

**“PULSE\* 120” – SG-1A**

**ELECTRONIC PRIVATE AUTOMATIC BRANCH EXCHANGE**

**GENERAL INSTALLATION INFORMATION**

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SHELVES . . . . .	3	1.01 This document provides information about the identification and installation requirements of the PULSE 120 Electronic Private Automatic Branch Exchange (EPABX) system apparatus comprising the cabinet, console, reserve power supply, and connector cables.	
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TABLE A PULSE 120 EPABX NEP

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553-5011-000	Numerical Index
553-5011-100	General Description
553-5011-101	Telephone Consoles QCN100B and QCN102A Identification and Features
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553-5011-182	CO/FX Trunks (Gain/Nongain) Function and Description
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553-5011-186	Dictation Trunk Applique Function and Description
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553-5011-188	Transmission Performance
553-5011-189	Music-on-Hold CO/FX Trunk Function and Description
553-5011-190	Engineering Data (Hotel/Motel Service)
553-5011-201	Shipping and Receiving
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553-5011-502	Maintenance Aids Description and Maintenance Tools
553-5011-503	Fault Clearing Classification
553-5011-504	Control Logic Tests and Fault Clearing Procedures
553-5011-505	Station Line Tone Fault Clearing Procedure
553-5011-506	Ringing Fault Clearing Procedure
553-5011-507	Station Line Transmission and/or Dialing Fault Clearing Procedures
553-5011-508	Station Line Option Fault Clearing Procedure
553-5011-509	Telephone Console QCN100B and QCN102A, Operation Transmission and Traffic Measurement Fault Clearing Procedures.
553-5011-510	Telephone Console QCN100B and QCN102A Mechanical Fault Repair
553-5011-511	Busy Lamp Field Fault Clearing Procedure
553-5011-512	Outgoing Trunk Selection Fault Clearing Procedure
553-5011-513	Trunk Transmission Fault Clearing Procedure
553-5011-514	Incoming Trunk Fault Clearing Procedure
553-5011-515	Trunk Option Fault Clearing Procedure
553-5011-516	Power Failure and Power Fail Transfer Fault Clearing Procedures
553-5011-517	Message Registration Fault-Clearing Procedure

3.02 The power requirements of the system are provided by a power plant incorporated in the cabinet. The power plant has no batteries. An external reserve power supply can be installed optionally.

3.03 The PULSE 120 EPABX has a maximum capacity of 120 station lines, 20 Central Office (CO) trunks and 10 miscellaneous trunks. The miscellaneous trunk circuits can be substituted by CO trunk circuits to provide a maximum total of 30 CO trunks.

## CABINET

3.04 The overall dimensions of the PULSE 120 EPABX cabinet are 67 inches (1.70 m) high, 30 inches (0.76 m) wide, and 34 inches (0.86 m) deep. The depth measurement includes the panels. The cabinet is shown in Fig. 1.

3.05 The maximum weight, including all features, is approximately 855 pounds (387.83 kg).

3.06 A row of screened ventilation openings in the front and side faces of the cabinet base, at the top of each panel, and in the top of the cabinet permit the circulation of air through the cabinet. A metal plate, an inch above the top of the cabinet, prevents obstruction of the top holes. ***The ventilation openings must not be obstructed.***

3.07 The back of the cabinet is enclosed. Projecting ***stops*** fitted to the rear of the frame provide a separation of 1-1/2 inches (3.81 cm) between a wall and the cabinet.

3.08 Removable panels fitted to the front and sides of the cabinet provide access to the interior of the cabinet. The front panel must be removed to open the sides

3.09 The front and side panels are removed by turning the two captive screws (Fig. 2), at the top of the panel, anti clockwise so the panel can be tilted slightly away from the cabinet. Grasp the panel by the edge trim and lift it vertically to disengage the two clips holding the bottom edge of the panel to the frame.

## SLIDES

3.10 Inside the cabinet two slides on telescoping rails extend from the front of the cabinet enabling access to the shelves. Up to four shelves can be mounted on the slides containing the central control and the power and optional equipment. Up to 5 shelves can be mounted on the slide containing the line and trunk equipment.

3.11 A mechanical interlock prevents either slide from being extended unless the other slide is in the fully closed position. The mechanical interlock eliminates the need for anchoring the cabinet to the floor, since the cabinet will not tip over with only one of the slides fully extended.

3.12 Each slide is locked in the fully closed and fully extended positions by a spring clip at the top of the front vertical support of the slide. A slide may be extended by holding the spring clip in the upward position, and gently pulling the slide forward to its fully open position when the spring clip engages the projecting stud at the rear of the slide.

3.13 The slide is returned to its original position by disengaging the spring clip from the rear stud, and pushing the slide into the cabinet until the spring clip locks over the stud at the front of the slide.

## SHELVES

3.14 Each of the shelves is 10 inches (25,cm) high, 28 inches (71 cm) wide; and 10 inches (25 cm) deep. They are mounted in the slides with the back-plane wiring towards the inside or center of the cabinet. A view of the shelf positions seen from the front of the cabinet is shown in Fig. 3 and 4.

3.15 The physical characteristics and apparatus codes of the available shelves are given in Table B. The shelf weights shown include a full complement of circuit packs.

