experienced, in two-storey buildings, to provide on the ground floor for either manual exchanges or long line equipment, leaving the first floor of the exchange available to meet development of the exchange equipment.

Suburban Main Exchange Buildings are generally of two-story structure; however, in some cases, single-storey buildings may be erected.

The layout of exchange equipment in either a single-storey or more than one storey building follows the principles described in "Exchange Layouts" in Section 10.

Where other groups of equipment will be installed, such as junction carrier or long line equipment, the design of the building should be arranged so that it will provide for the installation of this class of plant without disturbing the layout practices associated with exchange equipment.

In the case of a single-storey building, the areas allotted for other groups of plant should be located outside the boundaries of the area required for the development of the automatic exchange services and, in addition, should be clear of the main frame area, except where small amounts of equipment are to be installed.

In two-storey main exchange buildings, the ground floor should be reserved for main distributing frame and for other groups of equipment, such as long line or junction carrier, leaving the remaining floor for the layout and development of exchange equipment.

Main Exchange Buildings in City Areas, Two or More Floors. Where these buildings are designed for exchange services only, they should provide floor areas capable of accommodating one, two or more 10,000 line units of equipment. The areas adjacent to the main frame should be designed to provide for the installation of the junction repeater rack equipment in order to effect economies in exchange cabling.

Co-Main Exchange Buildings. No difference in planning exists between the City Main or Co-Main buildings other than the provision of additional floor areas included to meet the inter-switching conditions associated with the increase in Junction groups.

Multi-Purpose City Exchange Buildings. Reference to the introduction of this Instruction details the general grouping arrangements of equipment in buildings of this type.

3. COUNTRY AREAS.

3.1 General. Country exchange buildings normally accommodate equipment included in Groups 1-4.

In the planning of a country building, the Engineer will apply the same general principles as those detailed for the metropolitan areas. However, several other problems arise in the planning of new equipment layouts for the reason that many buildings are for composite use as they may embrace the accommodation requirements of the Postal Service as well as the Engineering and Telecommunications Divisions. This fact may lead to greater delays between initial planning and the final erection of such buildings.

3.2 When planning buildings to meet the communication accommodation requirements of a country area, consideration should be given to the selection of buildings to meet the requirements detailed hereunder. See Fig. 8-10.

Subscribers' Automatic Equipment. The area required for the installation of subscribers' equipment should be related to the 20 year planning period. Unless the building design permits ready extensions allowance should be made initially to the extent of 25% for unforeseen development.

The area required can be determined from the trunking diagram which details the switching system to be employed, the subscribers development and the various switching stages included in the installation.

Since the subscribers' automatic equipment is related to the particular city or town, the original plan is not likely to be influenced by considerations other than the development of the actual city and, where the 25% additional floor area is included in the building, it should provide for most unforeseen growth.

Trunk Switching or Trunk Termination Equipment. Provision of this equipment is not entirely related to the size of the city or town but takes into account -

- (i) the trunking requirements in the local trunk network;
- (ii) the development of a trunk system serving other switching centres;

thus requiring space for additional transit switching equipment in order to conform to the Commonwealth trunk switching plan.

When determining the area for trunk switching, considerable care must be exercised to enable the development of the trunk switching equipment to take place in an unrestricted way or to site the equipment so that building extensions in the future will enable further development to take place. In considering the area set aside for this type of plant, it must be borne in mind that trunk line development cannot be forecast with the same degree of accuracy as subscribers' line development. In addition, area requirements per line for trunk switching equipment far exceed those for subscribers' equipment, hence the need to plan for building extensions by suitable siting arrangements and reservation of space on the site to permit unforeseen expansion in equipment areas.

Long Line Equipment also requires space for development in keeping with requirements of a trunk switching network, and in order to meet the requisite arrangements for the various carrier systems to be installed.

Manual Switchboards for Trunk Services. Generally, with the development of the automatic trunk network the manual positions will be developed to meet requirements of the local subscribers' network. In the early stages, and until such time as a complete automatic trunk switching equipment is installed, some portion of the through trunk traffic will be handled on those positions but, in a long-term planning arrangements, the trend will be for the installation of manual positions to handle local trunk traffic only.

Conclusion. It will be seen that buildings in country areas are mainly multi-purpose types. Where single-purpose buildings are required, the same principles will apply to those appertaining to metropolitan buildings.

3.3 Types of Buildings and the Most Suitable Positions for Equipment Groups in these Buildings.

Single-storey and part-Mezzanine Rectangular-Shaped Buildings (See Figs. 8 and 9). Where long line equipment requirements are relatively small, subscribers' plant should be confined, preferably, to the front of the building and provide for 25% additional area to meet development, the remaining rear portion providing for the installation and development of long line equipment. Alternatively the trunk switching equipment may be installed parallel with the Automatic Exchange Equipment. In some instances it may be preferable to divide the rear area of the floor into two half-sections, allowing for growth of the long line and trunk switching equipment towards the rear and parallel with each other.

Where quantities of exchange and long line equipment are approximately equal, a wide building allowing for the growth of each type independently towards the rear is the most satisfactory design. In other cases a wide building allows for growth of the three main components, i.e. Auto Exch. Long Line and Trunk Switching - parallel with each other.

This type of building is the most suitable when the local subscribers' network is provided by a manual switching system. The manual trunk switchroom should be sited at the front end of the building in a low ceiling portion of the building, or the manual exchange may be installed in a separate structure of low ceiling height, erected parallel with the main equipment area.

As written earlier from the viewpoint of building economics, the standard single storey and mezzanine types are much preferred to the two storey structure and shall be adopted wherever practicable.

Two-Storey Rectangular-Shaped Buildings (see Fig. 10). In buildings of this type, the manual exchange, main frame area, power plant, battery rooms and staff amenities in some instances will be provided on the ground floor. The main frame location should be selected to conform to the position of the manual or automatic exchange equipment.

The layout of equipment on the first floor should conform generally to that set down for a single-storey building, that is, automatic exchange equipment at the front of the building and the long line and trunk switching plant at the rear. Typical arrangements of equipment for this type are shown.

Two-Storey L-Shaped Buildings (see Fig. 11). When buildings of this design can be extended on both wings, the automatic exchange is best sited on the first floor at the junction of the wings, the two wings on this floor being set aside, one for the positioning of the trunk switching equipment and the other for long line equipment. This will allow for development in the growth of those two classes of plant.

On the ground floor, the section of the building parallel to the street alignment should be used as accommodation for the manual trunk positions, the automatic trunk switching equipment being sited immediately above the manual switchroom.

Where the L-shaped building cannot be extended other than towards the rear of the site, the installation of the automatic exchange equipment should be arranged on the front wing of the building, the remaining area being set aside for the development of trunk switching and long line equipment, the manual trunk exchange being sited on the wing parallel with the street alignment and the main frame located near the automatic exchange equipment. Typical arrangements of equipment for this type are shown.

Buildings of more Than Two Storeys may be required at very large provincial centres for the installation of internal plant. The selection of areas for each class of equipment should be co-ordinated with associated equipment such as main frames, manual trunk exchange, etc., and the areas so selected that the most economical grouping is arranged between all classes of plant. The areas set aside on the different floors should be in accordance with the grouping arrangements shown in Fig. 12.

Equipment Located in Separate Buildings (see Fig. 13). When, for various reasons, it is necessary to provide for separate buildings for individual types of internal plant, one building may be used for automatic exchange subscribers' services and the trunk switching equipment and manual switchroom; the second building being used for the installation of long line plant.

When planning for the location of separate buildings on separate sites or on the same site, particularly in Country Towns or Cities, to house different classes of equipment, consideration should be given to the economies which can be affected in the provision of the interconnecting junctions, e.g. the junction costs between Auto & Manual exchange equipment may far exceed those to interconnect Long Line and Exchange equipment.

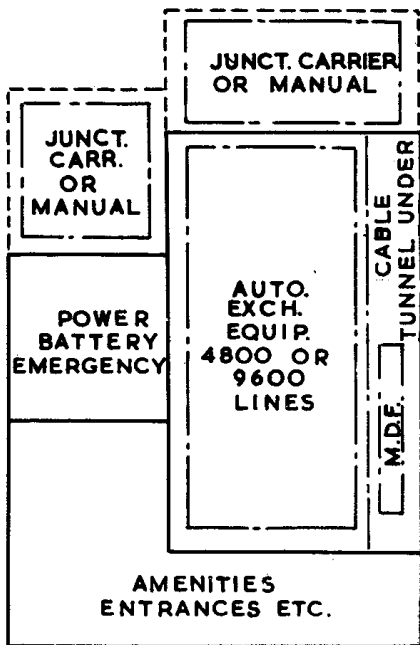
These economic studies should also take into account the costs of staffing and other Service arrangements.

Partly Erected Buildings (Fig. 14). When financial restrictions are encountered, however, the building erected may be of a size much less than originally planned, that is, in some cases the front or rear section of a building may be provided initially. When such a part-building is erected, it would include the service features, that is, stairways, lifts, lobbies, etc, that would be normally included in the front section of the full-size building or, alternatively, where the rear half of the building is erected, temporary entrances and facilities may be included.

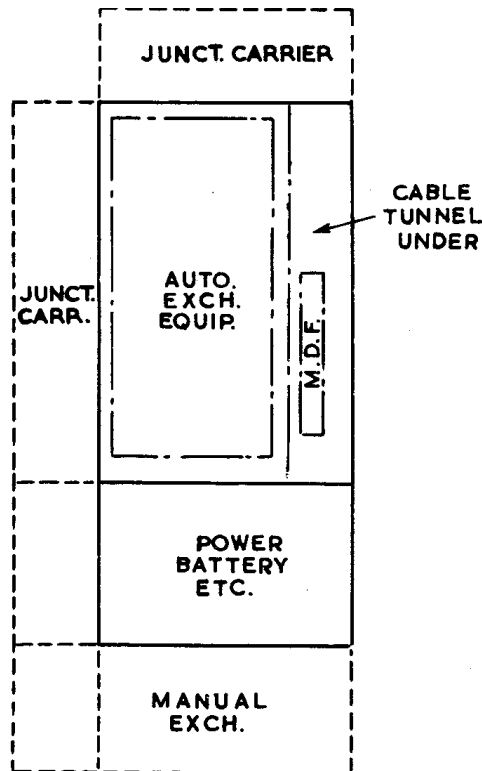
When a half-building is provided, the original building design will be maintained and, for this reason, in many instances, all equipment requirements cannot be installed in accordance with the original planning arrangements which envisaged the complete building initially. Fig. 10 illustrates a typical rearrangement brought about by such a conditions.

