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SERIES 1250
UNIVERSAL
SWITCH CONTROLLER

PUBLICATION NO. 980609 Volume 1 of 2



RACAL INSTRUMENTS

Racal Instruments, Inc.
4 Goodyear St., Irvine, CA 92618-2002
Tel: (800) RACAL-ATE, (800) 722-2528, (949) 859-8999;
FAX: (949) 859-7139

Racal Instruments, Ltd.
480 Bath Road, Slough, Berkshire, SL1 6BE, United Kingdom
Tel: +44 (0) 1628 604455; FAX: +44 (0) 1628 662017

Racal Systems Electronique S.A.
18 Avenue Dutartre, 78150 LeChesnay, France
Tel: +33 (1) 3923 2222; FAX: +33 (1) 3923 2225

Racal Systems Elettronica s.r.l.
Strada 2-Palazzo C4, 20090 Milanofiori Assago, Milan, Italy
Tel: +39 (0)2 5750 1796; FAX +39 (0)2 5750 1828

Racal Elektronik System GmbH.
Technologiepark Bergisch Gladbach, Friedrich-Ebert-Strasse, D-51429
Bergisch Gladbach, Germany
Tel.: +49 2204 8442 00; FAX: +49 2204 8442 19

Racal Instruments, Ltd.
Unit 5, 25F., Mega Trade Center, No 1, Mei Wan Road, Tsuen Wan, Hong Kong, PRC Tel: +852 2405 5500, FAX: +852 2416 4335

http://www.racalinstruments.com

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You may contact your customer service advisor by:

E-Mail:	Helpdesk@racalinstruments.com	
Telephone:	+1 800 722 3262	(USA)
	+44(0) 8706 080134	(UK)
	+852 2405 5500	(Hong Kong)
Fax:	+1 949 859 7309	(USA)
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	+852 2416 4335	(Hong Kong)

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FOR YOUR SAFETY

Before undertaking any troubleshooting, maintenance or exploratory procedure, read carefully the **WARNINGS** and **CAUTION** notices.

This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.

If this instrument is to be powered from the AC line (mains) through an autotransformer, ensure the common connector is connected to the neutral (earth pole) of the power supply.

Before operating the unit, ensure the conductor (green wire) is connected to the ground (earth) conductor of the power outlet. Do not use a two-conductor extension cord or a three-prong/two-prong adapter. This will defeat the protective feature of the third conductor in the power cord.

Maintenance and calibration procedures sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures and heed warnings to avoid “live” circuit points.

Before operating this instrument:

1. Ensure the instrument is configured to operate on the voltage at the power source. See Installation Section.

2. Ensure the proper fuse is in place for the power source to operate.

3. Ensure all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If the instrument:

- fails to operate satisfactorily
- shows visible damage
- has been stored under unfavorable conditions
- has sustained stress

Do not operate until performance is checked by qualified personnel.

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Table of Contents
Volume 1

Chapter 1
GENERAL INFORMATION 1-1
Introduction 1-1
1250 and 1250 Series Switch modules 1-1
1250 Series Latching Switch modules 1-3
Specifications 1-4
1250 Universal Switch Controller 1-4
Option 1250-10 1-7
Specifications 1-7
Option 1250-12 1-8
Specifications 1-8
Option 1250-14 1-10
Specifications 1-10
Option 1250-15 1-12
Specifications 1-12
Option 1250-15A 1-13
Specifications 1-13
Option 1250-16 1-14
Option 1250-20 1-16
Specifications 1-16
Option 1250-30 Series 1-18
Option 1250-35 1-23
Specifications 1-23
Option 1250-40 1-26
Specifications 1-27
Option 1250-40B 1-28
Specifications 1-29
Option 1250-45 1-30
Specifications 1-31
Option 1250-50 1-32

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Specifications 1-33
Options 1250-51A and 1250-51B 1-34
Specifications 1-35
Options 1250-52A and 1250-52B 1-36
Specifications 1-37
Option 1250-54B 1-38
Specifications 1-39
Option 1250-55B 1-40
Specifications 1-41
Options 1250-60 and 1250-61 1-42
Specifications 1-43
Option 1250-65 1-44
Option 1250-750 1-46

Chapter 2
INSTALLATION 2-1
Introduction 2-1
Unpacking and Inspection 2-1
Reshipment Instructions 2-1
Preparation for use 2-1
Power Connections 2-1
Line Voltage Selection 2-2
Power Cord and Grounding 2-3
1250 Series Plug-in Modules 2-4
Switch modules 2-4
Switching Module Installation 2-4
Strain Relief Screw Terminals 2-5
GPIB interface 2-6
GPIB Bus Organization 2-6
GPIB Interconnections 2-9
GPIB Cable Length Limits 2-9
GPIB Address Assignment 2-9
GPIB Rear-Panel Connector 2-10
GPIB Interface Signal Pin Assignments 2-11
Equipment Rack Installation 2-12

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Introduction 2-12
Slide-Mount Option 65 Installation 2-13
Intelligent Front Panel (Option 90) Installation 2-22
Standard Mounting 2-22
Remote Mounting 2-22
Rear-Forward Rack Mounting 2-22
Standard Mounting 2-22
Remote Mounting 2-24
Storage and Temperature 2-25
Ventilation Requirements 2-25

Chapter 3
OPERATION 3-1
Introduction 3-1
1250 Home State 3-1
1250 Front and Rear Panels 3-2
GPIB Input Format 3-4
GPIB Output Format 3-5
Serial Poll Status Byte 3-5
Power-up Self Tests 3-6
Device Dependant Command Codes 3-7
CLOSE 3-7
CNF 3-7
DLY 3-8
EQU 3-8
EXCL 3-9
OPEN 3-9
PDATAOUT 3-10
PSETUP 3-11
PUPRCL 3-12
READ 3-12
RECALL 3-12
RESET 3-13
SCAN 3-13
SETUP 3-13

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SLIST 3-14
SRQMASK 3-15
STORE 3-16
TEST 3-16
WRITE 3-17
YERR 3-17
1250 Series Module Specific Syntax 3-19
1250-10 Breadboard Module Specific Syntax 3-19
1250-12 Relay Actuator Module Specific Syntax Specific Syntax 3-19
1250-14 Digital Input/Output Module Specific Syntax 3-21
1250-15 Relay Driver Module Specific Syntax 3-30
1250-15A Relay Driver Module Specific Syntax 3-36
1250-16 High Density Signal Switching Module Specific Syntax 3-49
1250-20 Relay Power Module Specific Syntax 3-52
1250-30 Scanner / Multiplexer Module Specific Syntax 3-55
1250-35 Module Specific Syntax 3-58
1250-40 Module Specific Syntax 3-69
1250-40B Module Specific Syntax 3-70
1250-45 Module Specific Syntax 3-72
1250-50, 1250-51A, and 1250-51B, R.F. Multiplexer Module Specific Syntax 3-74
1250-52A and 1250-52B R.F. Multiplexer Module Specific Syntax 3-78
1250-54B and 1250-55B RF Multiplexer Module Specific Syntax 3-81
1250-60 and 1250-61 Microwave Switching Module Specific Syntax 3-83
1250-65 Latching 18 GHz Microwave Switching Module Specific Syntax 3-84
1250-750 RF Multiplexer Module Specific Syntax 3-87
Local Control 3-90
Introduction 3-90
1250 Intelligent Front Panel (Option 90) 3-90
Local Operation 3-93
Introduction 3-93
OPEN and CLOSE keys 3-93
READ and WRITE keys 3-94
STORE and RECALL keys 3-95
TEST key 3-96
LOCAL key 3-96

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

TRIG / SCAN key 3-96
VIEW key 3-97
EDIT key 3-98
DEL key 3-99
CLR key 3-100
EXEC key 3-100
RESET key 3-100
ERR key 3-100
DISPLAY keys 3-100
SEL keys 3-101

Chapter 4
OPERATION Verification 4-1
Introduction 4-1
General Information 4-1
Required Equipment 4-1
Performance Verification Procedures 4-2
Mainframe Self-Test 4-2
Test Procedure 4-3
GPIB Test 4-3
1250-10 Breadboard Module Test 4-5
Test Procedure 4-5
1250-14 Digital Input/Output Module Test 4-7
Test Procedure 4-8
1250-40 Signal Matrix Module Test 4-11
Test Procedure 4-13
1250-60/1250-61 18/26.5 GHZ Microwave Switching Module Tests 4-14
Test Procedure 4-14
Low Frequency Relay Module Tests 4-16
1250-12 Relay Actuator Module Test 4-16
1250-15 Relay Driver Module Test 4-19
1250-20 Relay Power Module Test 4-20
1250-30 Scanner/Multiplexer Module Test 4-23
RF Relay Module Tests 4-26
1250-50 and 1250-750 200 MHz RF Switching Module Test 4-26

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1250-51/1250-52 500MHz/1GHz RF Switching Module Tests 4-28

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List of Figures

Figure 1-1, 1250 Front Panel 1-1
Figure 1-2, 1250 Option 90, Intelligent Front Panel 1-2
Figure 1-3, Dimensions of the 1250 1-5
Figure 1-4, Block Diagram of 1250-12 1-8
Figure 1-5, Block Diagram of 1250-14 1-10
Figure 1-6, Block Diagram of 1250-15 1-12
Figure 1-7, Block Diagram of 1250-16 1-14
Figure 1-8, Block Diagram of 1250-20 1-16
Figure 1-9, Block Diagram of 1250-30 Series 1-19
Figure 1-10, Block Diagram of 1250-35 1-23
Figure 1-11, Block Diagram of 1250-40 1-26
Figure 1-12, Block Diagram of 1250-40B 1-28
Figure 1-13 1-30
Figure 1-14, Block Diagram of 1250-50 and Insertion Loss vs, Frequency 1-32
Figure 1-15, Block Diagram of 1250-51 and Insertion Loss vs, Frequency 1-34
Figure 1-16, Block Diagram of 1250-52B and Insertion Loss vs. Frequency 1-36
Figure 1-17, Block Diagram of 1250-54B 1-38
Figure 1-18, Block Diagram of 1250-55B 1-40
Figure 1-19, Block Diagram of 1250-60 and 1250-61 1-42
Figure 1-20, Block Diagram of 1250-65 1-44
Figure 1-21, Block Diagram of 1250-750 and Insertion Loss vs. Frequency 1-46

Figure 2-1, AC Line Voltage Selection 2-3
Figure 2-2, 1250 Switching Module Installation Showing Use of Quick-Release Disconnector (common guard assembly not shown in the figure and not supplied with all models) 2-4
Figure 2-3, 1250 Option 80 Guard Connection Procedure 2-5
Figure 2-4, Linear (A) and Cluster (B) Bus Organizations 2-6
Figure 2-5, GPIB-Connector (Rear Panel) 2-10
Figure 2-6, A & B Slide-Mount and Bracket Assembly 2-17
Figure 2-7, Rear End Slide-Mount Rack Dimensions 2-18
Figure 2-8, Standard (A) and Optional Rear-Forward Rack-Mount

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(B and C) Assembly-to-Instrument Configurations 2-20
Figure 2-9, Slide Assembly-to-Side Channel Installation 2-21
Figure 2-10, 1250 Side View (Left) 2-22
Figure 2-11, Option 90 to 1250 Chassis Installation 2-23
Figure 2-12, Rear View of Option 90 Showing Ribbon Cable 2-24
Figure 2-13, Front View of Standard Front Panel Showing Option 90 D Receptacle 2-24

Figure 3-1, 1250 Front Panel 3-2
Figure 3-2, 1250 Rear Panel 3-3
Figure 3-3, 1250-14 Module Handshake Lines 3-24
Figure 3-4, 1250-14 Timing Diagrams 3-25
Figure 3-4, 1250-14 Timing Diagrams (Cont) 3-26
Figure 3-4, 1250-14 Timing Diagrams (Cont) 3-27
Figure 3-4, 1250-14 Timing Diagrams (Cont) 3-28
Figure 3-4, 1250-14 Timing Diagrams(Cont) 3-29
Figure 3-5, 1250-15 Relay Driver Connection Diagram 3-32
Figure 3-5, 1250-15 Relay Driver Connection Diagram (Cont) 3-33
Figure 3-6, 1250-15 Coil Sense 3-34
Figure 3-7, 1250-15 Form A Sense 3-35
Figure 3-8, 1250-15 Form B Sense 3-36
Figure 3-9, 1250-15A Switch Locations 3-40
Figure 3-10, 1250-15A Form B Sense 3-41
Figure 3-11, 1250-15A Form A Sense 3-42
Figure 3-12, 1250-15A Coil Current Sense 3-43
Figure 3-13, 1250-15A No Relay Sense 3-44
Figure 3-14, 1250-15A Using an External Power Supply 3-45
Figure 3-15,1250-15A, Relay Driver Connection Diagram Group 1 3-46
Figure 3-16, 1250-15A Relay Driver Connection Diagram Group 2 3-47
Figure 3-17, 1250-15A Relay Driver Connection Diagram Group 3 3-48
Figure 3-18, Detail A – 1250-16 3-51
Figure 3-19, 1250-20 Relay Power Module Connection Diagram 3-54
Figure 3-20, 1250-30 Scanner/Multiplexer Connection Diagram 3-57
Figure 3-21, 1250-35 Inputs and Outputs 3-64
Figure 3-22, 1250-35 Configuration 3-65
Figure 3-23, 1250-40 Block Diagram 3-70

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Figure 3-24, 1250-40B Block Diagram 3-71
Figure 3-25, 1250-45 Block Diagram 3-73
Figure 2-26, 1250-50 Top View 3-76
Figure 2-27, 1250-51A/B Top View 3-77
Figure 3-28, 1250-52A/B Top View 3-80
Figure 3-29, 1250-60 and 1250-61 Block Diagram 3-84
Figure 3-30, Orientation of front panel connectors 3-85
Figure 3-31, 1250 Intelligent Front Panel 3-90

Figure 4-1, 1250-14 Test Configuration 4-7
Figure 4-2, 1250-40 Test Configuration 4-12
Figure 4-3, 1250-12 Test Configuration 4-17
Figure 4-4, 1250-15 Test Configuration 4-19
Figure 4-5, 1250-20 Test Configuration 4-21
Figure 4-6, 1250-30 Test Configuration 4-24

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List of Tables

Table 2-1, GPIB Connector Pins 2-11
Table 2-2, Interface Signal Pin Assingments 2-12

Table 3-1, Status Byte Format 3-5
Table 3-2, 1250 Status Byte 3-16
Table 3-3, 1250 Series Error Codes 3-18
Table 3-4, 1250-15A Pins D and S 3-39
Table 3-5, ... 3-58
Table 3-6, ... 3-61
Table 3-7 3-63
Table 3-8 3-66
Table 3-9, 1250 Intelligent Front Panel Features 3-90

Table 4-1 4-4
Table 4-2, 1250-10 Breadboard Module Test Program 4-5
Table 4-3, 1250-14 Digital Input/Output Module Test Program 4-9
Table 4-4, 1250-40 Signal Matrix Module Test Program 4-13
Table 4-5, 1250-60/1250-61 18/26.5 GHz Microwave Switching Module Test Program 4-15
Table 4.6-1250-12 Relay Actuator Module Test Program 4-18
Table 4-7, 1250-15 Relay Driver Module Test Program 4-20
Table 4-8, 1250-20 Power Relay Module Test Program 4-22
Table 4-9, 1250-30 Scanner/Multiplexer Module Test Program 4-25
Table 4-10, 1250-50 and 1250-750 200 MHz RF Switching Module Test Program 4-27
Table 4-11, 1250-51A/51B 500MHz RF Switching Module Test Program 4-29
Table 4-12, 1250-52A/52B 1GHz RF Switching Module Test Program 4-30

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Chapter 1

GENERAL INFORMATION

Introduction

This manual provides the information necessary to install and operate the Racal-Dana Model 1250 Universal Switch Controller. Section two (Installation) provides the procedures necessary to unpack and inspect the 1250, install the intelligent front panel, install 1250 Series switch modules in the chassis and connect the 1250 to the GPIB. Section three (Operation) provides the command codes and keystrokes required in both local and remote control of the 1250.

1250 and 1250 Series Switch modules

The 1250 Universal Switch Controller allows signals to be switched in a single system from DC to 26.5GHz. The 1250 Series is a general purpose switching system designed for both manual and automatic test systems. Low level, power, R.F. and microwave switching requirements are addressed by the switch modules available in the 1250 Series.

The 1250 is designed for use in automatic test systems, but local control of the switching system is supported by Option 90, which supplies an intelligent front panel with a display and keyboard. Refer to Figures 1-1 and 1-2 for illustrations of the 1250 front panel and Option 90, the intelligent front panel, respectively.

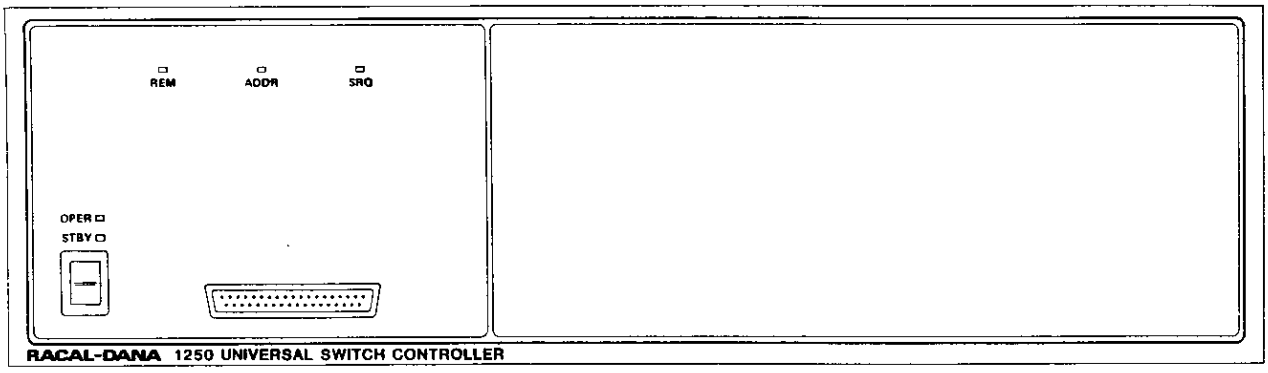


Figure 1-1, 1250 Front Panel

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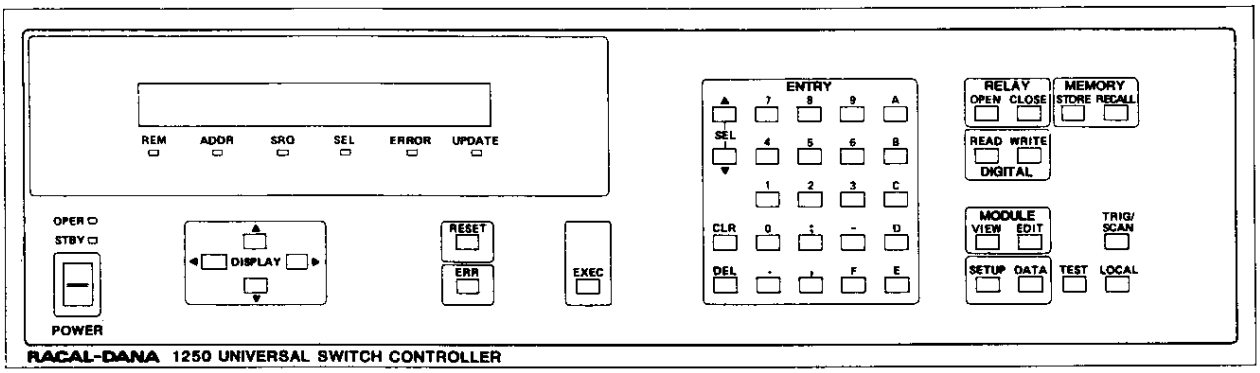


Figure 1-2, 1250 Option 90, Intelligent Front Panel

Extensive software capabilities are available for use in the 1250. These include:

Exclude Lists

The exclusion of possibly dangerous or damaging system configurations from the configurations that the 1250 regards as valid is available via an Exclude list.

Equate Lists

The equating together of more than one switching module to reduce programming time, so that a command sent to one equated module is obeyed by all of the modules equated together.

Scan Lists

A list of relays that may be entered into a Scan list that will be sequenced through on receipt of a trigger pulse, use of the Manual key on the front panel or the GPIB Group Execute Trigger (GET) command.

Confidence

A non-destructive confidence check mode which can monitor the state of all relays in the chassis to ensure that all 1250 Series switch modules fitted to the 1250 chassis have operated as programmed.

Power Up Recall

The automatic recalling of a switching system configuration from non-volatile memory at power up.

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Test

A self-test capability to ensure that the system ROM, RAM, CPU, backplane and switching module handshaking are functioning correctly. This test is carried out at power up and may also be invoked over the GPIB or the optional front panel.

Non-Volatile Memory

A 47 location non-volatile memory for the storage and recall of complete switching system configurations.

The 1250 is of a modular construction that allows easy removal and replacement of all major assemblies. These assemblies are as follows:

1) Switch modules

2) Card Cage

3) Microprocessor Controller

4) Power Supply

5) (Optional) Front Panel

The signals to be switched by the 1250 are routed through up to five plug-in relay cards installed in the 1250 chassis. These plug-in cards allow the 1250 System to be easily reconfigured as required.

The switching capabilities of the 1250 are enhanced by providing a 10-wire Analog bus. This allows switch modules to be interconnected to expand beyond the capabilities of each individual switching module. This is particularly useful in configuring large switching matrices. The Analog Bus may also be cut to separate selected 1250 Series modules, as required.

1250 Series Latching Switch modules

Several of the 1250 Series switch modules are also available in latching versions. A latching switching module will retain its configuration even when power is removed from the 1250 chassis. These switch modules perform electrically the same as the non-latching switch modules that they are based on and use a similar 1250 Series option number. The latching feature is indicated by the presence of the letter 'L' in the option number, e.g. 1250-L30.

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The 1250 Series latching switch modules available are as follows:

1250-L12	Latching Relay Actuator Module
1250-L30	Latching 20 Channel Signal Multiplexer
1250-L40	Latching 4 x 4 Matrix
1250-L52B	Latching RF Multiplexer

The command codes required to operate the 1250 Series latching switch modules are the same as those required to operate the non-latching versions.

Specifications

1250 Universal Switch Controller

General

Annunciators:	2 status LED indicators 3 GPIB LED indicators 16 character alphanumeric display (Option 90)
AC Voltage Requirements:	100, 115, 215, 230 VAC ± 10% 47-66 Hz (400 Hz operation also available. Contact Racal-Dana for details.)
Dimensions:	133.4 mm (5.25 in) High x 421.6 mm (16.6 in) Wide x 304.8 mm (12 in) Deep
Weight:	Main Chassis: 11.4 kg (25 lb.)
Rack Mounting:	Standard or reversed positions
Environmental:	Designed to meet MIL-T-28800C Type III, Class 5, Style F
Temperature Range:	0°C to 50°C operation -40°C to 70°C storage
Humidity:	95% Non-condensing
Vibration:	0.013 in. double-amplitude, 20-55 Hz; designed to meet MIL-T-28800C Type III, Class 5, Style F
GPIB Transfer Rate:	10 kHz typical

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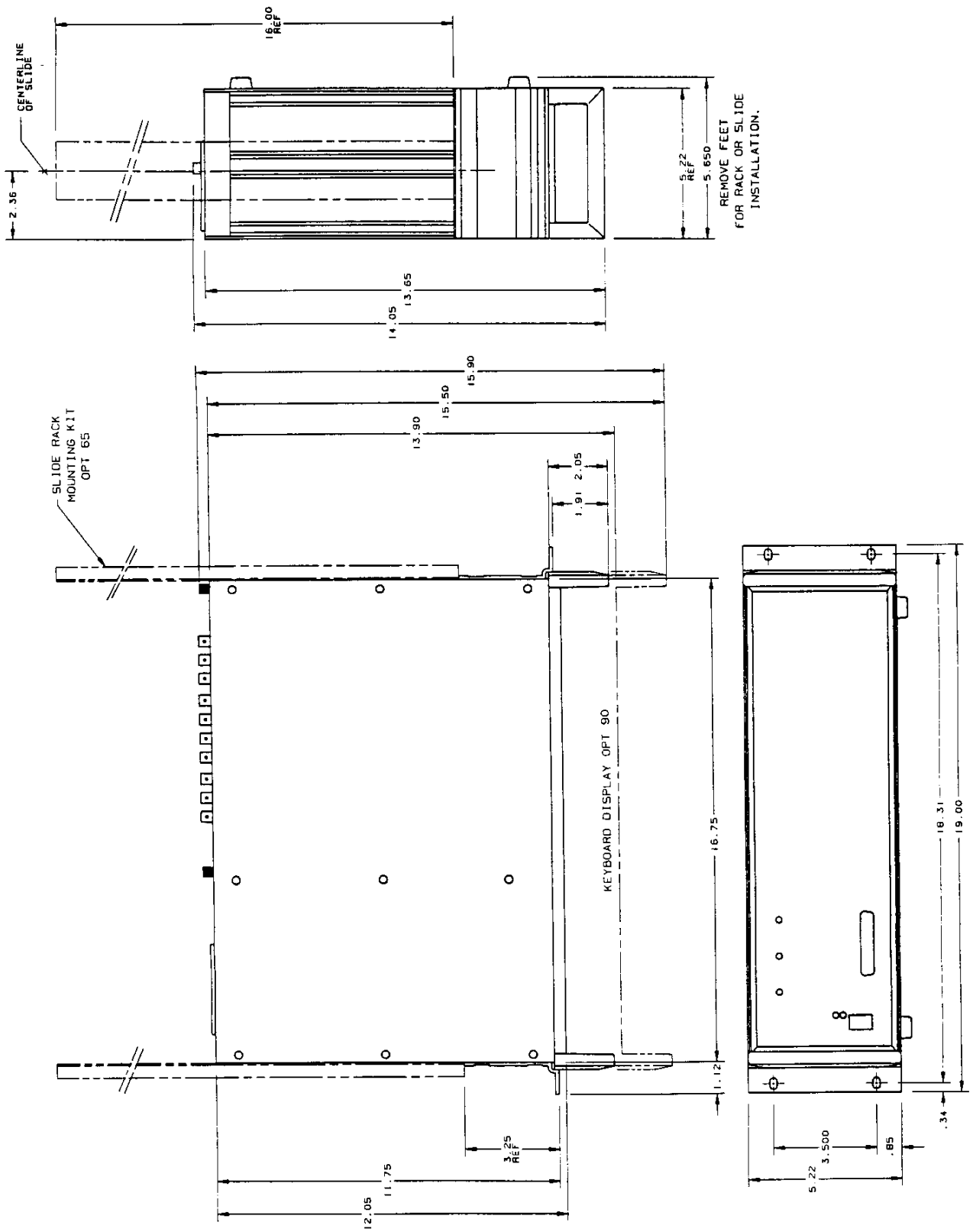


Figure 1-3, Dimensions of the 1250

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IEEE-488-1978 Standard Interface Subset Capability

GPIB

Subset	Description	Applicable Capability
SH1	Source Handshake	Complete Capability
AH1	Acceptor Handshake	Complete Capability
T6	Talker	Complete Capability (1) Basic Talker (2) Serial Poll (3) Unaddress if MLA
TI0	Extended Talker	None
L4	Listener	Complete except Listen Only (1) Basic Listener (2) Unaddress if MTA
LE0	Extended Listener	None
SR1	Service Request	Complete Capability
RL1	Remote/ Local	Complete Capability (1) REN-Remote Enable (2) LLO-Local Lockout (3) GTL-Go to Local
PP0	Parallel Poll	No Capability

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Option 1250-10

The 1250-10 Breadboard module is designed to allow the user to create custom circuits and incorporate them under switching system control. Forty square inches of surface area are provided for user implementation of designs. Fused +5V and +13 V DC supplies are provided and LEDs indicate the status of each supply. Latched inputs and outputs interface to the system backplane to allow programming via the GPIB.

Specifications

I/O Characteristics

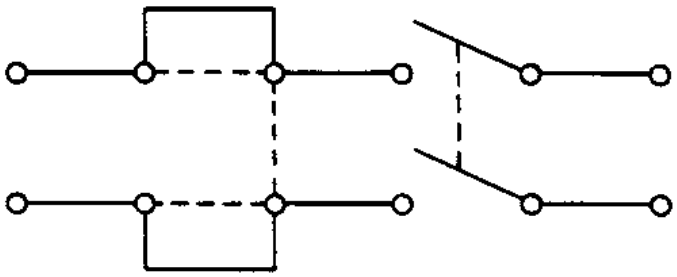
Power:	+13V DC ± 10% at 1.7 A (Fused) +5V DC ± 10 % at 1.7 A (Fused)
Interface to User Circuitry:	
Inputs:	24 LS - TTL Compatible
Outputs:	24 LS - TTL Compatible
General	
User Connector:	Quick Disconnect screw terminal (1250-80)
Breadboard Area:	40 square inches
Mounting Holes:	0.1" spacing
Maximum component height:	0.5"
Maximum lead length below board:	0.062"

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Option 1250-12

Description

The 1250-12 is designed for general purpose signal switching and actuation of external devices. Each channel switches up to 2 amps and 250 V dc or 250 V rms. Relay contacts are monitored to provide user selectable confidence checking. Each channel provides mounting holes to allow the addition of shunt and series elements such as arc suppressors, filters, etc.



Model 1250-12. Ten independent relays. One channel is shown, with provision for addition of series and shunt elements.

Figure 1-4, Block Diagram of 1250-12

Specifications

Switch configuration:	Ten DPST
User Connector:	Quick Disconnect
screw terminal (1250-80)	
Maximum Switchable Voltage	
(Terminal-Terminal or Terminal-Chassis):	250 VDC, 250 VAC RMS and 350 VAC pk
Maximum Switchable Current per channel:	2 A DC or rms
Maximum Switchable Power per channel:	60 W DC, 500 VA AC

DC Performance

Differential Thermal Offset:	< 3 µV per channel,
Path Resistance:	200 milliohm at 2A
Isolation (40^{o} C, 50 % RH)	
Open Channel, channel-channel:	$>10^{11}$ ohms
Channel-Chassis:	$>5x10^{10}$ ohms
Hi-Lo:	$>10^{11}$ ohms

AC Performance

Capacitance

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Open Channel:	<5 pF
Channel-Channel:	<5 pF
Channel-Chassis:	<15 pF
Hi-Lo:	<10 pF
Bandwidth, (-3 dB, 50 ohm termination):	20 MHz
Insertion Loss, (50 ohm termination):	<.20 dB at 100 kHz
	<.25 dB at 1 MHz
	<0.5 dB at 10 MHz
Crosstalk, (50 ohm termination):	<-75 dB at 100 kHz
	<-60 dB at 1 MHz
	<-40 dB at 10 MHz
Switching Time:	# 10 ms / channel

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Option 1250-14

The 1250-14 Digital I/O Module provides 16 digital input/output lines for the generation of control signals, digital stimulus and the input of digital responses. Data can be manipulated in a byte or a word format. The module memory supports storage of up to 127 16-bit words or 254 8 bit bytes for input or output operations. Five input/output control modes are available: two static modes, two strobe modes and one full handshake mode.

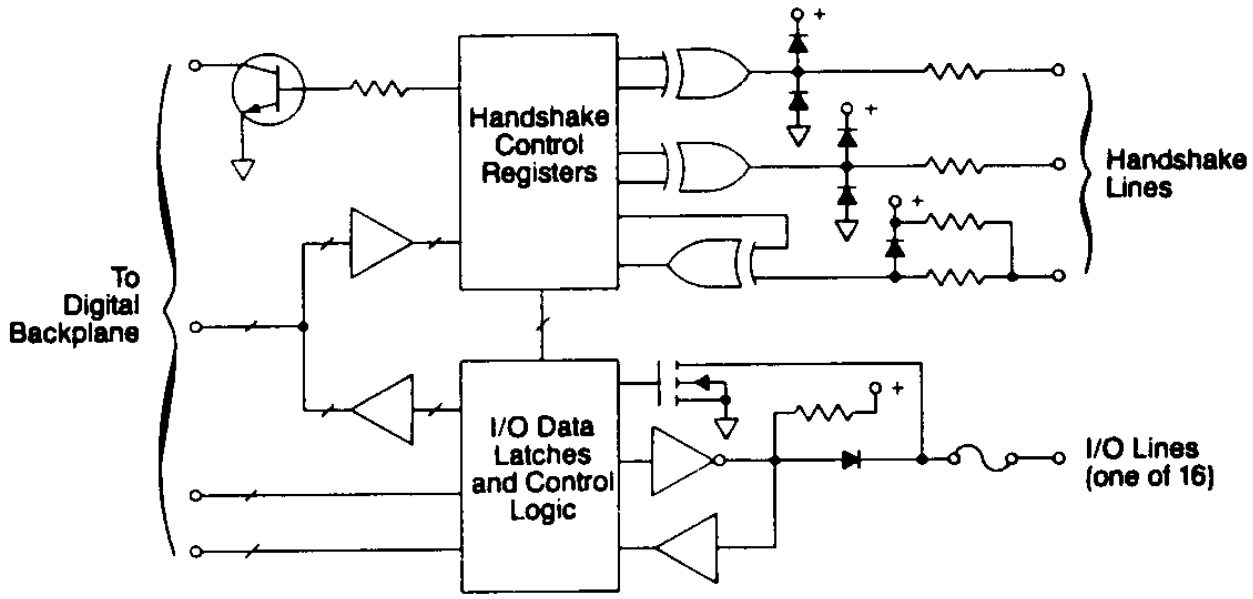


Figure 1-5, Block Diagram of 1250-14

Specifications

User Connector:	40 pin DIL
I/O Lines:	16, each fused
Data Rate:	Static to > 1 kHz
Output	
V_{out} (High):	$ 2.4 V at 8 mA
V_{out} (Low):	# 0.4 V at 126 mA
I_{low} (Max):	125 mA at V_{out} (Low)
Input	
V_{in} (High):	$ 2.0 V
V_{in} (Low):	# 0.4 V
V_{in} (Max):	30 VDC (line to chassis)
Handshake Lines:	3
Output Characteristics:	
V_{out} (High):	$ 2.4 V at 400 µA output

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V_{out} (Low):	# 0.5 V at 2 mA output
Input Characteristics:	
V_{in} (High):	$ 2.0 V
V_{in} (Low):	# 0.8 V
V_{in} (Max):	# 5 V

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Option 1250-15

Description

The 1250-15 Relay Driver Module is designed for applications where it is necessary to locate relays externally. Each module provides 20 current sink output drivers and 20 high impedance sense inputs. Sense feedback circuitry supports confidence testing for these external relays. An internal +13V supply is available as a source for relay coil currents. External supplies up to +40V may also be used.

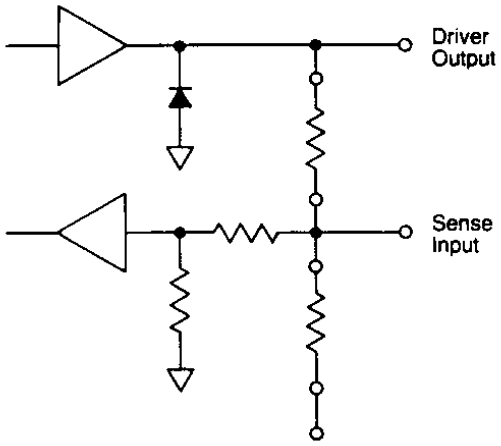


Figure 1-6, Block Diagram of 1250-15

Specifications

User Connector:	Quick Disconnect screw terminal (1250-80)
Maximum Voltage at Output Driver	
Off:	40 V
On:	1.6 V
Maximum Current:	
Per Driver:	350 mA
Per Module:	3 A
Number of Channels:	20
Sense Input Voltage	
Relay OFF:	9 - 40 V
Relay ON:	0 - 1.6 V
Sense Input Impedance:	150 kS
Internal Supply:	+13 V at 1.7 A (Fused)

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Option 1250-15A

Description

The 1250-15 Relay Driver Module is designed for applications where it is necessary to locate relays externally. Each module provides 24 current sink output drivers and 24 sense inputs. Sense feedback circuitry supports confidence testing for these external relays. An internal +13V supply is available as a source for relay coil currents. External supplies up to +30V may also be used.

Specifications

Switch configuration:	24 output drivers (sinking), 24 Sense inputs
User Connector:	3 DB25 connectors. Each connector carries 8 output drivers, 8 sense inputs, supply voltage and corresponding return line.
Maximum Voltage at Output Driver	
Off:	30V
ON:	1.6V
Maximum Current at 100% duty Cycle:	
Per Driver	350mA
Per Group:	
CH00-07	1.0A
CH08-15	1.0A
Ch16-23	1.0A
Per Module	3.0A with external supply
Number of Channels: :	24
Sense Input impedance:	6.8kΩ
Sense Input Voltage:	
Relay de-energized	9-30V
Relay energized	0-1.6V
Internal Supply:	+12V at 1.7A, fused at 2A
Maximum driver switching time:	1.0µs/driver

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Option 1250-16

Description

The 1250-16 is designed for general purpose multiple line switching up to 10 MHz. Each channel switches up to 2 amps and 250 V. Relay contacts are monitored to provide user selectable confidence checking. Separate isolating relays allow 10 lines to access the Analog bus. The 1250-16 is configured as five channels to a common bus, with fifteen lines per channel, twelve of which are switched. Jumpers at the relays allow for user reconfiguration.

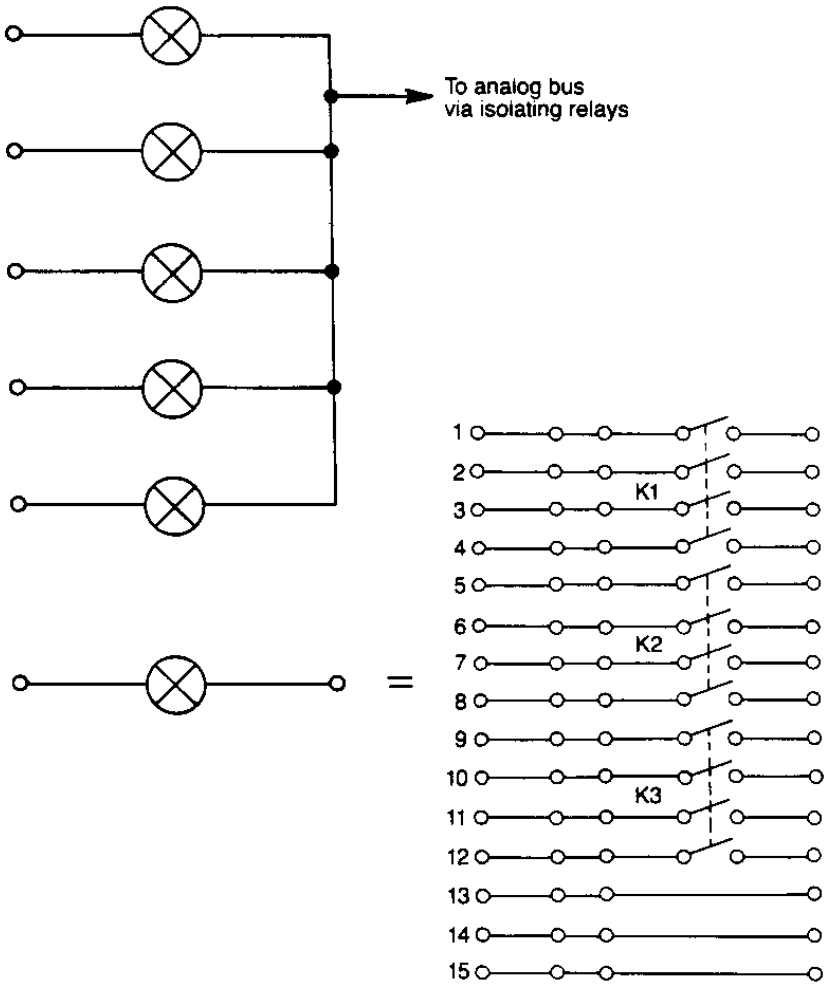


Figure 1-7, Block Diagram of 1250-16

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Specifications

Switch configuration:	Five channels, twelve lines per channel, switched to a common 12 line bus.
User Connector:	D-type subminiature
Maximum Switchable Voltage	250 VDC, 250 VAC RMS and 350 VAC pk
Maximum Switchable Current:	2 A DC or AC rms
Maximum Switchable Power:	60 W DC, 500 VA AC
DC Performance	
Path Resistance:	600 milliohm at 2A DC
AC Performance	
Bandwidth, (-3 dB, 50 ohm termination) :	10 MHz
Switching Time:	# 10 ms

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Option 1250-20

Description

The 1250-20 Power switching module provides switching for AC or DC power supplies and current sources. Switching networks may be configured from the ten independent DPST relays provided. The 1250-20 switches up to 8 A at 250 VAC rms or 5 A at 48 VDC. Relay contacts are monitored to provide user selectable confidence checking. Each channel provides mounting holes to allow the addition of shunt and series elements such as arc suppressors, filters, etc. A fused +13 V DC supply is provided for driving external relays. Separate connections to both sides of the relay allow each channel to function independently or to be configured as custom networks

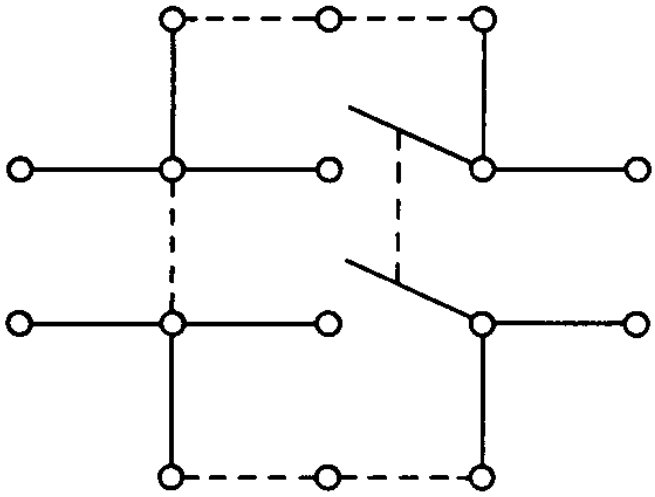


Figure 1-8, Block Diagram of 1250-20

Specifications

Switch configuration:	10 DPST
User Connector:	Quick Disconnect screw terminal (1250-80)
Maximum Switchable Voltage	250 VDC, 250 VAC RMS or 350 VAC pk
Maximum Switchable Current (DC or AC rms)	
Per Terminal:	5 A
Per Channel:	8 A
Per Module:	30 A
Maximum Switchable Power	

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Per Terminal:	150 W DC, 1250 VA
Per Channel:	240 W DC, 2000 VA
Per Module:	900 W DC, 7500 VA
DC Performance	
Path Resistance:	150 milliohm at 5A DC
AC Performance	
Bandwidth, (-3 dB, 50 ohm termination):	20 MHz
Switching Time:	# 15 ms

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Option 1250-30 Series

Description

The 1250-30 Series Scanner/Multiplexer Switch modules are configurable as a 20x1 two wire or two 10x1 two wire multiplexer networks for use at up to 20 MHz. For larger multiplexers or scanners, the analog bus may be accessed via a separate relay. Relay coil currents are monitored to provide user selectable confidence checking. Each channel provides mounting points to allow the addition of shunt and series elements such as arc suppressors, filters, etc.

The 1250-30B Scanner / Multiplexer provides either one 1 x 20, two 1 x 10 or two 1 x 5 and two 1 x 4 two wire multiplexers for use at frequencies up to 20 MHz. All configurations are user selectable. The 1250-30B allows the automatic connection to each channel of a user specified termination when the channel is open.

The 1250-30C Scanner / Multiplexer provides either one 1 x 20 or two 1 x 10 one wire multiplexers for use at frequencies up to 20 MHz. All configurations are user selectable.

The 1250-30D Scanner / Multiplexer provides either one 1 x 20 or two 1 x 10 one wire multiplexers for use at frequencies up to 20 MHz. The 1250-30D supports applications where regular calibration is required without removal of instruments from the system. All configurations are user selectable.

