

CENTRALIZED KEY TELEPHONE INSTALLATIONS

1. GENERAL

1.01 This section contains information on standardized key telephone system installations for large buildings using color coded modular backboards in equipment rooms, riser closets, apparatus closets, satellite closets, and satellite locations.

1.02 A well planned terminal arrangement is essential for large building installations of key telephone systems or excessive cost and effort will result when expansion and service changes are made. In providing facilities for new buildings, close coordination among Architects and Builder Services, Station Installation, Marketing, and Outside Plant Engineering is recommended. New colored backboards and mounting brackets for 66M1-50 connecting blocks are arranged in a standard configuration, minimizing installer orientation time and reducing cost.

1.03 Key telephone systems are designed for subsequent increase in customer requirements rather than to accommodate customer current demand, and allow for expansion or service change without installation of additional equipment.

1.04 Estimates may be calculated based on the use of apparatus mountings and working floor space of each building. These estimates should be made prior to the initial installation and preferably during the planning stage of the building.

TERMINOLOGY

1.05 Certain terms used in this section may be unfamiliar to the user and are defined in the following list.

(a) **Key Telephone Stations:** Consist of multi-key instruments which are used to receive and initiate calls.

(b) **Key Telephone Systems:** Consist of *building block* units of station apparatus designed to provide features such as: multiline pickup, line lamp signals, common audible signaling, intercommunication, and auxiliary service. These units are installed on customer premises.

(c) **Service Features:** Can be categorized as follows:

Basic line

Intercommunication

Auxiliary

(d) **Basic Line Services:** Include line pickup, line hold, and call status indications in the form of lamp signals for multiple lines appearing at key telephone stations.

(e) **Intercommunication Service:** Provides internal communication among stations without the need for connections through CO or PBX facilities.

(f) **Auxiliary Services:** Provide special features, such as:

Exclusion

Power failure transfer

Incoming call transfer

Auxiliary lamp control

Common audible signals.

(g) **Equipment Rooms:** Are normally designed for PBX equipment, key telephone system apparatus and terminating facilities. The number of rooms is dictated by predicting customer needs for on-premise equipment.

(h) **Riser Closets:** Provide a location on each floor where riser cables terminate for further distribution on that floor. A riser closet may also serve as an apparatus or satellite closet in accordance with size, function, and telephone facilities required for a particular floor.

(i) **Apparatus Closets:** Designed for apparatus installations and of adequate size to contain key telephone system apparatus and terminating facilities for KTS services, stations, and CO/PBX lines. Other names used: equipment closet, zone closet, or riser closet. These names are keyed to the underfloor duct or riser system function. By locating associated relay and power equipment in closets, the following advantages are provided:

- Eliminates equipment operating noise from office area.
- Improves office appearance.
- Minimizes disturbance to customer during work operations.
- Minimizes required equipment space and allows some common equipment to be shared.

(j) **Satellite Closets:** Do *not* contain key telephone apparatus; their primary use is to provide terminating facilities for key telephone services, stations, and CO/PBX lines. Other names used: terminal closet, zone closet, or riser closet. These names are keyed to the function of the building distribution system.

(k) **Satellite Locations:** Include flush mounted wall cabinets or boxes, surface mounted terminal facilities, and terminal facilities mounted in other areas. Wall cabinets or boxes are normally customer provided and installed into the wall during construction. In some cases, terminal boxes are provided by the telephone company and surface mounted when other facilities are not available.

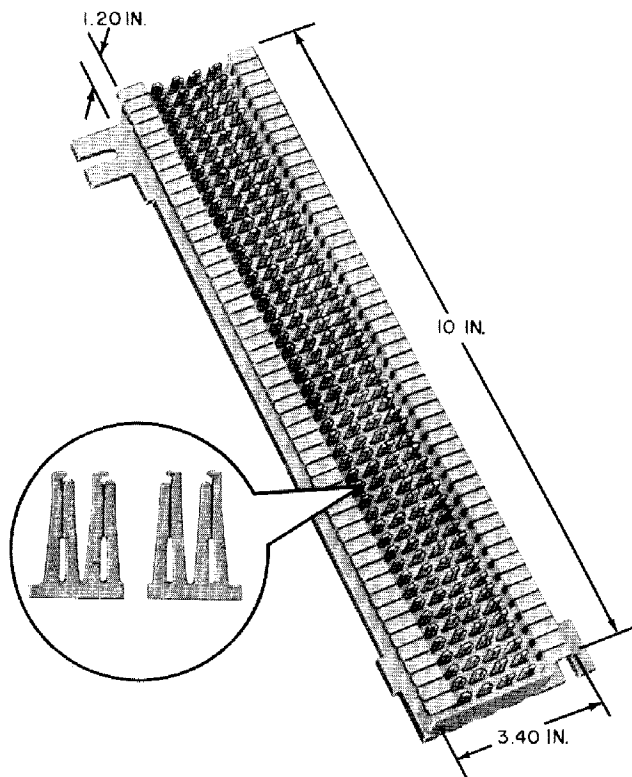
RELATED REFERENCES

1.06 See the following:

TITLE	SECTION
CONNECTING BLOCKS, SELECTION	461-600-100
CONNECTING BLOCKS, DESIGNATION STRIPS AND METHODS OF MARKING	461-600-101
CONNECTING BLOCKS, 66-TYPE TOOLS, ADAPTERS, TERMINATING AND MAINTENANCE	461-604-100
CONNECTING BLOCKS, 66-TYPE NUMBERING AND WIRING	461-604-101
CONNECTING BLOCKS, 66A-, B-, C-, AND M1-TYPE	461-604-102
BACKBOARDS, IDENTIFICA- TION AND INSTALLATION	463-130-100
PIC, CROSS-CONNECTION TERMINALS	631-330-200
POWER SYSTEMS, POTENTIAL AND PROTECTION GROUNDNG	SD-81899