Take care therefore when selecting the installation areas for the various types of equipment to avoid, wherever possible, restrictions in growth on any type of plant by concentrating excessive plant in the available area.

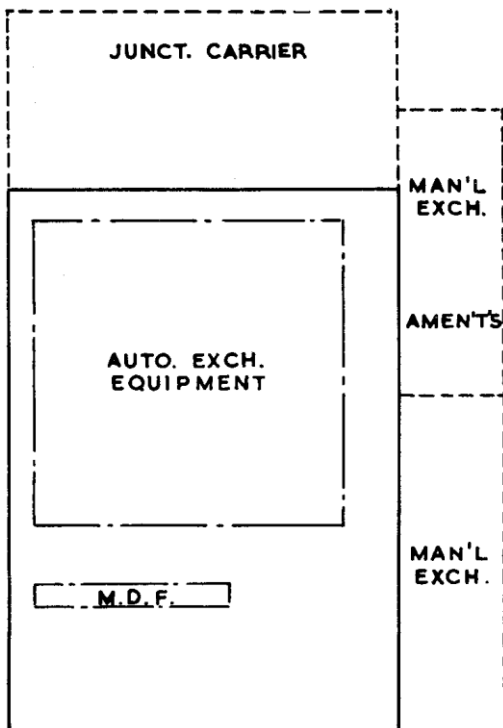
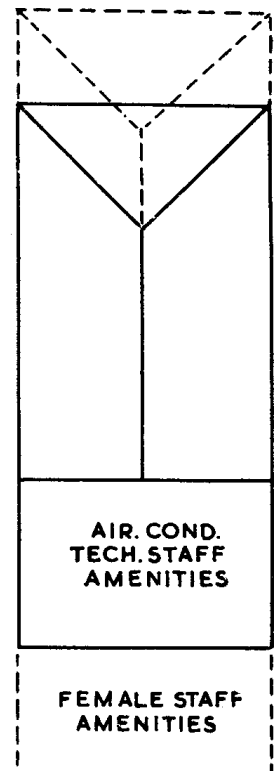
Consequently, installations which are carried out in buildings of this type may need to depart from the principles laid down in the subsequent sections of this E.I.



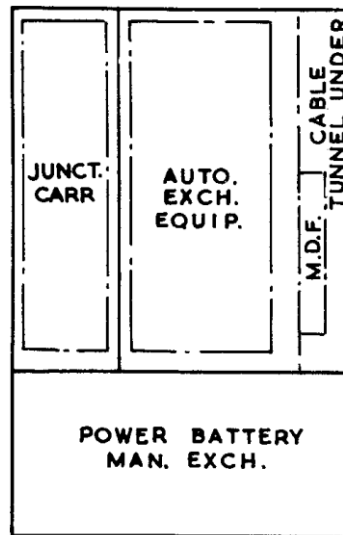
(a) Single Storey Branch Exchange.
Alternative arrangements for providing for Junction Carrier and/or Manual equipment by extending building.



(b) Mezzanine Type Exchange Buildings.
Location for Junction Carrier equipment and Manual switchboards obtained by lengthening or widening the building.



(c) Prefabricated Building.
Provision for Junction Carrier by extending Length of building Provision for Manual Exchange by addition of a low ceiling height section at side.



(d) Wider Type Mezzanine Building.
Junction Carrier equipment installed parallel with Auto Exchange Equipment.

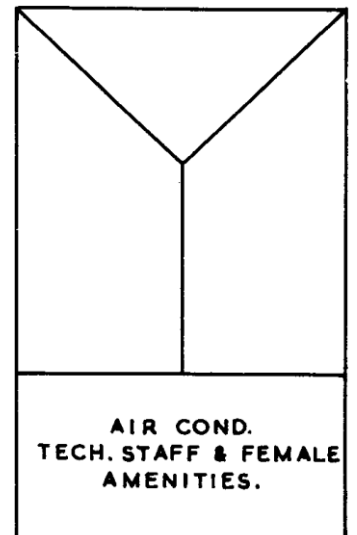
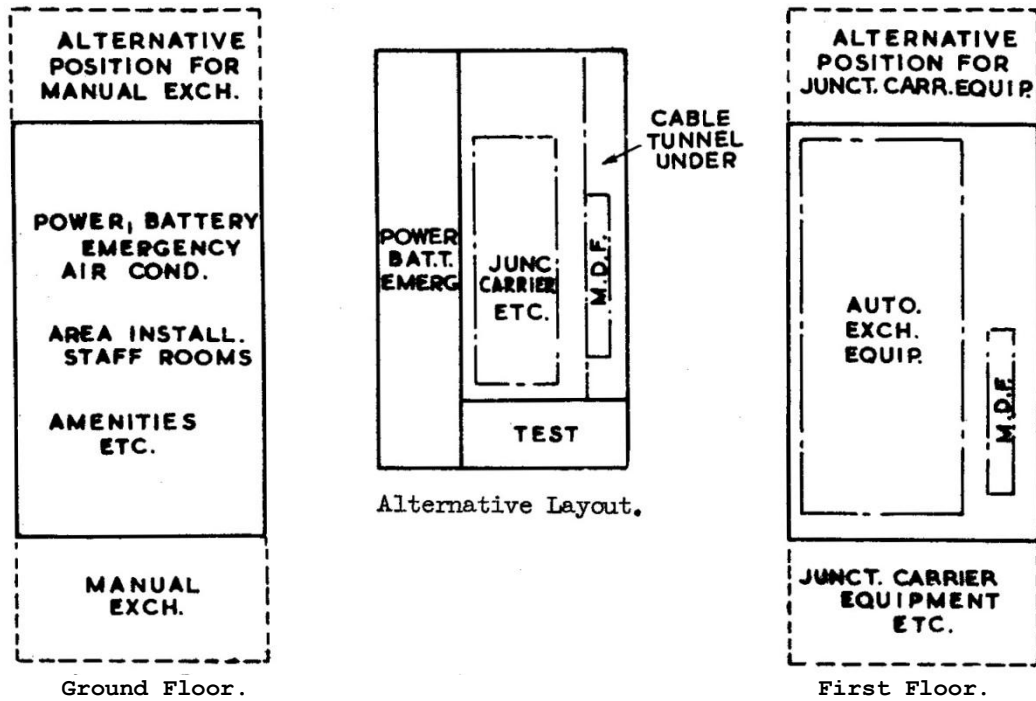


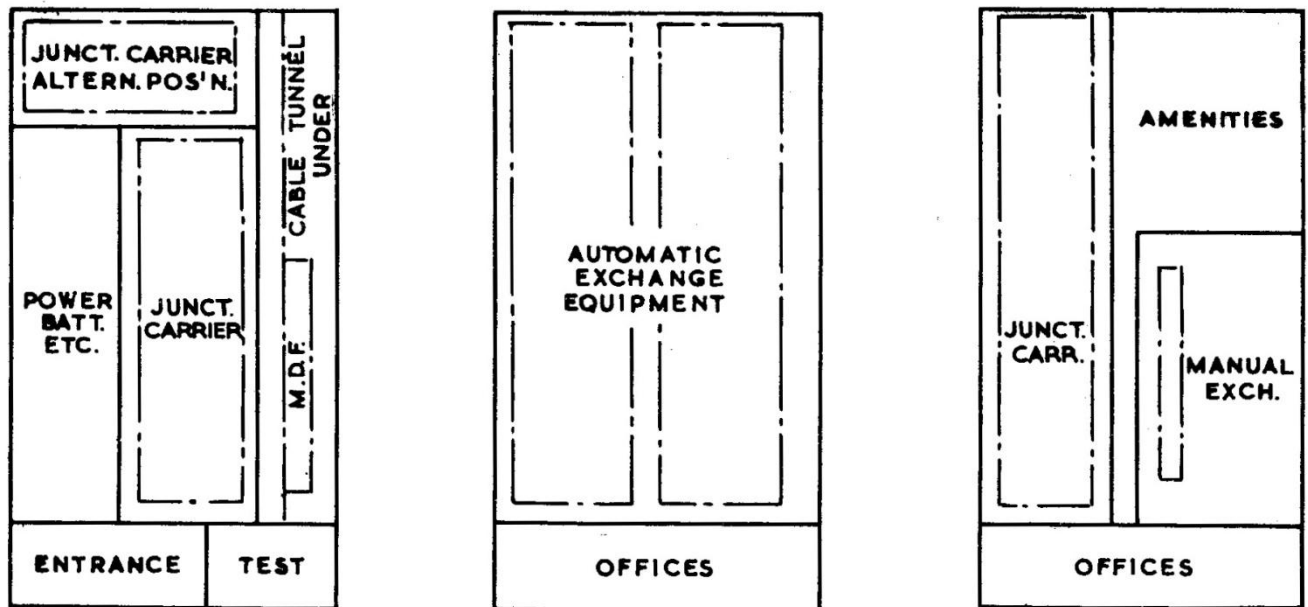
FIG. 1. METROPOLITAN EXCHANGE BUILDINGS (FUNCTIONAL CONDITIONS). (Cont'd on next page)

Not to be used for Country Buildings which are covered in Figs. 8-14.



(e) Two Storey Exchange Building.

Alternative arrangements shown for Manual Exchange and/or Junction Carrier equipment with Automatic Exchange.



(f) Three Storey Exchange Building.

Showing alternative location for Junction Carrier Equipment.

METROPOLITAN EXCHANGE BUILDINGS (FUNCTIONAL CONDITIONS).

Not to be used for Country Buildings which are covered in Figs. 8-14.

FIG. 1.

