



TC4171 COA Module, TC4181 Repeater Amplifier, and TC4180 Expander Chassis Installation

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Preliminary

Description

The TC4171 Module ("Central Office Adapter," or "COA") is an FCC-approved device for connecting a Telecenter IV or Telecenter TCS system to an outside telephone trunk; it can also be used for connecting these systems to a line from a PBX. The module enables the system to detect outside calls, receive such calls, and call via an outside trunk.

The TC4181 Repeater Amplifier boosts incoming and outgoing audio by 6.5 decibels. This offsets the losses that occur inside the Telecenter system. These losses can cause reduced and noisier audio levels on interconnected lines; in some cases, they can cause dialing problems. For these reasons, Rauland highly recommends the use of a repeater amplifier with every COA Module. The Canadian Standards Association (CSA) requires repeater amplifiers for Canadian installations. The CSA-approved R-TEC VFR1050 (List 2) repeater amplifier can be obtained locally. It can be inserted in the place of the TC4181.

The TC4180 Chassis holds five COA Modules and five TC4181 Repeater Amplifiers. To simplify installation and prevent installation errors, it has pre-wired connectors and two different sizes of card guides. It requires 3% inches of vertical space in a standard 19-inch rack; all of the required mounting hardware is included. This model replaces the TC4170 chassis.

Additional Equipment

If the TC4171 is to be connected directly to a central-office trunk, the trunk must terminate in an RJ 11 or RJ2 1X connector installed by the telephone company.

Each TC4171 COA Module requires one Telecenter line. Additional Telecenter lines are needed for key phones, extensions at a console, and related equipment that will be connected to the Telecenter to answer outside calls. The number of lines needed depends upon the hardware to be installed and the software functions and options.

If the rack's mounting holes are not tapped, you will have to obtain four #10 $\times \frac{1}{2}$ " self-tapping screws (e.g., Rauland WA102); if the holes are not protruded, obtain four #10 speed nuts (e.g., Rauland AB1889).

The repeater amplifiers require 24-VDC power. The low-cost Rauland 6400 Power Supply can accommodate 10 TC4181s. The COAs derive their power from the Telecenter system.

For details about wiring, programming, and FCC requirements, refer to the main Telecenter IV manuals, included in KI-1435, especially KI-1582 (*Interconnect Planning and Installation*) and RI-1584 (*Programming*), or to the Telecenter TCS planning and installation manual, KI-1539, and programming manual, ICI-1538.

Retrofit in TC4170 Chassis

Since the card guides and connectors needed by the COA Module are already installed in the new, TC4180, Expander Chassis, they are no longer packed with the COA. However, if you need to add a COA Module to an older, TC4170, Expander Chassis, you will need to order these parts:

Qty.	Description	Rauland Part No.
2	Card guide.	QP0761-1
1	Card-edge connector, 30-pin wire-wrap.	SF0506-30
1	Polarizing key for the connector.	QP0938
2	#4 $\times \frac{7}{16}$ " hex washer-head thread-forming screw for attaching the connector to the TC4170.	WA216
1	ID strip for the COA connector (already installed).	QP0928

For installation instructions, consult IU-1457, the older TC4171 manual, which also covers the TC4170.

False Calls (TC4171)

In January 1987, resistor R3 was changed to 22 kilohms, and resistor R16 was changed to 680 ohms. These resistors were changed to eliminate the triggering of false outside calls, which can occur when the central-office line is connected to the COA module with reverse polarity. If an older COA module (one shipped from Rauland before 1987) is involved in the triggering of false

Telecentet COA, Repeater Amp, and Chassis

outside calls, check the polarity of the CO-line connection and change R3 and R16 to the new values.

Incoming Calls

The following components have been changed on all COA modules shipped after September 1988:

Component	New Value	Old Value
R3	15 K Ω	22 K Ω
R15	470 K Ω	100 K Ω
C6	3.3 μ F	2.2 μ F
V1	General Electric V270ZA05	General Electric V220ZA05

These changes were made to eliminate the following problems:

- * Slow response (or none at all) to incoming calls.
- * When answering an incoming call, the operator would hear nothing, but the caller would hear continual ringing.

If an older COA module exhibits either of these problems, return it to the Factory for repair.

FCC Approval

A copy of the Federal Communication Commission's registration for the TC4 17 1 is attached. You may wish to

consult it for the technical provisions and the Registration Number, which is required on some forms.

