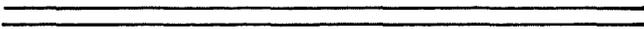


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# PRELIMINARY

## Bell System Voice Communications TECHNICAL REFERENCE



*not designed for T.T., CTX or TL*

### Connecting Arrangements

*OK for TT  
CTX  
TL*

**CIV** *study off hook*  
**RCX** *gives dialed #*

*eff 7-20-72*

*ICC # 1  
see 8*

### Interface Specification

*p 91.87*



**December 1970**

**ENGINEERING DIRECTOR - CUSTOMER TELEPHONE SYSTEMS**



NOTICE

This Technical Reference is published by American Telephone and Telegraph Company as a guide for the designers, manufacturers, and consultants of customer-provided systems and equipment which connect with Bell System communications systems or equipment. American Telephone and Telegraph Company reserves the right to revise this Technical Reference for any reason, including, but not limited to, conformity with standards promulgated by ANSI, EIA, CCITT, or similar agencies; utilization of new advances in the state of the technical arts; or to reflect changes in the design of equipment or services described therein. The limits of responsibility and liability of the Bell System with respect to the use of customer-provided equipment and systems are set forth in the appropriate tariff regulations.

If further information is required, please contact:

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LIST OF FIGURES

- Fig. 1. Connecting Arrangements ClV and RCX
- Fig. 2. Interface Connecting Block
- Fig. 3. Block Diagram - Connecting Arrangements ClV and RCX
- Fig. 4. Simplified Schematic - Connecting Arrangements ClV and RCX

1. GENERAL

Tariffs filed by the Bell System provide for the direct electrical connection of customer-provided terminal equipment to the Bell System telecommunications network. Direct electrical connection is made through a connecting arrangement furnished, installed, and maintained by the Telephone Company. The Tariffs also provide for the indirect (acoustic or inductive) connection of equipment or systems.

In addition, the Bell System retains responsibility for network control signaling. This includes the switchhook, dialing and control functions, as well as responsibility for the protective function of voice signal limiting and isolation of Central Office battery from the customer-provided equipment.

The connection services described in this Technical Reference are identified by the Bell System as Connecting Arrangements CLV and RCX and should be ordered as such. Contact your local Telephone Company Business Office or Marketing Representative for information regarding rates for, and the availability of, these Connecting Arrangements for both new and additional service.

2. SYSTEM DESIGN CONSIDERATIONS

2.1 Connecting Arrangements CLV and RCX

Connecting Arrangements CLV and RCX provide an indication of the dc supervisory conditions of a Central Office line to customer-provided traffic recording equipment (typically used for peg count and dialed number recording). The arrangements are intended for use in conjunction

with Telephone Company provided PBX Central Office trunks, Key Telephone System lines, WATS Access Lines or Central Office station lines and are not intended for use with Telephone Company Centrex services or PBX tie lines.

2.11 Connecting Arrangement CLV

This arrangement provides a contact closure when the line is seized and the closure is maintained until the line becomes idle.

2.12 Connecting Arrangement RCX

This arrangement provides a contact closure when the line is seized but opens with each dial pulse and remains closed after dial pulsing until the line becomes idle.

2.13 Combination of Connecting Arrangements CLV and RCX

These arrangements may be used together on one line to provide one contact closure when the line is seized which remains closed until the line becomes idle, and another contact closure when the line is seized but opens and closes with each dial pulse.

2.2 Service and Maintenance Considerations

2.21 Responsibility of the Customer

The Tariffs permitting direct electrical connection of customer-provided communications equipment state in substance:

Where long distance message telecommunications service or WATS service is available under the appropriate Tariff for use in connection with customer-provided communications equipment or systems, the operating characteristics of such equipment shall be such as

not to interfere with any of the services offered by the Telephone Company. Such use is subject to the further provisions that the customer-provided equipment does not endanger the safety of Telephone Company employees or the public; damage, require change in, or alteration of, the equipment or other facilities of the Telephone Company; interfere with the proper functioning of such equipment or facilities; impair the operation of the telecommunications system or otherwise injure the public in its use of the Telephone Company's services. Upon notice from the Telephone Company that the customer-provided equipment is causing or is likely to cause such hazard or interference the customer shall make such change as shall be necessary to remove or prevent such hazard interference.