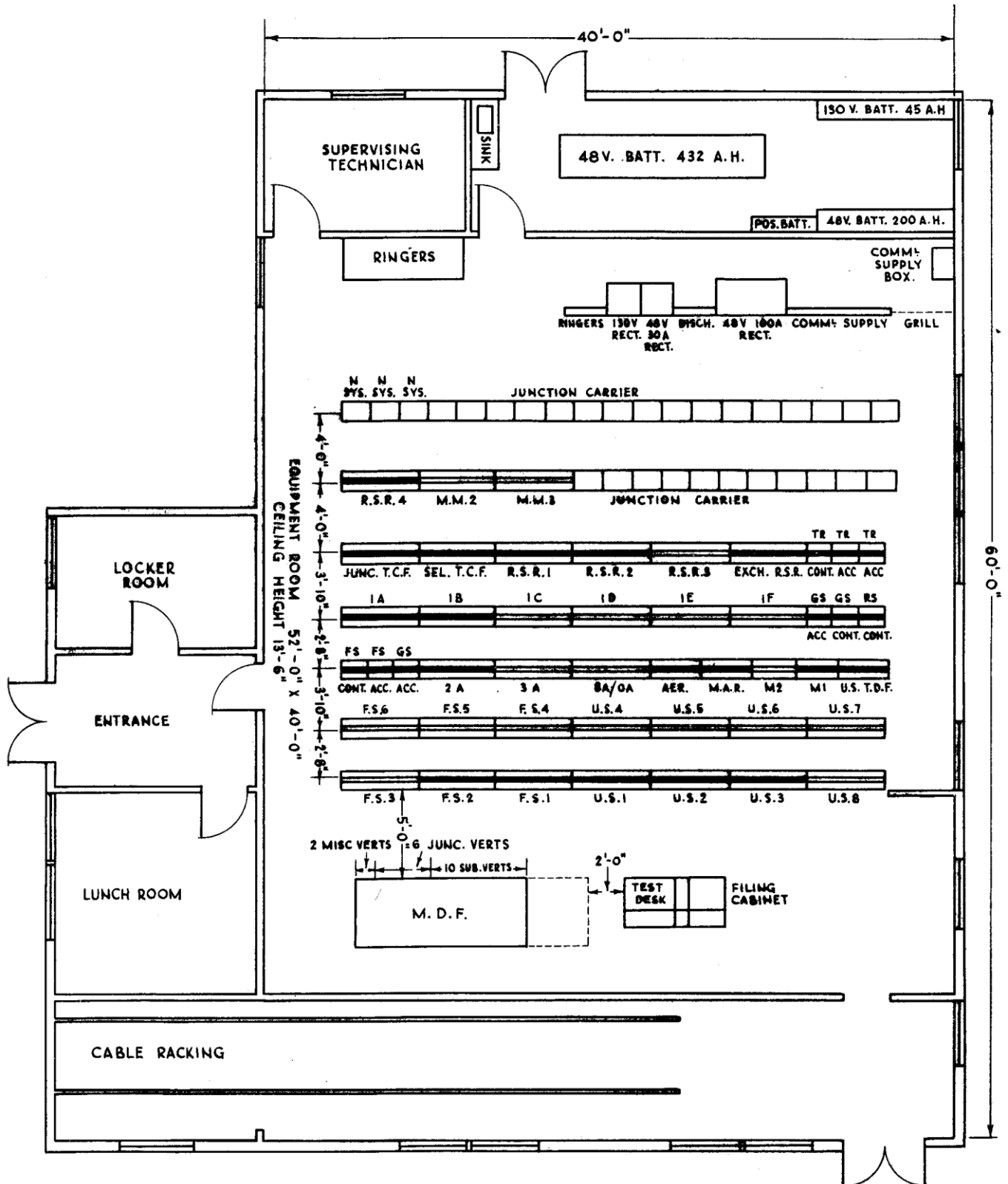


FIG. 2. SINGLE STOREY PREFABRICATED BUILDING WITH OTHER EQUIPMT GROUPS
2400 line Automatic Exchange with Junction Carrier Equipment
suitable for exchanges on boundary of large networks.

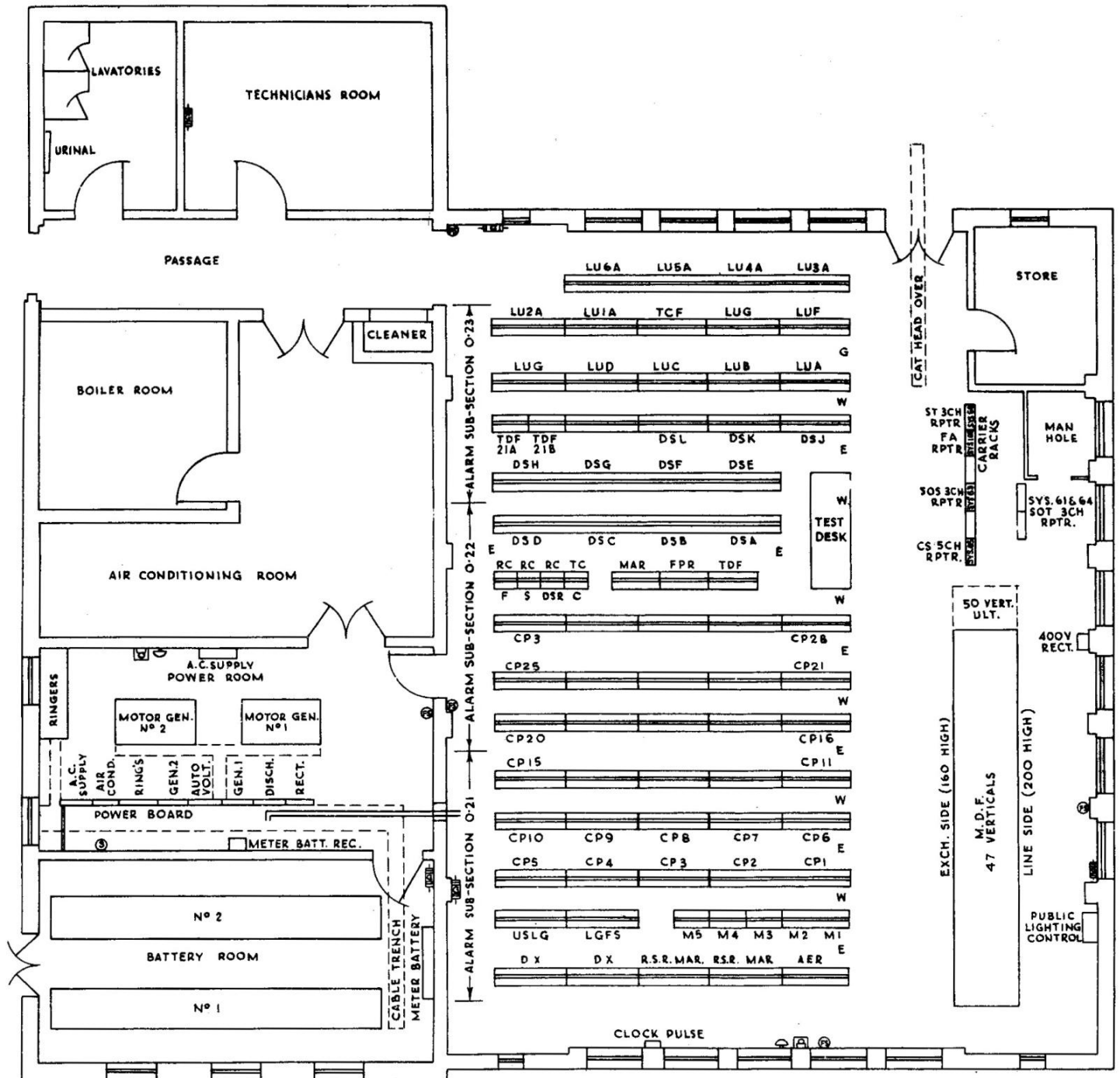


FIG. 3. SINGLE STOREY BRANCH EXCHANGE WITH OTHER EQUIPMENT GROUPS.
Long Line Equipment racks installed at end of M.D.F.

