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DATA TRANSLATION®

UM-10710-A

DT777
User Manual

Screw Terminal Panel
for Chromatography Boards

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First Edition
June, 1991

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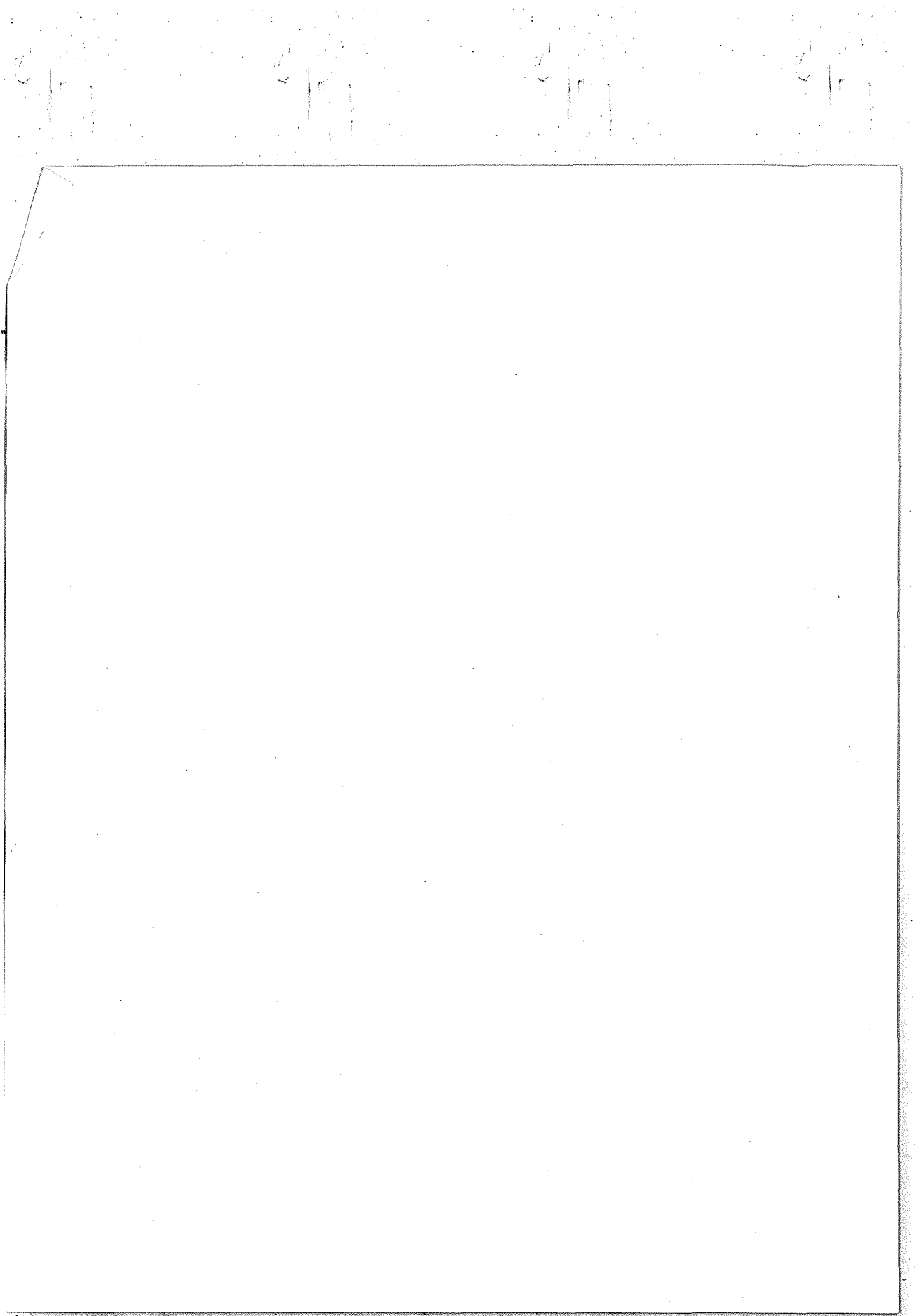
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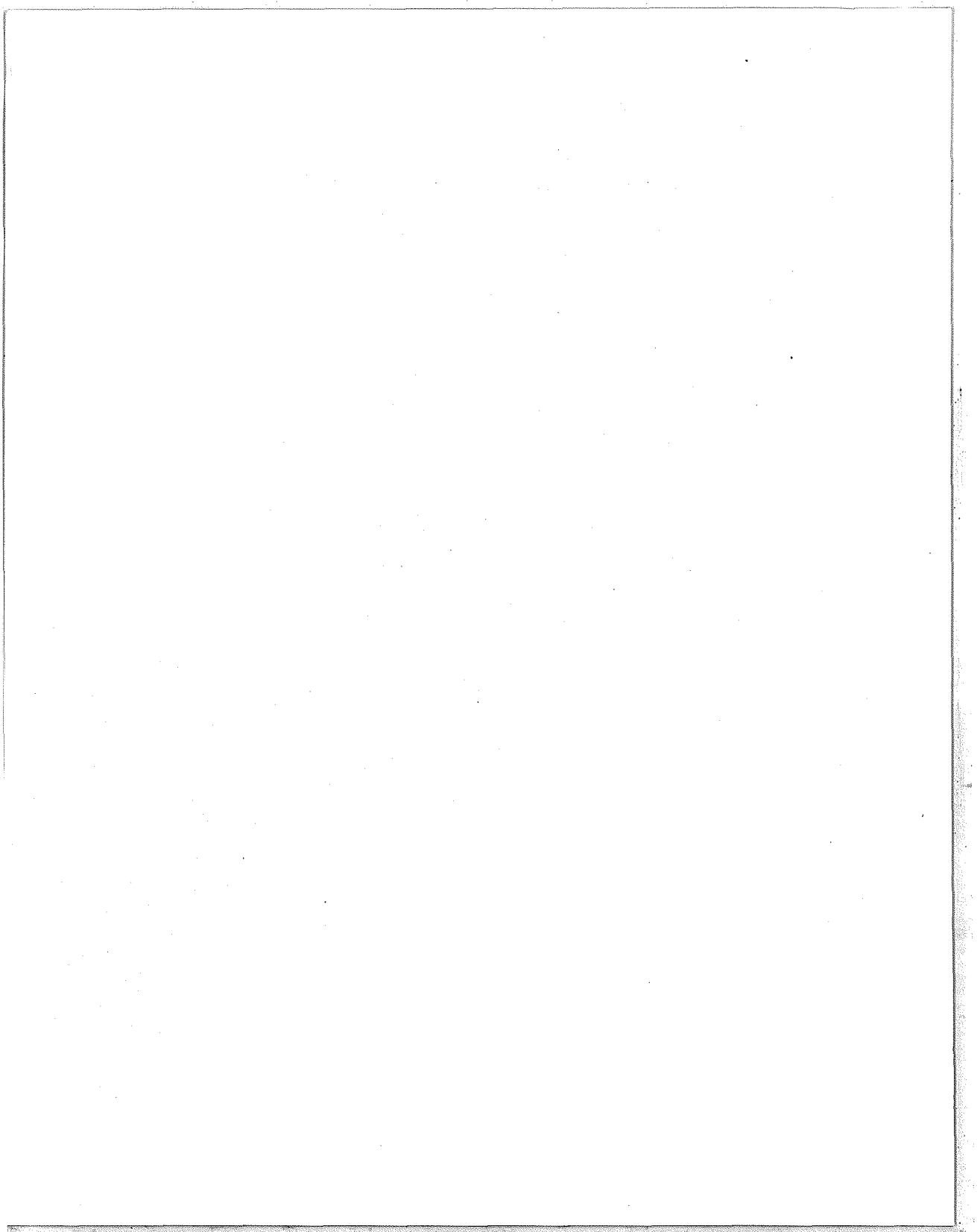
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How to Use This Manual

This manual describes Data Translation's DT777 screw terminal panel. This panel facilitates user connections to Data Translation's chromatography boards.

Listed below is an overview of the information presented in this manual.

Chapter 1, "**Getting Started**," introduces you to the major features of the DT777 screw terminal panel and explains how to connect it to chromatography boards.

Chapter 2, "**Using the DT777**," describes how to connect the DT777 to the various subsystems on chromatography boards.

