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No of pages 7
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Subject RTD Ref. Module

Cat no 016-013-27

RTD Reference Module

SECTION II

SPECIFICATIONS

2-1 GENERAL

The characteristics and specifications of the RTP7504/30 Series Uniform Temperature Reference (UTR) Plate Assemblies and the RTP7504/40 Resistance Temperature Device (RTD) are listed in this section of the manual.

Functional Characteristics

RTP7504/30 Series UTR Assembly

Input Channels:	64, with terminals for High and Low Thermocouple inputs and shields.
Temperature Uniformity of Connector Plate:	Less than 0.25°F (0.14°C) maximum temperature Differential between all channels with a slowly varying ambient change of ± 10°C.
Electrical Resistances:	More than 100 megohms channel-to-channel and channel-to-ground.
Capacitance:	Less than 10 Picofarads channel-to-channel, channel-to-ground, channel-to-shield and shield-to-ground.
RTD Element:	100 Ohm platinum wire.
RTD Accuracy:	± 0.5°C following correction with supplied calibration data.

RTP7504/40 RTD Reference Module

Reference Power Source:

Output Voltage:	+ 12 Volts ± 2 %
Temperature Coefficient:	± 0.02 %/°C
Input Voltage:	115VAC ± 10 Volts or 230VAC ± 20 Volts @ 50Hz. or 60Hz.
Input Isolation:	50 Megohms
Line Regulation:	± 0.02 %
Load Regulation:	± 0.02 %
Reference Resistance:	100 ohm wire-wound ± 0.005 % ± 5PPM/°C
Noise:	5 microvolts peak.

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Physical Specifications

RTP7504/30 Series UTR Assembly

Enclosure

Height:	14 Inches
Width:	19 Inches
Depth:	6.25 Inches

UTR Plate

Height:	6.125 Inches
Width:	14.75 Inches
Depth:	0.75 Inches
Material:	Aluminum
Terminals:	Phillips Stainless screws in 0.75 inch brass terminals embedded in black epoxy.

RTP7504/30 RTD Reference Module

Height:	3.5 Inches
Width:	6.64 Inches
Depth:	1.25 Inches
Construction:	Printed circuit card with stand-offs for mounting to enclosure. Contains encapsulated 12 volt power supply, current limiting components, reference resistor and terminal strip.

Environmental Specifications

Temperature Range:	0° to +55°C, Operating -20° to +85°C, Storage
Humidity Range:	20% to 80% R.H., Non-condensing

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SECTION III

INSTALLATION AND PROGRAMMING

3-1 GENERAL

This section of the manual recommends connection and cabling technique for the UTR plate and a use for data received from the RTD Reference Module.

3-2 UTR CONNECTION TECHNIQUES

The following techniques should be observed for optimum results using the RTP 7504/30 Series of UTR Plate Assemblies:

1. Trim shield as short as possible when crimping screw terminals on cable leads.
2. Dress cable bundles as flat as possible and pack with foam to seal off air convection.
3. If unshielded thermocouple cables are used, connect the low side of the input to the shield terminal.

3-3 USE OF THE RTD REFERENCE MODULE

The RTD Reference Module consists of a regulated 12 volt power supply, current limiting components, a precision 100 ohm ±0.005% reference resistor and a terminal strip (see Figure 3-1). The RTD is connected in series with the reference resistor with the voltage drops across both available for connection from the terminal strip to separate analog input channels. The ratio of these voltages will vary with the changes in resistance of the RTD due to the changes in temperature of the plate. This ratio, corrected for the calibration values at the 0° and 55°C points (listed on the label affixed to the epoxy side of the plate) and extrapolated across the essentially linear range between those points, will provide the temperature of the plate in Degrees Celsius. The plate temperature can then be used with stored tables for the types of thermocouples used in the system to determine the thermocouple-to-copper junction error. This error calculation is then added algebraically to the measured value at the thermocouple junction to provide the true temperature.