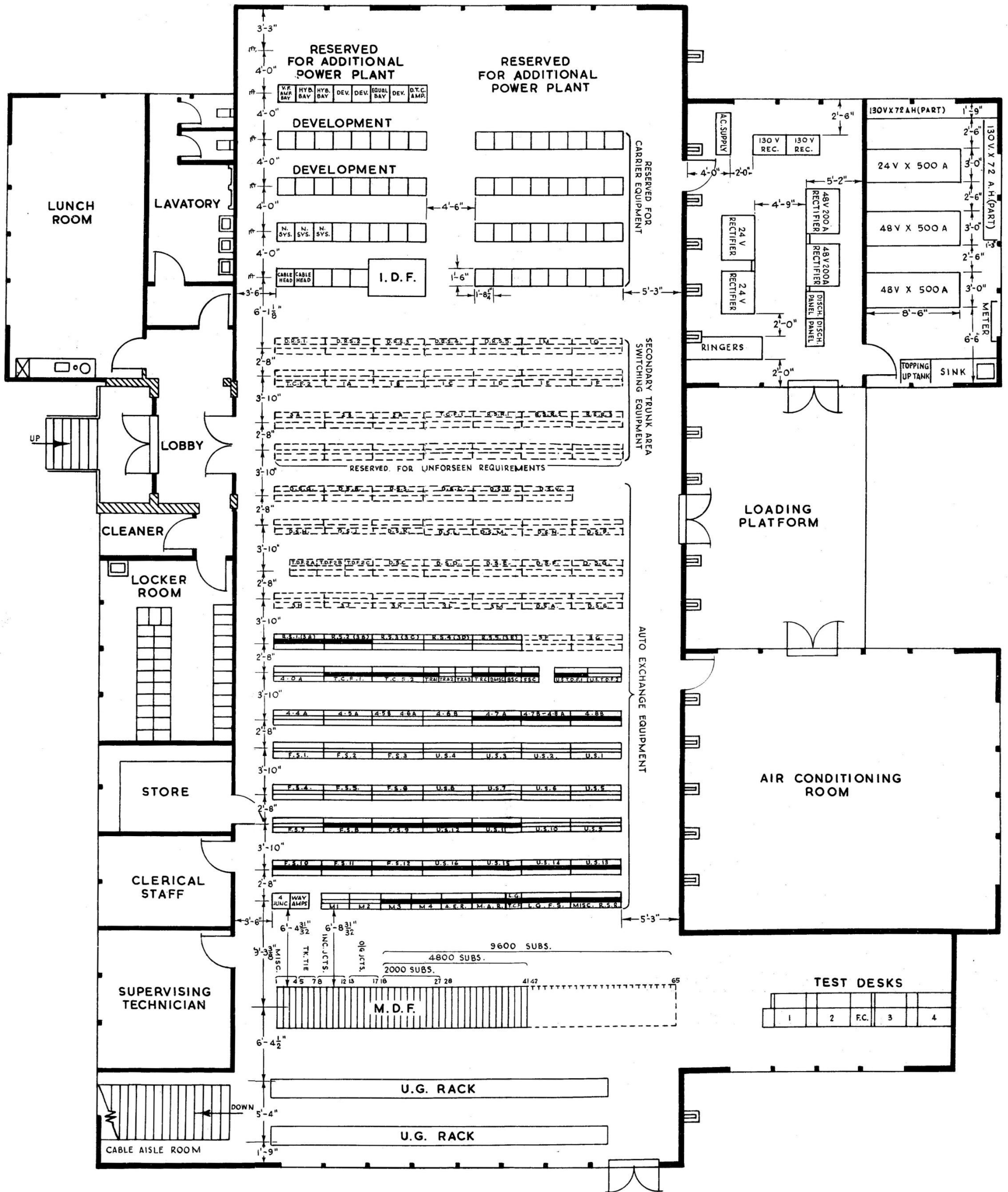
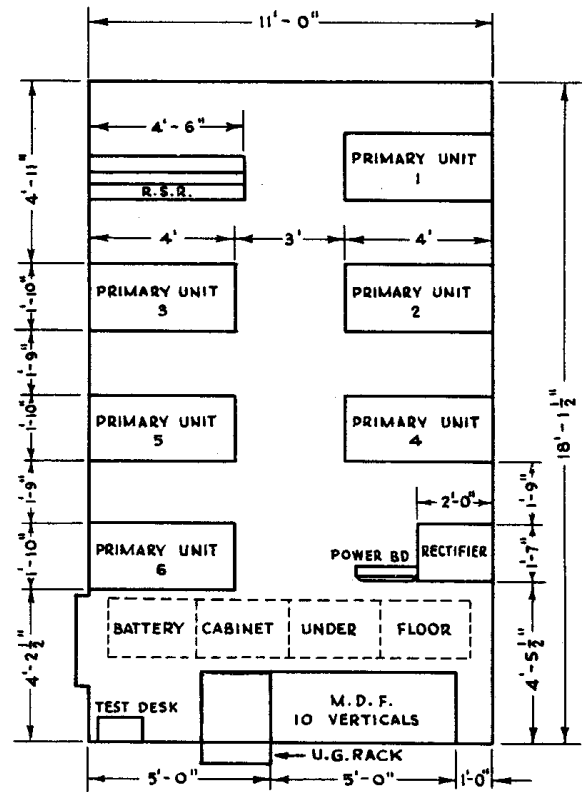
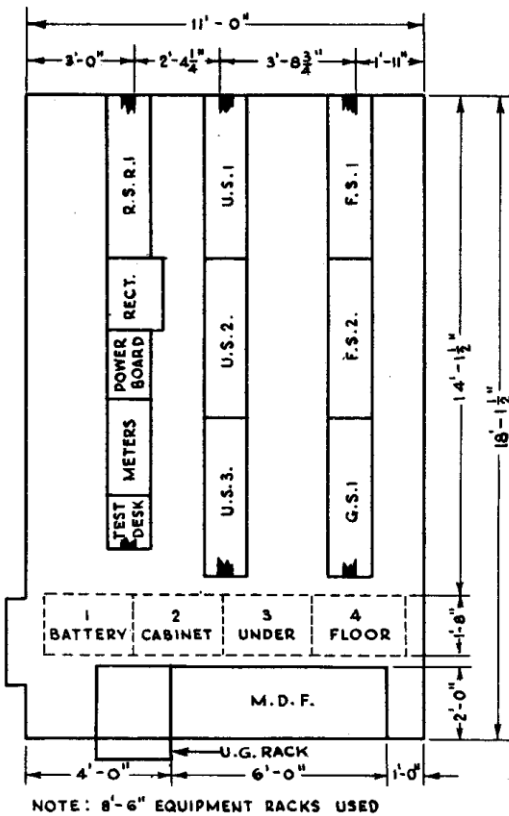


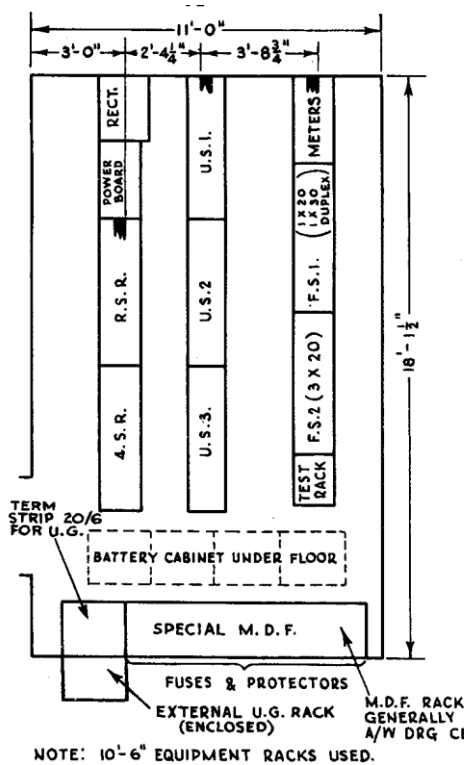
FIG. 4 SINGLE STOREY PREFABRICATED BUILDING.

AUTOMATIC SUBSCRIBERS' EXCHANGE WITH LOCATIONS FOR TRUNK SWITCHING AND LONG LINE EQUIPMENT. MANUAL EXCHANGE PROVIDED IN SEPARATE BUILDING WHEN REQUIRED.



(a) Equipment Layout for Standard Buildings.
Portable 600 line 2000 type auto
exchange.

(b) Equipment Layout for Standard Buildings.
Portable 600 line Pre-2000 type auto
exchange.



(c) Equipment Layout for Standard Buildings.
Portable 900 line 2000 type
auto exchange.

PORTABLE EXCHANGE.

FIG. 5.

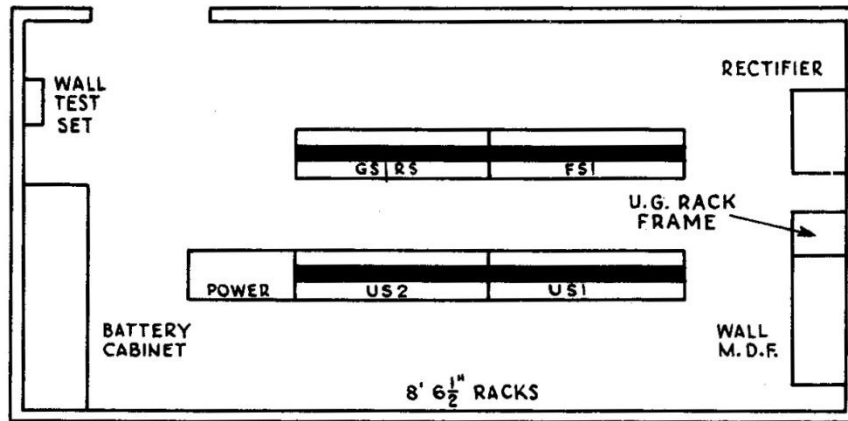


FIG. 6. EQUIPMENT LAYOUT FOR STANDARD BUILDING. TEMPORARY ACCOMMODATION. FOR 200/400 BRANCH EXCHANGE.