#### 2.22 Responsibility of the Telephone Company

The Tariffs permitting direct electrical connection of customer-provided communications equipment state in substance:

The Telephone Company shall not be responsible for the installation, operation, or maintenance of any customer-provided communications equipment. Long distance message telecommunications service and WATS service are not represented as adapted to the use of customer-provided equipment and where such equipment are connected to Telephone Company facilities, the responsibility of the Telephone Company shall be limited to the furnishing of facilities suitable for long distance message telecommunications service and WATS service to the maintenance and operation of such facilities

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in a manner proper for such telecommunications service. Subject to this responsibility, the Telephone Company shall not be responsible for (i) the through transmission of signals generated by the customer-provided equipment or for the quality of, or defects in, such transmission, or (ii) the reception of signals by customer-provided equipment. The Telephone Company shall not be responsible to the customer or otherwise if changes in minimum network protection criteria contained in the Tariffs or in any of the facilities, operations, or procedures of the Telephone Company render any customer-provided facilities obsolete or require modification or alteration of such equipment or otherwise affect its use or performance.

2.23 Trouble Reporting Procedure

When trouble is experienced with this service, the customer should perform the necessary testing to sectionalize the difficulty by opening the circuit at the interface connecting block and testing only toward the customer-provided equipment. If the tests indicate that the trouble is in the Telephone Company-provided equipment, it should be promptly reported to the Telephone Company. Trouble reports should be called to the listed "Repair Service" number, which can be found in the front of the telephone directory. The repair attendant should be given:

- (a) Customer's name.
- (b) Customer's address.
- (c) Listed telephone number.
- (d) Description of the trouble.
- (e) Customer's contact for additional information.

### 2.3 Foreign and Surge Voltage Protection

Where telephone lines are exposed to lightning, power circuit contact, or induction, protective devices are installed at the Central Office and on the customer's premises which provide a path to ground for foreign voltages exceeding about 600 volts peak. Since the customer's equipment is connected to the telephone line through the connecting arrangement, the customer's equipment is protected from longitudinal surges by relay isolation.

The customer is responsible for providing protection against foreign and surge voltages from his equipment and facilities being applied to the voice connecting arrangement.

## 3. DESCRIPTION OF CONNECTING ARRANGEMENTS CLV AND RCX

### 3.1 Physical

Connecting Arrangements CLV and RCX (Fig. 1) will be mounted in a covered apparatus box, that will accommodate the required number of units. These arrangements will function satisfactorily within a temperature range of 0° to 55°C and a humidity range from 5 to 95 percent. Leads from these arrangements will be terminated on a Telephone Company-provided interface connecting block (Fig. 2) conveniently located to permit testing, maintenance, trouble isolation, and ease of connection to the customer-provided equipment.

### 3.2 Functions

The major functions of these connecting arrangements are:

- (a) To protect Telephone Company personnel and facilities from potentially hazardous voltages which may be applied through the connecting arrangements to the telecommunications network.

- (b) To detect dc supervision on a PBX Central Office trunk or station line.
- (c) To provide a contact closure to the customer-provided equipment.
- (d) To provide dc and ac isolation to the customer-provided equipment.

### 3.3 Operation

#### 3.31 Connecting Arrangement ClV

When the line is seized by the Telephone Company-provided station or PBX, the relay of Connecting Arrangement ClV operates from the line current, and provides a contact closure to the customer-provided equipment on leads CBS1 and CBS2.

The contact closure will not follow dc dial pulses and will remain closed until the line becomes idle.

#### 3.32 Connecting Arrangement RCX

When the line is seized by the Telephone Company-provided station or PBX, the relay of Connecting Arrangement RCX operates from the line current, and provides a contact closure to the customer-provided equipment on the CDP1 and CDP2 leads. If dc dialing takes place on the line, the contact will open and close with each dial pulse. After dialing, the contact closure will be maintained until the line becomes idle and the relay releases.

#### 3.33 Connecting Arrangements ClV and RCX Combined

When the two arrangements are combined on one line, two contact closures are provided for the customer-provided equipment; one contact

closure as explained in Paragraph 3.31 and another contact closure as explained in Paragraph 3.32.

