PI-J820-001 Rev A

Gould
884 Remote I/O System

INSTALLATION and OPERATION

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SUBJECT: Describes how to install, operate, and maintain an 884 Remote Input/Output (I/O) system, incorporating the J820 Remote I/O Driver and the J821 Remote I/O Receiver.

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PREFACE

This manual provides the information needed to install the J820 Remote I/O Driver and the J821 Remote I/O Receiver in a 884 remote and local configuration. It also contains the information needed to determine whether the J820 and the J821 are functioning correctly and to correct difficulties.

Section 1 provides general information and a detailed description of the 884 Remote I/O System, which includes the J820 Remote I/O Driver and one or more J821 Remote I/O Receivers. Section 2 provides the information needed for installation and checkout of the units. Section 3 describes normal operation and explains the indicator lights and their interpretation. Section 4 contains maintenance procedures.

Use the following documents in conjunction with this manual:

ML-P190-USE	P190 Programmer User's Guide
PI-884A-001	884 Programming Guide
PI-884A-002	884 System Planning and Installation
PI-884A-006	884 Maintenance

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SECTION 1
GENERAL INFORMATION

1.1 General Description

The 884 Remote I/O System expands the capabilities of the Gould 884 Programmable Controller. The J820 Remote I/O Driver and the J821 Remote I/O Receiver, operating in conjunction with the 884, allow up to five I/O racks of the 884 system to be located up to 7000 feet from the 884 (depending on the type of cable used), allowing remote input and remote output modules to be incorporated into the programmable controller system. Error detection and correction circuitry ensures proper operation of the network.

The 884 Remote I/O System operates exactly the same as the local 884 I/O network, while providing remote I/O capabilities. User programming is done in the same way as with a local system; fault isolation is simplified through the use of indicator lights. The 884 Remote I/O System is fully compatible with all 884 system components. Use of the Remote I/O System requires only that the 884 mainframe be capable of remote communications.

The 884 Remote I/O System may be set up as a multidrop, daisy-chained, or star-shaped network, or as a combination of these. Shielded or unshielded twisted pair wire is used for communications between units.

1.2 Detailed System Description

The J820 Remote I/O Driver resides in I/O slots 4 and 5 of the primary I/O housing, immediately to the right of the 884 mainframe. The 884 and the J820 are connected via an interface cable to the first Modbus port on the 884. Full Modbus capabilities are accessed through a connector on the front of the J820. Alternatively, the Modbus cable can be connected to the second Modbus port on the 884, if desired. A twisted pair cable connected to the J820 provides communications to the remote J821 I/O Receivers and their accompanying housings (racks) within the network. Figure 1-1 shows the J820 Remote I/O Driver.

The J821 Remote I/O Receiver, which resides in the mainframe slot of the primary housing at each remote site, is connected to the J820 by means of the twisted pair cable. One or more I/O housings can be located at each site. Figure 1-2 shows the J821 Remote I/O Receiver.

The part numbers for those 884s which are capable of remote I/O are:

884A-101	884A-111
884A-201	884A-211

Detailed installation instructions are given in Section 2.

Figure 1-1 J820 Remote I/O Driver

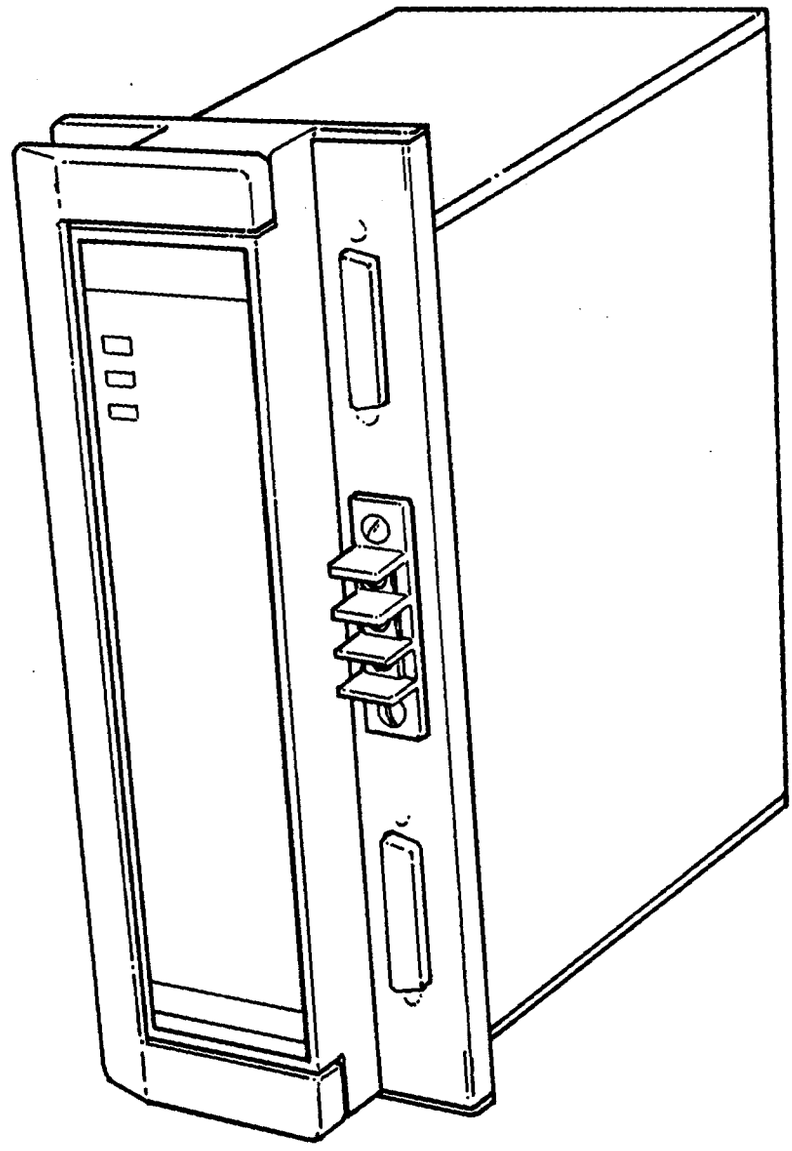
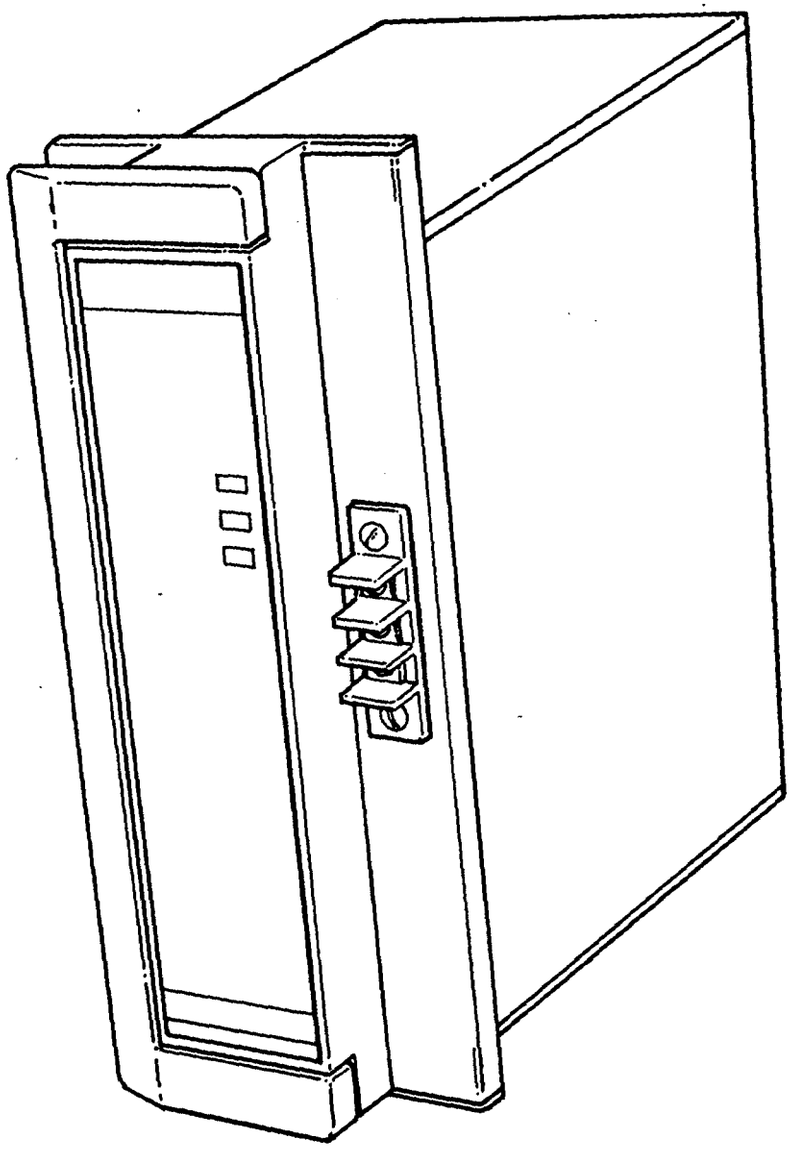


Figure 1-2 J821 Remote I/O Receiver



1.2.1 Specifications

Capacity: The 884 Remote I/O System allows from one to all five I/O housings, with up to 32 I/O modules, to be located at up to five remote sites. Specifically, up to four H827 (11-slot) housings can be used; up to five H819 (7-slot) housings can be used. If all I/O is remote, the housing holding the power supply, 884, and J820 is not considered a housing by the 884, and no I/O modules may be placed in that housing. All I/O with the same housing address must be located at the same site. If more than one housing is located at the same remote site, the housings must have contiguous addresses. Addresses are set with DIP switches on the J820 and J821.