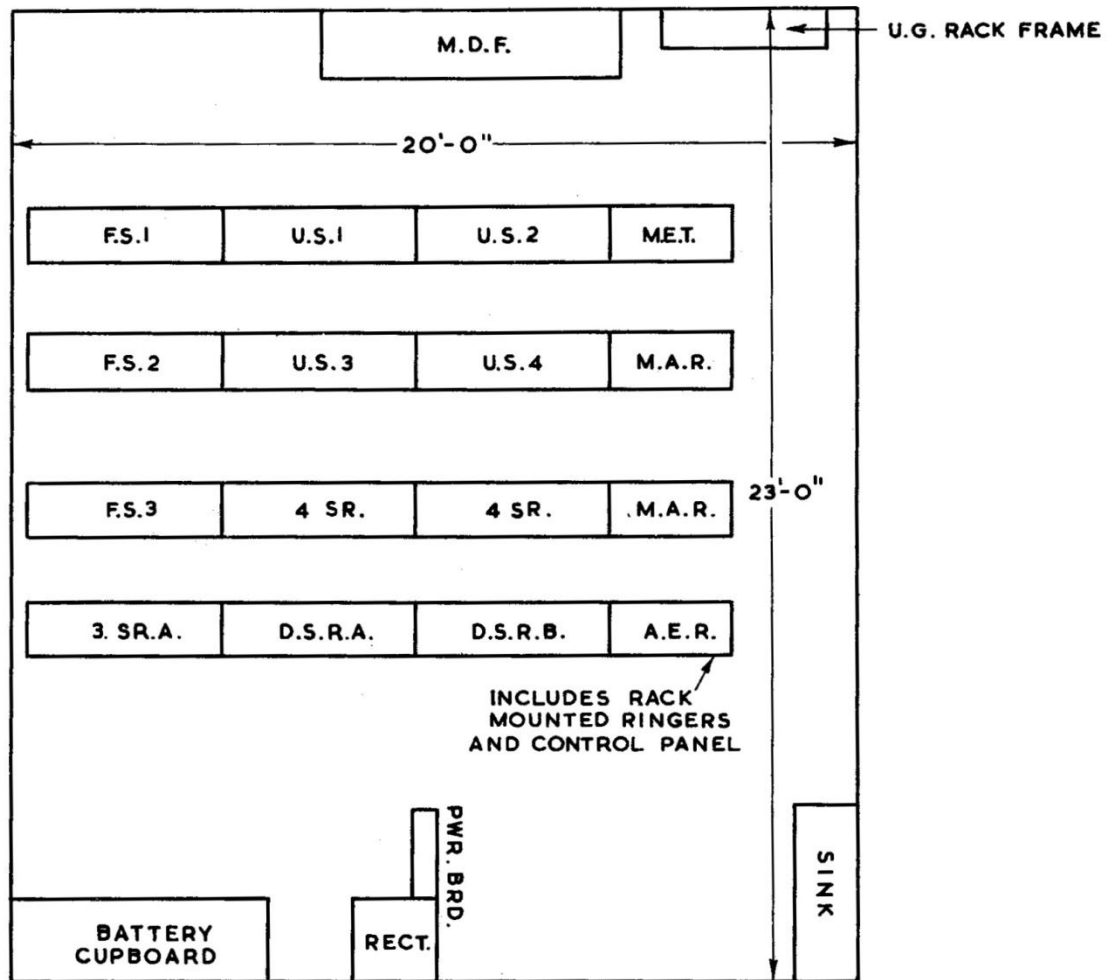
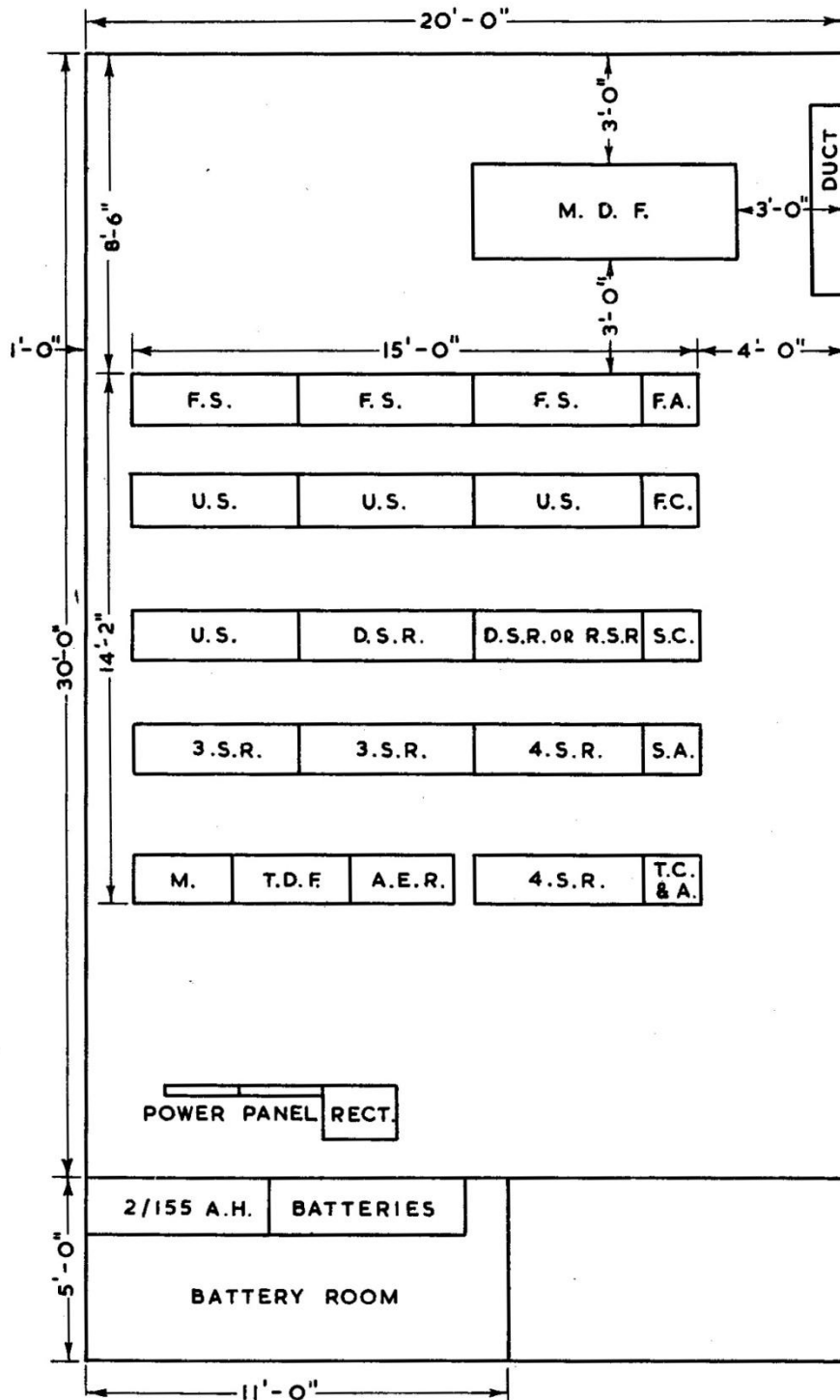


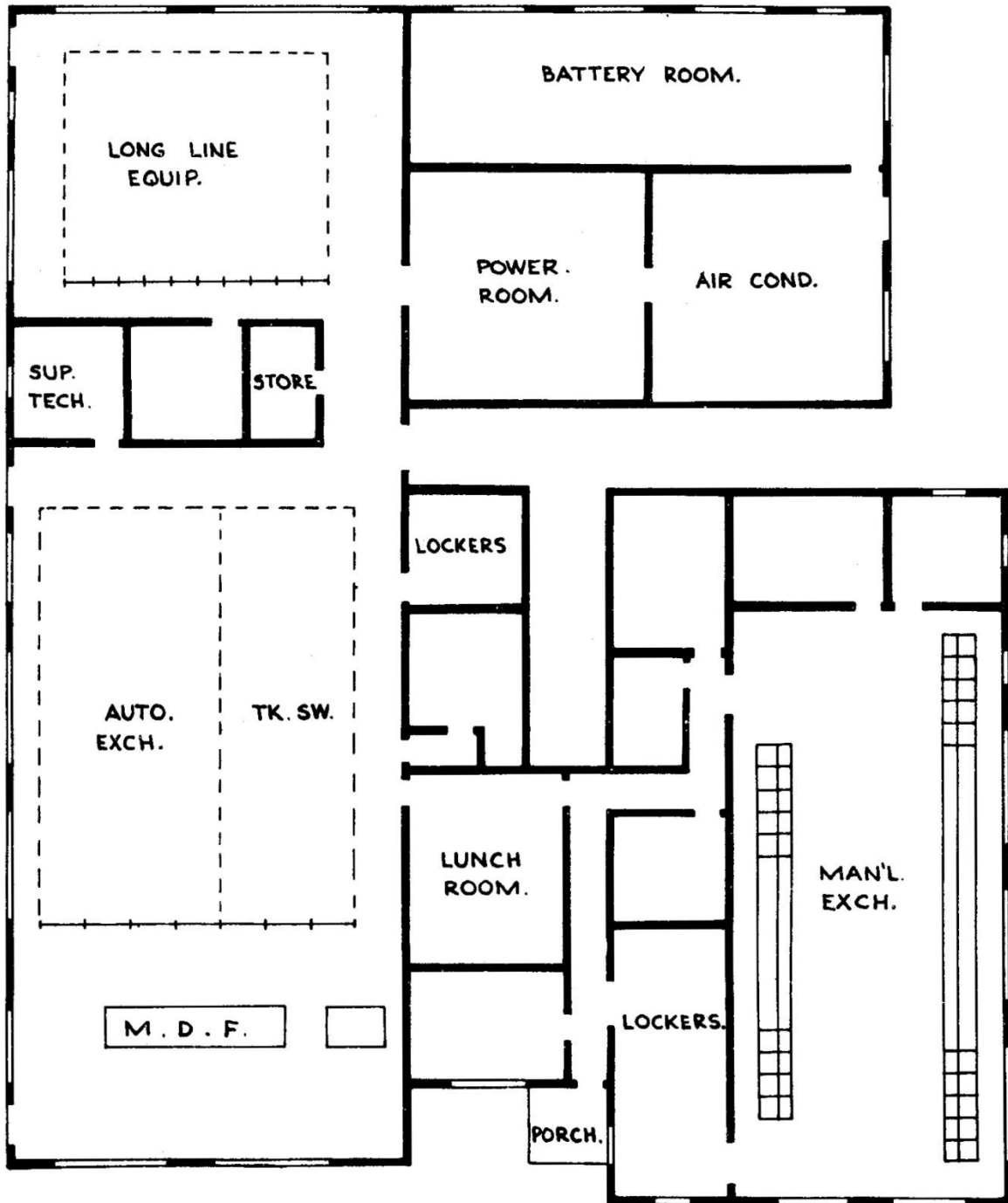
FIG. 7(a). EQUIPMENT LAYOUT FOR STANDARD BUILDINGS. Temporary accommodation 1200 lines branch auto exchange.