Reference 1, "**Attenuation Resistors**," lists the resistor networks for attenuating detector signals.

Reference 2, "**Connector Pin Assignments**," lists the pin assignments for the DT777's J1 connector.

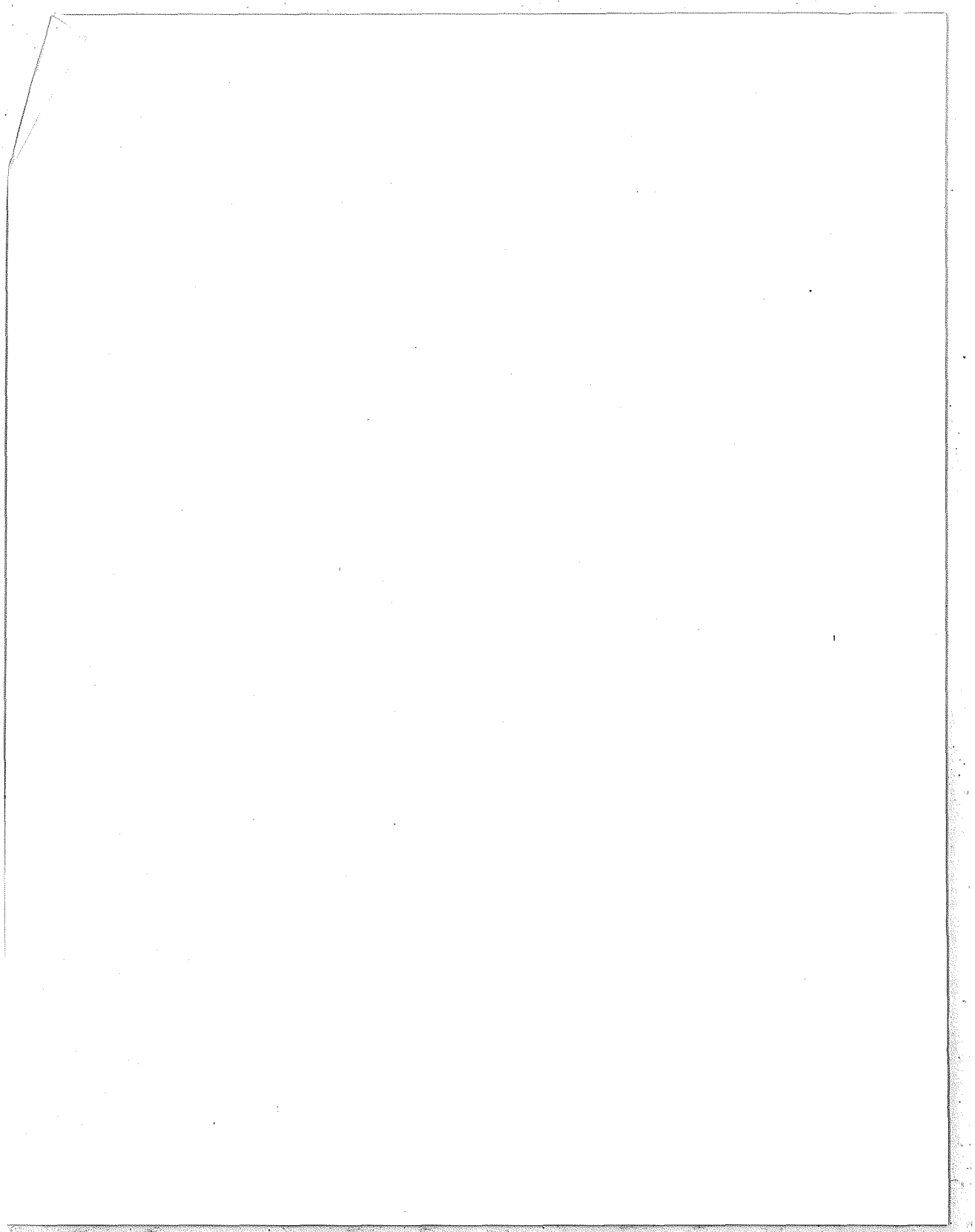
Reference 3, "**Specifications**," lists the electrical and physical specifications for the DT777.

Reference 4, "**Troubleshooting**," explains what to do if you encounter difficulty using your screw terminal panel.

Where to Get Help

If you have difficulty installing or using your screw terminal panel, see Reference 4, "Troubleshooting."

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Chapter 1

Getting Started

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*Chapter 1, "**Getting Started**," describes the DT777 screw terminal panel and explains how to connect it to a Data Translation chromatography board. This chapter is organized as follows:*

- *About the DT777*
- *Unpacking*
- *Connecting to a Chromatography Board*

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About the DT777

The DT777 screw terminal panel is an accessory product which permits the user connections to a chromatography board to be made on screw terminals. The function of each screw terminal on the panel is indicated by a silk-screened label.

The DT777 can accommodate signal attenuation on the detector inputs, effectively extending the detector input range of the chromatography board.

The DT777 provides transient overvoltage protection on the input switch detectors and output switches, protecting both the chromatography board and the user's interface from transient overvoltages.

The DT777 screw terminal panel has an optional rugged fully-shielded plastic enclosure. Data Translation recommends you use this enclosure to shield the screw terminal panel from air flow and electrical noise.

Required Equipment

The following equipment is required to install and use the DT777 screw terminal panel:

- Data Translation chromatography board
- EP777 cable assembly (available from Data Translation)
- Flat blade screwdriver

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Accessory Products

The EP777 cable assembly (available from Data Translation) consists of individually shielded twisted pairs housed in a 6-ft flexible cable. This cable assembly has a D-shell connector at each end. One end plugs into connector J1 on the chromatography board. The other end plugs into the J1 connector on the DT777.

Data Translation also has a resistor pack which provides the additional resistors required to attenuate the detector input signals. Consult the factory for ordering information for this resistor pack.

The EP246 shielded enclosure (available from Data Translation) helps preserve the integrity of analog signals by shielding the DT777 from electrical noise (RFI and EMI) and from ambient airflow. Data Translation recommends using the EP246 enclosure for best performance.

Note *If you do not use the EP246, protect your connections to the DT2802 following one of these two methods:*

(1) Enclose the DT777 in a metal box and connect the metal box to SGND on the DT777. The metal box will provide shielding from air flow and electrical noise.

(2) Enclose the DT777 in a cardboard box or wrap it in bubble pack to shield it from air flow. This method does not shield the connections from electrical noise.

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Unpacking

The screw terminal panel package includes the following items:

- DT777 screw terminal panel
- *DT777 User Manual*

Note *Save the original packing material in the unlikely event that your panel requires servicing in the future.*

If an item is missing or damaged, call Data Translation's **Customer Service Department** at **(508) 481-3700**. They will guide you through the appropriate steps for replacing missing or damaged items.

Note *If you are located outside the USA or Canada, call your local distributor. The name and telephone number of your nearest distributor are listed in your Data Translation catalog.*

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Connecting to a Chromatography Board

The following steps explain how to connect the DT777 screw terminal panel to a chromatography board.

Note *The chromatography board must be installed in your computer before you begin. Refer to the user manual supplied with your board for installation instructions.*

1. Turn off the computer and all accessories.

2. Position the computer so that you can easily access the chromatography board's rear panel connector (J1).

3. Attach one end of the cable to the J1 connector on the screw terminal panel.

4. Attach the other end of the cable to the rear panel connector (J1) of the chromatography board.

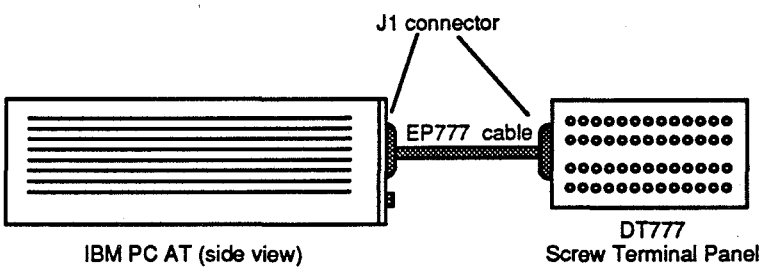


Figure 1: Connecting to a Chromatography Board

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Chapter 2



Using the DT777

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*Chapter 2, "**Using the DT777**," explains how to connect devices to the various subsystems on the chromatography board via the screw terminal panel. This chapter is organized as follows:*

- *Screw Terminal Assignments*
- *Detector Connections*
- *External Event Device Connections*
- *Other Connections*

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Screw Terminal Assignments

Connections for the chromatography board's data acquisition subsystem and external event switches are made by connecting the board's J1 connector pins to the screw terminals. Each J1 signal name is indicated directly on the panel next to the corresponding screw terminal.