Attachments

- IL0291 (Mechanical Installation).
- KM0946 (Wiring Diagram).
- KC1475 (Schematic for the TC4171).

Parts for TC4180 Chassis

Qty.	Description	Rauland Part No.
4	# 10-32 x 1/2" hex, SEMS, unslotted machine screw, for attaching the chassis to the rack.	WA202
1	Locking bar, for holding the TC4171s and TC4181s in the chassis.	AB3628
1	Thread-forming screw, for attaching the locking bar to the chassis.	WA5
5	ID strip for the COA connector.	QP0928
[Dress Panel and Mounting Hardware]		
1	Dress panel.	AN1058
2	#6-32 x 1/2" pan-head slotted stainless-steel screw.	WA96
2	#6 flat stainless steel washer.	WJ0074
2	#6-32 "U" nut.	AB2904

Installation

Important

1. Any lines that go outside of the building, including central-office lines, must have lightning protection-see the "LP" details on KM0716 and the appropriate Telecenter manual.

2. If the TC4181 Repeater Amplifiers are used, make sure that the negative side of the connection to the power supply is jumpered to a "Z" terminal on the Telecenter (see KM0946). Failure to provide this grounding could result in severe crosstalk.

3. Be sure to cut Pin 3 of the LLM "UI" line hybrid used by each COA module (see step 3 of KM0716). Removing this pin prevents ring voltage from reaching, and damaging, the COA.

Note: Capacitor C4 is the component most likely to be damaged by ring voltage.

Initial Mechanical

Step 1. Orient the Expander Chassis horizontally, with the rack-mounting ears to the front. The tabs for the locking bar should be on top, and the left-most card guides should be the larger ones used for the repeater amplifiers (see IL029 1).

Step 2. Locate the two vertically centered tabs used for mounting the front panel. Push a #6-32 "U" nut, flat side facing outward, on each of these tabs.

Step 3. Fasten the chassis to the rack with the four #10 machinescrews.

Note: If the rack's mounting holes are not tapped, obtain the self-tapping screws speed nuts listed earlier under "Additional Equipment."

Step 4. Before installing the TC4171 modules, make sure that the jumper to the left of the transformer is set to match the impedance of the central-office lines (typically 900 ohms) or PBX lines (typically 600 ohms). To change the setting, simply pull the jumper connector off, then push it onto the center pin and the pin with the desired value (600" or "900").

Step 5. Working from the front of the chassis, insert the TC4 17 1 modules into the slots with the smaller card guides; the component side should face to the right (as viewed from the front of the chassis).

Step 6. Working from the front of the chassis, insert the TC4181 amplifier modules into the slots with the larger card guides; the component side should face to the left (as viewed from the front of the chassis) and the printing on the face plate should be right-side-up.

Step 7. Complete all wiring, programming, and testing (see the attached KM0946 and the appropriate Telecenter manuals). Note that the wiring between the connectors has already been done by the factory.

Step 8. Label each module pair with both the central-office or PBX number and the Physical Number of the Telecenter line. Check the gain of the repeater amplifiers; make any necessary adjustments. Complete the installation by doing the final mechanical assembly.

Amplifier Gain Adjustment

FCC standards require that a system not produce any net gain between approved telephone instruments and C.O. interface terminals. Although the TC4 181 is designed to have a slight net loss, the following procedure is provided as a means of verifying and adjusting system gain if necessary.

You will need:

- ✓ A dial phone that will produce a pure tone (941 Hertz) when you simultaneously press any two or all three buttons in the bottom row. Alternatively, use any dialing phone plus an oscillator with a special network that maintains line balance and impedance.
- ✓ A meter with which you can measure decibels.
- ✓ To make an adjustment, you will need quarter-watt resistors with values like those in the table for Step 4; a substitution (decade) box would also prove helpful.

Step 1. Place the telephone next to the Telecenter system, then establish communications between it and another telephone: the second phone may be inside or outside the Telecenter system; what is essential is that the connection be made via the trunk you want to test (e.g., get central-office dial tone via the trunk, then call back into the system by dialing the appropriate seven-digit number used by outside callers). To select a particular trunk for dialing out, make sure that it is available, then dial its Architectural Number instead of "9." Keep both phones off-hook.