### 3.4 Interface Leads

Two interface leads per circuit are provided from Connecting Arrangements ClV and RCX to the interface connecting block (Fig. 2) for the customer's use (four leads for combined use). Technical information pertaining to these leads is discussed in Paragraph 4.

### 3.5 Method of Connection

Leads from Connecting Arrangements ClV and RCX will be terminated by the Telephone Company on an interface connecting block (Fig. 2). The customer or his representative will provide and install the conductors from the customer-provided equipment to the interface connecting block and will make the necessary connections to associate his equipment with the connecting arrangement at this terminal box using leads of 22-26 gauge wire. It is recommended that a Reliable Electric R714B Tool or equivalent be used to connect the wires to the "quick-connect" type block shown in Fig. 2. The leads will be designated as follows:

<u>Lead Designation</u>	<u>Function</u>
CDP1, CDP2	ClV on-hook, off-hook supervision
CBS1, CBS2	RCX on-hook, off-hook supervision and dial pulse indication

## 4. ELECTRICAL CHARACTERISTICS

### 4.1 Supervisory Path

The supervisory leads CDP1, CDP2 and CBS1, CBS2 will provide an indication of various dc supervisory conditions of a line. The maximum

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load current on the relay contacts which is applied by the customer-provided equipment shall be limited to .5 ampere. Each contact and associated telephone company wiring will have a nominal 5-ohm dc resistance when the contact is closed. This figure is based on not more than 100 feet of 24-gauge conductor loop or equivalent between the interconnection circuit and the interface connecting block.

The maximum peak voltage permissible across the CBS1 and CBS2 and the CDP1 and CDP2 leads with the contacts open is 135 volts dc. The customer's equipment should provide appropriate contact protection.

#### 4.2 Grounding

It is expected that the customer's equipment, if powered from commercial power, will be grounded in accordance with applicable electrical codes (NEC) and should be bonded to the ground electrode to which the telephone protector is grounded but not using the telephone ground clamp. Self-powered or passive customer's equipment need not be grounded. Provisions should be made within the customer's equipment for connecting together all internal signal grounds. This connection shall be isolated from both the grounding (green) conductor run with the power supply primary conductors and the chassis or frame of the customer-provided equipment.

The customer's signal ground may be obtained with a proper connection to a metallic cold water pipe, using a single No. 14 AWG, or larger copper conductor. The other end should be connected to the ground return terminal of the customer's equipment. The run should be short, straight, and a continuous piece of wire. Proper attention should be given to providing the lowest possible resistance connection at each end of the circuit.

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It is imperative that this ground be connected at the same location to the water piping system or ground electrode as the telephone protector or signal ground lead but not using the Telephone Company ground clamp. This lead shall not be fused.

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5. GLOSSARY \*

COMMUNICATIONS SYSTEMS - denotes channels and other facilities which are capable, when not connected to Long Distance Message Telecommunications Service of communications between customer-provided terminal equipment or Telephone Company stations.

CONNECTING ARRANGEMENT - Connecting Arrangements CLV and RCX provided by the Telephone Company to accomplish the direct electrical connection of customer-provided equipment with the facilities of the Telephone Company.

CUSTOMER-PROVIDED EQUIPMENT - denotes devices or apparatus and their associated wiring, provided by the customer, which do not constitute a communications system and which, when connected to the communications path of the telecommunications system, are so connected either electrically, acoustically, or inductively.

INTERFACE CONNECTING BLOCK - the Telephone Company furnished connecting point to which the customer brings and connects the leads of his equipment and to which the Telephone Company brings and connects leads from the voice connecting arrangement.

+ PEG COUNT - denotes the number of calls offered to a trunk during a predetermined period of time.

\* May differ in letter from exact wording as used in the Tariffs.