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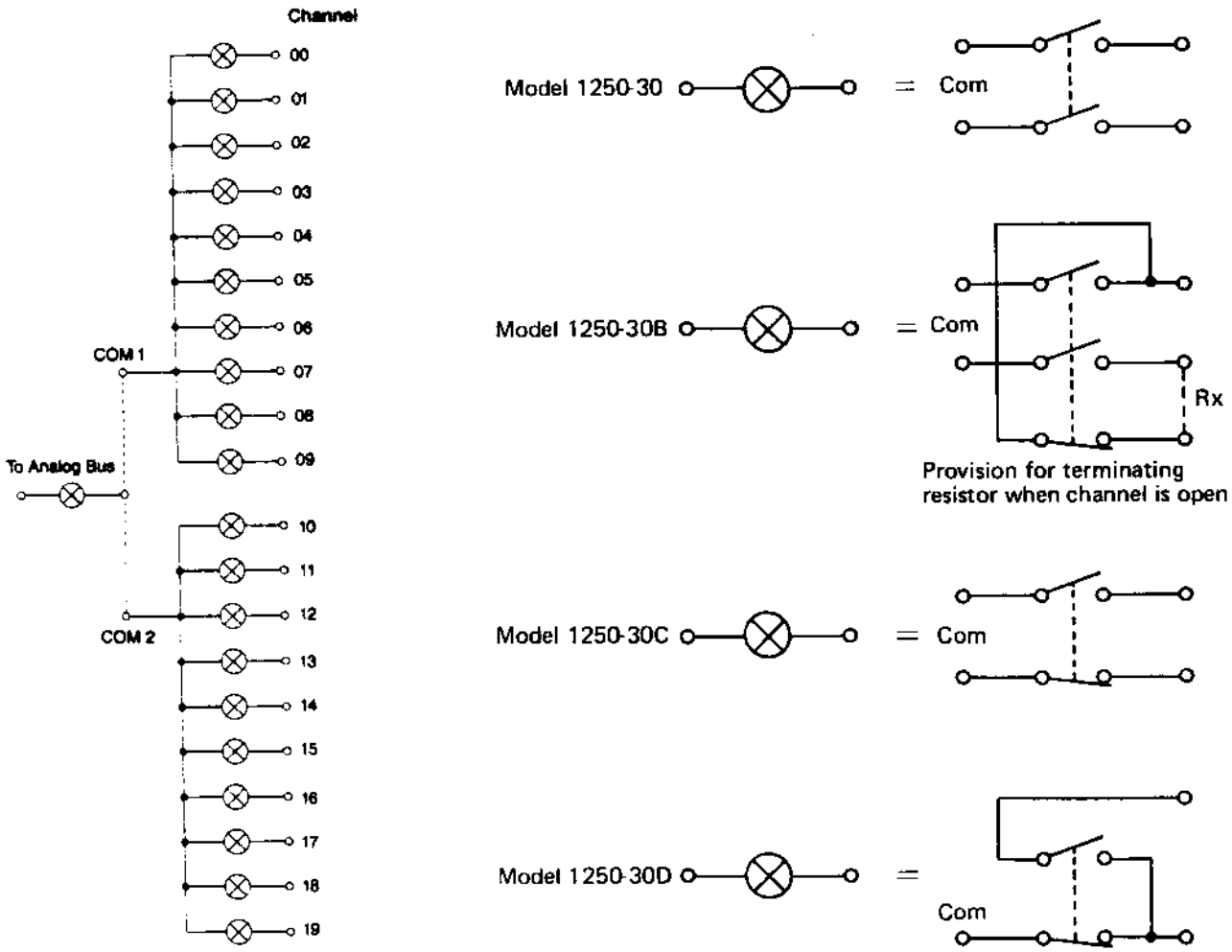


Figure 1-9, Block Diagram of 1250-30 Series

Scanner / Multiplexer Module Model 1250-30B Specifications

Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis):	250 VDC or AC rms, 350 VAC Peak
Maximum Switchable Current (DC or AC rms) Per Channel:	2 A
Maximum Switchable Power	
Per Channel:	60 WDC, 500 VA
Per Module:	60 WDC, 500 VA

DC Performance

Differential Thermal Offset:	3 µV per channel
Path Resistance:	300 millohm at

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	2ADC
Isolation	
Open Channel, Channel-Channel:	$>10^{11}$ohm
Channel-Chassis:	$>10^{10}$ ohm
High-Low:	$>10^{11}$ohm

AC Performance

Capacitance	
Open Channel:	<10 pF
Channel-Channel:	<10 pF
Channel-Chassis:	<125 pF
High-Low:	<20 pF
Bandwidth (-3dB):	20 MHz (50 ohm termination)
Insertion Loss (50 Ohm Termination)	
100 kHz:	<0.20 dB
1 MHz:	<0.25 dB
10 MHz:	<1.50 dB
Cross Talk (50 Ohm Termination)	
100 kHz:	-70dB
1 MHz:	-55 dB
10 MHz:	-36dB
Switching Time:	10 mSec per channel

Scanner / Multiplexer Module Model 1250-30C Specifications

Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis):	250 VDC or AC rms, 350 VAC Peak
Maximum Switchable Current (DC or AC rms) per Channel:	2 A
Maximum Switchable Power	
Per Channel:	60 WDC, 500 VA
Per Module:	60 WDC, 500 VA

DC Performance

Differential Thermal Offset:	3 µV per channel
Path Resistance:	300 millohm at 2ADC
Isolation	
Open Channel, Channel-Channel:	$>10^{11}$ohm
Channel-Chassis:	$>10^{10}$ ohm
High-Low:	$>10^{11}$ohm

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AC Performance

Capacitance

Open Channel:	<10 pF
Channel-Channel:	<10 pF
Channel-Chassis:	<125 pF
High-Low:	<20 pF
Bandwidth (-3dB):	20 MHz (50 ohm termination)

Insertion Loss (50 Ohm Termination)

100 kHz:	<0.20 dB
1 MHz:	<0.25 dB
10 MHz:	<1.50 dB

Cross Talk (50 Ohm Termination)

100 kHz:	-70dB
1 MHz:	-55 dB
10 MHz:	-36dB
Switching Time:	10 mSec per channel

Scanner / Multiplexer Module Model 1250-30D Specifications

Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis):	250 VDC or AC rms, 350 VAC Peak
Maximum Switchable Current (DC or AC rms) Per Channel:	2 A

Maximum Switchable Power

Per Channel:	60 WDC, 500 VA
Per Module:	60 WDC, 500 VA

DC Performance

Differential Thermal Offset:	3 µV per channel
Path Resistance:	300 millohm at 2ADC

Isolation

Open Channel, Channel-Channel:	$>10^{11}$ohm
Channel-Chassis:	$>10^{10}$ ohm
High-Low:	$>10^{11}$ohm

AC Performance

Capacitance

Open Channel:	<10 pF
Channel-Channel:	<10 pF
Channel-Chassis:	<125 pF
High-Low:	<20 pF

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Bandwidth (-3dB):	20 MHz (50 ohm termination)
Insertion Loss (50 Ohm Termination)	
100 kHz:	<0.20 dB
1 MHz:	<0.25 dB
10 MHz:	<1.50 dB
Cross Talk (50 Ohm Termination)	
100 kHz:	-70dB
1 MHz:	-55 dB
10 MHz:	-36dB
Switching Time:	10 mSec per channel

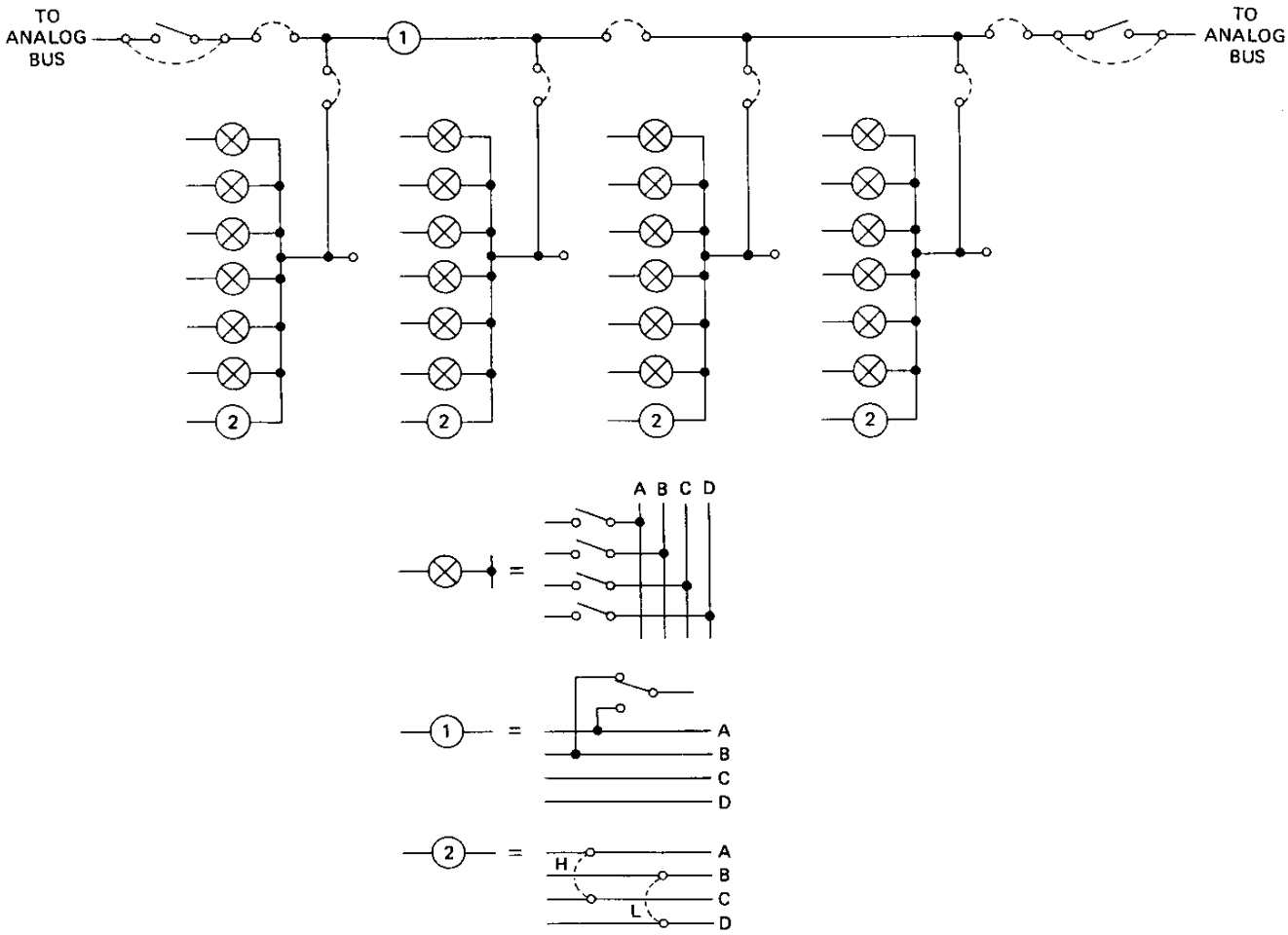
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Option 1250-35

The 1250-35 Scanner / Multiplexer Module is a user configurable switching module that may be configured in eight different configurations for use at frequencies up to 30 MHz. These are :

1) Eight 1 x 6 two wire scanner / multiplexers
2) Four 1 x 6 four-wire scanner / multiplexers
3) Four 1 x 12 two-wire scanner / multiplexers
4) Two 1 x 12 four wire scanner / multiplexers
5) Two 1 x 24 two-wire scanner / multiplexers
6) One 1 x 24 four-wire scanner / multiplexers
7) One 1 x 48 two-wire scanner / multiplexers
8) One 1 x 96 one-wire scanner / multiplexer

Figure 1-10, Block Diagram of 1250-35



Specifications

Maximum Switchable Voltage
(Terminal-Terminal or Terminal-Chassis): 110 VDC, 125 VAC RMS

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Maximum Switchable Current per channel:	1 A DC or rms
Maximum Switchable Power per channel:	30 W DC, 62.5 VA AC

DC Performance

Differential Thermal Offset:	# 4 µV per channel,
Path Resistance:	# 1 S
Isolation	
Open Channel, channel-channel:	> $5x10^8$ S
Channel-Chassis:	> $5x10^8$ S
Hi-Lo:	> $5x10^8$ S

AC Performance

Capacitance	
Open Channel:	<5 pF
Channel-Channel:	<10 pF
Channel-Chassis:	<100 pF
Bandwidth, (-3 dB, 50 ohm termination):	30 MHz
Insertion Loss, (50 ohm termination):	<.25 dB at 1 MHz
Crosstalk, (50 ohm termination):	<-90 dB at 10 kHz <-70 dB at 100 kHz <-50 dB at 1 MHz
Switching Time:	# 2 ms / channel (typical)

Refer to the section on 1250-35 Module Specific Syntax in Section 3 for instructions on how to select the 1250-35 configuration.

In most of the above configurations the 1250-35 may be user configured to access the 1250 Analog bus. The Analog bus allows internal expansion for the configuration of larger scanner / multiplexers than the 1250-35 may achieve alone.

The 30 MHz bandwidth specified for the 1250-35 is a worst-case specification for the 1 x 6 two wire configuration only. Unterminated stubs on the signal paths are the cause of the band-limiting effects that may reduce the bandwidth to as low as 3 MHz in the case of the 1 x 96 one wire mode.

NOTE

The 1250-35 is supported by 1250 operating systems at rev. Levels 14.1 and above.

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Option 1250-40

Description

The 1250-40 Matrix Module supplies a two wire 4x5 signal switching matrix for use at up to 10 MHz*. The Analog bus allows internal expansion for the configuration of matrices of up to 4x25. Relay contacts are monitored to provide user selectable confidence checking.

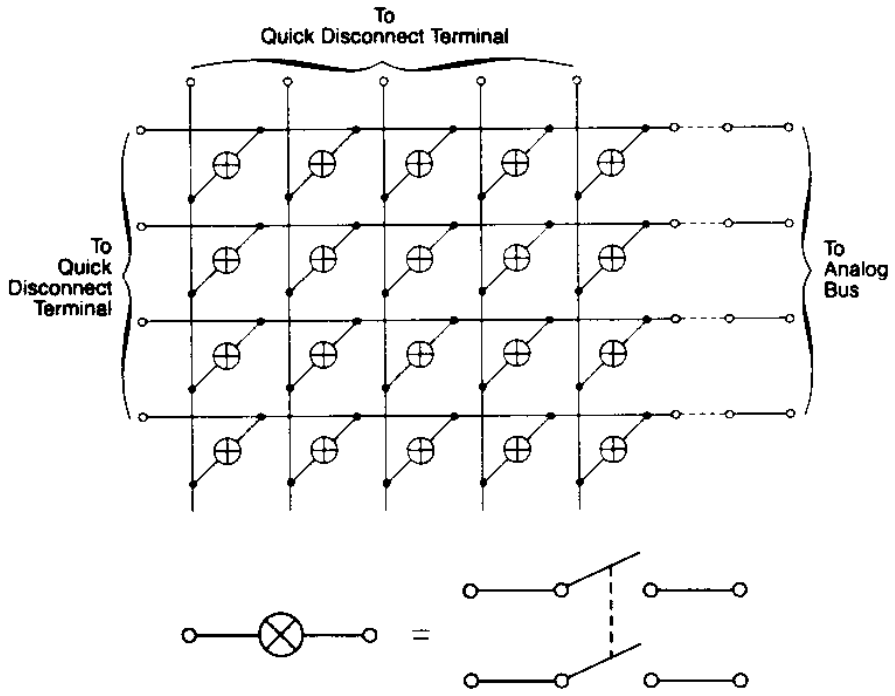


Figure 1-11, Block Diagram of 1250-40

The 10 MHz bandwidth specified for the 1250-40 is a worst-case specification. Unterminated stubs on the matrix signal paths are the cause of the band-limiting effects that reduce the 1250-40 bandwidth to 10 MHz. Choosing the longest path length possible for a signal will reduce the length of these unterminated stubs and also reduces the band limiting effects that they cause. This allows the 1250-40 to be used above 10 MHz.

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NOTE

The 1250-40 has been superceded by the 1250-40B. It is still available to users with systems configured to use the 1250-40, however, as the pin configuration used by the 1250-40B is different from that of the 1250-40.

Specifications

Switch Configuration:	4x5 two wire matrix
User Connector:	Quick Disconnect screw terminal
Maximum Switchable Voltage:	250 VDC, 250 VAC RMS or 350 VAC pk
Maximum Switchable Current (DC or AC rms):	
Per Channel:	2 A
Per Module:	8 A
Maximum Switchable Power	
Per channel:	60 W DC, 500 VA AC
Per module:	240 W DC, 2000 VA AC

DC Performance

Differential Thermal Offset:	# 3 µV per channel
Path Resistance:	300 milliohm at 2A DC
Isolation at 40 ^{o}C, 50 % RH	
Open Channel, channel-channel:	>10^{10} ohms
Channel-Chassis:	>10^{10} ohms
Hi-Lo:	>10^{10} ohms
Capacitance	
Open Channel:	<10 pF
Channel-Channel:	<10 pF
Channel-Chassis:	<75 pF
Hi-Lo:	<15 pF
Bandwidth, (-3 dB, 50 ohm termination):	10 MHz
Insertion Loss, 50 ohm termination:	<.20 dB at 100 kHz <.30 dB at 1 MHz <3.00 dB at 10 MHz
Crosstalk, 50 ohm termination:	<-70 dB at 100 kHz <-50 dB at 1 MHz <-30 dB at 10 MHz
Switching Time:	10 ms / channel

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Option 1250-40B

Description

The 1250-40B supplies a four wire 4x5 signal switching matrix for use at up to 10 MHz*. Relay coil currents are monitored to provide user selectable confidence checking. Access to the analog bus is provided by the addition of jumper wires.

The 10 MHz bandwidth specified for the 1250-40B is a worst-case specification. Unterminated stubs on the matrix signal paths are the cause of the band-limiting effects that reduce the 1250-40B bandwidth to 10 MHz. Choosing the longest path length possible for a signal will reduce the length of these unterminated stubs and also reduces the band limiting effects that they cause. This allows the 1250-40B to be used above 10 MHz.

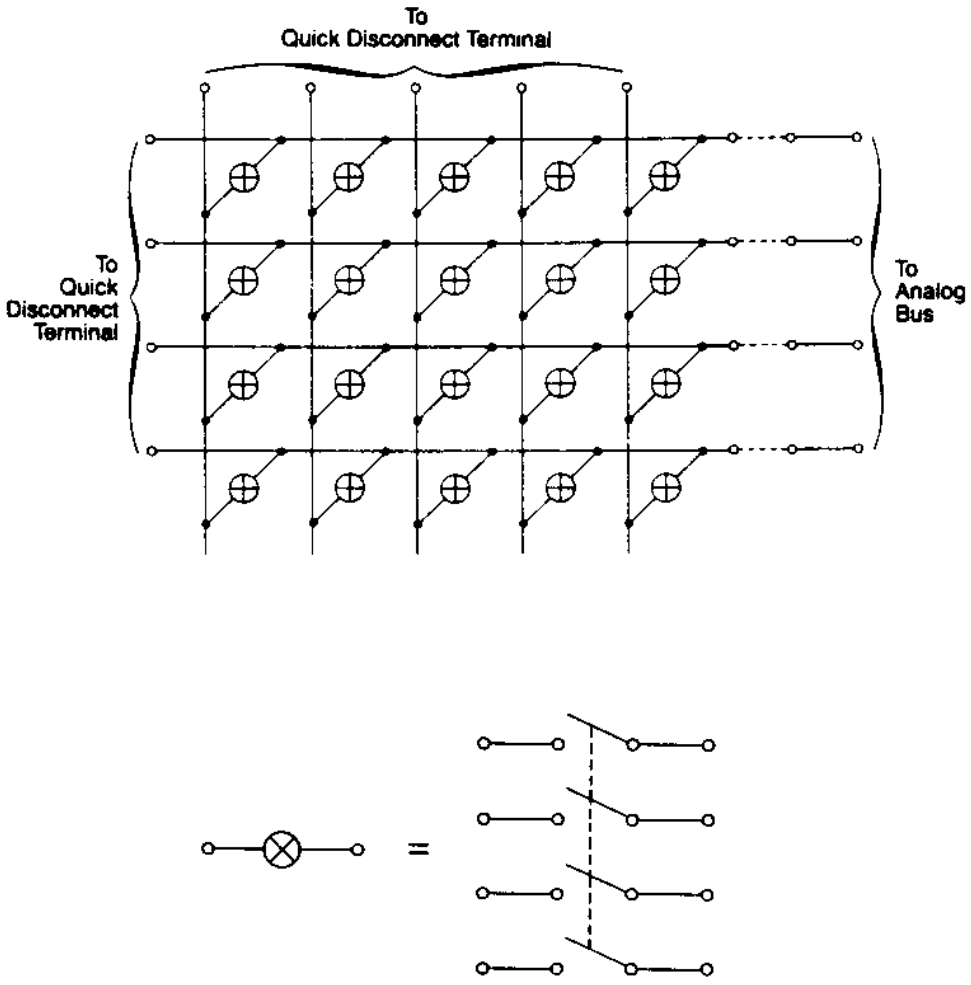


Figure 1-12, Block Diagram of 1250-40B

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Specifications

User Connector:	Quick Disconnect screw terminal
Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis):	250 VDC, 250 VAC RMS and 350 VAC pk
Maximum Switchable Current per channel:	2 A DC, 2A AC RMS
per module:	8 A DC, 8A AC RMS
Maximum Switchable Power per channel:	60 W DC, 500 VA AC
per module:	240 W DC, 2000 VA AC
Thermal Offset:	< 3uV per channel, differential
Path Resistance:	300 milliohm at 2A DC
Isolation	
Open Channel, channel-channel:	$>10^{10}$ ohms
Channel-Chassis:	$>10^{10}$ ohms
Hi-Lo:	$>10^{10}$ ohms
Capacitance	
Open Channel:	<10 pF
Channel-Channel:	<10 pF
Channel-Chassis:	<75 pF
Hi-Lo:	<15 pF
Bandwidth, 50 ohm termination:	10 MHz
Insertion Loss, 50 ohm termination:	<.20 dB at 100 kHz
	<.30 dB at 1 MHz
	<3.00 dB at 10 MHz
Crosstalk, 50 ohm termination:	<-70 dB at 100 kHz
	<-45 dB at 1 MHz
	<-30 dB at 10 MHz
Switching Time:	10 ms

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Option 1250-45

Description

The 1250-45 supplies a two wire 4x12 signal switching matrix or it may be configured in the factory as two 4x6 matrices, for use at up to 10 MHz. Relay coil currents are monitored to provide user selectable confidence checking.

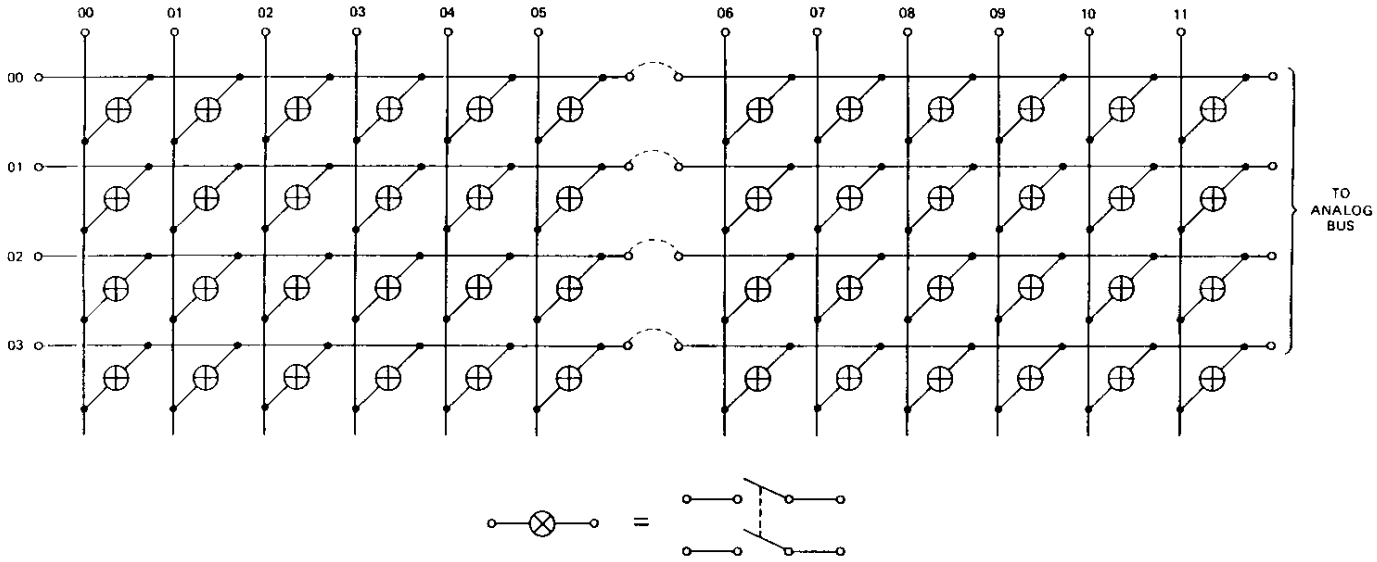


Figure 1-13

NOTE

The 1250-45 is not supported by 1250 operating systems at rev. levels 13.1 or lower. To introduce the 1250-45 into a 1250 system at a lower operating system rev. level than 13.1, contact Racal-Dana for details of the software upgrade required.

The 10 MHz bandwidth specified for the 1250-45 is a worst-case specification. Unterminated stubs on the matrix signal paths are the cause of the band-limiting effects that reduce the 1250-45 bandwidth to 10 MHz. Choosing the longest path length possible for a signal will reduce the length of these unterminated stubs and also reduces the band limiting effects that they cause. This allows the 1250-45 to be used above 10 MHz.

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Specifications

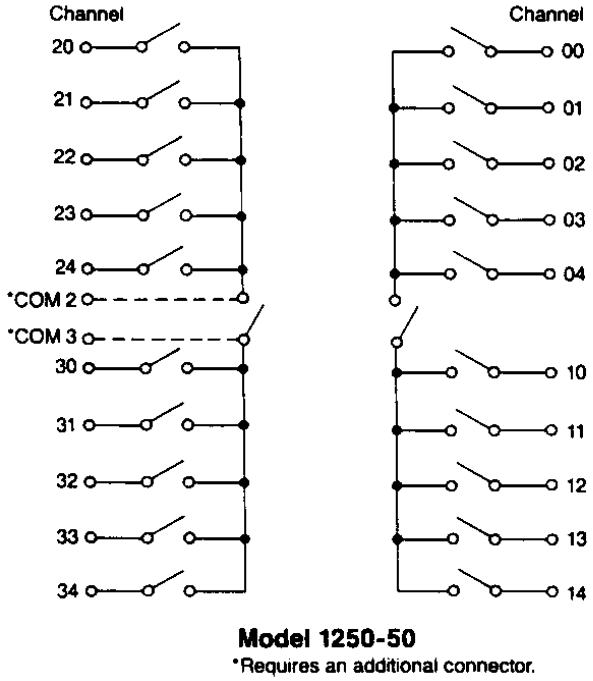
User Connector:	Quick Disconnect screw terminal
Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis):	220 VDC, 250 VAC RMS and 350 VAC pk
Maximum Switchable Current per channel:	2 A DC, 2A AC RMS
per module:	8 A DC, 8A AC RMS
Maximum Switchable Power per channel:	60 W DC, 125 VA AC
per module:	240 W DC, 500 VA AC
Thermal Offset:	< 15uV per channel, differential
Path Resistance:	300 milliohm at 2A DC
Isolation	
Open Channel, channel-channel:	$>10^{10}$ ohms
Channel-Chassis:	$>10^{10}$ ohms
Hi-Lo:	$>10^{10}$ ohms
Capacitance	
Open Channel:	<80 pF
Channel-Channel:	<30 pF
Channel-Chassis:	<200 pF
Hi-Lo:	<100 pF
Bandwidth, 50 ohm termination:	10 MHz
Insertion Loss, 50 ohm termination:	<.20 dB at 100 kHz
	<.30 dB at 1 MHz
	<3.00 dB at 10 MHz
Crosstalk, 50 ohm termination:	<-70 dB at 100 kHz
	<-45 dB at 1 MHz
	<-25 dB at 10 MHz
Switching Time:	10 ms

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Option 1250-50

Description

The 1250-50 RF Multiplexer Module provides four 1x4, two 1x9 or one 1x17 multiplexers for use at up to 200 MHz. The addition of user installable BNC connectors allows two 1x5 and two 1x4, one 1x10 and one 1x9 and one 1x19 multiplexers to be configured. Relay contacts are monitored to provide user selectable confidence checking.



Model 1250-50

*Requires an additional connector.

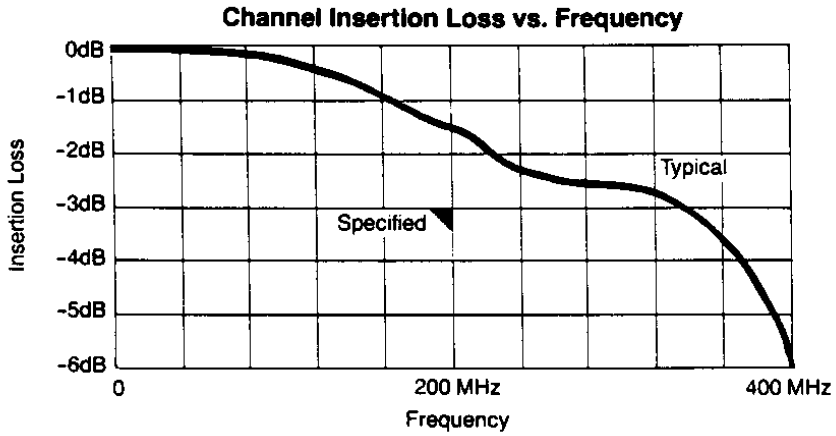


Figure 1-14, Block Diagram of 1250-50 and Insertion Loss vs, Frequency

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Specifications

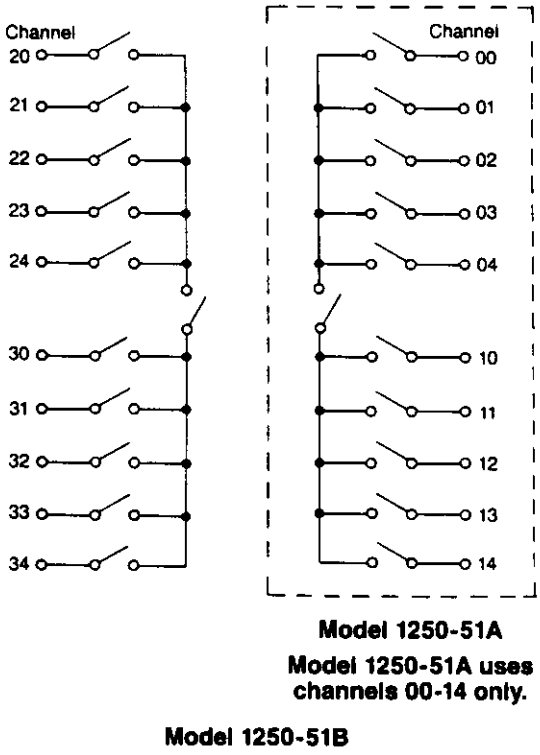
User Connector:	BNC Plug
Maximum Switchable Voltage Signal - Signal Ground:	200 VDC, 200 VAC pk
Maximum Switchable Current Per Channel:	5 A DC, 1 A AC pk
Maximum Switchable Power:	10 W DC, 10 VA, 10 W RF into 50 S
DC Performance	
Path Resistance:	# 500 milliohm
AC Performance	
Impedance:	50 S
Bandwidth, (-3 dB, 50 ohm termination):	200 MHz
Insertion Loss, 50 ohm termination:	0.5 dB typical at 100 MHz
Crosstalk, 50 ohm termination:	<-75 dB at 10 MHz <-55 dB at 100 MHz <-50 dB at 200 MHz
Isolation (50S termination)	
10 MHz:	# -55 dB
100 MHz	# -40 dB
200 MHz	# -35 dB
VSWR (50 S termination)	# 1.5 : 1 at 100 MHz
Switching Time:	# 2 ms

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Options 1250-51A and 1250-51B

Description

The 1250-51A RF Multiplexer Module supplies two 1x4 or one 1x9 multiplexers for use at up to 500 MHz. The 1250-51B supplies four 1x4, two 1x9 or one 1x17 multiplexers and is also for use at up to 500 MHz. Relay coil currents are monitored to provide user selectable confidence checking.



Model 1250-51A

Model 1250-51A uses channels 00-14 only.

Model 1250-51B

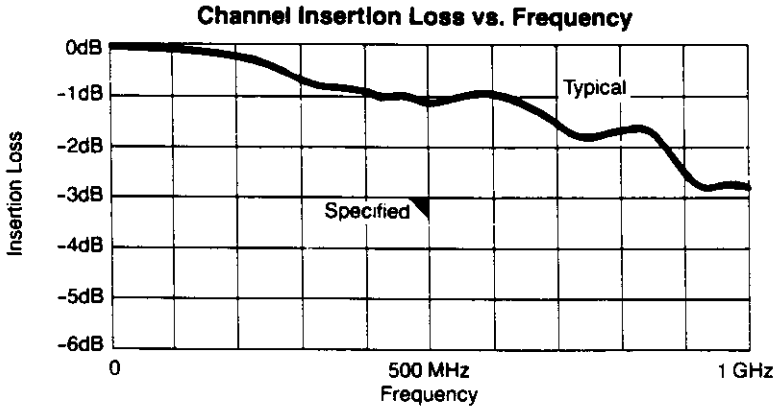


Figure 1-15, Block Diagram of 1250-51 and Insertion Loss vs, Frequency

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Specifications

User Connector:	BNC
Maximum Switchable Voltage Signal - Signal Ground:	30VDC, 100VAC rms
Maximum Switchable Current Per Channel:	2 A DC, 2 A rms
Maximum Switchable Power Per Channel:	60 W DC, 60 VA, 60 W RF into 50 S
Maximum Voltage, Signal Ground to Chassis:	52 V DC or peak AC

DC Performance

Path Resistance:	# 600 milliohm at 2A

AC Performance

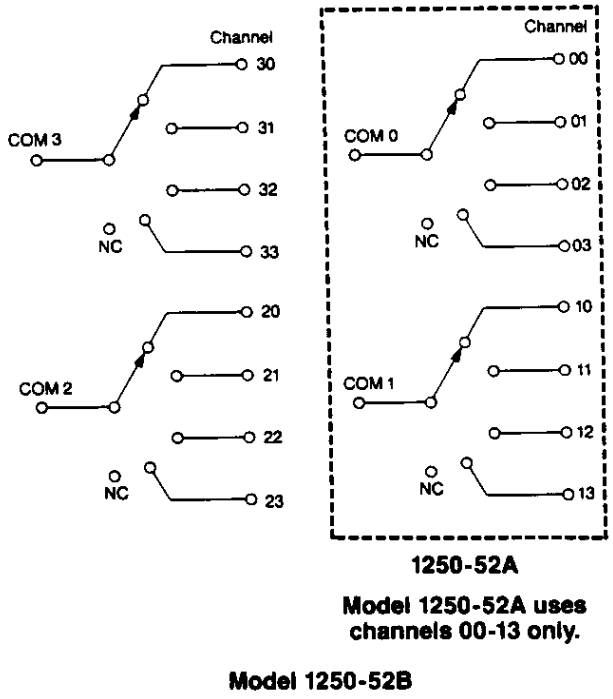
Impedance:	50 S
Bandwidth, (-3 dB, 50 ohm termination):	500 MHz
Insertion Loss, 50 ohm termination:	< 0.5dB at 100 MHz < 1.0 dB at 250 MHz
Crosstalk, 50 ohm termination:	<-100 dB at 10 MHz <-90 dB at 100 MHz <-60 dB at 500 MHz
Isolation (50 S termination)	# -70 dB at 10 MHz # -60 dB at 100 MHz # -50 dB at 500 MHz
VSWR (50 S termination)	1.2 : 1 at 100 MHz
Switching Time:	# 10 ms

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Options 1250-52A and 1250-52B

Description

The 1250-52A Multiplexer Module provides two 1x4 multiplexers for use at up to 1 GHz. The 1250-52B Multiplexer Module provides four 1x4 multiplexers for use at up to 1 GHz. Binary tree configurations are employed to avoid unterminated stub effects that would otherwise limit the bandwidth of the modules signal paths. Unused paths are isolated and grounded to reduce the effects of radiated and conducted noise. Relay coil currents are monitored to provide user selectable confidence checking.



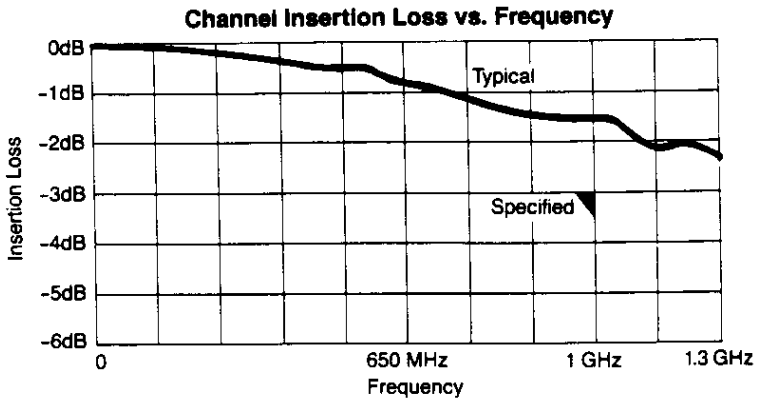


Figure 1-16, Block Diagram of 1250-52B and Insertion Loss vs. Frequency

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Specifications

User Connector:	BNC
Maximum Switchable Voltage Signal - Ground:	30 VDC, 100VAC rms
Maximum Switchable Current Per Channel:	2 A DC, 2 A rms
Maximum Switchable Power Per Channel:	60 W DC, 60 VA, 60 W RF power
Maximum Voltage, Signal Ground to Chassis:	42 V DC or peak AC
DC Performance	
Path Resistance:	500 milliohm at 2 A
AC Performance	
Impedance:	50 S
Bandwidth, (-3 dB, 50 ohm termination):	1 GHz
Insertion Loss, (50 S termination):	0.5 dB at 100 MHz, 1.0 dB at 500 MHz
Crosstalk, (50 S termination):	<-100 dB at 10 MHz <-95 dB at 100 MHz <-55 dB at 1 GHz
Isolation (50 S termination):	# -100dB at 10 MHz # -90dB at 100 MHz # -55dB at 1 GHz
VSWR (50 S termination)	1.4 : 1 at 500 MHz
Switching Time:	# 10 ms

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Option 1250-54B

Description

The 1250-54B supplies four 4:1 multiplexers for use at up to 1 GHz. Any unused inputs may be terminated into 50 ohms. Binary tree configurations are employed to avoid unterminated stub effects that would otherwise limit the bandwidth of the modules signal paths. Relay coil currents are monitored to provide user selectable confidence checking.

Note:

A version of the 1250-54B with a characteristic impedance of 75 S is available and is designated the 1250-55B.

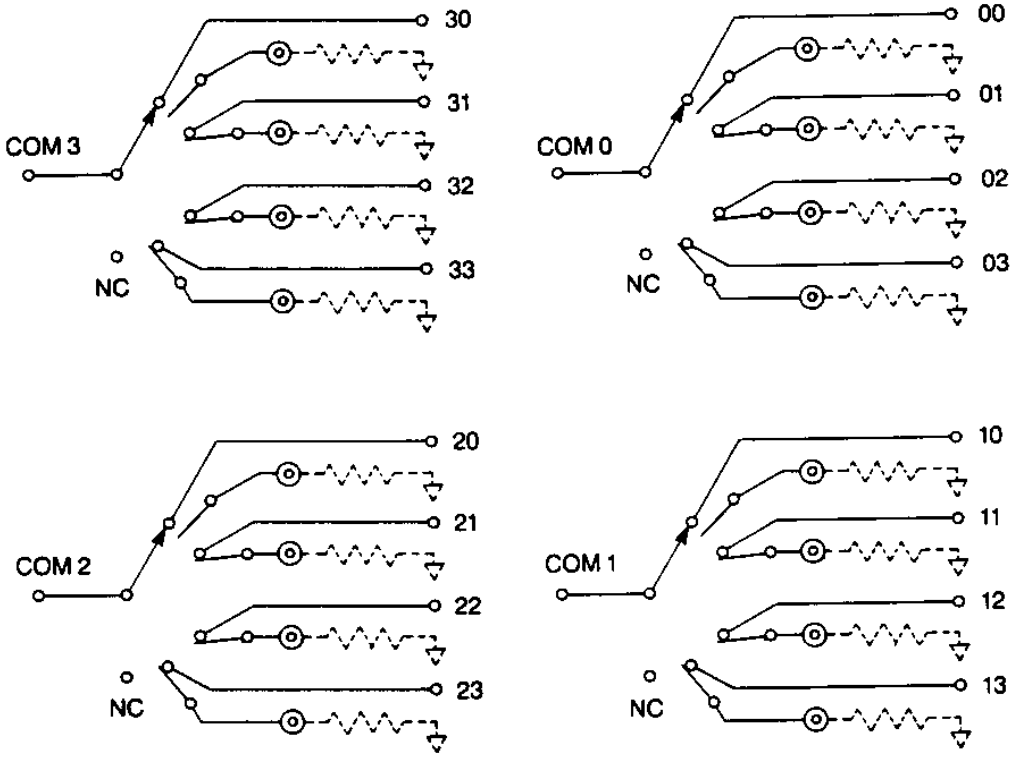


Figure 1-17, Block Diagram of 1250-54B

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Specifications

User Connector:	BNC
Maximum Switchable Voltage (Signal - Ground):	30 VDC, 100 VAC rms
Maximum Switchable Current:	2 A DC or AC rms
Maximum Switchable Power:	60 WDC, 600 VA, 60 W RF Power
Maximum Voltage (Signal Ground - Chassis):	42 VDC or peak AC

DC Performance

Path Resistance:	500 mS at 2 ADC

AC Performance

Impedance:	50 S
Bandwidth (-3dB, 50S termination):	1 GHz
Insertion Loss (50 S termination):	0.5 dB at 100 MHz
	1.0 dB at 500 MHz
Crosstalk (50 S termination):	# -100 dB at 10 MHz
	# -85 dB at 100 MHz
	# -55 dB at 1 GHz
Isolation: (50 S termination)	# -100 dB at 10 MHz
	# -80 dB at 100 MHz
	# -55 dB at 1 GHz
VSWR: (50 S termination)	1.4 : 1 at 500 MHz
Switching Time:	# 10 mSec

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Option 1250-55B

Description

The 1250-55B supplies four 4:1 multiplexers for use at up to 1 GHz. Any unused inputs may be terminated into 50 ohms. Binary tree configurations are employed to avoid unterminated stub effects that would otherwise limit the bandwidth of the modules signal paths. Relay coil currents are monitored to provide user selectable confidence checking.

Note:

A version of the 1250-55B with a characteristic impedance of 50 S is available and is designated the 1250-54B. The module will be reported to the user as a 1250-54B, regardless of weather it is a 1250-45B or 1250-55B. In either case, the module will operate correctly.

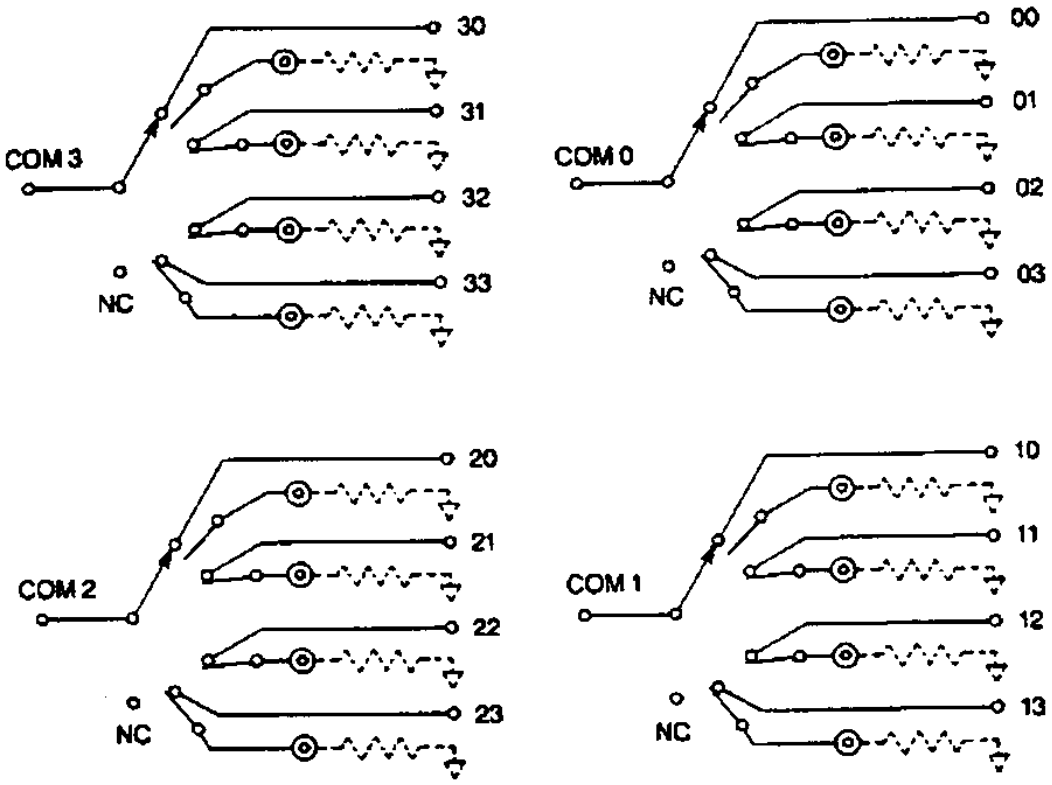


Figure 1-18, Block Diagram of 1250-55B

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Specifications

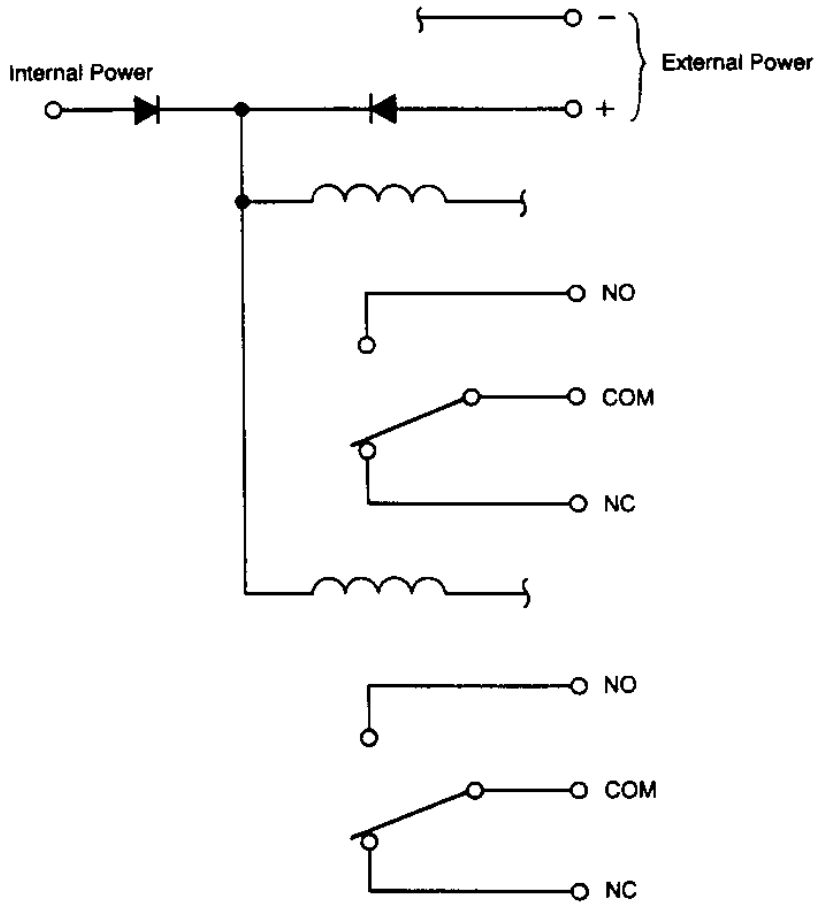
User Connector:	BNC
Maximum Switchable Voltage (Signal - Ground):	30VDC, 100VACrms
Maximum Switchable Current:	2 A DC or AC rms
Maximum Switchable Power:	60 WDC, 600 VA, 60 W RF Power
Maximum Voltage (Signal Ground - Chassis):	42 VDC or peak AC
DC Performance	
Path Resistance:	500 mS at 2 ADC
AC Performance	
Impedance:	50 S
Bandwidth (-3 dB, 50 S termination):	1 GHz
Insertion Loss (50 S termination):	0.5 dB at 100 MHz 1.0 dB at 500 MHz
Crosstalk (50 S termination):	# -100 dB at 10 MHz # -85 dB at 100 MHz # -55 dB at 1 GHz
Isolation: (50 S termination)	# -100 dB at 10 MHz # -80 dB at 100 MHz # -55 dB at 1 GHz
VSWR: (50 S termination)	1.4 : 1 at 500 MHz
Switching Time:	# 10 mSec

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Options 1250-60 and 1250-61

Description

The 1250-60 and 1250-61 Microwave Switch modules provide up to four SPDT coaxial switches per module. The 1250-60 is for use at up to 18 GHz and the 1250-61 is for use at up to 26.5 GHz. The A version of these switch modules provides two SPDT relays per module and the B version provides four SPDT relays per module. Relay coil currents are monitored to provide user selectable confidence checking.



Model 1250-60A/61A microwave switch and power supply configuration. Model 1250-60B/61B contains four relays.

Figure 1-19, Block Diagram of 1250-60 and 1250-61

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Specifications

Maximum Voltage		71 VAC rms	
Maximum Current Per Channel:		1.4 A rms	
Maximum Power Per Channel:		1250-60	1250-61
	100 MHz	100 W	250 W
	1 GHz	50 W	80 W
	10 GHz	10 W	25 W
	18 GHz	7.5 W	20 W
	26.5 GHz	-------	25 W
Switching Time	(18 GHz):		# 30 msec
	(26.5 GHz)		# 15 msec

AC Performance

1250-60

Insertion Loss, (50 S termination):	0.2 dB to 6 GHz
	0.4 dB to 12.4 GHz
	0.5 dB to 18 GHz
Isolation (50 S termination):	# -70 dB at 6 GHz
	# -60dB at 12.4GHz
	# -60dB at 18 GHz
VSWR (50 S termination)	1.25 : 1 to 6 GHz
	1.4 : 1 to 12.4 GHz
	1.5 : 1 to 18 GHz

1250-61

Insertion Loss, (50 S termination):	0.1 dB at 4 GHz
	0.2 dB at 12.4 GHz
	0.3 dB at 18 GHz
	1.0 dB at 26.5 GHz
Isolation (50 S termination):	# -80 dB at 4 GHz
	# -70dB at 12.4GHz
	# -60 dB at 18 GHz
	# -40dB at 26.5GHz
VSWR (50 S termination)	1.2 : 1 to 4 GHz
	1.3 : 1 to 12.4 GHz
	1.5 : 1 to 18 GHz
	1.65 : 1 to 26.5 GHz

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Option 1250-65

The 1250-65 consist of 4 transfer switches capable of operating at frequencies up to 18 0Hz. Each transfer switch has a built-in latching circuit which eliminates the need to provide continuous coil current. Each transfer switch also has 4 SMA connectors which are configured in 2 ways. The 2 configurations are implemented through the OPEN, CLOSE, and RESET commands.

The 2 configurations of each transfer switch are shown below.