The DT777 screw terminal panel accommodates the differential analog input signal from a detector. Blank circuit pads provided onboard the panel allow you to install a resistor network to attenuate the detector signal. Tables 1 and 2 on page 21 list the resistors necessary for attenuating a 5V and 10V detector input signal.

Figure 2 illustrates the screw terminal and resistor locations for the DT777. Refer to this figure while performing the connection procedures listed in the sections that follow.

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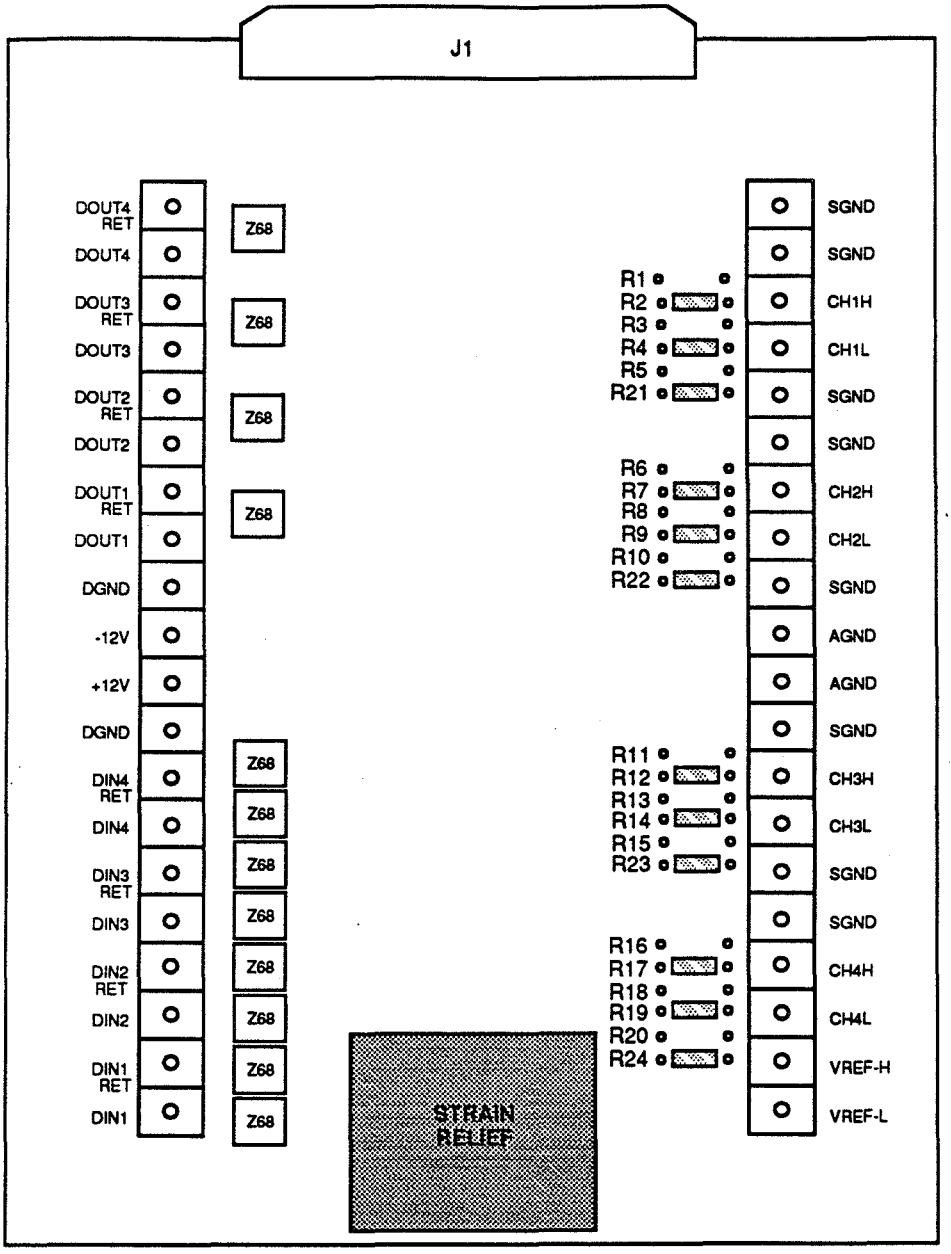


Figure 2: DT777 Screw Terminal Assignments

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Detector Connections

The DT777 screw terminal panel accommodates connections for up to four detectors to the chromatography board. Each integrator on the board supports two detector input channels. Integrator A supports channel 1 and channel 2; integrator B supports channel 3 and channel 4.

The detector connections are differential. Each channel has a separate return. Differential inputs are relatively insensitive to electrical noise since the integrator sees only the difference in voltage between the high and return sides of each channel. The DT777 provides a 100kΩ resistor from each channel return to AGND. This resistor provides a return path for the bias current input.

The chromatography board is capable of converting analog input voltages ranging from –0.207V to +2.000V. The detector you are connecting need not have a voltage output that ranges to +2.000V. If your detector's output voltage exceeds +2V, however, you must reduce the voltage using a resistor divider circuit. The DT777 screw terminal panel can accommodate 5V and 10V detector outputs. Refer to "Detector Input Attenuation" on page 13 for more information.

In order to reduce the noise pickup in the cabling, use a shielded twisted pair cable for each detector input connection. The two wires that make up the pair are used for the signal HI and signal LOW connections. The shield protects the signal wires from outside electrical influences. For further information about making detector connections, see Chapter 4, "Detector Connections," in the *DT2802 User Manual*.

To connect the detector to the DT777 (no signal attenuation):

1. Connect the screw terminal panel to the chromatography board.

2. Connect the voltage output from the detector to the desired channel terminal on the screw terminal panel.

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3. Connect the low side of the detector to the corresponding low terminal for that channel.

4. Connect the shield to the SGND terminal on the screw terminal panel. *Do NOT connect the other end of the shield to the detector! (See Figure 3.)*

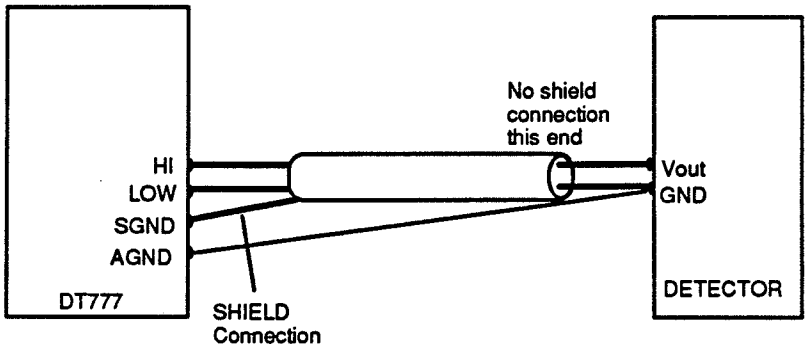


Figure 3: Preferred Detector Connections

Note *If you cannot connect the shield at the DT777, leave that end unconnected and connect the other end of the shield to the detector as shown in Figure 4.*

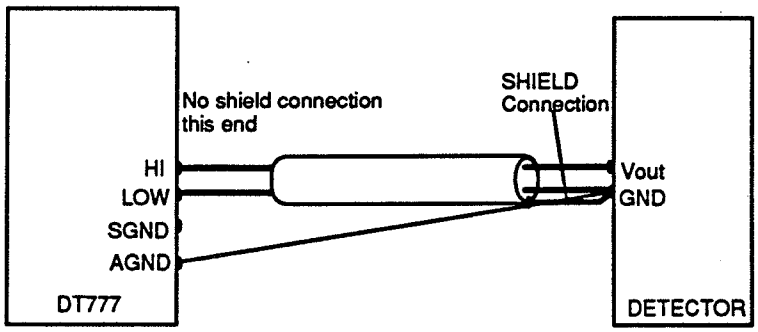


Figure 4: Alternate Detector Connections

When the shield is connected, it carries no electrical current. This means that the entire shield is at the same voltage, making it an equipotential or electrostatic shield.