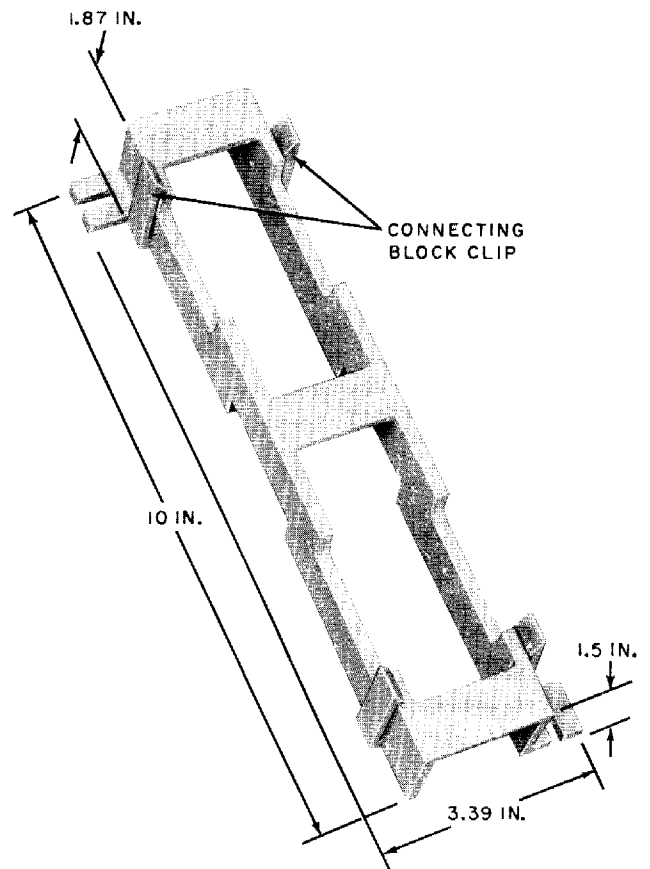
2. IDENTIFICATION

2.01 Fig. 1 through 7 show modular components and other apparatus which may be used for standardization of terminating facilities.



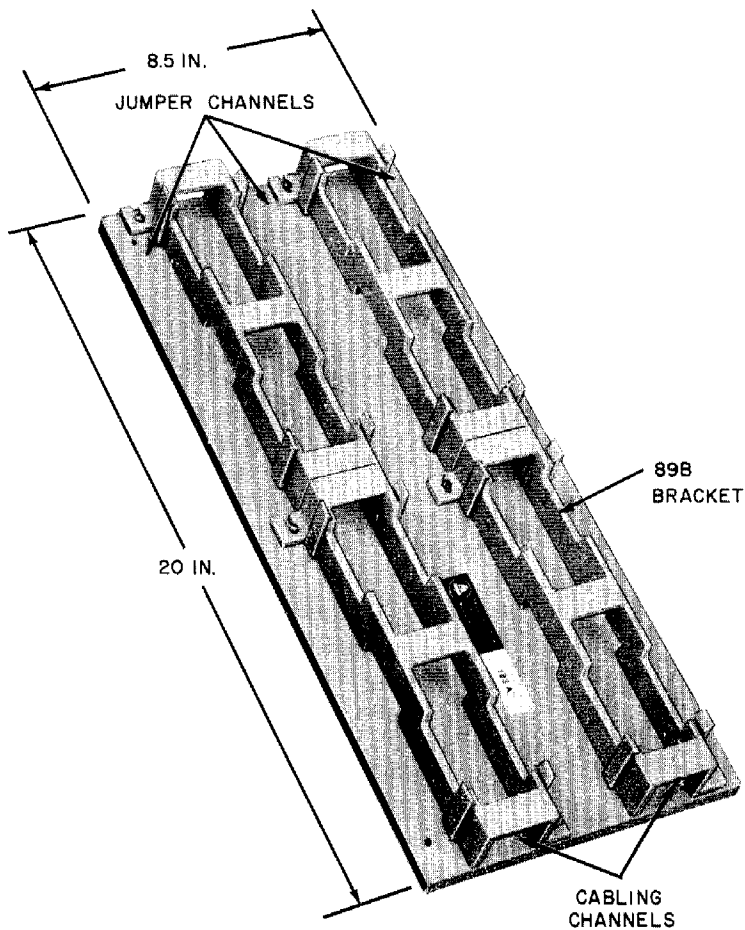
- ADAPTS TO 89B BRACKET
- FIRE RETARDANT PLASTIC BLOCK
- EQUIPPED WITH ONE DIO DESIGNATION STRIP (NOT SHOWN)

Fig. 1 — 66M1-50 Connecting Block



- ACCOMMODATES 66M1-50 CONNECTING BLOCK.
- SPACE UNDER BRACKET ADEQUATE FOR EIGHT 25-PAIR D INSIDE WIRING CABLE.
- SNAP-ON/SNAP-OFF FOR CONNECTING BLOCK.

Fig. 2 — 89B Bracket



- BLUE (183A1)
GREEN (183A2)

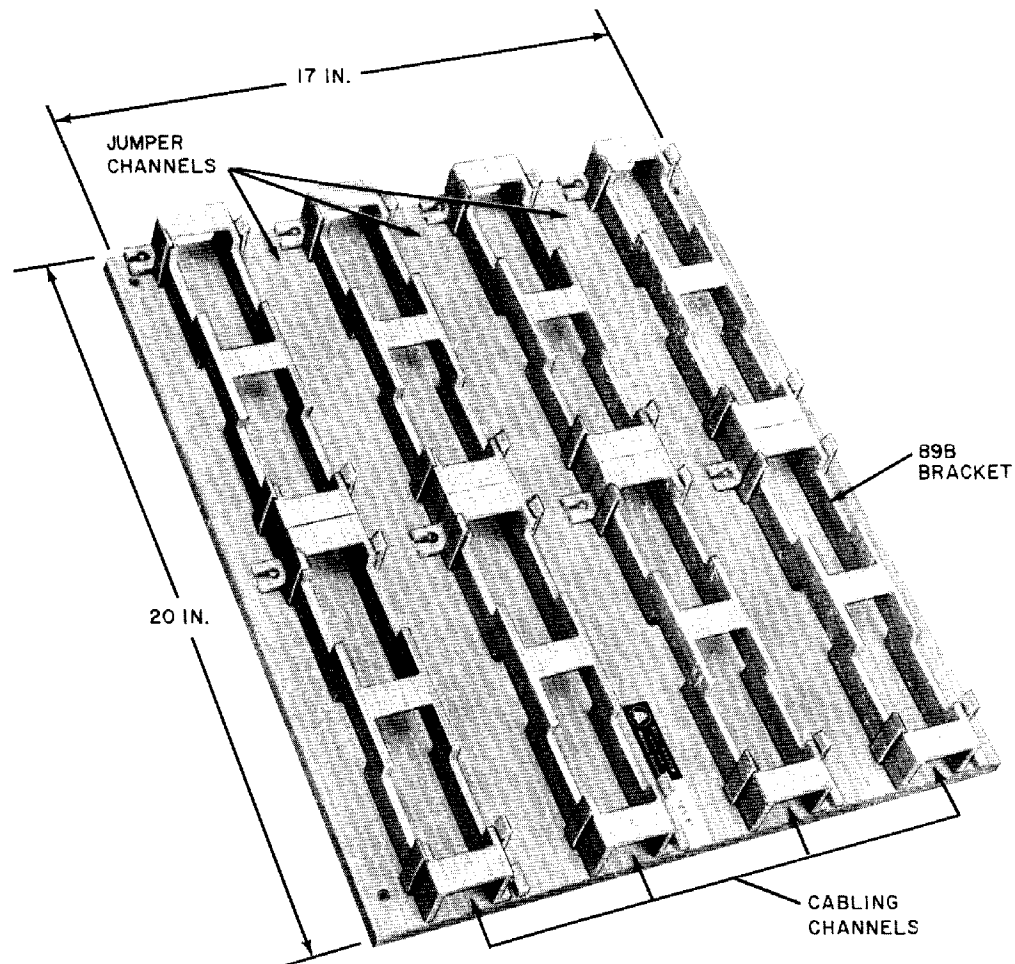
- APPLICATION:

183A1 TERMINATE UP TO EIGHT 25-PAIR CABLES CONNECTED TO KEY TELEPHONE SETS FROM APPARATUS OR SATELLITE CLOSETS.

