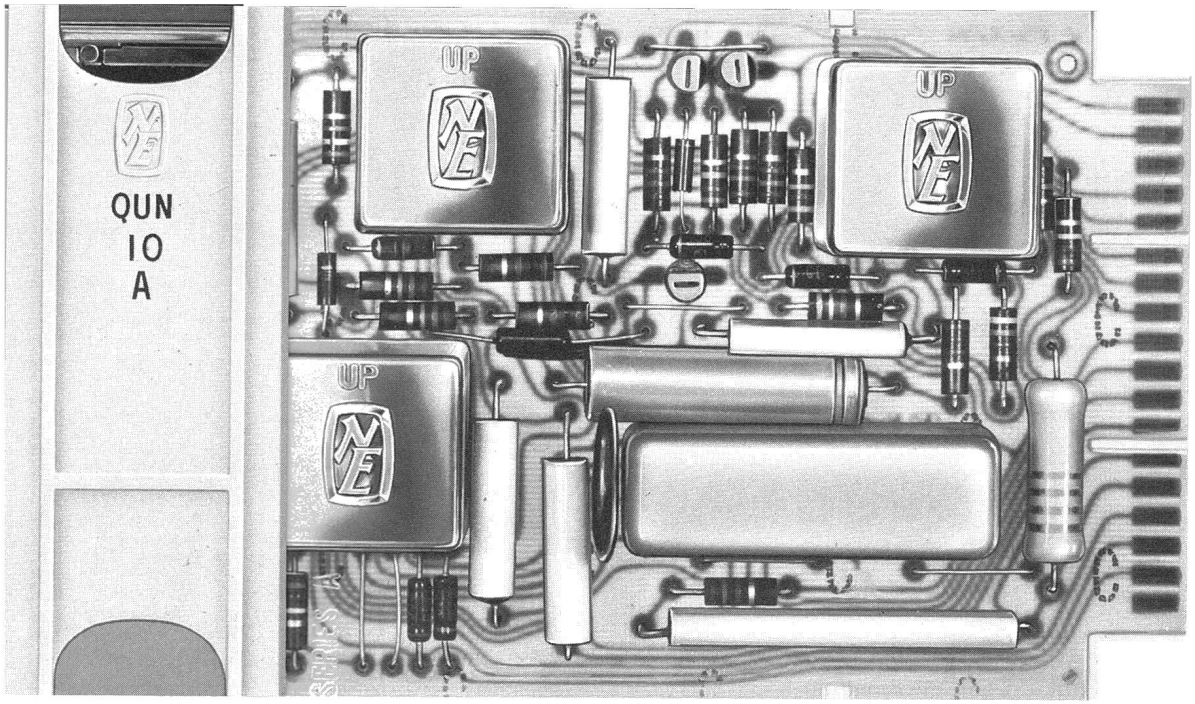
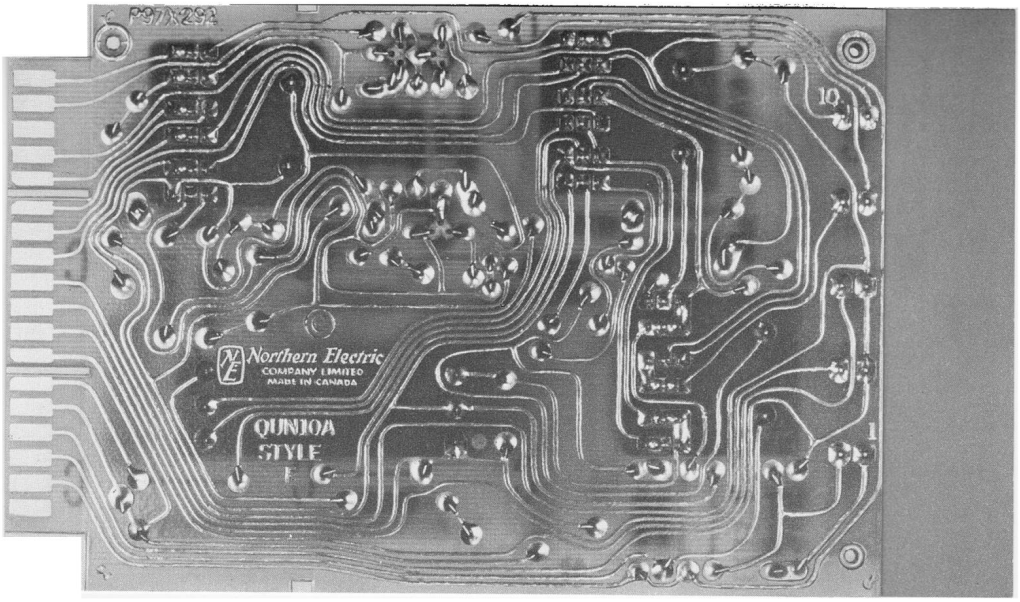
NE-1A2