SEE DRAWING
C.L. 666 FOR
U.G. RACKING
WALL CHAMBER

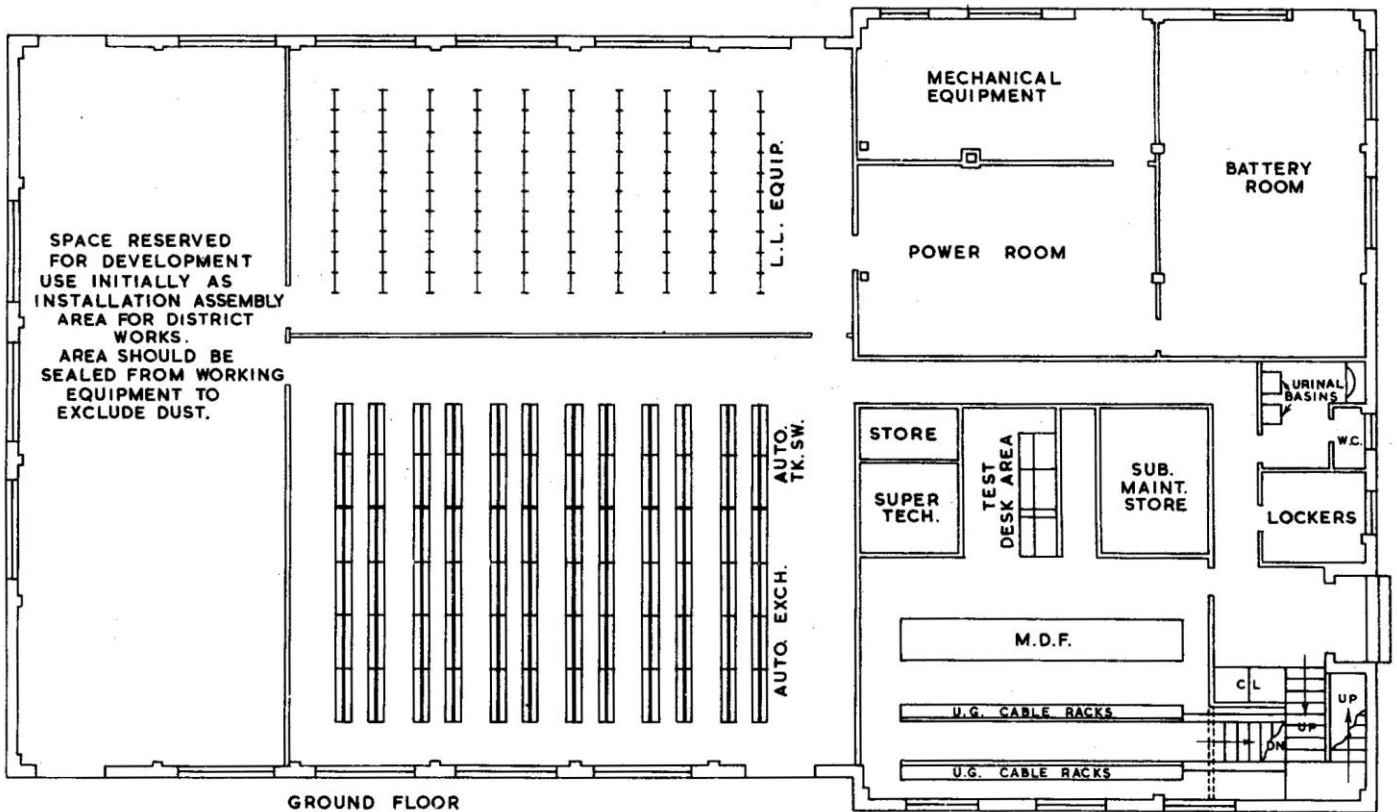
NOTE:—USED GENERALLY IN CASES WHERE GROWTH IS MORE RAPID. ACCOMMODATION MAY FIND ULTIMATE USE AS TRIPLE GARAGE.

FIG. 7(b). EQUIPMENT LAYOUT FOR STANDARD BUILDING.
Temporary accommodation 1200 line branch exchange.



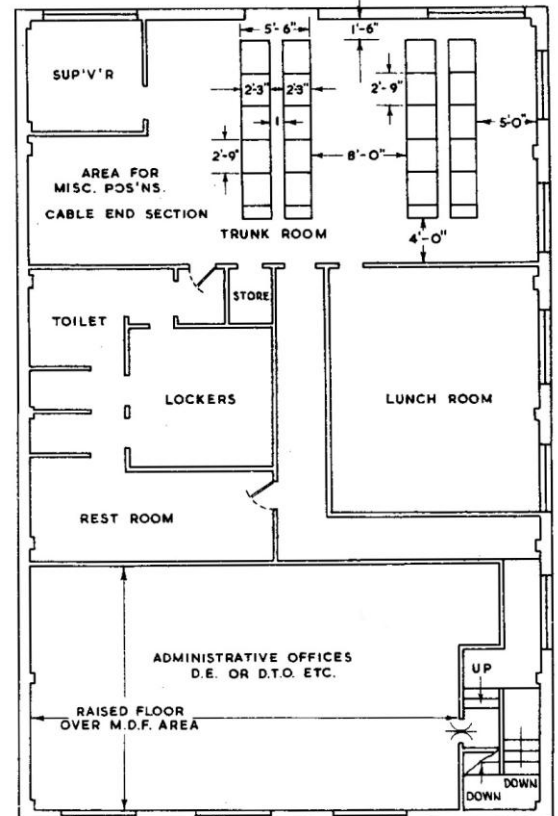
SINGLE STOREY COUNTRY EXCHANGE BUILDING.

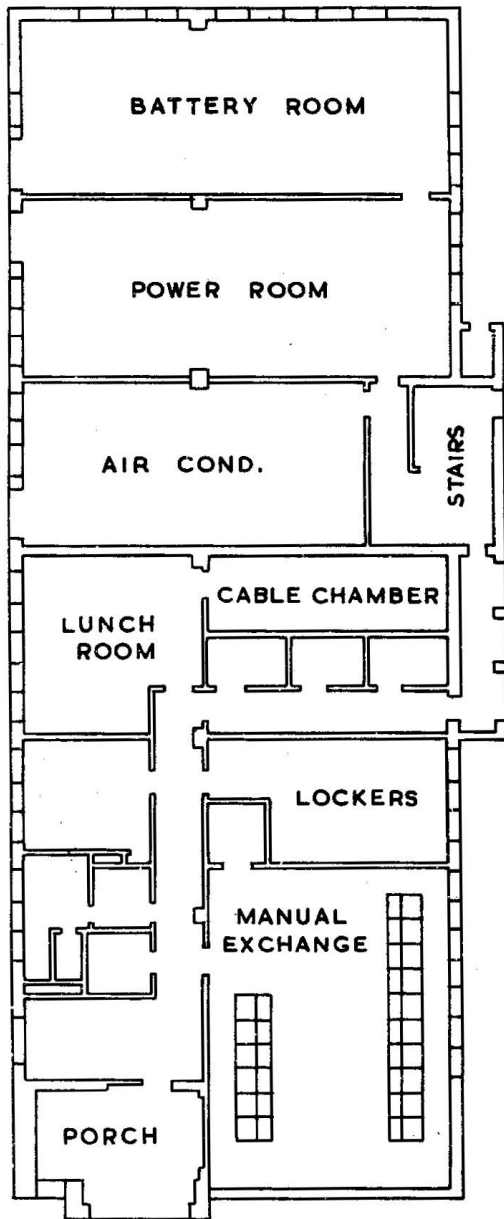
FIG. 8.



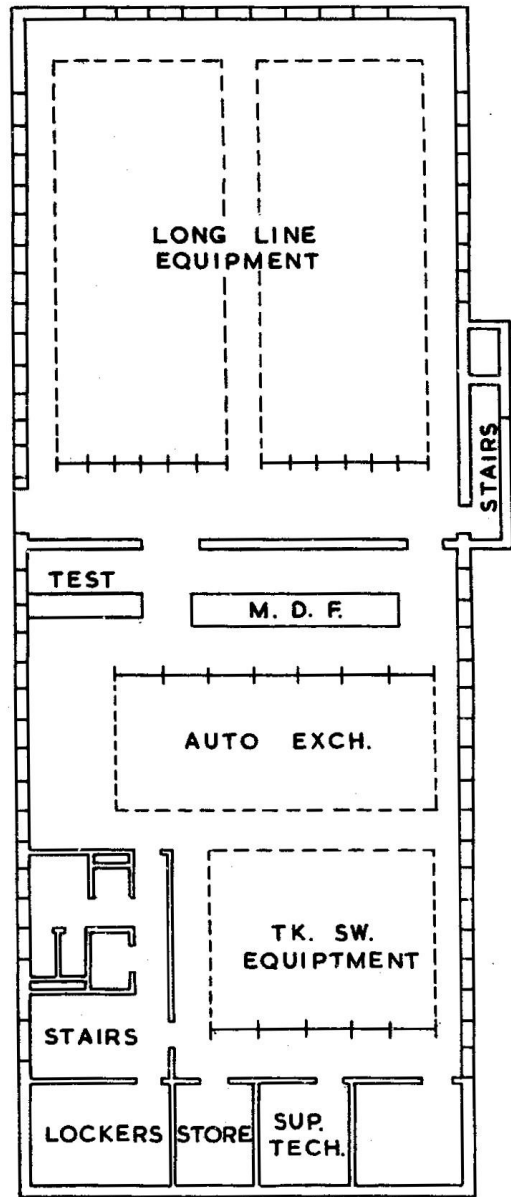
MEZZANINE TYPE BUILDING FOR
LARGE COUNTRY CENTRE.

FIG. 9.