Step 2. While you measure the trunk you are testing (1) across T and R on the LLM, then (2) CT and CR on the COA, hold in any two or all three buttons on the telephone's dial pad (or use an oscillator, as described in the first check-marked paragraph at the beginning of the "Amplifier Gain Adjustment" **section**). To make sure that you are measuring the DTMF tone and not noise or DC current, release the dial buttons: the meter reading should drop appreciably.

Mark down the reading for each tone measurement (LLM and COA).

Important:

1. If you **are** using **another** Telecenter line for receiving, make sure that you are measuring the trunk you are calling out on: the tones returning on the other line should be considerably lower, because of losses through the central-office lines.

Note: You **can estimate the** amount of gain by talking to someone on the other phone as you plug and unplug the repeater amplifier at the chassis (the chassis's amp **connectors have shorting contacts so that the COA module will continue working when there is no repeater amplifier**).

2. A positive gain of 1.76 dB is permissible when the central-office line is 900 ohms and the COA is connected via its 900-ohm tap. This higher voltage level will produce the same power level on a 900-ohm line as the regular voltage level would on a standard 600-ohm line:

$$10 \log (900/600) = 1.76$$

Step 3. (a) If the levels are satisfactory, skip to the final mechanical assembly.

(a) If there is excessive gain, continue with Step 4.

Step 4. (a) If the gain is five or more decibels, remove the repeater amplifier.

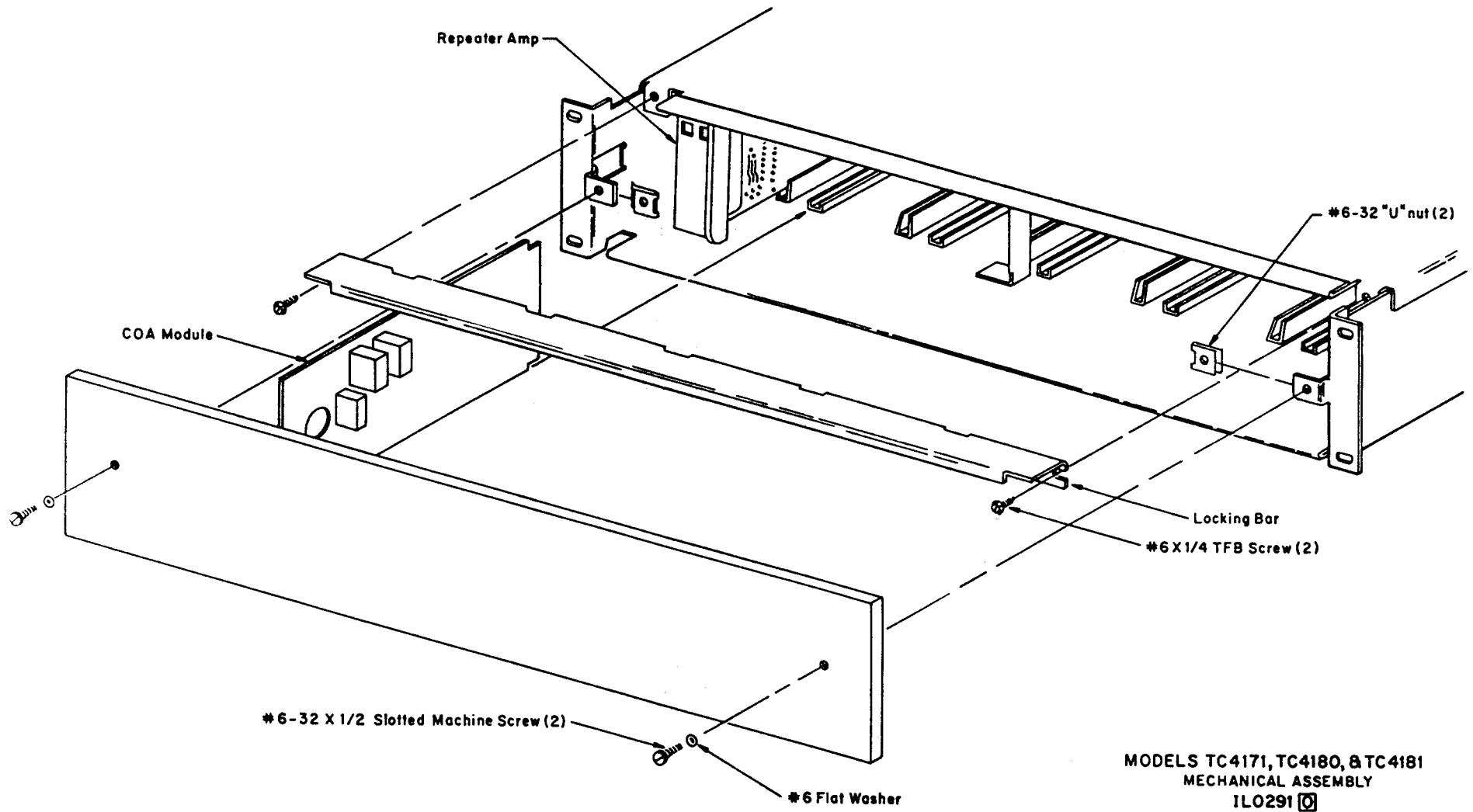
(b) **If the gain is from one to four decibels, reduce it by installing a quarter-watt resistor across COA Terminals A2 and A4.** You will have to experiment to find the exact value needed (a load box would prove helpful here). The following table suggests the **approximate values that you will need:**