KEY TELEPHONE SYSTEM

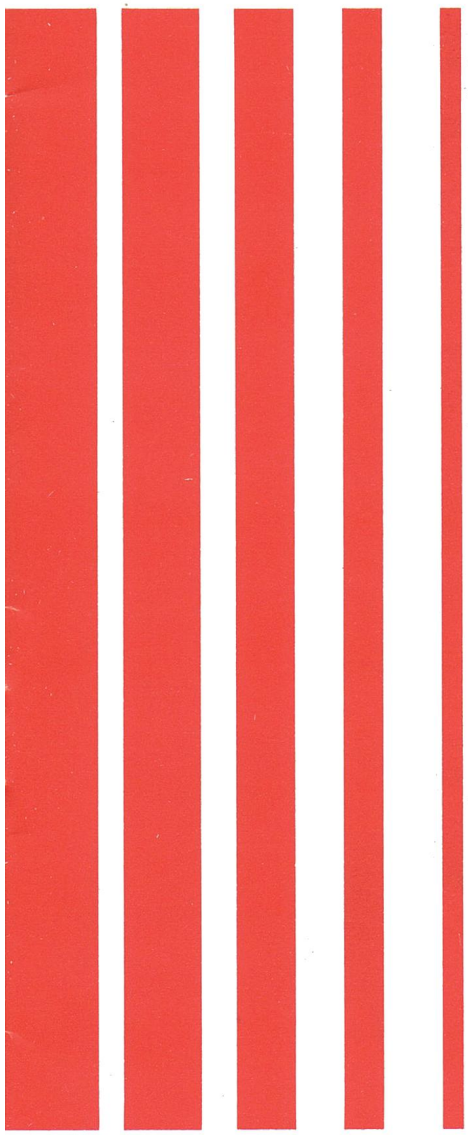
DESIGNED AND MANUFACTURED BY

Northern Electric
COMPANY LIMITED





INTRODUCTION



The NE-1A2 Key Telephone System is a switching system designed to provide an economic method of signalling customer's stations on lines from a common battery central office or PBX, without the assistance of an attendant or operator. This system is of modern design using solid-state components and miniature relays on plug-in printed circuit cards which provide ease of installation and maintenance. The system makes use of multi-button key telephone sets that enable the subscriber to perform the following :

- Answer and originate calls on one or more central office, PBX, or private lines.
- Hold calls from central office or PBX lines.
- Answer and originate calls on tie lines between stations of other key telephone systems.
- Answer and originate calls on manual or dial intercommunicating lines between stations.

Visual signals at all stations in the key system indicate an incoming call, a call on hold, or a busy line. Audible signals, which can be common to a number of lines, are provided on incoming lines at the called station.

When dial intercom is provided, the NE-1A2 system will operate from the pulses received from rotary dial telephone sets or the multi-frequency signals received from DIGITONE* dial telephone sets ; however, if DIGITONE sets are employed, an NE-247BQB DIGITONE adapter is required, plus a P97X289 printed circuit board assembly. The P97X289 board mounts in the DIGITONE adapter.

Field maintenance on the NE-1A2 key telephone system is limited to the replacement of the key telephone units (printed circuit cards). To protect the key telephone units during shipping and storage, a reusable packing kit is provided.

*Trademark of Northern Electric Company Limited

ADVANTAGES

The following are some of the advantages of the NE-1A2 key telephone system compared to the NE-1A1 key telephone system :

- Reduced size and weight
- Simplified installation
- Reduced installation costs
- Encourages centralized installations
- Facilitates rearrangement and change
- Less maintenance
- Higher utilization of lines
- Individual time-out of common audible signal
- All service features are provided on a plug-in basis

Typical multi-button key telephone sets used with the NE-1A2 key telephone system.

Telephone sets equipped with a DIGITONE push-button type dial or a rotary type dial can be provided as required.

Six-button type telephone set

Multi-button type telephone set

DESCRIPTION

The NE-1A2 is arranged for installing in the customer's premises. The units, panels, and plug-in printed circuit cards that constitute the NE-1A2 key telephone system are identified as:

Key Service Units • Key Service Panels • Key Telephone Units

Key Service Units (KSU's)

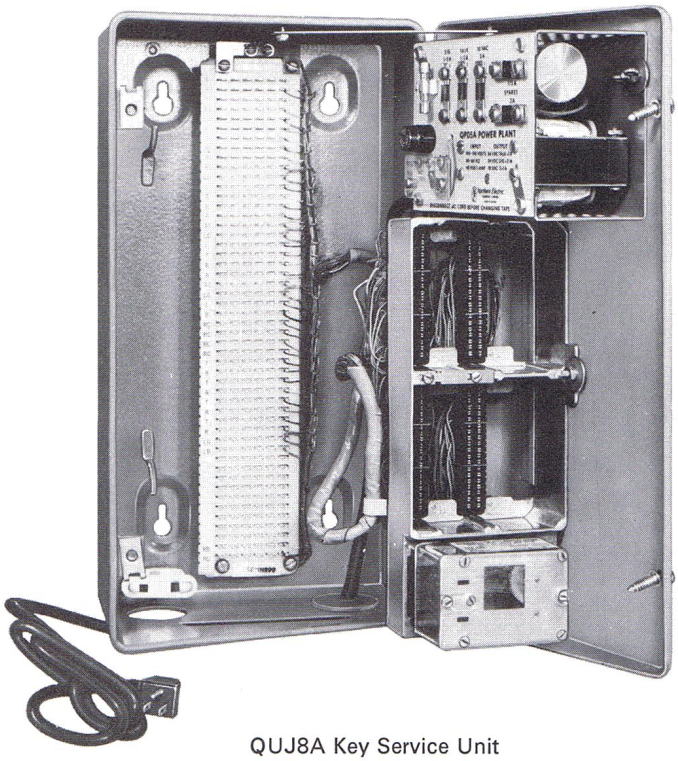
These units are arranged for wall mounting and are completely shop assembled and prewired to minimize installation effort. There are three sizes of KSU's available: the QUJ8A, QUJ9B, and QUJ10A. These units provide the wiring and connecting facilities for a maximum of 4, 7, and 14 key telephone units (KTU's) respectively. Quick-connect terminal blocks and their associated ground strip are secured to the backboard of each KSU. A hinged gate provides ready access to front and rear of all equipment. Connectors, mounted on the hinged portion of the framework, accommodate plug-in type printed circuit cards, an interrupter, and a power supply unit. All connectors are prewired in local cable to the quick-connect terminal blocks.