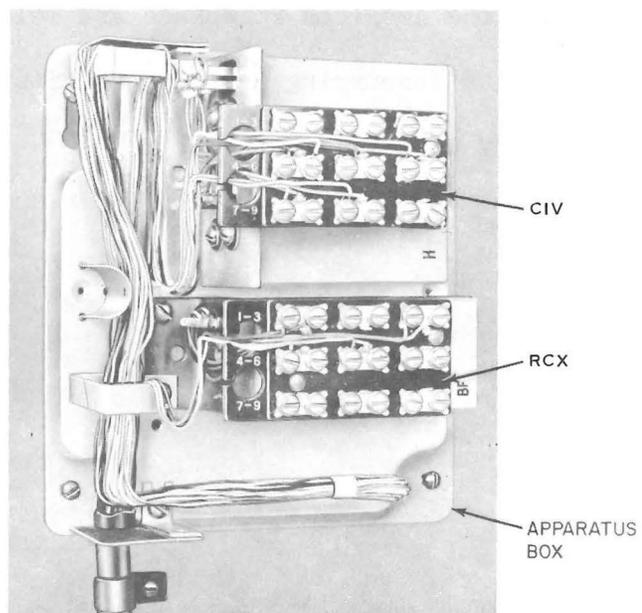
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TELECOMMUNICATIONS NETWORK - the Bell System voice switching equipment, associated interconnecting facilities and station equipment which connects its customer's together.

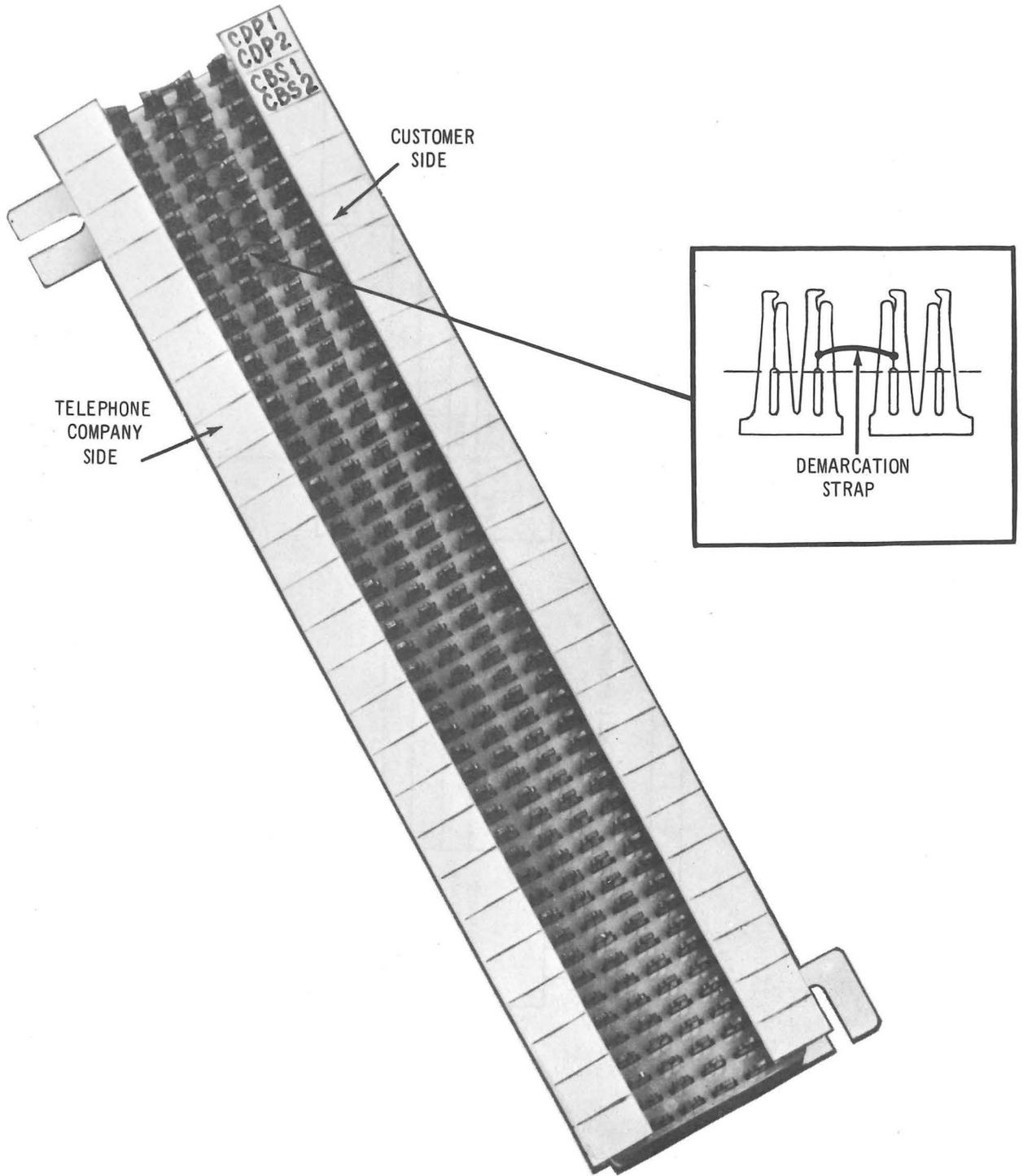
TELEPHONE COMPANY - denotes the American Telephone and Telegraph Company, the Long Lines Department, its concurring carriers and its connecting carriers, either individually or collectively.