3.16 The shelves are identified by an apparatus code printed on the front-facing end plate as shown in Fig. 5.

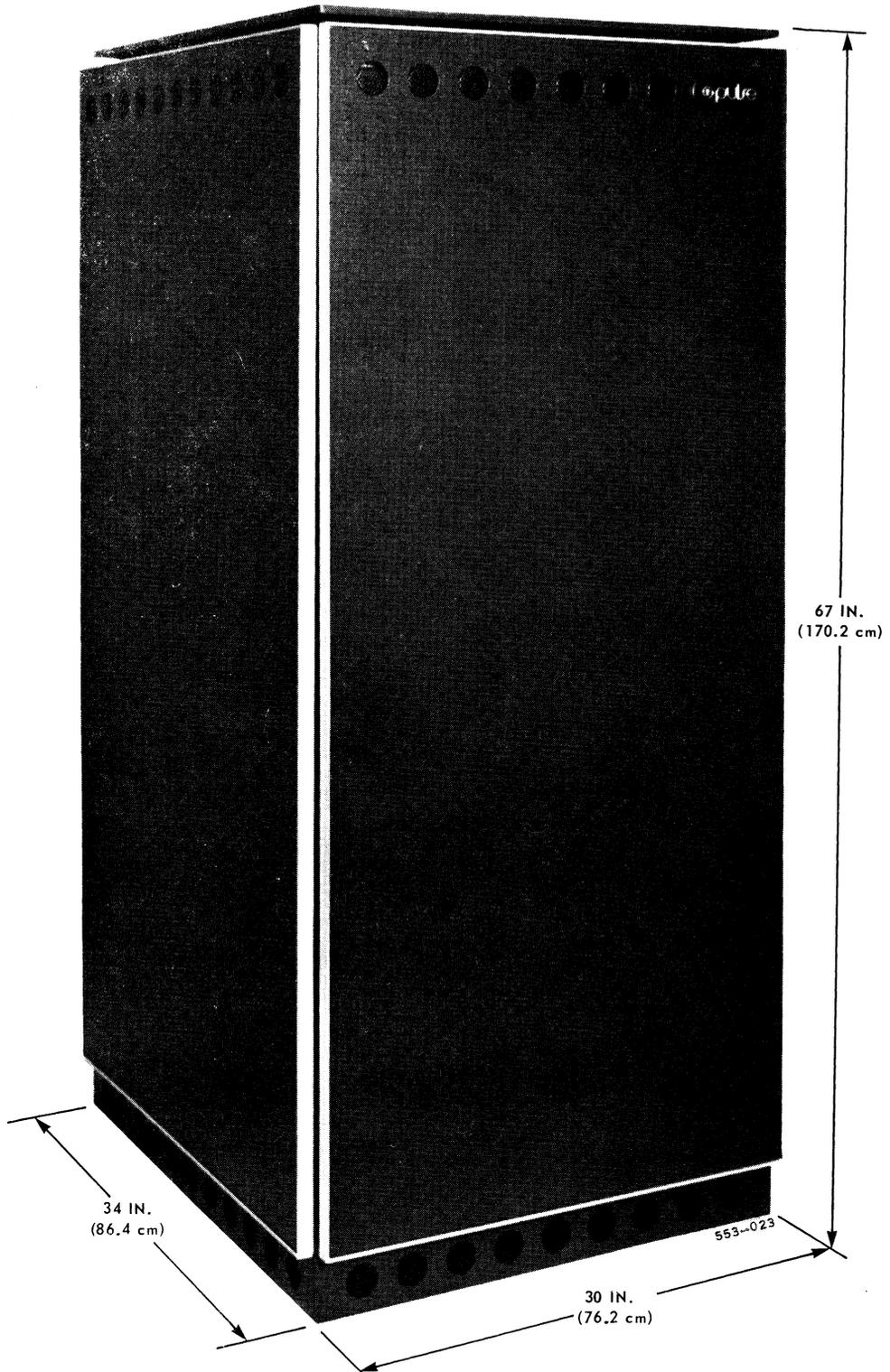


Fig. 1 – PULSE 120 EPABX Cabinet

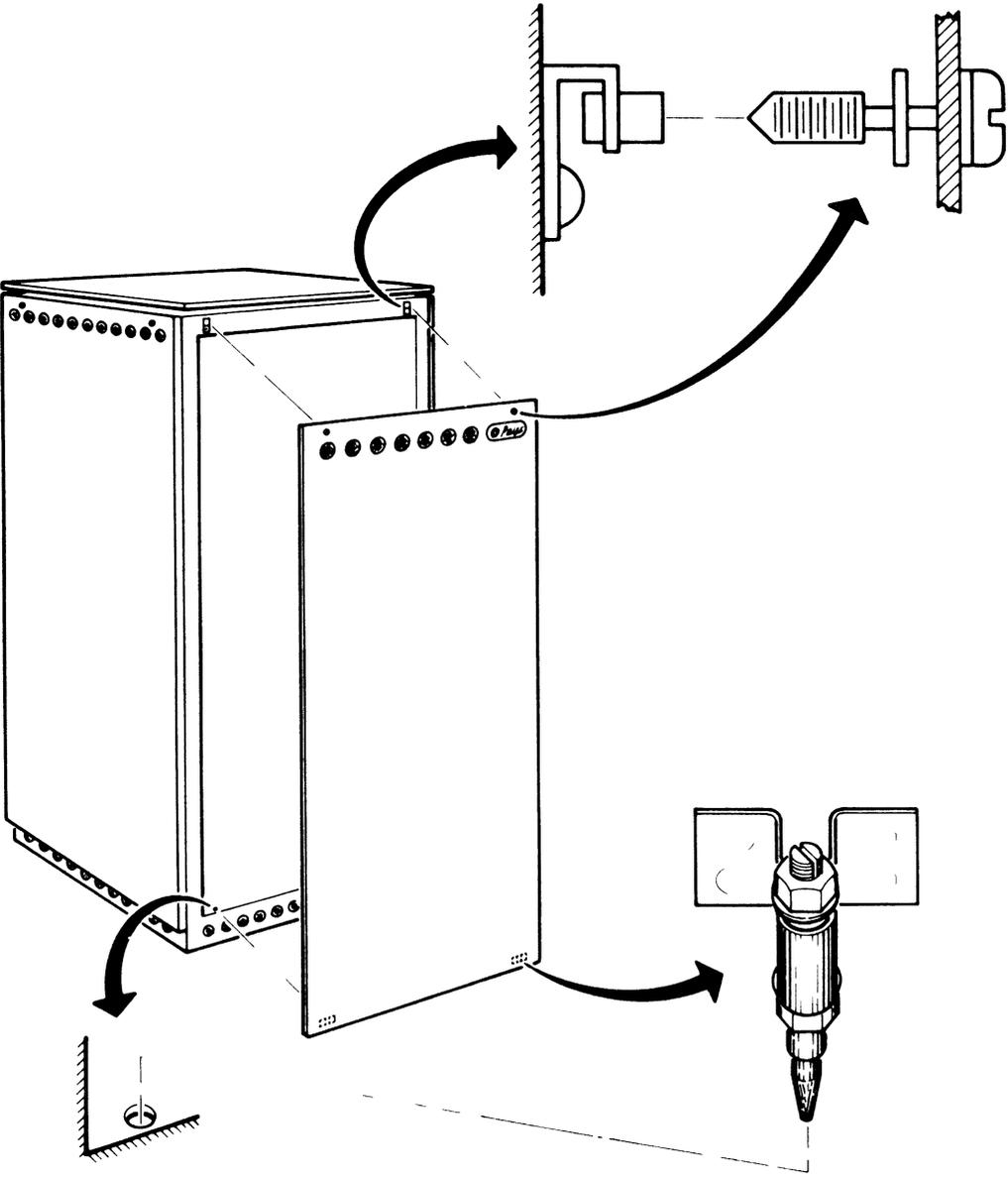


Fig. 2 – Removal of Front and Side Panels

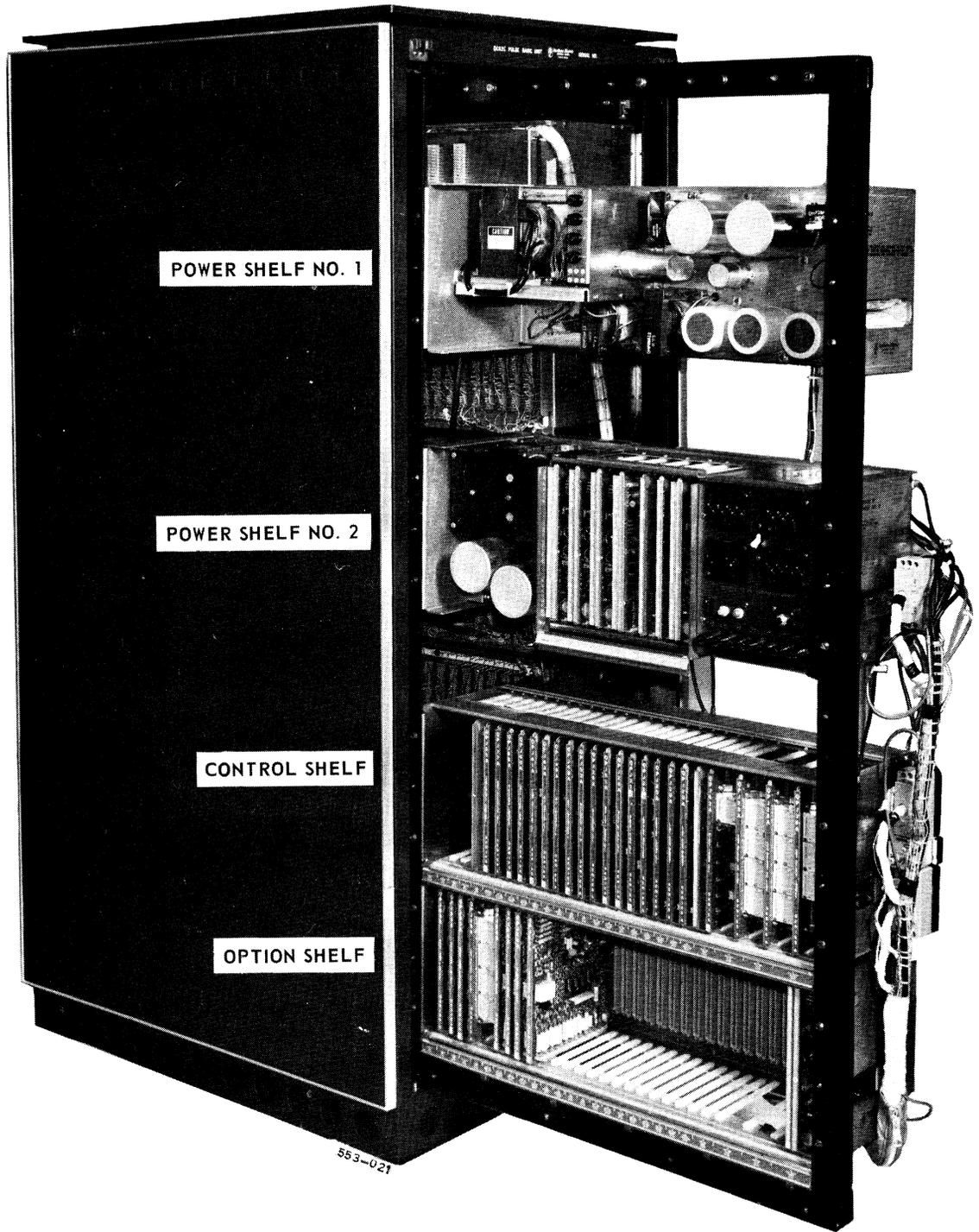


Fig. 3 — Shelf Positions on Slide No. 1

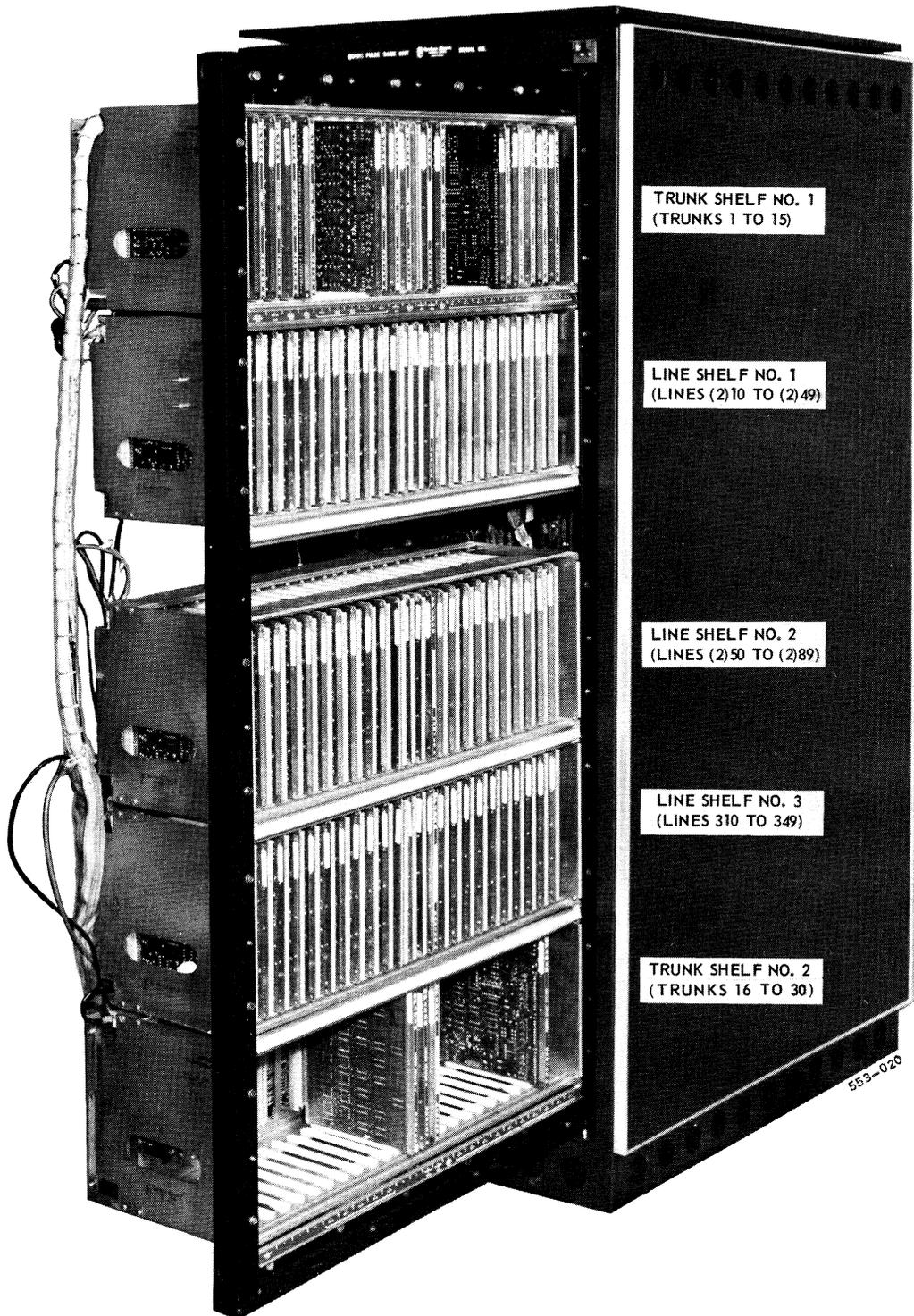


Fig. 4 — Shelf Positions on Slide No. 2

**TABLE B**  
**PHYSICAL CHARACTERISTICS OF PULSE 120 EPABX SHELVES**

NAME OF SHELF	CODE	WEIGHT (pounds)	MAXIMUM NUMBER OF CIRCUIT PACKS
Power Supply No. 1	QSP7F	60	0
Power Supply No. 2	QSP7E	75	7
Central Control	QSP6G	30	26
Option (Fully Wired)	QSP6M	30	20
Option (Fully Wired)	QSP6U	30	24
Option (Hotel/Motel)	QSP6R	30	20
Option (Shelf Only)	QSP6P	4	—
DIGITONE* Subshelf	—	10	4
Busy Lamp Field Subshelf	—	6	4
Toll Denial Subshelf	—	6	1
Trunk Shelf No. 1	QSP6K	40	24
Line Shelf No. 1	QSP6H	50	24
Line Shelf No. 2	QSP6J	50	24
Line Shelf No. 3	QSP6N	50	24
Trunk Shelf No. 2	QSP6L	40	24