Each KSU is equipped with an interrupter and power supply unit. The 10-volt, 50/60 Hz synchronous motor interrupter provides lamp flash, lamp wink, and audible signal interruptions. The power supply unit provides all the a-c and d-c requirements for operating a key service unit under maximum load and a filtered d-c supply for the talking circuits. The power unit is equipped with a six-foot (1830 mm) 3-conductor input cord having a standard grounded plug. Telephone type fuses that are readily accessible are provided on one side of each output circuit and provision is made for grounding the other side. The power supply unit provided with a KSU operates on a 110-volt a-c input, unless the order specifies that it must operate on a 230-volt a-c input.

A cover is provided with each key service unit package. The QUJ8A has a hinged metal cover which forms part of the cabinet. The QUJ9B and QUJ10A units are provided with a removable fire-resistant fibreglass cover.

QUJ8A Key Service Unit

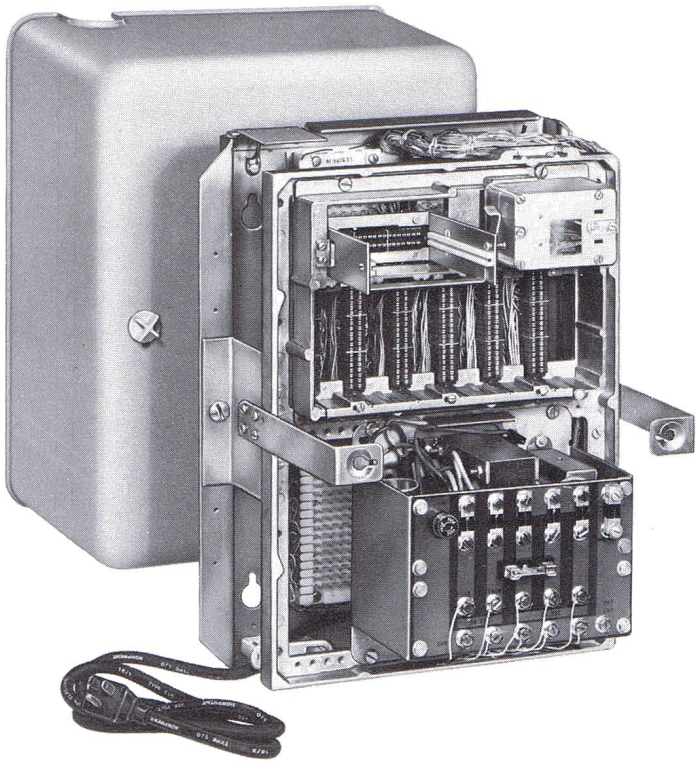
This KSU is arranged to accept four CO/PBX line circuits or three CO/PBX line circuits and one manual intercom key telephone unit or a combination of other 18-pin key telephone units. For available key telephone units and intercom features, see Table "A". The unit is approximately 15½ inches (394 mm) high, 8 inches (203 mm) wide, and 5¾ inches (146 mm) deep.