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5. Connect a wire between the AGND terminal on the screw terminal panel and the detector GND terminal.

6. Connect each detector input to the DT777 in this manner. Shielding the input channels from each other minimizes crosstalk, particularly when one input channel is near full-scale and the other is near zero.

Detector Input Attenuation

The DT777 provides circuit pads for installing resistors for attenuating the detector input signal. Each detector input channel can be configured with resistors to increase the –0.207V to +2.000V input range of the chromatography board to –0.500V to +5.000V or –1.000V to +10.00V.

Each detector input channel requires a network of three individual precision, low temperature coefficient resistors. Zero ohm resistors are factory-installed at the appropriate locations to provide a factory configuration of no attenuation. When you attenuate the detector signal, all four detector input channels must be configured for the same level of attenuation.

To install the resistor network:

1. Cut the 0Ω resistors from the DT777. See Tables 1 and 2 on page 21 for the resistors to remove.

2. Install the attenuation resistors for each input channel at the appropriate locations. See Tables 1 and 2 on page 21 for the resistors to use and the resistor locations for each input channel.

3. Make each detector input connection as described in the previous section.

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External Event Device Connections

The DT777 provides screw terminal connections for the input switch detectors and output switches of the chromatography board. The chromatography board protects the input switch detectors to ±50V. The DT777 provides transient (surge) voltage protection with a metal oxide varistor (MOV) connected in parallel at each input switch detector terminal. The MOV protection devices enhance the input protection already provided by the chromatography board.

The chromatography board's output switches are optically isolated switch closures having a voltage rating of 24VDC. There is an MOV connected in parallel at each output switch terminal for transient (surge) voltage protection.

Input Connections

Many external devices in a chromatographic system output a signal when an event occurs at that device. You can connect this signal output to one of the input switch detectors on the chromatography board.

To connect an input signal to the DT777:

1. Connect the high side of the input signal to the desired input switch terminal on the DT777.

2. Connect the low side of the input signal to the corresponding input switch low terminal on the DT777.

Note *Use a shielded cable for minimum noise on the input signal to the detector.*

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Output Switch Connections

Many external devices in a chromatographic system accept a switch closure signal from another device. These devices use this signal as a trigger to perform a particular activity during the separation.

To connect an output switch to an external device:

1. Connect one lead of the cable between the desired switch low terminal on the DT777 and a GND terminal on the device.

2. Connect the other leads on the cable to the corresponding switch high terminal on the DT777 and the input terminal on the device.

Note *Use a shielded cable for minimum noise on the input signal to the detector.*

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Other Connections

±12V Supplies The chromatography board provides the user access to the ±12V supplies of the PC/AT bus. These lines are brought out to screw terminal connections on the DT777. Returns for the supplies are provided through DGND. The amount of power available is 10mA from each supply.

Vref I/O The chromatography board provides access to the internal voltage reference of integrator A. You may use the Vref connection to input a stable, precision voltage reference or use the integrator's own reference voltage as an output.

To sense integrator A's internal reference, you must buffer the Vref I/O and Vref RETURN signals with low drift, low bias current op amps. (Data Translation recommends OP-27 op amps.) You must make a differential amplifier with a gain of 1.00 (see Figure 5) where the positive input is the buffered Vref I/O and the negative input is the Vref RETURN. The output of the differential amplifier is then an "image" of the +5.000V internal reference with respect to your ground system.

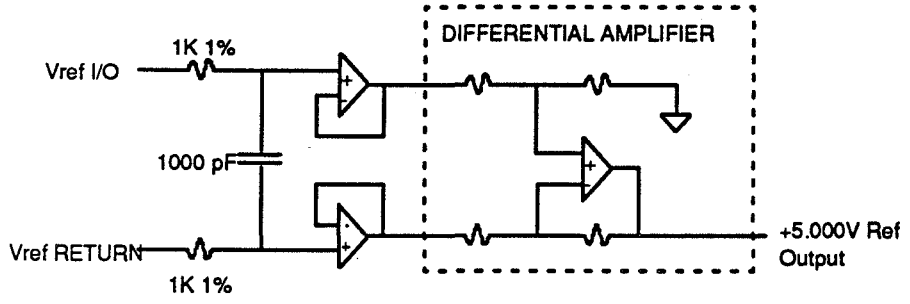


Figure 5: Sensing Vref

To supply a voltage reference to the chromatography board, you must provide a voltage source of +5.000V ±1%. This voltage source must be an op amp or other low impedance output with respect to the Vref RETURN signal. See Figure 6 on the following page.

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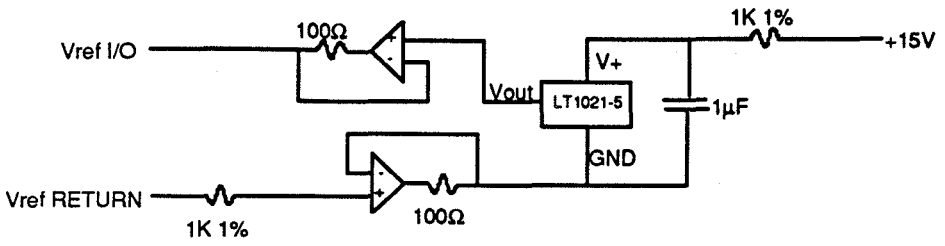
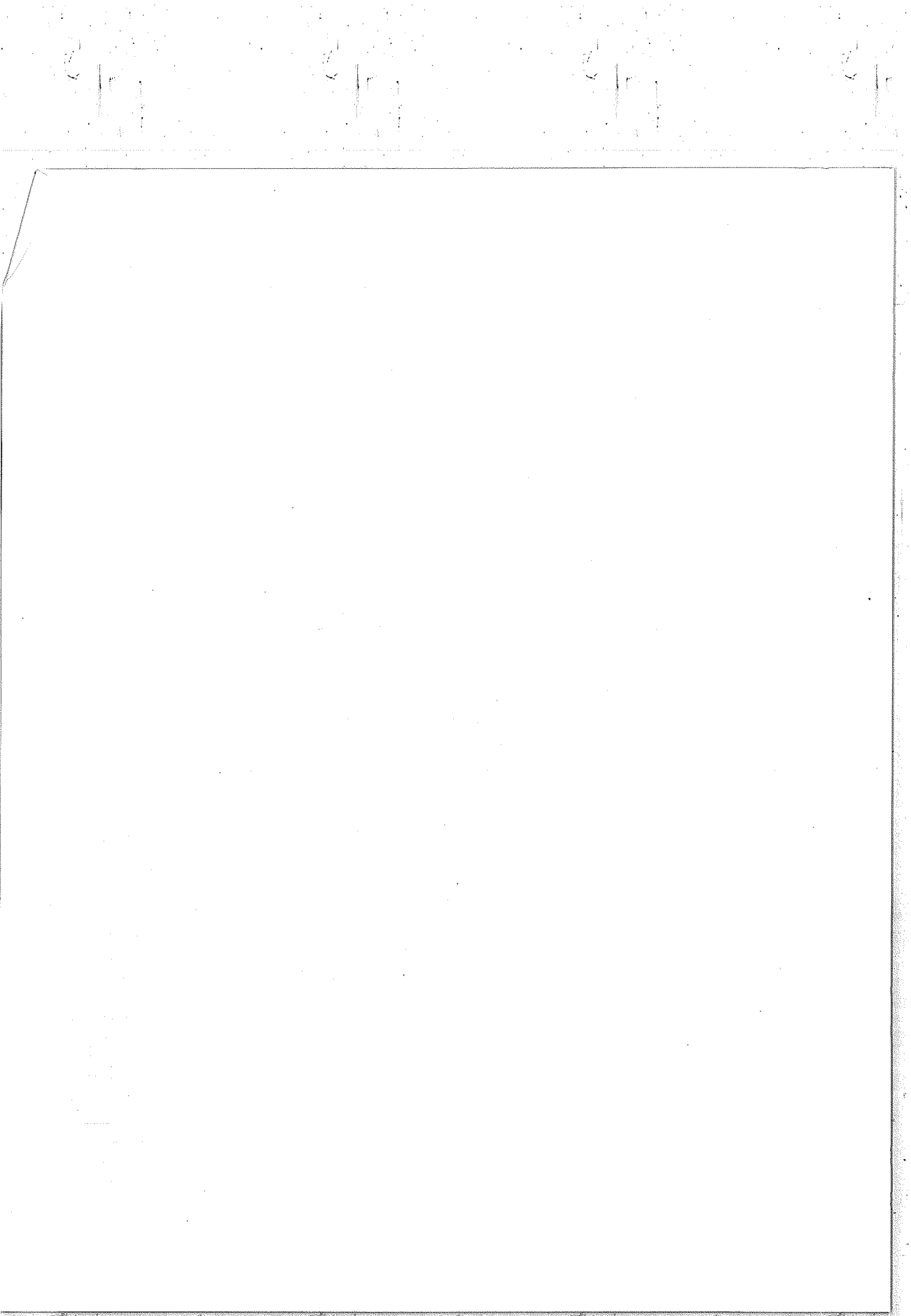