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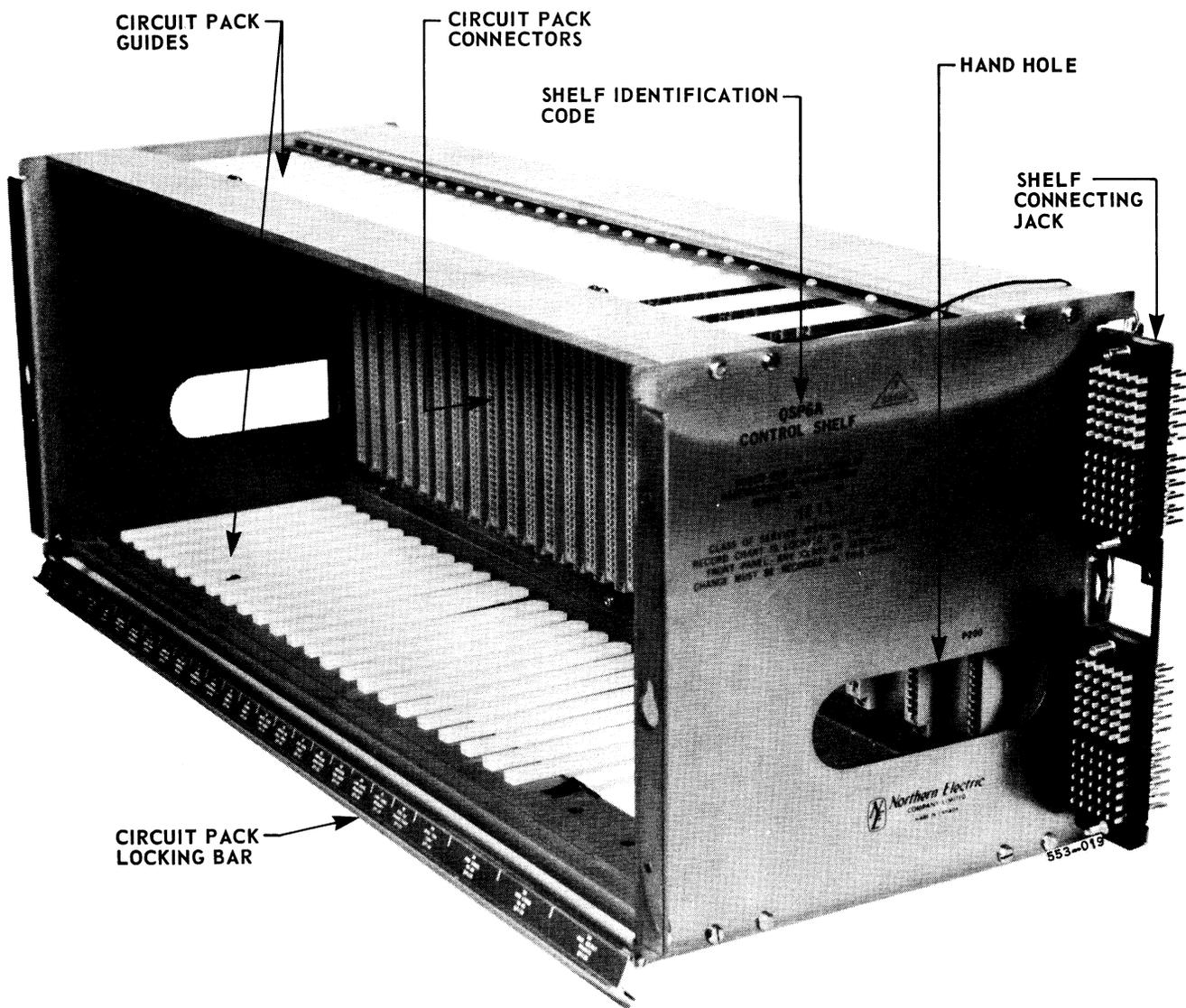


Fig. 5 — Location of Shelf Identification Code

3.17 Two hand holes are provided at each end of the shelf for easier lifting.

3.18 The option shelf position on slide no. 1 (Fig. 3) can be used for either a fully wired shelf or a subshelf type. When the subshelf type is installed the code restrictor and DIGITONE-to-dial pulse conversion features cannot be provided.

3.19 DIGITONE, Busy Lamp Field, and Toll Denial Subshelf assemblies are installed in the QSP6P option shelf as required. A subshelf assembly consists of a metal plate with four rectangular openings to accommodate a maximum of four connectors. The wire harness from the connectors is attached to the top of the assembly and terminated on connector plugs. The subshelf code is stenciled on the wiring side, at the bottom of the assembly plate.

3.20 A locking bar on the face of the shelves ensures that the circuit packs are well seated in their connectors. A colored identification strip (Table C) on the locking bar corresponds with the color identification on the circuit packs associated with the shelf. Connector numbers, circuit codes and abbreviated names in addition to trunk and station line numbers are stenciled on the colored identification strip.

3.21 Wiring interconnections between shelves, and from the shelves to the EPABX connector panel, occur through plug-ended cables. The mating of the connectors is detailed in Section 553-5011-202.

3.22 The shelves are fastened in the slides with six self-tapping screws (Fig. 6). Detailed instructions for the installation and removal of shelves and subshelves are given in Section 553-5011-202.

**CIRCUIT PACKS**

3.23 The printed wiring boards used for circuit packs are fiberglass sheets measuring 8 inches (20 cm) wide by 9 inches (23 cm) high, which may have wiring patterns printed on one or both sides. A typical circuit pack is shown in Fig. 7.

3.24 The handle riveted to the front edge of the assembly is used to insert or remove the assembly from its connector. The assembly base code number is stenciled on the shelf color code strip on the face of the handle. The color corresponds to the color on the shelf identification strip. Several circuit packs have two colors on the handle, indicating that the pack may be used on two shelves.

3.25 All the trunk circuit packs have a light emitting diode (LED) mounted on the component side. When lit, the LED indicates that the trunk has been seized and is in use for a call connection.

3.26 The hole next to the handle of the circuit pack may be used for attaching a defective condition tag when the item is returned for repairs.

3.27 The printed circuit connectors are keyed to prevent installation of circuit packs in the wrong shelf.

3.28 Some circuit packs bearing the same code number and color designation may differ in appearance, e.g., there may be surface wiring on some packs and not on others. These differences do not affect the interchangeability of the circuit packs, provided their apparatus base code number, and suffix letters are identical.

**TABLE C  
SHELF IDENTIFICATION COLOR CODE**

SHELF	COLOR CODE
Power Shelves No. 1 and No. 2	Blue
Control Shelf	Red
Option Shelf	Orange
Trunk Shelves No. 1 and No. 2	Brown
Line Shelves No. 1 No. 2 and No. 3	Yellow