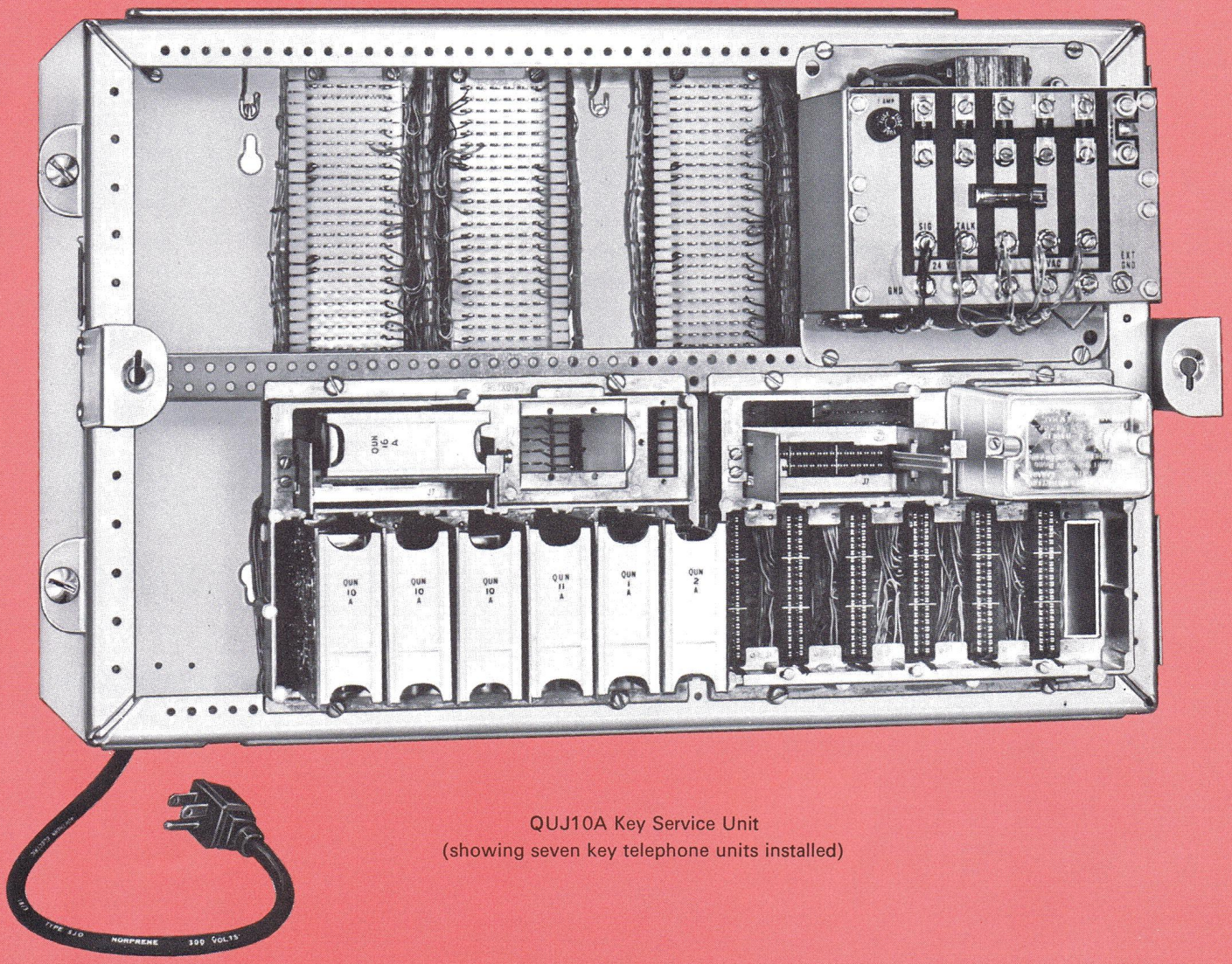
QUJ8A Key Service Unit

QUJ9B Key Service Unit

This KSU is arranged to accept seven CO/PBX line circuits or a combination of CO/PBX line circuits and other 18- or 20-pin key telephone units. Three of the seven connectors in this unit will accept 40-pin key telephone units and therefore allow the use of plug-in relay-type dial intercom circuits. For available key telephone units and system combinations for intercom features, see Tables "A" and "B". This unit is a hinged apparatus mounting with a removable fibreglass cover. The overall size is approximately 16½ inches (419 mm) high, 13½ inches (343 mm) wide, and 10 inches (254 mm) deep.



QUJ9B Key Service Unit



QUJ10A Key Service Unit
(showing seven key telephone units installed)

QUJ10A Key Service Unit

This KSU is arranged to accept fourteen key telephone units. It will accommodate CO/PBX line circuits, manual intercom circuits, and/or a relay-type dial intercom circuit. Eight connectors in this unit will accept 18- or 20-pin key telephone units and six will accept 40-pin key telephone units. For available key telephone units and system combinations for intercom features, see Tables "A" and "B". Space is available for mounting an NE-247BQB KTU (DIGITONE adapter) and/or an NE-235A or NE-236A KTU (concentrator unit). An NE-235A concentrator unit is used with an 18-button telephone set operation, while an NE-236A unit is used with a 30-button telephone set. This KSU is a hinged apparatus mounting with a removable fibreglass cover (cover not shown). The overall size is approximately 16½ inches (419 mm) high, 26 inches (660 mm) wide, and 10 inches (254 mm) deep.

Key Service Panels (KSP's)

These panels are arranged to mount on standard 23-inch (584.2 mm) relay racks. The panels occupy the space of two, 2-inch (50.8 mm) mounting plate spaces. The panels are completely shop assembled and prewired to minimize installation effort. There are two types of panels available, the QPC12B and QPC14A. These panels provide the wiring and connecting facilities for an interrupter and 14 and 10 key telephone units (KTU's) respectively.

Unlike the KSU's, interrupters and power supply units are not furnished as standard equipment with the KSP's and are ordered separately as required. As these panels are intended for large centralized installations, ultimate power and interrupter requirements can only be determined during job engineering. The Northern Electric Company offers a full range of power equipment to suit customer requirements; however, existing power plant facilities may be utilized, if the necessary 24-volt d-c and 10-volt a-c supplies are available.

The interrupter used with key service panels is the NS15900, List 1 type. The interrupter provides lamp flash, lamp wink, and audible signal interruptions the same as interrupters provided with the key service units; however, it has greater capacity and, therefore, will handle more than one panel. The output of one interrupter may be multipled to any number of panels, providing the permissible contact load is not exceeded.

KTU connectors, located on the front of the panel, terminate at amphenol plugs at the rear of the panel. The connections are then extended to a distributing field of NE-66 type quick-connect blocks by means of A-type connector cables. Also provided at the rear of the panel is a connecting field for external power leads, fusing for external power facilities, and a connecting field for multipling interrupter facilities.

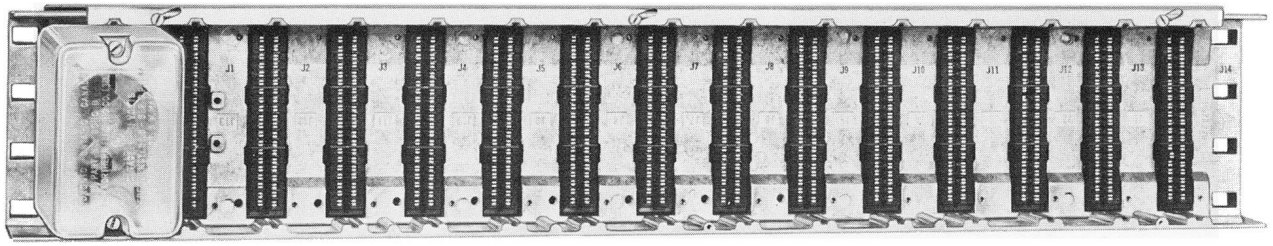
The number of plug-in positions for KTU's determines the ultimate number of incoming lines that can be accommodated by any one KSP. The ultimate desired number of incoming lines to suit customer requirements, however, can be provided by installing additional panels as required. (See Page 8).