Remote I/O can be combined with local I/O as necessary; a maximum of five total housings can be used.

Speed: Because of the increased communications distance, remote I/O requires slightly more processing time than local I/O. Each remote I/O slot requires from 1.6 to 1.8 msec for a discrete module; analog modules require 2.8 msec. The typical I/O cycle time with 32 remote and active I/O modules is 50 milliseconds. The cycle time will decrease as more I/O is made local. Since I/O processing occurs simultaneously and synchronously with logic scanning, most applications will not cause an increase in logic scan time. Those applications requiring a large number of remote I/O modules combined with little logic to solve may see an increase in logic scan time over the same application with local I/O.

Error Correction and Retries: The 884 Remote I/O System incorporates error detection and correction logic to ensure proper operation. Then, if the J821 Remote I/O Receiver is malfunctioning, the entire housing or housings at that location is reported as unhealthy; if only one module within the remote housing is faulty, the single I/O module is reported as unhealthy. Thus, any failure will appear to the mainframe like one or more absent I/O modules.

Distances and Topologies: Each remote I/O housing may be located up to 3000 feet from the 884 mainframe. Each cable link must be terminated with a resistor. A multidrop, daisy-chain, or star-shaped network structure may be used; combinations of these configurations are also allowed. Section 2 gives details of cable selection, distances for each type of cable, and the possible configurations and how they are installed.

Indicators and Controls: The J820 Remote I/O Driver uses three indicator lights. The READY light indicates that power is supplied to the unit, and it is passing its internal diagnostics. The TRANSMIT light indicates that the unit is transmitting data. The RECEIVE light illuminates whenever the unit receives a valid character. (NOTE: the light is not on if the unit is receiving invalid data or no data at all.) In addition, the J820 uses a DIP switch on the back of the unit to indicate the housing numbers of the remote J821s which it serves.

The J821 Remote I/O Receiver uses the same three indicator lights as the J820: READY, TRANSMIT, and RECEIVE. The RECEIVE light is on whenever the unit receives a valid character, whether the data is addressed to that unit or to another one in the system. The J821 also includes a DIP switch on the back of the unit to indicate its address within the network.

Power Requirements: All input power for the J820 Remote I/O Receiver and J821 Remote I/O Driver is supplied by the P800 Power Supply mounted in the same housing.

Environment: The J820 and J821 have these environmental specifications:

Temperature:	0 to 60 degrees C
Storage Temperature:	-40 to 80 degrees C
Relative Humidity:	0% to 95% (non-condensing)
Shock:	10 G for 10 ms
Vibration:	5 to 50 Hz
	0.625 G (0.005 inches max peak-to-peak)

Dimensions: The J820 and J821 have these dimensions:

Width:	3.53 in (89.66 mm)
Height:	10.47 in (265.94 mm)
Depth:	8.25 in (209.55 mm)

Weight: The J820 and J821 each weigh four (4) pounds.

1.2.2 Self-Testing and Power-up Diagnostics

On powerup, the J820 Remote I/O Driver performs a complete self-test of its PROM and RAM, as well as testing its communications. If these tests fail, the 884 treats all communications as local; the remote I/O modules are ignored.

The J821, on powerup, performs a complete self-test of its PROM and RAM, as well as testing its remote communications. If the J821 fails these tests, the entire housing or housings at that location are reported unhealthy. If the J821 is functioning correctly but individual I/O modules are not healthy or are missing entirely, the 884 sees the appropriate status indicators for those modules.

The READY light does not light until the self-tests and power-up diagnostics have been completed successfully.

The J820 and J821 each use a watchdog timer to halt operation if an internal failure occurs. In addition, if the I/O modules are not regularly updated by the 884, the I/O module's watchdog timer causes outputs to shut off 200 msec after the last valid update from the mainframe.

SECTION 2
INSTALLATION AND CHECKOUT

2.1 List of Equipment

The 884 Remote I/O System includes the equipment listed in Table 2-1. To use the 884 Remote I/O System, your 884 must be remote-I/O capable. The part numbers for remote-I/O capable units are given in Section 1. If your 884 is not remote-I/O capable, contact Gould, Inc. PCD Customer Service (Salem, N.H., 603-893-0400) to arrange for an exchange of your unit. Additional components you will need for installation are shown in Table 2-2.

Table 2-1 Equipment Supplied

Quantity	Description	Part Number
1	J820 Remote I/O Driver (with termination resistor)	J820-000
1-4	J821 Remote I/O Receiver (with termination resistor)	J821-000
1	J820-to-884 Interface Cable	W809-000

NOTE: the termination resistor may also be purchased by the customer if necessary. A 100 ohm, 1/4 watt, carbon composition (not wire-wound), 5% resistor is needed.

Table 2-2 Additional Equipment Needed

Quantity	Description	Part Number
1-5	Twisted-pair cable(s) for remote connection	Customer-supplied: cable recommmendations are given in Table 2-3.

If, after opening the shipping carton, you notice damaged or missing equipment, please contact the Salem, New Hampshire facility of Gould, Inc., Programmable Control Division by calling (603) 893-0400 and asking for a logistic expediter.

Table 2-3 Cable Selection Information

Vendor	Part No.	Description	Maximum Distance
Belden	9152	Unshielded Twisted Pair Speaker Wire	3000 feet
Belden	8460	Unshielded Twisted Pair Speaker Wire	3400 feet
Belden	8470	Unshielded Twisted Pair Speaker Wire	3700 feet
Belden	8760	Shielded Twisted Pair	2000 feet
Belden	8795	Unshielded Telephone Pair	2800 feet
Belden	9182	Shielded Twin Axial Data Cable	5100 feet
Belden	9184	Shielded Twin Axial Data Cable	5100 feet
Belden	RG59B/U	Coaxial Cable	6300 feet
Belden	RG62A/U	Coaxial Cable	6900 feet

NOTE: The cables above have been tested and are recommended by Gould, Inc. While the 884 Remote I/O network has been designed for maximum noise tolerance, only these cables have been tested. The best performance will result if the cables above are used and installed as recommended. If a cable of another type must be used, follow these guidelines:

1. Determine the maximum distance from the driver to any receiver, measured along the cable.

2. Determine, from the cable manufacturer's specifications, the attenuation per foot of cable at 1.375 MHz (which is the carrier frequency of the remote I/O system).

3. The remote I/O modems drive 8 volts peak-to-peak into the cable. The minimum signal level at the receiver should be no less than 500 millivolts for reliable operation. If the calculated attenuation of the selected cable for the maximum distance from the driver to any receiver is greater than 500 millivolts, the cable can be used safely.

4. If the characteristic impedance of the cable (as specified by the manufacturer) is different from 100 ohms ($\pm$ 10%) then termination resistors of value equal to the characteristic impedance should be substituted for those supplied.

2.2 Preparing for Installation

When installing the J820 and J821 modules into the 884 network, the 884 must be programmed for the I/O housings and modules in the network. When programming the 884, the I/O housings and modules, whether remote or local, are entered the same way. No special programming is required.

NOTE

When configuring the 884 programmable controller, the presence of the J821 and J820 modules is not indicated on the screen. Their presence and proper functioning is seen only by the list of I/O modules; the letters B8 will be seen, indicated that the modules there are not I/O modules. If, for example, an I/O module in a remote housing can be seen in the list of I/O modules, the remote housing and the J821 at that location are obviously functioning properly. If an entire set of I/O modules at a remote location is missing, the J821 may be malfunctioning and the troubleshooting chart in Section 4 should be consulted.

I/O housings are shown on the screen of the P190 as racks; the two terms are equivalent.

In setting up the network, the 884 system allows four H827 housings or five H819 housings, with part numbers as shown below.

For J820s, these housings may be used:

Primary Housing: H827-007, H819-007
Secondary Housing: H827-000, H819-000 (for secondary local I/O units)

For J821s, these housings may be used:
Remote Primary Housing: H827-003, H827-007, H819-003, H819-007
Remote Secondary Housing: H827-000, H819-000 (for secondary remote I/O units)

Three configurations can be used to install the 884 Remote I/O System: daisy-chained, multidrop, and star-shaped. Combinations of the configurations are permitted. Each configuration requires different cabling and termination, and will have different restrictions on the cable lengths. Several possible configurations are shown in Figure 2-1. In any configuration, a primary housing and one or more secondary housings can be used at any remote location.