Figure 6: Supplying Vref

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Reference 1

Attenuation Resistors

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*Reference 1, "**Attenuation Resistors**," lists the resistor networks for attenuating the detector input signal.*

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About the Resistors

To ensure the accuracy of the chromatography board's converter, the attenuation resistors should be precision (±0.01% or better tolerance), high stability (tempco of 5 ppm/°C matched) MAR5 or wirewound resistors of at least 1/10 watt power dissipation. The resistors provided in the resistor pack accessory meet these requirements.

Each detector input channel requires a network of three resistors.

Tables 1 and 2 list the attenuation resistors to install and remove on the DT777 for each detector input channel.

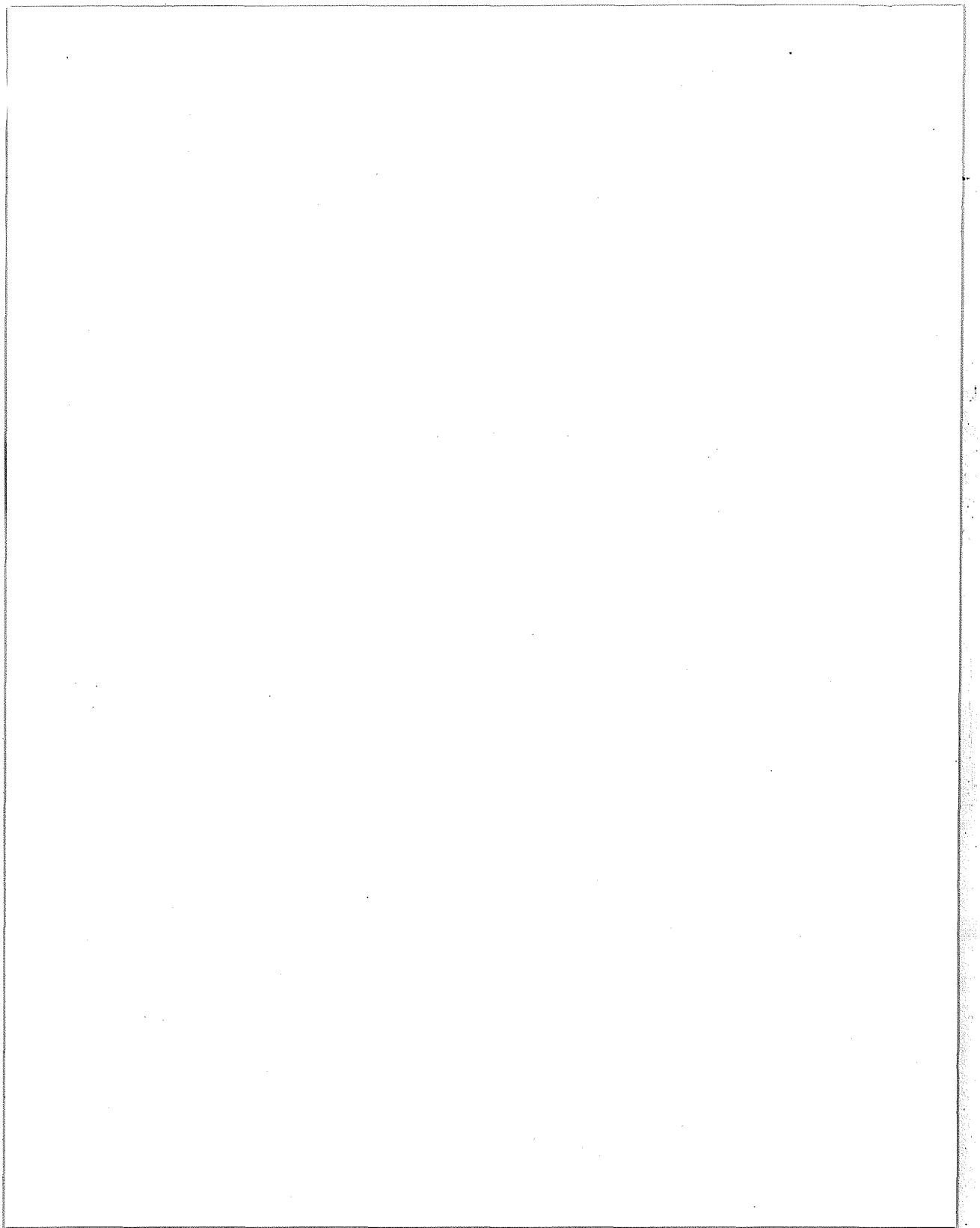
Table 1: Attenuation Resistors (-0.500V to 5.000V)

	Install			Remove	
Channel	**Resistor 1**	**Resistor 2**	**Resistor 3**	**Resistor 1**	**Resistor 2**
1	R1: 300kΩ	R3: 400kΩ	R5: 300kΩ	R2: 0Ω	R4: 0Ω
2	R6: 300kΩ	R8: 400kΩ	R10: 300kΩ	R7: 0Ω	R9: 0Ω
3	R11: 300kΩ	R13: 400kΩ	R15: 300kΩ	R12: 0Ω	R14: 0Ω
4	R16: 300kΩ	R18: 400kΩ	R20: 300kΩ	R17: 0Ω	R19: 0Ω

Table 2: Attenuation Resistors (-1.000V to 10.00V)

	Install			Remove	
Channel	**Resistor 1**	**Resistor 2**	**Resistor 3**	**Resistor 1**	**Resistor 2**
1	R1: 400kΩ	R3: 200kΩ	R5: 400kΩ	R2: 0Ω	R4: 0Ω
2	R6: 400kΩ	R8: 200kΩ	R10: 400kΩ	R7: 0Ω	R9: 0Ω
3	R11: 400kΩ	R13: 200kΩ	R15: 400kΩ	R12: 0Ω	R14: 0Ω
4	R16: 400kΩ	R18: 200kΩ	R20: 400kΩ	R17: 0Ω	R19: 0Ω

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Reference 2

Connector Pin Assignments

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*Reference 2, "**Connector Pin Assignments**," lists the pin assignments for the DT777's J1 connector.*