QPC12B
Key Service Panel

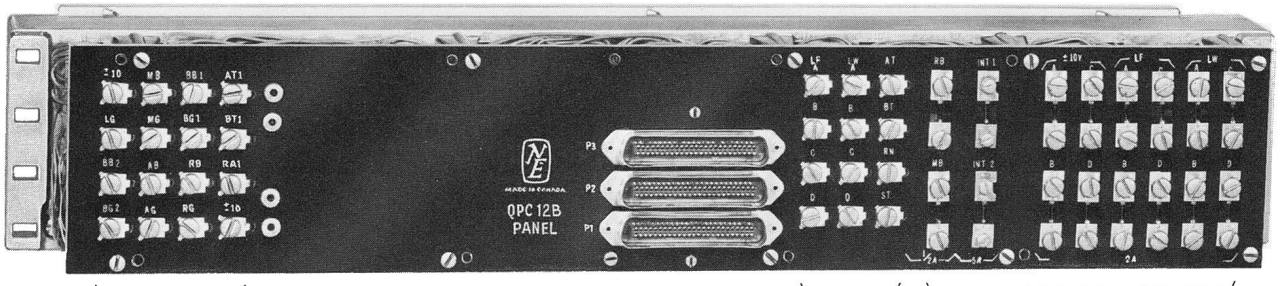
This KSP is arranged to accept fourteen key telephone units, nine with 18 pins and five with 20 pins. It will accommodate CO/PBX line circuits, manual intercom circuits, dial intercom long line circuits, tie line circuits, and off-premise extension circuits. For available key telephone units and system combinations for intercom features, see Tables "A" and "B". This panel occupies 4 inches (101.6 mm) of space on a 23-inch (584.2 mm) relay rack.

QPC14A
Key Service Panel

This KSP is arranged to accept ten, 40-pin key telephone units. The key telephone units requiring 40-pin connectors include dial intercom circuits and add-on conference circuits. For available key telephone units and system combinations for intercom features, see Tables "A" and "B". This panel occupies 4 inches (101.6 mm) of space on a 23-inch (584.2 mm) relay rack. This panel is completely flexible in that it can accommodate 18-, 20-, or 40-pin key telephone units, and therefore will provide any NE-1A2 services available.

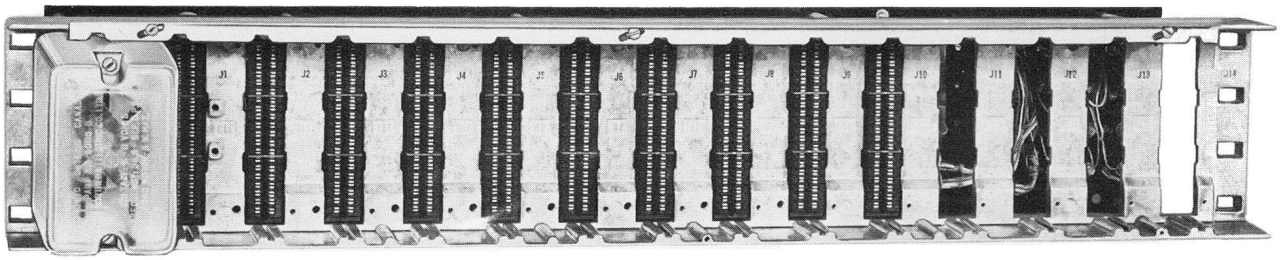


FRONT VIEW

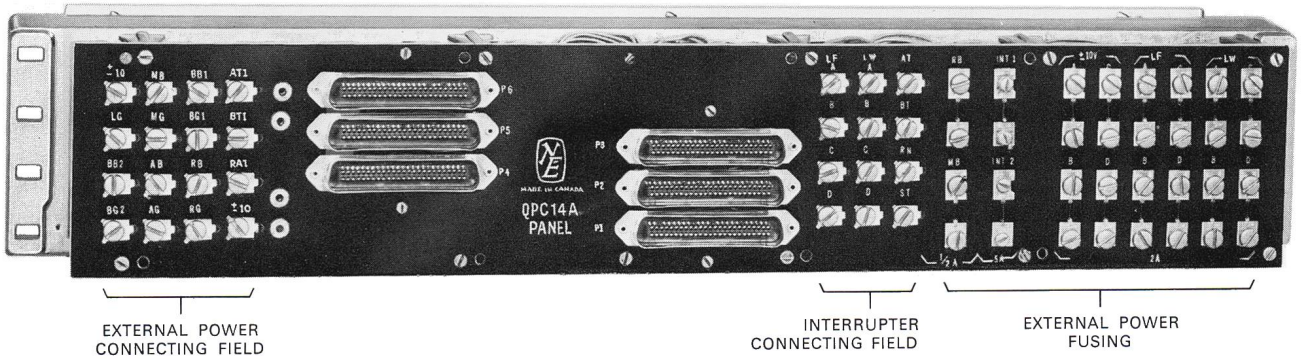


REAR VIEW

QPC12B Key Service Panel
(Interrupter shown installed)