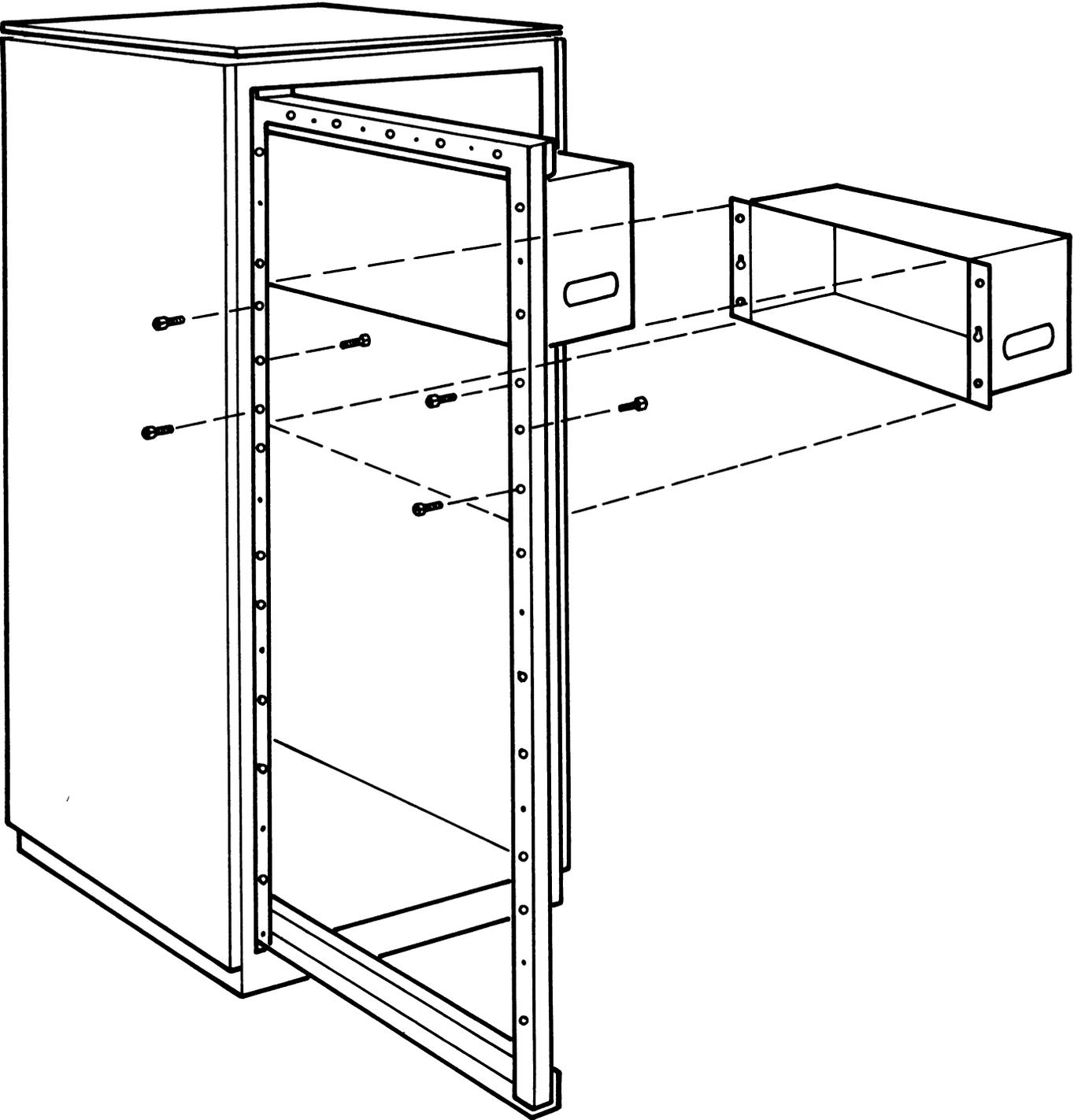


Fig. 6 – Installation of Shelf



3.29 Makeup of a typical circuit pack assembly code QPJ60A CALL TFER IND CTL is:

QPJ – Prefix and common to all PULSE 120 EPABX circuit packs

60 – Base code number for identification of individual circuit packs

A – Vintage control suffix letter

CALL TFER

IND CTL – Abbreviated name.

When replacing circuit packs, the base code numbers of replacing and existing circuit packs must be identical. The vintage control suffix letter may be identical or a following letter e.g: A QPJ60A or QPJ60B.

*Note:* A QPJ60A should not be used to replace a QPJ60B.

### CLASS OF SERVICE AND FEATURE SELECTION

3.30 Assignment of the Class of Service (COS) for station lines and trunks is carried out by inserting diode pins in selection blocks and by placing wire straps on terminal blocks.

3.31 The plastic selector blocks mount on printed circuit assemblies in the control and option shelves. A typical COS circuit pack is shown in Fig. 8. Each horizontal row of pin locations represents all the options provided for the station line or trunk assigned to that row on the selector block. The ten vertical columns on the face of the block correspond to the COS code of that block.

3.32 The diode pins are 1-1/8 inches (2.86 cm) long and consist of a diode enclosed in a miniature plug. A sketch of a diode pin is shown in Fig. 9.

3.33 The diode pin must be inserted fully to its metal shank, so that the colored plastic sleeve containing the diode rests against the selector block. The pin will make connections to contacts inside the block.

3.34 The pin extractor, shown in Fig. 10, must be used to remove the diode pin from the selector block. Pliers *must not* be used to extract the diode pin.

3.35 The COS program for a new installation is selected after all the required shelves and circuit packs are inserted, but before connecting the EPABX to the commercial power receptacle. Service program changes on an existing installation may be made at any time.

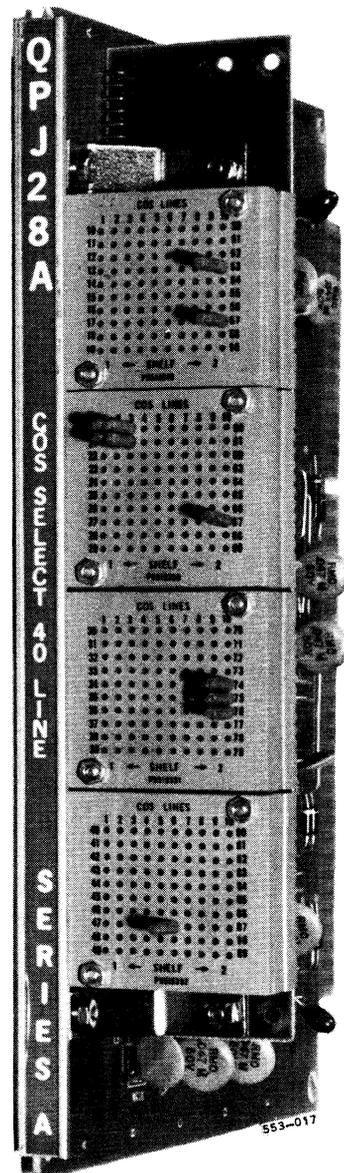


Fig. 8 – A Typical Class of Service Circuit Pack

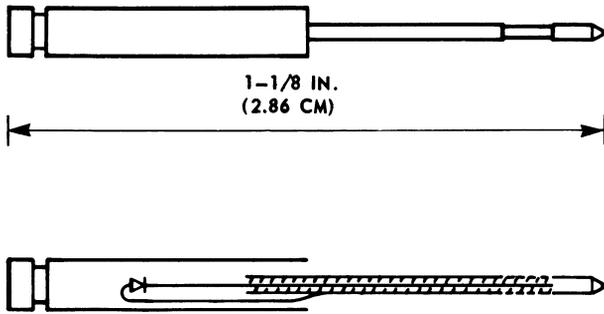


Fig. 9 – Class-of-Service Diode Pin

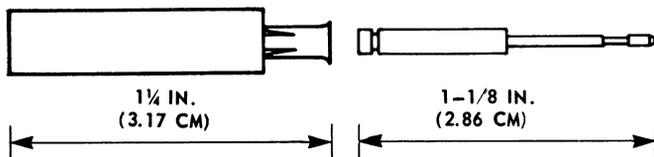


Fig. 10 – Diode Pin Extractor Tool

**CODE RESTRICTION**

3.36 Code restriction is an optional feature which provides digit absorption and selectivity in the denied access arrangements from stations to toll, area, and exchange codes. Denied or allowed access code digits are preselected by inserting shorting pins in selector blocks, one pin for each digit, and by placing wire straps on terminal blocks.