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J1 Connector

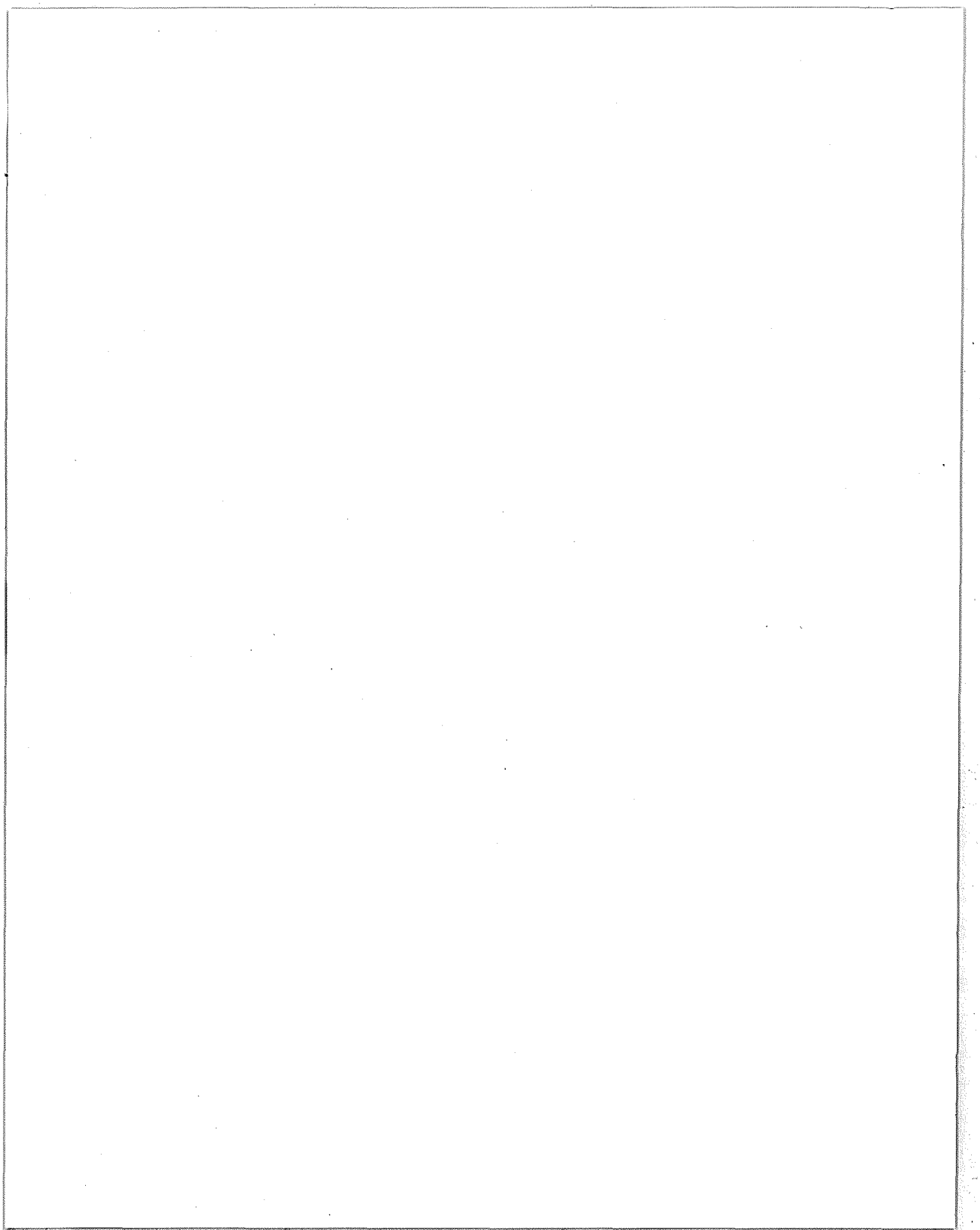
Table 3 lists the pin assignments for the DT777's 37-pin J1 connector.

Table 3: J1 Pin Assignments

Description	Pin		Description
Channel 1 High	19	37	Channel 1 Low
Analog Ground	18	36	Analog Ground
Channel 2 High	17	35	Channel 2 Low
Voltage Reference High	16	34	Voltage Reference Low
Channel 3 High	15	33	Channel 3 Low
Analog Ground	14	32	Analog Ground
Channel 4 High	13	31	Channel 4 Low
Analog Ground	12	30	Analog Ground
Digital Ground	11	29	Digital Ground
+12V[1]	10	28	–12V[1]
Input Switch 1 High	9	27	Input Switch 1 Low
Input Switch 2 High	8	26	Input Switch 2 Low
Input Switch 3 High	7	25	Input Switch 3 Low
Input Switch 4 High	6	24	Input Switch 4 Low
Switch 1 High	5	23	Switch 1 Low
Switch 2 High	4	22	Switch 2 Low
Switch 3 High	3	21	Switch 3 Low
Switch 4 High	2	20	Switch 4 Low
Digital Ground	1		

[1] *No more than 10mA should be drawn from the ±12V terminals (pins 10 and 28). The return for the ±12V is Digital Ground.*

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Reference 3

Specifications

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*Reference 3, "**Specifications**," lists the electrical and physical specifications for the DT777. All specifications are typical at +25°C and rated voltage unless otherwise specified. This section is organized as follows:*

- *Electrical Specifications*
- *Physical Specifications*

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Electrical Specifications

Analog Input Attenuation

Note *Resistors must be supplied by the user. Resistor kits are available from Data Translation.*

Resistor Value: -0.500V to 5.000V

Channel 1	R1 and R5 = 300k, R3 = 400k
Channel 2	R6 and R10 = 300k, R8 = 400k
Channel 3	R11 and R15 = 300k, R13 = 400k
Channel 4	R16 and R20 = 300k, R18 = 400k

Resistor Value: -1.000V to 10.00V

Channel 1	R1 and R5 = 400k, R3 = 200k
Channel 2	R6 and R10 = 400k, R8 = 200k
Channel 3	R11 and R15 = 400k, R13 = 200k
Channel 4	R16 and R20 = 400k, R18 = 200k

Resistor tolerance ±0.01% or better

Resistor power dissipation
1/10 watt

Resistor temperature coefficient
±5 ppm/°C TCR (matched)

Resistor type MAR5 or precision wirewound

External Event I/O Protection

Protection device Metal oxide varistor

Rated voltage 45V DC

Varistor voltage 56V ±10%

Rated peak single pulse transient current
500A

Rated single pulse transient energy
5.6 joules

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Rated transient average power dissipation
0.4 watts

Maximum clamping voltage
70V @ 10A

Typical capacitance 1800pF

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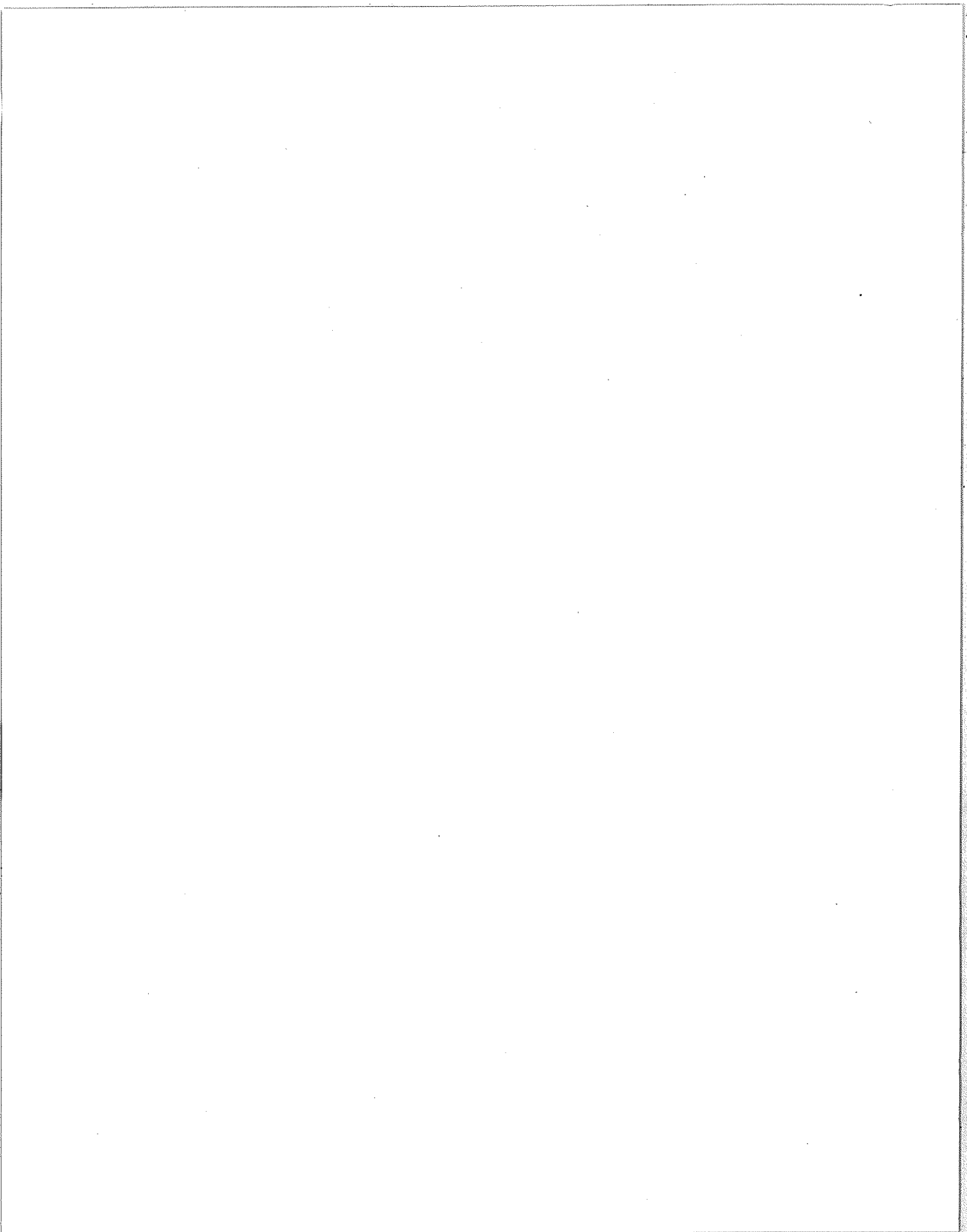
Physical Specifications