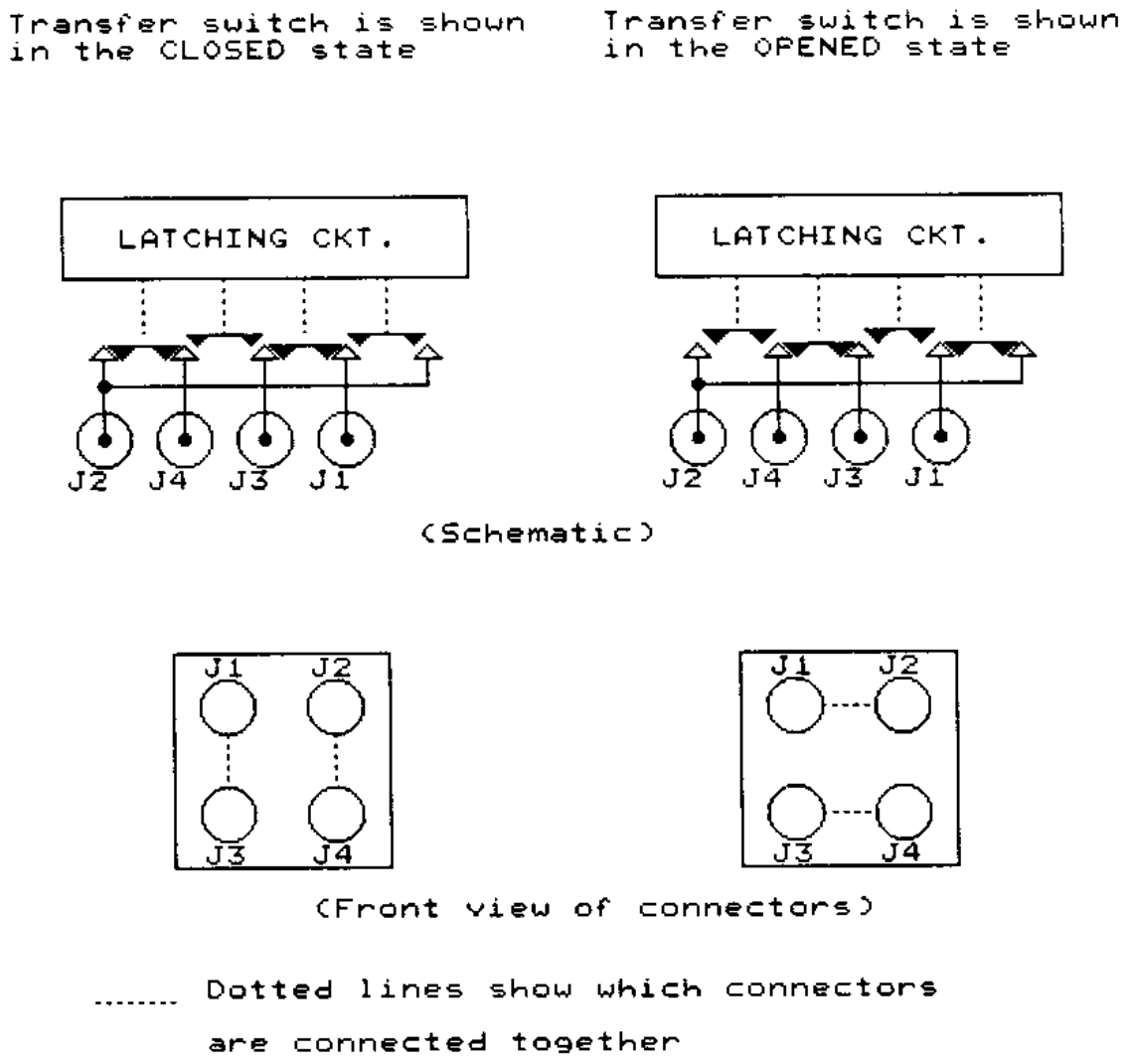


Figure 1-20, Block Diagram of 1250-65

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Two configurations of the transfer switch used on the *1250-65* module.

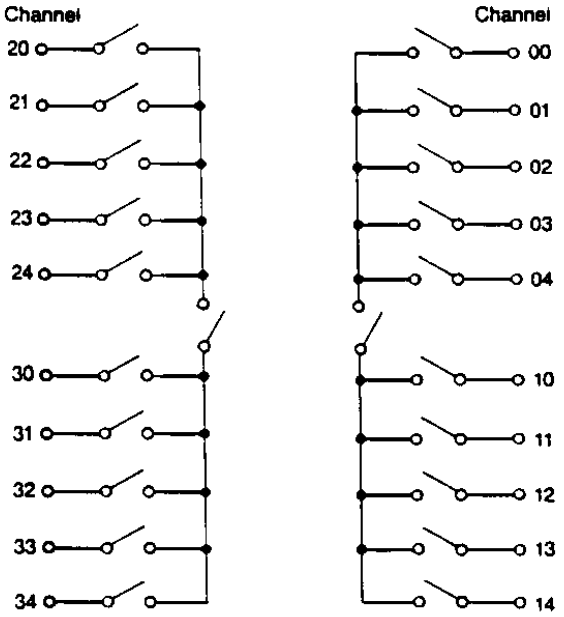
1250-65 Latching 18 GHz Microwave Switching Module Specifications

User Connector:	SMA
Maximum Power Per Channel:	400 W to 100 MHz 150 W to 1 GHz 80 W to 4 GHz 45 W to 12 GHz 35 W to 18 GHz
Insertion Loss (50-ohm termination):	0.2dB to 4 GHz 0.3dB to 12 GHz 0.5dB to 18 GHz
Isolation (50-ohm termination):	-80dB to 4 GHz -70db to 12 GHz -60dB to 18 GHz
Isolation (50-ohm termination):	-80dB to 4 GHz -70dB to 12 GHz -60dB to 18 GHz
VSWR (50-ohm termination):	1.25 to 4 GHz 1.4 to 12 GHz 1.6 dB to 18 GHz
Switching Time:	< 15 ms
Latching Circuit Recovery Time:	< 100 ms

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Option 1250-750

The 1250-750 Mulfiplexer Module is a *75* ohm system that provides four 1x4 or two 1x9 mulfiplexers for use at up to 200 MHz. Relay contacts are monitored to provide user selectable confidence checking.



Model 1250-750

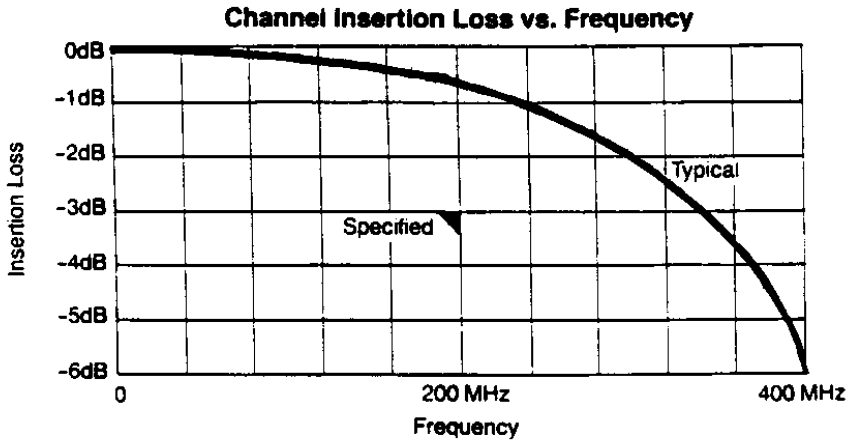


Figure 1-21, Block Diagram of 1250-750 and Insertion Loss vs. Frequency

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Chapter 2
INSTALLATION

Introduction

This section describes the unpacking and inspection, reshipment, preparation for use, plug-in modules, General Purpose Interface Bus (GPIB), equipment rack installation, Option 90 Intelligent Front Panel installation, storage/temperature, and ventilation requirements for the 1250.

Unpacking and Inspection

Before unpacking the 1250, check the exterior of the shipping carton for any signs of damage. All irregularities should be noted on the shipping bill. Remove the instrument from its carton, preserving the factory packaging as much as possible. Inspect the 1250 for any defect or damage. Notify the carrier immediately if any damage is apparent. Have a qualified person check the instrument for safety before use.

Reshipment Instructions

Use the original packaging if it is necessary to return the 1250 to Racal-Dana for servicing. The original shipping carton and the instrument's plastic-foam form will provide the necessary support for safe reshipment. If the original packaging is unavailable, reconstruct it as much as possible. Wrap the 1250 in plastic; then use plastic spray foam to surround and protect the instrument. Reship in either the original or new, sturdy shipping carton.

Preparation for use

Power Connections

Before operating the 1250, verify that the AC voltage selector is correctly set for the local AC supply. The 1250 operates on 100, 120, 220, or 240 volts, 50 to 60 Hz (or 100 and 120 volts on the 50 to 440 Hz version). The present voltage range in use can be seen through the small window in the power input module on the rear panel.

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NOTE:

The 1250 modular family of systems and sub-systems has been designed with the capability to utilize a system-supplied negative power supply, dubbed –13V. This capability has not been implemented in the present 1250 family of products.

Line Voltage Selection

The line voltage setting is easily changed by repositioning the small voltage selector card in its slot. Refer to Figure 2-1 and use the following procedure:

a. Remove the power cord from the power input module

b. Fully slide the transparent fuse cover to the left. This exposes the fuse and voltage selector card

c. Pull the small lever marked FUSE PULL completely to the left. This ejects the fuse from its holder, permitting access to the selector card

d. Remove the selector card, then reposition it in its slot so that the desired line voltage designation is visible. (Using a small pair of needle-nose pliers can be helpful in completing this step.)

e. Pull the lever completely back to the right, snapping it closed

f. Replace the fuse in its holder. Line voltage settings of 100 or 120V should have a 1.5A (.75 on the 50-440 Hz version) Slow-Blow fuse installed; settings of 220 or 240A should have a .75V (.375A on the 50-440 Hz version) Slow-Blow fuse installed

g. Slide the fuse cover completely to the right covering the voltage selector card and fuse. The correct line voltage designation should be visible through the window

h. Connect the power cord to the 1250 again

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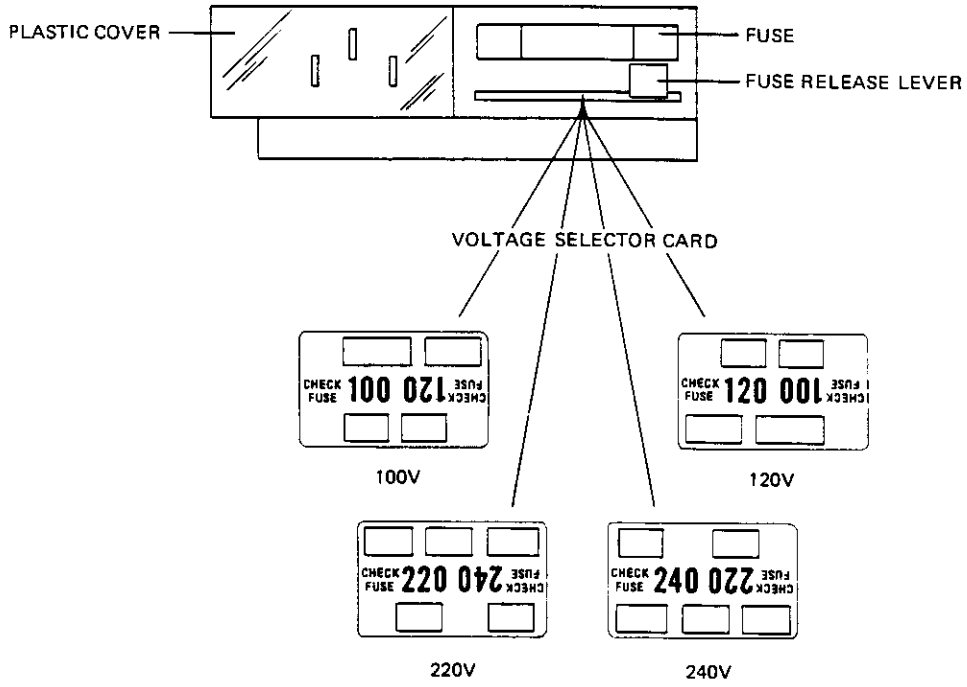


Figure 2-1, AC Line Voltage Selection

Power Cord and Grounding

The 1250 is grounded in accordance with MIL-T-28800C, protecting the user from possible injury due to shorted circuits.

A protective ground terminal, forming part of the rear-panel input socket, is provided. The 1250 is supplied with a detachable 3-core power cord. Only this cord should be used.

Use only AC power outlets having a protective ground for connection to the 1250. DO NOT USE 2-core extension cords or 3-prong to 2-prong adaptors that don't provide a protective ground connection. Connection of the power cord to the power outlet must be made in accordance with the following standard color code:

	American	European
Live	Black	Brown
Neutral	White	Blue
Ground (Earth)	Green	Green/Yellow

All devices connected to or in proximity with the 1250 must maintain the third-wire ground (earth) intact.

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1250 Series Plug-in Modules

Switch modules

Up to five user-selected plug-in modules can be placed in the 1250. Modules measure approximately 9 in. Wide x 10 in. Deep x 1 in. Thick and are polarized, along with the card cage, to prevent any module from being installed upside-down. By use of card guides, 1250 modules are easily installed and extracted from the card cage. All plug-in modules provide for a maximum component height of 0.625 in. Basic modules are designed to provide high-voltage shielding on the top, bottom, and sides (1000V max.; max. component height of 0.4 in).

Switching Module Installation

Each of the five plug-in switch modules is easily installed, using its corresponding card guides, into the rear of the 1250 mainframe as shown in Figure 2-2. Modules may be removed without the need for desoldering or removing the mainframe from the system. At installation, ensure that the front of the plug-in module is securely connected to the Analog and Interconnect Buses using their respective connectors and plugs at P2 and P1.

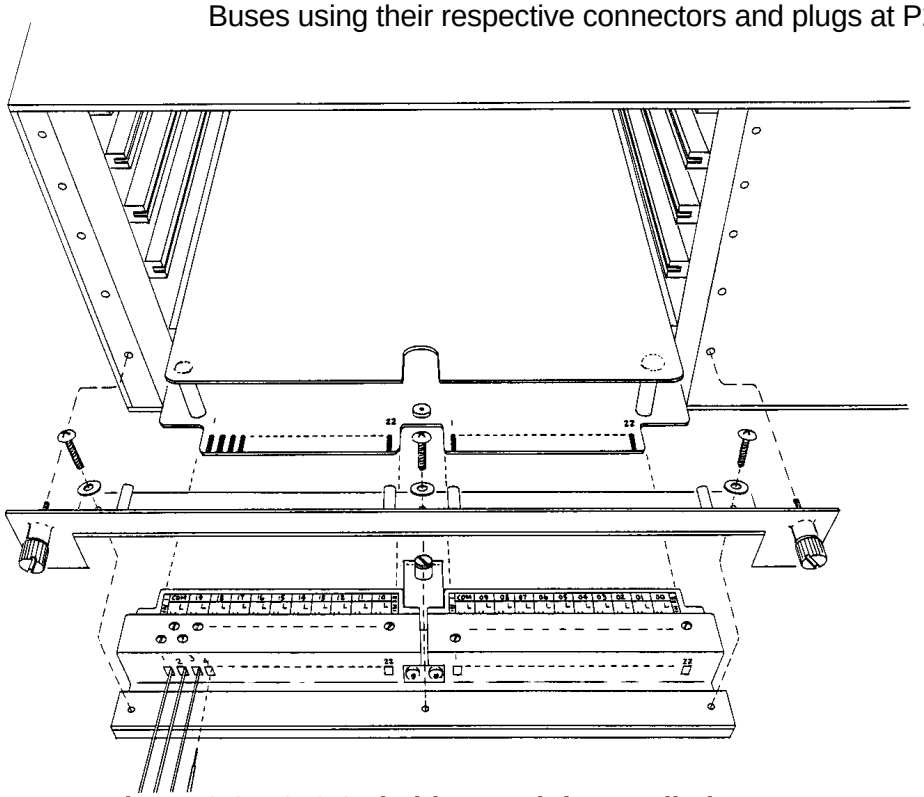


Figure 2-2, 1250 Switching Module Installation
Showing Use of Quick-Release Disconnector (common guard assembly not shown in the figure and not supplied with all models)

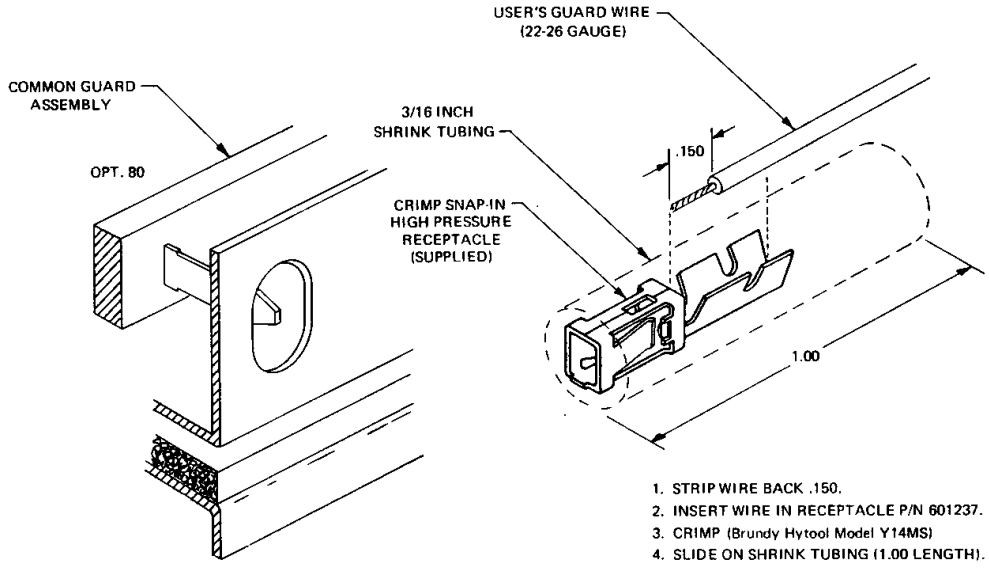
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Strain Relief Screw Terminals

All low-frequency switch modules, like the 1250-30 Scanner/Multiplexer module, have special screw terminal blocks which incorporate strain-relief cable supports. Again refer to Figure 2-2 showing these features. The terminal blocks are attached to the module with gold-plated edge connectors secured with a rapid-release screw. The user may either remove only the terminal block assembly or the entire module with attached terminal block from the 1250 mainframe. The terminal block assembly has a quick-release feature (using two slotted fast-operating screws) which permits rapid connection/disconnection of terminal blocks from the 1250 mainframe. Terminal block assemblies may be pre-wired (loosen and remove the three screws shown in the figure) for easy interchange on any of the plug-in modules. To complete cabling, insert the stripped wires into the appropriate connector holes (as shown) and retighten the corresponding screws. Ensure that each wire is positioned evenly between the two sections of the strain-relief support.

If the user's signal shields must be commoned, the common guard assembly may be used. Terminate the drain (guard) wires to the connector as shown in Figure 2-3 below. The connectors are supplied with the Option 80.

NOTE



The Common guard assembly is not supplied with all models

Figure 2-3, 1250 Option 80 Guard Connection Procedure

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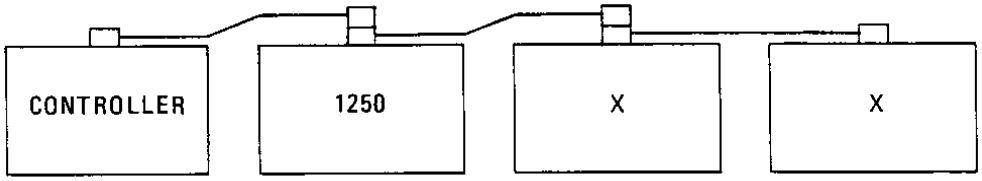
GPIB interface

GPIB Bus Organization

Shown below in Figure 2-4A and B are the linear and cluster bus organizations possible for the 1250/GPIB.

A

Linear Bus Organization



B

Cluster Bus Organization

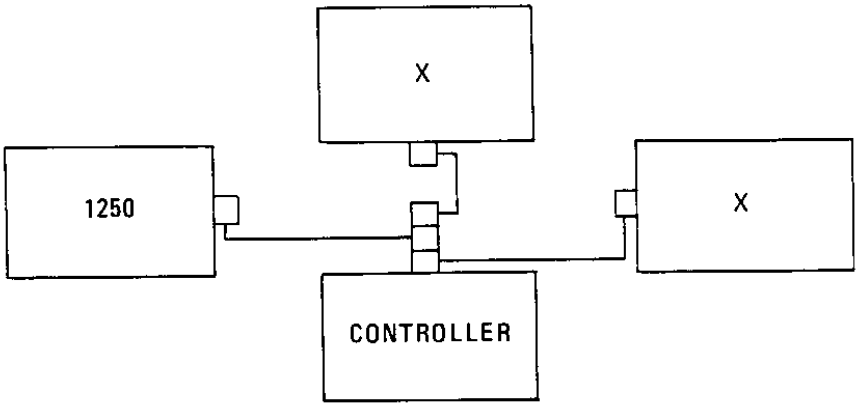
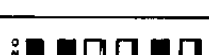
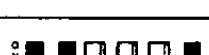
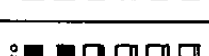


Figure 2-4, Linear (A) and Cluster (B) Bus Organizations

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ASCII CHARACTERS		DATA LINES							ADDRESS SWITCH SETTING (A5 A4 A3 A2 A1)	DECIMAL ADDRESS
		D_7	D_6	D_5	D_4	D_3	D_2	D_1		
TALK	LISTEN	TALK	LISTEN	ADDRESS						
				16	8	4	2	1		
	SP	0	1	0	0	0	0	0		00
@		1	0	0	0	0	0	0		
	!	0	1	0	0	0	0	1		01
A		1	0	0	0	0	0	1		
	"	0	1	0	0	0	1	0		02
B		1	0	0	0	0	1	0		
	#	0	1	0	0	0	1	1		03
C		1	0	0	0	0	1	1		
	$	0	1	0	0	1	0	0		04
D		1	0	0	0	1	0	0		
	%	0	1	0	0	1	0	1		05
E		1	0	0	0	1	0	1		
	&	0	1	0	0	1	1	0		06
F		1	0	0	0	1	1	0		
	' (APOSTROPHE)	0	1	0	0	1	1	1		07
G		1	0	0	0	1	1	1		
	(	0	1	0	1	0	0	0		08
H		1	0	0	1	0	0	0		
	)	0	1	0	1	0	0	1		09
I		1	0	0	1	0	0	1		
	*	0	1	0	1	0	1	0		10
J		1	0	0	1	0	1	0		
	+	0	1	0	1	0	1	1		11
K		1	0	0	1	0	1	1		
	,	0	1	0	1	1	0	0		12
L		1	0	0	1	1	0	0		
	–	0	1	0	1	1	0	1		13
M		1	0	0	1	1	0	1		
	.	0	1	0	1	1	1	0		14
N		1	0	0	1	1	1	0		
	/	0	1	0	1	1	1	1		15
O		1	0	0	1	1	1	1		

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ASCII CHARACTERS		DATA LINES							ADDRESS SWITCH SETTING (A5 A4 A3 A2 A1)	DECIMAL ADDRESS
		D_7	D_6	D_5	D_4	D_3	D_2	D_1		
TALK	LISTEN	TALK	LISTEN	ADDRESS						
				16	8	4	2	1		
	ø	0	1	1	0	0	0	0		16
P		1	0	1	0	0	0	0		
	1	0	1	1	0	0	0	1		17
Q		1	0	1	0	0	0	1		
	2	0	1	1	0	0	1	0		18
R		1	0	1	0	0	1	0		
	3	0	1	1	0	0	1	1		19
S		1	0	1	0	0	1	1		
	4	0	1	1	0	1	0	0		20
T		1	0	1	0	1	0	0		
	5	0	1	1	0	1	0	1		21
U		1	0	1	0	1	0	1		
	6	0	1	1	0	1	1	0		22
V		1	0	1	0	1	1	0		
	7	0	1	1	0	1	1	1		23
W		1	0	1	0	1	1	1		
	8	0	1	1	1	0	0	0		24
X		1	0	1	1	0	0	0		
	9	0	1	1	1	0	0	1		25
Y		1	0	1	1	0	0	1		
	:	0	1	1	1	0	1	0		26
Z		1	0	1	1	0	1	0		
	;	0	1	1	1	0	1	1		27
[		1	0	1	1	0	1	1		
	<	0	1	1	1	1	0	0		28
\		1	0	1	1	1	0	0		
	=	0	1	1	1	1	0	1		29
]		1	0	1	1	1	0	1		
	>	0	1	1	1	1	1	0		30
^		1	0	1	1	1	1	0		
US	—	ILLEGAL								31

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GPIB Interconnections

The GPIB system permits up to 15 instruments (including the controller) to interconnect and reside on a single bus. The GPIB cables have identical "piggyback" connectors on both ends permitting several cables to be connected to a single source. System devices and instruments may be interconnected in almost any desired configuration. There must be a path, however, from the controller to every device residing on the bus. Avoid stacking more than three or four cables on any single connector for if the stack gets too large, the force may damage the connector mounting. Be certain that each connector is firmly (finger-tight) screwed in place. Refer to Table 3.2 and associated figure for the 1250's rear-panel connections.

GPIB Cable Length Limits

If the system cabling is too long, the lines cannot be properly driven and the system will not perform correctly. It is important to ensure that the following guidelines are strictly met:

a. Total cable length for the system must be less than or equal to 65.6 feet (20 meters)

b. Total cable length for the system must be equal to or less than 6.6 feet (2 meters) times the total number of devices residing on the bus

c. Total number of instruments residing on the bus must not exceed 15

GPIB Address Assignment

The 1250 as a bus member must be assigned a unique address when operating in a GPIB system. By assigning a GPIB-Bus address to the 1250, it can be "called up" by the computer controller or another device on the bus without interfering with other units residing on the 488 bus. The coding used for setting the 1250 address is binary.

The 1250 is equipped with a rear-panel switch bank, enabling the user to assign one of 31 addresses (numbers 00 to 30).

Table 2.1 contains all the information required for setting the 1250's address and determining the talk and listen address codes used in programming the controller. Switches A1 to A5 define the listen/talk addresses for the 1250 in the addressed mode. The PWR ON SRQ, when set to 1, permits the instrument to transmit a service request to the controller when the 1250 is first powered-on.

Note in the table the column headed "ADDRESS SWITCH

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SETTING". It illustrates the positions of switches A1 to A5 for each number address listed in the far right column. To set the GPIB address, simply select the desired decimal address for the 1250, refer to the table, and set the switches on the address selector to the corresponding pattern in the column.

Once an address has been assigned, the controller may then address the 1250 as a talker/listener by transmitting the appropriate ASCII character on the data lines and asserting the ATN line. The "DATA LINES" column of the table shows the 7-bit binary codes for every talk/listen address assigned to the 1250. The controller transmits these codes to the 1250 to establish its talker/listener status.

Note also in the table that there are two address codes for each GPIB address number. Each code represents a different ASCII character. For example, if an address of 02 is assigned to the 1250, the talk address is the ASCII character B and the listen address is the ASCII character ". The only difference in the binary code in each case is the state of data lines D6 and D7.

The 1250 is preset at GPIB address 00 when shipped.

GPIB Rear-Panel Connector

The GPIB-Bus with its interface circuitry provides for reception and execution of programmed commands between a GPIB bus controller and the 1250 switch controller (shown in Figure 2-5) located on the rear panel of the 1250. The pin location, line identification, and operation of the GPIB-Bus are in compliance with IEEE-Standard-488-1978.

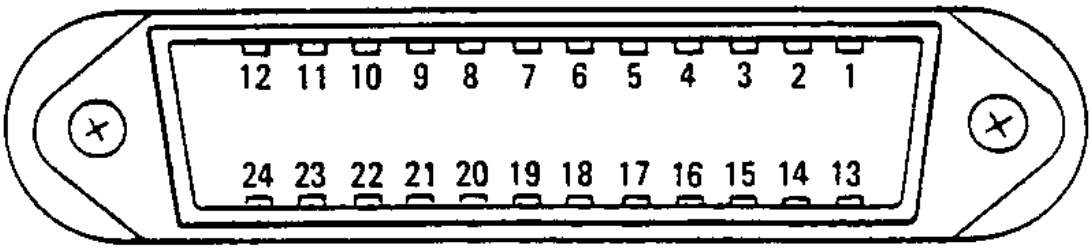


Figure 2-5, GPIB-Connector (Rear Panel)

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Table 2-1, GPIB Connector Pins

Pin No.	Assignment	Pin No.	Assignment
1	DIO 1	13	DIO 5
2	DIO 2	14	DIO 6
3	DIO 3	15	DIO 7
4	DIO 4	16	DIO 8
5	EOI	17	REN
6	DAV	18	GND, (6)
7	NRFD	19	GND, (7)
8	NDAC	20	GDN, (8)
9	IFC	21	GND, (9)
10	SRQ	22	GND, (10)
11	ATN	23	GND, (11)
12	SHIELD	24	GND, (5 AND 17)

GPIB Interface Signal Pin Assignments

GPIB interface signal pin assignments are shown in Figure 2-6. Also, refer as required to the GPIB interface subsets available using the 1250 shown in Table 1.1.

There are 24 lines available at the GPIB connector, including 16 signal and 7 ground return lines, and one shield. All of the data bus lines are bidirectional, having the following characteristics:

Logic Levels: 1 = Low = .8V
0 = High = 2.0V

Input Loading: Each input = one TTL load

Output: The output is capable of driving 15 interface bus loads. It consists of an open-collector driver and is capable of sinking 48 mA with a maximum voltage drop of 0.4 volts.

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Table 2-2, Interface Signal Pin Assingments

Pin	Nomenclature	Description	
1	DIO-1	Data In/Out Bit 1 (LSB)	Data lines are used to transfer data from one instrument to another
2	DIO-2	Data In/Out Bit 2	
3	DIO-3	Data In/Out Bit 3	
4	DIO-4	Data In/Out Bit 4	
13	DIO-5	Data In/Out Bit 5	
14	DIO-6	Data In/Out Bit 6	
15	DIO-7	Data In/Out Bit 7	
16	DIO-8	Data In/Out Bit 8	
6	DAV	(Data Valid)	
7	NRFD	(Not Ready for Data)	
8	NDAC	(Not Data Accepted)	
5	EOI	(End or Identify)	
9	IFC	(Interface Clear)	
10	SRQ	(Service Request)	
11	ATN	(Attention)	
17	REN	(Remote Enable)	
12	SHIELD		
18	GND (6)		
19	GND (7)		
20	GND (8)		
21	GND (9)		
22	GND (10)		
23	GND (11)		
24	GND (5 and 17)		

Equipment Rack Installation

Introduction

The 1250 may be mounted in a standard 19-inch equipment rack. The 1250 may be rack-mounted front-forward or rear-forward. Using Slide Mount Option 65, the 1250 must be slide-mounted front-forward. Installation instructions for this option follow.

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Slide-Mount Option 65 Installation

Refer to Figures 2-6 and 2-7 for this procedure. The installation package includes:

a. Front rack-brackets (2); part of P/N 454488

b. Rear rack-brackets (2); part of P/N 454488

c. Triple-rail slide-mount assemblies (2); P/N 454489

d. Self-anchoring #10-32 tinnerman nuts (12); P/N 610920

e. Phillips panhead #10-32 x 1/2 screws (8); P/N 615091

f. Slotted panhead #8-32 x 3/8 screws, nuts, flat washers, and lock washers (8 each); part of P/N 454488

g. Phillips panhead self-tapping #8-32 x 5/16 screws (4); P/N 610910

h. Phillips panhead #10-32 x 3/4 screws (4); P/N 615093

Refer to Figure 2-6. Prepare the triple-rail slide-mount assembly for equipment rack installation. First, note that the instrument-rail and rack-rail holes are accessible either directly or through the enlarged holes in the center-rail (as the assembly is extended or retracted). Complete the following procedure:

a. Place a front rack-bracket (with one mounting slot) on the workbench, slotted flange facing down

b. Position the front end (i.e., slide-out end) of the slide-mount assembly over and parallel to the front rack-bracket. The rack-rail should rest within the bracket, about 3 1/4 inches from the bracket's front edge

c. Adjust the rails, aligning the front rack-rail hole with the center-rail access hole and mounting slot in the front rack-bracket. Insert a slotted panhead #8-32 x 3/8 screw through the holes. Attach a washer, lock washer, and nut to the screw and secure firmly, maintaining the 3 1/4-inch dimension to the front of the bracket

AMENDMENT

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SLIDE RACK-MOUNT KIT INSTALLATION INSTRUCTIONS

In recent slide rack-mount kits, the front and rear rack-brackets are the same size and each has only one screw slot. Otherwise, the installation procedure remains as described in the manual.

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NOTE

Measure the distance between the front and rear mounting-rails of the rack at this point. If the distance is less than 20 inches, follow instruction "d" next; if the distance is greater than 20 inches, follow instruction "e".

d. Fully extend the slide-mount assembly. Position a rear rack-bracket (with two elongated mounting slots) on the rear of the assembly in the same way as the front rack-bracket. Align the mounting slot closest to the slotted flange with the rear rack-rail nail hole. Insert a slotted panhead #8-32 x 3/8 screw through the holes. Attach a washer, lock washer, and nut to the screw and secure the rear rack-bracket loosely to the slide-mount assembly

e. Fully extend the slide-mount assembly. Position a rear rack-bracket (with two elongated mounting slots) on the rear of the assembly in the same way as the front rack-bracket. Align the mounting slot farthest from the slotted flange with the rear rack-rail nail hole. Insert a slotted panhead #8-32 x 3/8 screw through the holes. Attach a washer, lock washer, and nut to the screw and secure the rear rack-bracket loosely to the slide-mount assembly

f. Complete the other slide-mount and rack-bracket assembly in the same manner as just described

g. Slide two self-anchoring #10-32 tinnerman nuts on the front and rear rack-brackets at the top and bottom slots of both slide-mount assemblies

The assistance of a second person will be needed for the following instrument-rack assembly. Secure the slide-mount assembly in the designated area of the instrument rack using the procedure below.

NOTE

If the mounting rail of the instrument rack is tapped for #10-32 screws, drill out two places for each bracket using a 1/4 inch diameter bit. Proceed with the assembly.

a. Hold the front end of the slide-mount assembly behind the front mounting-rail of the rack, while the second person

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holds the rear end of the assembly

b. Secure the front rack-bracket to the front mounting-rail using two phillips panhead #10-32 x 1/2 screws. Seat the front rack-bracket firmly against the mounting-rail before tightening these screws

c. Install the other front rack-bracket on its front mounting-rail in the same manner

d. Set the front dimension between the two slide-mount assemblies at 16 5/8 inches

e. Adjust the length of the rear rack-brackets so that they touch the inside of the rear mounting-rail. Tighten the rear rack-bracket assembly screws

f. The distance between the two slide-mount assemblies at the rear-bracket should be 16 5/8 inches. Should a filler plate be required to secure the slide-mount assembly to the rear rack mounting-rail at 16 5/8 inches, use the dimensions given in Figure 2-7 to determine filler- plate size

NOTE

The rear rack-bracket may require adjustment to accommodate the thickness of the filler plate.

g. Secure the rear rack-bracket to the rear rack mounting-rail (or filler plate) using two phillips panhead #10-32 x 1/2 screws in each bracket

h. The triple-rail slide-mount assemblies should move freely to their maximum extended positions. If not, remove any obstacle before installing the instrument

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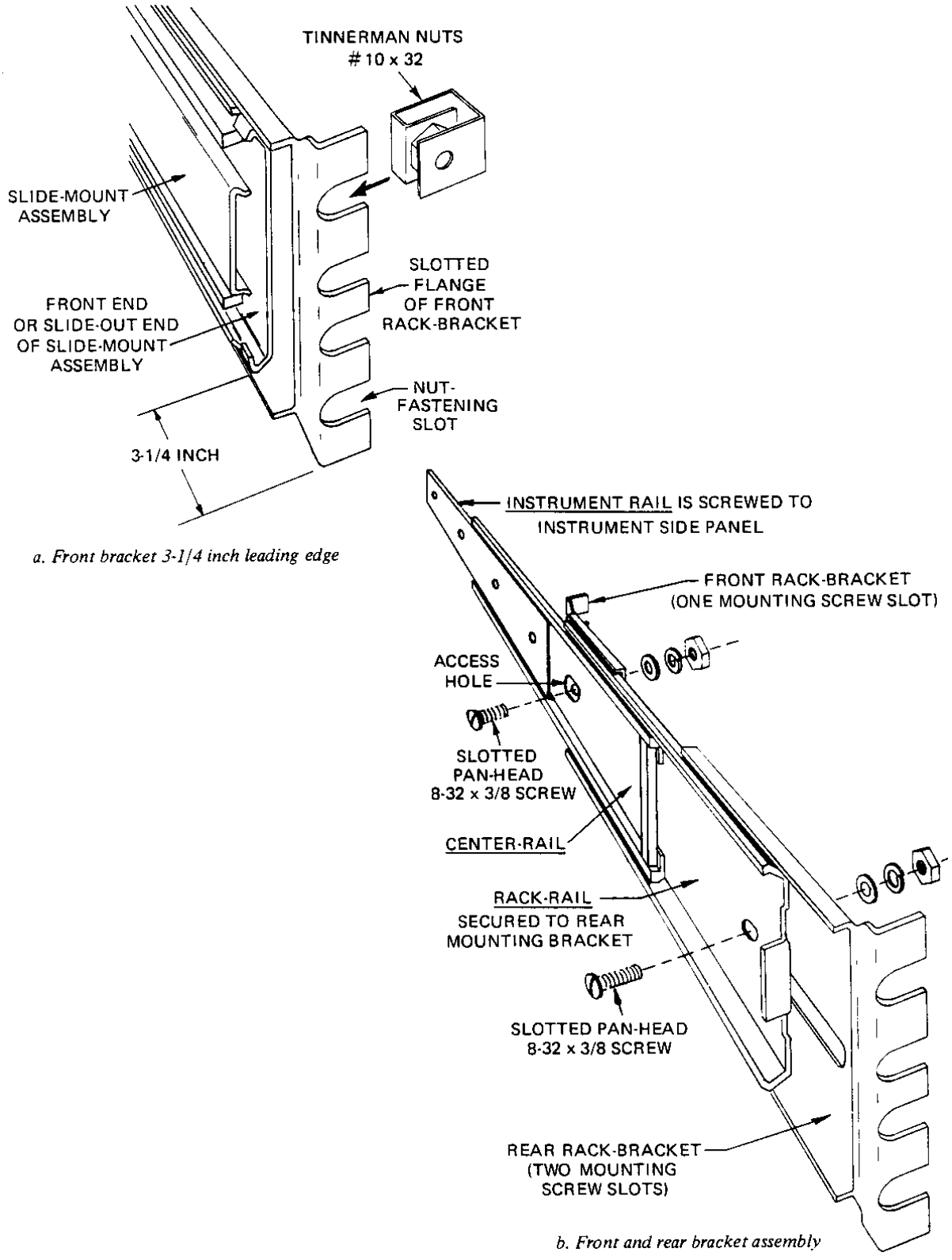


Figure 2-6, A & B Slide-Mount and Bracket Assembly

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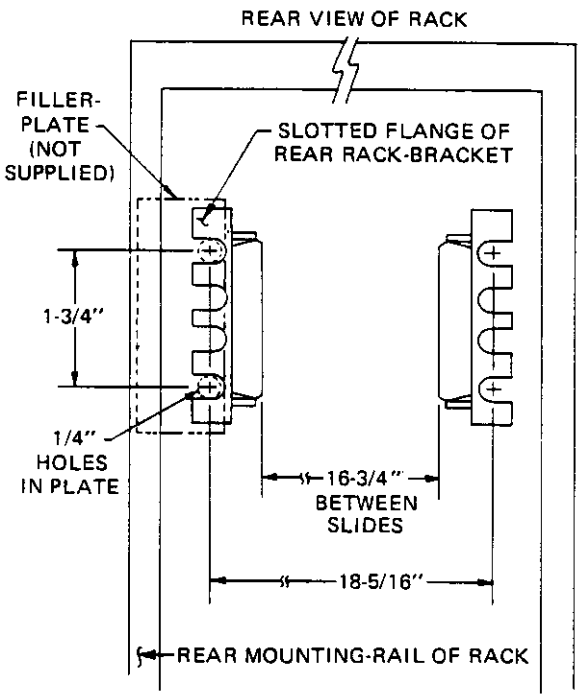


Figure 2-7, Rear End Slide-Mount Rack Dimensions

Refer to Figures 2-8 A, B, and C and Figure 2-9 for the following procedure. Figure 2-8 A shows the 1250 with the standard configuration with the flange-mount angle-bracket located at the front of the instrument. Figure 2-8 B shows the 1250 with one of the two rear-forward rack-mount configurations.

NOTE

Rear-forward rack-mount configurations may not use the Option 65 slide mounts.

This installation has the angle-brackets mounted on the rear of the instrument with the 1250's rear panel recessed. This installation is accomplished by completing the following procedure:

a. Extend the rails of the slide-mount assemblies to their maximum positions for installation

b. Remove the flange-mount angle-brackets from the front of the instrument. Rescrew the front handles in their normal front locations using two #8-32 x 1/2 angle-bracket screws

c. Remove the four rubber plugs at the rear of the instrument using a sturdy, pointed instrument

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d. Using the two remaining phillips panhead self-tapping #8-32 x 1/2 screws (from the previously front-mounted angle-brackets), reattach the two angle-brackets securely at the rear of the instrument as shown in Figure 2-8 B.

Figure 2-8 C shows the second rear-forward rack-mount configuration for the 1250. This installation has the angle-brackets mounted on the rear of the instrument with the 1250's rear panel nearly flush with these brackets. This installation is achieved by completing the following procedure:

a. Extend the rails of the slide-mount assemblies to their maximum positions for installation

b. Remove the flange-mount angle-brackets from the front of the instrument. Rescrew the front handles in their normal front locations using two #8-32 x 1/2 angle-bracket screws

c. Remove the four rubber plugs at the rear of the instrument using a sturdy, pointed instrument

d. Reverse the positions of the instrument's side panels as shown in the figure. (The angle-bracket holes formerly at the front will now be at the rear of the instrument.)

e. Using the two remaining phillips panhead self-tapping #8-32 x 1/2 screws (from the previously front-mounted angle-brackets), reattach the two angle-brackets securely at the rear of the instrument as shown in Figure 2-8 C

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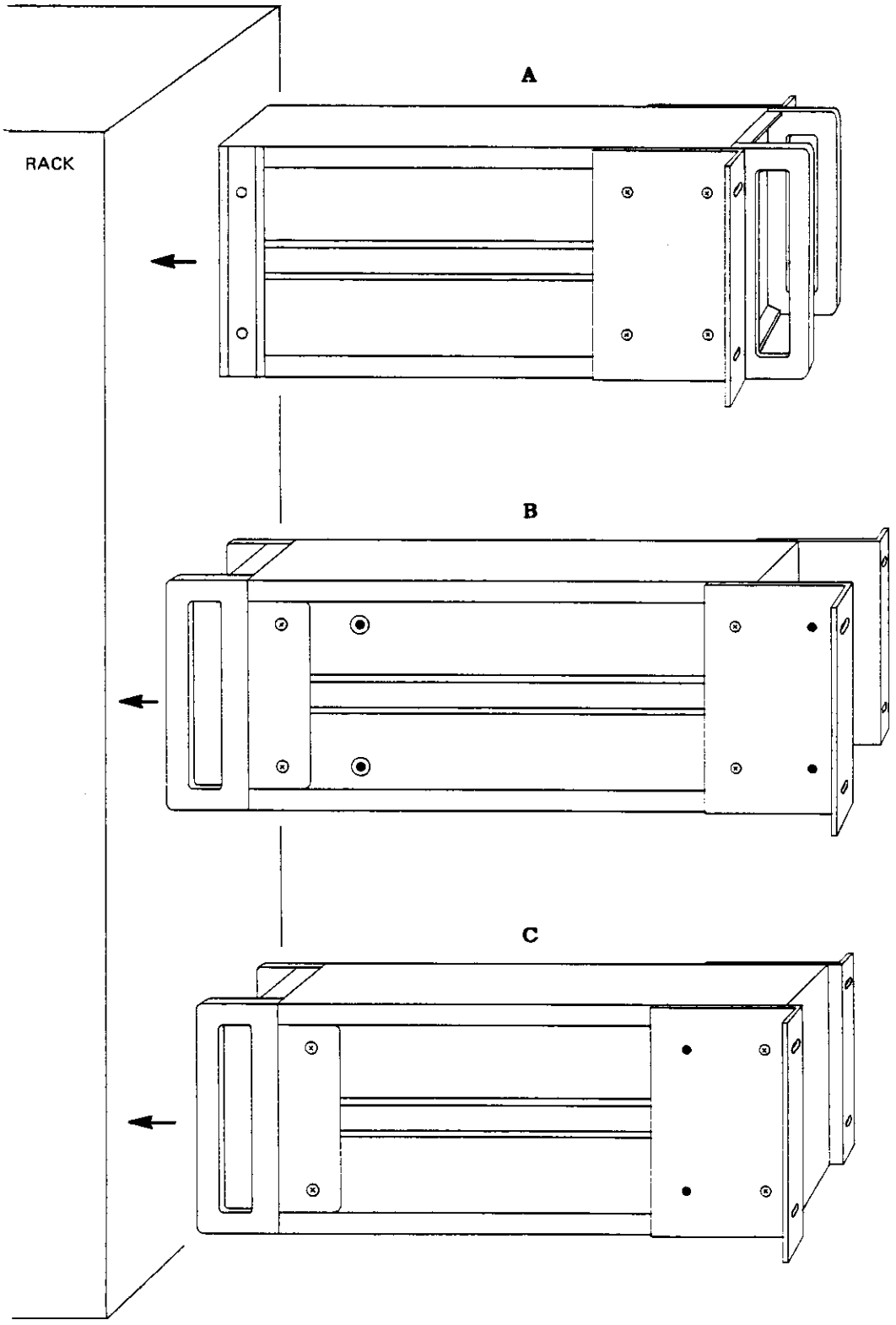


Figure 2-8, Standard (A) and Optional Rear-Forward Rack-Mount (B and C) Assembly-to-Instrument Configurations

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Refer to Figure 2-9. Mount the instrument-rail of the slide assembly securely to the side channel using the top slot and two phillips panhead self-tapping #8-32 x 5/16 screws. Ensure that the instrument-rail is flush against the rear of the flange-mount angle-bracket. Complete the same procedure for the other side of the instrument.

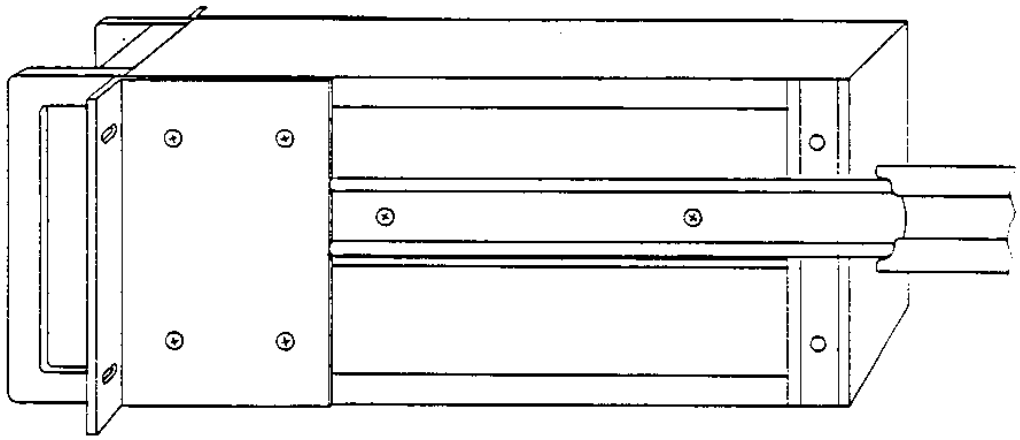


Figure 2-9, Slide Assembly-to-Side Channel Installation

The instrument should now slide freely on the rails.

The following assembly is required to lock the instrument into its operating position on the racks:

a. Slide two self-anchoring #10-32 tinnerman nuts on the mounting-rail of the rack (each side). These nuts should be aligned with the angle-bracket slots. Omit the tinnerman nuts if the mounting-rail is tapped for #10-32 screws

b. Slide the instrument fully into the rack until the angle brackets strike the slide-mount bracket screws. Secure the instrument in place using four phillips panhead #10-32 x 3/4 screws

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Intelligent Front Panel (Option 90) Installation

Standard Mounting

Refer to Figures 2-10 and 2-11 and complete steps a-e to install the Option 90 on the front of the 1250.

Remote Mounting

Refer to Figures 2-12 and 2-13 and complete step f for "remote" mounting or use of Option 90 with the 1250.

Rear-Forward Rack Mounting

Refer to the previous section “Equipment Rack Installation”, including Figure 2-8, of the 1250 Manual for rear-forward rack-mounting instructions.