Daisy-chained Network: In a daisy-chained network, each module, whether a J820 or J821, is daisy-chained to the next module. The cabling may be run through wire troughs or loose, as required. The two end units, whether they are J821s or a J820, must have termination resistors. The J821s may not be further than the distance specified in Table 2-3 for the cable used from the J820. (Two J821s can be twice that distance apart, if they are the two ends of the daisy-chain.)

Star-shaped Network: In a star-shaped network, each J821 is directly connnected by its own cable back to the J820. No module may be more than the recommended distance from the J820; all units with cables more than 20 feet long must have termination resistors. A maximum of four points (spokes) on the star is permitted.

Multidrop Network: In a multidrop network, the individual J821s are cabled by "stubs" off a single main cable to the J820. The main cable is usually in a wire trough. The stubs, which must be less than 20 feet long, may be connected to the main cable by soldering, barrier strips, or wire nuts. Only the two furthest units (the J820 and the furthest J821) require termination resistors.

Combinations: Combinations of the above networks can be created as needed. For example, a star-shaped network could include two daisy-chained units and a stub unit. Resistors should not be placed on stubs or intermediate units of a daisy-chain; all other units should be terminated. Figure 2-1 shows various network configurations. No single remote J821 unit should be more than the recommended distance from the J820.

Section 2.5 gives detailed environmental considerations that should be used when planning the cable routing and installation.

These steps must be followed to set up the J820 and J821 modules for installation:

1. Set the DIP switch on the J820 Remote I/O Driver to indicate which housings (racks) of I/O are remote and which are local. The DIP switch uses one switch per remote housing: switch 1 indicates housing 1, switch 2 indicates housing 2, and so on. To indicate that a housing will be remote, set the switch to ON for each housing that will be remote (from 1 through 5), as shown in Figure 2-2. (Figure 2-2 shows the J820 DIP switch for housings 2, 4, and 5 remote.)

   If all housings (racks) are to be remote and no local I/O is desired, only the P800 power supply, 884, and J820 should be placed in the housing. Then, DIP switch positions 1 to 5 should be set to ON. The housing with the power supply, 884, and J820 is not considered as a remote housing in this configuration.

2. Set the DIP switch on each J821 Remote I/O Receiver to indicate which housing or housings (rack or racks) will be controlled by that particular J821. Each position of the DIP switch indicates a single housing. To indicate a housing, set the switch to ON for that housing. Figure 2-3 shows the J821 DIP switch to indicate that housing 2 is to be controlled by that J821.

Figure 2-1 Network Diagrams

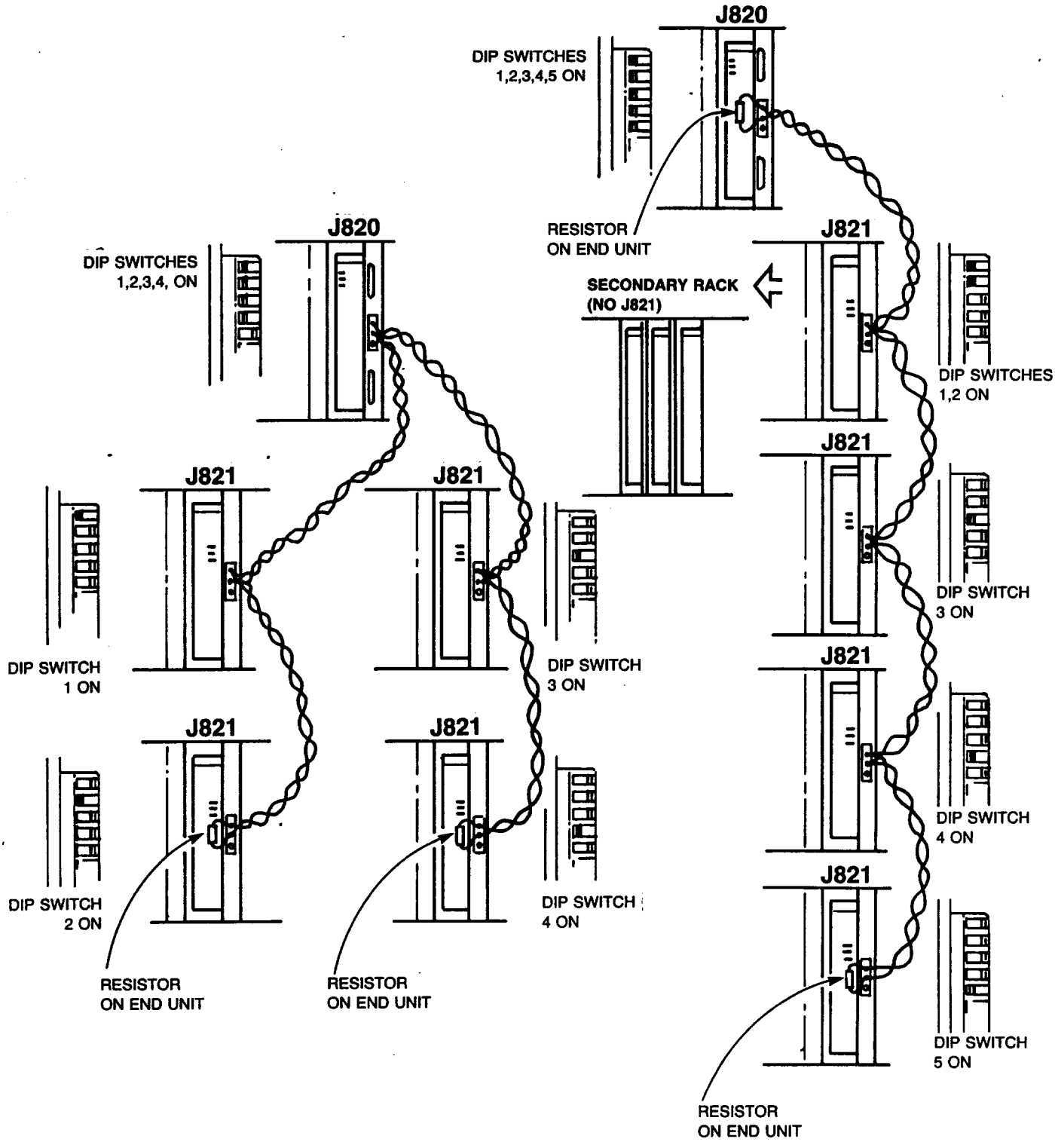


Figure 2-1 Network Diagrams (continued)