PCB dimensions	0.875"H x 6.00"W x 4.59.00"L (2.22 cm x 15.24 cm x 11.43 cm)
Weight	16 ounces
Screw terminal	40 barrier strip connections: 4 sections with 10 connections each
Barrier strip screws	
Size	6-32 screws, cadmium plated steel
Terminal material	Bright acid, tin plated brass
Barrier strip material	Thermoplastic polyamide, UL grade, recognized flammability rating 94V-0
Acceptable wire size	14 to 22 AWG

EP246 Enclosure

Enclosure dimensions	2.95"H x 6.50"W x 5.00"L (7.49 cm x 16.51 cm x 12.71 cm)
Enclosure material	Aluminum

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Reference 4

Troubleshooting

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*Reference 4, "**Troubleshooting**," describes what to do if you have difficulty using your screw terminal panel. This section is organized as follows:*

- *General Checklist*
- *Service and Support*

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General Checklist

Should you experience difficulty using your screw terminal panel, the following sections describe some possible problems and suggest steps you can take to correct them.

If you are experiencing a problem not described here, or have followed the steps suggested and are still having problems, please follow the instructions provided in "Service and Support."

Go through the following checklist when troubleshooting to help you isolate your problem.

1. Make sure that all connections are made properly.

   Refer to Chapter 2, "Using the Screw Terminal Panel," for the appropriate connection scheme.

2. Verify that all cables associated with the board are firmly connected.

3. Make sure that all unused analog input channels are referenced to analog ground.

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Service and Support

Please be prepared to answer the following questions when you call for technical support. This information helps to identify specific system and configuration-related problems.

- What is the serial number of the product?
- What other boards or applications are installed in your system?
- Have you verified that all your connections are made properly and are secure?
- Have you been able to isolate the source of your problem: input or output device, board, software?
- Are all unused input channels grounded?

In addition, if your problem appears to be software-related, specify whether or not it has occurred more than once and, if possible, document the sequence of steps that caused the problem. This information helps us to reproduce the problem in-house.

If your problem is not solved by the steps outlined in the previous sections, the Technical Support staff is available to provide prompt, reliable assistance. They can be reached by calling:

(508) 481-3700

If you are located outside the USA, call your local distributor. The name and telephone number of your nearest distributor are listed in your Data Translation catalog.

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If Your Board Needs Factory Service

If your screw terminal panel must be returned to Data Translation:

1. Call the Customer Service Department and obtain a Return Material Authorization (RMA) number.

   All return shipments to Data Translation must be marked with the correct RMA numbers to ensure proper processing.

2. Package the board as follows:

   - Wrap the board in an electrically conductive plastic material, handling it with ground protection. *A static discharge can destroy components on the board.*
   - Pack the board in its original shipping container, if available and in good condition. If the original container is not available, use any secure shipping container.

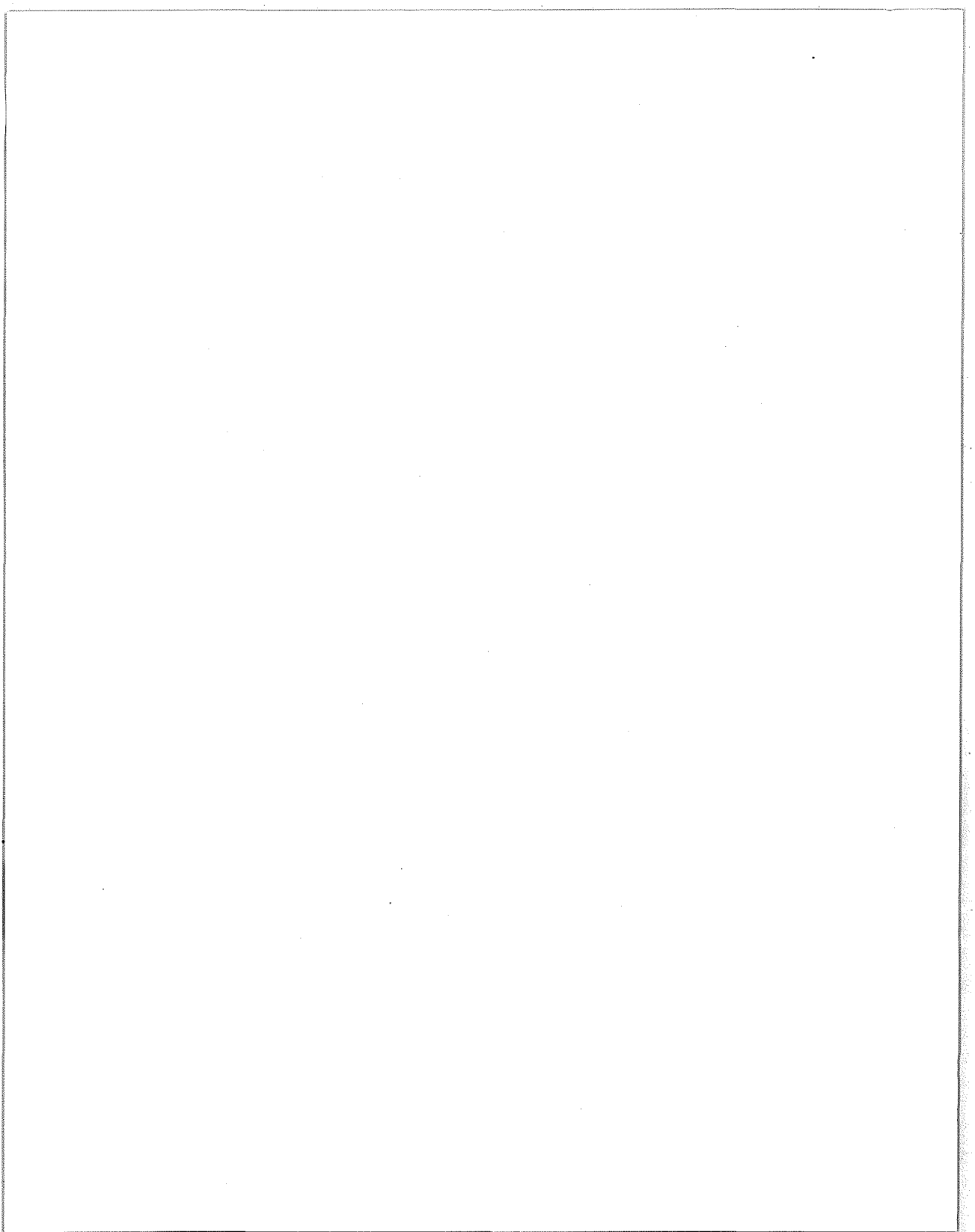
3. Return the board to the following address, making sure the RMA number is visible on the outside of the box.

   Customer Service Dept.
   Data Translation, Inc.
   100 Locke Drive
   Marlboro, MA 01752-1192

Outside the USA

If you are located outside the USA, call your local distributor for authorization and shipping instructions. The name and telephone number of your nearest distributor are listed in your Data Translation catalog.

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All boards, modules, systems, and software media are warranted for one year from date of invoice. Products repaired or replaced within this warranty period maintain their original warranty. Products repaired or replaced outside the warranty period are warranted for 30 days from invoiced date of return.

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c. If a product should fail during the warranty period, it will be repaired free of charge. For out-of-warranty repairs, the customer will be invoiced for repair charges.