Desired Reduction	Resistor Value
1 dB	3.3 K Ω
2 dB	1.5 K Ω
3 dB	1 K Ω
4 dB	6800

Final Mechanical

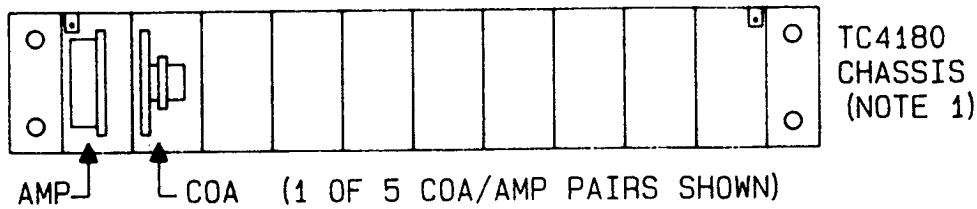
Step 1. Orient the locking bar as shown in IL0291 and secure it with the two #6 x 1/4" thread-forming screws.

Step 2. Install the dress panel, using the #6 pan-head Phillips screws and flat washers; be careful not to mar the panel.

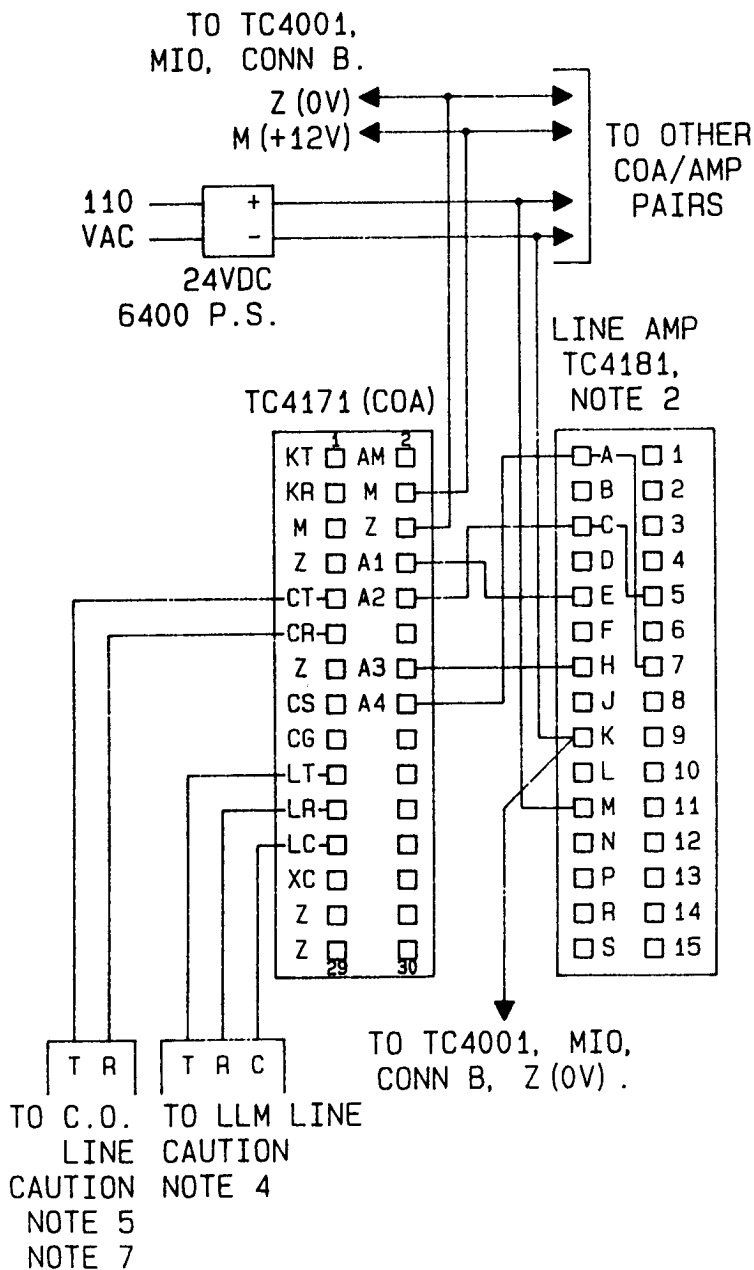


MODELS TC4171, TC4180, & TC4181
 MECHANICAL ASSEMBLY
 ILO291 

LAYOUT (FRONT VIEW)



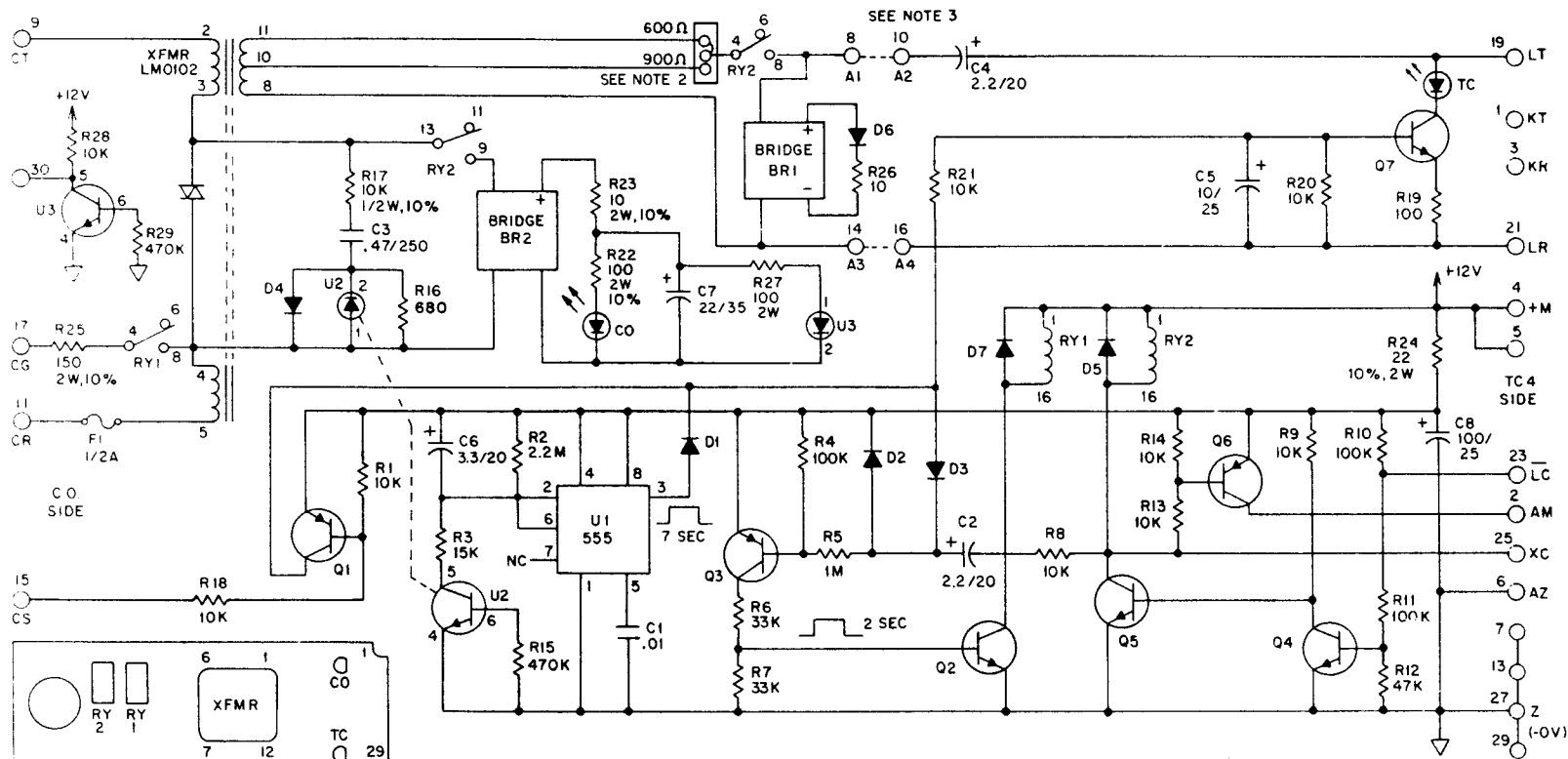
WIRING (REAR VIEW)