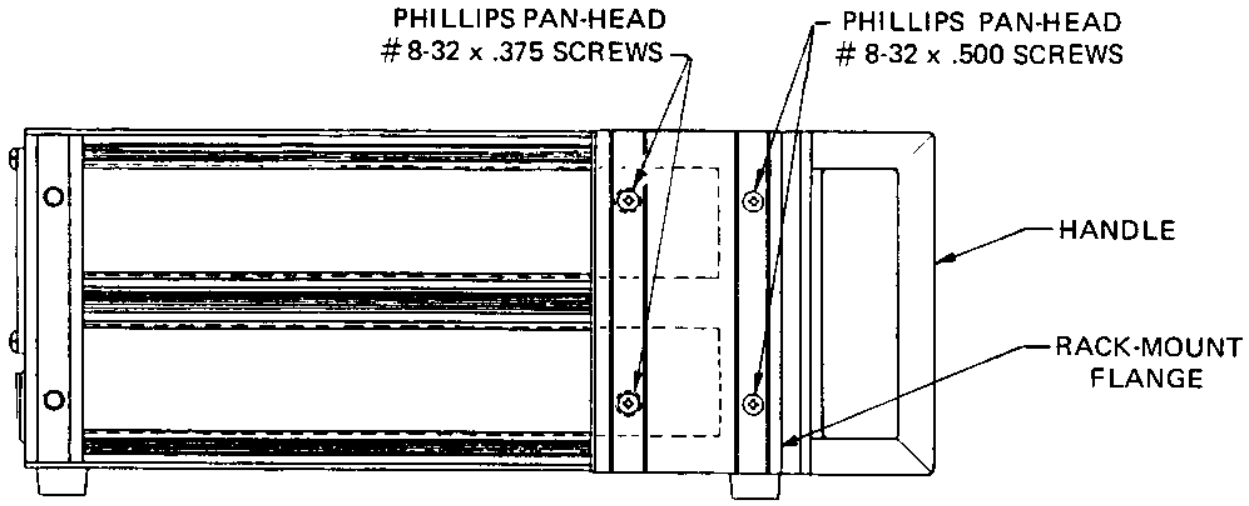


Figure 2-10, 1250 Side View (Left)

Standard Mounting

a. Refer to Figure 2-11. Remove the two phillips panhead #8-32 x 3/8 screws and two phillips panhead #8-32 x 1/2 screws from each side of the 1250

b. Remove the two rack-mount flanges and the two handles from the unit; store parts for possible separate mounting of the 1250 chassis and Intelligent Front Panel in the future

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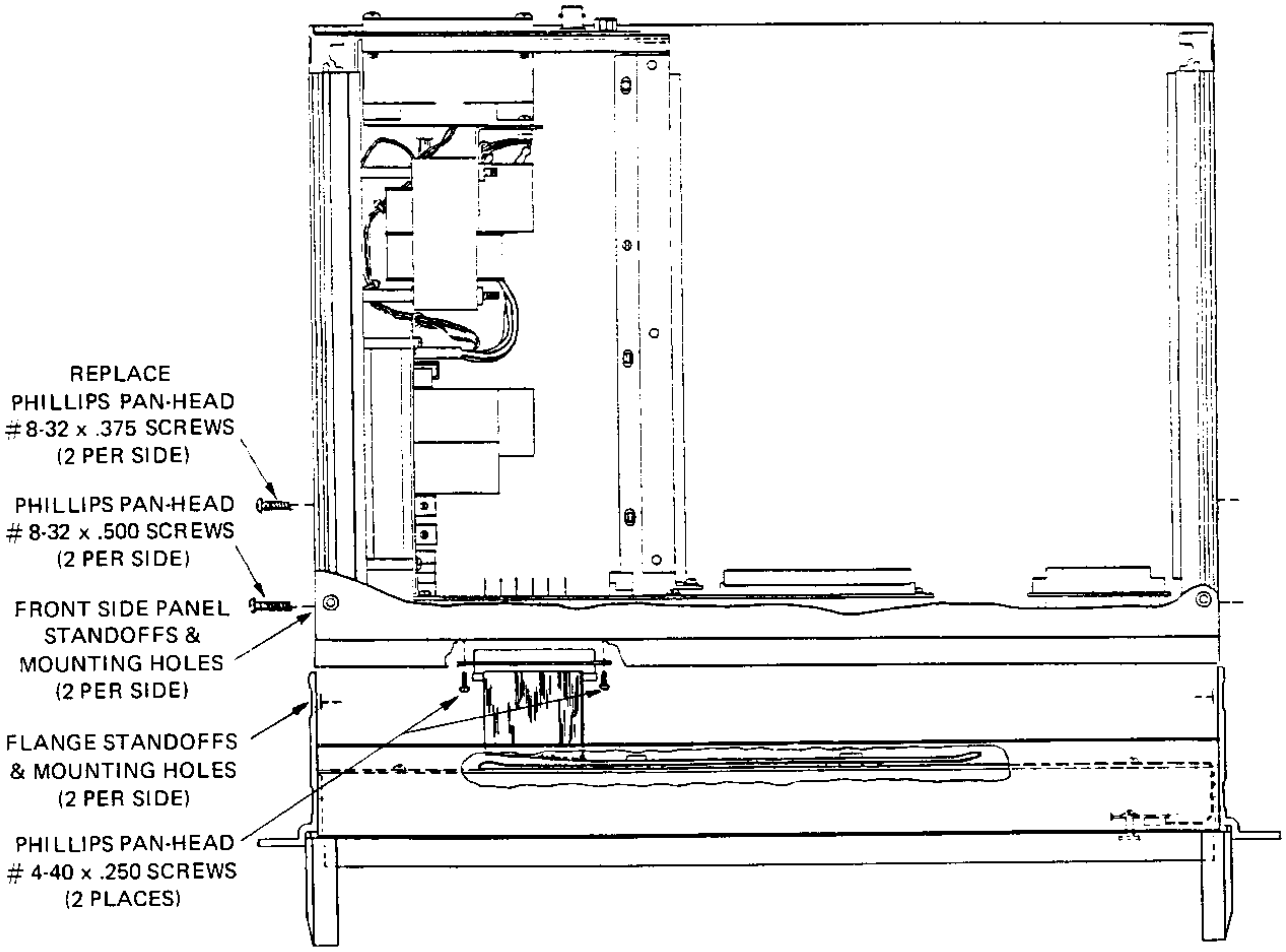


Figure 2-11, Option 90 to 1250 Chassis Installation

c. Refer to Figure 2-12. Secure the Option 90 cable connector into its receptacle on the front panel of the 1250 chassis with the two supplied #4-40 x 1/4 screws and place the power switch on the 1250 chassis in the OFF position

d. Place the Option 90 onto the front of the 1250 chassis. Align the two standoffs/mounting holes on the inside of each Option 90 rack-mount flange with the existing two standoffs/mounting holes in the front of each 1250 side panel

e. Use the four phillips panhead #8-32 x 1/2 screws removed in step a to securely fasten the Option 90 to the 1250 chassis. Replace all four phillips panhead #8-32 x 3/8 screws removed in step a.

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Remote Mounting

f. Refer to Figures 2-12 and 2-13. If you wish to mount or use the Option 90 Intelligent Front Panel "remote" from the 1250, first unhook the 36-inch ribbon cable from its two flat cable clips on the rear of the front panel option. Then, simply plug the option's cable connector into the 37-pin D-subminiature receptacle on the standard front panel and secure the connector with the two supplied #4-40 x 1/4 screws

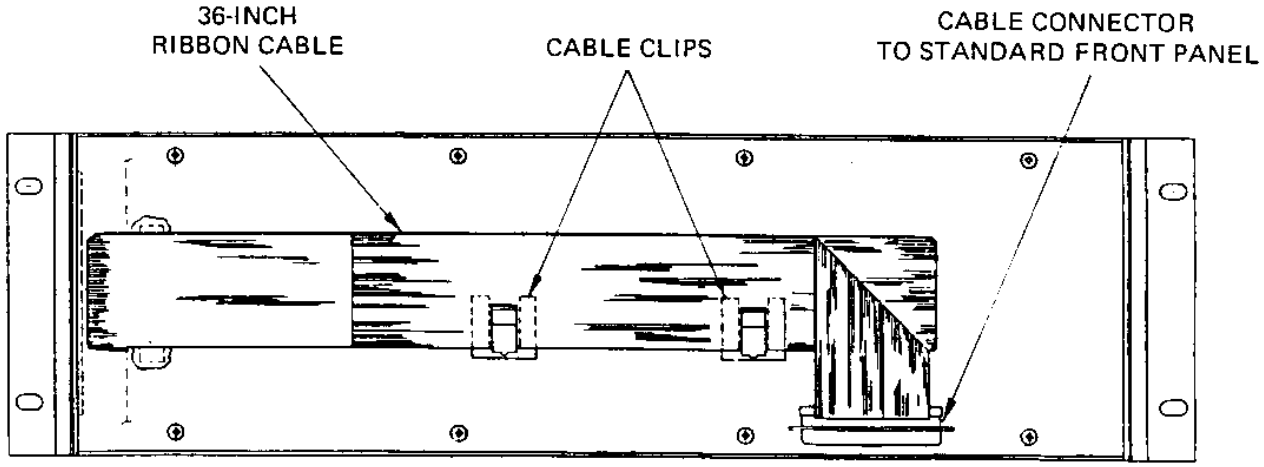


Figure 2-12, Rear View of Option 90 Showing Ribbon Cable

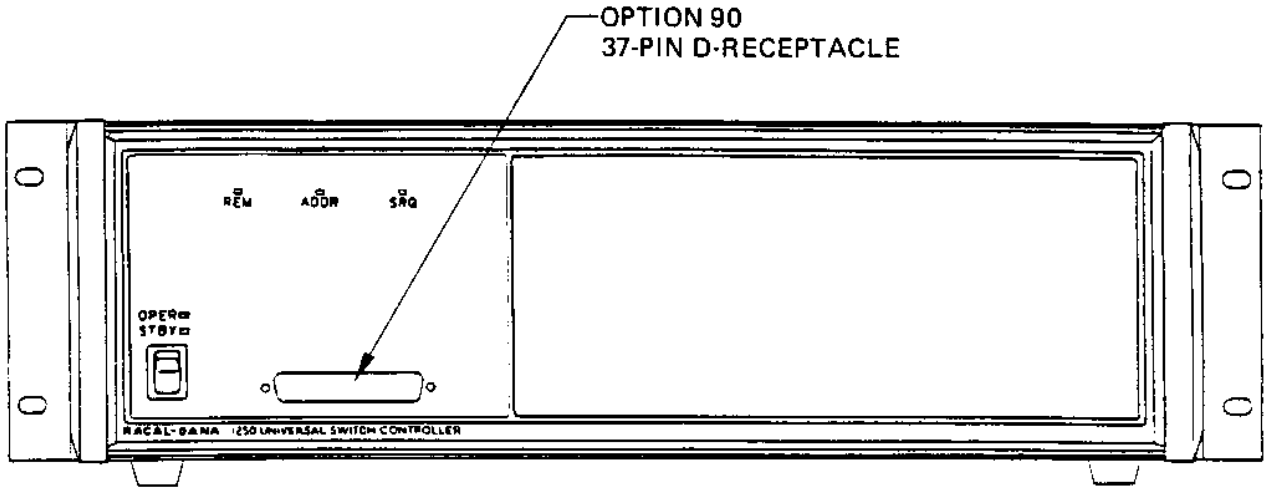


Figure 2-13, Front View of Standard Front Panel Showing Option 90 D Receptacle

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Storage and Temperature

The 1250 can be stored at temperatures ranging from -40EC to +70EC at 95% relative humidity without adverse effects to PCBs or components. The 1250 must be brought within its specified operating range of 0EC to +55EC before commencing operation.

Ventilation Requirements

To maintain internal temperatures within safe limits it is important not to obstruct the airflow to the instrument.

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Chapter 3

OPERATION

Introduction

This section supplies the information required to operate the 1250 Universal Switch Controller, both remotely and locally. The information required for each of the 1250 Series modules is different, so a section detailing the command formats required for each module is also supplied.

1250 Home State

The default condition (Home State) of the 1250 is as follows:

CNF (Confidence test) OFF
DLY (Delay) 0
DSP (Display) ON
EQU (Equate list) 0
EXCL (Exclude list) 0
SCAN ON
SLIST (Scan list) 0
SRQMASK 44
TRIG (Trigger) ON
PUPRCL (Power up recall) - Same as on power down

All non-latching relays fitted to the 1250 Series switch modules are in their de-energised states.

The 1250 will not power up in the Home state if the power up recall mode is active. This mode sets the 1250 Relay switch modules to the configuration stored in non volatile memory location 1 at power up. Note that the 1250 mainframe (slot 0) will power up in the home state regardless of whether the Power up recall is active or not.

The 1250 will return to the home state in response to the RESET command and the GPIB SDC and DCL commands.

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1250 Front and Rear Panels

Refer to Figure 3-1 for a view of the 1250 Front Panel and to Table 3-1 for descriptions of the 1250 Front Panel features.

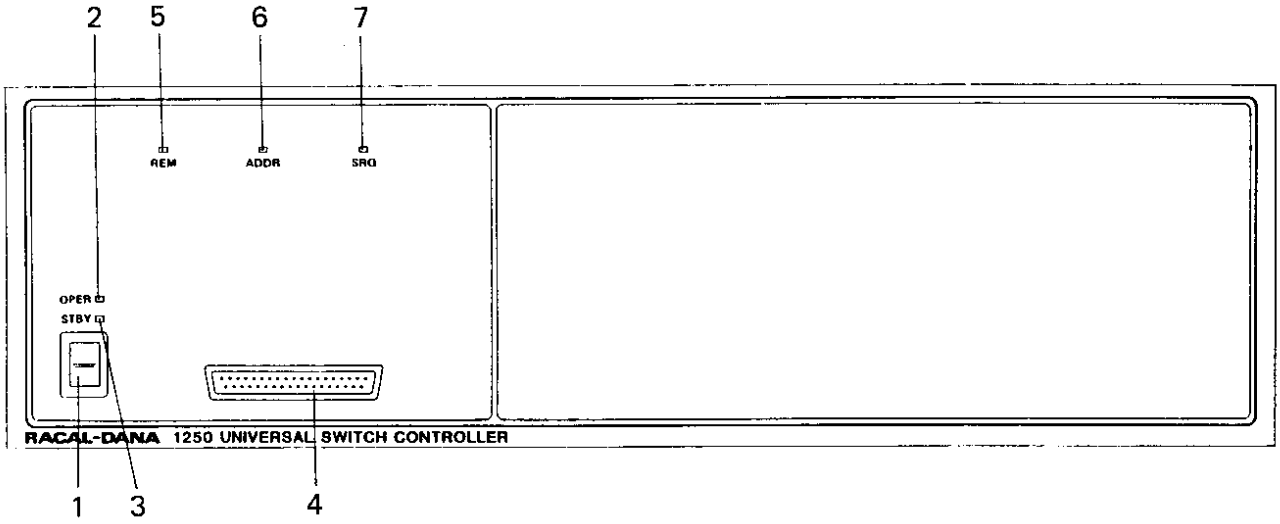


Figure 3-1, 1250 Front Panel

Reference	Description
1	Power Switch. This rocker switch places the 1250 in either the operating mode or the standby mode.
2	OPER LED. This LED lights to show that the 1250 is in the operating mode.
3	STBY LED. This LED lights to show that the 1250 is in the standby mode.
4	Option 90 (Intelligent Front Panel) connector. This 37 pin D-Subminiature connector is provided to allow installation of Option 90 on the 1250.
5	REM LED. This LED lights to show that the 1250 is in the GPIB remote mode.
6	ADDR LED. This LED lights to show that the 1250 is addressed over the GPIB.
7	SRQ LED. This LED lights to show that the 1250 has asserted the GPIB SRQ line.

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Refer to Figure 3-2 for a view of the 1250 Rear Panel and to Table 3-2 for descriptions of the 1250 Rear Panel features.

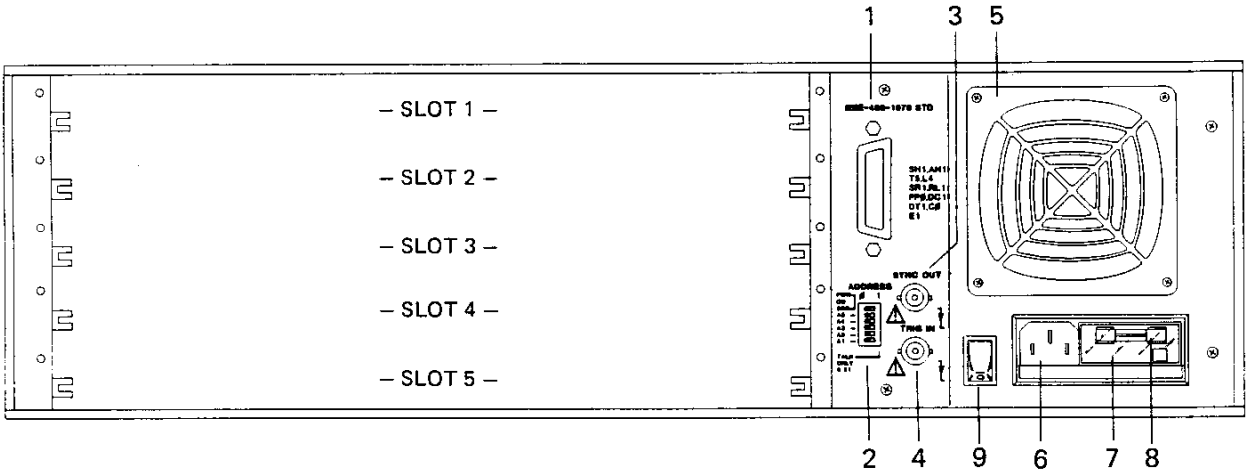


Figure 3-2, 1250 Rear Panel

Reference	Description
1	GPIB (IEEE-STD-488) Connector.
2	GPIB address switch. The lower five switches fitted in this switch bank are used to set the GPIB address of the 1250. The sixth switch determines whether the 1250 Power Up SRQ feature is active. This feature, when active, causes the 1250 to unconditionally assert SRQ on power up.
3	SYNC OUT connector. This BNC connector outputs a TTL compatible, active high signal while a command string is being processed. A delay between relay switching and the Sync pulse returning to a low level may be achieved by the use of the DLY command.
4	TRIG IN connector. This BNC connector input accepts TTL level signals to cause the 1250 to proceed to the next element of the scan list. The trigger input must be enabled by the TRIG ON command or from the Intelligent Front Panel (Option 90) and the scan mode activated for this to occur.
5	Fan. This supplies the forced air cooling required by the 1250.
6	Line input. This is a standard AC supply connector.
7	Line voltage selector. This removable printed circuit card selects the line voltage that the 1250 will operate on. The

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voltage selected is printed on the card and is visible through the fuse cover fitted. To change the voltage selected, remove the card and reinsert with the desired voltage visible. The line voltages that the 1250 will operate on are 100, 120, 220 and 240 V.

8 Line fuse. This is a glass cartridge slow blow fuse, value 1.5 A for 100 and 120 volt operation and 0.75 A for 220 and 240 volt operation.

9 AC power switch. This rocker switch connects the AC line to the 1250 power supply. It glows red in position 1 to show that the 1250 has power applied. Note that the front panel power switch must also be in the OPER position for the 1250 to be operated.

GPIB Input Format

The 1250 will recognize commands as soon as two or more characters are received, (a "wild card parser"). For example, a CLOSE command would be recognized by the 1250 if the characters CL, CLO, CLOS, or CLOSE were detected. Similarly, OP, OPE, or OPEN are valid for an OPEN command.

The following two restrictions apply:

a. The spelling of the command must be correct. For example, "OPD", "OPR", "OP (any letter besides E)" would be considered errors for the OPEN command.

b. All commands in the command set can be recognized from two letters with the exception of the RESET, READ, and RECALL commands, which require a minimum of three letters.

The general syntax for all 1250 command lines is the following:

<command> [arg 1] [arg 2] ... [arg n] <terminator>.
Hyphenated expression-arguments must be in ascending order.

Only one individual 1250 command and its arguments may appear on each command line.

Commands may be upper or lower-case or a combination of the two.

In general, there is no limit on the length of a 1250 command string. Several commands do, however, place a limit on the number of arguments which may appear in the command string. The EXCLUDE function allows a maximum of 50 arguments in the list, the EQUATE function and the SCAN LIST allow 85

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arguments.

Each 1250 command line must be properly terminated. The 1250 recognizes two different terminators: line feed (ASCII $0A) and EOI. Any combination of these two terminators is acceptable. Note that a carriage return - line feed pair is also acceptable because of the line feed present.

GPIB Output Format

Each line of text output from the 1250 will have a leading space (ASCII value $20).

All output strings are in upper case.

Serial Poll Status Byte

Table 3-1 shows the status byte format for the 1250. This byte is returned to the controller in response to a serial poll enable (SPE) message.

Table 3-1, Status Byte Format

Bit Number	Description
1 (LSB)	Unused
2	Unused
3	Power-On SRQ
4	Scan List at Break Point
5	Ready
6	Programming Error
7	Service Requested
8 (MSB)	Unused

NOTE

When bit 7 of the status byte (Service Requested) is set to show that SRQ is asserted, the 1250 will not respond to any GPIB commands until the interrupt is serviced. This may be done remotely with a serial poll, or locally with the RESET key. After the interrupt has been serviced, the error code generated may be obtained over the GPIB in response to the YERR command.

Bits 3, 4, 6, and 7 are cleared after each Serial Poll Enable (SPE) command. Bit 5 is cleared by sending instructions to the 1250 and is set when the 1250 finishes executing a command. These transitions are coincident with the rising and falling edges of the SYNC OUT output, respectively. All status bits are active-high.

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Power-up Self Tests

At power-up, the 1250 completes a series of self-tests and configures itself for the current complement of modules. If any phase of the self-test fails, or if an error is detected during the configuration process, the 1250 flags an error and alerts the user. With the Option 90 Intelligent Front Panel installed, a successful power-up will display the following message:

RACAL DANA 1250

The 1250 Power-up tests occur in the following order:

a. ROM/RAM/NON-VOL Test

b. CPU Circuitry/Backplane Bus Test

c. Self-Configuration

Errors that occur during the 1250 power up sequence are reported by the 1250 front panel LEDs as follows:

REM LED	ADDR LED	FAILURE
OFF	ON	ROM/RAM/NON-VOL Test
ON	OFF	CPU Circuitry/Backplane Bus Test
ON	ON	Self-Configuration Test

All three of the above self test failures are fatal. The 1250 will enter a "lockout" state after a self-test or configuration error occurs. In this state, the 1250 will not respond to any GPIB commands and if Option 90 is fitted, the front panel controls will be inoperative.

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Device Dependant Command Codes

This section of the manual gives the GPIB command codes used to control the 1250 Series switch modules. It describes the general syntax required for each command code and then describes the action taken to implement the command. Note that not all commands are supported by the 1250 Series switch modules. This is because:

1) The command may be inappropriate for the switching module in question, e.g. the WRITE command does not apply to a relay switching module.

2) The command may be directed to the 1250 chassis controller rather than the plug-in modules themselves, e.g. the CNF command will turn the 1250 confidence check on or off or the SLIST command will enter the scan list into the 1250. Both of these affect the 1250 Series plug-in modules indirectly, but do not affect the state of the switch modules immediately.

Refer to Section 3.4 for the module specific syntax used by each 1250 Series switching module. This section will also supply information on the commands that do not follow exactly the command code syntax specified here.

CLOSE

CLOSE <module specific syntax> [;<module specific syntax>].....

This command causes one or more connections on a switching module to close. It is the converse of the OPEN command. Any number of connections in more than one slot may be closed in one CLOSE statement if the <slotnumber>.<module specific syntax> sections are concatenated using a semi-colon (;). Refer to Section 3.5 for the <module specific syntax> to be used for each 1250 Series switching module.

CNF

CNF <ON|OFF>

This command turns the 1250 Confidence test on or off. The Confidence test checks that the state of all relays is as programmed. It causes the 1250 to assert the SRQ line after each OPEN or CLOSE command is processed and lights the ERR LED if Option 90 (Intelligent Front Panel) is fitted. A character string detailing the `error' (error 99, Passed Confidence Test or error 51, Failed Confidence Test,) may be obtained from the 1250 in response to a Serial poll followed by

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the YERR command. The character string that the YERR command causes the 1250 to generate is "error <slotnumber>.51" or "error <slotnumber>.99". The default (power-up) state for the confidence test is OFF.

DLY

DLY <value>

This command is used to cause a delay between the last relay closure after a command string is processed and the SYNC OUT pulse. <value> may be 0-655 ms, and is set to zero at power up.

EQU

EQU <equate list>

This command causes any OPEN, CLOSE or TRIG/SCAN commands addressed to any switching module on the <equate list> to be carried out for all switch modules on the <equate list>. All modules on the list are required to be identical.

The <equate list> is made up of the slot numbers of the switch modules that are to be equated separated by a semi-colon (;). Continuous groups of switch modules may be entered onto the <equate list> by entering the first and last modules to appear on the list joined by a hyphen (-). More than one equate group may be set up in a single EQU statement by separating the equate groups with a comma (,).

Example: EQU 1;3-6

This command will equate slots 1, 3, 4 and 5 as one equate group.

NOTE

All switch modules must be of the same type to be accepted in the same equate list or the 1250 will generate an error.

NOTE

Use of the EQU command will overwrite all previously entered <equate list>s. An <equate list> of 0 may be used to clear all equate groups.

NOTE

When an <equate list> is entered, all switch

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modules on the list adopt the state of the first module to appear on the list.

EXCL

EXCL <exclude list>

This command causes the 1250 to regard the channel closures specified in the <exclude list> as mutually exclusive. A channel is described in the <exclude list> by the slotnumber of a switching module and module specific syntax to describe the relay closures in a channel. Refer to Section 3.9 for the module specific syntax of the various switch modules available. Continuous groups of switch modules may be entered onto the <exclude list> by entering the first and last modules to appear on the list joined by a hyphen (-). More than one <exclude list> may be specified in an EXCL statement by separating the Exclude groups with the letter E and a semi-colon (E;). In this case, only one of the channels in each exclude group may be closed.

NOTE

Use of the EXCL command will overwrite all previously entered <exclude list>s. An <exclude list> of 0 may be used to clear all exclude groups.

OPEN

OPEN <module specific syntax> [;<module specific syntax>].....

This command causes one or more connections on a switching module to open. It is the converse of the CLOSE command. Any number of connections in more than one slot may be opened in one OPEN statement if the <slotnumber>.<module specific syntax> sections are concatenated using a semi-colon (;). Refer to Section 3.9 for the <module specific syntax> to be used for each 1250 Series switching module.

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PDATAOUT

PDATAOUT <slotnumber>;<slotnumber>.....

This command causes the specified switch modules to output the present state of the relays contained in those modules. Data for slot 0 (the controller), after the identification string consists of the revision level of the 1250 operating system.

More than one slot number may be specified for this command by hyphenating the first and last slots to be examined. In this case, all 1250 slots with a 1250 Series module fitted in the range specified will respond to the PDATAOUT command in ascending slot number order.

An example character string output by a 1250 with switch modules installed in slots 1 and 5 in response to a PDATAOUT 0-5 command is given below.

```
0.MODEL 1250 UNIVERSAL SWITCH CONTROLLER
0.OS Rev 1.2 1250
1.1250-50 200 MHZ RF SWITCHING MODULE
1.20-22
5.1250-30 SCANNER/MULTIPLEXER MODULE
5.1-4,8,13
5.END
```

NOTE

The switching module configuration is described in the same format as is required by the OPEN and CLOSE commands.

NOTE

The character string output by the 1250 is made up of multiple lines and contains carriage-return, line-feed pairs. These may terminate the output string and so the PDATAOUT RESPONSE must be read repeatedly until all lines of the output have been read for all modules specified. The final line output by the 1250 is <slotnumber>.END where <slotnumber> is the address of the slot that the last 1250 Series module described is resident.

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PSETUP

PSETUP <slotnumber>[;<slotnumber>]....

This command causes the 1250 to output a character string describing the setup of the switching system master and switch modules. An example of a character string obtained in response to a PSETUP command from a 1250 with switch modules installed in slots 1 and 5 is given below.

```
0.MODEL 1250 UNIVERSAL SWITCH CONTROLLER
0.CNF OFF
0.DLY 0
0.DSP ON
0.EQU 0
0.EXCL 0
0.SCAN ON
0.SLIST 0
0.SRQMASK 44
0.PUPRCL OFF
0.END
1.1250-50 200 MHZ RF SWITCHING MODULE
1.BBM
5.1250-30 SCANNER/MULTIPLEXER MODULE
5.IMM
5.END
```

NOTE

The character string output by the 1250 is made up of multiple lines and contains carriage-return, line-feed pairs. These will terminate the output string and so the PSETUP output string must be read repeatedly until all lines of the output have been read for all modules specified. The final line output by the 1250 is <slotnumber>.END where <slotnumber> is the address of the chassis slot that the last 1250 Series module present in the chassis.

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PUPRCL

PUPRCL <ON|OFF>

This command enables and disables the automatic recall of the switch settings stored in non-volatile memory location 1 at power up. The configuration in non-vol location 1 is stored by the use of the STORE command. Refer to Section 3.8.18 for details of the STORE command.

NOTE

If non-volatile location 1 is cleared and PUPRCL is ON, no recall will take place at power up.

NOTE

The Power up recall feature status is not changed by the RESET command. This feature will retain the status that it had on power down.

READ

READ <slotnumber>.<portnumber>

where <slotnumber> ::= 1|2|3|4|5

<portnumber> ::= 0|1|2

This command is supported by 1250 Series digital and breadboard cards only. It allows the data appearing at one of the 1250 Series digital or breadboard cards eight bit ports to be read by the system controller via the GPIB or the optiona intelligent front panel.

RECALL

RECALL <non-vol location>

where <non-vol location> = 1|2|.....|47

This command will set all switch modules in the 1250 chassis to the configuration stored in the non-volatile location specified. Note that an error will be generated if an attempt is made to RECALL a memory setting into a switching system configuration that differs from the configuration present when the memory setting was stored. An error will also be generated if an attempt is made to RECALL a memory setting from an empty location.

NOTE

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1250 Universal Switch Controllers containing operating systems at level 13.1 or lower have 63 non-volatile memory locations available. The operating system level installed may be obtained with the command "PDATAOUT 0".

RESET

This command causes the 1250 to return to its home state and all 1250 Series switch modules to be set to their de-energised states. Note that the RESET command will not change the Power up recall (PUPRCL) feature.

SCAN

SCAN <ON|OFF|CONT>

The SCAN ON command causes the 1250 to open and close the channels as specified in the scan list in turn. Each channel is closed on receipt of a trigger input or command. The 1250 will scan the channels until it reaches a break point or the SCAN OFF command is received. Refer to Section 3.4.16 for further details of the scan list. Note that connecting the 1250 SYNC OUT output to the TRIG IN input will result in the 1250 scanning the channels specified with a delay between each closure equal in duration to that specified by the DLY command until a break point or SCAN OFF command is encountered.

SCAN OFF causes the 1250 to stop scanning. Scanning may only be resumed by the use of the SCAN ON or SCAN CONT commands.

NOTE

The SCAN command may also be used to recall non volatile memory settings in turn. Refer to Section 3.8.16 for further details of the scan list.

The SCAN CONT command causes the 1250 to resume scanning the channels on the scan list after pausing at a break point in the scan list. The 1250 will continue to scan until it reaches a break point on the scan list or it receives the SCAN OFF command.

SETUP

SETUP <slotnumber>.<seqmode>

This command is used to control the sequence in which a switch modules relays are opened and closed. The sequence

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modes (<seqmode>s) are IMM (Immediate), BBM (Break-before-make) and MBB (Make-before-break).

The Immediate (IMM) sequence mode will cause the opening and closing of switching module channels as quickly as possible, and the sequence of opening and closing is indeterminate. Care must be taken to avoid potentially damaging connections while the switching module is in a state of transition, (e.g.) short circuiting power supplies to ground, connecting high power outputs together or applying excessive power to low impedance inputs.

The Break-before-make (BBM) sequence mode causes existing channel closures to be opened before new channel closures are made. BBM is the default (power up) state.

The Make-before-break (MBB) sequence mode causes new channel closures to be executed before existing channel closures are opened.

SLIST

SLIST <scan list>

where <scan list> is <slotnumber>.<channel> [;<slotnumber>.<channel>];....

This command enters the slot and channel information to be used in the scan list while in the SCAN mode. The <scanlist> describes the channels that are to be closed in the order given in the scan list. The closures are made on receipt of a trigger pulse input to the rear panel TRIG IN connector or the GPIB Group Execute Trigger (GET) command. The SCAN and TRIG modes must both be ON for this to occur.

Non-volatile memory locations may be recalled in the scanlist by specifying the memory location delimited by semicolons (;) in the scan list. On reaching the non-volatile location in the scan list, any previous closures not specified in the non-volatile location are opened and the switch configuration is recalled from memory. Note that when the 1250 proceeds to the next element in the scan list, the switch closures recalled from memory are not opened.

The range of values of <slotnumber> is from 1 to 5. Switching channels are closed if <channel> is a module specific statement. If a non volatile memory setting is to be recalled, <channel> must have an integer value between 1 and 47.

NOTE

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1250 Universal Switch Controllers containing operating systems at level 13.1 or lower have 63 non-volatile memory locations available. The operating system level installed may be obtained with the command "PDATAOUT 0".

A break point in the scan list will cause the 1250 to stop scanning after opening the previous channel. A break point in the scan list is defined as the character zero (0), delimited by semi-colons (;0;). On reaching a scanlist break point, the scan mode is set to SCAN OFF. Scanning is resumed only after receipt of the SCAN CONT or SCAN ON commands. SCAN CONT will cause the 1250 to resume scanning from the scan list break point it was paused at and the SCAN ON command will cause the 1250 to resume scanning from the beginning of the scan list.

If the 1250 pauses at a scan list break point, bit 4 of the GPIB status byte, Scan list at break point, is asserted and SRQ asserted if the SRQMASK permits. Refer to the next section for further details of the SRQMASK command.

SRQMASK

SRQMASK <integer>

This command controls the circumstances under which the 1250 will assert SRQ by masking the 1250 status byte. The mask value, <integer> is the decimal equivalent of the binary weighted eight bit byte ANDED with the status byte, (i.e.) if a bit in the mask is a logic 1, then the assertion of the corresponding bit in the status byte will cause the 1250 to assert SRQ. Refer to Table 3-2 for the bit assignments of the 1250 GPIB Status byte. Note that the status byte also details the possible responses of the 1250 to a GPIB serial poll.

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Table 3-2, 1250 Status Byte

Bit Number	Description
1 (lsb)	Unused
2	Unused
3	Unused
4	Scan list at break point
5	Ready
6	Programming error
7	Service requested
8 (msb)	Unused

The Programming error bit cannot be masked and so the range of values for <integer> is 32-63, 96-127, 160-191 and 224-255.

The power up (default) value of the SRQMASK is 44, (i.e.) Programming error and Scanlist at break point will cause SRQ to be asserted.

STORE

STORE <non-vol location> where <non-vol location> = 1|2|.....|47

This command will store the present state of all switch modules resident in the 1250 chassis in the non-volatile memory location specified.

NOTE

1250 Universal Switch Controllers containing operating systems at level 13.1 or lower have 63 non-volatile memory locations available. The operating system level installed may be obtained with the command "PDATAOUT 0".

TEST

TEST 0.<testnumber> where <testnumber>::=1|2|3

This command causes the 1250 to carry out a self test. The possible tests are:

1 - Non-destructive RAM test

2 - EPROM checksum test

3 - Non-destructive non-volatile memory test

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On commencing a test, the Ready bit of the status byte is reset until the test is completed.

WRITE

WRITE <slotnumber>.<portnumber>,<data>

where <slotnumber> is in the range 1 - 5

<portnumber> is in the range 0 - 2

<data> is in the range 0 - 255 for 8 bit operations and +32,767 to -32,768 for 16 bit operations.

This command is supported by 1250 Series digital and breadboard cards only. It allows the system controller to write data to one of the three eight bit ports on a 1250 Series digital or breadboard module.

YERR

This command causes the 1250 to transmit the location (<slotnumber>) of the most recent error and a two digit number (<errornumber>) that describes the error. Refer to Table 3-3 for a listing of all possible values of <errornumber> and corresponding error descriptions.

NOTE

In the event of an error being generated, the GPIB SRQ line is asserted. The interrupt must be serviced remotely with either a serial poll or locally with the RESET key before the YERR command can be used. Any attempt to use the YERR command without servicing the interrupt will cause the GPIB to lock up, unless a timeout condition has been set.

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Table 3-3, 1250 Series Error Codes

<errornumber>	Error Description
0	No error
1	Invalid module number specified
2	Specified module not installed
3	Invalid channel number specified
4	Invalid port number specified
5	Command syntax error
6	Read value larger than expected
7	Function not supported by module
8	Expected line terminator not found
9	Valid command not found
20	Exclude list too long
21	Channel entered on exclude list twice
22	Module doesn't allow exclude function
23	Scan list too long
24	Module doesn't allow scan
25	Equate list too long
26	Module entered on equate list twice
27	Incompatible modules equated or digital modules invalid
31	SRQMASK invalid
40	Number invalid as a test number
41 *	RAM test failure
42 *	ROM test failure
43 *	Non-vol memory test failure
44 *	Incompatible operating system EPROMS, software revisions
45 *	Self-test CPU or related circuitry failure
46 *	Self-test 13 V supply failure
47 *	Self-test timer chip failure
48 *	Insufficient RAM for option module
49 *	Checksum error reading from option module EPROM
50 *	Option module EPROM incompatible with CPU EPROM
51	Failed confidence test
55	Error STOREing to non-vol memory
56	Error RECALLing from non-vol memory
57	Non-vol storage location number out of range
58	RECALLing from an empty non-vol location not allowed
99	Passed Confidence Test

Note: * denotes a 'fatal' error

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1250 Series Module Specific Syntax

1250-10 Breadboard Module Specific Syntax

The 1250-10 supports the READ, WRITE, RESET and PDATAOUT commands.

The module specific syntax for the 1250-10 is of the form

<slotnumber>.<portnumber>,<data>

where <slotnumber> is the 1250 chassis slot that the 1250-10 resides in, value 1 - 5.

<portnumber> is in the range 0 - 2

<data> is in the range 0 - 255

The PDATAOUT command outputs the data which was read or written during the last transaction to or from the 1250-10. The output is of the form:

<slotnumber>.1250-10 BREADBOARD MODULE
<slotnumber>.<portnumber>,<data>
<slotnumber>.END

1250-12 Relay Actuator Module Specific Syntax Specific Syntax

The 1250-12 Relay Actuator Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-12 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-12 resides in, value 1 - 5.

<channel> is the reference of a channel of 2 FORM A (2 SPST) relays implemented on the 1250-12.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-12 only. The syntax used is:

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SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-12 RELAY ACTUATOR MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-12 Relay Actuator Module is as follows:

<slotnumber>.1250-12 Relay Actuator Module
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 9 for the 1250-12

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1250-14 Digital Input/Output Module Specific Syntax

The 1250-14 Digital Input/Output Module supports the WRITE, READ and SETUP commands.

The WRITE command permits the writing of 8 or 16 bit data to a port, W.

The module specific syntax used with the 1250-14 in the WRITE command is of the form:

WRITE <slotnumber>.<portnumber>,<data>

where <slotnumber> is the 1250 chassis slot that the 1250-14 resides in, value 1 - 5.

<portnumber> is the port written to, value 0 - 2. Port 0 writes to the lower 8 bits of a 16 bit word, port 1 writes to the upper 8 bits of a 16 bit word and port 2 writes to all 16 bits of the word. For ports 0 and 1, each data output is the decimal equivalent of the binary data written. The range of values of data written to ports 0 and 1 is 0 - 255. For port 2, each data output is in the 2's complement form of the 16 bit word written. The range of values of data written to port 2 is +32,767 to -32,768.

Note: To convert from 2's complement to binary, invert each bit and add (binary) 1.

The module specific syntax used with the 1250-14 in the READ command is of the form:

READ <slotnumber>.<portnumber>,[<number of readings>]

where <slotnumber> and <portnumber> are the same as for the WRITE command.

<number of readings> sets the number of data words to be captured and stored by the 1250. The default value is 1, and the valid ranges for <number of readings> is 1 - 127 for 16 bit words and 1 - 254 for 8 bit words. The read rate is as defined by the SETUP command. When the data captured by the READ command is read by the system controller, it is returned over the GPIB as multiple lines of data. The number of lines returned will be the number specified in <number of readings>. The data read by the 1250-14 does not require an instruction to load the data into the GPIB output buffer, but may be read over the GPIB

The module specific syntax used with the 1250-14 in the SETUP command is of the form:

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SETUP <slotnumber>.<modenumber>,<polarity code>

where: <slotnumber> is the same as in the WRITE command.

<modenumber> sets the 1250-14 to one of the five modes available. The range of values for <modenumber> is 1 - 5. There are three control lines used to qualify data transfers, I/O, PFLG and PCTL. The lines used in each mode are described below. Modes 1 and 2 are available at all three ports, and modes 3, 4 and 5 are available at ports 0 and 2 only.

Mode 1 is Static Mode 1. This mode will clear the data written to the output port when a READ command is issued. It causes data to be read synchronously, at a nominal 1 kHz rate. The I/O line is active as a data direction indicator. This mode is the default power up mode employed by the 1250-14.

Mode 2 is Static Mode 2. This mode permits the reading of data previously written to the output port, otherwise it is the same as mode 1. Multiple READs are carried out at a nominal 1 kHz rate.

Mode 3 is Strobe Mode 1. This mode uses the I/O line to indicate data direction and the PCTL line to output a strobe to trigger data transfer. Multiple READs are carried out at a nominal 1 kHz rate.

Mode 4 is Strobe Mode 2. This mode uses the WR line as the write data strobe and the RD line is the read data strobe. The I/O line is used to indicate data direction. Multiple READs are carried out at a nominal 1 kHz rate.

Mode 5 is the Handshake mode. This carries out all data transfers using a three wire handshake. The lines used are I/O, PFLG and PCTL. Both single and multiple READs are carried out at the speed of the slowest handshake line.

<polarity code> sets the logic levels that are to be interpreted as true and false. The default value is P=0. The decimal number entered is the weighted sum of the following:

P=1 The lower byte polarity is low true. P=0 sets the lower byte polarity to high true.

P=4 The upper byte polarity is low true. P=0 sets the upper byte polarity to high true.

P=2 PCTL polarity is low busy. P=0 sets the PCTL polarity to low ready.

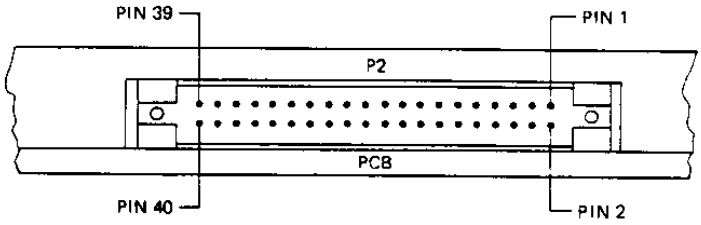
P=16 PFLG polarity is low busy. P=0 sets the PFLG polarity to low ready.

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P=8 I/O polarity is low input. P=0 sets the I/O polarity to low output.

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PIN	
1	GND
2	GND
3	H7
4	GND
5	H6
6	GND
7	H5
8	GND
9	H4
10	GND
11	H3
12	GND
13	H2
14	GND
15	H1
16	GND
17	H0
18	GND



PIN	
19	L7
20	GND
21	L6
22	GND
23	L5
24	GND
25	L4
26	GND
27	L3
28	GND
29	L2
30	GND
31	L1
32	GND
33	L0
34	GND
35	I/$\overline{O}$
36	GND
37	PFLG
38	PCTL
39	GND
40	GND

H0 – H7 ARE BITS OF HIGH ORDER BYTE
L0 – L7 ARE BITS OF LOW ORDER BYTE

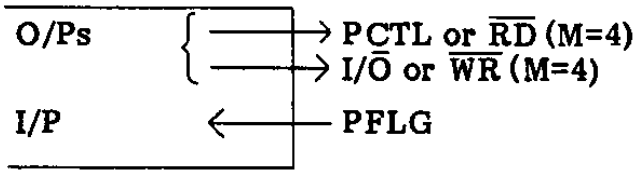


Figure 3-3, 1250-14 Module Handshake Lines

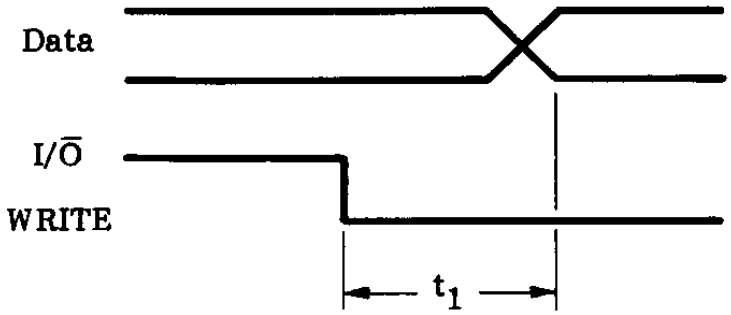
NOTE

Handshaking (M=3, 4, or 5) is only available for ports 0 and 2, whereas port 1 is always static (M=1, 2). Also, attempting to execute an Open or Close operation on a module will generate and error. The I/O, PCTL, and PFLG lines are always associated with port 0 or port 2. Writing/reading to/from port 1 will not affect these lines.