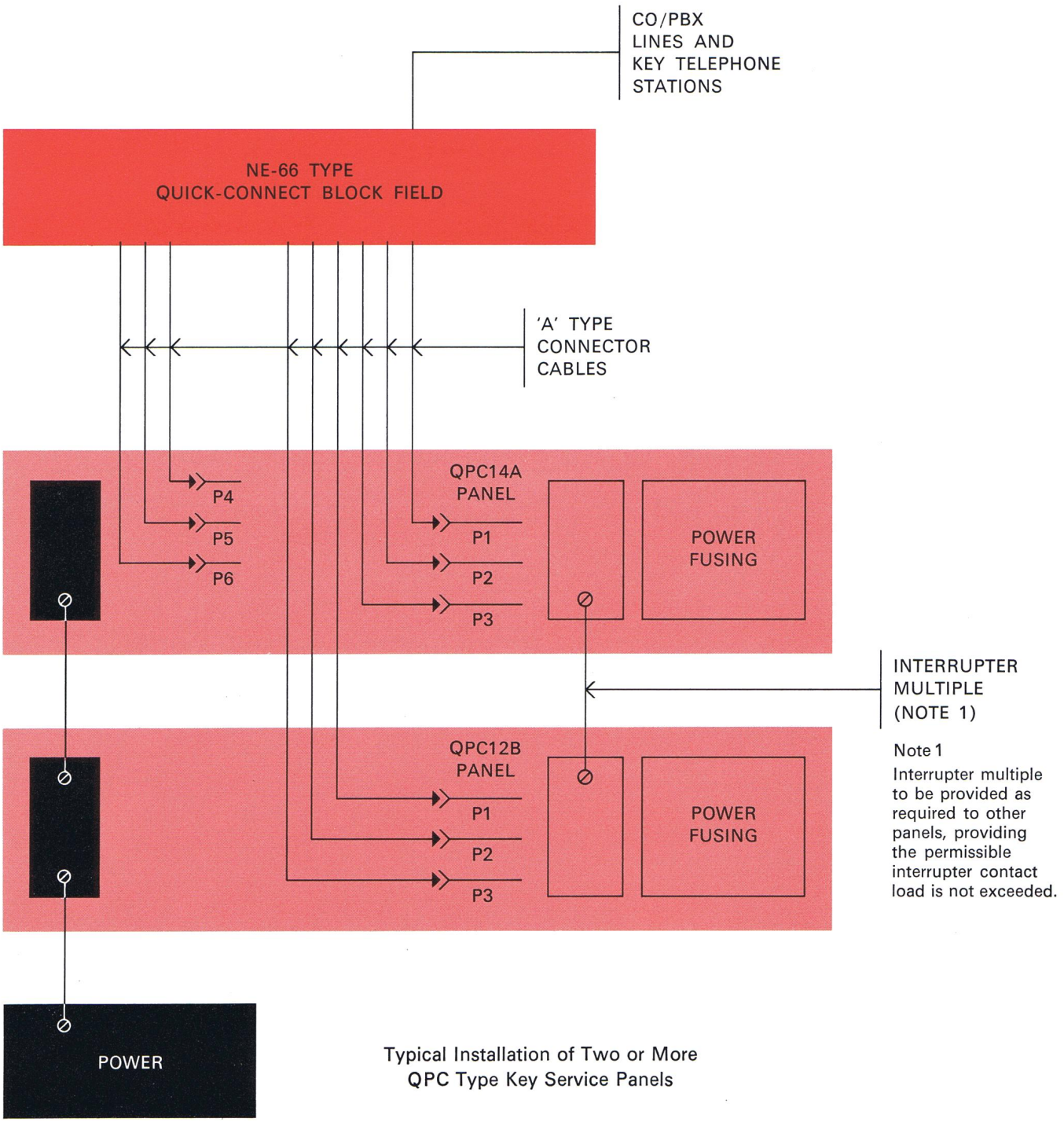


FRONT VIEW



REAR VIEW

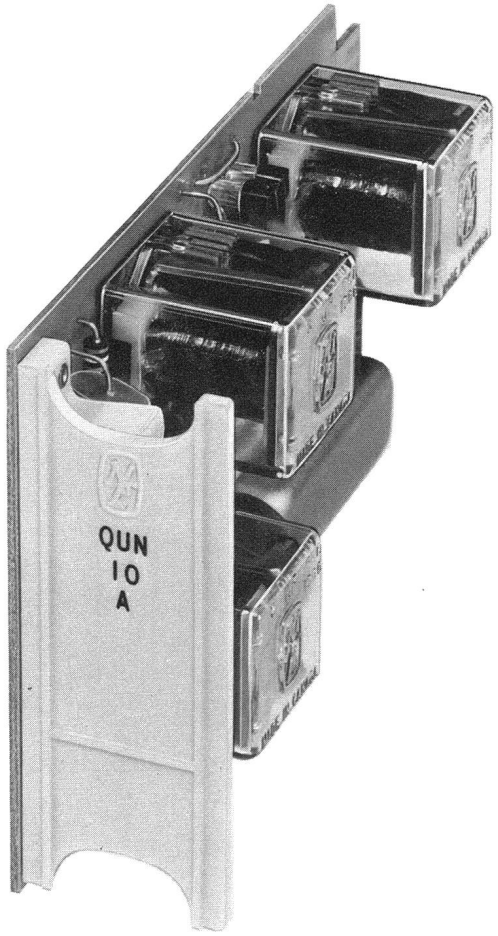
QPC14A Key Service Panel
(Interrupter shown installed)



Note 1
Interrupter multiple to be provided as required to other panels, providing the permissible interrupter contact load is not exceeded.

Typical Installation of Two or More
QPC Type Key Service Panels

Key Telephone Units (KTU's)