183A2 TERMINATE UP TO 200 PAIR OF OUTSIDE PLANT CABLE IN APPARATUS CLOSET PER BACKBOARD (MINIMUM OF 2 PER CLOSET). ALSO USED FOR CO/PBX SPECIAL SERVICE IN ALL LOCATIONS, IF REQUIRED.

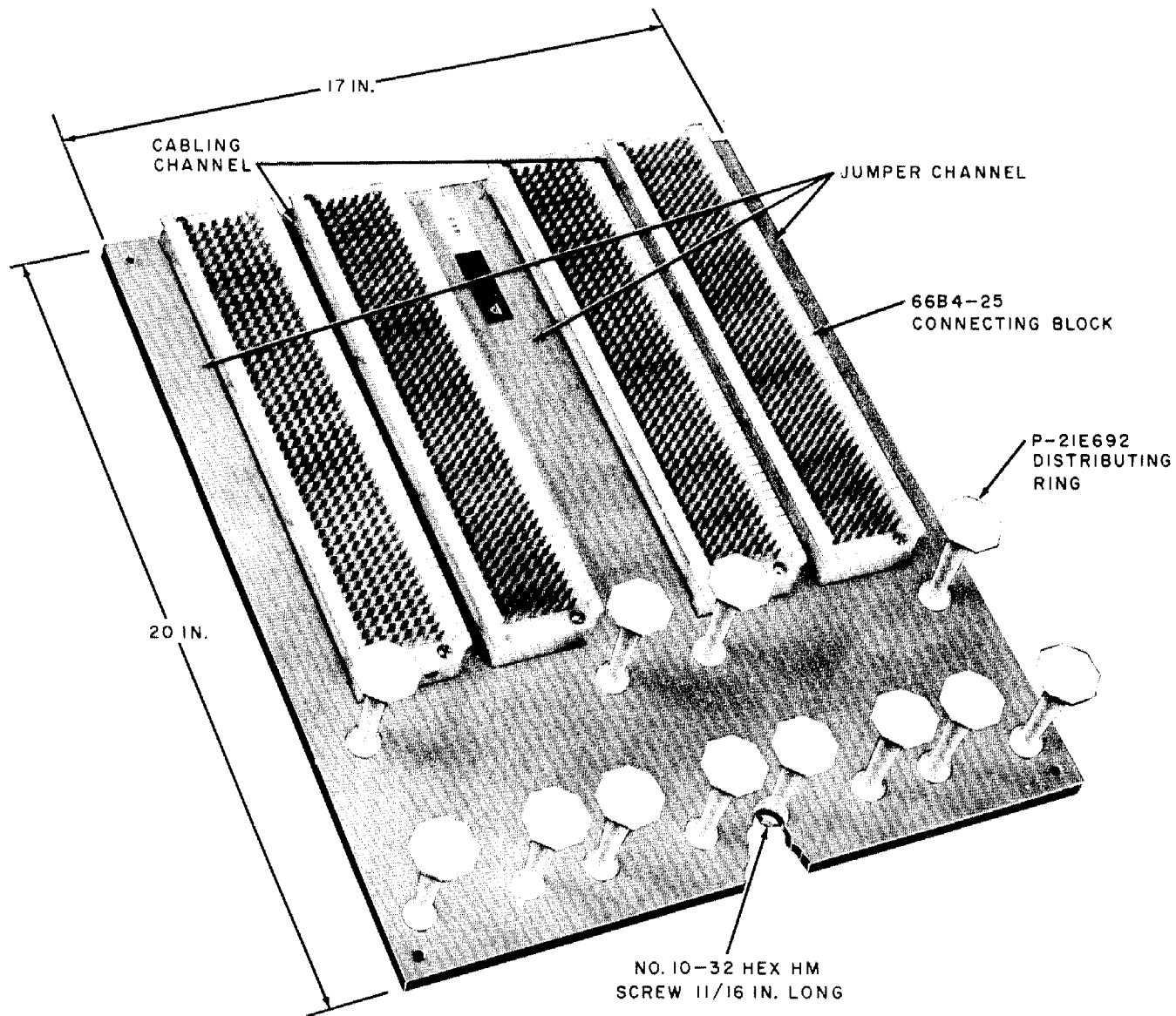
- SEPARATELY ORDER 66 MI-50 CONNECTING BLOCKS AS REQUIRED.
- WOOD PANEL TREATED WITH FIRE RETARDANT MATERIAL.

Fig. 3 — 183A-Type Backboard (Blue or Green Half Module)



