Rauland

TELECENTER® IV: EIGHT-LINE ATTENDANTS' KEY SYSTEM

RAULAND-BORG CORPORATION • 3450 West Oakton Street, Skokie, Illinois 60076-2951 • (708) 679-0900

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DESCRIPTION

When a customer wants one or two people to handle calls from several outside telephone trunks as well as a steady stream of internal calls, then that person will need more than one line to handle the traffic. For such applications, Rauland-Borg is offering the TC4172 adapter to connect standard eight-line attendant phones to the Telecenter® IV. The kit includes special connectors to simplify the installation.

Connecting the key system to the TC4 offers flexibility in transferring incoming calls and in making outside calls. The outside trunks are not connected directly to the key system but to the TC4, and therefore can be routed to any TC4 line and be accessed by any authorized phone.

Keep in mind that each line of the microprocessor-controlled Telecenter IV can be programmed for any functions. Therefore, the attendant phones can be structured in a wide variety of ways. What we are describing in this manual is a method that Rauland has worked out for a representative application.

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Printed in U.S.A. 6/87

SUMMARY

Rack-Mounting Dimensions

- 19" W x 5¼" H (48.3 cm x 13.3 cm) rack-mounted KSU.
- 8" W x 8" D x 6" H (20.3 cm x 20.3 cm x 15.2 cm) surface-mounted power supply.

Typical Telephone Arrangement (using 10-button phones):

- Eight lines active.
- Ninth line used for disconnect (tenth button is Hold).
- Programmable line usage; typical programming:
  - 1,2,3: AAI.
  - 4 & 5: operator/recall.
  - 6,7,8: Administrative with DIL ("Direct Inward Line"--formerly called "DID").
- All of the wiring is done using the connectors supplied with the TC4172.
- Rectangular system (the same lines are connected to all of the phones).
- No display phones can be used with the key system.

Ringer Options

- The eight ring-signal terminals can be strapped to all three phone cables.
- Any phone can have its ringer internally connected to any single TC4 line (limit: one per line).

  Example: Strap ring-signal terminals 1, 2, 3, 4, and 5 together and connect them to the ringer terminals of connectors 1, 2, and 3. With this arrangement, calls on the first five lines will ring at the attendant phone. Each administrative phone can be internally modified to ring just for calls on line 6, 7, or 8. A modified phone will ring on its own line even if it is moved to another connector.

Collecting the Attendant-Phone Equipment

- The distributor is responsible for ordering all of the equipment needed.
- Rauland-Borg will allow space in the rack for a KSU, at your request.
- Rauland-Borg will also allow space on the rack floor for a power supply, at your request.
- Rauland-Borg supplies the TC4172 Adapter Kit:
  - Adapter (PCB).
  - LLM cable assembly.
  - Documentation.
  - Dress panel.
- The manufacturers of the other items needed are responsible for supplying the documentation, warranties, etc., for their equipment.

USING KEY PHONES WITH THE TC4: ADVANTAGES AND DISADVANTAGES

Having your key phone interconnected through the Telecenter IV system gives you several benefits over having just a few key phones:

KEY PHONES ALONE	KEY PHONES WITH TELECENTER
Can't call rooms.	Dial room number to call.
People must come to the office to call outside.	There can be many single-line phones around the building able to dial out
Outside callers cannot talk to the rooms.	Outside calls are easily transferred to rooms.
Administrative- and key-phone users must go to the mike to page.	Administrative- and key-phone users can page from the phone.

Many other features of the Telecenter IV are designed for ease of use as they help with a variety of communication needs. The abbreviated instructions at the end of this manual tell how to use a key phone for routing inside and outside calls.

EQUIPMENT NEEDED

Refer to drawing KM0779:

ITEM	QUANT.	ORDERING REFERENCE	VENDOR
A	1	19" x 5¼" Rack-Mtd KSU Plant Equipment, Inc. Order No. CC-3131-19	Graybar
A	1/Line	Line Card, ITT, K400E	Graybar
A	1	Interrupter Card Plant Equipment, Inc. Order No. 1803	Graybar
B	1	Power Supply (for DC, lamps, and ringers) Elgin Electronics Order No. FAK-4	Graybar
C	1	TC4 Adapter Kit Rauland-Borg Corp. Order No. TC4172	Rauland-Borg
D	As Req'd	9-Line Key Phone Comdial 2830CBCW907M or equivalent	Graybar
D	As Req'd	25-pair Extens. Cables or "Y" Connectors	Graybar

PLANNING AND INSTALLATION

To illustrate the planning and installation of a TC4 eight-line KSU, two representative installations are described below. Any deviations from these cases should be easy to implement with the help of the drawings included in this manual, and the general information in the main Telecenter IV manual.