NOTES:

1. SHOW DIRECTORY NUMBER AND TCIV PHYSICAL NUMBER BY MARKING IN FRONT OF EACH COA/AMP MODULE PAIR.
2. LINE AMP TERMINALS ARE MARKED ON SIDE OF EDGE CARD CONNECTION.
3. THIS DRAWING SUPERCEDES THE COA (TC4171) WIRING DIAGRAM (KM0716).
4. CUT PIN 3 OF LLM LINE HYBRID (U1, EH0001) TO DEFEAT RING VOLTAGE. OTHERWISE DAMAGE WILL OCCUR TO COA (TC4171) CAPACITOR "C4".
5. WIRING FOR 1 TRUNK OR C.O. LINE IS SHOWN. TYPICAL FOR 5 PER TC4180. CHOICE AND LOCATION OF PHYSICAL NUMBER CIRCUIT IS BASED UPON INTER-CONNECT PLANNING AND INSTALLATION SECTION OF TCIV MANUAL KI1435.
6. C.O. OR ANY LINE EXTENDING OUTSIDE OF BUILDING MUST HAVE LIGHTNING PROTECTION NEAR POINT OF ENTRY TO BUILDING.
7. TC4171 IS FCC REGISTERED, NUMBER EY65P7-15781-WP-T. RINGER EQUIVALENT NUMBER IS 1.7B.
8. FOR GROUND START TRUNKS (ONLY) CONNECT COA TERMINAL "CG" TO GROUND ("Z").

TC4180
WIRING DIAGRAM
KM0946 0



NOTES:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE RATED IN OHMS, 1/4 W, 5%. CAPACITORS ARE RATED IN MICROFARADS.
2. SELECT 600 OR 900 OHMS JUMPER BLOCK TO MATCH C.O. SIDE LINE IMPEDANCE.
3. JUMPER A1 TO A2 AND A3 TO A4 FOR NORMAL USE. SEE WIRING DIAGRAM KM0716 FOR WIRING IN REPEATER AMP.
4. FCC CERTIFICATION:
EY65P7-15781-WP-T
RING EQUIV 1.7B

COMPONENT DESIGNATION	DESCRIPTION
J1	555 TIMER EC0004
U2,U3	4N25 OPTOCOUPLER EC0125
Q1,3,6	MPS 6523 PNP TRANSISTOR
Q2,4,5	MPS 6515 NPN TRANSISTOR
Q7	MJE521 NPN TRANSISTOR
DIODES	1N4002
BR1,2	JR0108 BRIDGE RECTIFIER
V1	JR0116 VARISTOR 270V
RY1,2	D0259

KC1475 G	
5-4-85	
ISS	CHANGE
A	CIRCUIT CHANGE 9-26-85
B	ADDED RY1 & 2 TO COMP CHART. RESISTORS WERE 10%, EXCEPT WHERE OTHERWISE INDICATED. ADDED NOTE 4, 11-12-85
C	R22 WAS 180 Ω 9-11-86
D	R3 WAS 1K, R16 WAS 1.5K. 1-9-87
E	C6 WAS 2.2, R3 WAS 22K, R15 WAS 100K, V1 WAS JR0109, V220ZA-05. 9-28-88
F	ADDED FUSE I, R27, R28, R29, AND U3. 7-19-90
G	Q1, Q3, & Q6 WERE MPS6519. 8-20-90

MODEL TC4171
(COA)

RAULAND-BORG CORP
SKOKIE, ILL.
MADE IN USA

KC 1475 G