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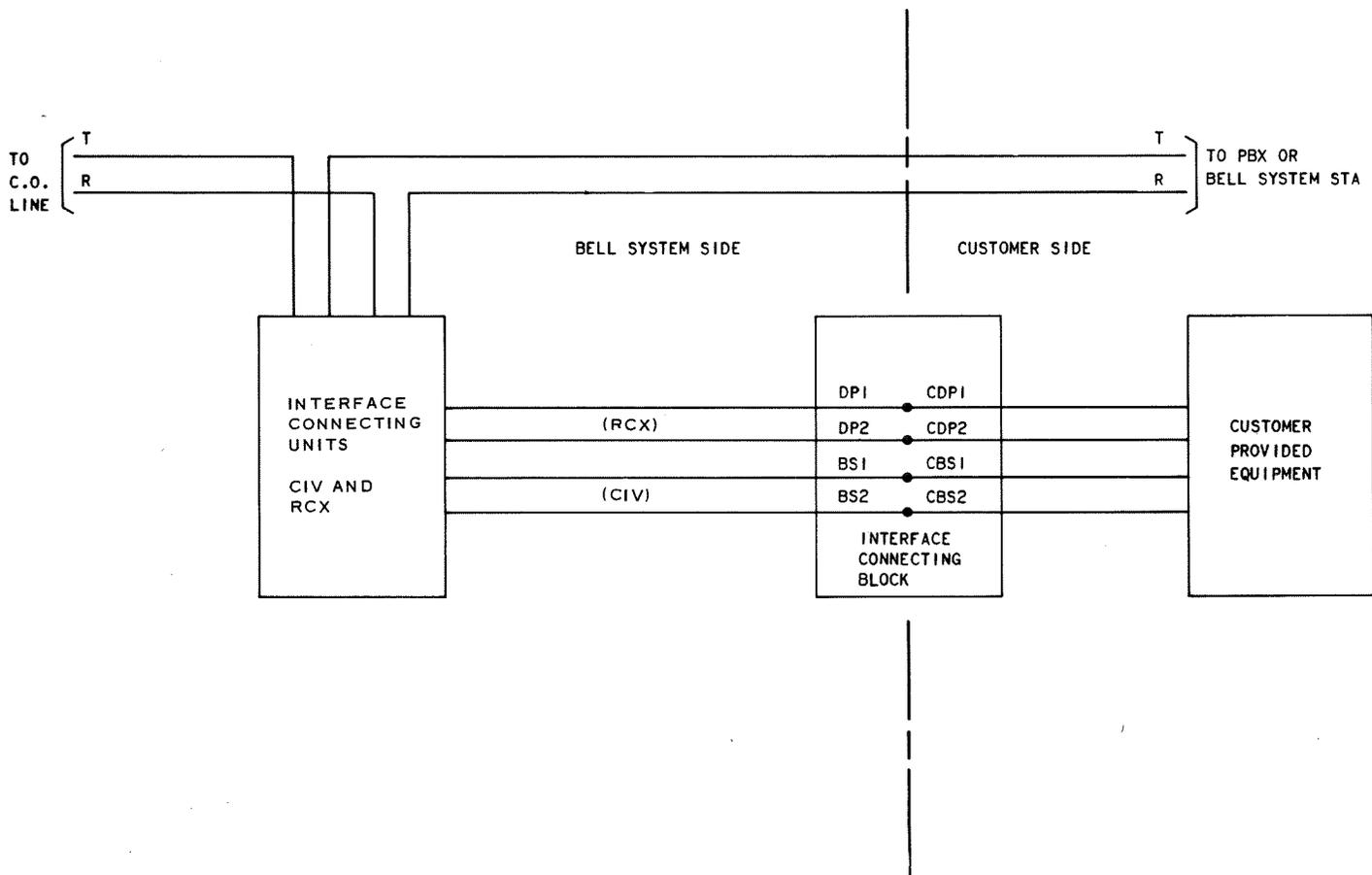