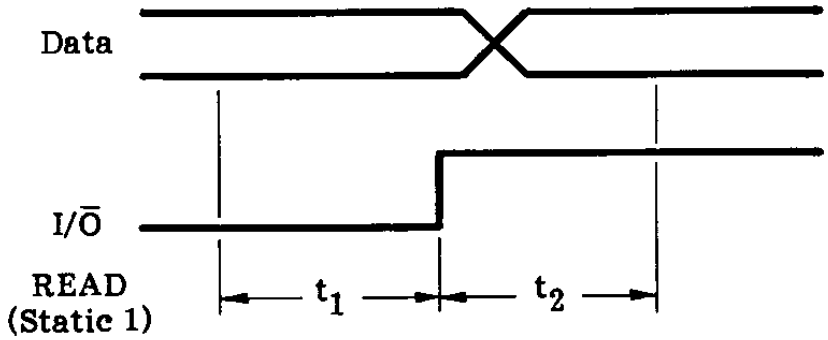
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Shown below are the timing diagrams for the four I/O control modes of the 1250-14:

(a) **Static 1 and 2**



t_1 is the time from when I/$\bar{O}$ equals output until the output is enabled (250 µs typical)



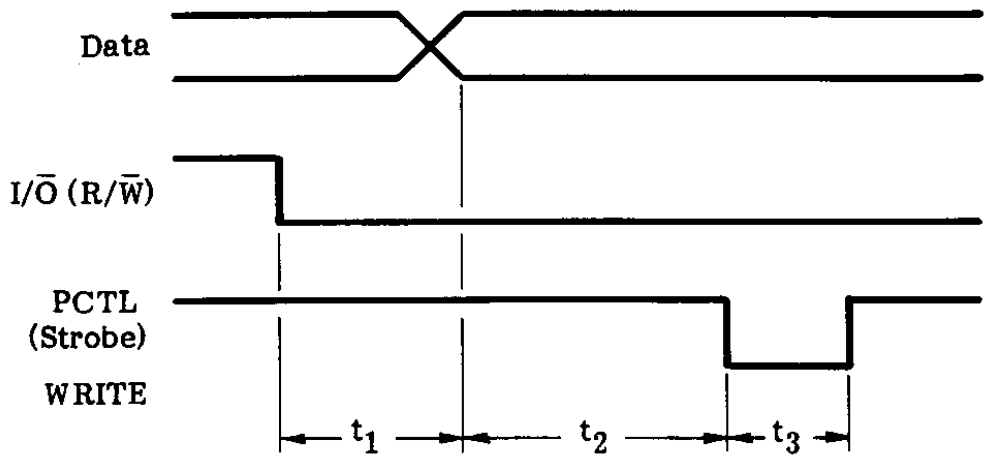
t_1 is the time from output disabled until I/$\bar{O}$ equals the input (90 µs typical)

t_2 is the time from when I/$\bar{O}$ equals input until data is latched (100 µs typical)

Figure 3-4, 1250-14 Timing Diagrams

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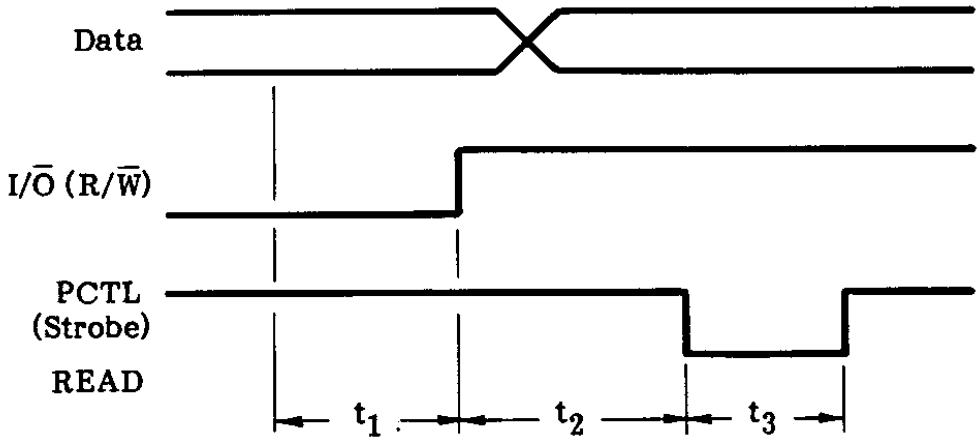
(b) **Strobe 1**



t_1 is the time from when I/$\bar{O}$ equals output until the output is enabled (260 µs typical)

t_2 is the time from output enabled to the start of strobe (90 µs typical)

t_3 is the strobe width (90 µs typical)



t_1 is the time from output disabled until I/$\bar{O}$ equals the input (100 µs typical)

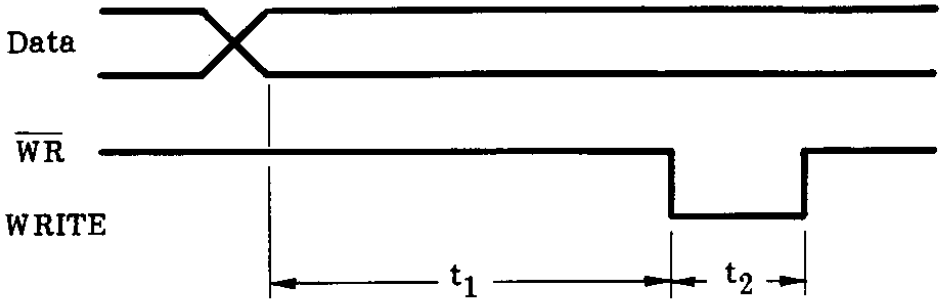
t_2 is the time when I/$\bar{O}$ equals the input until the start of strobe (90 µs typical)

t_3 is the strobe width (200 µs typical)

Figure 3-4, 1250-14 Timing Diagrams (Cont)

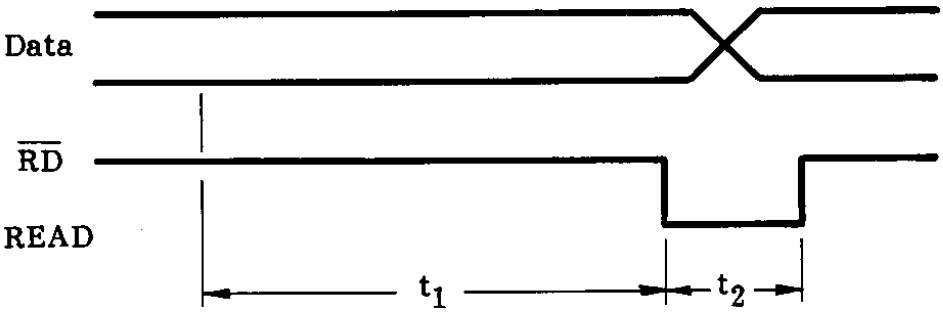
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(c) **Strobe 2**



t_1 is the time from data valid (output enabled) to the start of strobe (90 µs typical)

t_2 is the strobe width (90 µs typical)



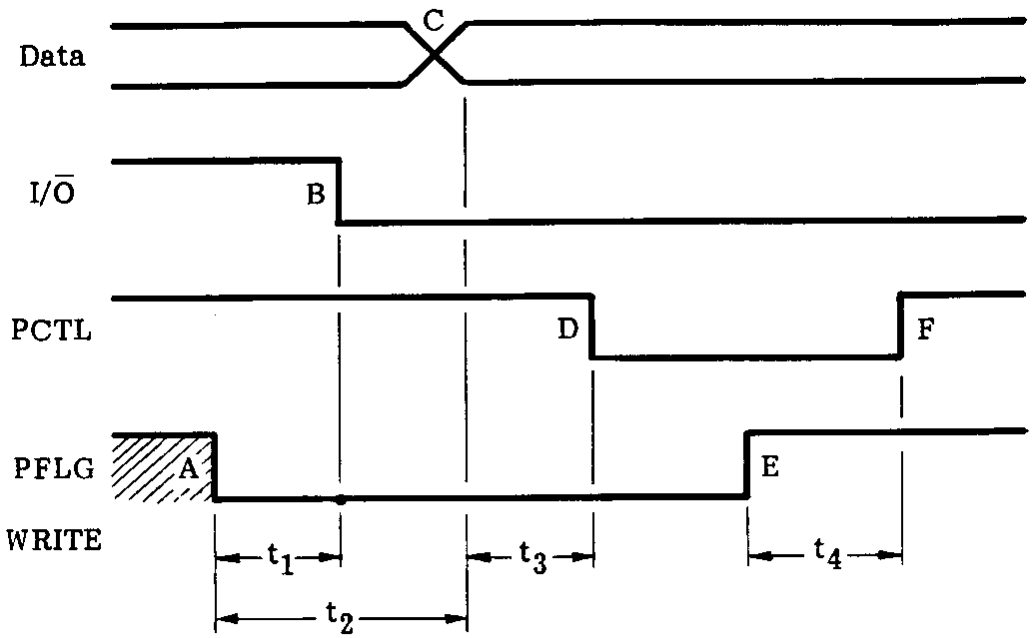
t_1 is the time from output disable to the start of strobe (80 µs typical)

t_2 is the strobe width (200 µs typical)

Figure 3-4, 1250-14 Timing Diagrams (Cont)

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(d) **Handshake**



t_1 is the time from when PFLG is true until I/Ō equals the output (400 µs typical)

t_2 is the time from PFLG true until the output is enabled (1 ms typical)

t_3 is the time from output enabled until line PCTL is true (100 µs typical)

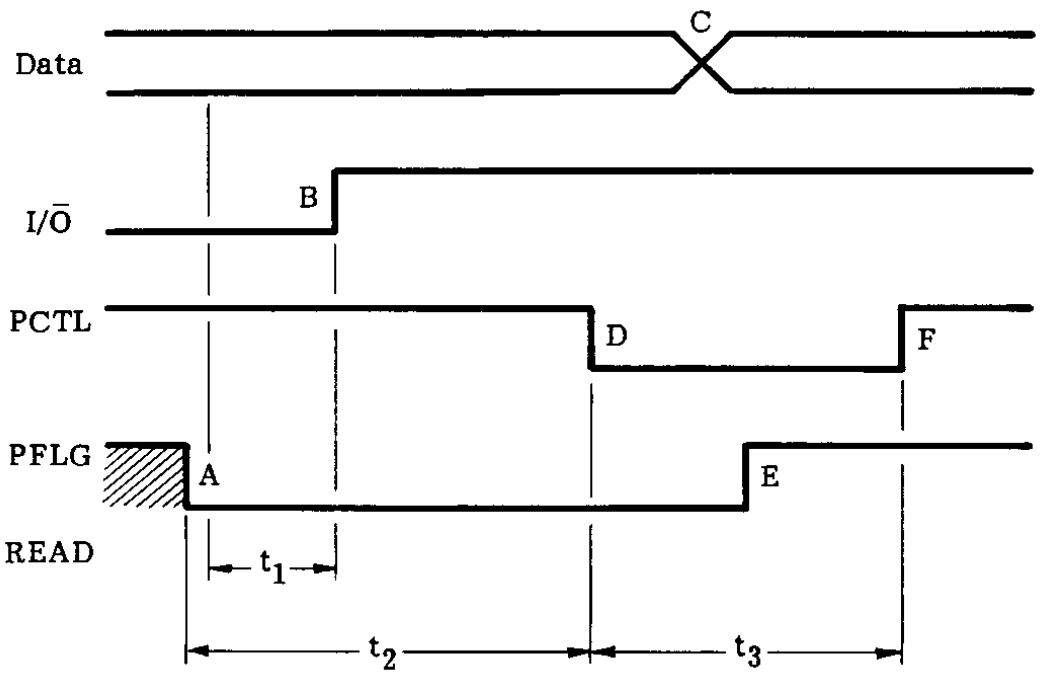
t_4 is the time from PFLG false until line PCTL is false (1 ms typical)

where:

A - peripheral indicates "ready for data"
B - I/Ō indicates Output (i.e., write)
C - Data lines are set
D - 1250-14 module indicates "output data valid"
E - Peripheral indicates "not ready for next data"
F - 1250-14 module indicates "not ready for next transfer"

Figure 3-4, 1250-14 Timing Diagrams (Cont)

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t_1 is the time from output disabled until when I/Ō equals the input (100 µs typical)

t_2 is the time from PFLG true until line PCTL is true (1 ms typical)

t_3 is the time from PFLG false until line PCTL is false and data latched (500 µs typical)

where:

A - peripheral indicates "ready for transfer"
B - I/O indicates Input (i.e., read)
C - Data lines set by peripheral
D - 1250-14 module indicates "ready for input"
E - Peripheral indicates "data valid and not ready for next transfer"
F - 1250-14 module indicates "not ready for next input and data accepted"

Figure 3-4, 1250-14 Timing Diagrams(Cont)

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1250-15 Relay Driver Module Specific Syntax

The 1250-15 Relay Driver Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-15 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-15 resides in, value 1 - 5.

<channel> is the reference of a channel that is to be used to actuate a relay external to the 1250-15. The range of values for <channel> is 0 - 19.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-60 and 1250-61 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-15 RELAY ACTUATOR MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250

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Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-15 RELAY ACTUATOR MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 19 for the 1250-15.

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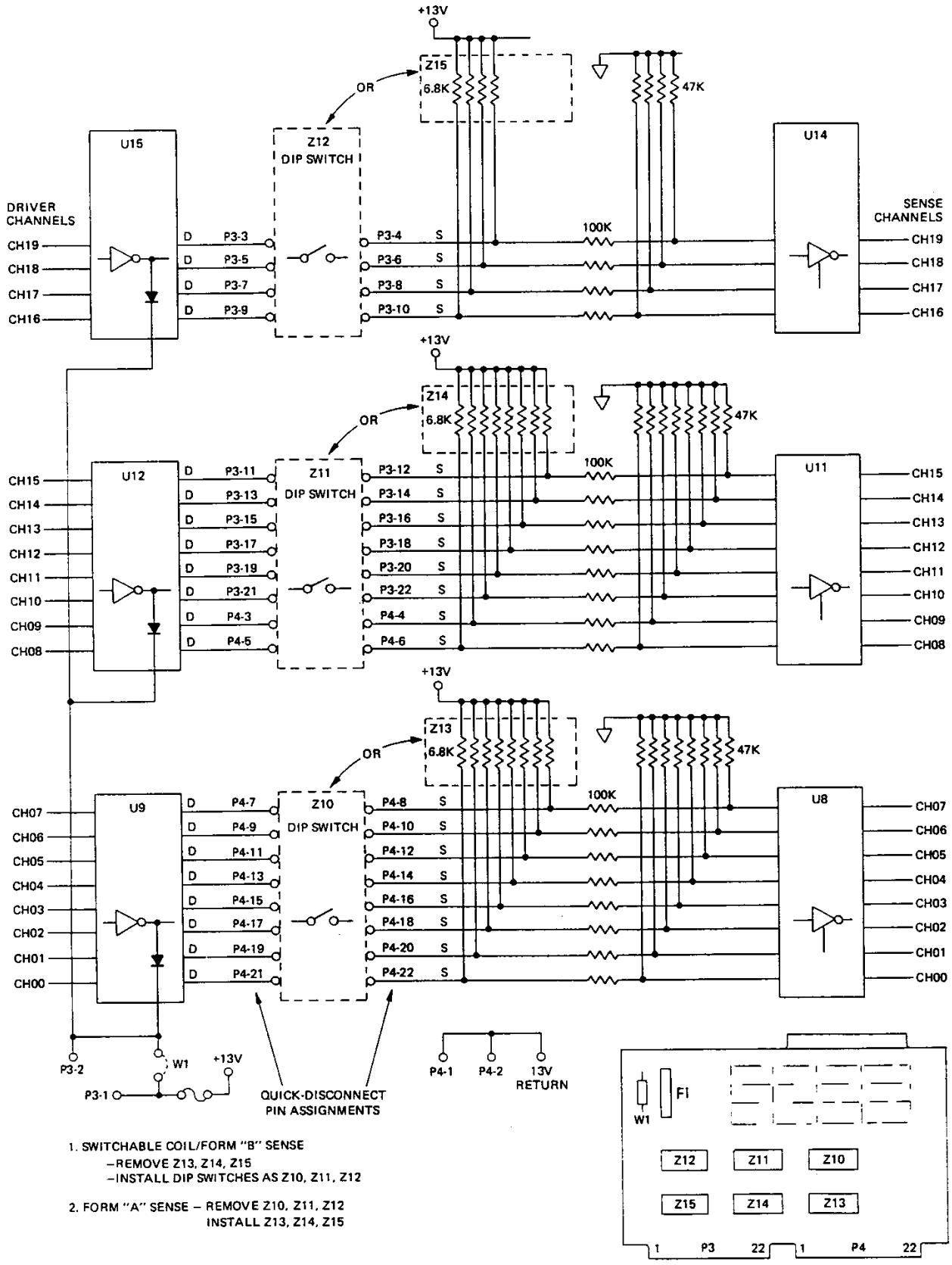
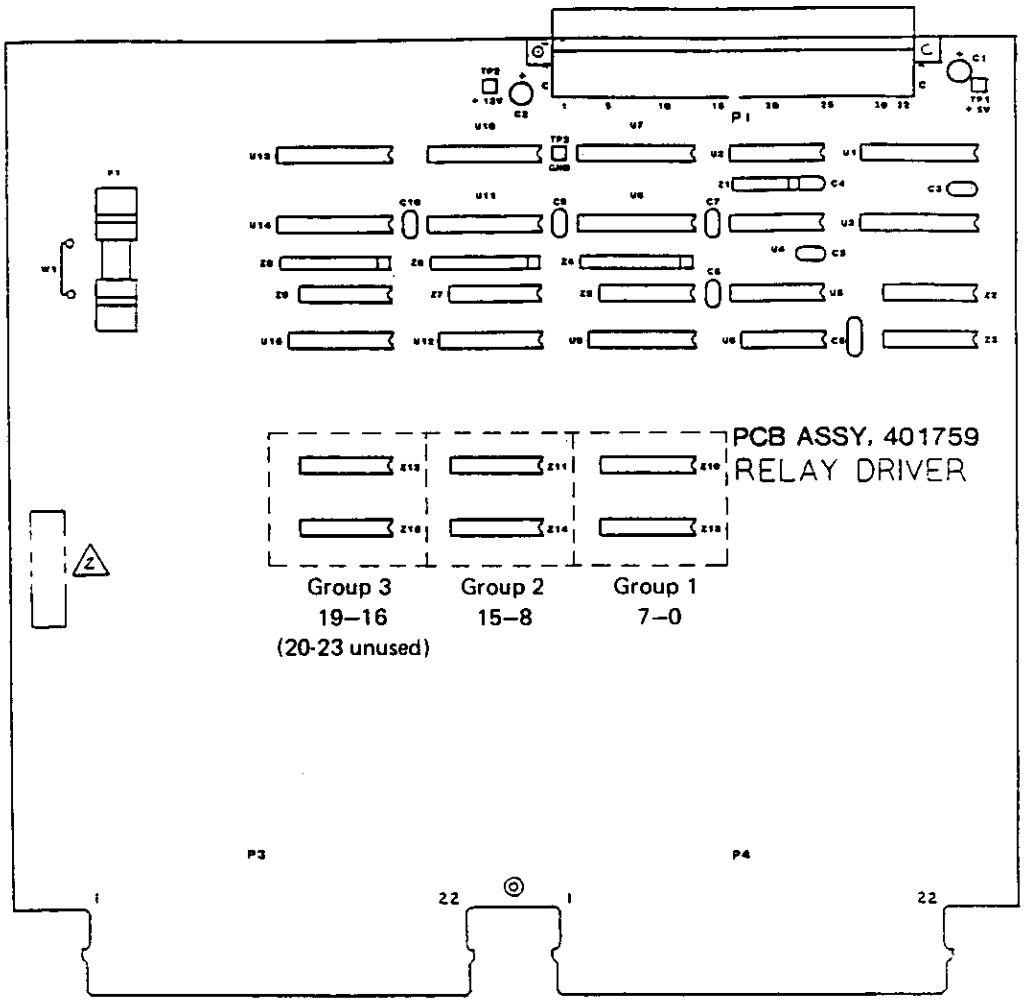


Figure 3-5, 1250-15 Relay Driver Connection Diagram

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This example of Form A, B, and C sensing uses the 3 different channel groups 1, 2, and 3 on Relay Driver PCB shown above. See text for configuring to meet your particular needs.

Sensing Examples:

FORM A	FORM B	FORM C
DIP Switches*	Empty	Z-block
Z-block	Empty	Empty

* Switches "ON" will provide confidence mode feedback.
Switches "OFF" user must provide external sense to pass confidence mode.

Figure 3-5, 1250-15 Relay Driver Connection Diagram (Cont)

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1250-15 Confidence Mode Support

The 1250-15 may be configured to support confidence testing in one or more ways, depending on the types of relays that the card is driving and the users requirements. Two types of confidence testing are available, coil current sensing and spare contact sensing. The spare contact sensing is available only if the relay is a DPDT type with one of the pair of contacts unused and the exact configuration depends on whether the relay is normally open or normally closed. More than one type of confidence test may be implemented on a single board and Racal-Dana recommend that channels 0 - 7, 8 - 15 and 16-19 have one type of confidence feedback per group implemented.

The 1259-15 is factory configured with DIP switches installed in sockets Z10, Z11 and Z12. These simulate the FORM A sense mode and allow the 1250-15 to pass the confidence mode test without external connections. If external relays are connected, the DIP switches must be removed or switched off and external coil or contact feedback supplied.

To implement coil current sensing, remove resistor blocks Z13, Z14 and Z15 from the 1250-15 and install them in the sockets for Z10, Z11 and Z12. Connect the relay coil to pins D and P3-2 on the 1250-15. Fit jumper W1 if it is required to use the 1250 internal +13 V supply to supply the relay coil current, as shown below.

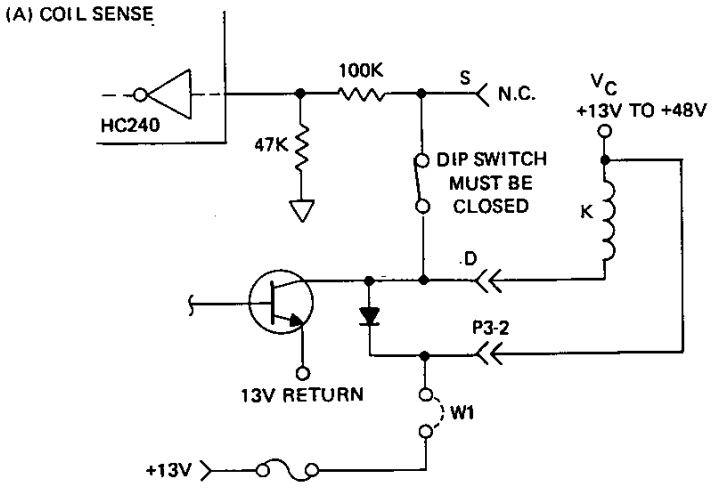


Figure 3-6, 1250-15 Coil Sense

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To implement FORM A (normally open) sensing, remove resistor blocks Z10, Z11 and Z12 from the 1250-15 and install them in the sockets for Z13, Z14 and Z15. Connect the relay coil to pins D and P3-2 on the 1250-15 and the unused switch contacts to pins S and P4-1,2. Fit jumper W1 if it is required to use the 1250 internal +13 V supply to supply the relay coil current as shown below.

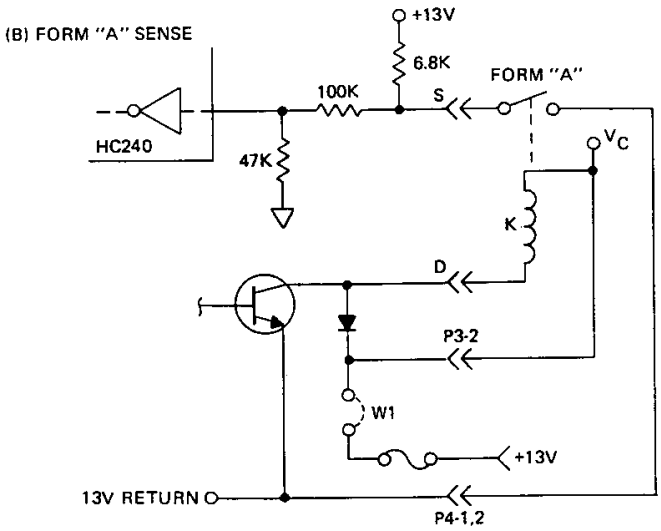
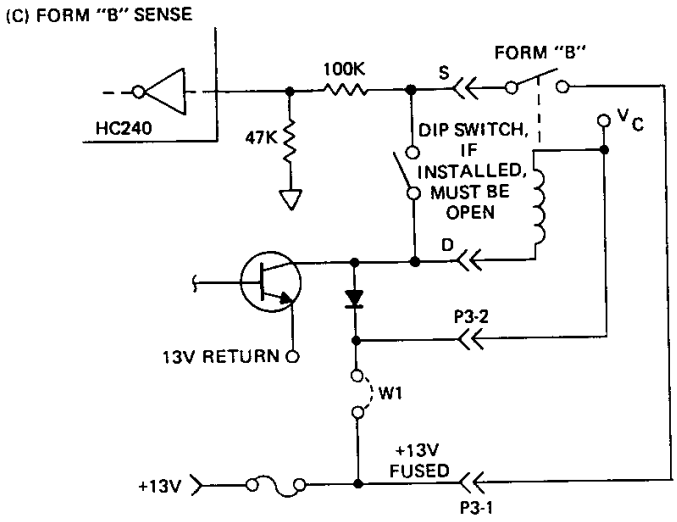


Figure 3-7, 1250-15 Form A Sense

To implement FORM B (normally closed) sensing, remove resistor blocks Z13, Z14, Z15, Z10, Z11 and Z12 from the 1250-15. Connect the relay coil to pins D and P3-2 on the 1250-15 and the unused switch contacts to pins S and P3-1. Fit jumper W1 if it is required to use the 1250 internal +13 V supply to supply the relay coil current.



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Figure 3-8, 1250-15 Form B Sense

1250-15A Relay Driver Module Specific Syntax

The 1250-15A Relay Driver Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-15A is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-15A resides in, value 1 - 5.

<channel> is the reference of a channel that is to be used to actuate a relay external to the 1250-15A. The range of values for <channel> is 0 - 23.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-15A. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-15A is as follows:

<slotnumber>.1250-15A RELAY ACTUATOR MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

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PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-15A is as follows:

<slotnumber>.1250-15A RELAY ACTUATOR MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 23 for the 1250-15A.

1250-15A Confidence Mode Support

The 1250-15A may be configured to support confidence testing in one or more ways, depending on the types of relays that the card is driving and the users requirements. Two types of confidence testing are available, coil current sensing and spare contact sensing. The spare contact sensing is available only if the relay is a DPDT type with one of the pair of contacts unused and the exact configuration depends on whether the relay is normally open or normally closed. More than one type of confidence test may be implemented on a single board and Racal-Dana recommend that channels 0 - 7, 8 - 15 and 16-19 have one type of confidence feedback per group implemented.

The 1250-15A is factory configured with DIP switches SW1 to SW6. The position of these switches determines the type of confidence testing to be used.

NOTE

The 1250-15A is shipped with al switches in the ON position, allowing all channels to pass the Confidence mode test without external connections. If external relays are connected, the Dip switches must be set to allow the type of confidence mode testing desired and external coil or contact feedback supplied

Each of the 24 channels of the 1250-15A may be configured to use any of the three confidence test modes available. Two switches must be set per channel to set the confidence mode for that channel.

The DIP switches that correspond to the particular channel

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groups are as follows:

Group 1 (Channels 0-7)	SW1 and SW2
Group 2 (Channels 8-15)	SW3 and Sw4
Group 3 (Channels 16-23)	SW5 and SW6

The switches contained in the switch blocks that are associated with a particular channel are as follows:

SW1 and SW2, switches 1 to 8, respectively,	Channels 0 to 7, respectively
SW3 and SW4, switches 1 to 8, respectively,	Channels 8 to 15, respectively
SW5 and SW6, switches 1 to 8, respectively,	Channels 16 to 23, respectively

NOTE

The switch numbers and the ON position for each switch block are marked on the switch block body rather that silk screened on to the PCB itself.

The switch settings for the confidence modes available for each channel are as follows:

Confidence mode	Switch SW1	Switch SW2
FORM B	OFF (open)	OFF (open)
FORM A	OFF (open)	ON (closed)
Coil Current	ON (closed)	OFF (open)
No Relay	ON (closed)	ON (closed)

NOTE

All unused channels must be set to the No Relay mode when the Confidence mode is enabled for the 1250-15A to Pass the Confidence test.

Refer to Table 3-4 for the 1250-15A DB25 pins that correspond to pins S and D for each channel and to Figure 3-9 for the locations of switches SW1 through SW6.

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Table 3-4, 1250-15A Pins D and S

Channel	Pin D	Pin S
00	J1-1	J1-7
01	J1-14	J1-20
02	J1-2	J1-8
03	J1-15	J1-21
04	J1-3	J1-9
05	J1-16	J1-22
06	J1-4	J1-10
07	J1-17	J1-23
08	J2-1	J2-7
09	J2-14	J2-20
10	J2-2	J2-8
11	J2-15	J2-21
12	J2-3	J2-9
13	J2-16	J2-22
14	J2-4	J2-10
15	J2-17	J2-23
16	J3-1	J3-7
17	J3-14	J3-20
18	J3-2	J3-8
19	J3-15	J3-21
20	J3-3	J3-9
21	J3-16	J3-22
22	J3-4	J3-10
23	J3-17	J3-23

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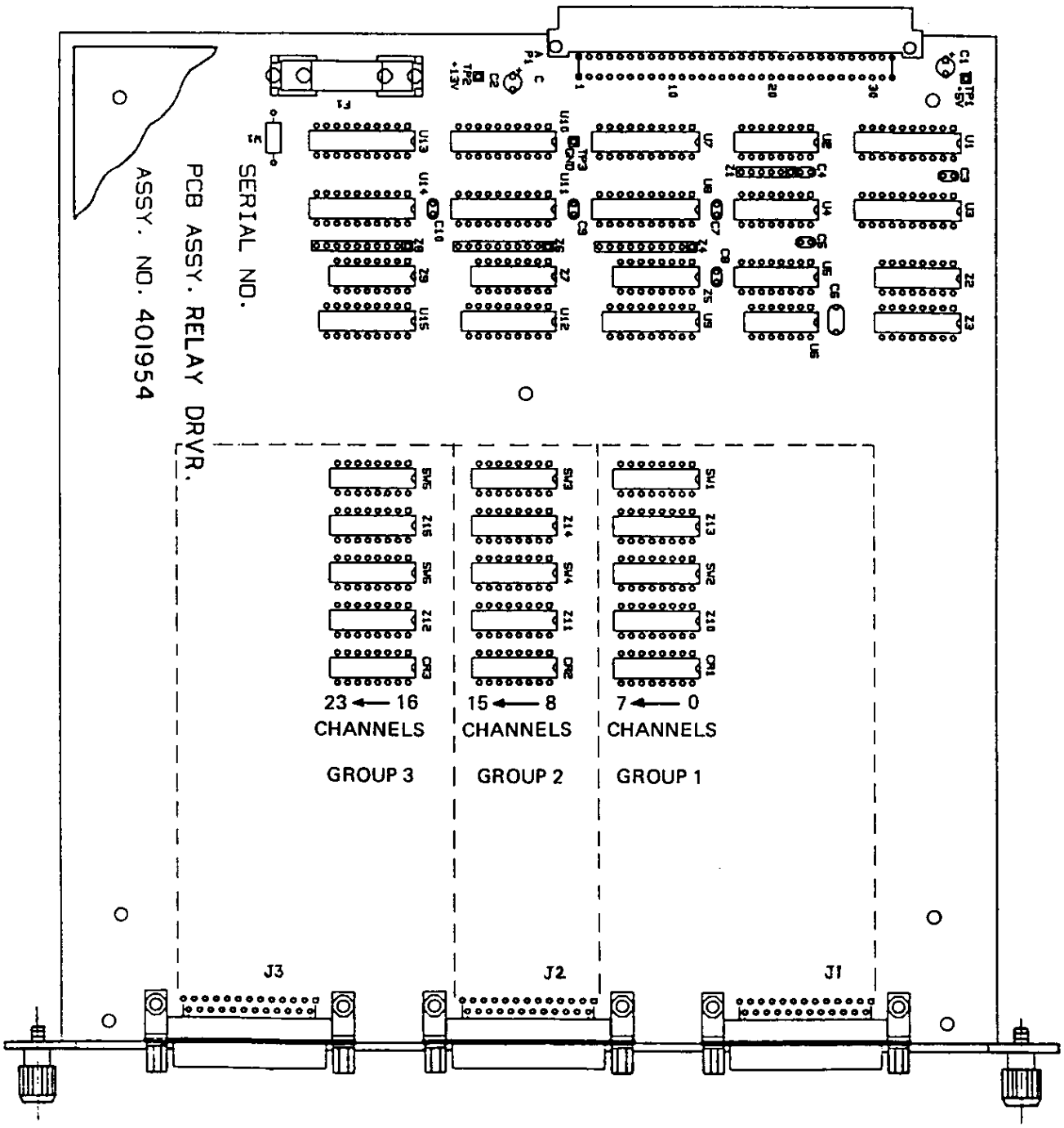


Figure 3-9, 1250-15A Switch Locations

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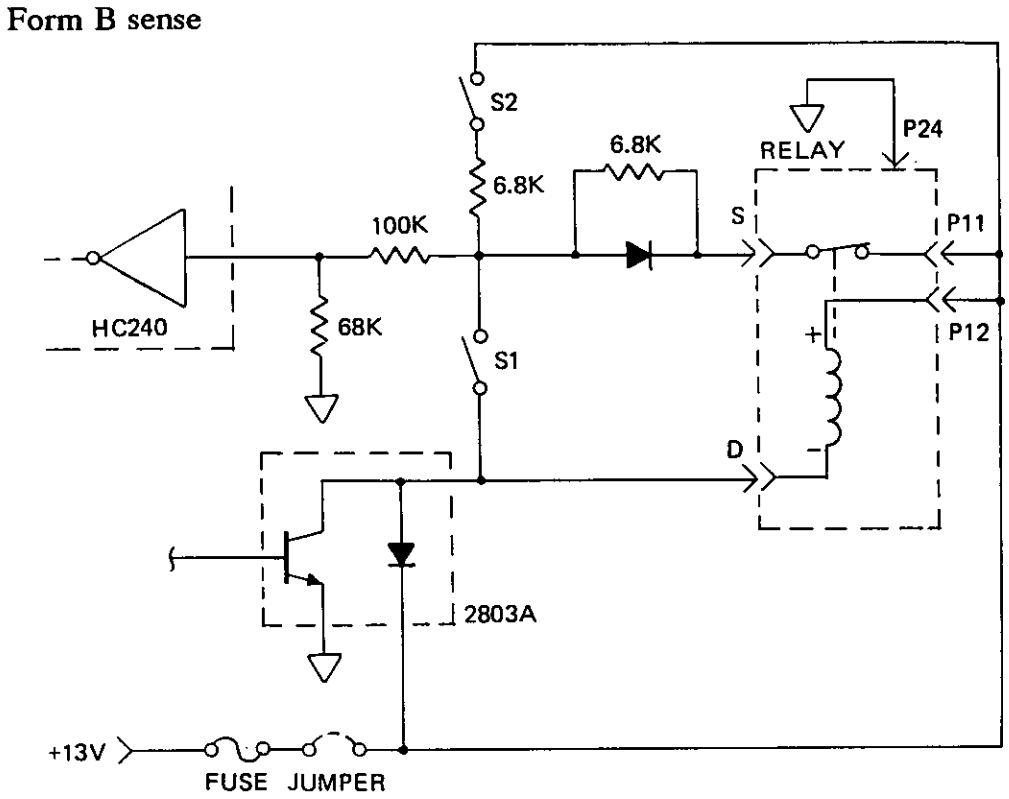


Figure 3-10, 1250-15A Form B Sense

To implement FORM B (normally closed) sensing, set both switches that correspond to the channel to be monitored to the OFF position. For a polarization relay coil, connect the positive side to pin 12 of the corresponding DB25 connector and the negative side of the coil to bin D. Connect the spare contacts of relay to pin 11 and pin S. There is no connection to pin 24.

Refer to Table 3-4 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

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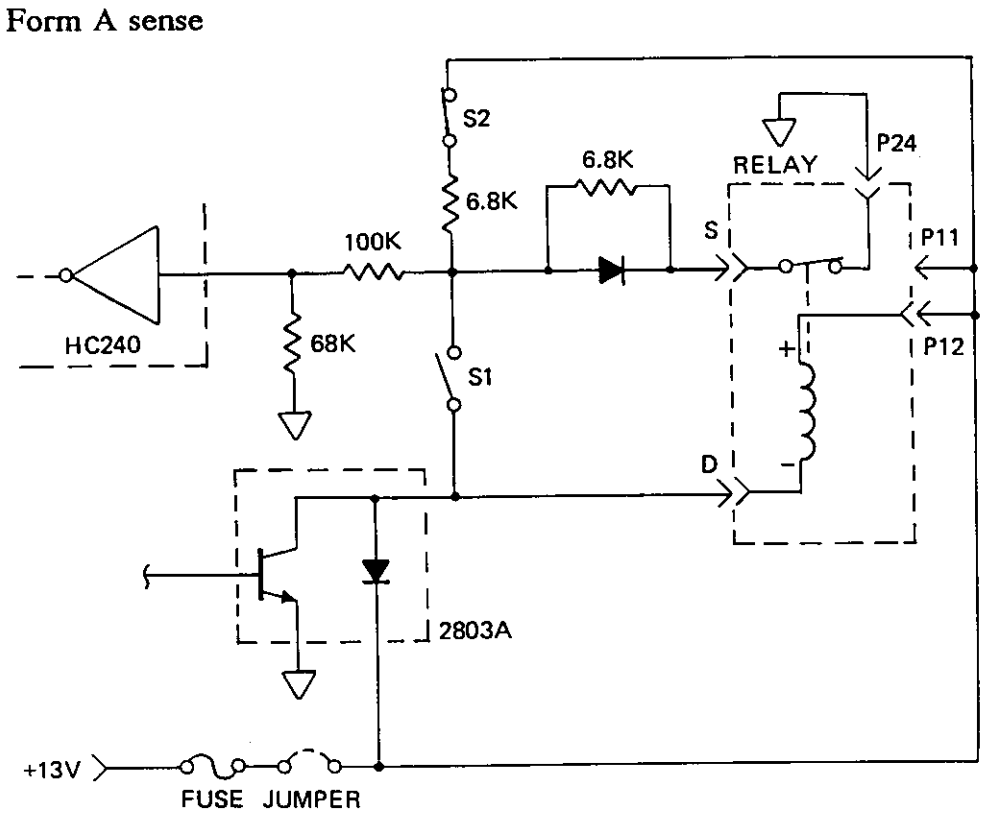


Figure 3-11, 1250-15A Form A Sense

To implement FORM A (normally open) sensing, set switch 1 for that channel to OFF and switch 2 to ON. For a polarization relay coil, connect the positive side to pin 12 of the corresponding DB25 connector and the negative side of the coil to bin D. Connect the spare contacts of the relay to pin 24 and pin S. There is no connection to pin 11.

Refer to Table 3-4 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

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Coil Current Sense

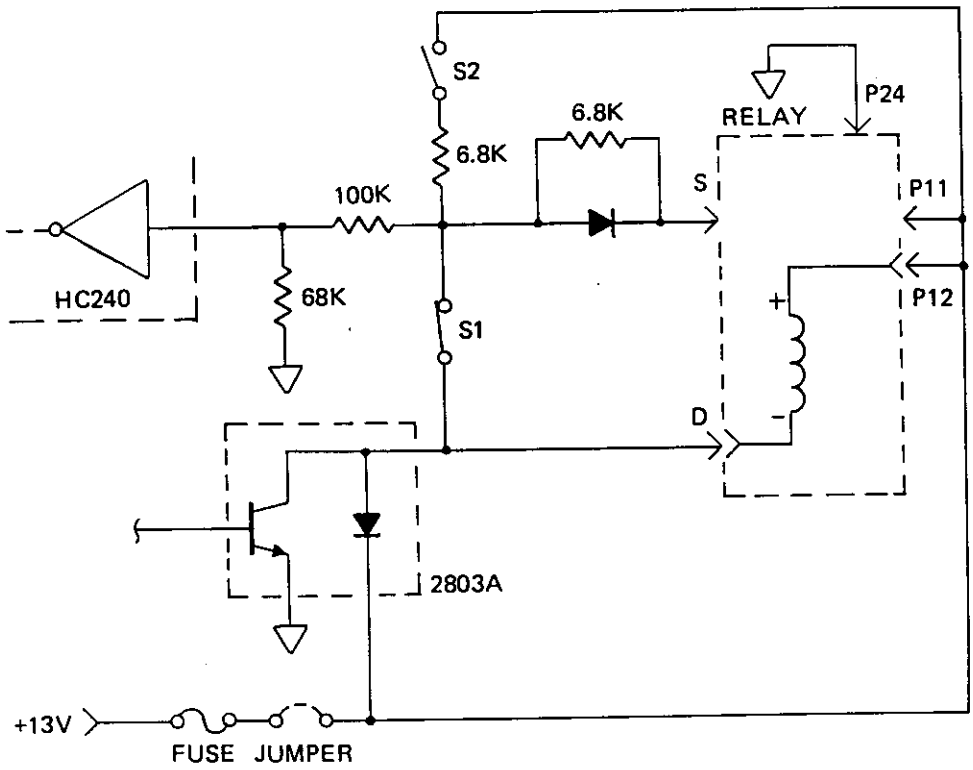


Figure 3-12, 1250-15A Coil Current Sense

To implement Coil current sensing, set switch 1 for that channel to ON and switch 2 to OFF. For a polarization relay coil, connect the positive side to pin 12 of the corresponding DB25 connector and the negative side of the coil to bin D. Connect the spare contacts of the relay to pin 24 and pin S. There is no connection to pin 11.

Refer to Table 3-4 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

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No Relay Sense

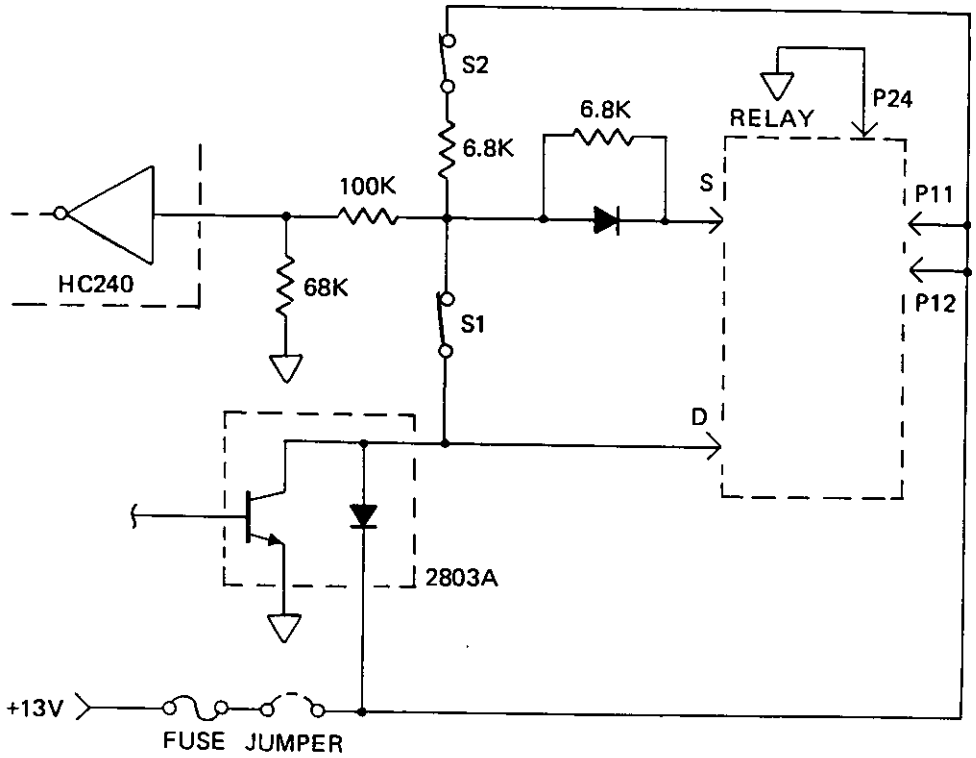


Figure 3-13, 1250-15A No Relay Sense

To implement No Relay sensing, set switch 1 for that channel to ON and switch 2 to ON. There are no connections to pin 11, pin 12, pin 24, pin S, and pin D. This is the default mode for the 1250-15A, and it allows any channel to pass the confidence test with no external connections. All channels not used must be set to this mode to avoid interference with the active channels when the 1250-15A fails the confidence test.

Refer to Table 3-4 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

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Internal and External Power Supply Configuration

The 1250-15A is shipped with jumper W1 installed. This allows the relays on the 1250-15A to draw power from the 1250 internal +13V power supply. If an external power supply is to be used, remove jumper W1 and supply the external power to the 1250-15A through the DB25 connectors as shown below. An external supply may be required when the relays used require a different coil voltage or when the coil currents required are greater than the rated current for the board. Refer to the 1250-15A Specifications for further details.

NOTE

Only one external power supply ca be used on a single board.

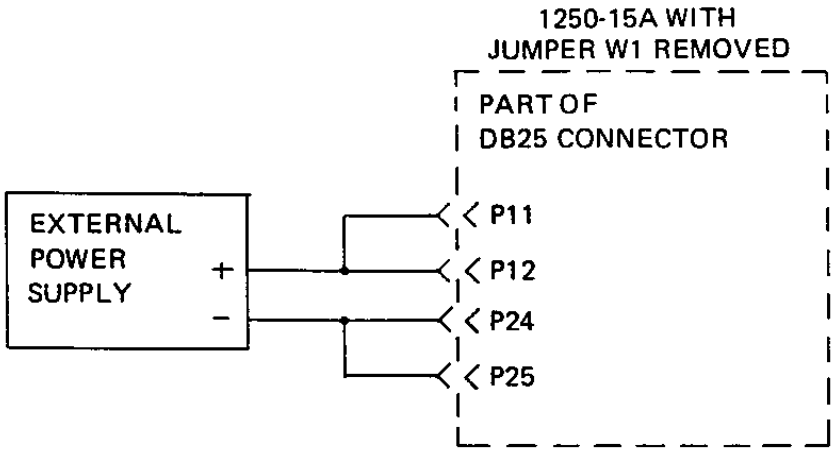


Figure 3-14, 1250-15A Using an External Power Supply

To use an external supply, connect the positive terminal of the supply to pins 11 and 12 of the DB25 connector and the negative terminal to pins 24 and 25.

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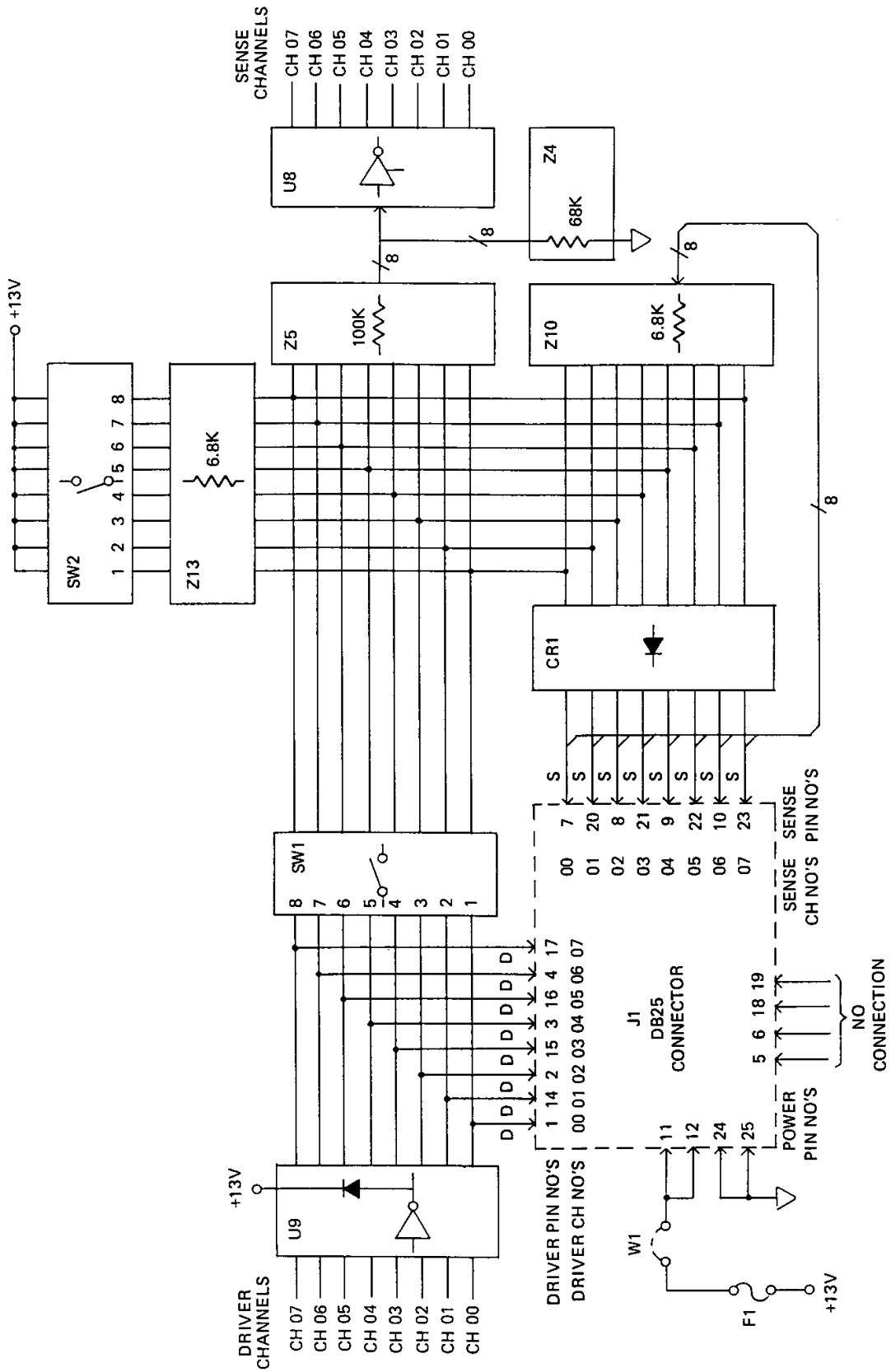


Figure 3-15,1250-15A, Relay Driver Connection Diagram Group 1

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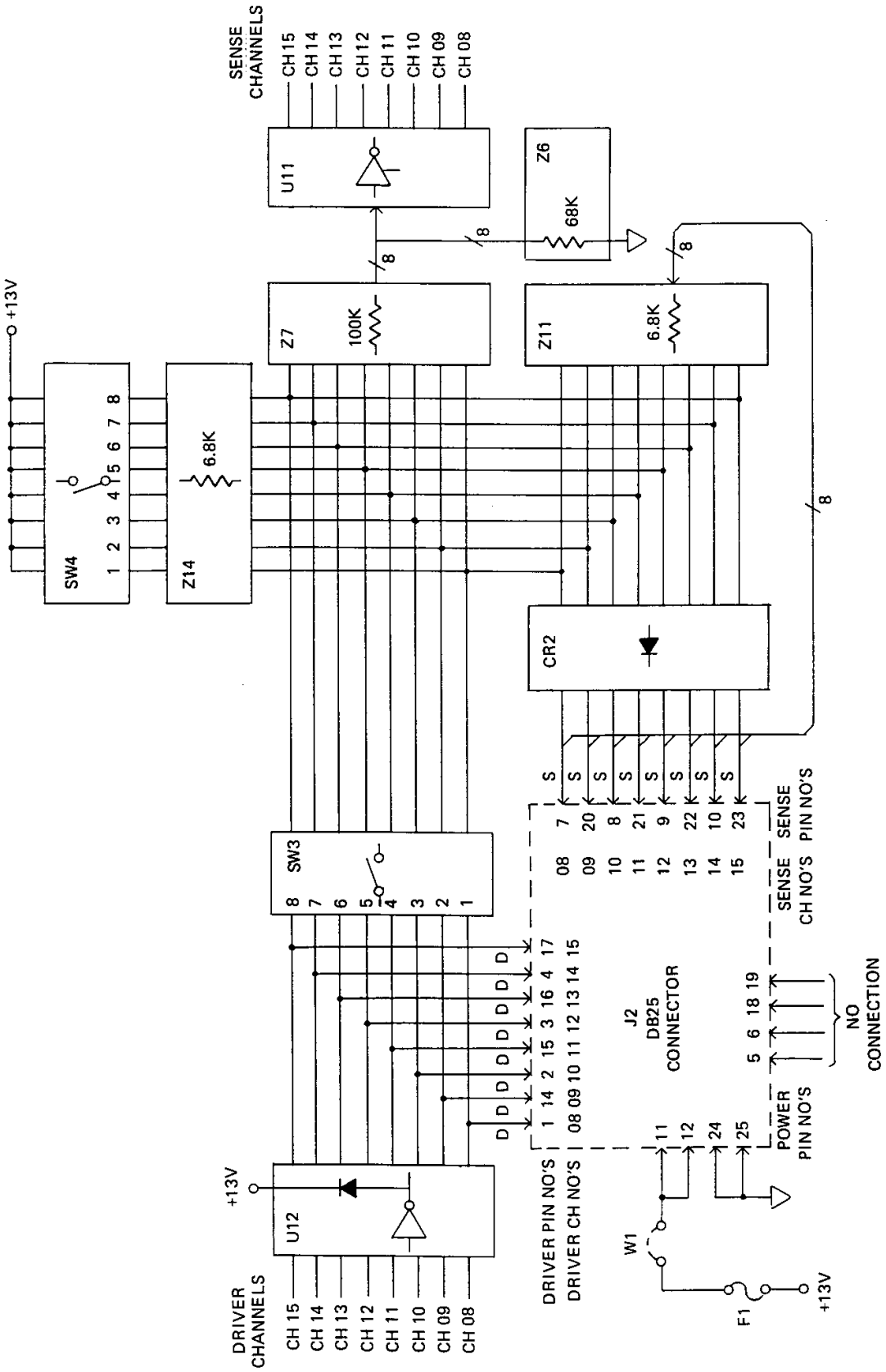


Figure 3-16, 1250-15A Relay Driver Connection Diagram Group 2

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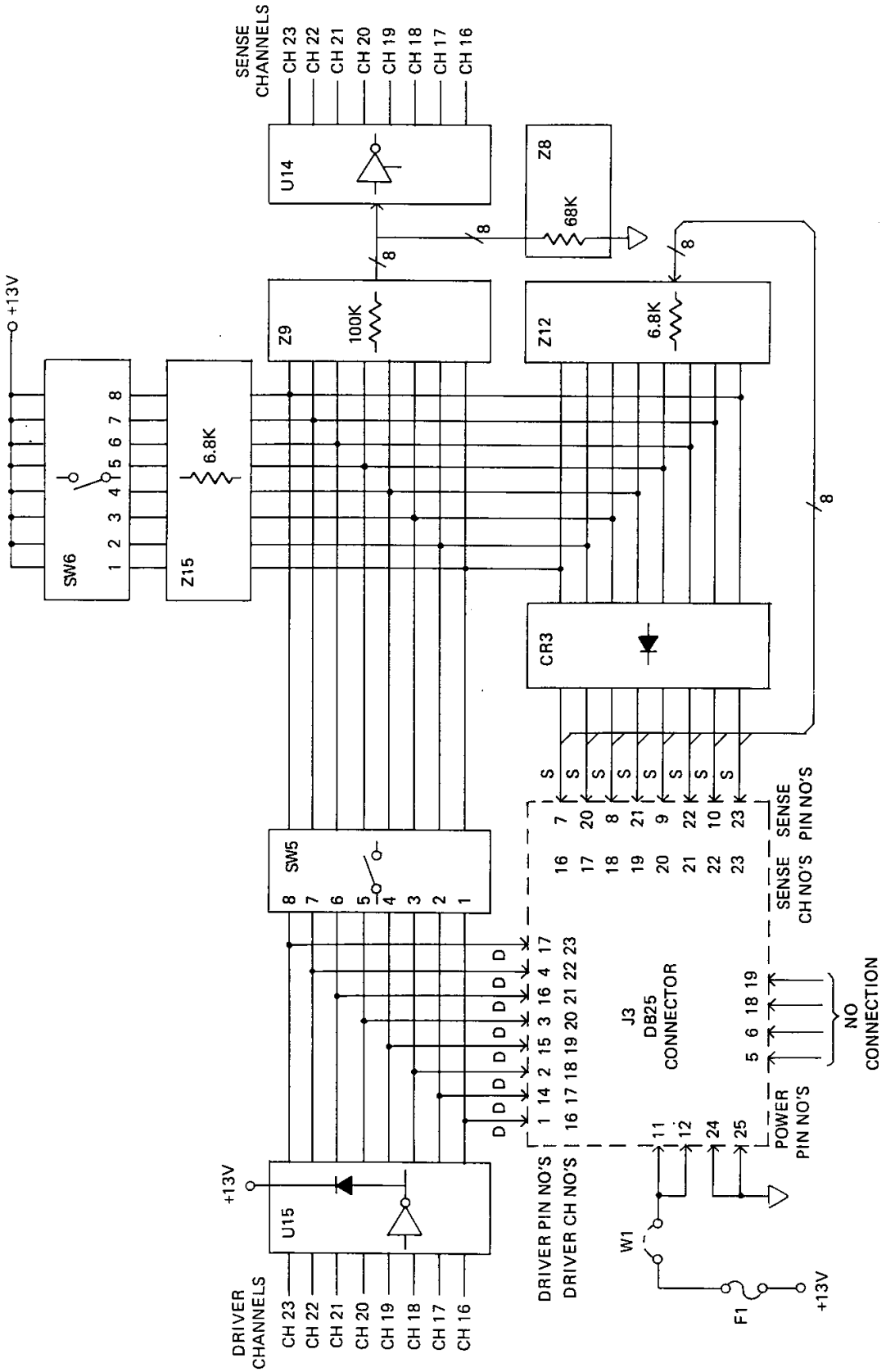


Figure 3-17, 1250-15A Relay Driver Connection Diagram Group 3

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1250-16 High Density Signal Switching Module Specific Syntax

The 1250-16 High Density Signal Switching Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-16 is of the form:

OPEN <slotnumber>.<port>[;<slotnumber>.<port>].....

where <slotnumber> is the 1250 chassis slot that the 1250-16 resides in, value 1 - 5.