3-4 INSTALLATION OF THE RTD REFERENCE MODULE

The RTD Reference module is a printed circuit card with attached standoffs. The module is mounted on the outside rear of the enclosure. The RTD element is bonded to the UTR plate inside the enclosure. The RTD leads connect to a small terminal block on the inside of the enclosure. A twisted-pair connects from the small terminal block inside the enclosure to terminals 5 and 6 of terminal block TB2 located on the Reference module (see Figure 3-1). The analog inputs connect to TB2 terminals 3 and 4 to sense the RTD voltage and to TB2 terminals 1 and 2 to sense the reference resistor voltage.

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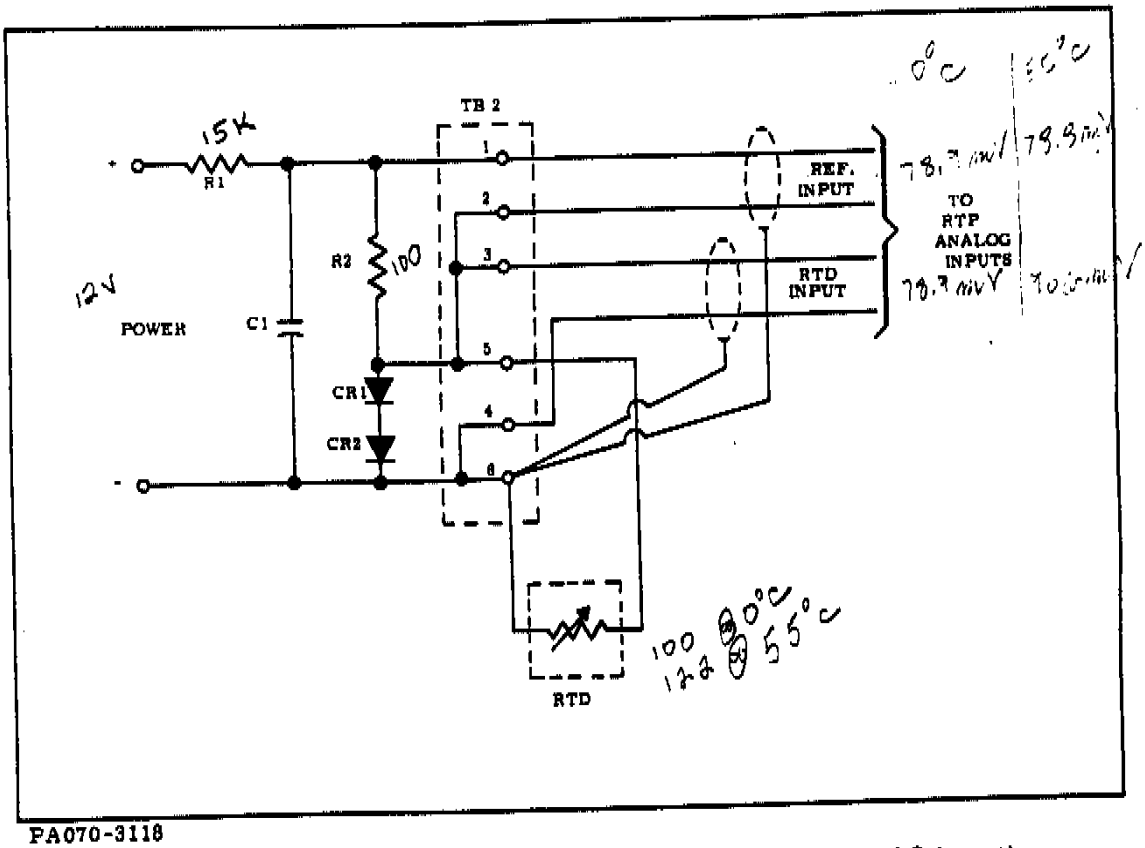

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Figure 3-1. RTP7504/40 RTD Reference Module - Partial Schematic

3-5 PROGRAMMING

The relationship between the voltage drop across the temperature-constant reference resistance and the temperature-variable RTD resistance has been reduced to the relative voltages and resistances which may be expressed as the following equation:

$$\text{Plate Temperature (in Degrees Celsius)} = K\left(\frac{D_2}{D_1} - \frac{R_c}{100}\right)$$

Where: D_1 = Reference Resistance Voltage Drop

D_2 = RTD Resistance Voltage Drop

R_c = RTD Ice-point Calibration Resistance

$$K = \frac{5500}{R_a - R_c}$$ Where: R_a = RTD 55°C Calibration Resistance

NOTE: The listed equation assumes a straight line from R_a to R_c. In reality, the line is bowed in the negative direction to a maximum of 0.09°C at the midpoint (27.5°C). If most operations are around the midpoint (near normal room ambient), a correction factor of +0.045°C may be subtracted from the product of the equation to reduce the error to one-half.