CONNECTING ARRANGEMENTS CIV AND RCX  
FIG. 1

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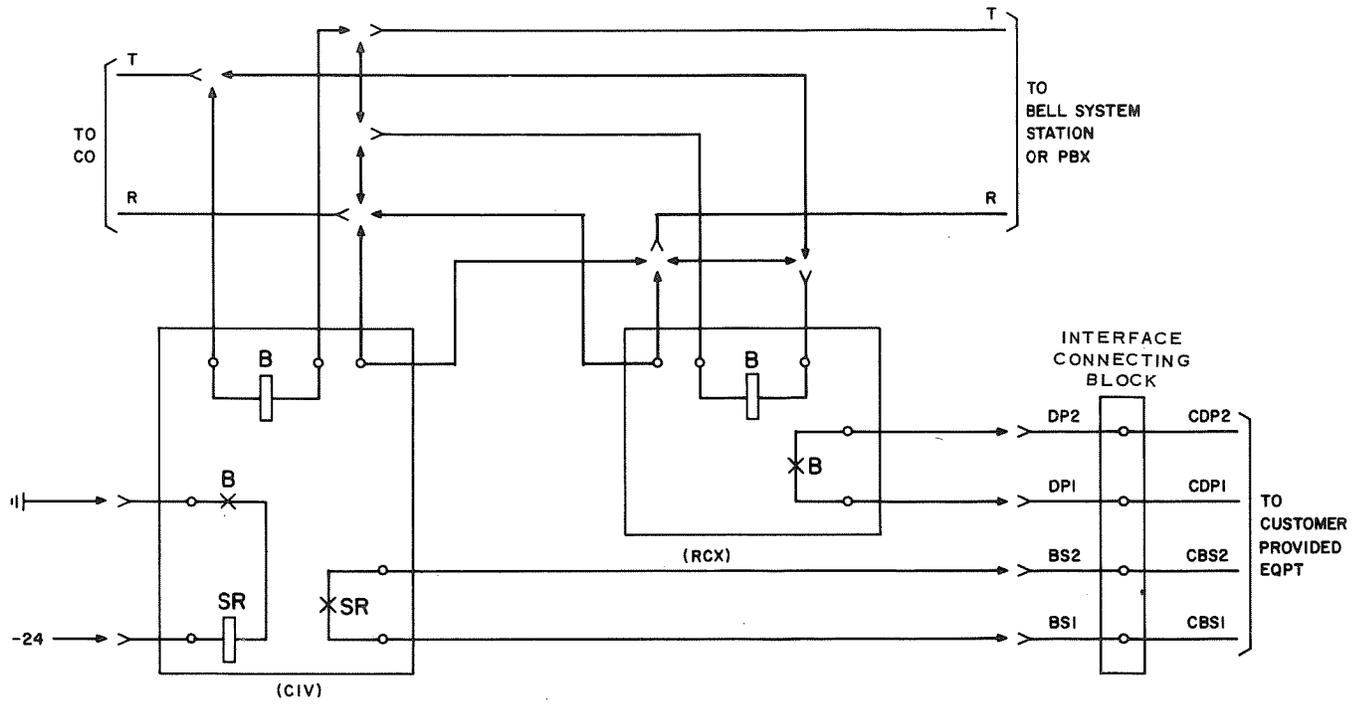
TYPICAL INTERFACE CONNECTING BLOCK  
FIG. 2



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BLOCK DIAGRAM - CONNECTING ARRANGEMENTS CIV AND RCX  
 FIG. 3

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SIMPLIFIED SCHEMATIC - CONNECTING ARRANGEMENTS CIV AND RCX  
FIG. 4