3.37 The plastic selector blocks, identical in appearances to those on a COS circuit pack, are mounted on printed circuit assemblies in the option shelf. A typical code restriction field (CRF) circuit pack is shown in Fig. 11.

3.37 The CRF is subdivided into 2 areas. The top section of the field (16 codes) is used for CO or FX trunks; the remaining section (24 codes) is used for CO trunks only. Within each of these

areas there is a set of 3 subfields:

- digit absorption
- allowed area and service codes
- allowed or denied exchange codes

3.38 The maximum code capacity of a CRF when used for restrictions on CO trunks is:

- digit absorption – 4 different single digits
- allowed area and service – 8 three digit codes
- allowed or denied exchange – 28 one-, two-, or three-digit codes.

When used for restrictions on an FX trunk group the maximum number of allowed or denied exchange codes is four, the remaining 24 codes are used for additional restrictions on CO trunks. The code capacity for CO and FX trunk groups can be expanded by additional CRF circuit packs up to a maximum of four packs.

3.40 The shorting pin used to select a digit in the CRF is 1-1/8 inches (2.86 cm) long and consists of a solid metal shank with a plastic handle. A sketch of the shorting pin and extractor tool is shown in Fig. 12.

3.41 The shorting pin must be inserted fully to its shank, so that the plastic handle rests against the CRF block. The pin will then make the two contacts inside the block.

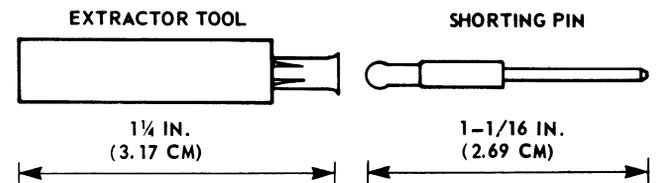


Fig. 12 – Shorting Pin and Extractor Tool

**CONSOLE**

3.42 The console (Fig. 13) with its mounting cord, is a self-contained unit. The console is installed by placing it on a desk top and plugging the mounting cord in the connector cable. Blank

designation strips are supplied to be marked as required and placed behind the window of the call-identification lamps.

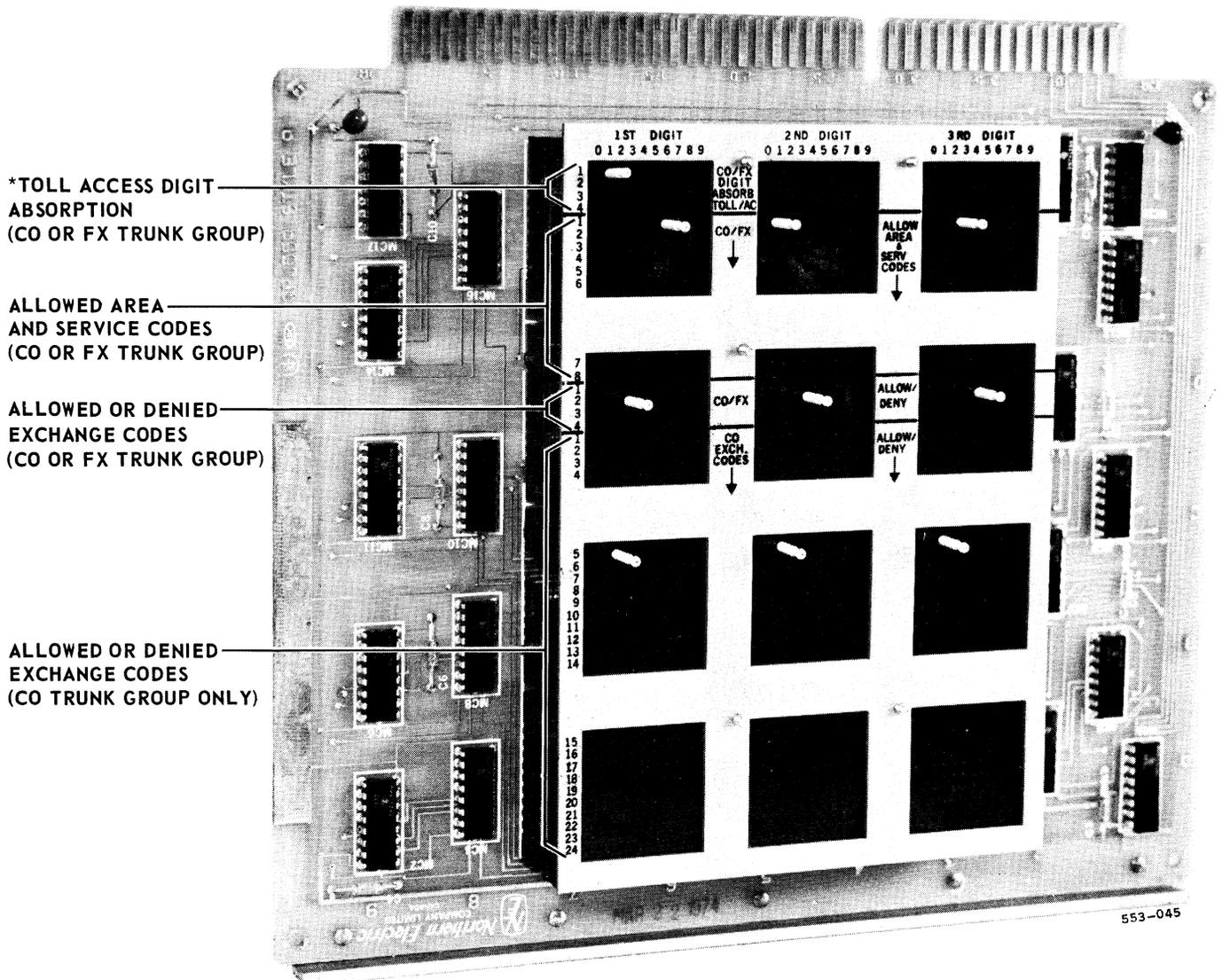
3.43 Optional, colored faceplates are available for both types of console, and must be installed in the field by removing the standard brown faceplate and installing the optional item. The faceplate color codes are:

- Brown — P0501026

- Blue — P0501027
- Green — P0501028

The busy lamp field is provided with a brown cover which is standard and the only colour available.

3.44 The busy lamp field will illuminate the station line number on the panel when the station is in use.



\* DIGIT 1 BLOCK ONLY. BLOCKS 2 AND 3 NOT USED.

Fig. 11 — A Typical Code Restriction Field Circuit Pack

3.45 Either a headset or a handset may be used with the console. If a handset is used a cradle is available for installation on the left side of the console.

3.46 The console is equipped with a dial keypad which may be used for DIGITONE or dial pulse sending.

### CONNECTOR CABLES

3.47 All connections to the console and all connections to the cabinet, except for the power cord and the traffic measurement connections, are made through the cross-connection terminal with standard 25-pair, 50-pair, or 75-pair connector cables, whichever is appropriate. The cable length between console and cabinet must not exceed 300 feet.

### POWER FAIL TRANSFER

3.48 If a commercial power failure should occur, power-failure transfer relays located in the bottom of the cabinet, will release and automatically connect the first ten CO trunks to assigned station lines in the tens group (2)10 to (2)19. The power-failure transfer relays will also release when any one of the following power supplies, +5 V, -12 V, +24 V, -24 V, -48 V, and the ringing generator fail.

3.49 **INCOMING CALLS:** For incoming calls after a transfer has occurred, ringing is applied directly to an assigned station line from the CO. When station lines (2)10 to (2)19 are part of a key system, ringers (e.g., C4A, E1A) must be connected to the station lines having a common signal arrangement to prevent an out-of-service condition.