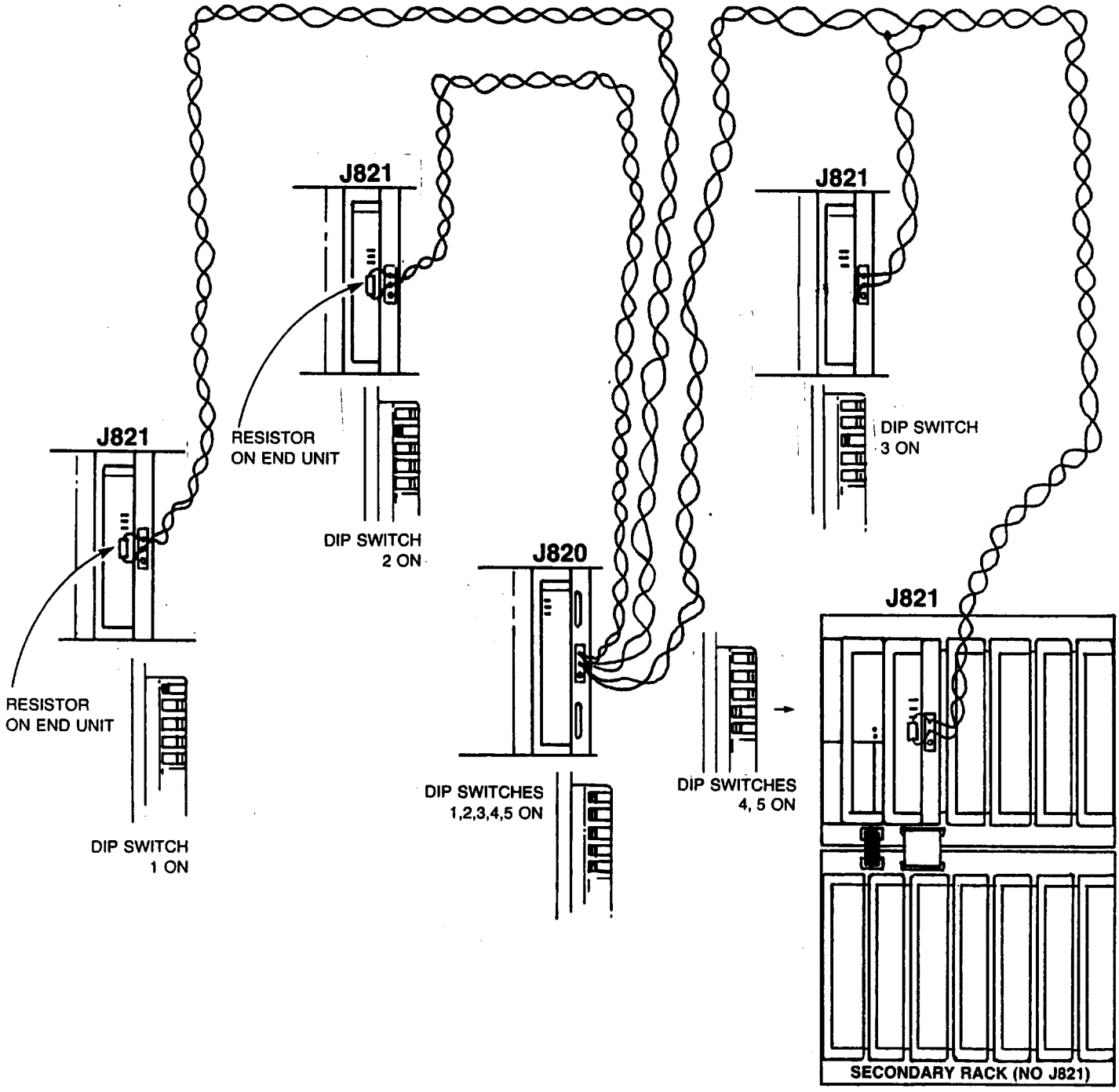


Figure 2-2 J820 DIP Switch and Settings

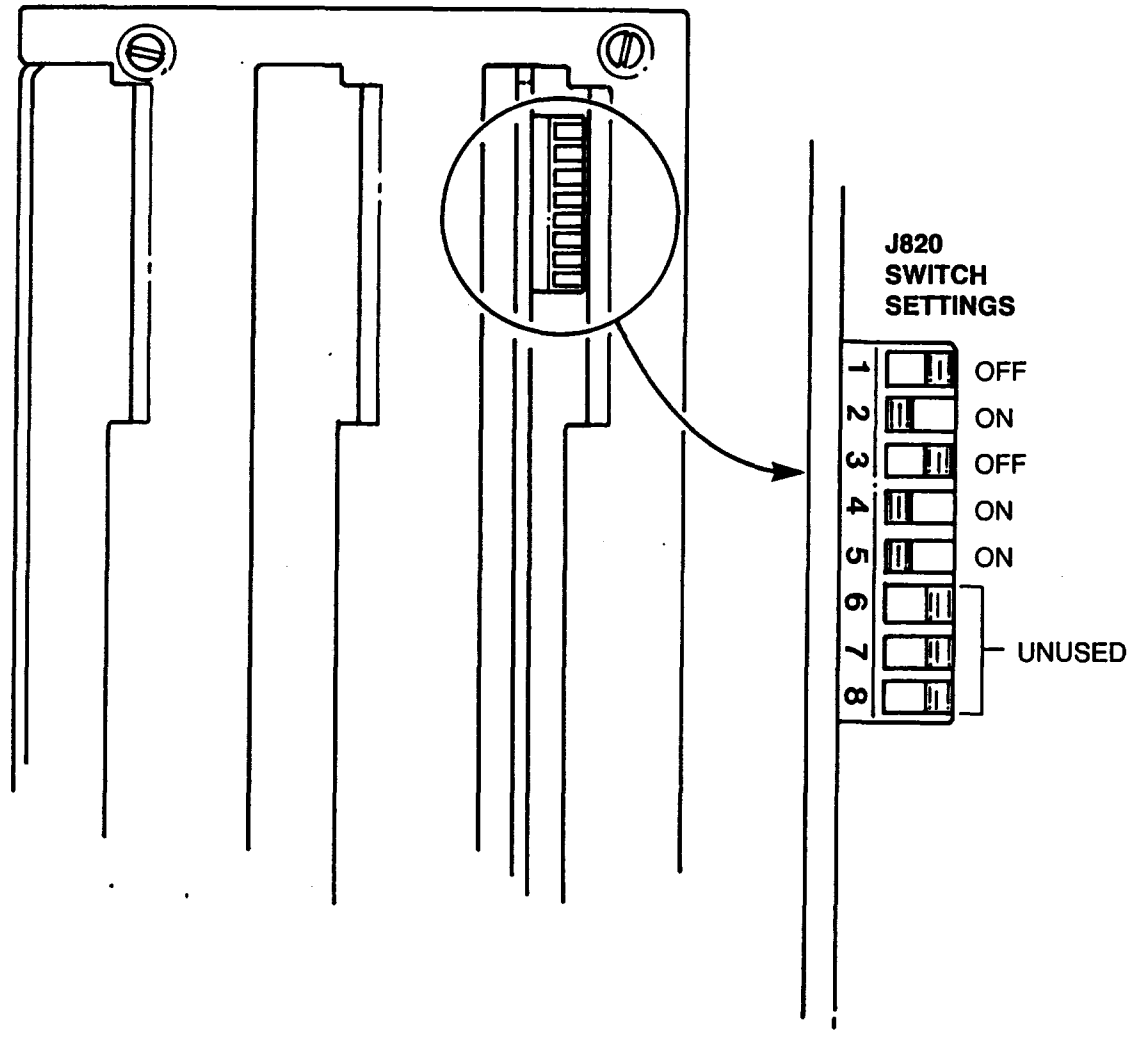


Figure 2-3 J821 DIP Switch and Settings

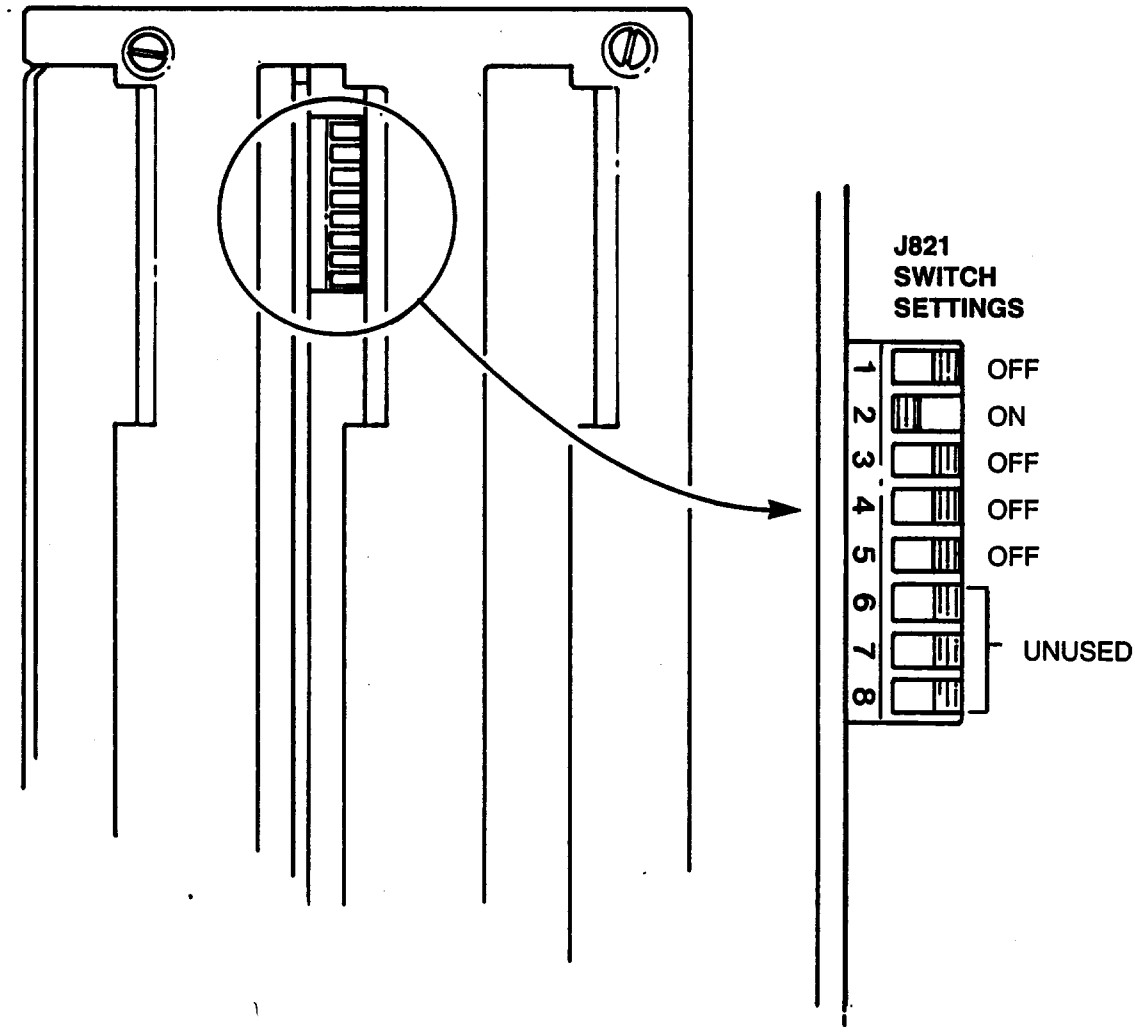
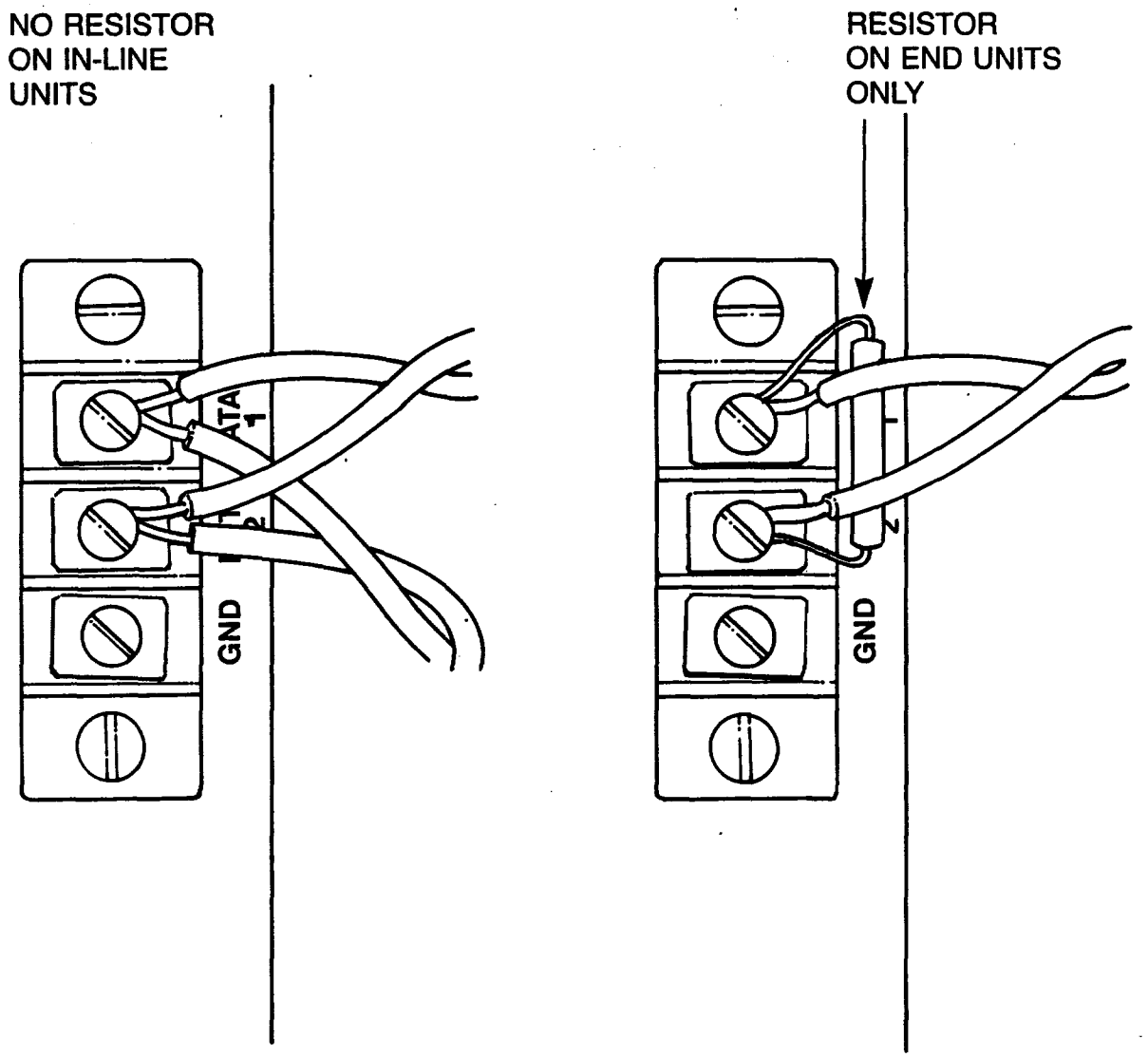


Figure 2-4 Termination of Units



For multiple housings (racks) at a given remote location, the DIP switch position for each housing must be set. For example, if housings 2 and 3 are at the same location--and thus using the same J821--positions 2 and 3 of the DIP switch would both be set to on. When multiple housings are used at a single location, the two housings must use contiguous housing numbers; for example, housings 2 and 3 could share a J821, while housings 2 and 4 could not.

The primary housing (rack) at the remote location gives the number of the lowest DIP switch set to ON in the J821 installed in the housing. The first secondary housing is the next highest number, and so on.

3. When the J820 and the J821 are installed in a network, certain units of the installation will require termination. To terminate the end units correctly, a termination resistor is used. The termination resistor is shipped installed on every unit and should be removed for those units which do not require termination. Figure 2-4 shows the J821 with and without the termination resistor.

2.3 Installing the 884 Remote I/O System

2.3.1 Rack Placement

At each remote site, the first I/O housing--the Primary housing--must contain a J821 Remote I/O Receiver. One or more secondary housings may also be located at the same site. The housings must be contiguous; housings 2 and 3 can be located at the same site, while housings 2 and 4 cannot. Housings (racks) and interconnecting cables should be placed as indicated in the 884 Programmable Controller System Planning and Installation manual.

2.3.2 The J820 Remote I/O Driver

To install the J820 Remote I/O Driver, follow these steps:

1. Remove the plastic field wiring terminal strips from I/O slots 4 and 5 of the master housing holding the 884; I/O slots 4 and 5 are immediately to the right of the 884. The terminal strips are removed by unscrewing the Phillips-head screws at the top and bottom of unit, as shown in Figure 2-5.

2. Insert the J820 into slot 1 to the right of the 884 mainframe, connecting the backplane. Tighten the captive screws at the top and bottom of the unit.

3. Connect the interface cable from the Modbus port of the 884 to the lower D-connector on the J820, as shown in Figure 2-6. Connect the Modbus cable (that was connected to the Modbus port of the 884) to the top right D-connector of the J820. (The Modbus cable can also be connected to the second Modbus port of the 884, if desired and if the 884 is equipped with a second Modbus port.)