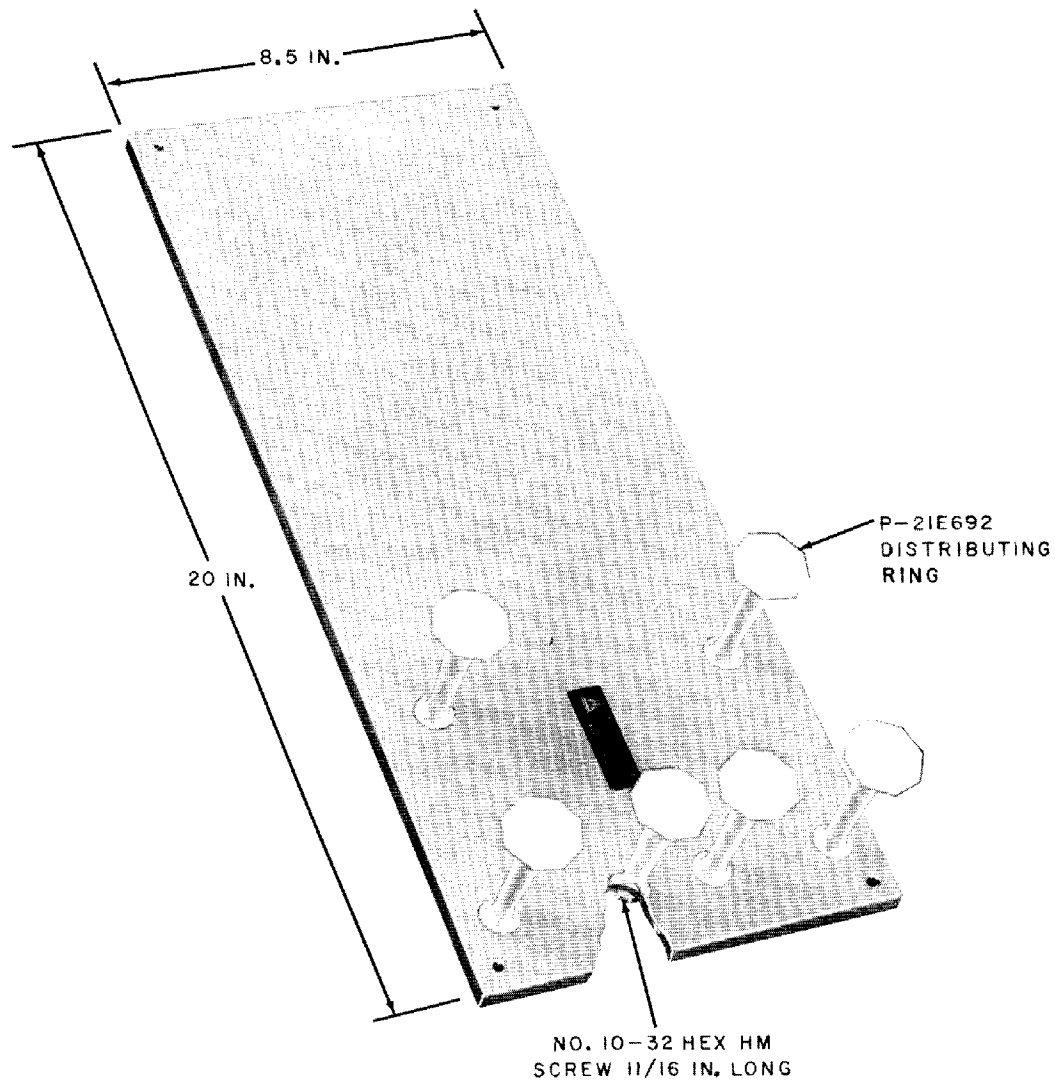
- BLUE
- APPLICATION:
TERMINATE UP TO SIXTEEN 25-PAIR CABLES CONNECTED TO
KEY TELEPHONE SETS FROM APPARATUS OR SATELLITE CLOSETS.
- SEPARATELY ORDER 66MI-50 CONNECTING BLOCKS AS REQUIRED.
- WOOD PANEL TREATED WITH FIRE RETARDANT MATERIAL.

Fig. 4 — 183B1 Backboard (Blue Full Module)



- RED
- APPLICATION:
TO TERMINATE KEY TELEPHONE SET LINES
IN APPARATUS AND SATELITE CLOSETS.
- WOOD PANEL TREATED WITH FIRE RETARDANT MATERIAL.
- EQUIPPED WITH 4 D13 DESIGNATION STRIPS (NOT SHOWN).

Fig. 5 — 184B1 Backboard (Red Full Module)



- YELLOW
- APPLICATION:
TO MOUNT CONNECTING BLOCKS WHICH TERMINATE
AUXILIARY SERVICES AND DIAL INTERCOMMUNICATION
LINES IN APPARATUS CLOSET.

MISCELLANEOUS APPARATUS SUCH AS DIODE MATRIX
BLOCKS. WIRING CHANNEL.
- SEPARATELY ORDERED 66MI-50 CONNECTING BLOCK AND
89B BRACKET AS REQUIRED.
- WOOD PANEL TREATED WITH FIRE RETARDANT MATERIAL.

Fig. 6 — 185A1 Backboard (Yellow Half Module)

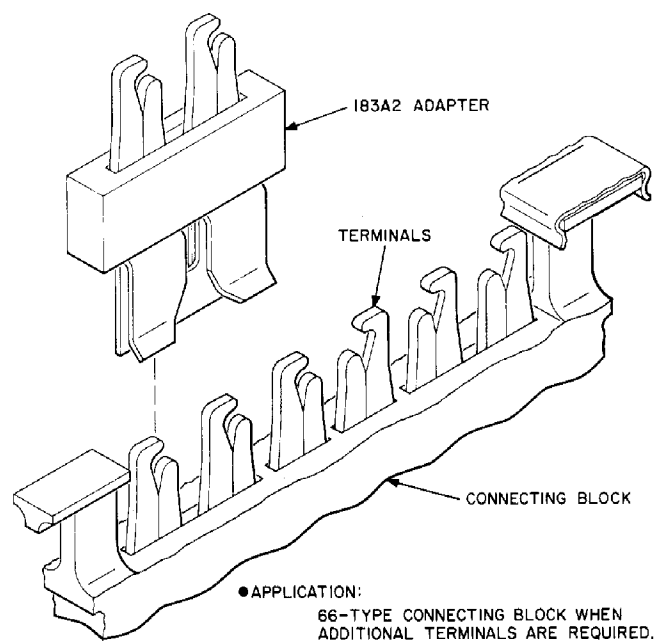


Fig. 7 — 183A2 Adapter

3. PLANNING

3.01 A telephone closet provides an installation enclosure for connecting blocks, apparatus units, or both, which are required for communication services for a specific area (Fig. 8).

3.02 Consider the following:

- Adequate space to mount modular backboards in accordance with floor area served (Fig. 9 and 10).
- Minimum of one ceiling light with control switch located near the door.

- A 20-ampere circuit provided with two 110-volt duplex receptacles.
- A minimum of one closet for each 10,000 square feet of usable area.

3.03 Part 6 provides tabulated data for estimating horizontal wall space needed to mount modular backboards.

3.04 Table A shows requirements for 1A2 KTS apparatus mountings. Table B shows types and dimensions of closets for 1A2 KTS apparatus mountings.