Representative Example 1

The case is most easily defined in a chart as follows:

KEY PHONE	CONNECTOR	RINGS ON 1	2	3	4	5	6	7	8	USER
1	C1	C	C	C	C	C				Attendant
2	C2						C			Secretary
3	C3							M		Principal
4	C3								C	Ass. Principal

This chart shows that four key phones are used (two more could be added). The second column shows which connector each phone is plugged into. Seeing that two phones are plugged into connector "C3," we know that a "Y" connector adapter is required. This should be located at the rack to avoid excessive voltage drops due to a long length of cable carrying current for both phones.

Since each cable has only one ringer wire, the KSU can satisfy only three different ringing requirements; any additional requirements must be handled by the TC4. The columns marked 1 through 8 are blank for any phones that do not produce an audible ring for that line. A "C" or an "M" marks any line that rings for a given phone. "C" means that the phone ringer is powered by the ring wire of the cable and the KSU. An "M" means that the phone is to be internally modified to connect the ringer to the selected TC4 line (see Note 1 on the attached KM0778).

The Principal's phone is modified in this way. This will have several "side effects" that may be significant:

1. TC4's double ring for an outside call will be transmitted.

2. If the KSU loses power, the "M" line can still be called.

3. If you move this phone around to any other connector in the system, it will still ring in the same way.

4. The Attendant's phone could have been programmed to also ring on this line through "C1."

5. Because this increases the load on the TC4 ring driver, this one ringer, combined with the KSU line card, is all that a TC4 line can handle.

From the chart, we can see that the jumpers required in the ring-patch area of the KSU adapter board are:

First jumper: V1, V2, V3, V4, V5, C1.
Second jumper: V6, C2.
Third jumper: V8, C3.

Representative Example 2

In this example, five central-office lines are connected for outside communication:

PHYS. NO.	LINE TYPE	DIRECTORY	HUNT ORDER
16	DIL	267-1304	Last
17	AAI	267-1303	4TH
18	AAI	267-1302	3RD
19	AAI	267-1301	2nd
20	AAI	267-1300	1ST

The five central-office lines are ordered as a hunt group so that, if the dialed number is busy, the next-highest number is automatically tried. Thus, if you dial 267-1300, you will get through if any trunk is available; however, if you dial one of the other numbers, reverse hunting will not take place. Notice that these lines have been connected to the TC4's Physical Numbers 16-20 in reverse order in order to minimize contention between incoming and outgoing traffic.

Line 16 is the Principal's direct line (DIL); it will also receive overflow incoming calls when all other trunks are busy. If we direct all outgoing dial "9" calls to Physical Number 16 but do not allow "public" access to the Principal's private line, then his outgoing calls will always use his private line and avoid tying up one of the other four trunks. Outside callers dialing his number (267-1304) will get a busy signal when he is dialing out. Incoming calls on his line will go directly to him if his extension is not busy; if he is busy, the calls will go to the Attendant.

Each trunk will require a TC4171 module to get an FCC-approved interconnection. The wiring and programming of these trunk interconnections, which is relatively independent of the key system's requirements, is fully described in the main TC4 manual. The programming for this particular case will be fully described shortly.

INSTALLATION

Refer to the above two charts for the following installation and programming steps:

Step 1. Mount the power supply in the rack near the KSU, and plug it in. Keep the power turned off until the installation has been completed and checked.

Step 2. Install the 5¼" dress panel on the mounting rails where the KSU is to go. Use the four #10-32 screws to hold the brackets on the rails, and mount the dress panel itself temporarily, to verify proper alignment relative to the other equipment in the rack. Install the KSU from the rear with nuts and lockwashers. This will prevent the thickness of the KSU from displacing the dress panel forward 3/32" from the other panels in the rack. Use the four mounting studs to mount the PCB adapter assembly on the rear of the KSU so that it mates securely with the two KSU connectors.

Step 3. Connect the six wires between the power supply and the KSU. Use at least #22 AWG wire.

Step 4. Use the extension cable to connect the "T" and "R" pairs to the TC4150 (LLM). Connect the two MIO ground wires. Refer to KM0779 (attached).