Figure 2-5 Removing the Field Wiring Terminal Strip

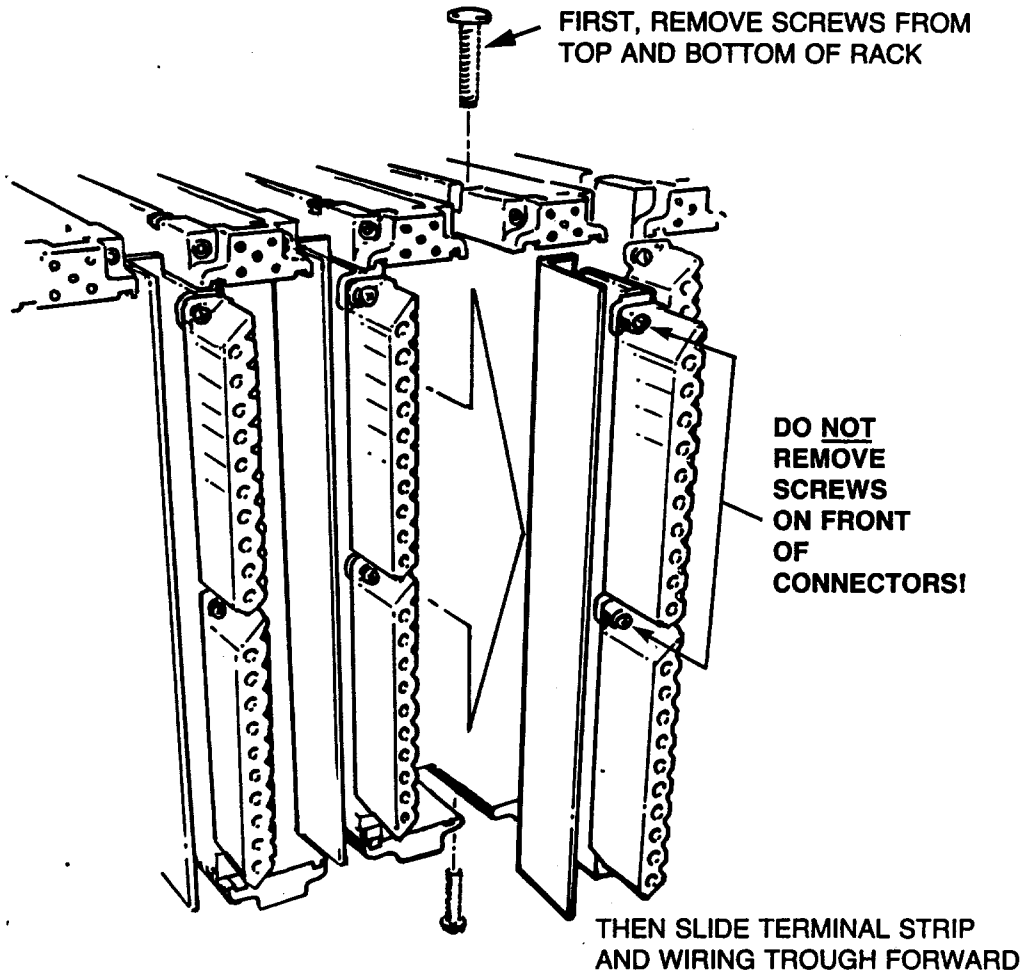
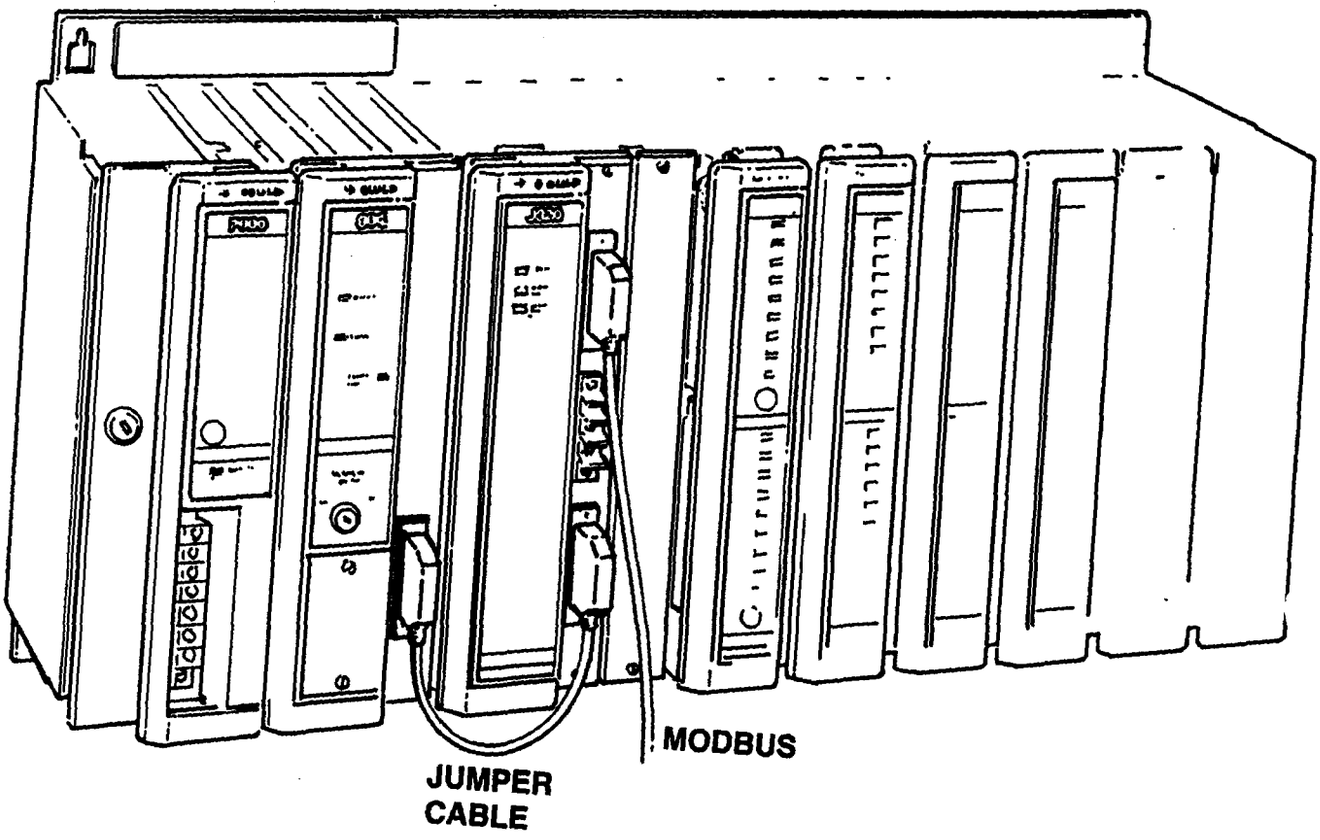


Figure 2-6 Connecting the J820 Cables to the 884



4. Connect the twisted pair cable or cables to the front of the J820. One of the two wire goes to DATA1, the other to DATA2. If shielded cable is used, the shield should be connected to GND of the J820 **ONLY**. If coaxial cable or unshielded cable is used, only DATA1 and DATA2 are used.

2.3.3 J821 Remote I/O Receiver

To install the J821 Remote I/O Receiver, follow these steps:

1. Check the DIP switch on the back of the J821 to verify that it corresponds to the housing number of the housing in which it will be installed.

2. Insert the J821 into the mainframe (884) slot of the remote housing. Remove the field wiring terminal strip, if necessary, as shown in Figure 2-5. Figure 2-7 shows the J821 in a housing of I/O modules.

3. Connect the twisted pair cable or cables to the screw terminal on the front of the unit. One end goes to the DATA1 screw, the other to the DATA2 screw. If shielded cable is used, the shield is not connected to the J821 ground screw; coaxial cable also uses only the DATA1 and and DATA2 screws.

2.4 System Checkout

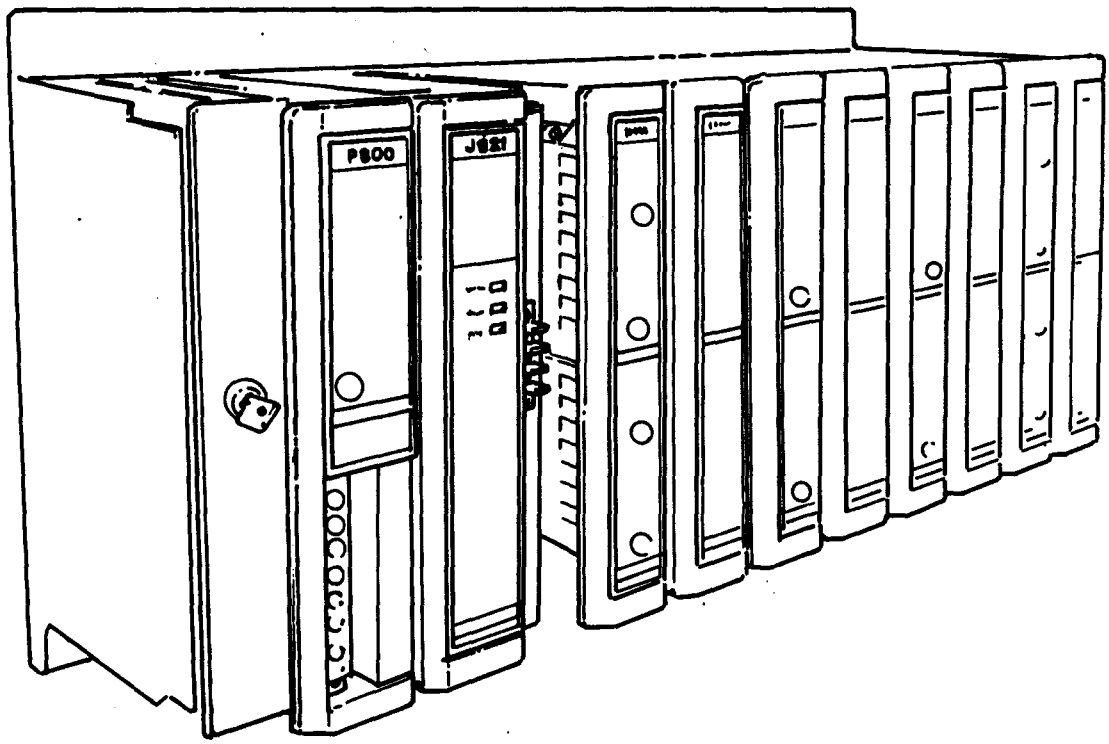
To test the 884 Remote I/O System, follow these steps:

1. Verify that the 884 Programmable Controller has been programmed to indicate that the desired remote and local housings and I/O modules are present. As units are added to the network, the P190's display will indicate that they are present and reporting in with data, or that they are programmed but not reporting.

2. Using the 884 and the P190, verify that the remote housings of I/O are reported correctly. If an entire housing is missing, there may be problems with the J821 or the power supply at that location; if a single I/O module is reported unhealthy, the J821 is fine, and the problem is in the I/O module. See section 4 for details of troubleshooting the J820 and the J821.

Refer to the System Planning and Installation Guide for details of the procedures for configuring I/O and checking I/O status.

Figure 2-7 The J821 in a Rack of I/O Modules



2.5 Environmental Considerations

When configuring systems using the 884 Remote I/O System and twisted pair cable, these guidelines should be used.

Earth Ground Guidelines: The outer shield of the cable (if shielded cable is used) must be physically connected to earth ground at one (and only one) point in the network. Shielded cables used for 884 Remote I/O installations must be connected to the GND screw at the J820 ONLY. At all other locations, the cable shield must be floating relative to earth ground. The cable shield must be insulated from every junction box as it leaves and enters, except for the one earth ground at the J820. All junction boxes should be grounded to one of the following: cold water pipe electrode, power service conduit, service equipment enclosure, or the grounding electrode of the power service of a multigrounded neutral power system. Other appropriate grounding methods may be used if none of the above are possible. The grounds used should be separate from grounds used for motors and generators.