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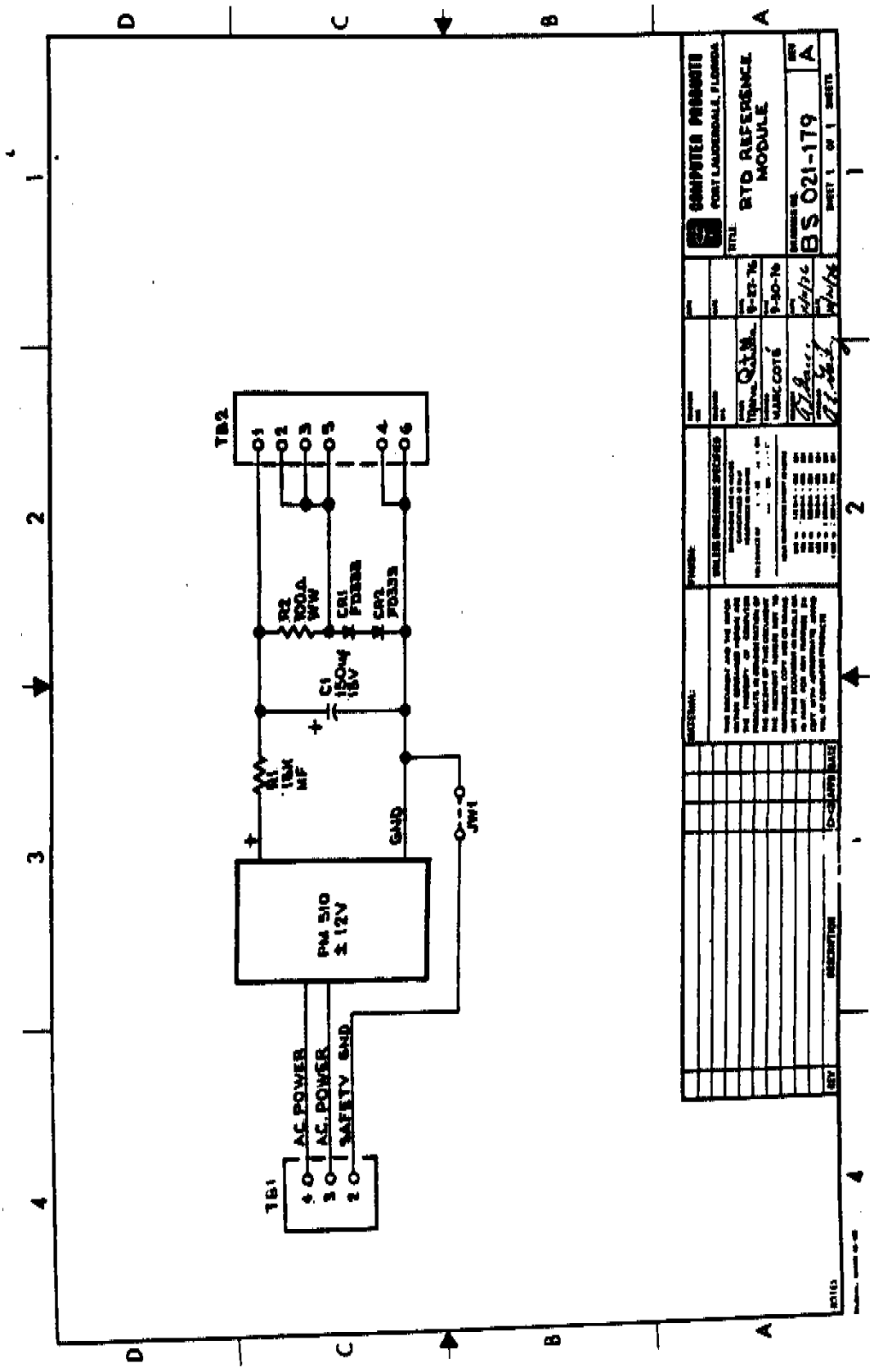
TB2
R2 100Ω 5W
CR1 FD333
CR1 FD333
C1 .15μf 15V
R1 15K MF
GND
JW1
PM 5/0 ± 12V
TB1
AC POWER
AC POWER
SAFETY GND
COMPUTER PRODUCTS
FORT LAUDERDALE, FLORIDA
STD REFERENCE MODULE
BS 021-179
A