Step 5. Apply the ring-programming jumpers as described above. A feed-through insulation-piercing connector is included in the kit to simplify this operation. Refer to the attached KM0778.

Step 6. Plug the line-card modules and the interrupter module into the KSU. The first line card goes into the leftmost card slot, and the interrupter goes into the rightmost slot.

Step 7. Power up the system and enter the Architectural and Location-Code data shown below. Use the TC4 diagnostic program, or the LCD phone and the [#][9][8] and [#][9][9] functions as described in the main TC4 manual.

Programming

The following table corresponds with the above example. The main TC4 manual gives the general rules for setting these values for various situations.

Coding for KSU Lines

Phys. No.	Arch. No.	"A" Attrib.	"B" Attrib.
008	908	1	12345678
009	909	1	12345678
010	910	1	12345678
011	911	1 8	12345678
012	912	1	12345678
013	111	1	12345 78
014	222	1	12345678
015	333	1	12345678

Coding for Interconnect Lines

Phys. No.	Arch. No.	"A" Attrib.	"B" Attrib.
016	014	123	12
017	917	3	12
018	918	3	12
019	919	3	12
020	920	3	12

Notes about the above coding:

1. The first five lines are coded with "9xx" numbers, which are not accessible by normal dialing since dial "9" is used for outside access.

2. Hunt bits are not needed for the attendant lines because incoming calls always hunt through administrative lines. This allows a simple means of

detecting and handling overflow situations (when all of the attendant lines are busy). It also reserves the programmable hunt function for routing internal calls, as in the case of line 4. If someone inside dials "0" and line 4 is in use, he will get line 5, but not line 6.

3. The Secretary's number is 111, the Principal is 222, and the Assistant Principal is 333.

4. All of the administrative lines are given maximum authority through the "B" attributes (any of these people could pick up on any line, anyway), except that the secretary does not have executive override.

5. No zones are selected. If speakers and modules are available, the zones could be used for time-zone or zone-announce functions.

6. Lines 16 to 20 are interconnect lines. The first is a DIL line pointed back to the Principal's line (that is, calls from this line are directed to "222." Only the Principal can use this line.

7. Lines 17-20 are AAI and go to the Attendant.

Some Required Location Codes

Location	Setting	Function
64000	8	Directs incoming AAI calls to the 1st Attendant.
64016	11	Directs "Dial "0" to KSU line 4.
64034	16	Directs "Dial 9" to the 1st interconnect line.
64192	1200	Transferred calls return to Attendant after 20 seconds.
64210	0	Outgoing calls are not routed through a PBX.
64222	11	Transferred and DIL calls not answered call back to Physical Number 11 (KSU line 4).

Note: Version 12 software is required to use Location 64222 or to use "Dial 9" access for both DIL and AAI trunks.

ABBREVIATED OPERATING INSTRUCTIONS

Answering Incoming Calls

All calls from the outside world come in on the first three keys of the phone. The phone rings and the lamp flashes as usual. Answer in the usual way, by depressing the key and picking up the handset. You can then:

1. Handle the call yourself and hang up to disconnect when done.

2. Ask a nearby person to pick up on that line. The line will clear when he hangs up.

3. Transfer the call to any other TC4 line by pressing the TAP button, getting dial tone, and dialing the number of the third party. Then:

a. If there is ringing, you may:

   -- wait for an answer, and then talk privately with the third party before hanging up or depressing your TAP switch again to complete the connection.

   -- hang up while ringing, thereby clearing your incoming key for the next call. The third party's phone will continue to ring for about 20 seconds; if there is no answer within that time, the call will come back on one of your operator keys.

      When you answer, there will be a series of short beeps to alert you to the fact that this is a recall, and not someone internal dialing "0."

b. If the third-party number that you dialed is busy, you will get four short beeps; if you have dialed an invalid number, you will get a disallow tone (a long beep). In either case, just press your TAP button again to get back to your original caller.

4. You may place the caller on hold, using the red HOLD key, while you answer another incoming call, or use another line to try and locate someone. You may perform a page-connect sequence in two ways:

   a. Use your page to announce, "Mr. Jones, there is a call for you on line 1" (assuming the call is on line 1). Mr. Jones can then go to any administrative phone and dial [#][4][1] to immediately answer the call on line 1. The last digit of [#][4][1] refers to the key on which the incoming call is being held (count the keys from left to right).