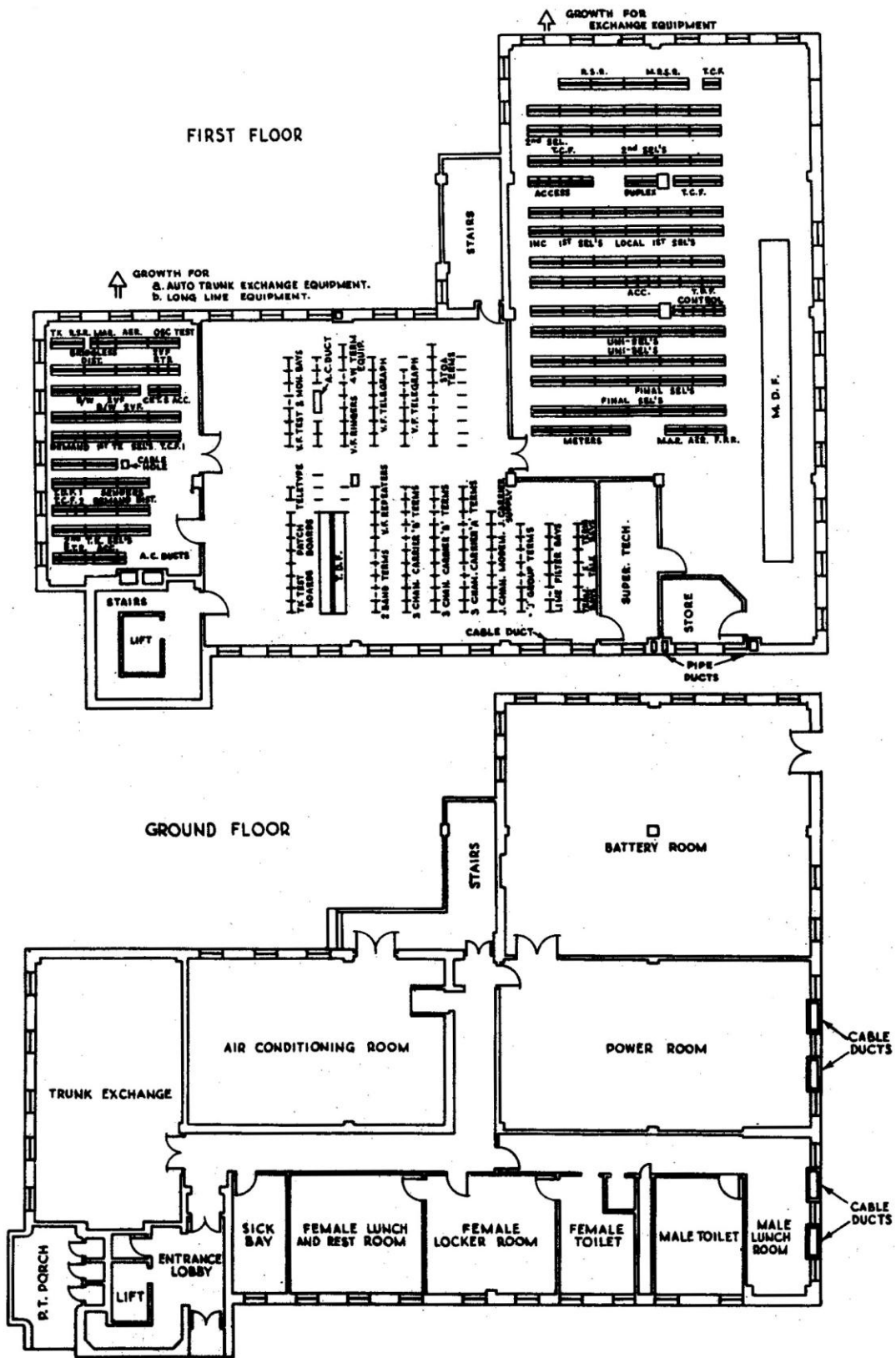
Ground Floor.



First Floor.

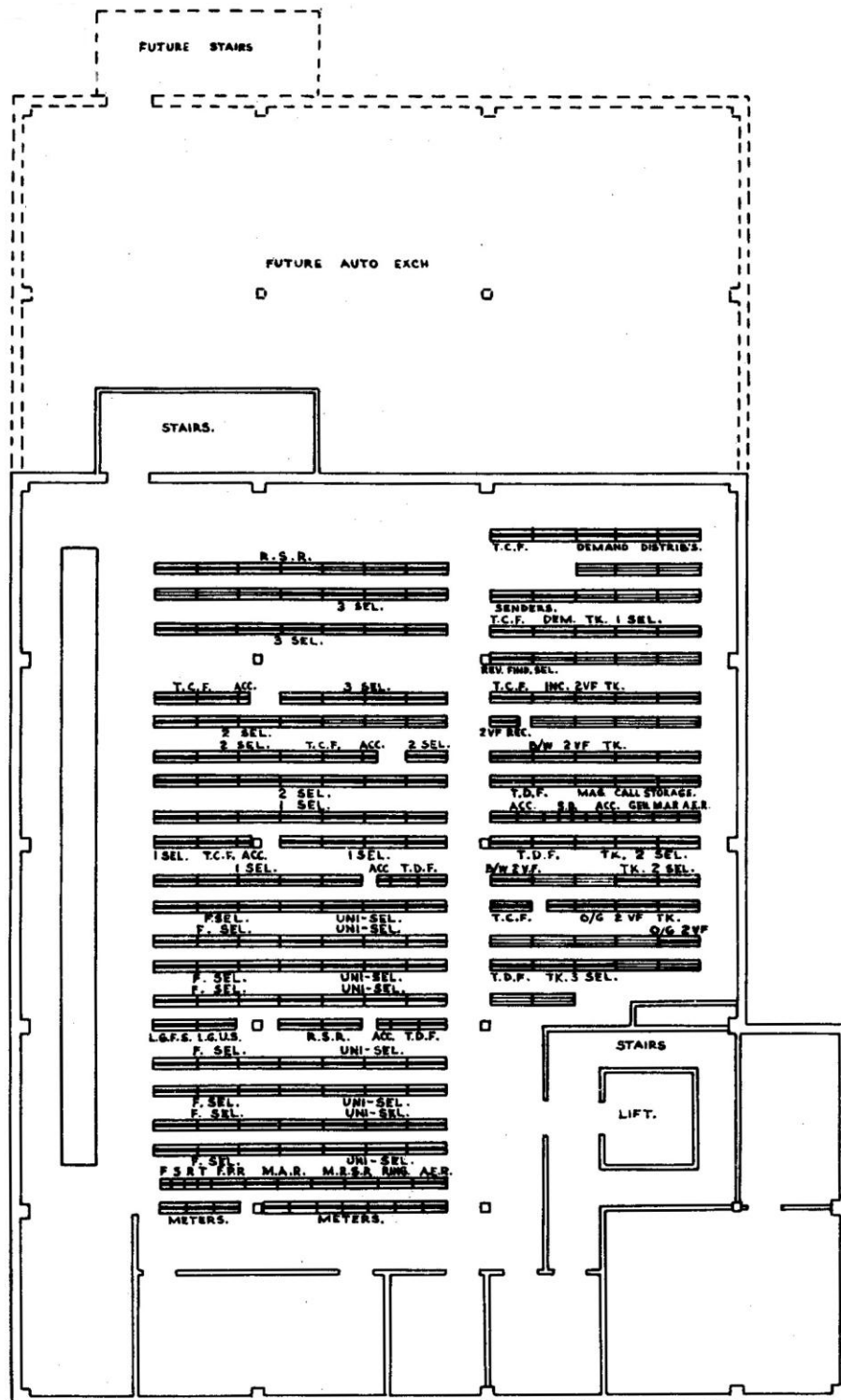
TYPICAL TWO STOREY BUILDING FOR COUNTRY EXCHANGE.

FIG. 10.



TWO STOREY L SHAPED BUILDING.

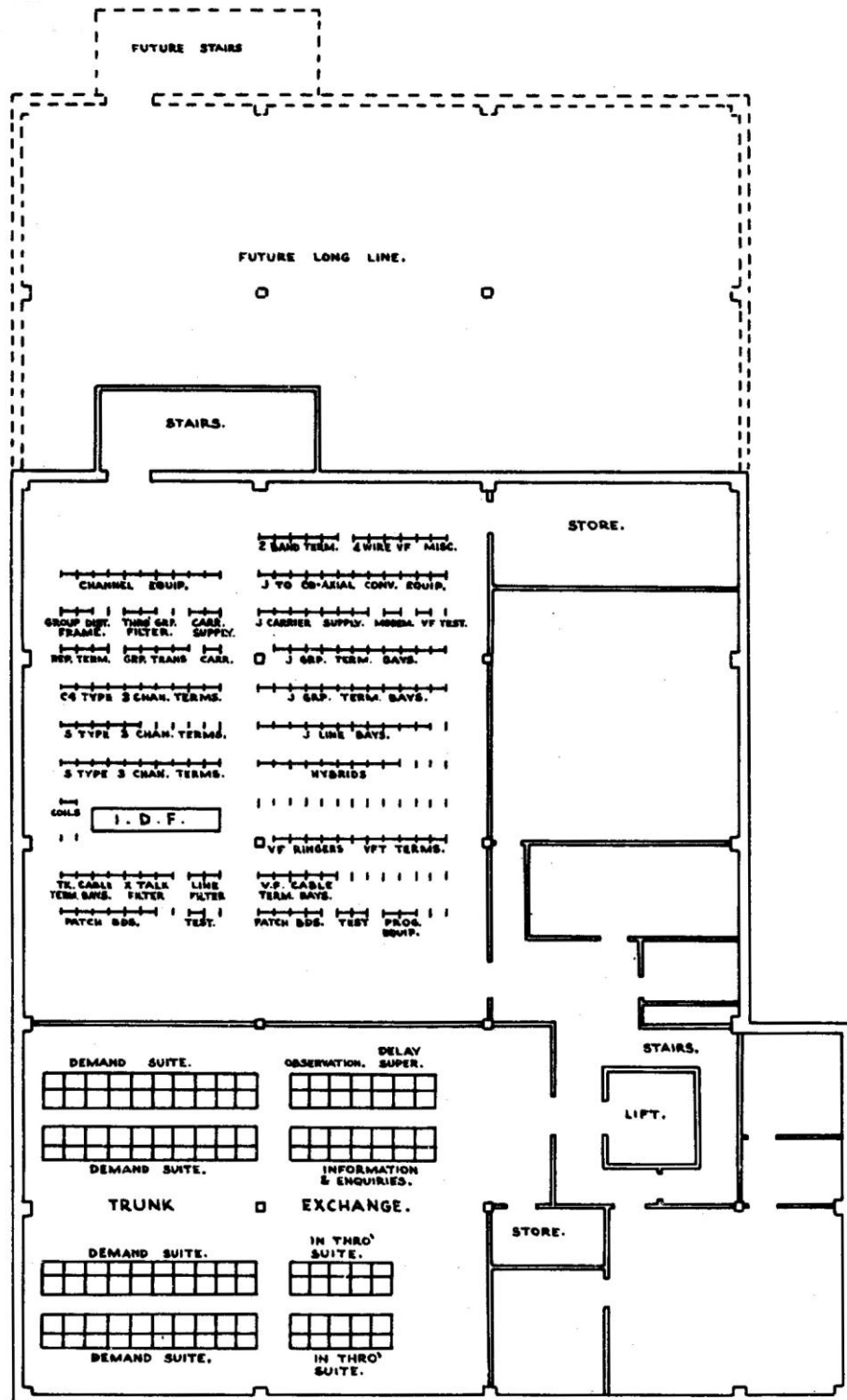
FIG. 11.