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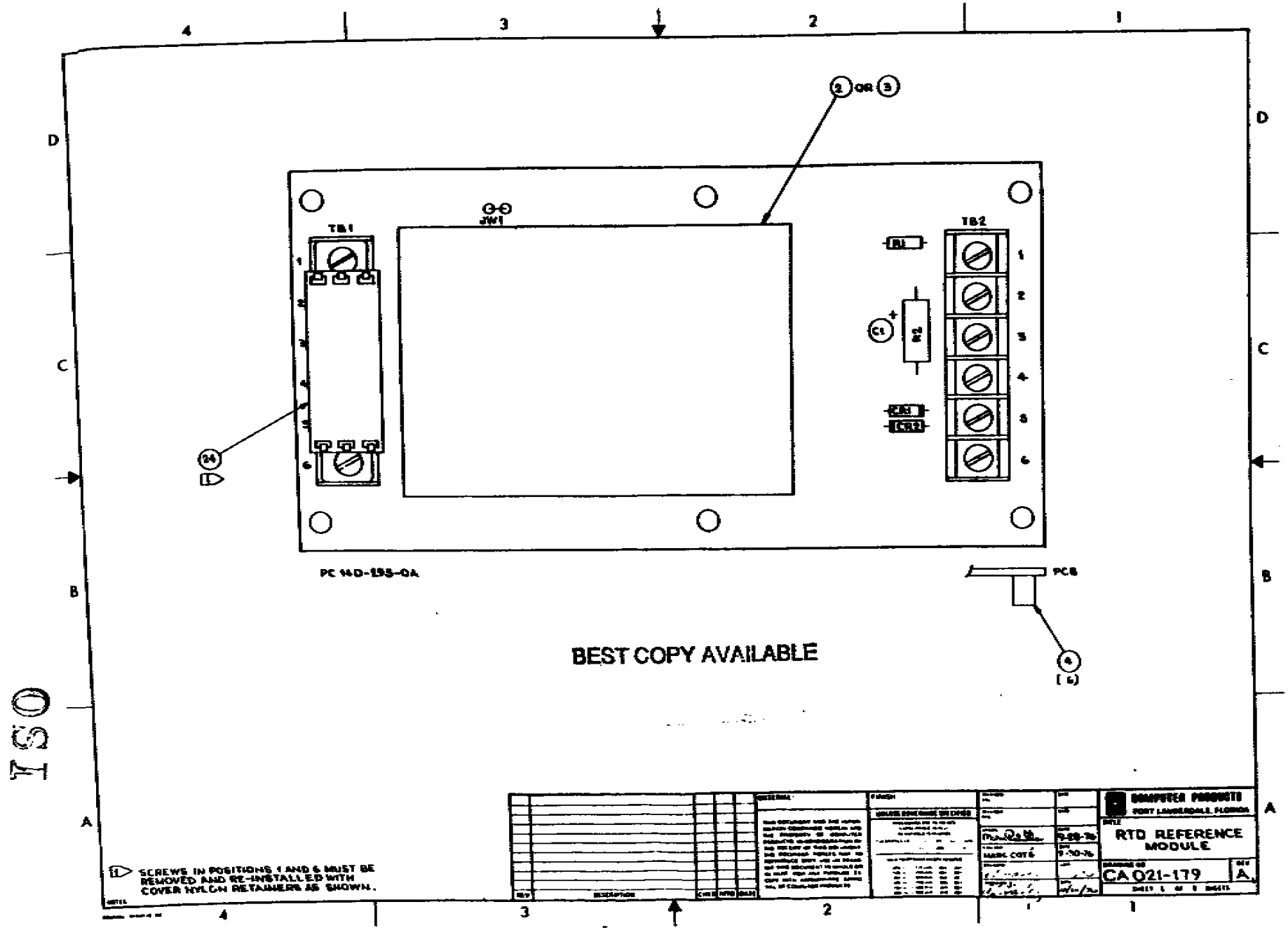