      The key will continue to flash until you pick up on its line again to determine whether the caller is still waiting. If he is still there, you may have to put him back on hold and repeat the process. If he has been answered by Mr. Jones, then the line the call originally came in on will be dead, and you can just hang up to clear its key.

   b. Use your page to announce "Mr. Jones, please call the operator." When Mr. Jones calls you and agrees to take the call, use the TAP button to get Telecenter dial tone, dial [#][4][1] (assuming that the call is on line 1). You will be connected to the caller and Mr. Jones, and may say "go ahead" and then hang up. You will still have to release the key that the call originally came in on: just "answer" it and hang up. This method allows Mr. Jones to answer from either an administrative phone or a multi-link room phone.

Placing Outgoing Calls

To place an outgoing call, select any key and, when you hear Telecenter dial tone, dial "9." You will be connected to an outside trunk and may proceed to dial out according to the authorization level programmed for that line. If you dial "9" using the transfer function, you can make connections for otherwise unauthorized administrative and staff phones.

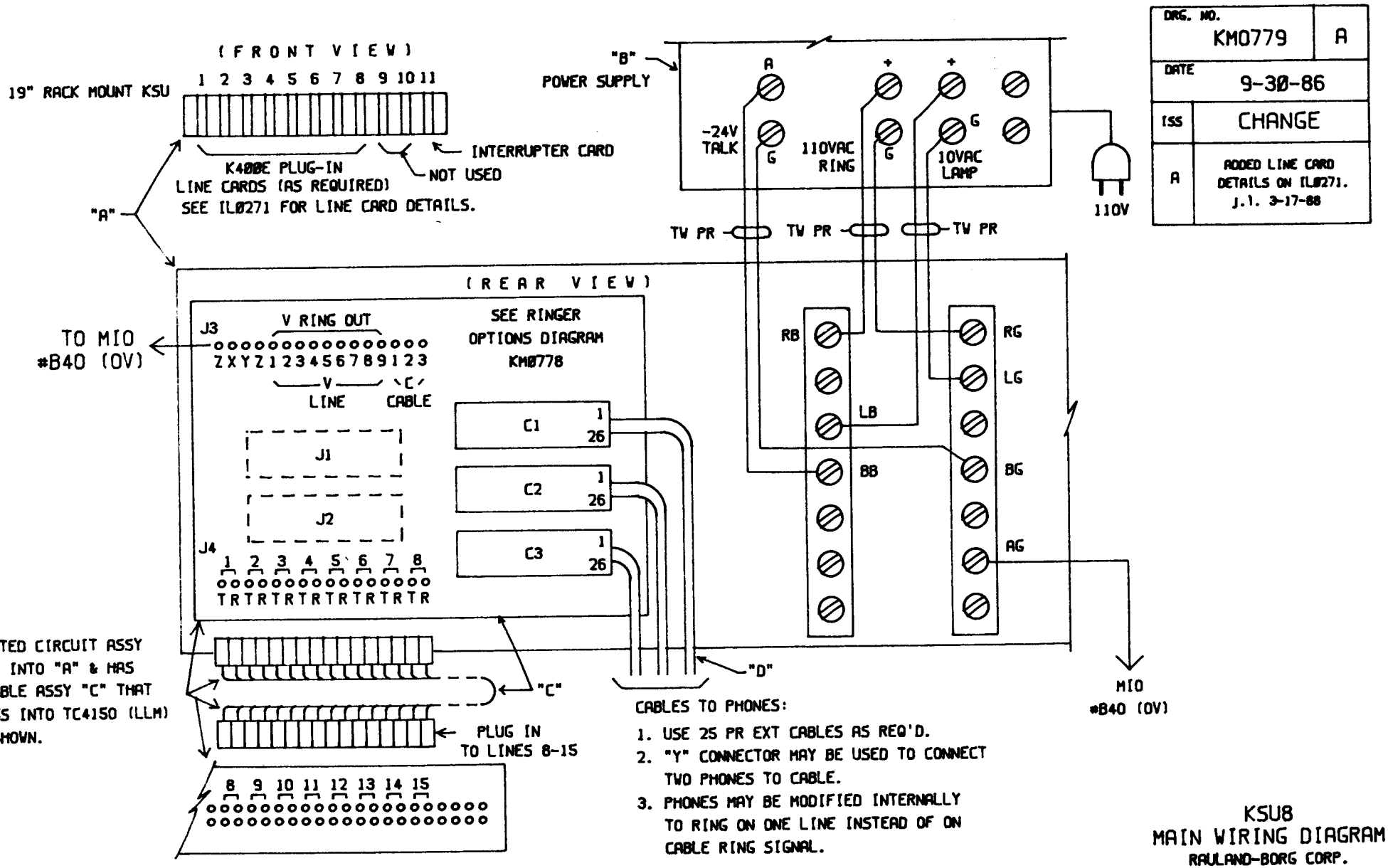
Note that in "Example 1" as described in this manual, the Principal was given a "DIL" line, or direct line. This is an outside trunk tied indirectly