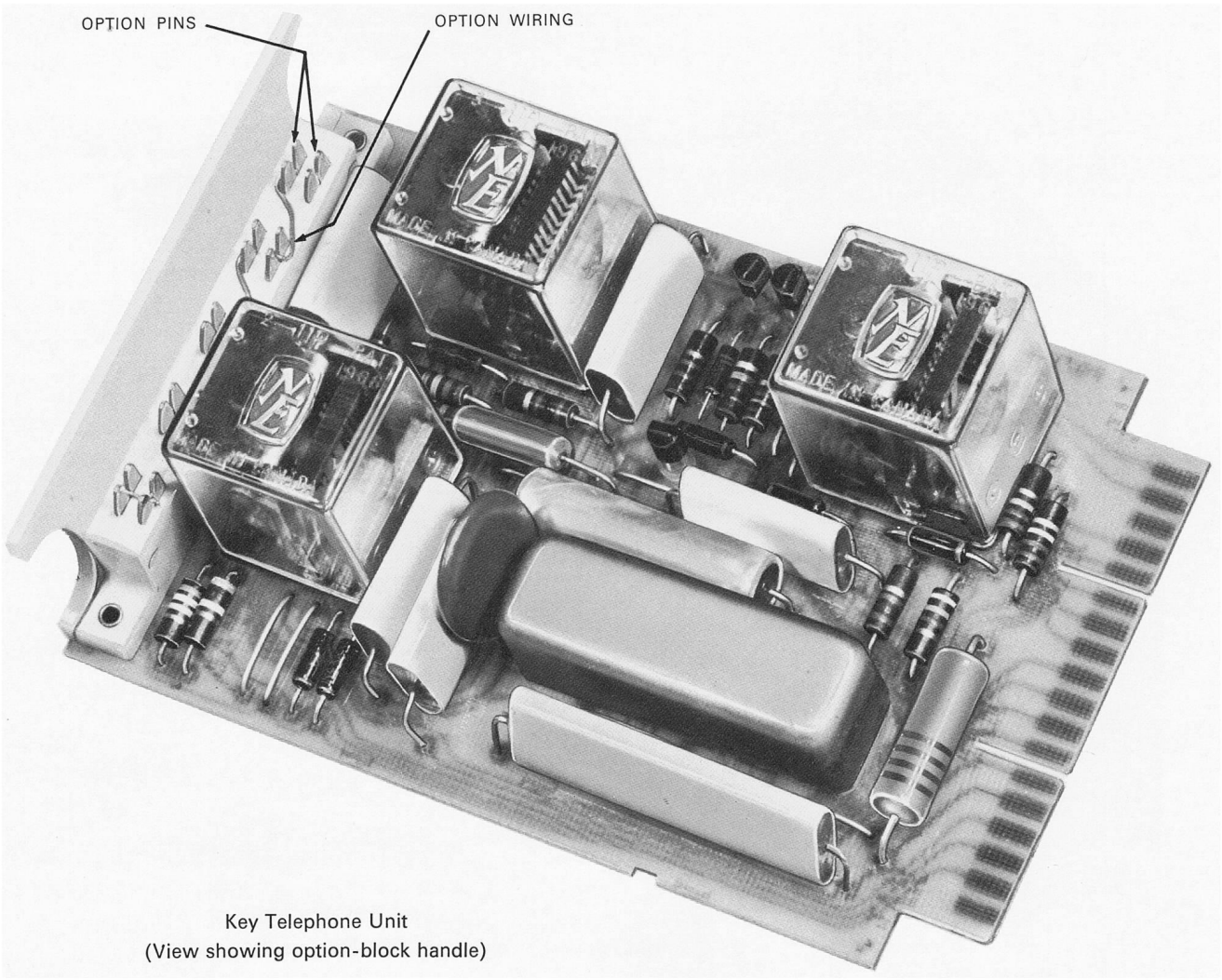


Typical Key Telephone Unit

The KTU's used in the NE-1A2 are plug-in printed circuit cards which facilitate the addition and removal of modules, thereby simplifying maintenance and minimizing down-time as well as reducing inventory requirements. The plug-in units are station switching circuits employing semiconductors, capacitors, resistors, and miniature relays. All KTU's are approximately 3½ inches (89 mm) by 5 inches (127 mm). They are either single- or double-sided cards having 18, 20, or 40 gold-plated land areas. All connections to external circuits are brought out to the gold-plated lands at the end of the card, which mate with connectors in the various key service units or key service panels.

The card has a plastic handle which facilitates insertion, removal, and handling of the card. The functional code designation is silk screened on the front surface of the handle of each KTU. The handle also provides an option block with or without quick-connect option pins, as required, to suit the particular circuit features. Strappings for the commonly used features are provided on each card; if other features are required, the option block strapping can be changed accordingly.

The key telephone units are not furnished as part of the key service units or key service panels; they must be ordered separately as required. Available KTU's are listed in Table "A".



Key Telephone Unit
(View showing option-block handle)

QUN1A to QUN6A Key Telephone Units

These KTU's provide a dial intercom of up to 37 stations in the same system, with a means of audible and visual signalling between stations. The audible signalling includes single-spurt or interrupted ringing. Answer detection, dial tone, ringback, and busy tone are provided. The visual signals are lamp flash or lamp steady. These KTU's accept rotary dial or DIGITONE dial pulses. For system combinations for intercom features, see Table "B".

QUN7A Key Telephone Unit

This KTU is a dial intercom long line circuit arranged to extend the loop limit of the dial intercom circuit. Transmission performance with this unit is satisfactory for a 500-ohm loop to a telephone set or a 1500-ohm loop to a central office.

The dial intercom cards (QUN1A to QUN7A) like all other cards used in the NE-1A2 key telephone system are approximately 3½ inches (89 mm) by 5 inches (127 mm). These cards are used in key service units or key service panels. The key service panels, therefore, only occupy 4 inches (101.6 mm) of space on a 23-inch (584.2 mm) relay rack.

QUN10A Key Telephone Unit

This KTU extends a CO/PBX line to a number of key telephone stations. It provides the following indications: lamp steady (busy), lamp flash (call), and lamp wink (hold). It controls an audible signal on calling and closes a holding bridge under station control. The QUN10A also provides individual line time-out, the length of which can be varied on abandoned calls.

QUN11A Key Telephone Unit

This KTU provides up to five stations in the same system with a direct 2-way communication path.

QUN12A Key Telephone Unit

This KTU has a circuit which inductively couples two CO/PBX lines appearing on a control station, thus establishing a 3-way conference.