3.50 **OUTGOING CALLS:** To place an outgoing call through a ground start CO trunk with the system in the power-fail transfer mode, the station set must be equipped with a start key, e.g., 551A key or telephone set 510, or equivalent. When the key is momentarily pressed, a ground is applied to the ring side of the line to energize the CO equipment. One side of the start key must be grounded and the other side connected to the tip

conductor of the station line, so that the grounding of the trunk is completed only when the receiver is off-hook. After momentarily depressing the start key, a dial tone is heard and the CO call can be completed. An outgoing call through a loop start CO trunk is made by lifting the receiver on emergency station, a dial tone is heard, and the CO call is completed.

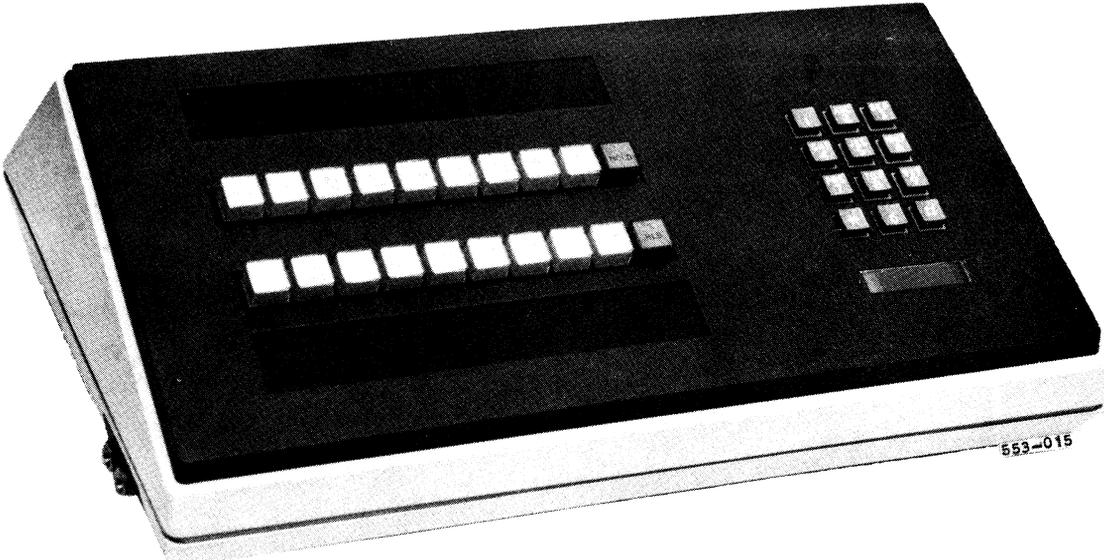
3.51 **RESET:** After transfer to power-fail mode, the system will reset automatically or remain in this mode until reset manually. With the switch on the power-fail transfer control circuit pack in the upper automatic (AUTO) position; the system will automatically reset for normal operation without illuminating alarm lamps, providing all the monitored voltages are present. In the lower manual (MAN) position, the system will remain in the power-fail transfer mode until reset by depressing the power-fail (PF) key on the attendant console or the RESET button on power shelf no. 2. An emergency transfer (ET) lamp on the console lights when (a) the commercial or battery reserve power is available, (b) the system is in the power-fail transfer mode, and (c) to indicate that an attempt to reset the power-failure transfer relays may be made. For a failure to the internal power supply without loss of commercial or battery reserve power, the ET lamp remains lit when the PF key is depressed, signifying that no reset has taken place.

3.52 **CENTRAL OFFICE ALARM:** With the system in the power-fail transfer mode, the alarm in the CO will be activated by either:

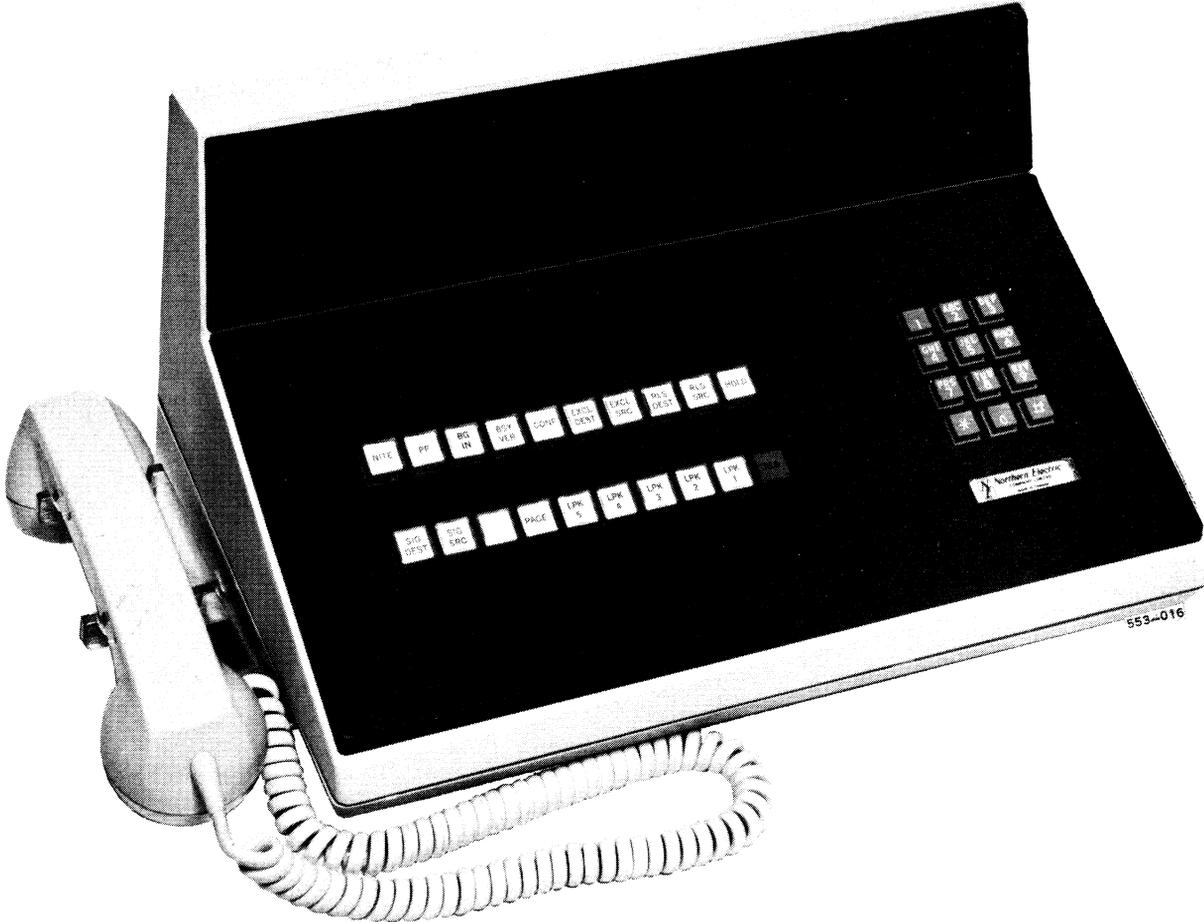
- (a) the removal of -48 V from the "R BAT" lead of the alarm loop pair, or
- (b) the removal of the short across the alarm loop pair.