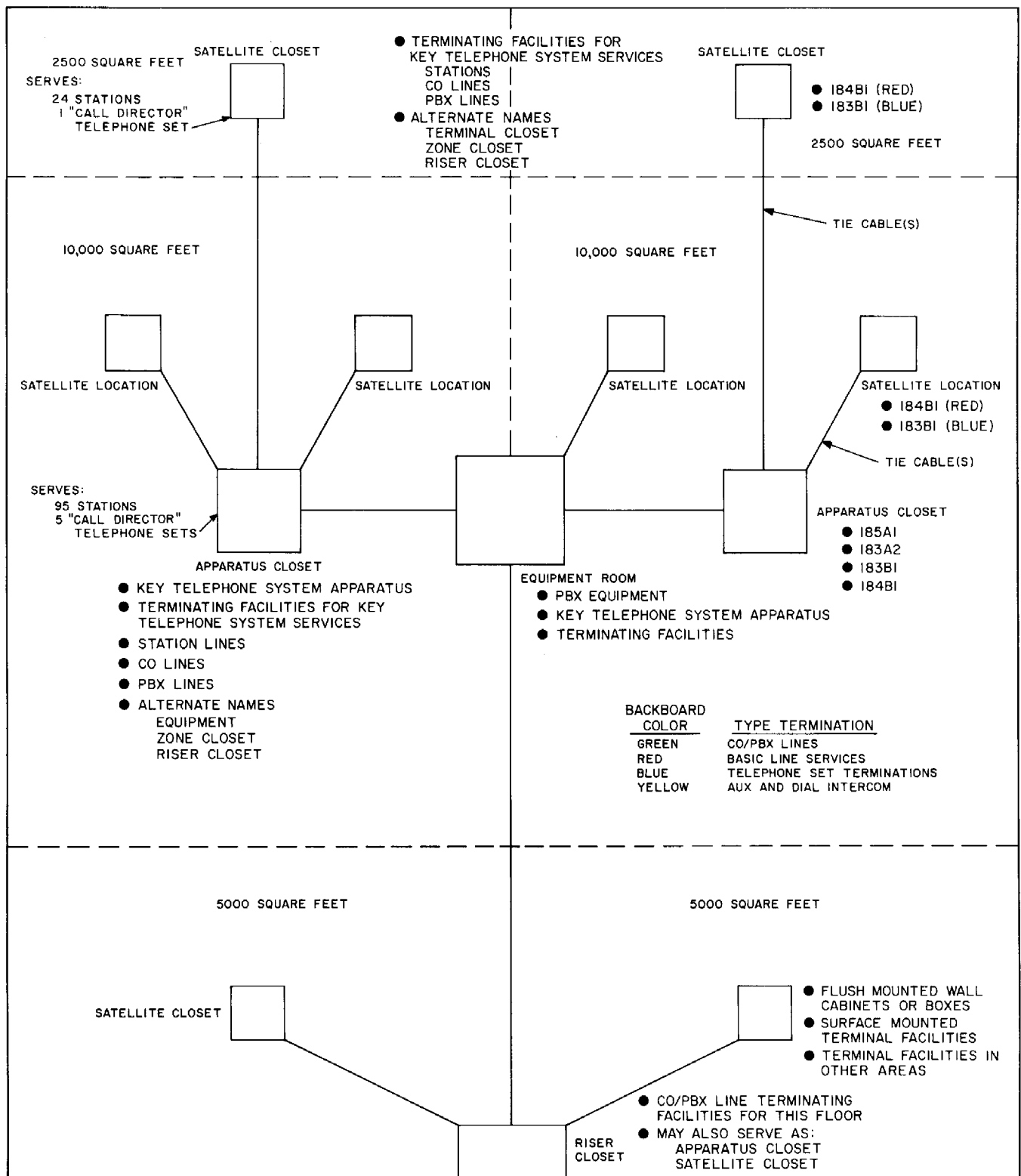


Fig. 8 — Typical Floor Plan Showing Specific Telephone Closet Function and Relation

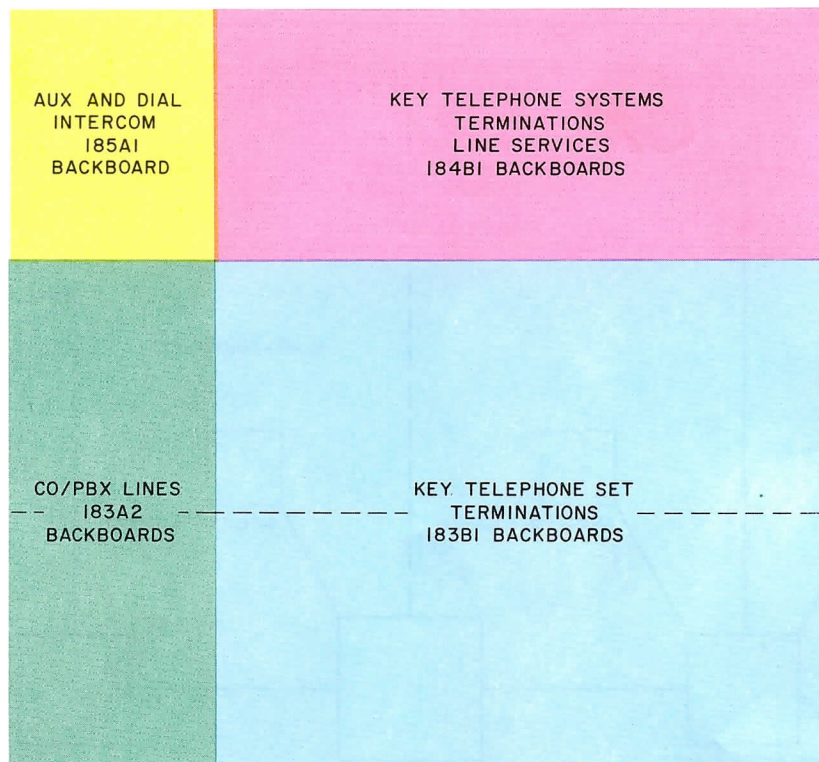


Fig. 9 — Apparatus Closet, Basic Pattern

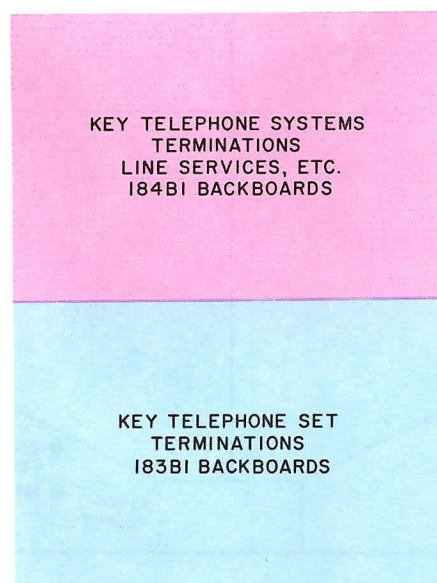


Fig. 10 — Satellite Closet, Basic Pattern

TABLE A
1A2 KEY TELEPHONE SYSTEM APPARATUS MOUNTING REQUIREMENTS

AREA SERVED IN SQUARE FEET	NUMBER OF APPARATUS MOUNTINGS (7 ft by 3 ft) †(TABLE B)	FLOOR AREA IN SQUARE FEET REQUIRED IN CLOSET (SEE TABLE B)	LINEAR FEET OF LATERAL WALL SPACE REQUIRED IN CLOSET
Up to 18,000	1	12	4
18,000 to 36,000	2	16 or 32*	8

* Required when apparatus mountings are located so that swing-open gate clearance space cannot be used jointly by both apparatus mountings.