Under no circumstances should the cable be grounded to steam or hot water pipes, lighting rod conductor, or rod electrodes grounding other than multiground neutral power circuits. Lightning protection should be installed for overhead outside cables.

Cable Routing Guidelines: Cable should be laid out in a route which protects it from excessive heat, moisture, mechanical stress or electrical noise. The maximum practical separation between power conductors and the cable protects against noise coupling. (For example, a minimum of six inches should be maintained from 480V power lines with a short circuit capacity of 500 amp.) If the data transmission cable must cross power lines carrying over 480V, they should cross only at right angles.

Environmental considerations are important in cable routing. The following problems are some of the most frequent sources of cable damage and signal impairment:

Temperature: Cable attenuation (loss of signal) increases with temperature. Also, routing cable through areas with high temperatures or large changes in temperature causes premature cable aging.

Moisture: Moisture can enter a cable through damaged insulation jackets and loose connectors. Water vapor can condense and migrate through the shield. Pollutants may be introduced into the cable and lead to a degradation of the cable and of the data transmission. Underground cables may be affected by moisture-bearing chemicals from the soil.

Electrical: Electrical noise or electromagnetic fields created by electrical machinery, electrostatic painters, welders, and radio transmitters should be avoided. Static electricity (often caused by vibration and friction) can affect the operation of the cable. Cable should be routed where vibration of carriers and mountings is at a minimum. (See list of specific equipment and separation distances below.)

Rodents: Underground and low-mounted cables are subject to rodent damage, which may allow water to enter the cable.

To reduce the likelihood of electrical and electromagnetic interference, cable should be routed away from the equipment listed below wherever possible. The minimum separation distance is given for the worst case, parallel run situations.

* Air conditioners, elevators, escalators, large blowers, and machine tools
* Radios and televisions
* Intercommunication and security signal system
* Fluorescent, incandescent, and neon lighting fixtures, 3.3 feet (1 meter)
* Power wiring, transformers, generators, and alternators, 10 feet (3 meters)
* RF stabilized arc welders, 14 feet (4.3 meters)
* 3 KW plastic welders, 45 feet (14 meters)
* 3 KW wood gluers, 45 feet (14 meters)
* 12 KW plastic preheaters, 14 feet (4.3 meters)
* RF induction heaters, 24 feet (7.3 meters)
* Automotive induction noise, 12 feet (3.7 meters)
* Transmitting systems (commercial broadcast, CB, navigation, radar, and remote communications) with the following power output: 50 KW--6600 feet (2000 meters); 100 W--330 feet (100 meters); 5 W--66 feet (20 meters)

Results of Improper System Planning: Operation in an area with a lot of electrical noise can reduce the amoung of information sent and received (network throughput). Extensive error checking virtually eliminates any possibility of a command being implemented as a result of an undetected error. Following the guidelines above ensures a more efficient communications system.

SECTION 3
OPERATION

3.1 Normal Operation

In normal operation, the J820 Remote I/O Driver and the J821 Remote I/O Receiver use three indicator lights: READY, TRANSMIT, and RECEIVE.

The **READY** light indicates that power is being supplied to the unit and that the unit is passing its diagnostics. This light should be on at all times.

The **TRANSMIT** light indicates that the unit is transmitting data. This light is whenever the unit is transmitting, regardless of the cable quality and whether the receiving unit is working.

The **RECEIVE** light turns on whenever the unit receives a valid character, whether or not the data is addressed to that unit. (This can be useful in troubleshooting, where the light is on if any J821 is receiving valid data.) NOTE: if the unit is receiving invalid (bad) data, the light is not on.

3.2 Abnormal Operation

If the J820 or J821 is not operating properly, these symptoms are seen, and the troubleshooting chart in Section 4 should be consulted to determine the correct course of action:

1. The READY light is not on.

2. The RECEIVE light of any unit is on, while the RECEIVE light of another unit in the system is not on.

3. An entire rack of I/O modules at a single site is reported as unhealthy; this occurs if the J821 at that site is bad.

4. All remote I/O racks are reported as unhealthy; this occurs if the J820 is bad or if the cable is bad.

5. No Modbus transmissions are occurring; if this happens, the interface cable between the 884 and the J820 should be replaced.

SECTION 4
MAINTENANCE

4.1 Maintenance Procedures

Maintenance and troubleshooting procedures are shown in Table 4-1 J820 and J821 Troubleshooting Chart. If the J820 or J821 is found to be faulty, it should be removed and replaced, as described in section 4.2.

4.2 Removal and Replacement of J820 Remote I/O Driver and J821 Remote I/O Receiver

To remove and replace the J820 and J821, follow these steps:

1. Disconnect all power to the J820 or J821 by turning off the power supply.

   CAUTION

   Damage may result if the J820 or J821 is installed or removed with the power connected.

2. Looking at the front of the unit, make a note whether a termination resistor is used. Then, disconnnect the cables to the unit--there may be more than one cable, depending on the configuration--and the termination resistor, if there is one. Figure 4-1 shows the cable and the termination resistor.

3. On the J820 Remote I/O Driver only, disconnect the interface cable connected to the 884 at the lower D-connector and disconnect the Modbus cable from the upper D-connector. These steps are shown in Figure 4-2.

   The D-connector is disconnected by sliding the slide latch connector up and then gently removing the cable.

4. Unscrew the top and bottom captive screws holding the unit in place, and slide the unit forward until it is free of the backplane.

5. Remove the unit from the slot and replace it with a new unit of the same type. Set the DIP switches on the new unit to match the old unit. Slide the unit in gently, and tighten the top and bottom captive screws.

6. Reconnect the appropriate cables:

   For the J820, reconnect the remote cable or cables. If a termination resistor was used on the old unit, make sure a termination resistor is properly attached to the new unit. Connect the interface cable to the 884 (by sliding the connector slide up and back down, gently locking the cable into place), and Modbus cable at the upper D-connector. (On 884s with two Modbus ports, the Modbus cable may be attached to the second port of the 884; in this case, the cable would be left as is.)

   For the J821, reconnect the remote cable or cables. If a termination resistor was used on the old unit, make sure a termination resistor is properly attached to the new unit.