<port> is a 12 wire port, each wire of which is to be switched. Any port may be selected as the `common' terminal and each port closed individually, as required. The range of values for <port> is 00 - 05. Note that <port> = 05 connects the 1250-16 to the analog bus.

CAUTION

The analog bus only supports 10 wire operation and so two of the 12 wires switched by the 1250-16 are not connected to the analog bus if port 5 is closed.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-16 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-16 switch module is as follows:

<slotnumber>.1250-16 HIGH DENSITY SIGNAL SWITCHING MODULE

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<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-16 Module is as follows:

<slotnumber>.1250-16 HIGH DENSITY SIGNAL SWITCHING MODULE
<slotnumber>.<port>[,<port>][,<port>].....
<slotnumber>.END

where <port> is 0 - 5 for the 1250-16

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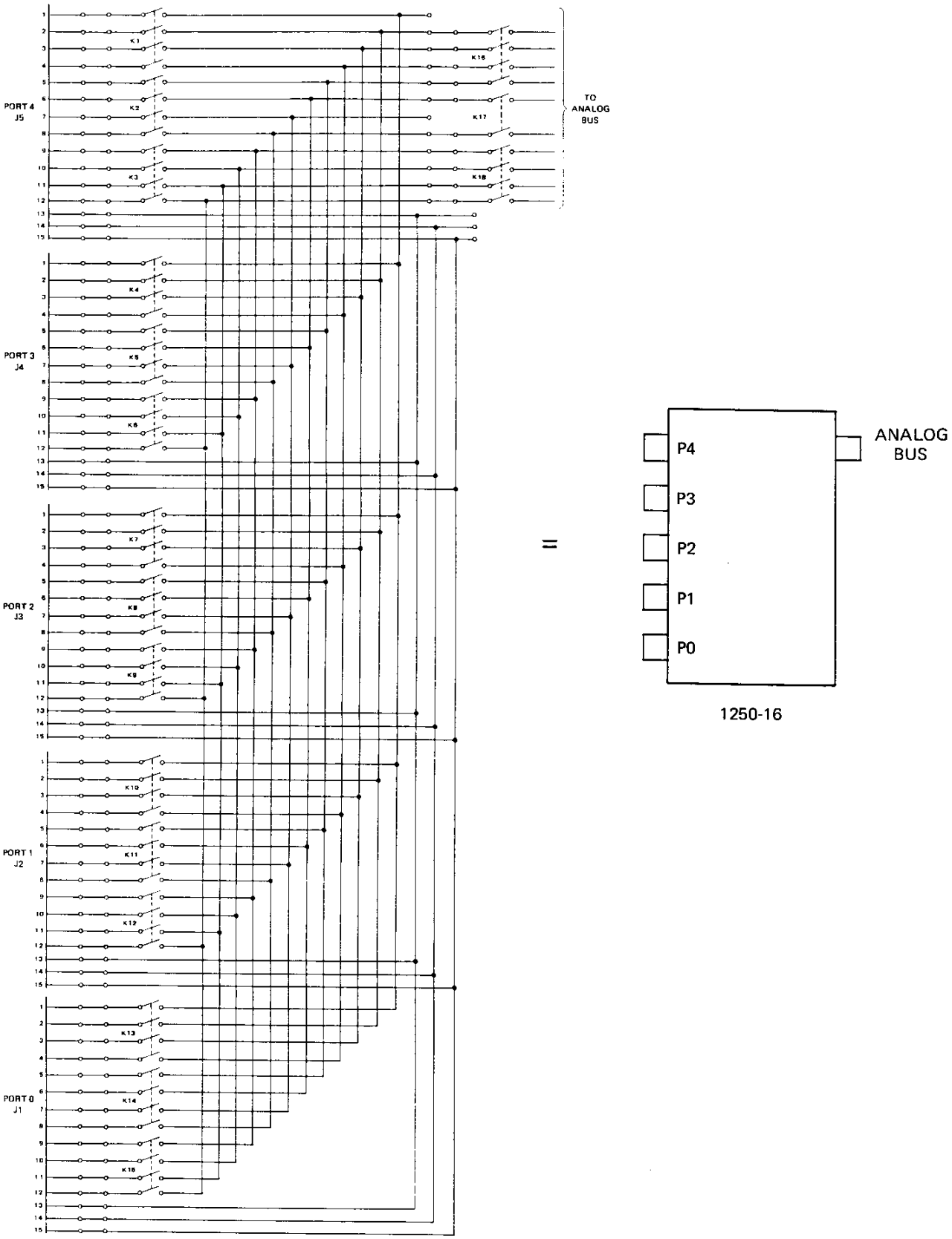


Figure 3-18, Detail A – 1250-16

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1250-20 Relay Power Module Specific Syntax

The 1250-20 Relay Power Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-20 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-20 resides in, value 1 - 5.
<channel> is the reference of a 2 FORM A (2 SPST) relays implemented on the 1250-20. The range of values for <channel> is 0 - 9.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-20 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-20 Relay Power modules are as follows:

<slotnumber>.1250-20 RELAY POWER MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

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The response to the PDATAOUT command for the 1250-20 Relay Power Module is as follows:

<slotnumber>.1250-20 RELAY POWER MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 9 for the 1250-20

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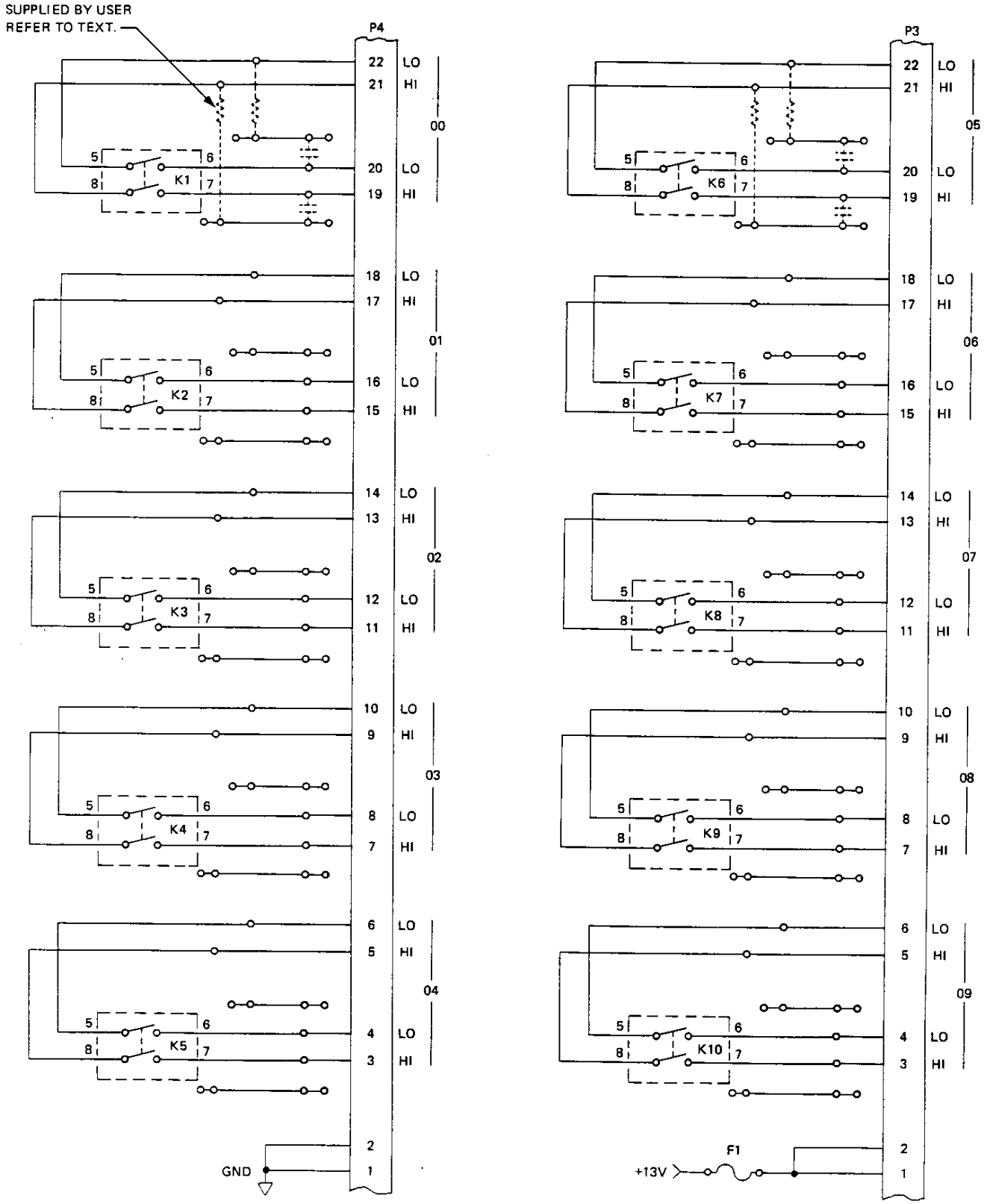


Figure 3-19, 1250-20 Relay Power Module Connection Diagram

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1250-30 Scanner / Multiplexer Module Specific Syntax

The 1250-30 Scanner / Multiplexer Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-30 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-30 resides in, value 1 - 5.
<channel> is the reference of the channel implemented in the 1250-30.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-30 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-30 Scanner/ Multiplexer modules are as follows:

<slotnumber>.1250-30 SCANNER / MULTIPLEXER MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

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where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-30 Scanner / Multiplexer Module is as follows:

<slotnumber>.1250-30 SCANNER / MULTIPLEXER MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 19 for the 1250-30.

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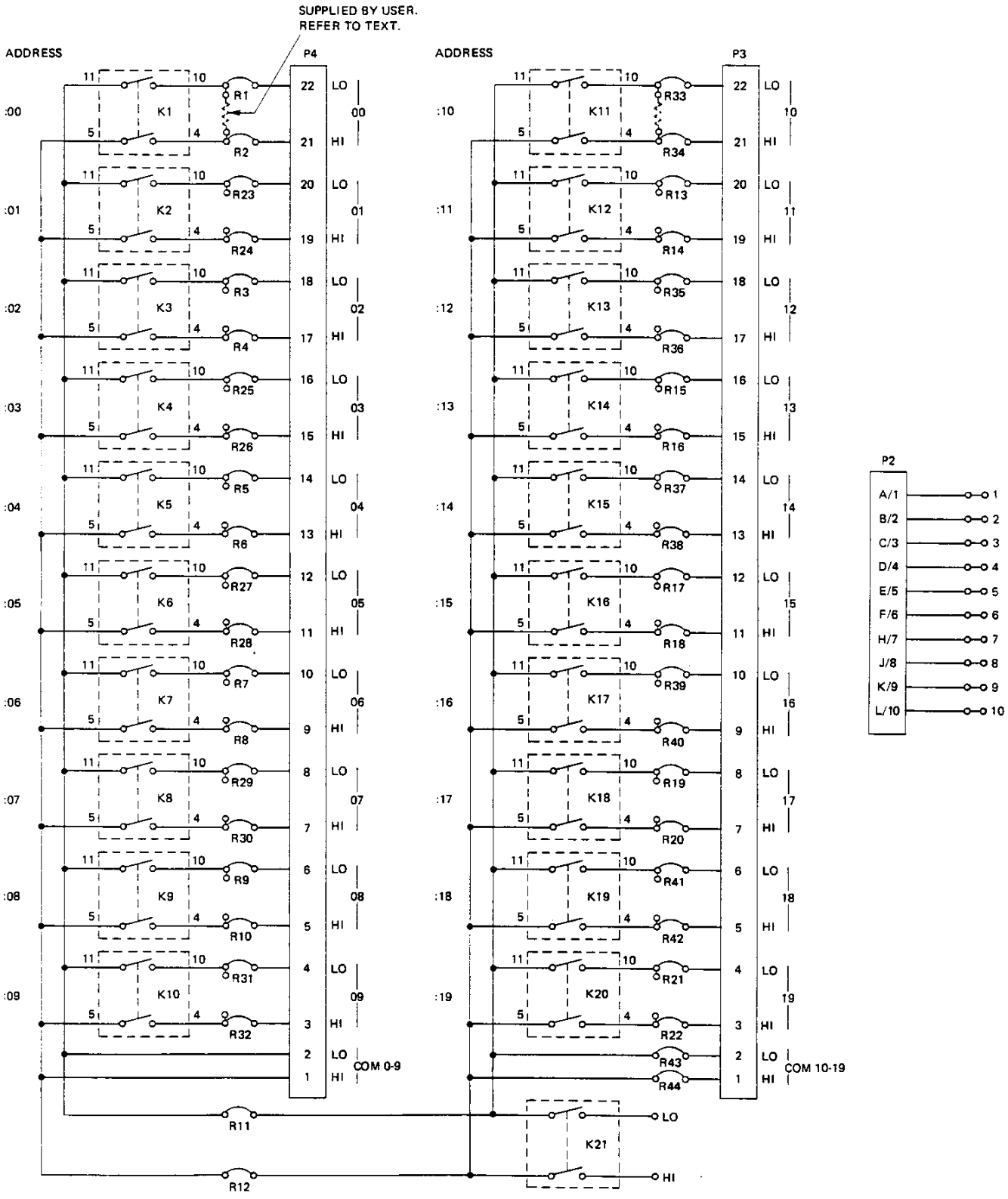


Figure 3-20, 1250-30 Scanner/Multiplexer Connection Diagram

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1250-35 Module Specific Syntax

The 1250-35 supports the OPEN, CLOSE, SETUP, PSETUP, PDATAOUT and RESET commands.

NOTE

The 1250-35 is supported by 1250 operating systems at rev. Levels 14.1 and above.

The module specific syntax for the 1250-35 is divided into three sections. The section to be used is dependant on the configuration implemented for the switching module.

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>;.....]

where <slotnumber> is 1 - 5. It describes the chassis slot that the 1250 Series module is resident in.

<channel> is the reference of the channel to be closed.

In a four wire mode, the range of values for <channel> is 0 - 23.
In a two wire mode, the range of values for <channel> is 0 - 47.
In a one wire mode, the range of values for <channel> is 0 - 95.

The 4, 2, or 1 wire mode of the 1250-35 is set by jumpers on the switching module PCB. To select a particular mode, set jumpers W15 and W16 to connect the jumper pins as follows:

	W15	W16
Four wire	1 to 2	1 to 2
Two wire	2 to 3	1 to 2
One wire	1 to 2	2 to 3

CAUTION

If jumpers W15 and W16 are both set to connect pins 2 to 3, an illegal state occurs and the 1250-35 will default to a four wire mode of operation. The configuration of the 1250-35 is determined by jumper pairs W1 to W14, and so if the hard wired configuration and the mode of operation are in conflict, the overall 1250-35 configuration is indeterminate.

In the one wire mode, the scanner output is always connector J2, Pin N. The inputs selected and deselected by OPEN <channel> and CLOSE <channel> commands are as follows for each value of <channel>:

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Table 3-5,

<channel>	Connector	Pin
0	J1	DD
1	J1	v
2	J1	k
3	J1	a
4	J1	S
5	J1	H
6	J3	DD
7	J3	v
8	J3	k
9	J3	a
10	J3	S
11	J3	H
12	J1	z
13	J1	r
14	J1	e
15	J1	W
16	J1	M
17	J1	C
18	J3	z
19	J3	r
20	J3	e
21	J3	W
22	J3	M
23	J3	C
24	J1	AA
25	J1	s
26	J1	f
27	J1	X
28	J1	N
29	J1	D
30	J3	EE
31	J3	w
32	J3	m
33	J3	b
34	J3	T
35	J3	J
36	J1	EE
37	J1	w
38	J1	m
39	J1	b
40	J1	T
41	J1	J
42	J3	AA
43	J3	s
44	J3	f
45	J3	X

Table 3-5, (Cont)

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<channel>	Connector	Pin
46	J3	N
47	J3	D
48	J1	BB
49	J1	t
50	J1	h
51	J1	Y
52	J1	P
53	J1	E
54	J3	BB
55	J3	t
56	J3	h
57	J3	Y
58	J3	P
59	J3	E
60	J1	x
61	J1	n
62	J1	c
63	J1	U
64	J1	K
65	J1	A
66	J3	x
67	J3	n
68	J3	c
69	J3	U
70	J3	K
71	J3	A
72	J1	y
73	J1	p
74	J1	d
75	J1	V
76	J1	L
77	J1	B
78	J3	CC
79	J3	u
80	J3	j
81	J3	Z
82	J3	R
83	J3	F
84	J1	CC
85	J1	u
86	J1	j
87	J1	Z
88	J1	R
89	J1	F
90	J3	y
91	J3	p
92	J3	d

Table 3-5, (Cont)

<channel>	Connector	Pin

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93	J3	V
94	J3	L
95	J3	B

NOTE

In the One wire mode, channels 0-47 and 48-95 are mutually exclusive if more than one input is to be selected at one time. This is because the 1250-35 uses double pole, double throw relays which are mechanically ganged together and selects between the high and low sides of the relays.

Example: Channel 0 is the high side of K1 and channel 50 is the low side of K3. As the 1250-35 selects between the high and low sides of its relays, it cannot select both high and low sides. Closing channel 0 while channel 95 is closed will result in the selection of the relays high side, which will open channel 95 and close channel 48.

In the two wire modes, there are several scanner outputs available, depending on the configuration selected. Refer to Figure 3-3 for the outputs available in the various two wire configurations. The inputs selected by CLOSE <channel> commands are as follows for each value of <channel>:

Table 3-6,

<channel>	Connector	Pins
0	J1	DD and BB
1	J1	v and t
2	J1	k and h
3	J1	a and Y
4	J1	S and P
5	J1	H and E
6	J3	DD and BB
7	J3	v and t
8	J3	k and h
9	J3	a and Y
10	J3	S and P
11	J3	H and E
12	J1	z and x
13	J1	r and n

Table 3-6 (Cont)

<channel>	Connector	Pins

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14	J1	e and c
15	J1	W and U
16	J1	M and K
17	J1	C and A
18	J3	z and x
19	J3	r and n
20	J3	e and c
21	J3	W and U
22	J3	M and K
23	J3	C and A
24	J1	AA and w
25	J1	s and p
26	J1	f and d
27	J1	X and V
28	J1	N and L
29	J1	D and B
30	J3	EE and CC
31	J3	w and u
32	J3	m and j
33	J3	b and z
34	J3	T and R
35	J3	J and F
36	J1	EE and CC
37	J1	w and u
38	J1	m and j
39	J1	b and Z
40	J1	T and R
41	J1	J and F
42	J3	AA and y
43	J3	s and p
44	J3	f and d
45	J3	X and V
46	J3	N and L
47	J3	D and B

In the four wire modes, there are several scanner outputs available, depending on the configuration selected. Refer to Figure 3-3 for the outputs available in the various four wire configurations. The inputs selected by CLOSE <channel> commands are as follows for each value of <channel>:

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Table 3-7

<channel>	Connector	Pins	Connector	Pins
0	J1	DD and BB	J3	DD and BB
1	J1	v and t	J3	v and t
2	J1	k and h	J3	k and h
3	J1	a and Y	J3	a and Y
4	J1	S and P	J3	S and P
5	J1	H and E	J3	H and E
6	J1	z and x	J3	z and x
7	J1	r and n	J3	r and n
8	J1	e and c	J3	e and c
9	J1	W and U	J3	W and U
10	J1	M and K	J3	M and K
11	J1	C and A	J3	C and A
12	J1	AA and y	J3	EE and CC
13	J1	s and p	J3	w and u
14	J1	f and d	J3	m and j
15	J1	X and V	J3	b and Z
16	J1	N and L	J3	T and R
17	J1	D and B	J3	J and F
18	J1	EE and CC	J3	AA and y
19	J1	w and u	J3	s and p
20	J1	m and j	J3	f and d
21	J1	b and Z	J3	X and V
22	J1	T and R	J3	N and L
23	J1	J and F	J3	D and B

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the relay sequence mode of the 1250-35 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is 1 - 5. It describes the chassis slot that the 1250 Series module is resident in.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

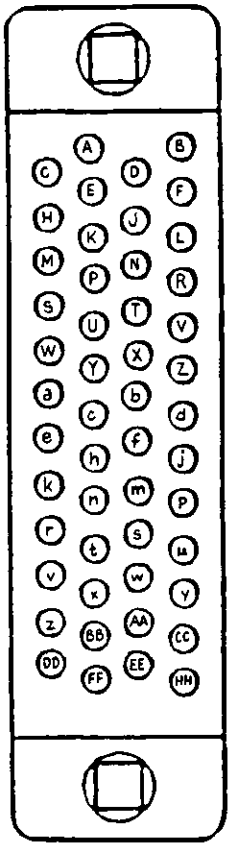
The default value for <seqmode> is BBM.

The PSETUP command causes the specified module setup to be transmitted over the GPIB to the 1250s controller. The syntax used is:

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PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

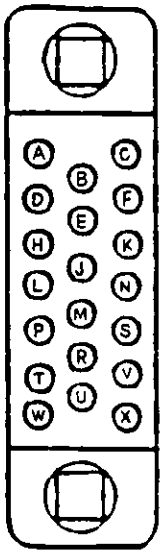
Mating face of female connector or
Rear face of male connector shown



Module Connector
Racal-Dana Part Number 601856-050

J1 and J3 for the 1250-35

Mating Connector is
Racal-Dana Part Number
601855-050, Pins 601857



Module Connector
Racal-Dana Part Number 601856-020

J2 for the 1250-35

Mating Connector is
Racal-Dana Part Number
601855-020, Pins 601857

Figure 3-21, 1250-35 Inputs and Outputs

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1250-35 Configuration Setting

The 1250-35 configuration is set by the addition of jumper wires to the 1250-35 PCB. The following Table gives the jumpers necessary to configure the 1250-35 in all of its configurations. An X indicates that the jumper is to be fitted and an (X) indicates that the jumper is optional, depending on whether access to the Analog bus is required.

Jumper pairs W1 to W14 set the 1250-35 switching topology and moveable jumpers W15 and W16 control the 1250-35 ID byte. This ID byte informs the 1251 whether the 1250-35 is in a 1, 2 or 4 wire configuration

The 1250-35 is despatched from the factory with no jumpers fitted except jumpers W15 and W16, which are both in positions connecting pins 1 to 2. This is the 4 (1 x 6) four wire configuration.

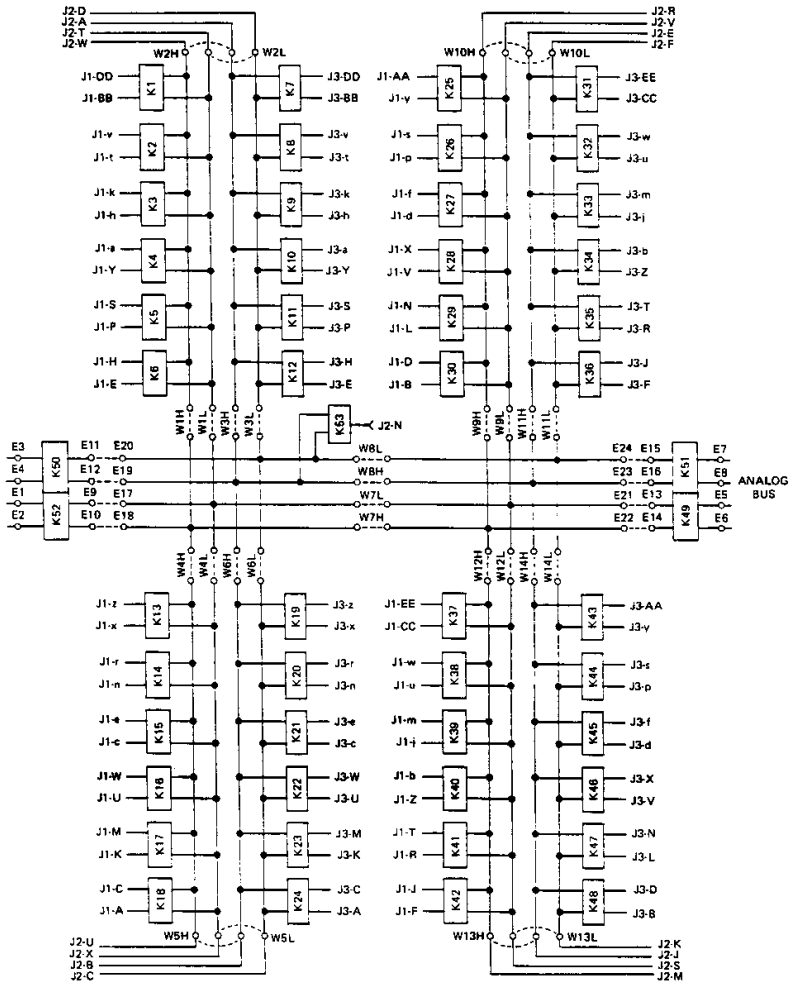


Figure 3-22, 1250-35 Configuration

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Table 3-8

	4(1x6) 4 wire	4(1x12) 2 wire	2(1x12) 4 wire	8(1X6) 2 wire	2(1x24) 2 wire	1(1x24) 4 wire	1(1x48) 2 wire	1(1x96) 1 wire
W1L W1H		(X) (X)	X X		X X	X X	X X	X X
W2L W2H		X X			X X		X X	X X
W3L W3H			X X		X X	X X	X X	X X
W4L W4H			X X		X X	X X	X X	X X
W5L W5H		X X			X X		X X	X X
W6L W6K		(X) (X)	X X		X X	X X	X X	X X
W7L W7H						X X	X X	X X
W8L W8H						X X	X X	X X
W9L W9H		(X) (X)	X X		X X	X X	X X	X X
W10L W10H		X X			X X		X X	X X
W11L W11H			X X		X X	X X	X X	X X
W12L W12H			X X		X X	X X	X X	X X
W13L W13H		X X			X X		X X	X X
W14L W14H		(X) (X)	X X		X X	X X	X X	X X
W15 W16	1 to 2 1 to 2	2 to 3 1 to 2	1 to 2 1 to 2	2 to 3 1 to 2	2 to 3 1 to 2	1 to 2 1 to 2	2 to 3 1 to 2	1 to 2 2 to 3

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Analog Bus Support

The 1250-35 may be configured to access the analog bus by the fitting of jumpers. This access may be via relays or hard wired, depending on the jumpers fitted.

To access the analog bus via relays, fit 24-gauge twisted pairs to the 1250-35 as follows:

E17 to E9 and E18 to E10
E19 to E4 and E20 to E3
E21 to E13 and E22 to E14
E23 to E8 and E24 to E7

To connect and disconnect the 1250-35 to and from the Analog bus, the OPEN and CLOSE commands are used. The values of <channel> used are as follows:

In a four wire mode, <channel> is in the range 24 - 27.
In a two wire mode, <channel> is in the range 48 - 51.
In a one wire mode,<channel> is in the range 96 - 99.

<channel> values 24 - 27, 48 - 51 and 96 - 99 close relays K49 - 52, respectively.

Note that all four relays must be closed to connect the 1250-35 to the Analog bus completely. Each relay connects two wires to the Analog bus. This allows the connection of selected wires to the Analog bus if desired.

To hard wire permanent access to the analog bus, fit 24-gauge jumpers to the 1250-35 as follows:

E17 to E1 and E18 to E2
E19 to E3 and E20 to E4
E21 to E5 and E22 to E6
E23 to E7 and E24 to E8

Note that Analog bus access is not supported in the 4 (1 x 6) four wire configuration. The fitting of jumpers to connect to the analog bus in this configuration would change the configuration of the switching module.

Analog bus access is supported for the 4 (1 x 12) two wire configuration only if the optional jumpers shown in the 1250-35 configuration table are installed. These jumpers are in addition to the jumpers required to access the analog bus as described above.

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1250-35 Performance Enhancements

The 1250-35 path resistance may be reduced and the bandwidth available increased by short circuiting connections to J2 on the 1250-35 EXTERNAL to the 1250-35. These performance improvements arise by connecting used and unused signal paths in parallel. This reduces path resistance and causes what were previously unterminated stubs to become current carrying conductors, which removes the band-limiting effects previously caused by the stubs.

In a four wire mode, short circuit the following pins EXTERNAL to connector J2 for the following configurations:

4(1 x 6):	No jumpers
2(1 x 12):	C and D
	A and B
	T and X
	U and W
	M and R
	S and V
	J and E
	F and K
1(1 x 24):	C, D, F and K
	A, B, J and E
	T, X, V and S
	W, U, R and M

In a two wire mode, short circuit the following pins EXTERNAL to connector J2 for the following configurations:

2(1 x 24):	D, T, X and C	
	A, W, U and B	
	M, J, R and E	
	V, F, K amd S	
4(1 x 12):	A and w	R and E
	D and T	V and F
	U and B	j and M
	X and C	K and S
1(1 x 48):	D, T, X, C, V, F, K and S	
	M, J, R, E, B, U, W and A	

In a one wire mode, short circuit the following pins EXTERNAL to connector J2 for the following configuration:

1 x 96:	D, T, X, C, V, F, K and S
	M, J, R, E, B, U, W and A

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1250-40 Module Specific Syntax

The 1250-40 supports the OPEN, CLOSE, RESET, and PDATAOUT commands.

The Module Specific Syntax for the 1260-40 4 x 5 Signal Matrix module is as follows:

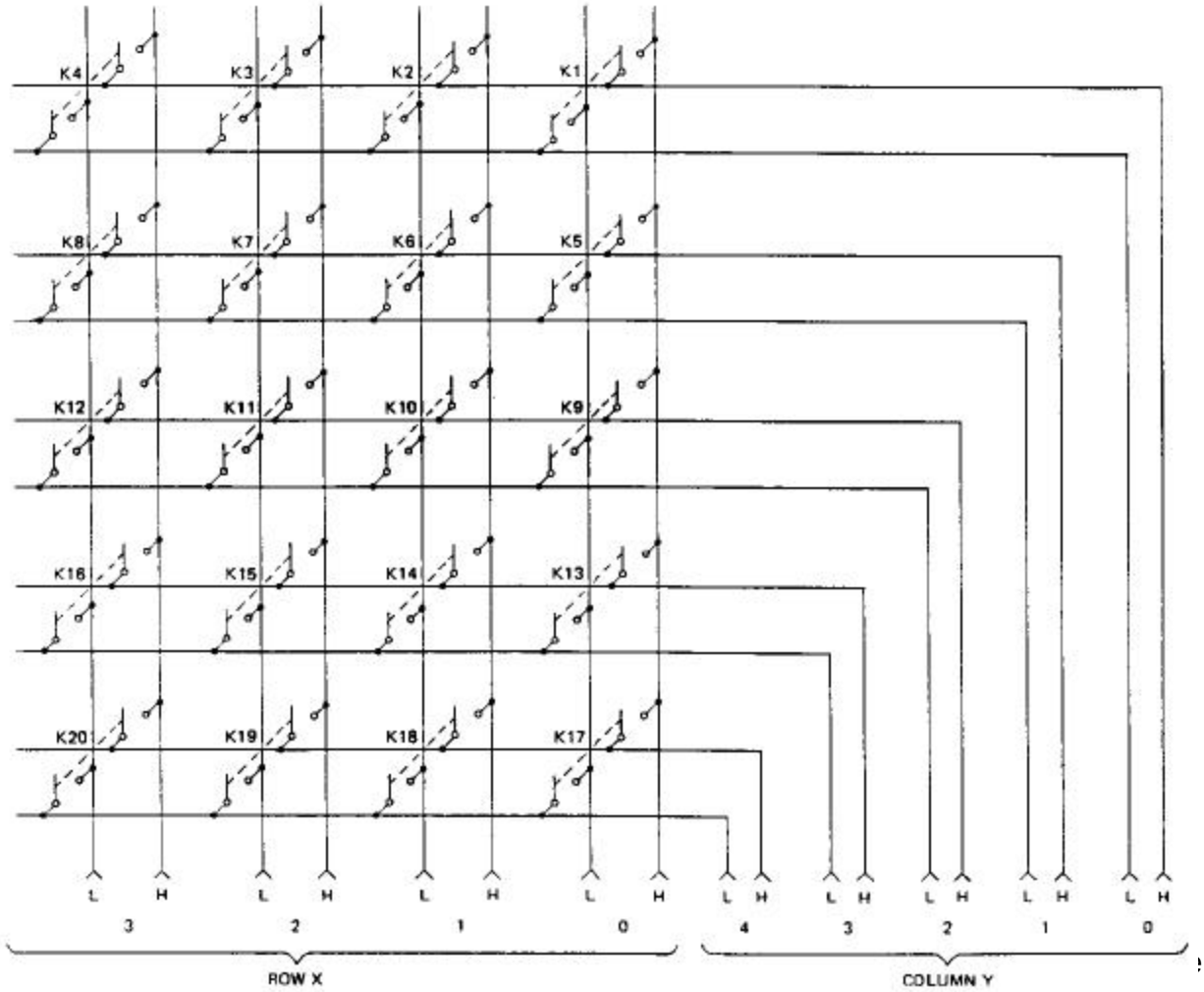
<slotnumber>.<rownumber><columnnumber>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

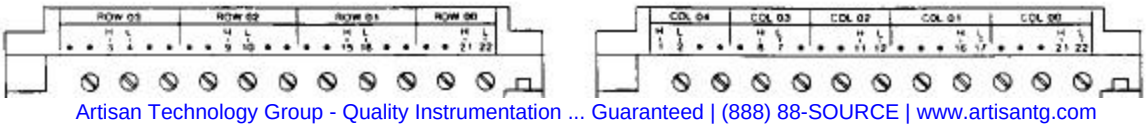
<rownumber> is the matrix row to be connected to <columnnumber>, value 00 through 03.

<columnnumber> is the matrix column to be connected to <rownumber>, value 00 through 04.

The following relay control matrix gives the possible command



1250-40 Signal Matrix Module Simplified Connection Diagram



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<rownumber><columnnumber>-<rownumber><columnnumber>

Example: OPEN 3.0101-0204

This OPEN statement has the same effect as a series of open commands to open all of the connections between rows from 1 through 3 and columns 1 through 4. i.e. connections 0101, 0102, 0103, 0104, 0200, 0201, 0202, 0203 and 0204 are opened.

Figure 3-23, 1250-40 Block Diagram

1250-40B Module Specific Syntax

The 1250-40B supports the OPEN, CLOSE, RESET, and PDATAOUT commands.

The Module Specific Syntax for the 1260-40B 4 x 5 Signal Matrix module is as follows:

<slotnumber>.<rownumber><columnnumber>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<rownumber> is the matrix row to be connected to <columnnumber>, value 00 through 03.

<columnnumber> is the matrix column to be connected to <rownumber>, value 00 through 04.

The following relay control matrix gives the possible command codes used to implement row and column closures for the 1250-40B

		Column number				
	00	01	02	03	04	
	00	0000	0001	0002	0003	0004
Row Number	01	0100	0101	0102	0103	0104
	02	0200	0201	0202	0203	0204
	03	0300	0301	0302	0303	0304
	04	0400	0401	0402	0403	0404

Two digits are required to describe <rownumber> and <columnnumber>. A leading zero is added to both <rownumber> and <columnnumber>.

Example: CLOSE 3.0204

This CLOSE statement will connect row 2 to column 4 on the 1250-40B resident in 1250 slot 3.

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In the case that more than one connection is to be made or broken on the 1260-40B with contiguous rows or columns, then the following format is supported:

<rownumber><columnnumber>-<rownumber><columnnumber>

Example: OPEN 3.0101-0204

This OPEN statement has the same effect as a series of open commands to open all of the connections between rows from 1 through 3 and columns 1 through 4. i.e. connections 0101, 0102, 0103, 0104, 0200, 0201, 0202, 0203 and 0204 are opened.

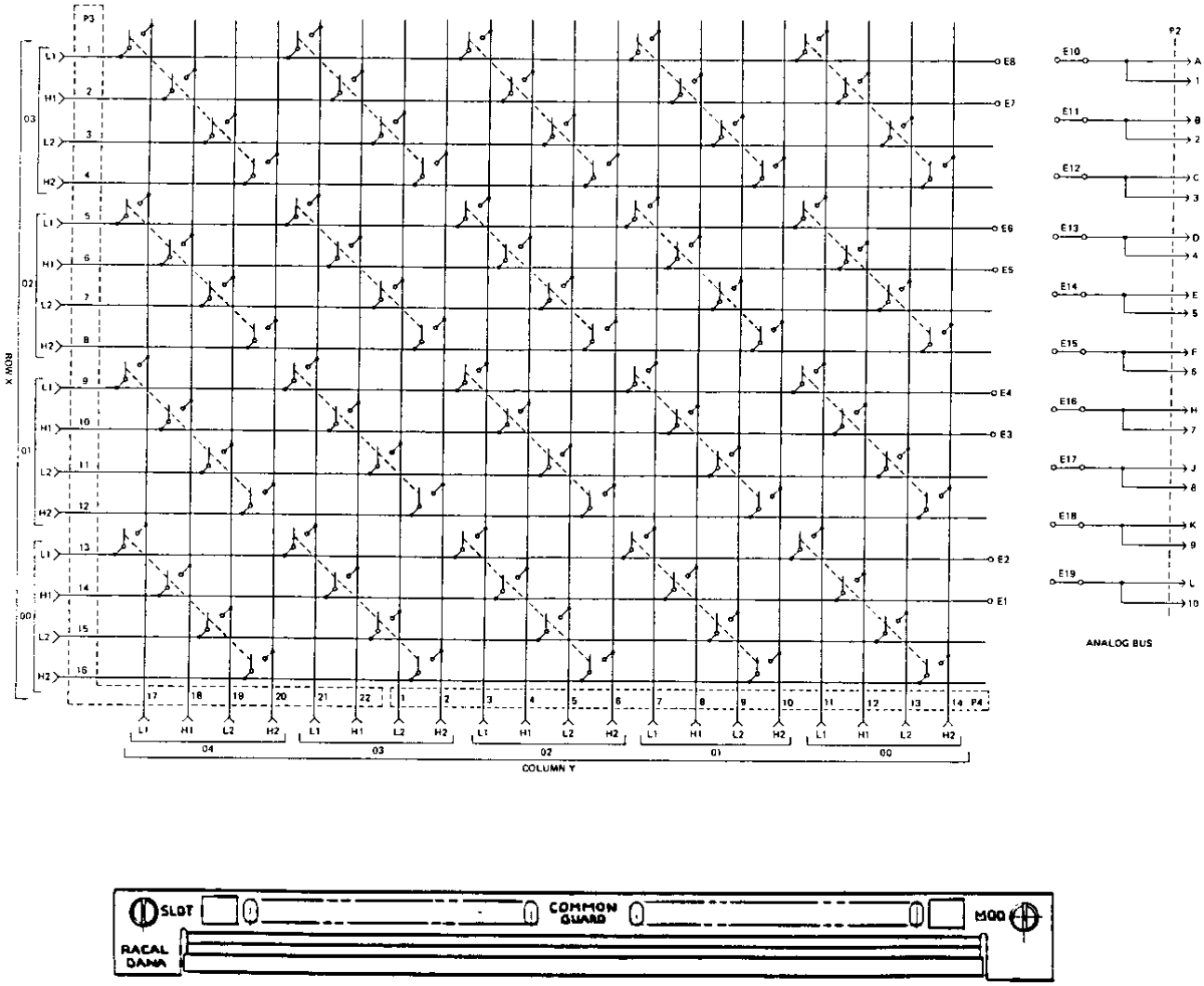


Figure 3-24, 1250-40B Block Diagram

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1250-45 Module Specific Syntax

The 1250-45 supplies a two wire 4x12 signal switching matrix or it may be configured in the factory as two 4x6 matrices, for use at up to 10 MHz.

The 1250-45 supports the OPEN, CLOSE, RESET, and PDATAOUT commands.

The Module Specific Syntax for the 1260-45 4 x 12 Signal Matrix module is as follows:

<slotnumber>.<rownumber><columnnumber>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<rownumber> is the matrix row to be connected to <columnnumber>, value 00 through 03.

<columnnumber> is the matrix column to be connected to <rownumber>, value 00 through 12

Two digits are required to describe <rownumber> and <columnnumber>. A leading zero is added to both <rownumber> and <columnnumber>.

Example: CLOSE 3.0204

This CLOSE statement will connect row 2 to column 4 on the 1250-45 resident in 1250 slot 3.

In the case that more than one connection is to be made or broken on the 1250-45 with contiguous rows or columns, then the following format is supported:

<rownumber><columnnumber>-
<rownumber><columnnumber>

Example: OPEN 3.0101-0204

This OPEN statement has the same effect as a series of open commands to open all of the connections between rows from 1 through 3 and columns 1 through 4. i.e. connections 0101, 0102, 0103, 0104, 0200, 0201, 0202, 0203 and 0204 are opened.

NOTE

To close the relays that connect and disconnect the matrix rows to the analog bus, via column 12, OPEN and CLOSE commands are used. For example, if

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this card were installed in slot 1, CLOSE 1.0012 and OPEN 1.0012 will connect and disconnect the matrix rows to and from the analog bus.

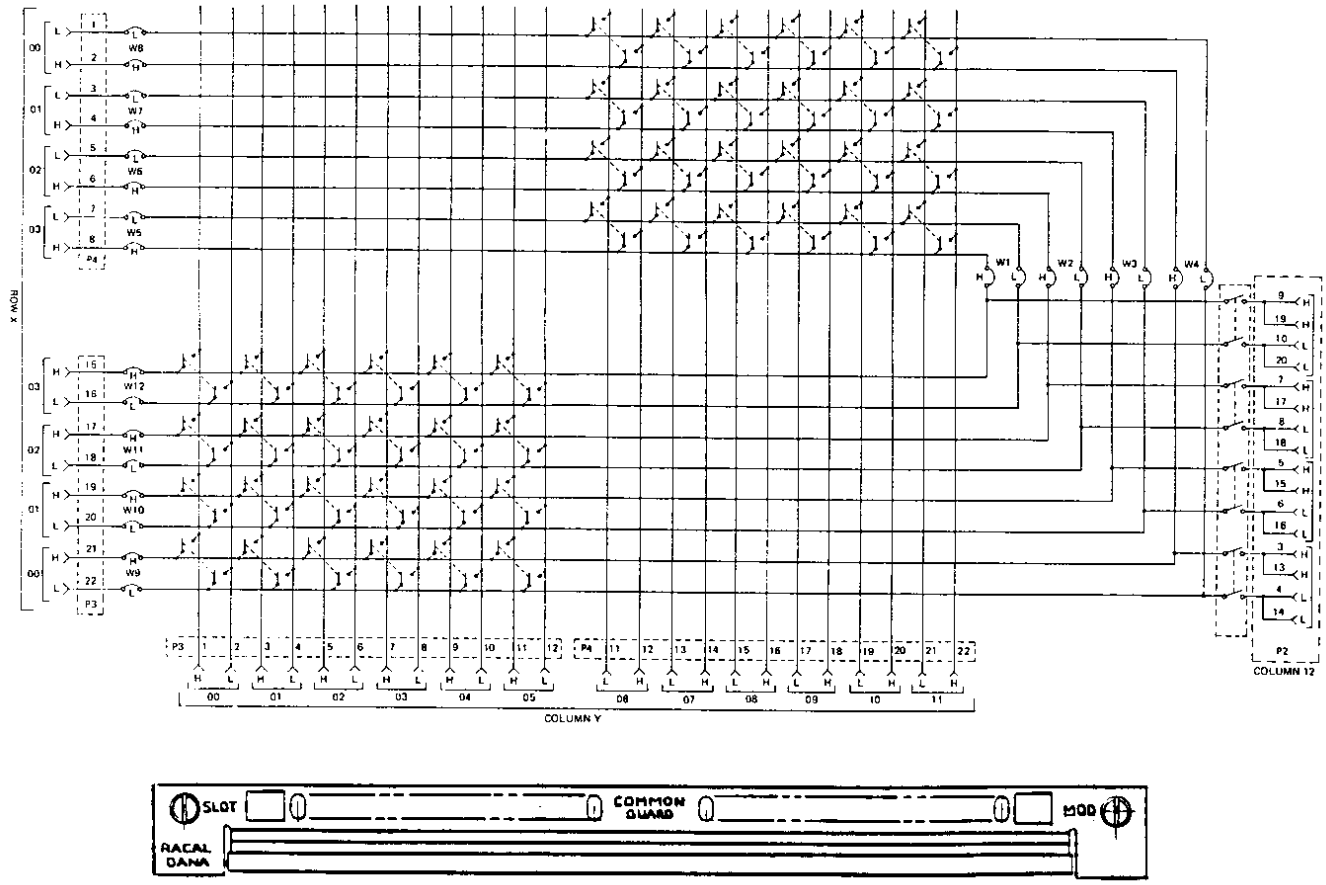


Figure 3-25, 1250-45 Block Diagram

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1250-50, 1250-51A, and 1250-51B, R.F. Multiplexer Module Specific Syntax

The 1250-50, 51A and 51B R.F. multiplexer modules support the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-50, 1250-51A and 1250-51B, R.F. Switch modules is as follows:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>].....

where <channel> is the relay to be closed to connect an input or output to the Common line. Note that two connections at least are required to connect an input to an output. Channels remain closed until opened by an OPEN command. Care must be taken not to leave connections closed if not required, as this may lead to unwanted connections to instruments, etc.