(a) First Floor. (See next sheet for Second Floor.)

Three-storey exchange building. Large country city. Automatic subscriber and trunk switching equipment. Ground floor not illustrated. Includes space for cable tunnel, power battery, air-conditioning and staff rooms, D.E. quarters, etc.

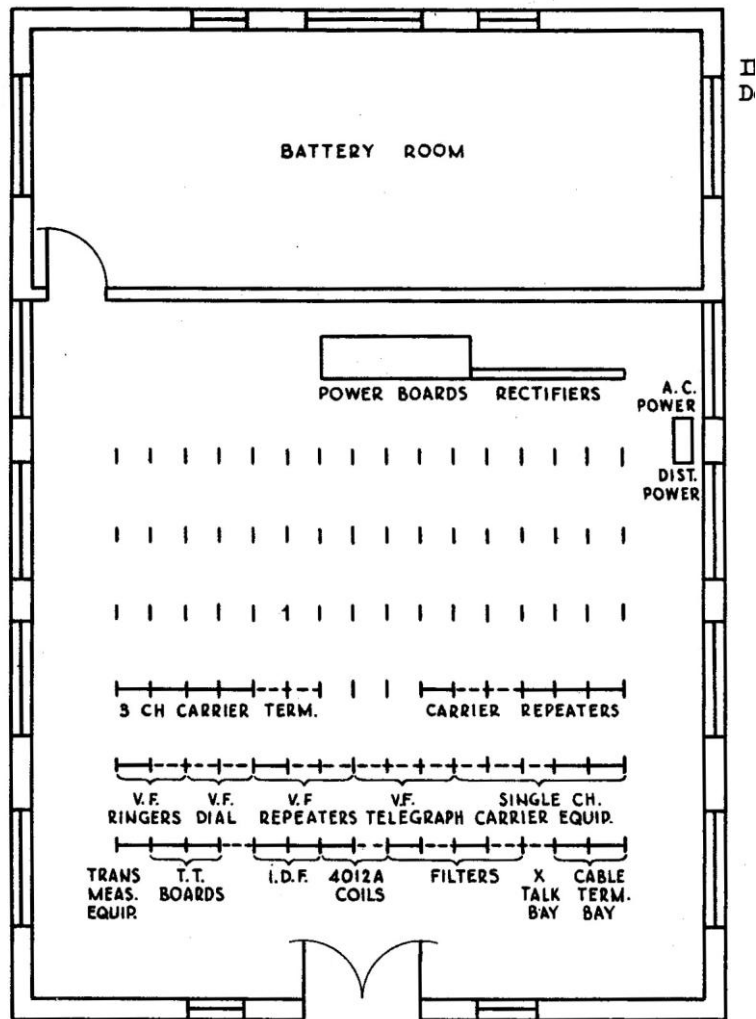
FIG. 12. THREE STOREY EXCHANGE BUILDING. (Cont'd on next page)



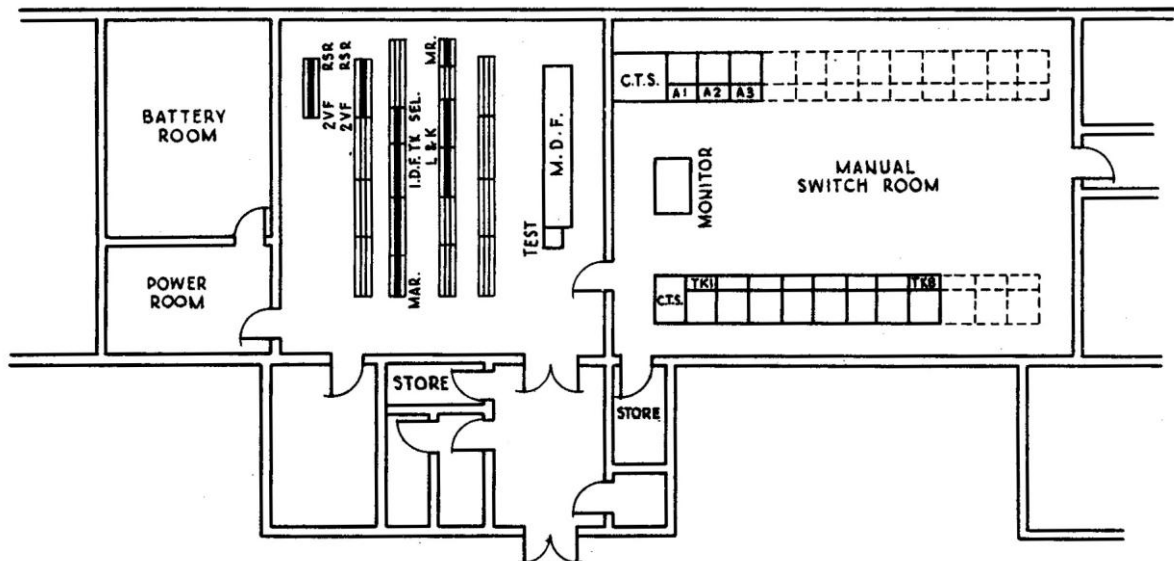
(b) Second Floor.

Three-storey exchange building. Large country centre, Long Line equipment and manual cordless trunk switch-board installation.

FIG. 12. THREE STOREY EXCHANGE BUILDING.

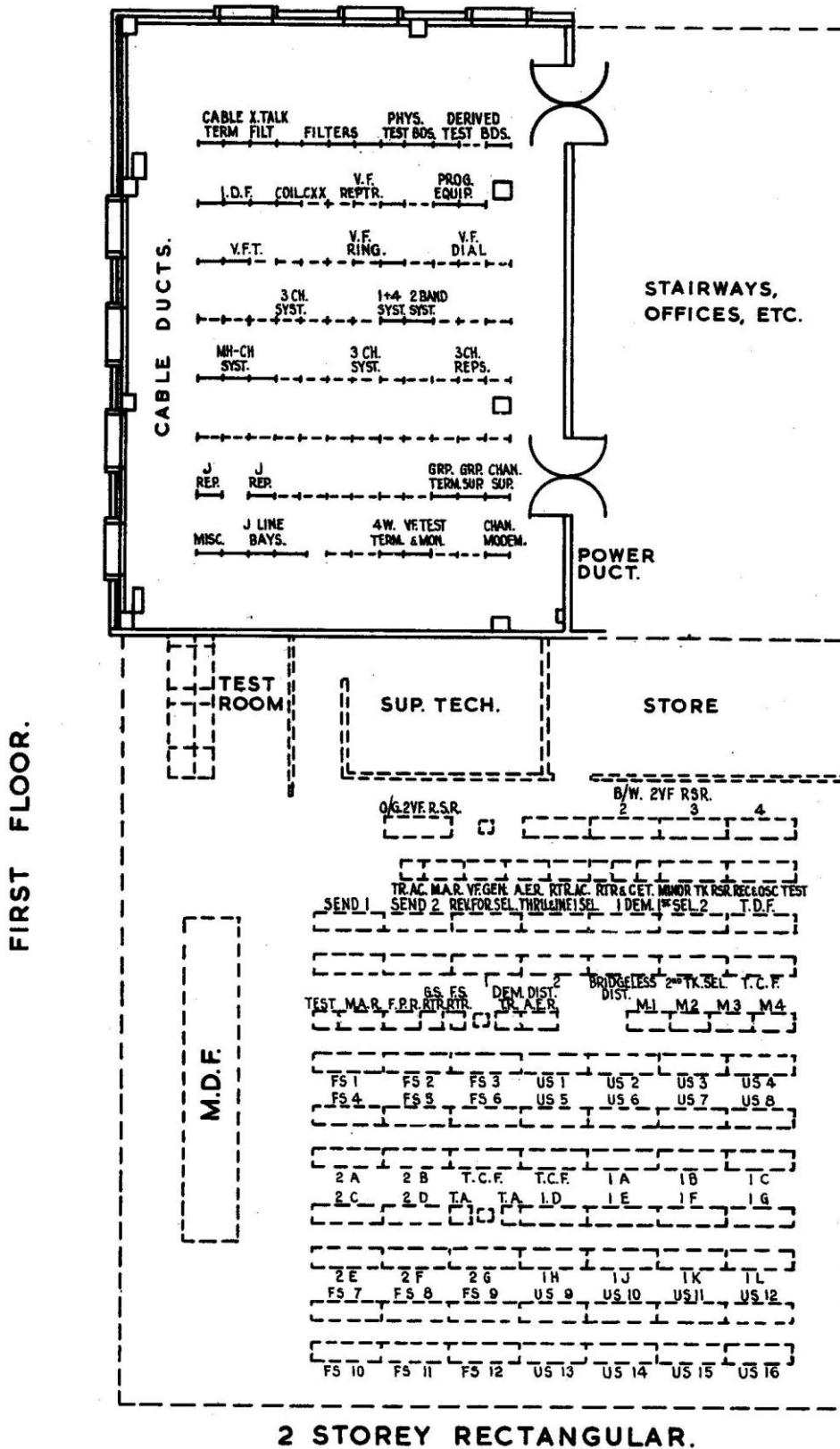


Building erected for Long Line purposes only.



(b) Building erected for manual exchange.

FIG. 13. TWO BUILDINGS ON SAME SITE ERECTED AT WIDELY SEPARATED DATES.



In this instance the original planning provided for exchange equipment at front with Long Line and Trunk Switching equipment at the rear.

First Floor Plan Only.
Ground floor includes areas for Power, Battery, Air-conditioning and Manual Exchange. See Fig. 10 for Two-Storey Rectangular Shaped building for Ground Floor Plan.

2 STOREY RECTANGULAR.

FIG. 14. TWO STOREY RECTANGULAR BUILDING (COUNTRY CENTRE) WHEN ONLY PART IS ERECTED INITIALLY.