QUN13A Key Telephone Unit

This KTU provides one or more key stations with a private direct 2-way link to a distant point, the loop limit being 2200 ohms. A QUN13A is required at each end.

QUN14A Key Telephone Unit

This KTU provides a private direct 2-way link between two groups of stations located near each other (50-ohm loop maximum) and automatic or manual signalling as required.

QUN15A Key Telephone Unit

This KTU is an off-premise extension circuit which provides a remote appearance of a CO/PBX line circuit and duplicates all visual and audible signals of the line circuit at the remote location. A QUN15A KTU is required at each location and replaces the QUN10A KTU which would otherwise have been provided.

QUN16A Key Telephone Unit

This KTU is a lamp flashing and answer detection circuit for the dial intercom (Maximum 10 codes).

TABLE A

KEY TELEPHONE UNITS

CODE	NO. OF PINS REQUIRED ON MATING CONNECTOR	FUNCTION
QUN1A	40	Selector Circuit for Dial Intercom
QUN2A	40	Selector Control Circuit for Dial Intercom
QUN3A	40	Transfer Circuit for Dial Intercom
QUN4A	40	Answer Detection and Tone Circuit for Dial Intercom
QUN5A	40	Flashing Lamp Circuit for Dial Intercom
QUN6A	40	Station Busy Selection Circuit for Dial Intercom
QUN7A	18	Dial Intercom Long Line Circuit
QUN10A	18	C.O. or P.B.X. Line Circuit
QUN11A	18	Manual Intercommunication Line Circuit
QUN12A	40	Conference Circuit
QUN13A	18	Tie Line, D.C. – Automatic
QUN14A	18 or 20†	Short Range Tie Line (Manual or Automatic Ringing)
QUN15A	20	Off-Premise Extension Circuit
QUN16A	40	Lamp Flashing & Answer Detection Circuit for Dial Intercom

† 20-pin connector required for manual ringing.
18- or 20-pin connector may be used for automatic ringing.

TABLE B

SYSTEM COMBINATIONS FOR DIAL INTERCOM FEATURES

ITEM	FEATURE COMBINATIONS	CARD CODES AND QUANTITIES REQUIRED FOR 10 TO 37 CODE INTERCOM			
		10 Codes Max.	19 Codes Max.	28 Codes Max.	37 Codes Max.
1	Single-spurt ringing and steady lamps only.	1–QUN1A 1–QUN2A	1–QUN1A 1–QUN2A 1–QUN3A	1–QUN1A 1–QUN2A 2–QUN3A	1–QUN1A 1–QUN2A 3–QUN3A
2	Flashing lamps and either interrupted or single-spurt ringing.	1–QUN1A 1–QUN2A 1–QUN16A	‡	‡	‡
3	Flashing lamps, dial tone, and audible ringing tone with either interrupted or single-spurt ringing.	1–QUN1A 1–QUN2A 1–QUN4A 1–QUN5A	1–QUN1A 1–QUN2A 1–QUN3A 1–QUN4A 1–QUN5A	1–QUN1A 1–QUN2A 2–QUN3A 1–QUN4A 2–QUN5A	1–QUN1A 1–QUN2A 3–QUN3A 1–QUN4A 2–QUN5A
4	Flashing lamps, station busy tone, dial tone, and audible ringing tone with either interrupted or single-spurt ringing.	1–QUN1A 1–QUN2A 1–QUN4A 1–QUN5A 1–QUN6A	1–QUN1A 1–QUN2A 1–QUN3A 1–QUN4A 1–QUN5A 1–QUN6A	1–QUN1A 1–QUN2A 2–QUN3A 1–QUN4A 2–QUN5A 2–QUN6A	1–QUN1A 1–QUN2A 3–QUN3A 1–QUN4A 2–QUN5A 2–QUN6A

‡ provided by item 3.

ORDERING INFORMATION

Quantity . . . QUN__ Key Telephone Unit (complete code by adding appropriate suffix for key telephone units listed in Table "A", e.g., QUN1A.)

Quantity . . . QUJ8A Key Service Unit (See Note 1)

Quantity . . . QUJ9B Key Service Unit (See Note 1)

Quantity . . . QUJ10A Key Service Unit (See Note 1)

Quantity . . . QPC12B Key Service Panel

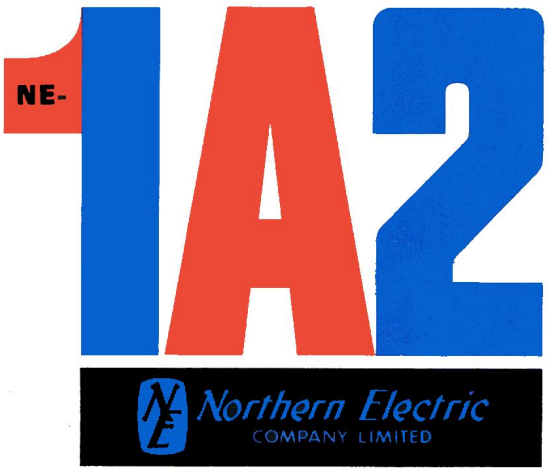
Quantity . . . QPC14A Key Service Panel

Quantity . . . NS15900, List 1 Interrupter

Quantity . . . NE-247BQB KTU (DIGITONE Adapter)
and
P97X289 Printed Circuit Board Assembly

Note 1 : A 110-volt a-c input power supply unit is provided with each key service unit, unless the order specifies that the power unit must operate on a 230-volt a-c input.

"Northern Electric reserves the right, without notice, to make such changes in products, materials, or design as progress in engineering or manufacturing methods may warrant."



A6918–SB–10M–2/70–GP