† See † at end of Table B

TABLE B
CLOSETS FOR 1A2† KEY TELEPHONE SYSTEM APPARATUS MOUNTINGS

CLOSET-TYPE	MINIMUM DEPTH	REQUIREMENTS/REMARKS
Walk-in	3 ft	Provides clearance for swing-open apparatus mounting gate One wall can be used For shallow closet (1-1/2 ft min.), unobstructed access to corridor or office area for swing open gates
Walk-in	4 ft	If two adjacent walls or opposite walls are used for apparatus mounting
Walk-in	5 ft	If two opposite walls and common adjacent walls are used for apparatus mounting
Walk-in	4 ft	If two opposite walls only are used for apparatus mounting
Shallow Apparatus	1-1/2 ft (2-1/2 ft max.)	Minimum door height: 6 ft 8 in. Minimum door width: 3 ft with center post eliminated between doors Minimum ceiling height: 7-1/2 ft, to accept 85-inch apparatus mounting
Walk-in	3 ft	Minimum door height: 6 ft 8 in. Minimum door width: 3 ft Minimum ceiling height: 7-1/2 ft, to accept 85-inch apparatus mounting

† For 1A1 Key Equipment use, one 7-foot apparatus mounting is required for up to 9,000 square feet of served floor area. For more than 9,000 square feet, double the number of apparatus mountings indicated in Table A.

4. RECOMMENDED BACKBOARD MOUNTING SEQUENCE

4.01 Table C shows sequence for mounting modular backboards in standardized configurations.

5. WIRING PATTERNS

5.01 When outside plant, apparatus, and station cables have been permanently terminated,

future installation and service changes will be accomplished by using jumpers.

5.02 Fig. 11 and Table D show jumper patterns for an apparatus closet which directly serves stations.

5.03 Fig. 12 and Table E show jumper patterns for an apparatus closet which directly serves two satellite closets.

TABLE C
MODULAR BACKBOARD INSTALLATION

COLOR AND CODE	PROCEDURE
Green 183A2	<p>First backboard</p> <p>Installed by construction forces in lower left corner 1 foot above floor. Horizontal location selected jointly by Outside Plant Engineer and service foreman</p> <p>Second backboard</p> <p>Above first backboard, bottom butted to first backboard</p>
Yellow 185A1	Above second GREEN backboard, bottom butted to GREEN backboard
Blue 183B1	<p>2 high — Lower BLUE 1 foot from floor</p> <p>Left side of first two backboards (2-high) butted to GREEN backboards</p>
Red 184B1	<p>Top row:</p> <p>Butt left side of first backboard to YELLOW; extend required number of backboards horizontally using only one row</p> <p>If inadequate horizontal space, place second row of RED above first row of RED</p> <p>If inadequate height, place RED backboards in middle row, at end, inverted. Never place RED backboard in bottom row</p>

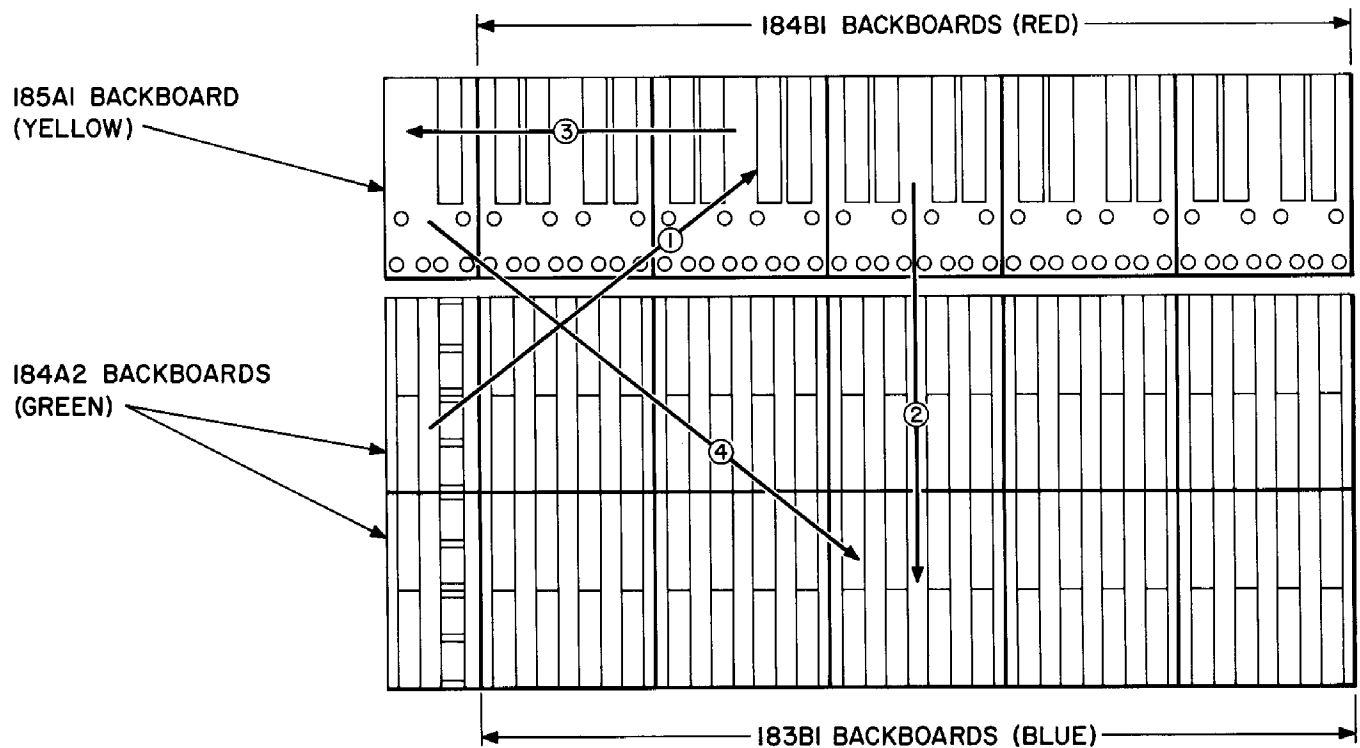


Fig. 11 — Jumper Patterns for an Apparatus Closet Which Directly Serves Stations

TABLE D
JUMPERS USED IN A TYPICAL APPARATUS CLOSET WHICH
DIRECTLY SERVES STATIONS

LINE PURPOSE	ARROW NO. (FIG. 11)	JUMPERS
CO/PBX	1	2-conductor: from GREEN field (line pickup) to RED field (key equipment termination)
Key telephone button with basic line service	2	6-conductor: from RED field (line service termination) to BLUE field (key telephone set termination)
	3	2-conductor (for ringing): from YELLOW field (auxiliary apparatus) to RED field (key equipment termination)
Auxiliary and dial inter-communication service	4	2-conductor: from YELLOW field (auxiliary apparatus) to BLUE field (key telephone set terminations)

6. DATA FOR ESTIMATING BACKBOARD HORIZONTAL WALL SPACE

6.01 Table F provides data for estimating the number of backboards required for various sizes of floor area and the closet space

needed for backboard installation.