### TEST LINES

3.53 When assigning station lines to subscribers, special consideration should be given to station lines (2)39 and (3)46. These two station lines will be used occasionally by the installer or repairman to perform tests, which would result in interruptions of service during maintenance activity.



(a) Standard Console



(b) Console with Busy Lamp Field

Fig. 13 – PULSE 120 EPABX Attendant Console

## RESERVE POWER SUPPLY

3.54 The recommended reserve power supply is a Lorain Gardac\* System Model 102 GAB. This reserve power supply is a battery-powered dc-ac converter connected into the line between the cabinet and the commercial power supply.

## PAGING AND DICTATION EQUIPMENT

3.55 Paging and telephone dictation equipment is not accommodated within the EPABX cabinet. This equipment is mounted externally on an assembly rack or in another suitable apparatus cabinet. The music control feature on paging trunks interrupts the music over system during voice messages. Refer to Section 553-5011-205 for external cable connection arrangements to this equipment.

## 4. INSTALLATION REQUIREMENTS

### FLOOR SPACE

4.01 The minimum floor and maintenance space required for the EPABX is shown in Fig. 14.

### CABINET LOCATION

4.02 The following floor requirements *must* be met when selecting a location for the cabinet:

- (a) The cabinet must stand solidly.
- (b) The cabinet must stand level, and if shims are used, enough should be used to distribute the weight of the cabinet equally over the base.
- (c) The cabinet must be located where it would be subjected to few vibrations.
- (d) The cabinet must be placed on a platform, where water may collect on the floor.

4.03 The location for the cabinet *must* be:

- (a) Dry and clean.

\*Registered Trademark

(b) Well ventilated.

(c) Well lit.

(d) Easily accessible.

4.04 The following locations *must* be avoided:

(a) Near a sprinkler system, sweating pipes, steam pipes, or steam vents.

(b) Areas with extreme heat or cold.

(c) Areas where corrosive fumes or exhaust from machinery are present.

(d) Near a passageway used for moving machinery or vehicles.

(e) Next to a reproducing or copying machine. A minimum clearance of 10 feet must be provided and the room should be ventilated by an exhaust fan if the reproducing machine is not equipped with a filtering system.

(f) Next to the outlet of a building heating system or near a window, from which the heat could cause the temperature in the cabinet to increase above operating range.

## COMMERCIAL POWER SUPPLY

4.05 The customer must provide a single-phase power receptacle, with the following recommendations:

- (a) 115 V, 60 Hz, fused, and capable of delivering 7 amperes.

*Note:* The PULSE 120 EPABX can be operated from a 230 V 50 Hz commercial power supply capable of delivering 4 amperes if the necessary power shelf options are installed.

- (b) The power receptacle should be wired and fused independently from all other receptacles.

- (c) A warning tag should be attached to circuit-breaker-type fuses to prevent unauthorized manual operation.
- (d) The power receptacle must not be controlled by a switch.
- (e) The power receptacle should be a 3-wire type, with the third wire grounded to the ground of the electrical system.
- (f) The receptacle should be located within 15 feet of the EPABX location.
- (g) The receptacle should be easily accessible for the removal of the plug for maintenance.
- (h) The receptacle location should be selected to prevent accidental removal of the power cord.
- (i) The power cord between the cabinet and the receptacle should not present a hazard to the subscriber.
- (j) The warning tag should be attached to the plug end of the power cord to prevent accidental removal of the cord by the subscriber.

### GROUNDING OF EPABX

4.06 An approved local ground must be run to the cabinet ground terminal via a 10 AWG (when cabinet is located 10 feet or less from the approved ground); or a 6 AWG copper wire (when cabinet is located more than 10 feet from the approved ground). This ground must be provided in addition to the ground wire in the power cord.

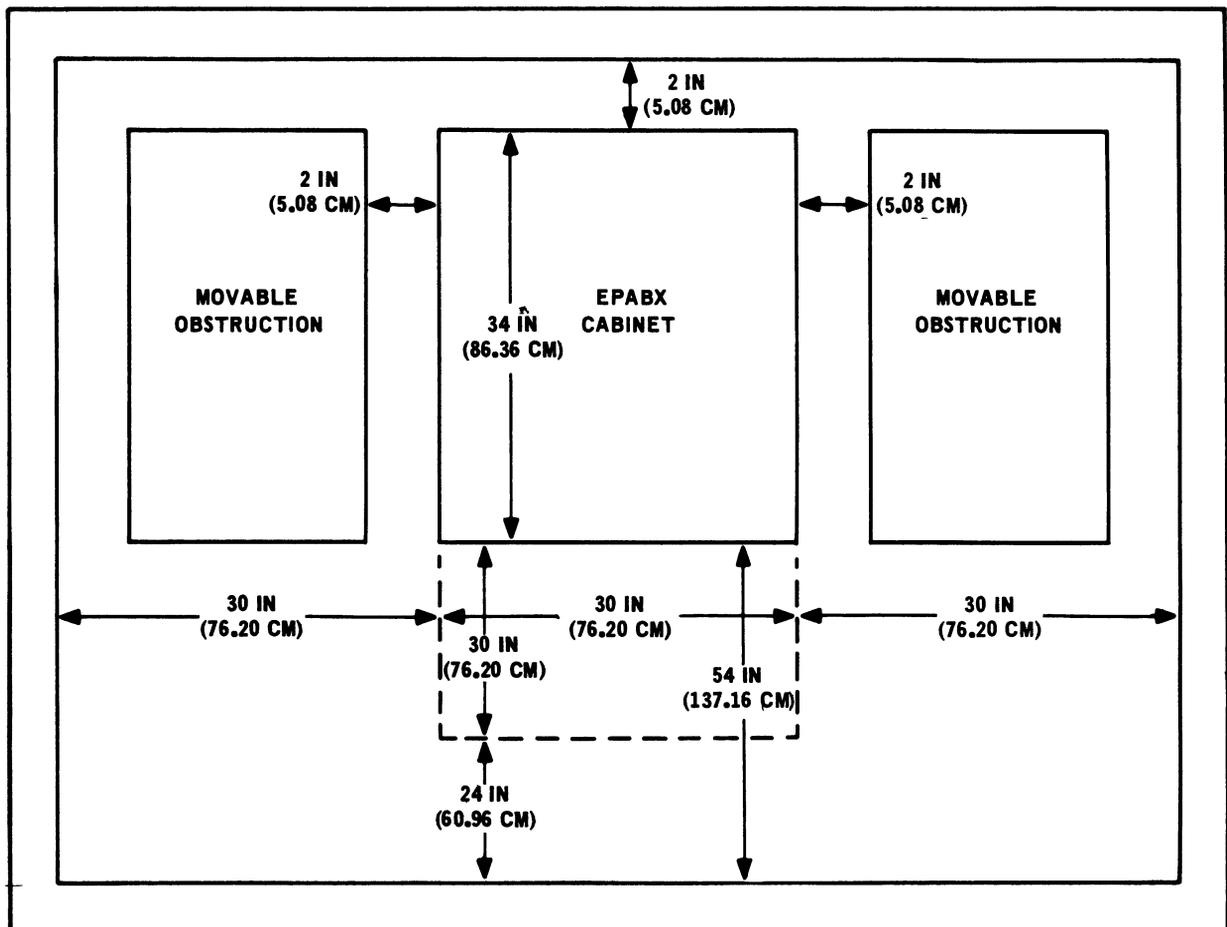


Fig. 14 – EPABX Floor Space Requirement  
Minimum Spacing for Solid Wall Enclosure