The range of values for <channel> is:

1250-50 and 51B:	00 - 04, 10 - 14, 19, 20 - 24, 30 - 34 and 39
1250-51A:	00 - 04, 10 - 14 and 19

The Module Specific Syntax for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-50, 51A and 51B only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-50, 51A and 51B switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<seqmode>
<slotnumber>.END

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The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching module to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-50, 51A and 51B RF switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<channel>[,<channel>][,<channel>]..
<slotnumber>.END

The range of values for <channel> is:

1250-50 and 51B:	00 - 04, 10 - 14, 19, 20 - 24, 30 - 34 and 39
1250-51A:	00 - 04, 10 - 14 and 19

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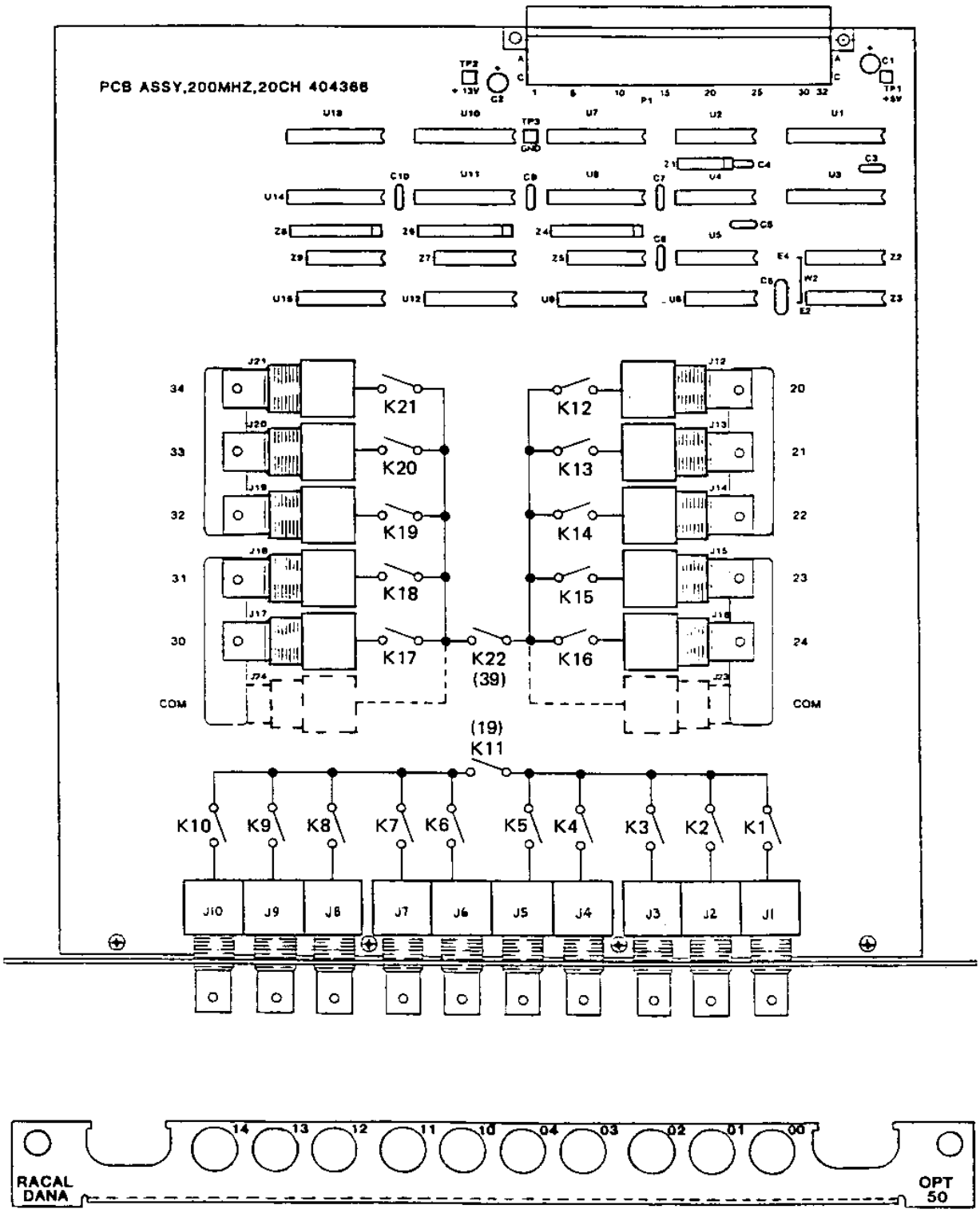


Figure 2-26, 1250-50 Top View

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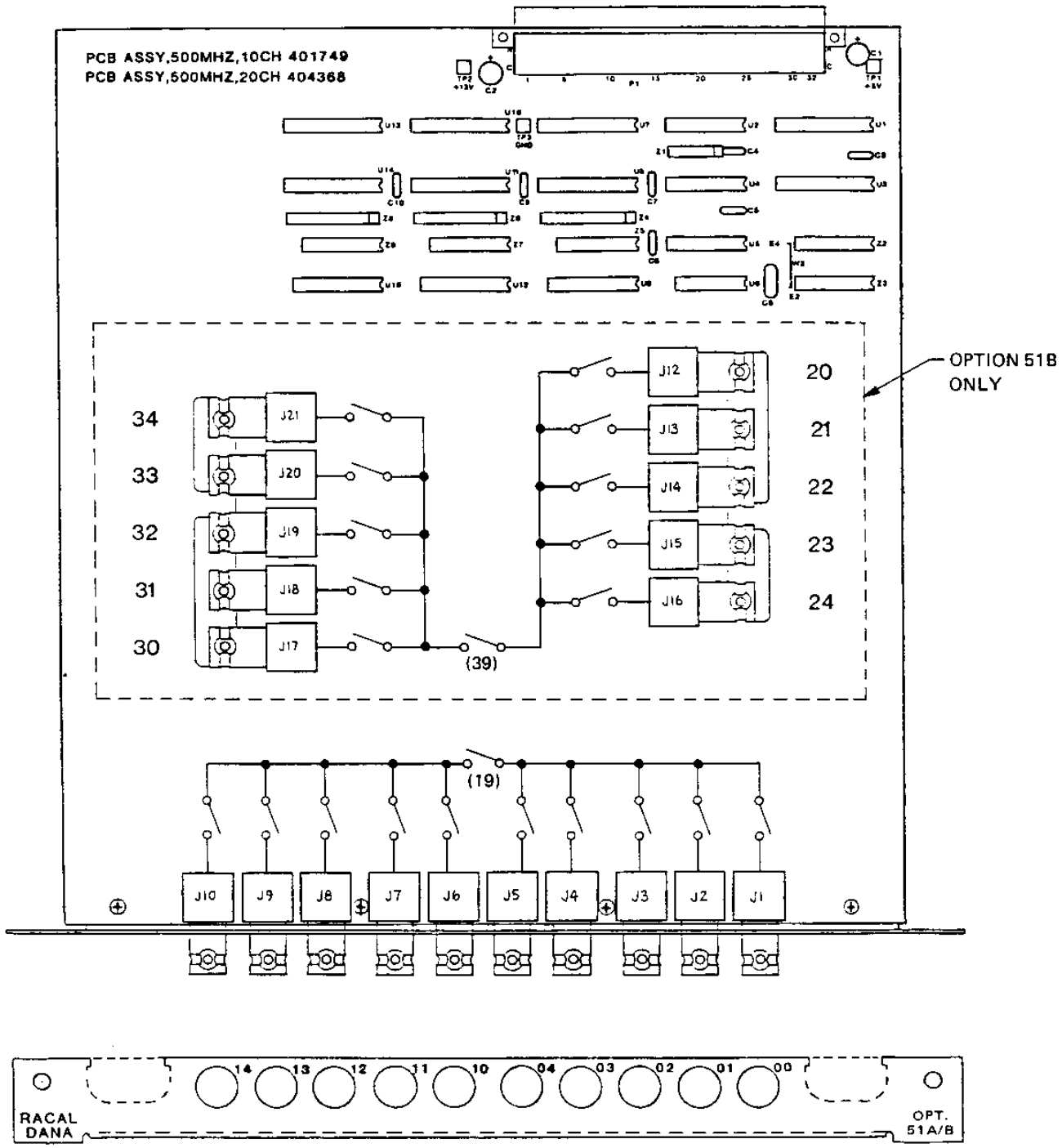


Figure 2-27, 1250-51A/B Top View

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1250-52A and 1250-52B R.F. Multiplexer Module Specific Syntax

The 1250-52A and 1250-52B R.F.Switch modules support the OPEN, CLOSE, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-52A and 1250-52B R.F. Switch modules is as follows:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>].....

where <channel> is the relay to be closed to connect an input to an output.

The range of values for <channel> is:

1250-52A:	00 - 04 and 10 - 14
1250-52B:	00 - 04, 10 - 14, 20 - 24 and 30 - 34

The Module Specific Syntax for the CLOSE command is the same as for the OPEN command. Note that connections to 04, 14, 24 and 34 are connections to a "not connected" pin and any connections in a group are opened. The commands OPEN and CLOSE will both open an existing connection if directed to one of the "not connected" pins.

Connections between input and output are mutually exclusive within a group in the 1250-52 switch modules. A CLOSE command will open an existing connection and close the new connection and an OPEN command will open any existing connection in the group and open circuit the Common connection.

The 1250-52A and 1250-52B are restricted to the Break Before Make sequence mode only.

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-52A and 1250-52B modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>. BBM
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching

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module to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-52A and 52B RF switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

The range of values for <channel> is:

1250-52A:	00 - 04 and 10 - 14
1250-52B:	00 - 04, 10 - 14, 20 - 24 and 30 - 34

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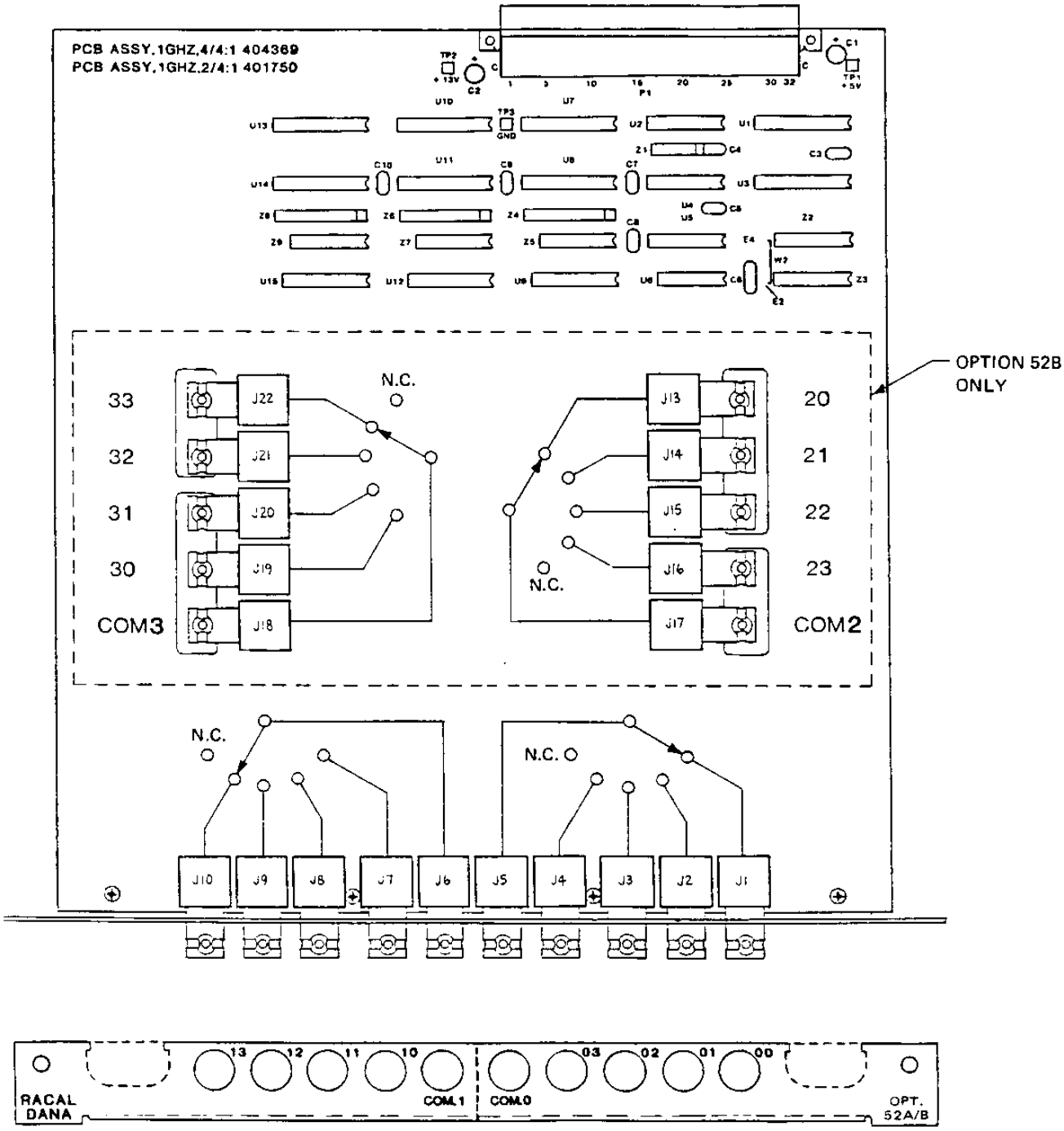


Figure 3-28, 1250-52A/B Top View

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1250-54B and 1250-55B RF Multiplexer Module Specific Syntax

The 1250-54B and 1250-55B R.F. multiplexer support the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-54B and 1250-55B R.F. Multiplexers is as follows:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>].....

where <channel> is the relay to be closed to connect an input to the output. Channels remain closed until opened by an OPEN command.

The range of values for <channel> is:

00 - 03
10 - 13
20 - 23
30 - 33

The Module Specific Syntax for the CLOSE command is the same as for the OPEN command. To connect to a "not connected" pin, open all echannels in a group. The default connection on power-up is a connection to the "not connected" pin in each group.

Connections between input and output are mutually exclusive within a group in the 1250-54B and 1250-55B switch modules. A CLOSE command will open an existing connection and close the new connection and an OPEN command will open any existing connection in the group and open circuit the Common connection.

The 1250-54B and 1250-55B switching modules are restricted to the Break Before Make sequence mode.

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-54B multiplexer is as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.BBM
<slotnumber>.END

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The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching module to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-50, 51A, 51B and 52A RF switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

The range of values for <channel> is:

00 - 03, 10 - 13, 20 - 23 and 30 - 33.

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1250-60 and 1250-61 Microwave Switching Module Specific Syntax

The 1250-60 and 1250-61 support the OPEN, CLOSE, SETUP, PSETUP, PDATAOUT and RESET commands.

The module specific syntax for the 1250-60 and 1250-61 is of the form:

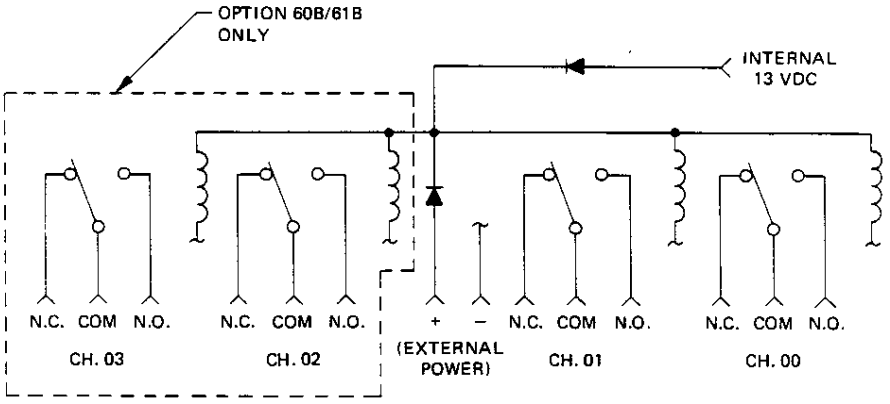
OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-60 and 1250-61 switch modules reside in, value 1 - 5.

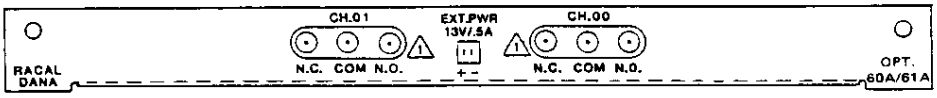
<channel> is the reference of a SPDT relay resident on the switching module. The range of values for <channel> is 0 - 1 for the 1250-60A and 1250-61A, and 0 - 3 for the 1250-60B and 1250-61B.

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-



1250–60A/B and 1250–61A/B Microwave Switching Module Simplified Connection Diagram



1250–60A/61A Rear Panel Connectors Showing Channel Numbering and Connector Placement



1250–60B/61B Rear Panel Connectors Showing Channel Numbering and Connector Placement

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where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-60A/61A MICROWAVE MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END
where <channel> is 0 or 1 for the 1250-60A and 1250-61A.
<slotnumber>.1250-60B/61B MICROWAVE MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0, 1, 2 or 3 for the 1250-60B and 1250-61B.

Figure 3-29, 1250-60 and 1250-61 Block Diagram

1250-65 Latching 18 GHz Microwave Switching Module Specific Syntax

The 1250-65 supports the OPEN, CLOSE, SETUP and PDATAOUT commands.

The module specific syntax for the 1250-65 is of the form:

OPEN <slotnumber> . <channel> [; <slotnumber>. <channel ~...]
where <slotnumber> is the 1250 chassis slot that the 1250-65 module resides in, value 1 - 5.

Note

The 1250-65 occupies two chassis slots, and is configured such that the chassis backplane connector *mates* with the higher numbered slot of the two slots occupied. Care must be taken to use the connect value of <slotnumber> for the 1250-65. For example, if a 1250-65 occupies slots 1 and 2, a value for <slotnumber> of 2 is used.

Note, however, that this constraint is imposed by the physical construction of the 1250-65. The electronics and software of the chassis fully support the use of the full range of values of <slotnumber>. In the event of controlling the 1250-65 via extender cables, any of the chassis backplane slots may be used to drive the card.

<channel> refers to one of four transfer switches residing on the 1250-65. The range of values of <channel> is 0-3. The relationship of each channel number to the transfer switch and front panel connectors reference designations is shown below.

Channel	Associated Transfer Switch	Associated Front

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Number		Panel Connectors
0	K1	J1 - J4
1	K2	J5 - J8
2	K3	J9 - J12
3	K4	J13 - J16

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The OPEN and CLOSE commands determine which of the 2 configurations the transfer switches will be set to. The orientation of the connectors on the 1250-65 module's front panel is shown below.

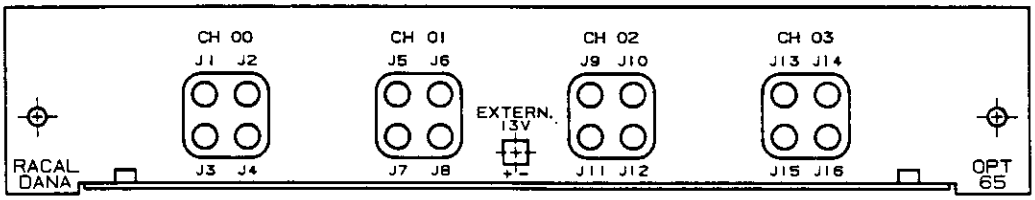


Figure 3-30, Orientation of front panel connectors

The "EXTERN. 13V" on the 1250-65 module's front panel is not used.

The operation of the transfer switches in relation to the module specific syntax for the 1250-65 is as follows:

RESET Command -Execution of the RESET command will cause all of the following configurations:

J1 connected to J2; J3 connected to J4
J5 connected to J6; J7 connected to J8
J9 connected to J10; J11 connected to J12
J13 connected to J14; J15 connected to J16

At power-up the state of the transfer switches on the 1250-65 module will not have changed since the preceeding power down state. But because the transfer switches are latching their state will be unknown to the 1250 chassis. The RESET command can be used to faorce all the switches to a known state.

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CLOSE Command - A CLOSE command specifying the corresponding channel number will cause the following configuration:

Channel Number	Configuration
0	J1 connected to J3;J2 connected to J4
1	J5 connected to J7;J6 connected to J8
2	J9 connected to J11;J10 connected to J12
3	J13 connected to J15;J14 connected to J16

OPEN Command - An OPEN command specifying the corresponding channel number will cause the following configuration:

Channel Number	Configuration
0	J1 connected to J2;J3 connected to J4
1	J5 connected to J6;J7 connected to J8
2	J9 connected to J10;J11 connected to J12
3	J13 connected to J14;J15 connected to J16

NOTE

The latching circuit recovery time of 100 milliseconds given in the specifications for this 1250-65 will limit the time interval between and OPEN or CLOSE command and the next command to a minimum of 100 milliseconds. This is necessary to allow sufficient settling time for the latching circuit (built-in each transfer switch) after an OPEN or CLOSE command.

The SETUP command controls the sequence mode of the 1250-65. The module only supports the break-before-make (BBM) mode, therefor, the module is always set to

BBM.

The PDATAOUT command causes the specified module to transmit the CLOSED state of the transfer switches to the 1250's controller. The syntax used is:

PDATAOUT <slotnumber> [;< slotnumber> ...1

where <slotnumber> is the 1250 chassis slot where the 1250-65 module is as resides in, value 1-5.

The responses to the PDATAOUT command for the 1250-65 module is as follows:

<slotnumber>.1250-65 LATCHING 18 GHZ MICROWAVE SWITCHING MODULE

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<slotnumber> . < channel> [(, or -) <channel>...]
<slotnumber> > .END

where <channel> is the channel number of the 1250-65 module that is currently in the CLOSED state.

Immediately after power-up, the result of a PDATAOUT command will not reflect the actual state of the latching transfer switches. This is because their state' are unknown to the 1250 chassis at power-up. The PUPRCL (Power-Up ReCaL1) command can be used to refresh the 1250 chassis with the previous states of the transfer switches. This can be done as follows:

1. The present states of the transfer switches are stored in non-volatile memory location 1 (This also stores the present states of 11 modules resident in the 1250 chassis).

2. The PUPRCL is turned ON.

3. The 1250 chassis is powered down.

On the next power-up, the states of the transfer switches will not have changed, but the automatic recall of non-volatile memory location 1 will enable the PDATAOUT command to print the actual configuration of the transfer switches (Refer to the section on System Operation for details on the STORE and PUPRCL commands).

1250-750 RF Multiplexer Module Specific Syntax

The 1250-750 RF multiplexer modules support the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The Module Specific Syntax for the 1250-750 RF Switch module is as follows:

OPEN < slotnumber> . <channel> [; < slotnumber> . <channel>]

where <channel> is the relay to be closed to connect an input or output to the Common line. Note that two connections at least are required to connect an input to an output. Channels remain closed until opened by an OPEN command. Care must be taken not to leave connections closed if not required, as this may led to unwanted connections to instruments, etc.

The range of values for < channel> is:

1250-750: 00 - 04, 10 - 14, 19, 20 - 24, 30 - 34 and 39

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The Module Specific Syntax for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-750. The syntax used is:

SETUP < slotnumber> . < seqmode>

where < slotnumber > is the 1250 or 1251 chassis slot the 1250 Series module resides in, value 1 - 5.

<seqmode> is BBM (Break-Before-Make)
MBB (Make-Before-Break)
IMM (Immediate)

The PSETUP command causes the specified module setup to be transmitted to the 1250 or 1251's controller. The syntax used is:

PSETUP < slotnumber> [; < slotnumber>] [; <slotnumber>]

where < slotnumber > is the 1250 or 1251 chassis slot the 1250 Series module resides in, and is in the range 1 - 14 or 112, depending on the number of chassis slaved to the master.

The responses to the PSETUP command for the *1250-750* switch module is as follows:

<slotnumber>. 1250-NN < MODULE NAME>
<slotnumber> . < seqmode>
<slotnumber> . END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching module to the 1250 or 1251 controller. The syntax used is:

PDATAOUT < slotnumber> [; < slotnumber>] [; <slotnumber>]

where < slotnumber > is the 1250/1251 chassis slot the 1250 Series module resides in, and is in the range 1 - 14 or 112, depending on the number of chassis slaved to the master.

The responses to the PDATAOUT command for the 1250-750 RF switch module is as follows:

<slotnumber>. *1250-NN* < MODULE NAME>
<slotnumber> . <channel> [, < channel>] [, < channel>]
<slotnumber> . END

The range of values for < channel> is:

1250-750: 00 - 04, 10 - 14, 19, 20 - 24, 30 - 34 and 39

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Local Control

Introduction

Local control of the 1250 is only available through the use of the Intelligent front panel, Option 90. This option allows the operator to control all 1250 functions from the front panel using keystrokes similar in format to the GPIB commands used to control the 1250.

1250 Intelligent Front Panel (Option 90)

Refer to Figure 3-31 for an illustration of the 1250 Intelligent Front Panel (Option 90) and to Table 3-9 for descriptions of the features of the 1250 Intelligent Front Panel.

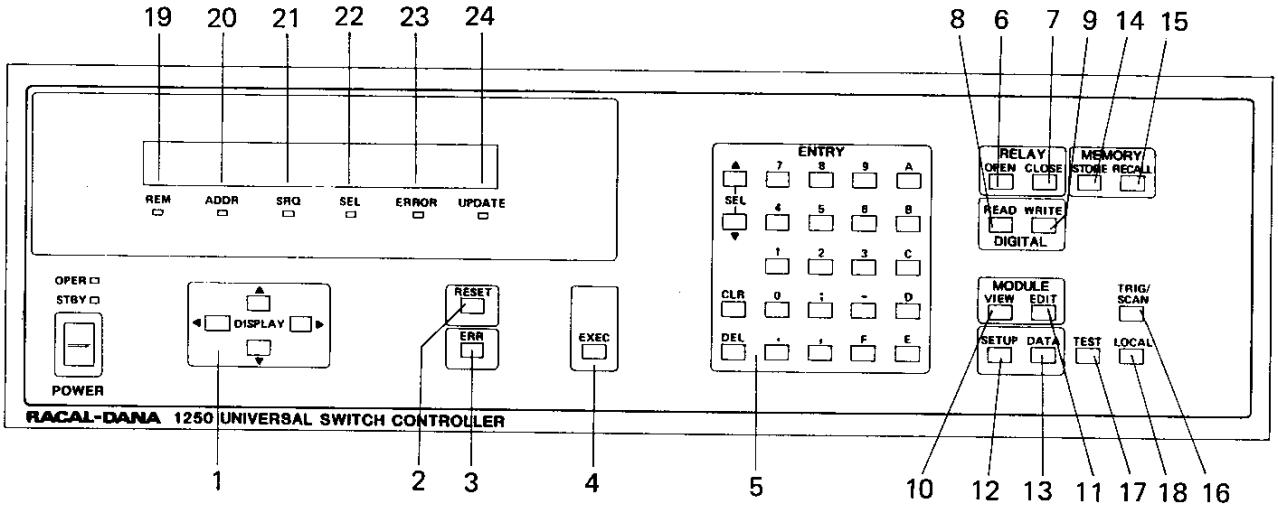


Figure 3-31, 1250 Intelligent Front Panel

Table 3-9, 1250 Intelligent Front Panel Features

Reference	Description
1	Display keys. These four keys are used to scroll the 1250 display UP, DOWN, LEFT or RIGHT, when it is necessary to view more information than may be displayed at one time. The information to be viewed may be more than the 16 character LED display can show or may be contained in more than one line, requiring the use of these keys. The direction of scrolling that each key causes is as marked on the front panel with arrows.

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2	RESET key. This key, when used with the EXEC key, causes the 1250 to return to its home state and to open all channel closures. All slot 0 settings are lost except the power up recall.
3	ERR (Error) key. This key causes any errors that have occurred to be displayed on the 1250 front panel display. The error message is of the form ERROR X.YY where X is the slot number associated with the error, value 0 - 5 (slot 0 is the mainframe) or XX if the error is not associated with a particular slot. YY is a two digit decimal number detailing the error. Refer to the YERR section in the Device Dependant Command Codes on page 3-17 for a listing of all error codes. The error is displayed while the ERR key is depressed and remains in the system until cleared by the CLR key or the 1250 is RESET.
4	EXEC (Execute) key. This key is used to cause the 1250 to carry out the commands associated with the different keys on the front panel after the keys selected are used.
5	Entry keys. These keys are used to enter data for use with the various command keys. The . and - keys are used to enter the delimiters required by the various command keys. The SEL keys are used to select between the various option available for the 1250 Series modules setups. The CLR key clears the current display, clears reported errors and returns the 1250 display to the power up condition. It also clears any commands entered since the last use of the EXEC key. The DEL key is used to delete the last data entry made, one character at a time, starting with the most recently entered.
6	OPEN key. This key is used to command the opening of previously closed 1250 Series switching module relays. Note that each switching module requires different descriptors for the command to be implemented.
7	CLOSE key. This key is used to command the closing of previously open 1250 Series switching module relays. Note that each switching module requires different descriptors for the command to be implemented.
8	READ key. This key is used to read digital data from the 1250 Series boards that support digital I/O operations.
9	WRITE key. This key is used to write digital data to the 1250 Series boards that support digital I/O operations.
10	VIEW key. This key is used to examine the operating conditions (setup or specific module data) used in the 1250 Series modules fitted to the 1250 and for the 1250 itself. Use with the SETUP and DATA keys and a numeric specifier that defines the slot to be viewed.
11	EDIT key. This key is used to change the operating conditions (setup or specific module data) used in the 1250 Series modules fitted to the 1250 and for the 1250 mainframe. Use with the SETUP key and a numeric specifier that defines the slot to be edited.

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12	SETUP key. This key specifies the type of information to be viewed in the 1250. Use with the VIEW and EDIT keys.
13	DATA key. This key specifies the type of information to be viewed. Use with the VIEW key.
14	STORE key. This key is used to store switch settings for all relay modules fitted to the 1250 in non-volatile memory.
15	RECALL key. This key is used to recall switch settings for all switch modules fitted to the 1250 from non-volatile memory.
16	TRIG / SCAN key. This key causes the 1250 to execute the next switch closure described in the scan list and open the previous switch closure if the scan mode is active.
17	TEST key. This key allows the operator to carry out the five 1250 self tests. Used with the entry keys.
18	LOCAL key. This key returns the 1250 to the GPIB local mode if it is in the remote mode. The 1250 will also display the power on SRQ status of the 1250 and the GPIB address.
19	REM LED. This LED lights to show that the 1250 is in the GPIB remote mode.
20	ADDR LED. This LED lights to show that the 1250 is addressed over the GPIB.
21	SRQ LED. This LED lights to show that the 1250 has asserted the GPIB SRQ line.
22	SEL LED. This LED lights to show that the SEL keys should be used.
23	ERROR LED. This LED lights to show that an error has occurred and that the ERR key should be used to determine the error reported. The LED remains lit until the CLR or RESET key is used.
24	UPDATE LED. This LED lights when one of the front panel keys is pressed or when commands are issued over the GPIB.

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Local Operation

Introduction

This section provides the information necessary to operate the 1250 using Option 90, the Intelligent front panel. As each 1250 Series switching module has a different configuration, different keystrokes are required to control the different modules. The keystrokes required are given in the section on Module Specific Syntax and are the same as the syntax used in the command codes used for remote control of the switch modules.

A close correspondence between the command codes used in the remote control of the 1250 and the keystrokes used to control it locally exists. It is recommended that the user be familiar with these command codes before operating the 1250 locally.

In general, each command is entered by pressing the front panel key that defines the type of operation to be performed, entering the data that defines the specific actions to be carried out and then carrying out the command by pressing the EXEC key. No action is taken by the 1250 until the EXEC key is pressed.

OPEN and CLOSE keys

The two main keys used to control the 1250 Series switch modules are the OPEN and CLOSE keys. Pressing either key causes the command to appear in the 1250 display. The 1250 then waits for the relay paths to be opened or closed to be specified. The details of the path to be opened or closed are entered from the front panel entry keys. The various paths that each 1250 Series switching module can implement are detailed in the section on Module Specific Syntax.

More than one path opening or closure may be carried out by concatenating the module specific commands with the semi-colon key. The two operations cannot be mixed.

All paths must be individually opened or closed. Existing path openings or closures are not affected by subsequent commands.

Example 1: To close a connection between row 02 and column 03 and row 04 and column 05 on a 1250-40 Matrix module in chassis slot 2 and close path 3 on a 1250-60B Microwave Switching module in chassis slot 4 with one command, enter the following keystrokes.

CLOSE 2 . 0 2 0 3 ; 2 . 0 3 0 4 ; 4 . 3 EXEC

Example 2: To open channel 8 on a 1250-12 Relay Actuator

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module in chassis slot 3, enter the following keystrokes:

OPEN 3 . 8

READ and WRITE keys

The READ and WRITE keys are used to transfer digital data to and from the 1250-10 and 1250-14 modules. The data is entered in binary weighted decimal form from the front panel entry keys.

To write digital data out to a module, the WRITE key is used, along with the data entry keys. The module specific syntax required is <slotnumber>.<portnumber>,<data> as described in the section on Device Dependant Command Codes.

To READ data back from a port, the READ key is used, along with the data entry keys. The module specific syntax required is <slotnumber>.<portnumber> as described in the section on Device Dependant Command Codes.

NOTE

The format of the data returned from a Digital I/O Module varies according to the I/O port read. Ports 1 and 2 return the data in a binary weighted decimal form and port 2 returns the data in 2s complement form.

More than one READ or WRITE command may be entered at a time by concatenating the module specific syntaxes together with semi-colons (;).

The results of a READ operation are obtained by the use of the VIEW and DATA keys. If the 1250 is in the VIEW DATA mode for the slot containing the Digital I/O module, the slot number, port selected and data obtained from the READ operation is displayed on the 1250 front panel automatically.

The VIEW DATA mode displays the slotnumber, port and data transferred in the last digital I/O operation, regardless of whether it was a READ or a WRITE operation.

Example 1: To write 55 out to a 1250-14 Digital I/O module port 1 in chassis slot 1 and 170 to port 1 of a Digital I/O Module in chassis slot 3, enter the following keystrokes:

WRITE 1 . 1 , 5 5 ; 3 . 1 , 1 7 0 EXEC

Example 2: To read the data at port 2 of a 1250-14 Digital I/O module in chassis slot 5, enter the following key strokes:

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READ 5 . 2 EXEC

To examine the data obtained from the READ operation, press:

VIEW DATA 5 EXEC

To change the Digital I/O module mode and polarity codes, enter the key sequence:

EDIT SETUP <slotnumber> EXEC <modenumber> , <polaritycode>

The 1250 will insert a decimal point after the <slotnumber> after the EXEC key is pressed as a prompt to enter the mode and polarity code numbers. Both mode and polarity codes must be entered, even if one of the default settings is resident and is not to be changed. The mode and polarity codes are as described in the section on Device Dependant Command Codes.

STORE and RECALL keys

The STORE and RECALL keys are used to store 1250 switching module configurations in the non-volatile memory provided and recall those settings as required. The configurations of all switch modules resident in the chassis are stored and the same module types must be resident in the same chassis slots when the configuration is recalled. If the module configuration recalled is not the same as the configuration that was stored, an error will be generated.

To store a 1250 chassis switching module configuration, enter the key sequence:

STORE <non-vol location> EXEC

where <non-vol location> is in the range 1 - 47.

NOTE

1250s with operating system software at level 13.1 or below have 63 non-vol locations.

To recall a 1250 configuration, enter the key sequence:

RECALL <non-vol location> EXEC

where <non-vol location> is the same as for the STORE key.

If the 1250 power up recall (PUPRCL) feature is active, the 1250 will automatically set the 1250 to the configuration stored in non-vol location 1 at power up. The legend PUPRCL . . . will be

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displayed after the power up self test is completed to indicate that this is occurring.

TEST key

The TEST key is used to carry out the 1250 self tests available. Two additional tests for the intelligent front panel are available in addition to the tests that are available over the GPIB. The tests available are:

1 Non-destructive RAM test

2 EPROM checksum test

3 Non-destructive non-volatile memory test

4 Display Test. All possible characters are displayed in turn in all display segments for approximately 1 second. The test is repeated until the test mode is exited by the use of the TEST key.

5 Keyboard test. Each key pressed during this test does not carry out its usual function but displays the key function on the 1250 display, with the exception of the TEST key. This key is used to exit the test. During the test you may see an extra character displayed in the 14th position, counting from the left. This is normal.

To carry out one of the 1250 self tests, enter the key sequence:

TEST 0 . <testnumber>

where <testnumber> is in the range 1 - 5 and is as described above.

Successful completion of tests 1 - 3 is indicated by the 1250 returning to the condition it was in prior to the test being carried out. Exiting tests 4 and 5 will also return the 1250 to the condition it was in. A test failure will be indicated by the ERR LED lighting.

LOCAL key

The LOCAL key is used to remove the 1250 from the GPIB REMOTE state and place it in the LOCAL state. While pressed, the 1250 will display its GPIB address and whether the power up recall feature is active or not.

Revised 3-21-02

TRIG / SCAN key

The TRIG / SCAN key is used to sequence the 1250 through the switch closures described in the scan list. Each time the key is pressed, the 1250 will open the previously specified switch closures and closes the next set of relays specified.

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Refer to the section on the scan list for the details of the 1250 response to the various elements of the scanlist.

A break point in the scan list will cause the 1250 to stop scanning after opening the previous channel. A break point in the scan list is defined as the character zero delimited by semi-colons (;0;). On reaching a scanlist break point, the scan mode is set to SCAN OFF. Scanning is resumed after editing the slot 0 SETUP to SCAN ON or SCAN CONT. SCAN CONT will cause the 1250 to resume scanning from the scan list break point it was paused at and the SCAN ON command will cause the 1250 to resume scanning from the beginning of the scan list.

VIEW key

The VIEW key is used with either the SETUP or DATA key to display information about the modules installed in the 1250 chassis. VIEW SETUP will display the slot number and information about the setup of the module specified in a multiline format. VIEW DATA will display the slot number and module type and the configuration for the slot specified in a multiline format. The DISPLAY up, down, left and right keys are used to scroll through the information displayed.

To view the setup of a slot, enter the key sequence:

VIEW SETUP <slotnumber> EXEC

and use the display keys to scroll through the lines of information presented.

The SETUP for slot 0 is as follows:

0.MODEL 1250 UNIVERSAL SWITCH CONTROLLER
0.CNF OFF or ON
0.DLY <value>
0.DSP ON or OFF
0.EQU <list>
0.EXCL <list>
0.SCAN ON, OFF or CONT
0.SLIST <list>
0.SRQMASK <VALUE>
0.TRIG ON or OFF
0.PUPRCL ON or OFF

The setup for switch modules is a two line message consisting of a module identifying header and the relay actuation sequence, (MBB, BBM or IMM). Each line is preceded by the slotnumber that the module is resident in.

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The setup for the 1250-14 Digital I/O module is a two line message consisting of a module identifying header and the port number and data transferred in the last digital I/O operation. Each line is preceded by the slotnumber that the module is resident in.

To view the data available for a slot, enter the key sequence:

VIEW DATA <slotnumber> EXEC

The data for slot 0 is a two line statement consisting of an identifying header and the 1250 operating system rev. level. Each line is preceded by the slotnumber that the module is resident in. The data for switch modules in slots 1 - 5 is a two line statement consisting of an identifying header and the channels closed on the module in the slot specified. The data for the 1250-14 Digital I/O module is a two line statement consisting of an identifying header and the slotnumber, portnumber and digital data transferred in the last I/O operation.

The SETUP or DATA for more than one slot may be obtained by hyphenating the first and last slot numbers of interest. In this case, several continuous lines of information will be available and the slot information is distinguished by the relevant slotnumber being the first element of each line.

The 1250 will remain in the VIEW DATA mode until the 1250 is RESET or the CLR key is used. The 1250 display will temporarily display new instructions until the EXEC key is pressed and then return to the VIEW DATA mode. GPIB activity will not cause the 1250 to exit this mode unless it is a RESET command.

EDIT key

The edit key is used with the SETUP key to change the operating parameters of the 1250. All parameters that can be examined with the VIEW SETUP key sequence may be changed with the EDIT key.

To edit a slot setup, enter the key sequence

EDIT SETUP <slotnumber> EXEC

and then use the DISPLAY keys to display the parameter to be changed. Enter data or use the SEL keys to display the desired parameter. Press the EXEC key to make the new parameter active.

For slot 0, the parameters to be edited are presented in the same order as they are given for the VIEW SETUP command. The operating condition is blank until the operator enters information via the SEL keys or the ENTRY keypad. Operating parameters

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requiring the use of the SEL keys are indicated by the SEL LED lighting. The parameters requiring data entry via the ENTRY keypad are the Equate, Exclude and Scan lists. The format for this data is as described in the section on Device Dependant Command Codes. Only one operating parameter may be edited at a time. The operating parameter displayed on the front panel is entered into the 1250 memory by the use of the EXEC key.

For switch modules in slots 1 - 5, the only operating parameter that can be edited is the relay actuation mode. The three options are Make Before Break (MBB), Break Before Make (BBM) and Immediate (IMM). The SEL LED lights to show that the SEL keys are to be used to scroll through the options for the sequence mode. The sequence mode selected is the one displayed when the EXEC key is pressed.

For the 1250-14 Digital I/O module, the mode number and polarity code may be edited. These parameters are as described in the Device Dependant Command Code section. Note that both of these parameters must be entered from the ENTRY keypad, even if one of them is not to be changed.

Example 1: To change the relay actuation mode of a 1250-51B 500 MHz RF switching module in chassis slot 4, enter the following key sequence:

EDIT SETUP 3 EXEC

Scroll through the possible actuation modes until the required mode is displayed. Press EXEC to make the new sequence mode active.

Example 2: To turn the power up recall feature off, enter the key sequence:

EDIT SETUP 0 EXEC

Scroll down the slot 0 operating parameters with the DISPLAY keys until the 1250 displays `PUPRCL _'. Use the SEL keys to change the display to PUPRCL OFF and press EXEC to deactivate the power up recall feature.

DEL key

The DEL key is used to remove data from the 1250 display in the EDIT mode before it is entered into the 1250 memory. Each time the key is pressed, the last character in the display will be removed, until the cursor reaches the operating parameter legend displayed. Further use of the DEL key will have no effect.

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CLR key

The CLR key clears the 1250 display and causes the 1250 to display the message "RACAL DANA 1250". All action taken since the last use of the EXEC key is cleared.

EXEC key

The EXEC key is used to execute all commands entered from the 1250 front panel. After its use, the 1250 becomes quiescent until another command is entered and executed.

RESET key

The RESET key is used with the EXEC key to return the 1250 to its power up (Home) state and to open all relay closures. To reset the 1250, enter the key sequence:

RESET EXEC

Note that the RESET key will not affect the status of the Power up recall (PUPRCL) feature.

ERR key

The ERR key is used to display the error number associated with a 1250 failure. The ERR LED lights to show that an error has occurred and that an error code is available. The 1250 will display "ERROR <slotnumber>.<error code> while the ERR key is pressed, where <slotnumber> is the slot that generated the error and <error code> is the two digit error code that details the error. Refer to the table of error codes given in the YERR section of the Device Dependant Command Codes section for the details of the possible errors. Note that if the error is not specific to one module, the 1250 will display the letter X and then the error code.

The ERR LED remains lit until the error is cleared with the CLR key or the 1250 is reset. Displaying the error will not clear the error from the 1250.

DISPLAY keys

The DISPLAY keys are used to scroll back and forth through displayed information if that information is made up of more characters than can be displayed on the 1250 front panel at one time or multiline information.

The DISPLAY left and DISPLAY right keys are used to scroll along a line of information if that line is too long to be completely displayed. Each time one of these keys is pressed, the display is shifted left or right by one character, according to which key is pressed. If the key is held down, the display will scroll as far as it can and then stop.

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The DISPLAY up and DISPLAY down keys are used to scroll up and down through the lines of available information. Each time one of these keys is pressed, a new line is displayed from the beginning, regardless of the section of the previous line displayed. The new line displayed is from above or below the previous line, depending on the key pressed. Repeatedly pressing the same key will scroll the display to the one end of the multiline display and then stop. The display does not wrap around and begin to repeat any additional lines of information available.

SEL keys

The SEL keys are used to choose between the various options available in the EDIT mode. If a choice is to be made, then the SEL LED will light and a prompt will appear in the 1250 display. Use of the SEL up and SEL down will display the options available and the EXEC key will select the option displayed.

The SEL keys do not display the options available in a wraparound manner. Once the end of a list of options is reached, the other SEL key must be used to scroll through the options until the other end of the list is reached.

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Chapter 4

OPERATION VERIFICATION

Introduction

By correctly completing the following Performance Verification Procedures (PVP), functional operation of the 1250 mainframe, its plug-in modules, and the Option 90 Intelligent Front Panel is verified.

The primary purpose of these tests is to provide a relatively fast and easy method for determining the operability of the 1250 and its' various plug-in modules and Intelligent Front Panel.

General Information

These PVPs should be performed whenever it is necessary to determine whether the 1250 and its plug-in modules/Intelligent Front Panel are operating correctly. These tests may also be used as an incoming inspection procedure to verify a suspected failure after the 1250 has been installed into a system. After diagnosing and repairing a 1250 failure, these PVPs can be used to confirm a satisfactory repair.

A Test Fixture is needed for several performance tests, and is noted in each appropriate subsection. The fixture simplifies testing and acts as an interface between the module and test multimeter. The test fixture can be fashioned for each module, using a removable wiring block configured as described in the corresponding subsection of the manual for each module.

Required Equipment

The following test equipment is recommended for these PVPs. Equivalent test equipment may be substituted when desired.

a. Digital Multimeter - Racal Instruments Model 5004 or equivalent
b. GPIB Instrument Controller - Hewlett-Packard Series 200

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Performance Verification Procedures

The PVP's described in this section are divided into the following 9 subsections:

a. Mainframe Self-Test

b. GPIB Test

c. 1250-10 Breadboard Module Test

d. 1250-14 Digital Input/Output Module Test

e. 1250-40 Signal Matrix Module Test

f. 1250-60/1250-61 18/26.5GHz Microwave Switching Module Test

g. Low Frequency Relay Module Test for the 1250-12, 1250-15, 1250-20, and 1250-30

h. RF Relay Module Tests for the 1250-50, 1250-51A/B, and 1250-52A/B

i. 1250-90 Intelligent Front Panel Option Test

NOTE

Always perform the mainframe self-test and GPIB test before any of the remaining module tests. This helps ensure the most comprehensive approach toward isolating an actual problem or failure.

Mainframe Self-Test

The mainframe self-test verifies operation of the display circuitry and most of the microprocessor-related circuitry on the computer board. This test does not verify the operation of the backplane or associated drivers of the 1250 mainframe. The operation of the backplane and drivers is verified when the specific modules are tested.

NOTE

If the mainframe self-test passes, this does not ensure that the 1250 is completely operational. Verification of proper operation is confirmed as the result of completing the specific module tests.