to his extension. Outside calls from his line always use this trunk if it is available. Incoming calls from his trunk always go to his line, unless it is busy, in which case the incoming call is sent to the Attendant in the usual way.

Receiving and Making Inside Calls

Administrative phones can reach the Attendant by dialing "0." The call will appear on line 4 or 5 (only new outside calls can come in on lines 1, 2, and 3).

If you call one of the inside extensions that has been modified for line 6, 7, or 8, that extension will ring. On the other key phones, the corresponding key will flash but no ringing will occur (assuming that the phones are wired as described in "Example 1").



DRG. NO.	KM0779	A
DATE	9-30-86	
ISS	CHANGE	
A	ADDED LINE CARD DETAILS ON IL0271. J.L. 3-17-88	

KSU8
MAIN WIRING DIAGRAM

RAULAND-BORG CORP.
MADE IN U.S.A.

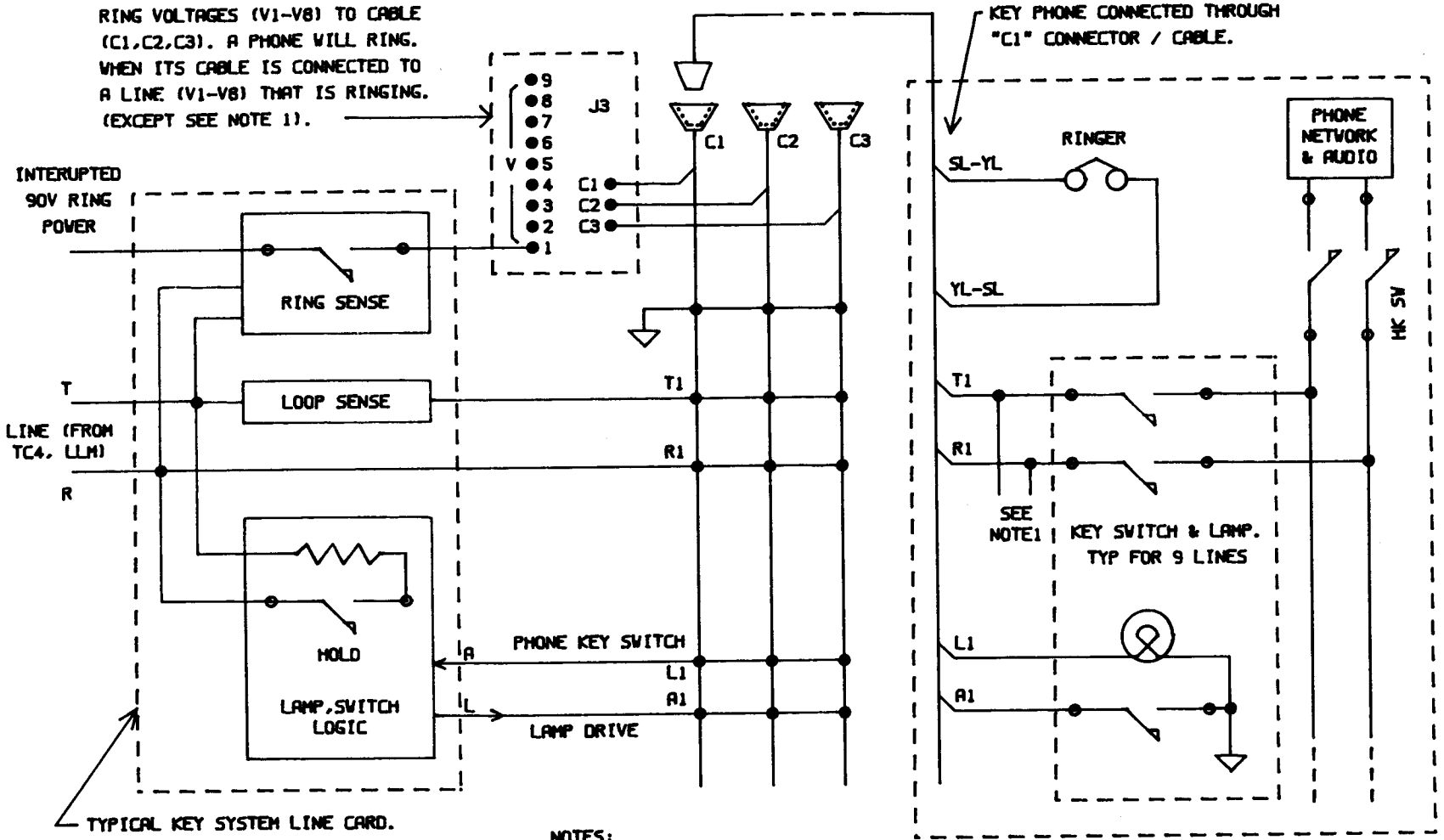
KM0779-A

DRG. NO.	KMØ778	A
DATE	9-29-86	
ISS	CHANGE	
A	ADDED OPTION NOTE.	

DRAWING NOTE:
FOR CONVENIENCE, WIRES AT EACH END OF THE CABLE COME OUT ON THE SAME LINE (SAME HEIGHT).

RINGER PATCH AREA, CONNECT RING VOLTAGES (V1-V8) TO CABLE (C1,C2,C3). A PHONE WILL RING. WHEN ITS CABLE IS CONNECTED TO A LINE (V1-V8) THAT IS RINGING. (EXCEPT SEE NOTE 1).

KEY PHONE CONNECTED THROUGH "C1" CONNECTOR / CABLE.



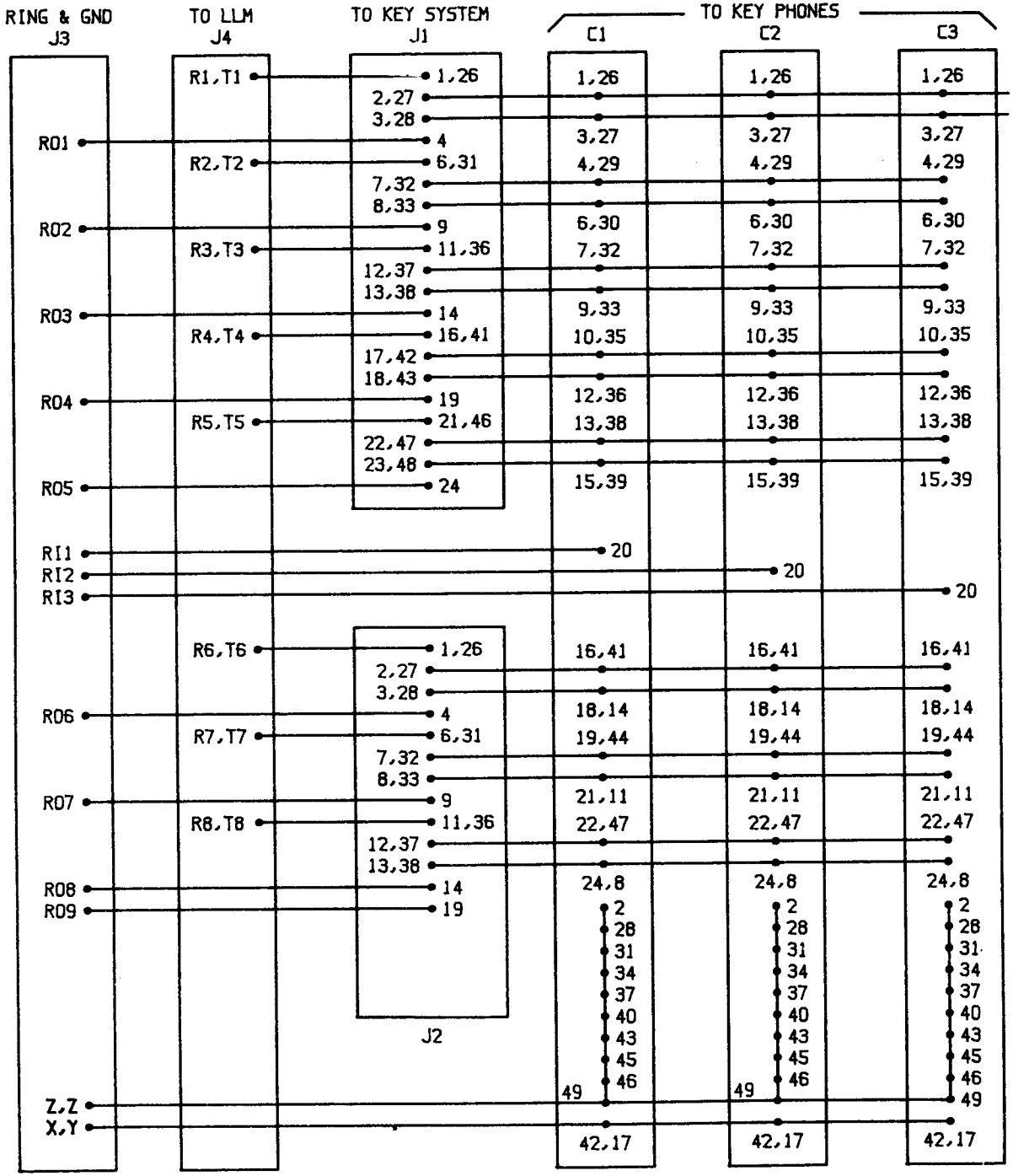
WIRE COLORS		
LINE	TIP	RING
1		
2		
3		
4		
5		
6	Y-BL	BL-Y
7	Y-BR	BR-Y
8	V-O	O-V
9		