RETURN/REPAIR PROCEDURES

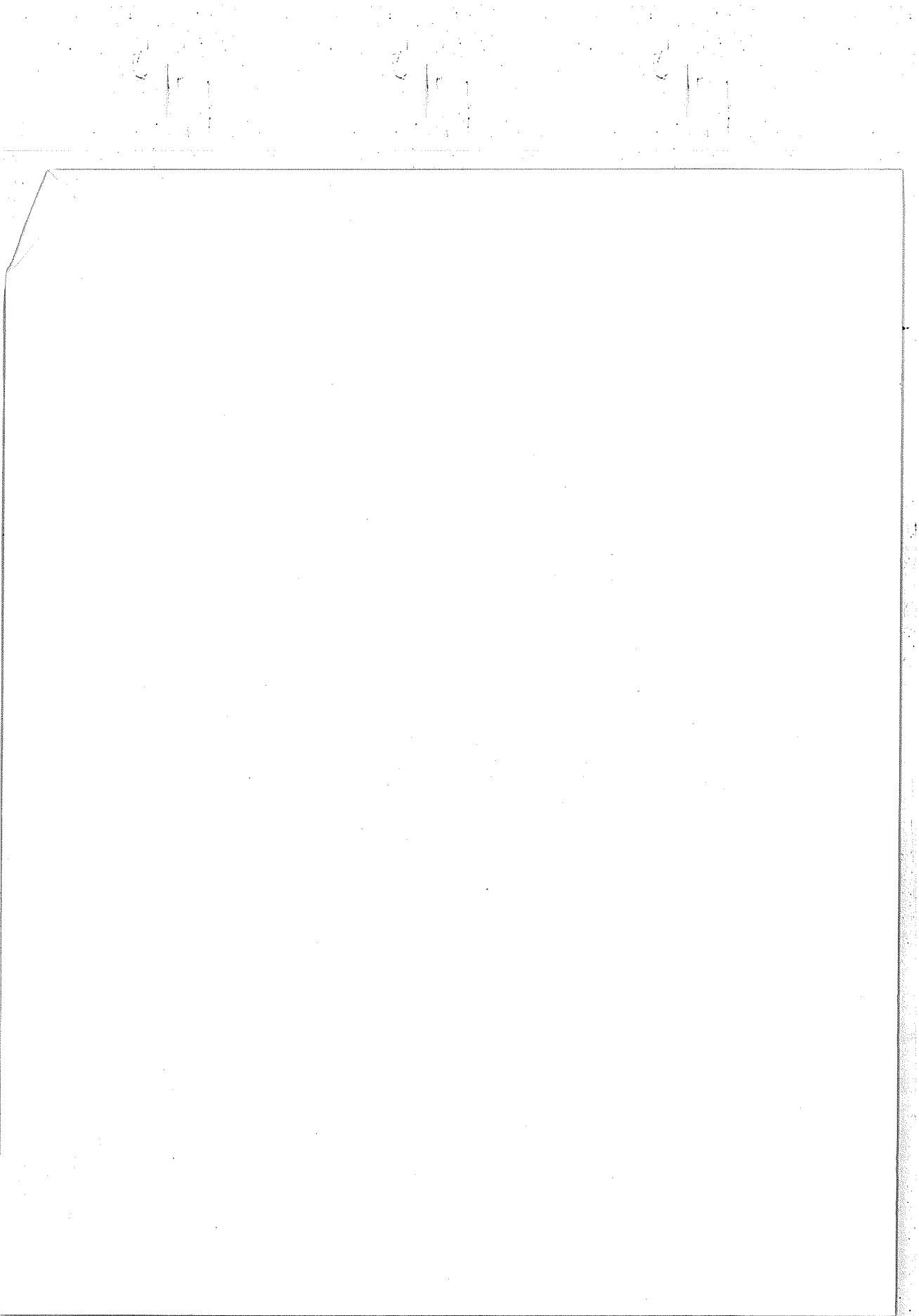
Upon determining that repair services are required, or to return a product to Data Translation, contact the Data Translation Customer Service Department at (508) 481-3700, extension 394 to obtain a Return Material Authorization (RMA) number. Have the following information ready when you call: complete product model number, product serial number, name, address, and telephone number of person returning product; and any special repair instructions.

Carefully package the product in anti-static packaging, making sure the RMA number appears on the outside of the package. Ship prepaid to:

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100 Locke Drive
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On completion of required service, an invoice is issued stating charges, when applicable, and the work that has been completed. A packing slip is enclosed in the return shipment.

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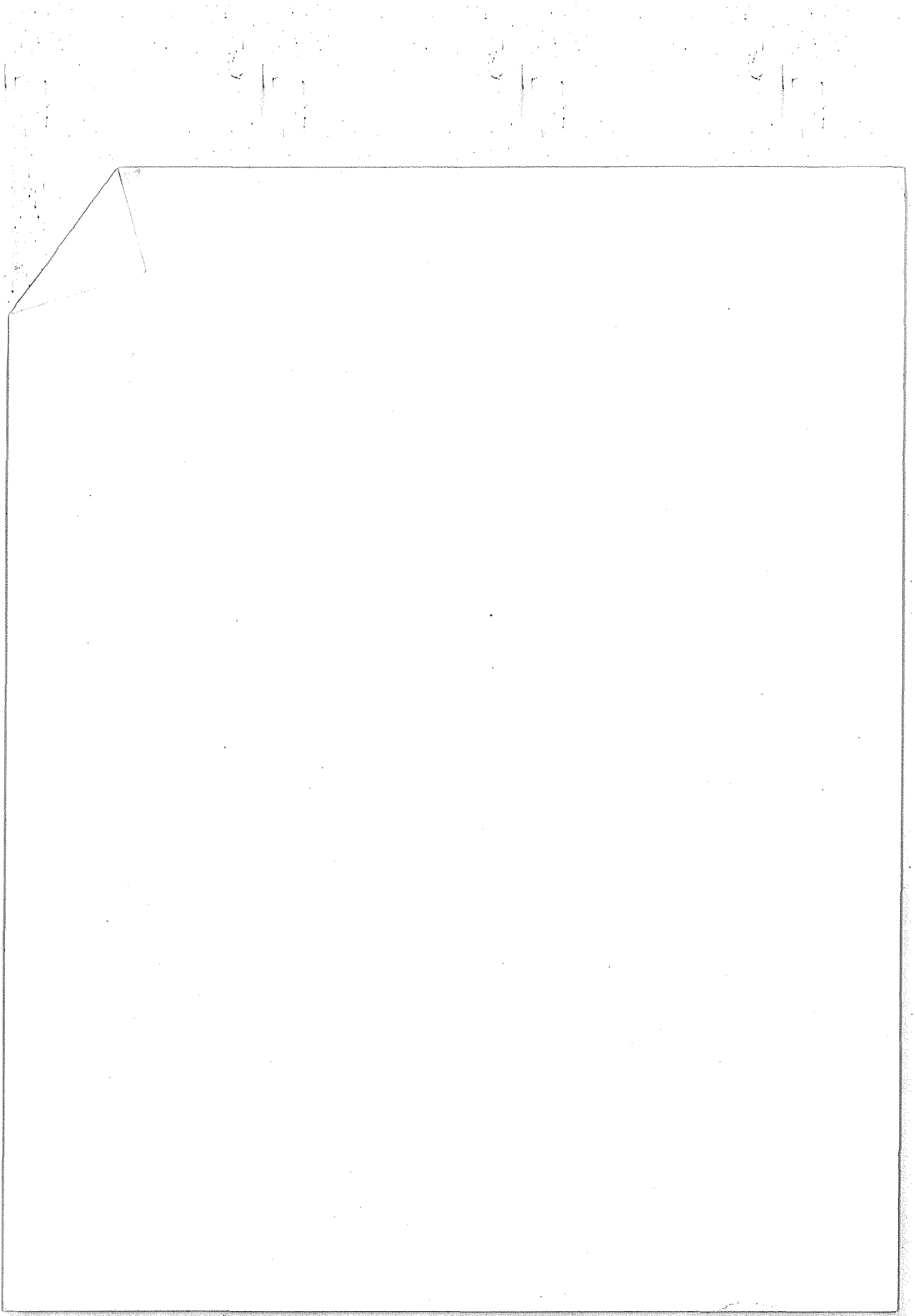
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