7. Reconnect the power by turning the power supply on. Section 2 provides system checkout information.

Figure 4-1 Disconnecting the Remote Twisted Pair Cable and Resistor

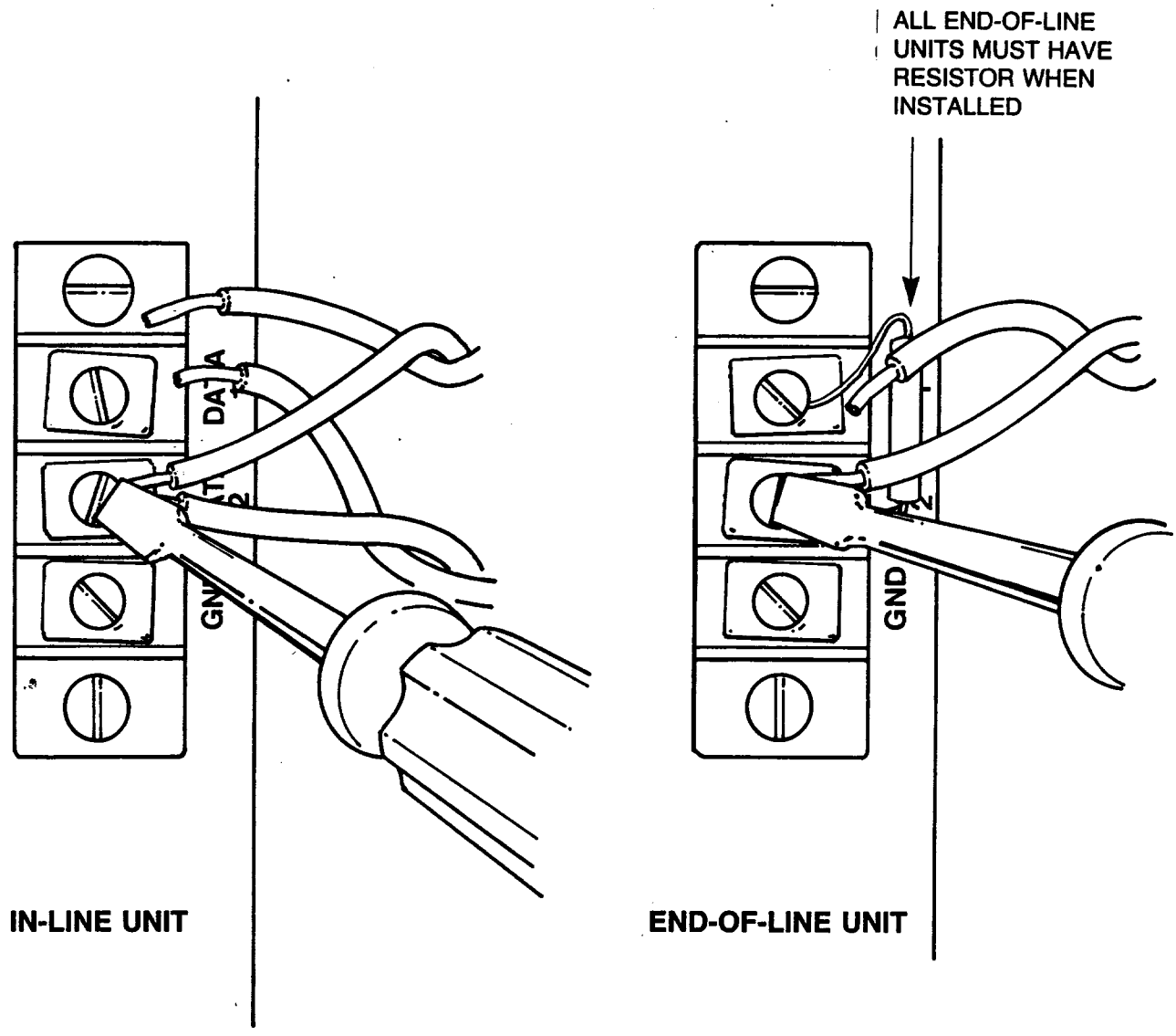


Figure 4-2 Disconnecting the J820 and 884 Cables

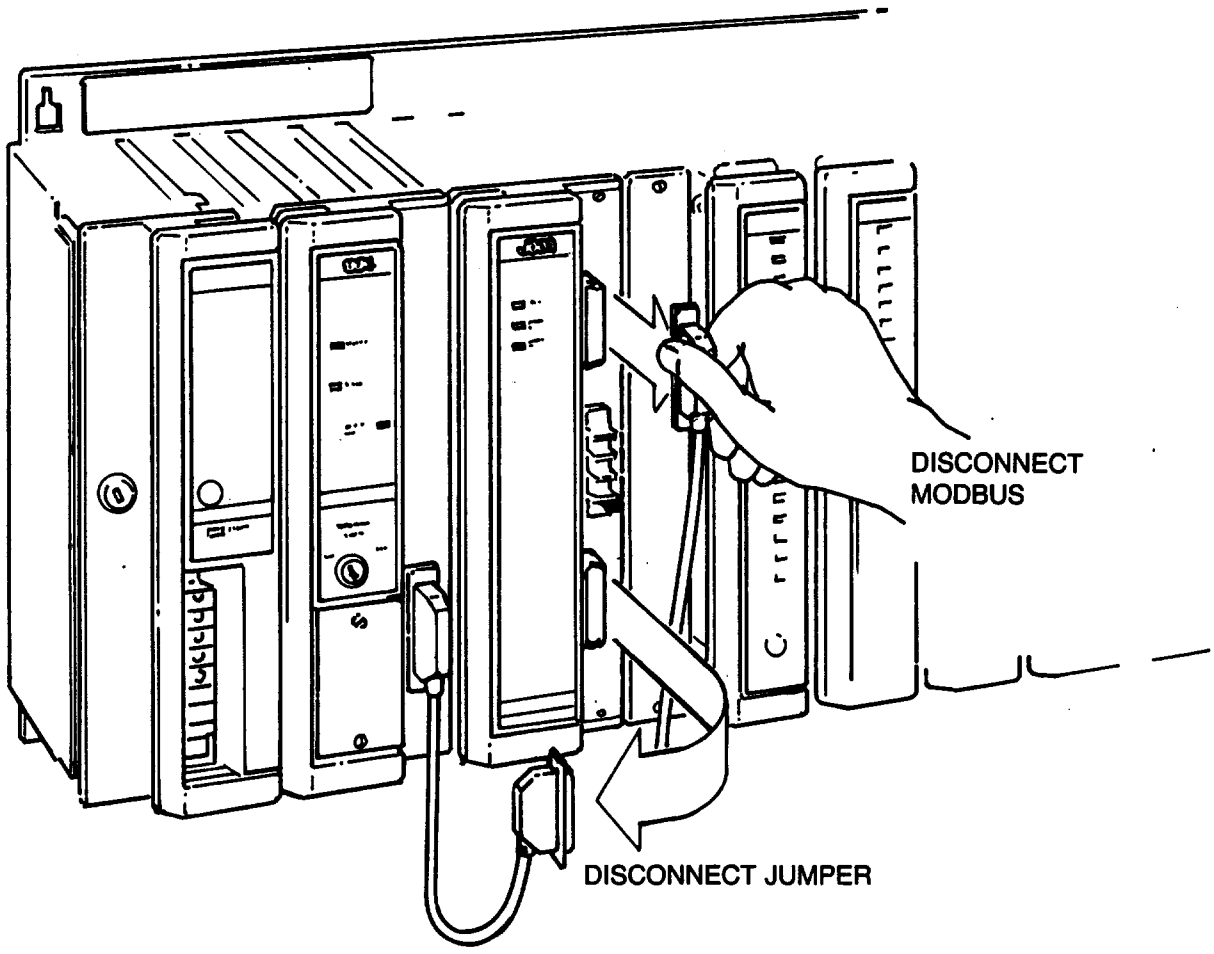
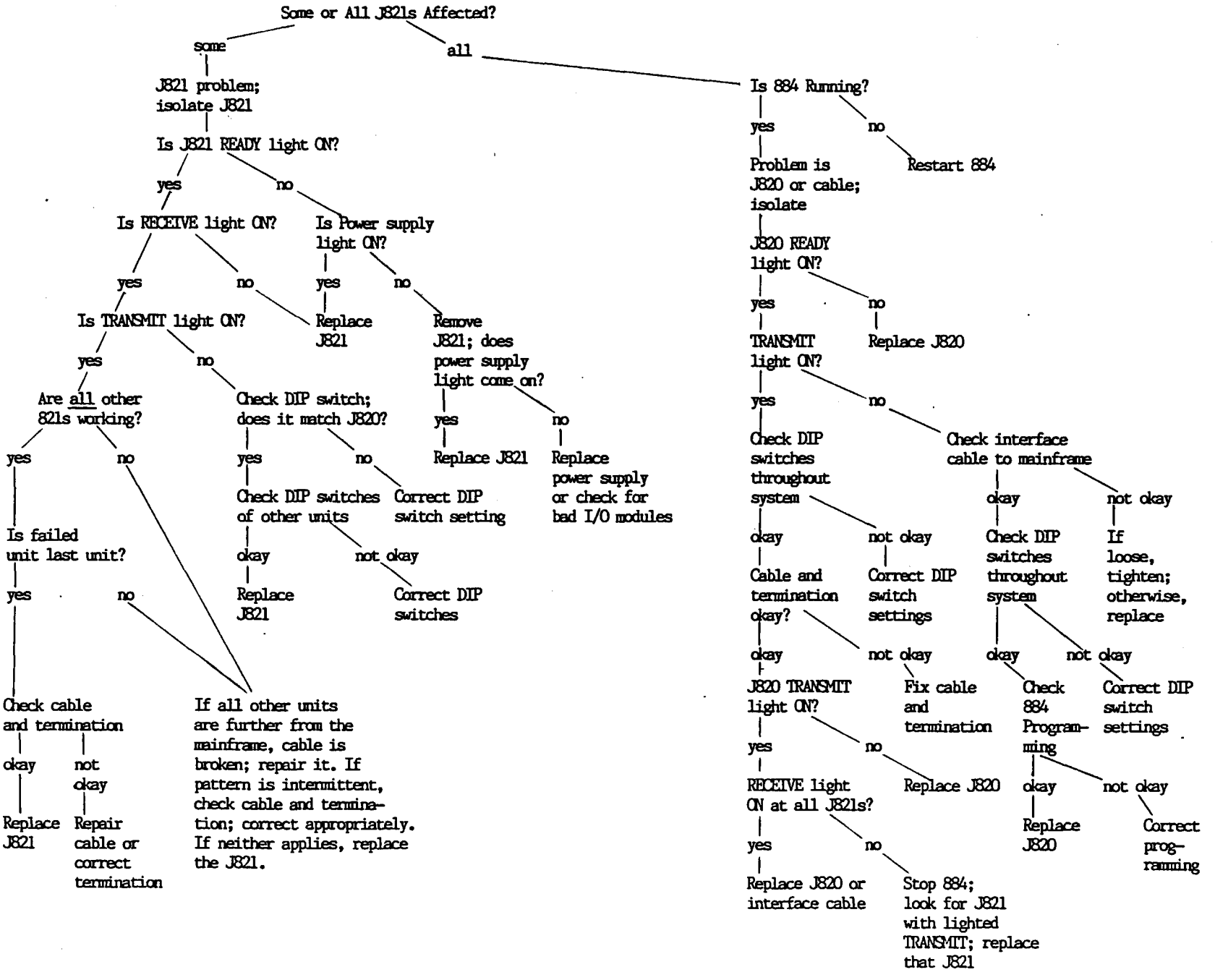


Table 4-1 Troubleshooting Flowchart for the J820 and J821



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