6.02 Fig. 13 shows a typical composite arrangement for an apparatus closet using one backboard mounting surface.

TABLE E
JUMPERS USED IN AN APPARATUS CLOSET WHICH DIRECTLY SERVES TWO
SATELLITE CLOSETS

LINE PURPOSE	ARROW NO. (FIG. 12)	JUMPERS
CO/PBX	1	2-conductor: from GREEN field (line pickup) to RED field (key equipment termination)
Key telephone button with basic line service (to satellite closet)	2	6-conductor: from RED field (line service termination) to BLUE field (tie cable termination) 2-conductor (for ringing): from RED field (line service termination) to BLUE field (tie cable termination) or from RED field (line service termination to YELLOW field (auxiliary services) to BLUE field (tie cable termination)
Key telephone button with basic line service (in satellite closet)	3	6-conductor: from RED field (line service termination) to BLUE field (station set termination). 2-conductor: from RED field (line service termination) to BLUE field (station set termination)

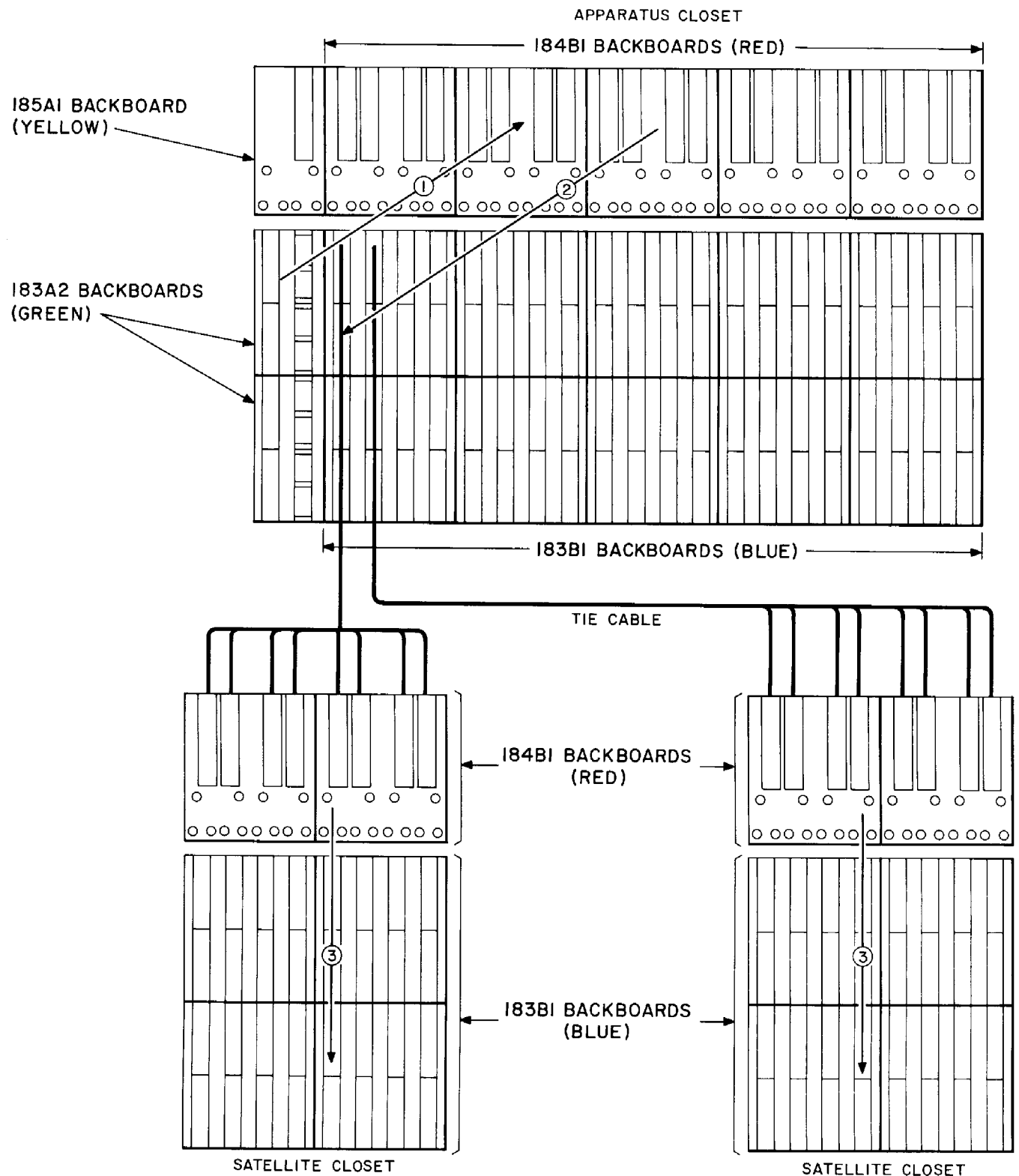


Fig. 12 — Jumper Patterns for an Apparatus Closet Which Directly Serves Two Satellite Closets