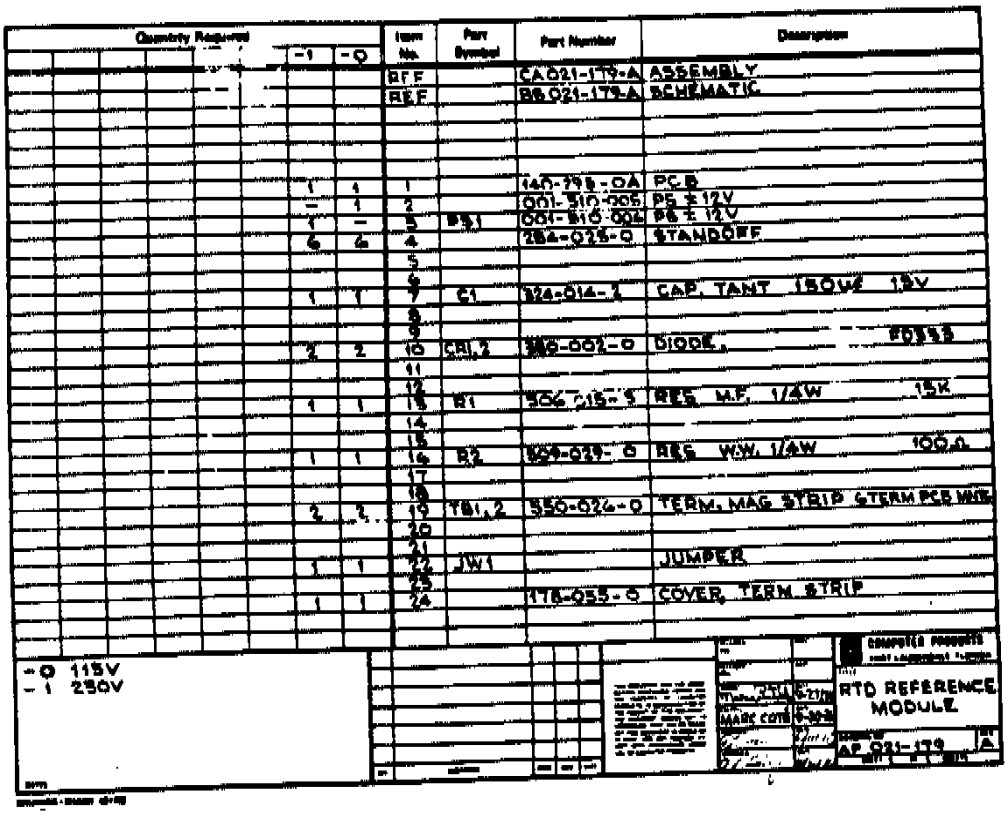

Quantity Required		Item No.	Part Symbol	Part Number	Description
-1	-0				
		REF		CA021-179-A	ASSEMBLY
		REF		BB021-179-A	SCHEMATIC
1	1	1		140-798-0A	PCB
—	1	2		001-510-005	PS ± 12V
1	—	3	PS1	001-510-004	PS ± 12V
6	6	4		284-025-0	STANDOFF
		5			
		6			
1	1	7	C1	324-014-1	CAP. TANT 150UF 15V
		8			
		9			
2	2	10	CR1,2	305-001-0	DIODE, FDS33
		11			
		12			
1	1	13	R1	304-015-5	RES M.F. 1/4W 15K
		14			
		15			
1	1	16	R2	304-039-0	RES W.W. 1/4W 100Ω
		17			
		18			
2	2	19	TB1,2	350-024-0	TERM. MAG STRIP 6TERM PCB MNT
		20			
		21			
1	1	22	JW1		JUMPER
		23			
1	1	24		178-055-0	COVER, TERM STRIP

-0 115V
-1 230V

RTD REFERENCE MODULE

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