TYPICAL KEY SYSTEM LINE CARD. MAXIMUM IS EIGHT CARDS. NOTE THAT THE CARD SENSES RING VOLTAGE FROM THE LINE & CLOSES A RELAY CONNECTING LOCAL RING POWER TO AN OUTPUT PIN (V1-V8).

OPTION: YOU MAY CONNECT A 2.2 MEG RESISTOR FROM PROGRAMMING STRIP 1 & 2 TO 3 TO SHORTEN TIMEOUT FROM 10 SECONDS TO 4 SECONDS.

NOTES:
1. PHONE CAN BE MODIFIED TO RING ON ANY SINGLE LINE BY RECONNECTING SL YL PAIR FROM RINGER TO LINE AT KEY SWITCH AS SHOWN. SEE WIRE COLOR DATA IN CHART. CUT SL-YL PAIR FROM CABLE & CONNECT TO LINE WITH PLASTIC "T" CONNECTORS PROVIDED.
   MAX: 1 LINE CARD + 1 RINGER LOAD PER LINE.

KSU 8
RINGER OPTIONS, PARTIAL SCHEMATIC
RAULAND-BORG CORP.
MADE IN U.S.A.
KM0778 - A

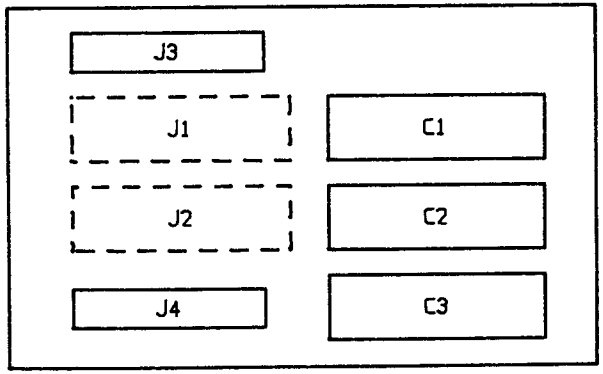


ORG. NO.	
KC1531	0
DATE	
9-27-86	
ISS	CHANGE

NOTES:

1. MOST LINES REPRESENT PAIRS. A LINE SUCH AS 2,27 TO 1,26 MEANS PIN 2 GOES TO PIN 1 AND PIN 27 GOES TO PIN 26.

PC BOARD CONNECTOR LAYOUT



KSU 8 ADAPTER

RAULAND BORG-CORP.

MADE IN U.S.A.

KC1531-0

TELECENTER® IV EIGHT-LINE ATTENDANT'S KEY SYSTEM

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CHANGES

CORRECTIONS

In the table for "Equipment Model" (page 3), the "Ordering Reference" numbers are the *manufacturer's*, not Graybar's. The power supply manufacturer is C-Elgin Electronics, the correct model number is EAK-4, and it must be special-ordered in the 19-inch rack-mount version.

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Orig. 5/88