TABLE F
BACKBOARD AND CLOSET SPACE ESTIMATION DATA

SPACE FACTORS	BLUE FIELD 183B1						SPACE FACTORS	BLUE FIELD 183B1					
	APPARATUS OR SATELLITE CLOSET							APPARATUS OR SATELLITE CLOSET					
SQUARE FEET PER FLOOR	1000	1500	2000	5000	10,000		SQUARE FEET PER FLOOR	1000	1500	2000	5000	10,000	
Stations Per Floor Area (Sq Ft/100) A	10	15	20	50	100		Total Number of Pairs for Stations (D + E = F) F	250	375	550	1400	2750	
CALL DIRECTOR® Tel Sets Per Floor Area Stations/20 B	—	—	1	3	5		Pairs for Key Tel Set in Tie Cable [F/Q]R = G* G	200	300	440	1120	2200	
Key Telephone Sets Per Floor Area (A - B = C) C	10	15	19	47	95		Pairs For Expanded Service (10% G = H) H	20	30	44	112	220	
Number of Conductor Pairs For CALL DIRECTOR Tel Sets 75 × B = D D	—	—	75	225	375		Total Pairs For Blue 183B1 Backboards (F + G + H = I) I	470	705	1034	2632	5170	
Number of Conductor Pairs for Key Tel Sets (25 × C = E) E	250	375	475	1175	2375		Number of Blue 183B1 Backboards (I/400 Pairs Per 183B1)	2	2	3	7	13	

GREEN FIELD 183A2			YELLOW FIELD 185A1		
APPARATUS CLOSET	SATELLITE CLOSET		APPARATUS CLOSET	SATELLITE CLOSET	
Note 1	None Required		Note 2	None Required	

TABLE F (Cont)

RED FIELD 184B1											
APPARATUS CLOSET						SATELLITE CLOSET					
Square Feet Per Floor	1000	1500	2000	5000	10,000	Square Feet Per Floor	1000	1500	2000	5000	10,000
Tel Sets Per Floor Area	10	15	20	50	100	Stations Per Floor Area	10	15	20	50	100
Lines (A/1 Station Per Line) A	10	15	20	50	100	Lines For KTS (Stations/1 Line Per Station) A	10	15	20	50	100
Number of Red 184B1 Backboards (A/20 Lines Per 184B) B	1	1	1	3	5	Number of Conductor Pairs for KTS (A × 4 Pairs Per Key Tel System) B	40	60	80	200	400
Required Closet Lateral Wall Space (No. of 184B1 × 17" + 8.5") 12 Note 3 C	2.2 ft	2.2 ft	2.2 ft	5.0 ft	7.9 ft	Pairs for Expanded Service (10% B = C) C	4	6	8	20	40
						Total Pairs For Red 184B1 Backboards (B + C = D) D	44	66	88	220	440
						Total Number of Red 184B1 Backboards (D/100 Pairs Per 184B1) E	1	1	1	3	5

* Q = 5 pairs (minimum per key telephone set)
R = 4 pairs for control

Notes:

1. Two green 183A2 backboards will accommodate outside plant needs unless special conditions exist. One backboard accommodates 200 pairs. These backboards will be installed by construction forces.
2. One 185A1 backboard is normally adequate for special needs. Where special requirements are known, provision must be made in the yellow field.
3. Total required horizontal wall space is determined by the number of red 184B1 backboards (each 17 in. wide) plus the number of yellow 185A1 backboards (each 8.5 in. wide) which are to be used.

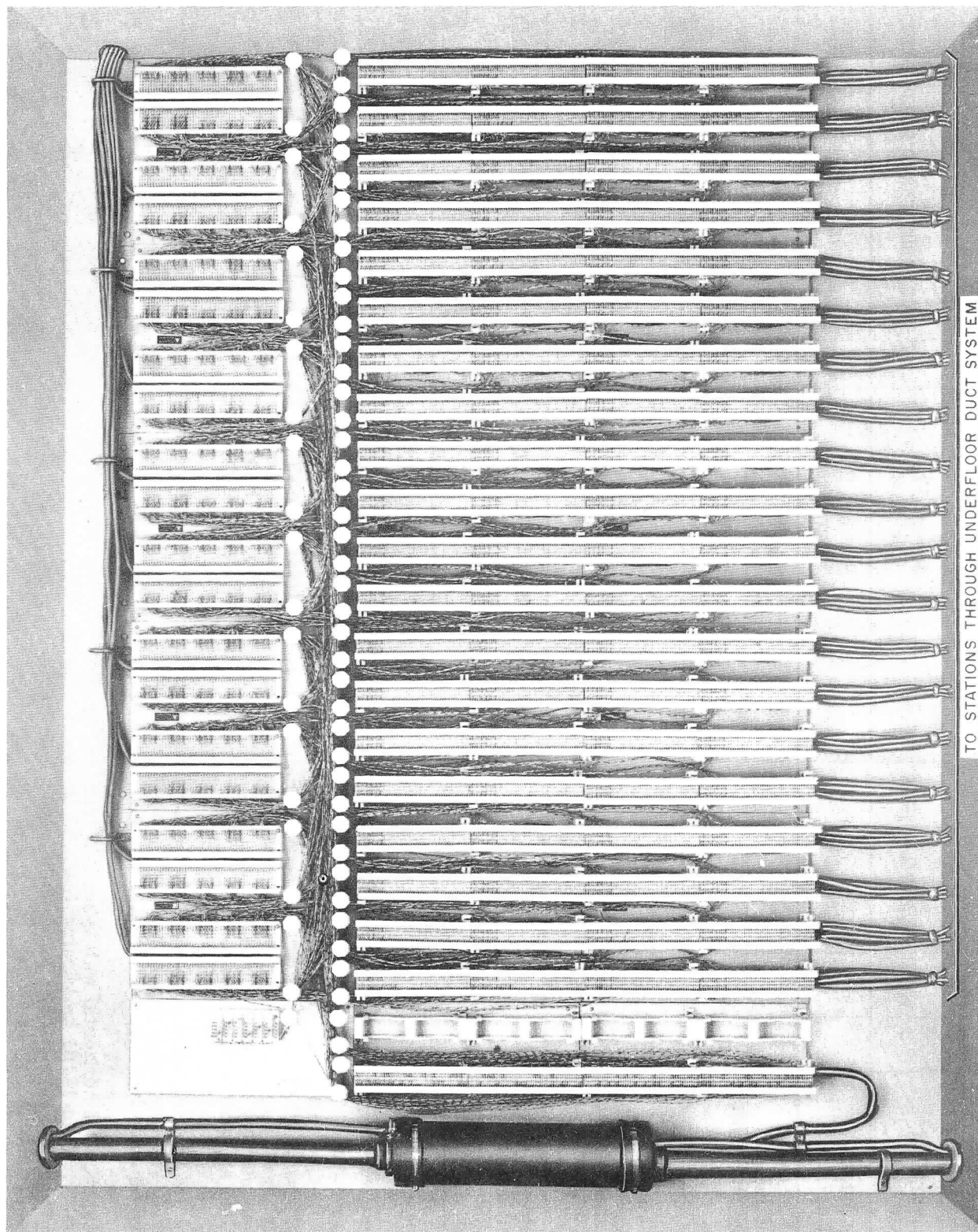


Fig. 13 — Apparatus Closet, Typical Arrangement Using Modular Apparatus