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Test Procedure

Initiate the mainframe self-test as follows:

a. Power-down the 1250.

b. Power-up the 1250.

c. The 1250 mainframe will have successfully passed a power-up self-test if after power-up the REM and ADDR LEDs are not illuminated. A failure is indicated as follows:

1. ADDR LED illuminated - ROM/RAM failure
2. REM LED illuminated - Microprocessor support circuitry/Non-Vol memory failure
3. ADDR and REM LEDs both illuminated - Self-configuration failure

d. If Option 90 is installed and the unit passes the power-up self-test, the following messages are displayed:

SELFTEST OK

RACAL-DANA 1250

If the self-test fails, refer to Table 3.7 for an explanation of error codes.

GPIB Test

See Table 4-1, which provides a test program for conducting the 1250 GPIB operational verification test.

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Table 4-1

THE FOLLOWING IS A LISTING FOR THE 1250 GPIB OPERATIONAL TEST. THE PROGRAM IS WRITTEN IN HP BASIC 2.0 AND CAN BE RUN ON ANY HP SERIES 200 CONTROLLER. CONNECT THE CONTROLLER TO THE 1250 IEEE-488 CONNECTOR AND LOAD AND RUN THE FOLLOWING PROGRAM:

```
10    !*************************************************************************
20    !------------------- 1250 GPIB BUS TESTS  MDB: 4/25/86 --------------------
30    !  UPON EXECUTION, THIS PROGRAM WILL TEST THE FOLLOWING ASPECTS OF THE
40    !  1250 GPIB INTERFACE:
50    !     1) HANDSHAKE
60    !     2) BUS INITIATED SELF TEST
70    !     3) STATUS REPORTING WHEN POLLED.
80    !*************************************************************************
90    DIM Error$(2)[15]
100   ASSIGN @Uut TO 710
110   ASSIGN @Crt TO 2
120    ON TIMEOUT 7,2 GOTO Timeerr
130         ENABLE INTR 7;2
140   REM 7
150   Clear$="K"
160   !
161!*************************************************************************
170 Test:   ! THIS ROUTINE CALLS A BUS INITIATED SELF TEST AND VERIFIES THAT                THE UNIT DOES NOT FAIL
180         OUTPUT @Crt;Clear$;
190         ON INTR 7 GOTO Srq
200         OUTPUT @Uut;"RESET"
210         FOR Loop=1 TO 2
220         OUTPUT @Uut;"TEST 0,"&VAL$(Loop)
230         GOSUB Spoll
240         OUTPUT @Uut;"YERR"
250         GOSUB Spoll
260         ENTER @Uut;Error$(Loop)
270           IF Error$(Loop)[10,10]<>"0" THEN
280             IF Loop=1 THEN PRINT "UUT FAILS RAM TEST. ERROR MESSAGE IS: ";
290               IF Loop=2 THEN PRINT "UUT FAILS ROM TEST. ERROR MESSAGE IS: ";
300           PRINT Error$(Loop)
310            GOTO 370
320           ELSE
330              IF Loop=1 THEN PRINT TABXY(1,3),"UUT PASSES RAM TEST"
340                IF Loop=2 THEN PRINT TABXY(1,5),"UUT PASSES ROM TEST"
350           END IF
360         PRINT
370         NEXT Loop
380         PRINT TABXY(1,7),"UUT PASSES GPIB TEST "
390         GOTO 650
391!*************************************************************************
400 Timeerr: ! FAILURE IF BUS TRANSACTIONS REQUIRE > 2 SECONDS
410                 PRINT "UUT FAILURE. TIMEOUT ERROR OCCURED"
420                    GOTO 650
430                 !
431!*************************************************************************
440 Srq:   ! UNEXPECTED SRQ OCCURED
450                 Status=SPOLL(@Uut)
460                 PRINT "UUT FAILURE. A SRQ WAS ENCOUNTERED. THE VALUE OF THE STATUS BYTE IS ".Status
470                 GOTO 650
471!*************************************************************************
480 Spoll:! SERIAL POLL UUT UNTIL TEST IS COMPLETE. FAILURE IF TEST IS NOT                COMPLETED WITHIN 2 SECONDS. ---------
481!
490                 PRINT TABXY(20,1),"WAITING FOR BUS SELF TEST TO COMPLETE"
500                 Elapsed=TIMEDATE
510                 Status=SPOLL(@Uut)
520                   IF Status<>16 THEN
540                     IF TIMEDATE-Elapsed>2 THEN
550                       OUTPUT @Crt;Clear$;
560                       PRINT "FAILURE. UUT NEVER COMPLETED BUS SELF TEST"
570                       GOTO 650
580                     ELSE
590                       GOTO 510
600                     END IF
610                   END IF
620                 PRINT TABXY(20,1),"
630                 RETURN
640                 !
641!*************************************************************************
650                 END
```


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1250-10 Breadboard Module Test

The 1250-10 Breadboard module permits the user to create circuits that will interact with the 1250. This module has three 8-bit output ports and three corresponding 8-bit input ports. Also, this module provides +5 VDC and +13 VDC (both at 1.7A) power supplies both of which are fused at 2A and have LED indicators. The module test consists of connecting each port output to its corresponding input and verifying that the port output data is valid by reading back the data written on each output port.

WARNING

If the 1250 switch controller is currently installed in a system, the 1250 must be disconnected from the system observing the following precautions. Completing this disconnection presents two potential safety hazards to the individual:

a. If high voltage exists in the system, the user may come in contact with it
b. Damage to equipment may occur if the wrong electrical lines are accidentally connected or disconnected

Therefore, the user must take the necessary precautions to prevent either a or b from occurring disconnecting the wiring or the wiring block. This WARNING applies to all following test procedures.

Test Procedure

NOTE:

Disconnect any user circuit from the three input or output ports that could cause a false failure.

1. Remove any wiring block from the 1250-10's rear edge connector
2. Enter the test program listed in Table 4.2 into the controller
3. Connect the GPIB cable of the controller to the 1250
4. Verify that LEDs CR1 and CR2 are illuminated
5. Execute the test program and follow the displayed prompts

Table 4-2, 1250-10 Breadboard Module Test Program

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```
10 !  1250-10 PERFORMANCE VERIFICATION TEST PROGRAM - 7/19/88 - MOOR
20    PRINT "CONNECT THE UUT TO THE BREADBOARD TEST FIXTURE"
30    PAUSE
40    OUTPUT 2;K";
50    INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
60    OUTPUT 2;K";
70    FOR X=0 TO 2
80    FOR Y=0 TO 7
90    OUTPUT 710;"WR "&VAL$(S)&","&VAL$(X)&","&VAL$(2^Y)
100   OUTPUT 710;"READ "&VAL$(S)&","&VAL$(X)
110   ENTER 710;A
120   IF BINEOR(A,2^Y)=0 THEN GOTO 150
130   PRINT "PORT "&VAL$(X)&", D"&VAL$(Y)&"  DATA: ";A;"  SHOULD EQUAL ";2^Y;"  FAILED"
140   GOTO 160
150   PRINT "PORT "&VAL$(X)&", D"&VAL$(Y)&"  PASSED"
160   OUTPUT 710;"WRITE "&VAL$(S)&","&VAL$(X)&",0"
170   NEXT Y
180   NEXT X
190   PRINT "TEST COMPLETE"
200   END
```


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1250-14 Digital Input/Output Module Test

The 1250-14 Digital Input/Output module consists of 16 bidirectional data lines and 3 control lines. The test fixture is shown in Figure 4.1 and the test procedure for this module includes the following:

a. Data line input/output test
b. I/O and PCTL line test
c. PFLG line test

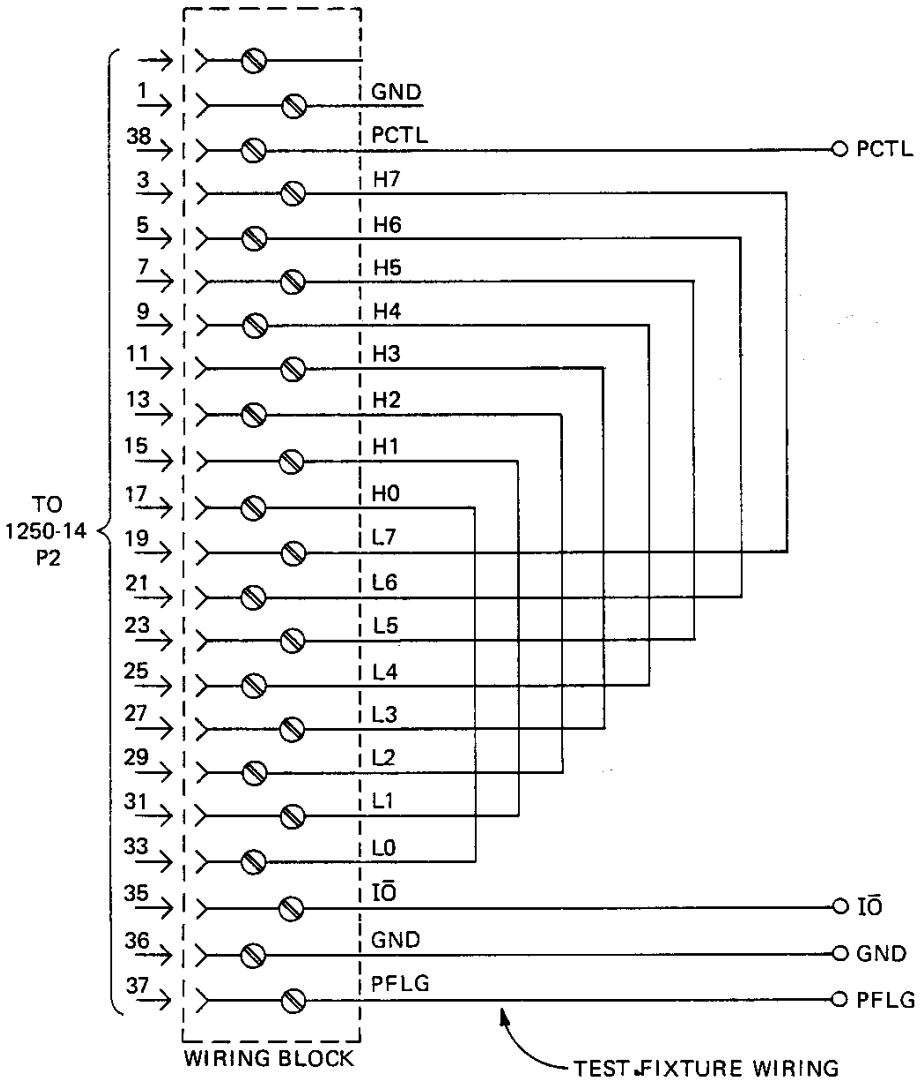


Figure 4-1, 1250-14 Test Configuration

The first test uses the test fixture to connect the eight Lo Byte data lines to the eight Hi Byte data lines. Therefore, by writing to one set of data lines and reading the data from the other set, the operation of the data lines and the continuity of the fuses and connectors can be verified. The second test checks the

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operation of the I/O and PCTL lines by individually connecting each line to a DC voltmeter, using the controller to change the logic states of each line, and verifying the state change using the DC voltmeter. The third test verifies the proper operation of the PFLG line as a function of the level presented to its input.

Test Procedure

1. Install the test fixture onto the 1250-14~s rear edge connector
2. Enter the test program listed in Table 4.3 into the controller
3. Execute the test program and follow the displayed prompts

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Table 4-3, 1250-14 Digital Input/Output Module Test Program

```
10 !  1250-14 PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    PRINT "1. SET 1250 ADDRESS TO 10."
30    PRINT "2. CONNECT TEST FIXTURE TO THE 1250-14."
40    PAUSE
50    OUTPUT 2;"K";
60    INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
70    OUTPUT 710;"RESET"
80    WAIT 1
90    OUTPUT 710;"SETUP ";S;".1,0"
100   FOR X=0 TO 1
110   IF X=0 THEN Y=1
120   IF X=1 THEN Y=0
130   OUTPUT 710;"WRITE ";S;".";X;",85"
140   OUTPUT 710;"READ ";S;".";Y
150   ENTER 710;A
160   B=BINEOR(A,85)
170   IF B=0 THEN GOTO 200
180   PRINT "FAILED PORT ";X;", WRITE 01010101. DATA IS: ";B
190   GOTO 210
200   PRINT "PASSED PORT ";X;", WRITE 01010101"
210   OUTPUT 710;"WRITE ";S;".";X;",170"
220   OUTPUT 710;"READ ";S;".";Y
230   ENTER 710;A
240   B=BINEOR(A,170)
250   IF B=0 THEN GOTO 290
260   PRINT "FAILED PORT ";X;", WRITE 10101010. DATA IS: ";B
270   BEEP 1500,.5
280   GOTO 300
290   PRINT "PASSED PORT ";X;", WRITE 10101010"
300   NEXT X
310   PRINT ""
320   PRINT "CONNECT DC VOLTMETER (-) LEAD TO GROUND @1"
330   PRINT "CONNECT DC VOLTMETER (+) LEAD TO PCTL"
340   FOR X=0 TO 1
350   OUTPUT 710;"RESET"
360   WAIT 1
370   Id$="I/O"
380   IF X=0 THEN Id$="PCTL"
390   IF X=1 THEN PRINT "CONNECT DC VOLTMETER (+) LEAD TO I/O"
400   INPUT "ENTER VOLTMETER READING",A
410   IF A>2.4 THEN 450
420   PRINT "FAILED "&Id$&" HIGH LEVEL TEST"
430   BEEP 1500,.5
440   GOTO 460
450   PRINT "PASSED "&Id$&" HIGH LEVEL TEST"
460   OUTPUT 710;"SETUP ";S;".5,10"
```


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Table 4-3, 1250-14 Digital Input/Output Module Test Program (Cont'd)

```
470  INPUT "ENTER VOLTMETER READING",A
480  IF A<.8 THEN 520
490  PRINT "FAILED "&Id$&" LOW LEVEL TEST"
500  BEEP 1500,.5
510  GOTO 530
520  PRINT "PASSED "&Id$&" LOW LEVEL TEST"
530  NEXT X
540  PRINT "1.) CONNECT PCTL TO PFLG"
550  PRINT "2.) CONNECT DC VOLTMETER (+) LEAD TO LO"
560  INPUT "ENTER VOLTMETER READING",A
570  IF A>2 THEN 600
580  PRINT "FAILED PFLG TEST"
590  BEEP 1500,.5
600  OUTPUT 710;"SETUP ";S;".5,16"
610  OUTPUT 710;"WRITE ";S;".2,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,
-1,0,-1,0,-1,0"
620  INPUT "ENTER VOLMETER READING",A
630  IF A<.8 THEN 670
640  PRINT "FAILED PFLG TEST "
650  BEEP 1500,.5
660  GOTO 680
670  PRINT "PASSED PFLG TEST"
680  PRINT "DONE"
690  END
```


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1250-40 Signal Matrix Module Test

The 1250-40 Signal Matrix module consists of 20 double-pole, single-throw relays arranged in a 4 row x 5 column channel switching matrix. As shown in Figure 4-5, each channel has a low and a high line which are switched simultaneously. The test fixture (see Figure 4-2) consists of the following:

a. Connection between all low line inputs
b. Connection between all high line inputs
c. Connection between all low line outputs
d. Connection between all high line outputs

With the test fixture installed and an ohmmeter connected between rows and columns, test the module by successively closing each channel while monitoring the ohmmeter for an indication of relay closure.

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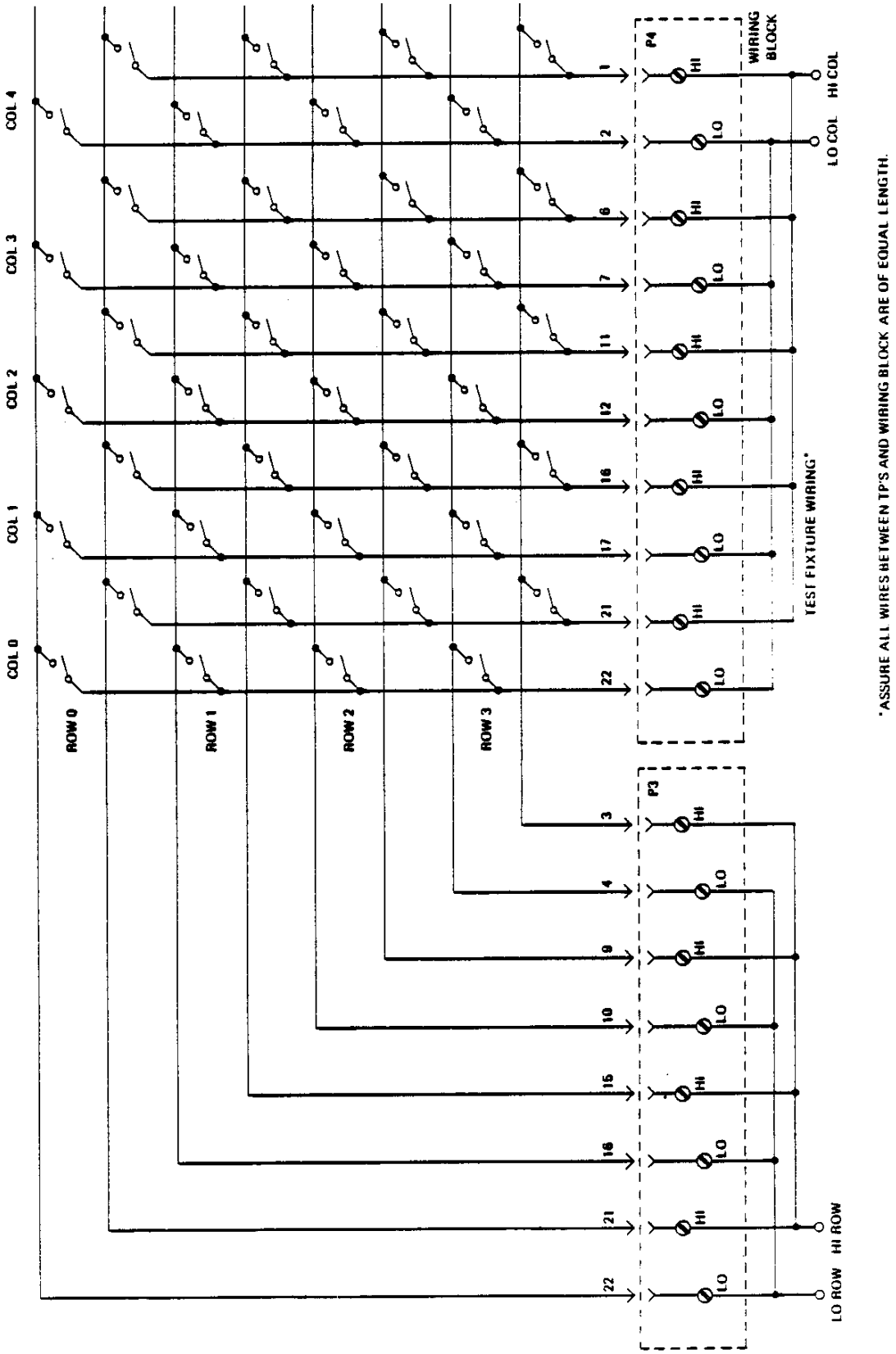


Figure 4-2, 1250-40 Test Configuration

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Test Procedure

1. Install the test fixture onto the 1250~0ls rear edge connector
2. Enter the test program listed in Table 4.4 into the controller
3. Execute the test program and follow all displayed prompts

Table 4-4, 1250-40 Signal Matrix Module Test Program

```
10 !  1250-40 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,M,S,Z,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.3
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI ROW AND HI COL."
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO ROW AND LO COL."
170   PAUSE
180   OUTPUT 2;"K";
190   FOR M=0 TO 3
200   FOR Y=0 TO 9
210   Z=M*100+Y
220   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Z)
230   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
240   OUTPUT 2;"K";
250   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
260   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Z)
270   IF Spec-Res>=0 THEN GOTO 320
280   IF X=1 THEN PRINT "H-ROW "&VAL$(M)&" TO H-COL. "&VAL$(Y)&Rep$&F$
290   IF X=2 THEN PRINT "L-ROW "&VAL$(M)&" TO L-COL. "&VAL$(Y)&Rep$&F$
300   BEEP 1500,1
310   GOTO 340
320   IF X=1 THEN PRINT "H-ROW "&VAL$(M)&" TO H-COL "&VAL$(Y)&Rep$&P$
330   IF X=2 THEN PRINT "L-ROW "&VAL$(M)&" TO L-COL "&VAL$(Y)&Rep$&P$
340   NEXT Y
350   NEXT M
360   NEXT X
370   PRINT "TEST COMPLETE"
380   END
```


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1250-60/1250-61 18/26.5 GHZ Microwave Switching Module Tests

The 1250-60A/61A consist of two single-pole, double-throw (SPDT) relays forming two channel groups. Each channel group consists of three terminals designated as normally-open (NO), normally-closed (NC), and a corresponding common (COM). The 1250~0B/61B consist of four SPDT relays forming four channel groups identical to those of the 1250-60A/61A, respectively. Each module is tested by connecting an ohmmeter between each channel group[1]s COM and corresponding NO terminals. The channel is closed and the ohmmeter is monitored for an indication of relay closure. Only the signal line of the channel group is switched; the signal return line of each group is connected to each of the three group terminals. No special test fixture is required.

Test Procedure

1. Enter the test program listed in Table 4.5 into the controller

NOTE:

Shown is the test program for the 1250-60A/60B. The program for the 1250-61A/61B is identical except for using the specific module option number whenever required.

2. Execute the test program and follow all displayed prompts

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Table 4-5, 1250-60/1250-61 18/26.5 GHz Microwave Switching Module Test Program

```
10 !  1250-60A/60B PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    COM A,K,S,Spec,Res
30    COM F$[30],Rep$[60],K$[1]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.5
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   INPUT "TEST OPTION 60B? Y OR N",K$
140   K=1
150   IF K$="Y" THEN K=3
160   OUTPUT 710;"RESET"
170   WAIT 2
180   FOR X=0 TO K
190   PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL COM "&VAL$(X)
200   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL N/C "&VAL$(X)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   IF Spec-Res)=0 THEN GOTO 280
250   PRINT "COM "&VAL$(X)&" TO N/C "&VAL$(X)&Rep$&F$
260   BEEP 1500,1
270   GOTO 290
280   PRINT "COM "&VAL$(X)&" TO N/C "&VAL$(X)&Rep$&P$
290   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X)
300   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL N/O "&VAL$(X)
310   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
320   OUTPUT 2;"K";
330   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
340   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X)
350   IF Spec-Res)=0 THEN GOTO 390
360   IF X<20 THEN PRINT "COM "&VAL$(X)&" TO N/O "&VAL$(X)&Rep$&F$
370   BEEP 1500,1
380   GOTO 400
390   IF X<20 THEN PRINT "COM "&VAL$(X)&" TO N/O "&VAL$(X)&Rep$&P$
400   PRINT ""
410   NEXT X
420   PRINT "TEST COMPLETE"
430   END
```


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Low Frequency Relay Module Tests

This subsection provides PVPs for the following four low-frequency relay modules: 1250-12, 1250-15, 1250-20, and 1250-30.

1250-12 Relay Actuator Module Test

The 1250-12 Relay Actuator module contains a 10-channel array of double-pole single-throw (DPST) relays. The required test fixture (see Figure 4.3) connects all high inputs together, all low inputs together, all high outputs together, and all low outputs together. By connecting an ohmmeter between the connected inputs and corresponding connected outputs, the module is tested by successively closing each channel while monitoring the ohmmeter for an indication of relay closure.

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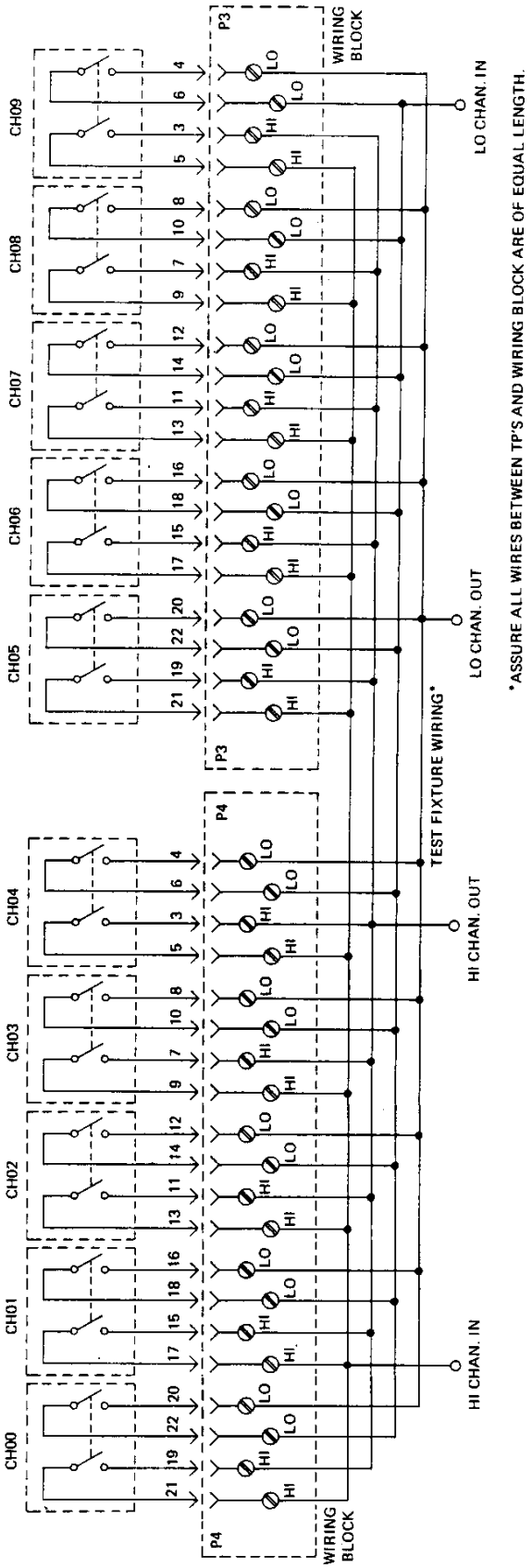


Figure 4-3, 1250-12 Test Configuration

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Test Procedure

1. Remove the wiring block from the 1250-12's rear edge connector
2. Install the test fixture onto the 1250-12's rear edge connector
3. Set the multimeter to measure ohms. Connect and short P4 pins 19 and 21 of the 1250-12 assembly together using the shortest possible wire length. Connect the ohmmeter across TP1 and TP2 and zero the ohmmeter
4. Remove the short between pins 19 and 21 of P4
5. Enter the test program listed in Table 4.6 into the controller
6. Execute the test program and follow all displayed prompts

Table 4.6-1250-12 Relay Actuator Module Test Program

```
10 !  1250-12 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,S,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.2
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI CHAN. IN AND HI CHAN. OUT"
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO CHAN. IN AND LO CHAN. OUT"
170   PAUSE
180   OUTPUT 2;"K";
190   FOR Y=0 TO 9
200   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Y)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Y)
250   IF Spec-Res>=0 THEN GOTO 300
260   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&F$
270   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&F$
280   BEEP 1500,1
290   GOTO 320
300   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&P$
310   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&P$
320   NEXT Y
330   NEXT X
340   PRINT "TEST COMPLETE"
350   END
```


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1250-15 Relay Driver Module Test

The 1250-15 Relay Driver module consists of 20 drive lines capable of sinking up to 350mA of current and 20 corresponding readback lines. The test for this module consists of connecting each drive line to its corresponding readback line and pulling the two lines up through a 39~hm, 10-watt resistor to the 13-volt line, See Figure 4,4 for a schematic view of the 1250-15 test fixture. Each drive line should be actuated and the corresponding readback line interrogated to ensure that the line assumed a low logic level.

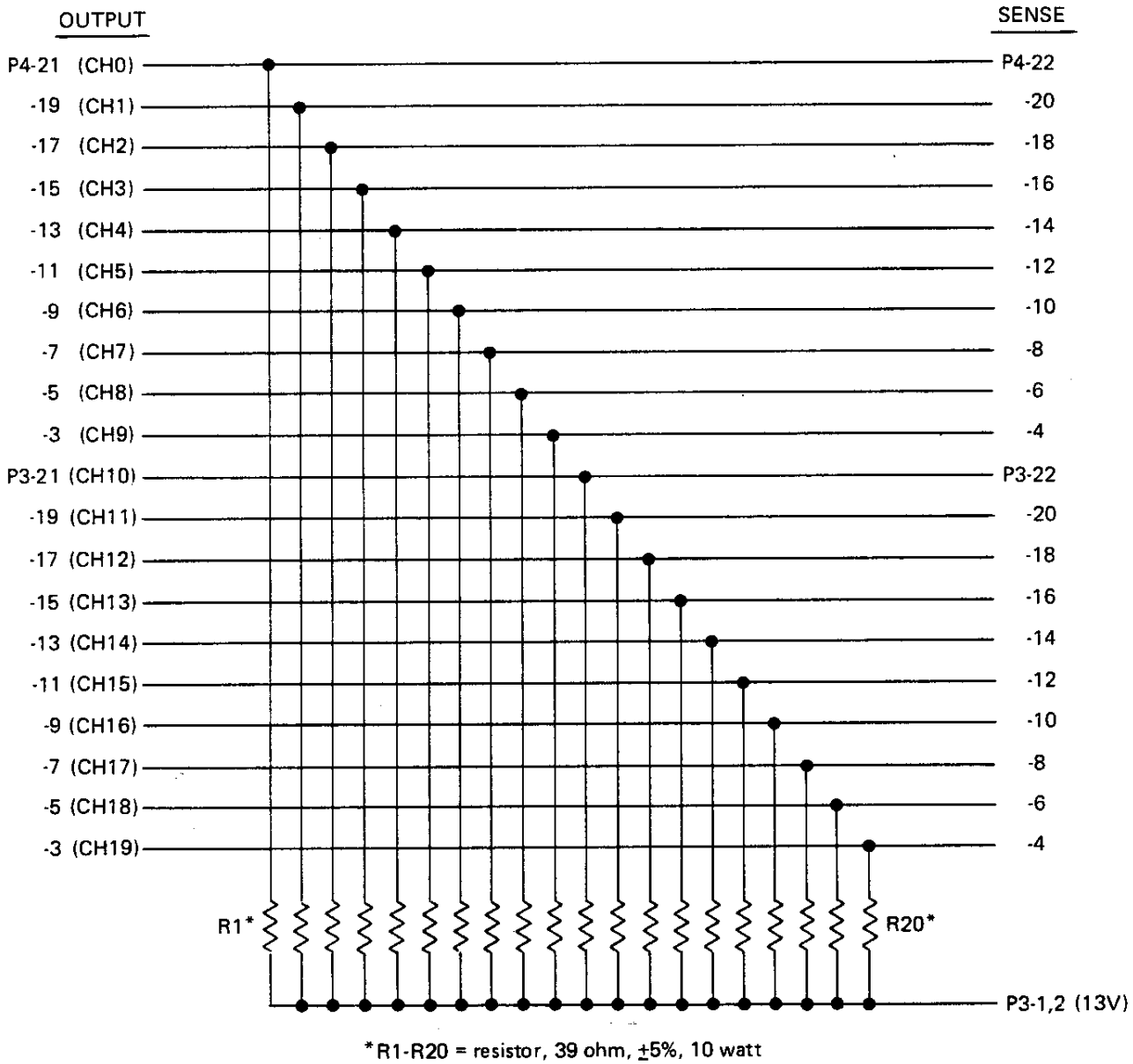


Figure 4-4, 1250-15 Test Configuration

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Test Procedures

1. Install the test fixture onto the 1250-15[1]s rear edge connector
2. Enter the test program listed in Table 4.7 into the controller
3. Execute the test program and follow the displayed prompts Table 4.7-1250-15 Relay Driver Module Test Program

Table 4-7, 1250-15 Relay Driver Module Test Program

```
10 !  1250-15 PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    PRINT "1. SET 1250 ADDRESS TO 10."
30    PRINT "2. CONNECT TEST FIXTURE TO THE 1250-15."
40    PAUSE
50    OUTPUT 2;"K";
60    INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
70    OUTPUT 710;"CNF ON"
80    FOR X=0 TO 19
90    OUTPUT 710;"CL "&VAL$(S)&","&VAL$(X)
100   OUTPUT 710;"YERR"
110   ENTER 710;A$
120   IF A$[12,13]=VAL$(99) THEN P=1
130   IF A$[12,13]=VAL$(51) THEN P=0
140   WAIT .5
150   OUTPUT 710;"OP "&VAL$(S)&","&VAL$(X)
160   OUTPUT 710;"YERR"
170   ENTER 710;A$
180   IF A$[12,13]=VAL$(99) AND P=1 THEN PRINT "CHANNEL "&VAL$(X)&"  PASSED"
190   IF A$[12,13]=VAL$(51) OR P=0 THEN GOSUB Fail
200   NEXT X
210   PRINT "DONE"
220   GOTO 270
230 Fail:  !
240   PRINT "CHANNEL "&VAL$(X)&"  "&CHR$(131)&"FAILED"&CHR$(128)
250   BEEP 1500,.1
260   RETURN
270   END
```

1250-20 Relay Power Module Test

The 1250-20 Relay Power module consist of a 10-channel array of double-pole, single-throw (DPST) relays. The required test fixture (see Figure 4.5) connects all high inputs together, all low inputs together, all high outputs together, and all low outputs together. By connecting an ohmmeter between the connected inputs and corresponding connected outputs, the module is tested by successively closing each channel while monitoring the ohmmeter for an indication of relay closure.

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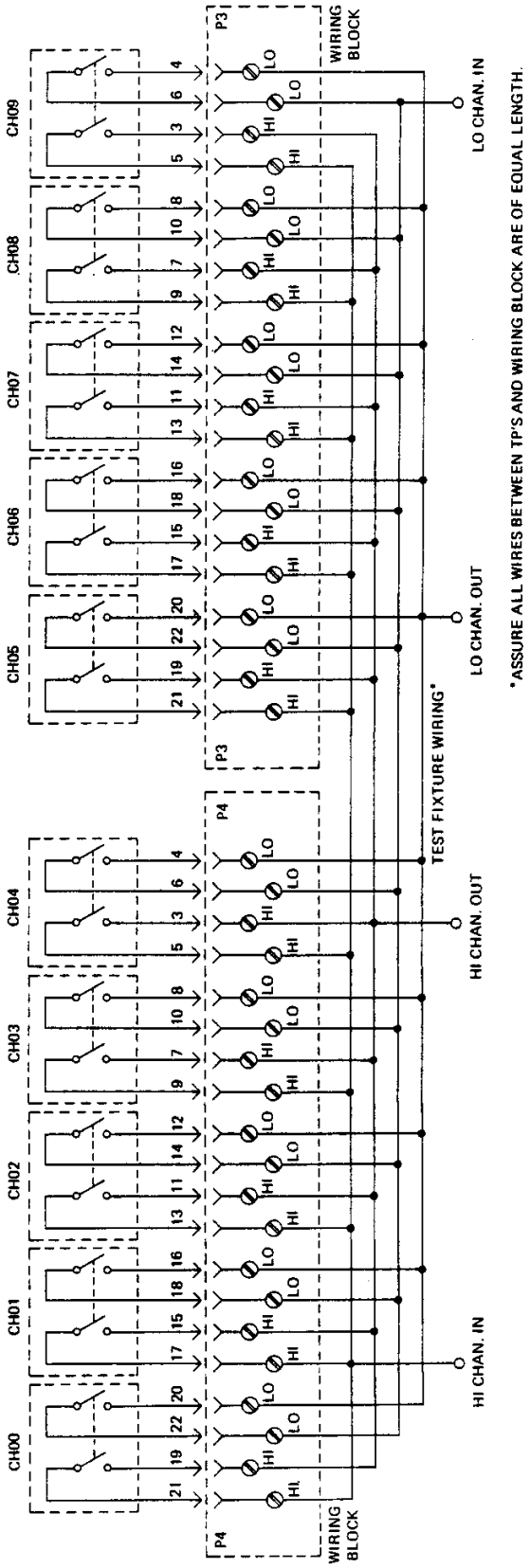


Figure 4-5, 1250-20 Test Configuration

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Test Procedure

1. Install the test fixture onto the 1250-20's rear edge connector
2. Enter the test program listed in Table 4.8 into the controller
3. Execute the test program and follow the displayed prompts

Table 4-8, 1250-20 Power Relay Module Test Program

```
10 !  1250-20 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,S,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.15
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI CHAN. IN AND HI CHAN. OUT"
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO CHAN. IN AND LO CHAN. OUT"
170   PAUSE
180   OUTPUT 2;"K";
190   FOR Y=0 TO 9
200   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Y)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Y)
250   IF Spec-Res)=0 THEN GOTO 300
260   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&F$
270   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&F$
280   BEEP 1500,1
290   GOTO 320
300   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&P$
310   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&P$
320   NEXT Y
330   NEXT X
340   PRINT "TEST COMPLETE"
350   END
```


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1250-30 Scanner/Multiplexer Module Test

The 1250-30 *is* a 20-channel scanner/multiplexer consisting of a 20-channel array of double-pole, single-throw (DPST) relays. Each relay channel has a low line and a high line which are simultaneously switched. The required test fixture (see Figure 4-6) consists of:

a. Connection between all low lines (channels 0-19)
b. Connection between all high lines (channels 0-19)
c. Connection of high common 1 and 2
d. Connection of low common 1 and 2

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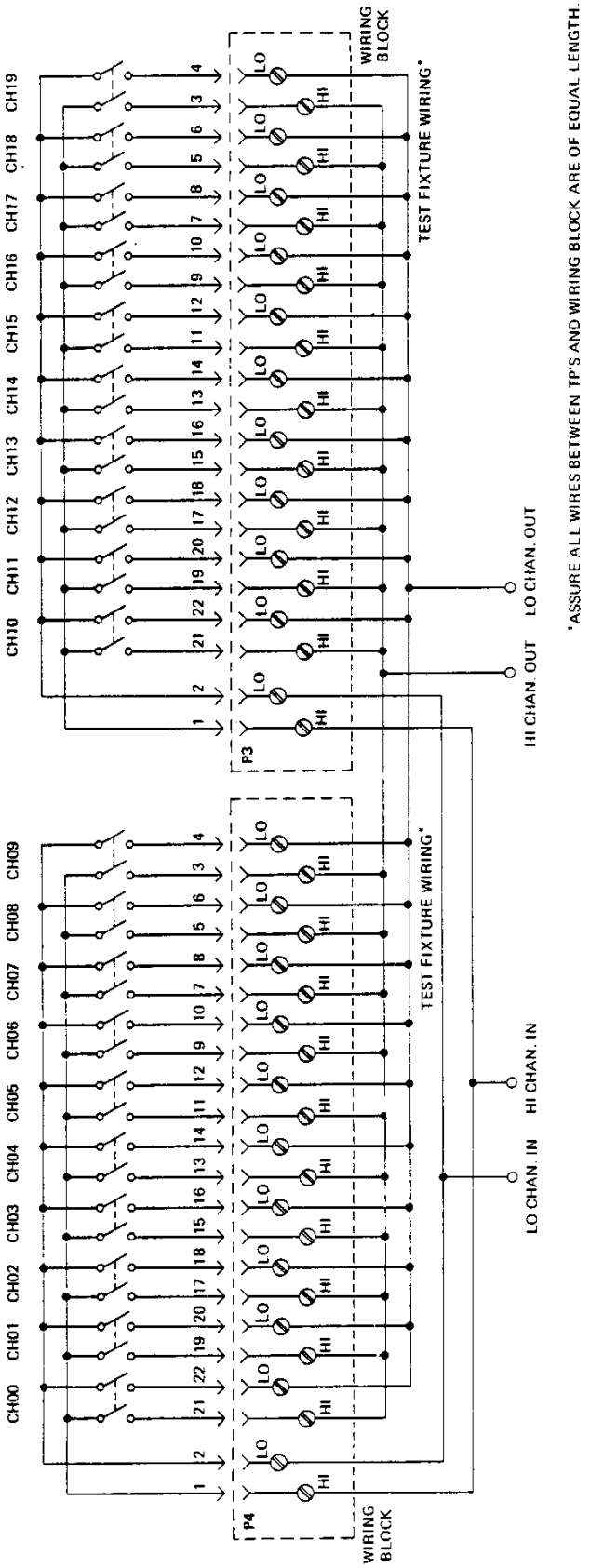


Figure 4-6, 1250-30 Test Configuration

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Test Procedure

1. Install the test fixture onto the 1250~30?s rear edge connector
2. Enter the test program listed in Table 4,9 into the controller
3. Execute the test program and follow all displayed prompts

Table 4-9, 1250-30 Scanner/Multiplexer Module Test Program

```
10 !  1250-30 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,S,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.3
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI CHAN. IN AND HI CHAN. OUT"
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO CHAN. IN AND LO CHAN. OUT"
170   PAUSE
180   OUTPUT 2;"K";
190   FOR Y=0 TO 19
200   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Y)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Y)
250   IF Spec-Res)=0 THEN GOTO 300
260   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&F$
270   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&F$
280   BEEP 1500,1
290   GOTO 320
300   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&P$
310   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&P$
320   NEXT Y
330   NEXT X
340   PRINT "TEST COMPLETE"
350   END
```


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RF Relay Module Tests

This subsection provides PVPs for the following RF relay modules: 1250-50, 1250-51A/51B, 1250-52A/52B, 1250-750.

1250-50 and 1250-750 200 MHz RF Switching Module Test

The 1250-50 200 MHz RF Switching module consists of 22 single-pole, single-throw (SPST) relays, grouped to form two arrays. Only the signal line of each channel is switched; the signal return lines of both groups channels are connected together. The module is tested by connecting an ohmmeter to the center conductor of two channels, closing the corresponding channel relays, and monitoring the ohm meter for an indication of relay closure. No special test fixture is required.

Test Procedure

1. Enter the test program listed in Table 4.10 into the controller.
2. Execute the test program and follow all displayed prompts.

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```
10 !  1250-50 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,S,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.5
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   WAIT 2
150   OUTPUT 710;"CL "&VAL$(S)&".0,19,20,39"
160   FOR X=0 TO 30 STEP 10
170   IF X=0 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 00."
180   IF X=20 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 20."
190   FOR Y=0 TO 4
200   IF X+Y=0 OR X+Y=20 THEN GOTO 350
210   OUTPUT 710;"CL "&VAL$(S)&","&VAL$(X+Y)
220   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL "&VAL$(X+Y)
230   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
240   OUTPUT 2;"K";
250   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
260   OUTPUT 710;"OP "&VAL$(S)&","&VAL$(X+Y)
270   IF Spec-Res>=0 THEN GOTO 320
280   IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&F$
290   IF X>=20 THEN PRINT "CHAN. 20  TO CHAN. "&VAL$(X+Y)&Rep$&F$
300   BEEP 1500,1
310   GOTO 340
320   IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&P$
330   IF X>=20 THEN PRINT "CHAN. 20 TO CHAN. "&VAL$(X+Y)&Rep$&P$
340   PRINT ""
350   NEXT Y
360   NEXT X
370   PRINT "TEST COMPLETE"
380   END
```

Table 4-10, 1250-50 and 1250-750 200 MHz RF Switching Module Test Program

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1250-51/1250-52 500MHz/1GHz RF Switching Module Tests

The 1250-51A/52A consist of either 12 double-pole, double-throw (DPDT) relays arranged to form two connecting 5-channel arrays (-51 A) or arranged as two 4:1 multiplexers (-52A). The 1250-51B/52B consist of either 24 DPIXI' relays arranged as two groups of two connecting 5-channel arrays (-52B) or arranged as four 4:1 multiplexers (-52B). For the 1250-51A/52B, the module is tested by connecting an ohmmeter between two channels of a particular group, closing the corresponding relays while monitoring the ohmmeter for an indication of relay closure. For the 1250-52A/52B, the module is tested by connecting an ohmmeter between the COM terminal and each of the four channel terminals, closing the corresponding relays while monitoring the ohmmeter for an indication of relay closure. In all testing, only the signal path of each channel is switched; the signal return lines are connected together. Also, no special test fixture is required.

Test Procedure

1. Enter the test program listed either Table 4-11 or 4-12 into the controller for the 1250-51/1250-52, respectively
2. Execute the test program and follow all displayed prompts

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```
10 !  1250-51A/51B PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    COM A,K,S,Spec,Res
30    COM F$[30],Rep$[60],K$[1]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.6
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   INPUT "TEST OPTION 51B? Y OR N",K$
140   K=10
150   IF K$="Y" THEN K=30
160   OUTPUT 710;"RESET"
170   WAIT 2
180   OUTPUT 710;"CL "&VAL$(S)&".0,19,20,39"
190   FOR X=0 TO K STEP 10
200   IF X=0 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 00."
210   IF X=20 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 20."
220   FOR Y=0 TO 4
230   IF X+Y=0 OR X+Y=20 THEN GOTO 380
240   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X+Y)
250   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL "&VAL$(X+Y)
260   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
270   OUTPUT 2;"K";
280   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
290   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X+Y)
300   IF Spec-Res>=0 THEN GOTO 350
310   IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&F$
320   IF X>=20 THEN PRINT "CHAN. 20  TO CHAN. "&VAL$(X+Y)&Rep$&F$
330   BEEP 1500,1
340   GOTO 370
350   IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&P$
360   IF X>=20 THEN PRINT "CHAN. 20 TO CHAN. "&VAL$(X+Y)&Rep$&P$
370   PRINT ""
380   NEXT Y
390   NEXT X
400   PRINT "TEST COMPLETE"
410   END
```

Table 4-11, 1250-51A/51B 500MHz RF Switching Module Test Program

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Table 4-12, 1250-52A/52B 1GHz RF Switching Module Test Program

```
10 !  1250-52A/52B PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    COM A,K,S,Spec,Res
30    COM F$[30],Rep$[60],K$[1]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.5
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   INPUT "TEST OPTION 52B? Y OR N",K$
140   K=10
150   IF K$="Y" THEN K=30
160   OUTPUT 710;"RESET"
170   WAIT 2
180   FOR X=0 TO K STEP 10
190   PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL COM "&VAL$(X/10)
200   FOR Y=0 TO 3
210   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X+Y)
220   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL "&VAL$(X+Y)
230   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
240   OUTPUT 2;"K";
250   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
260   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X+Y)
270   IF Spec-Res)=0 THEN GOTO 310
280   PRINT "COM "&VAL$(X/10)&" TO CHAN. "&VAL$(X+Y)&Rep$&F$
290   BEEP 1500,1
300   GOTO 320
310   PRINT "COM "&VAL$(X/10)&" TO CHAN. "&VAL$(X+Y)&Rep$&P$
320   PRINT ""
330   NEXT Y
340   NEXT X
350   PRINT "TEST COMPLETE"
360   END
```


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SERIES
1250
UNIVERSAL
SWITCH CONTROLLER

PUBLICATION NO. 980609 Volume 2 of 2

RACAL INSTRUMENTS

Racal Instruments, Inc.
4 Goodyear St., Irvine, CA 92618-2002
Tel: (800) RACAL-ATE, (800) 722-2528, (949) 859-8999; FAX: (949) 859-7139

Racal Instruments, Ltd.
480 Bath Road, Slough, Berkshire, SL1 6BE, United Kingdom
Tel: +44 (0) 1628 604455; FAX: +44 (0) 1628 662017

Racal Systems Electronique S.A.
18 Avenue Dutartre, 78150 LeChesnay, France
Tel: +33 (1) 3923 2222; FAX: +33 (1) 3923 2225

Racal Systems Elettronica s.r.l.
Strada 2-Palazzo C4, 20090 Milanofiori Assago, Milan, Italy
Tel: +39 (0)2 5750 1796; FAX +39 (0)2 5750 1828

Racal Elektronik System GmbH.
Technologiepark Bergisch Gladbach, Friedrich-Ebert-Strasse, D-51429 Bergisch Gladbach, Germany
Tel.: +49 2204 8442 00; FAX: +49 2204 8442 19

Racal Australia Pty. Ltd.
3 Powells Road, Brookvale, NSW 2100, Australia
Tel: +612 9936 7000, FAX: +612 9936 7036

Racal Electronics Pte. Ltd.
26 Ayer Rajah Crescent, 04-06/07 Ayer Rajah Industrial Estate, Singapore 0513.
Tel: +65 7792200, FAX: +65 7785400

Racal Instruments, Ltd.
Unit 5, 25F., Mega Trade Center, No 1, Mei Wan Road, Tsuen Wan, Hong Kong, PRC
Tel: +852 2405 5500, FAX: +852 2416 4335

http://www.racalinstruments.com



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Table of Contents
Volume 2

CHAPTER 5
CHASSIS DRAWINGS 5-1

CHAPTER 6
MODULE DRAWINGS 6-1

CHAPTER 7
CHASSIS PARTS LIST 7-1

CHAPTER 8
MODULE PARTS LIST 8-1

CHAPTER 9
OPTION 05,06 (1250-62, 1250-63) 9-1

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Chapter 5

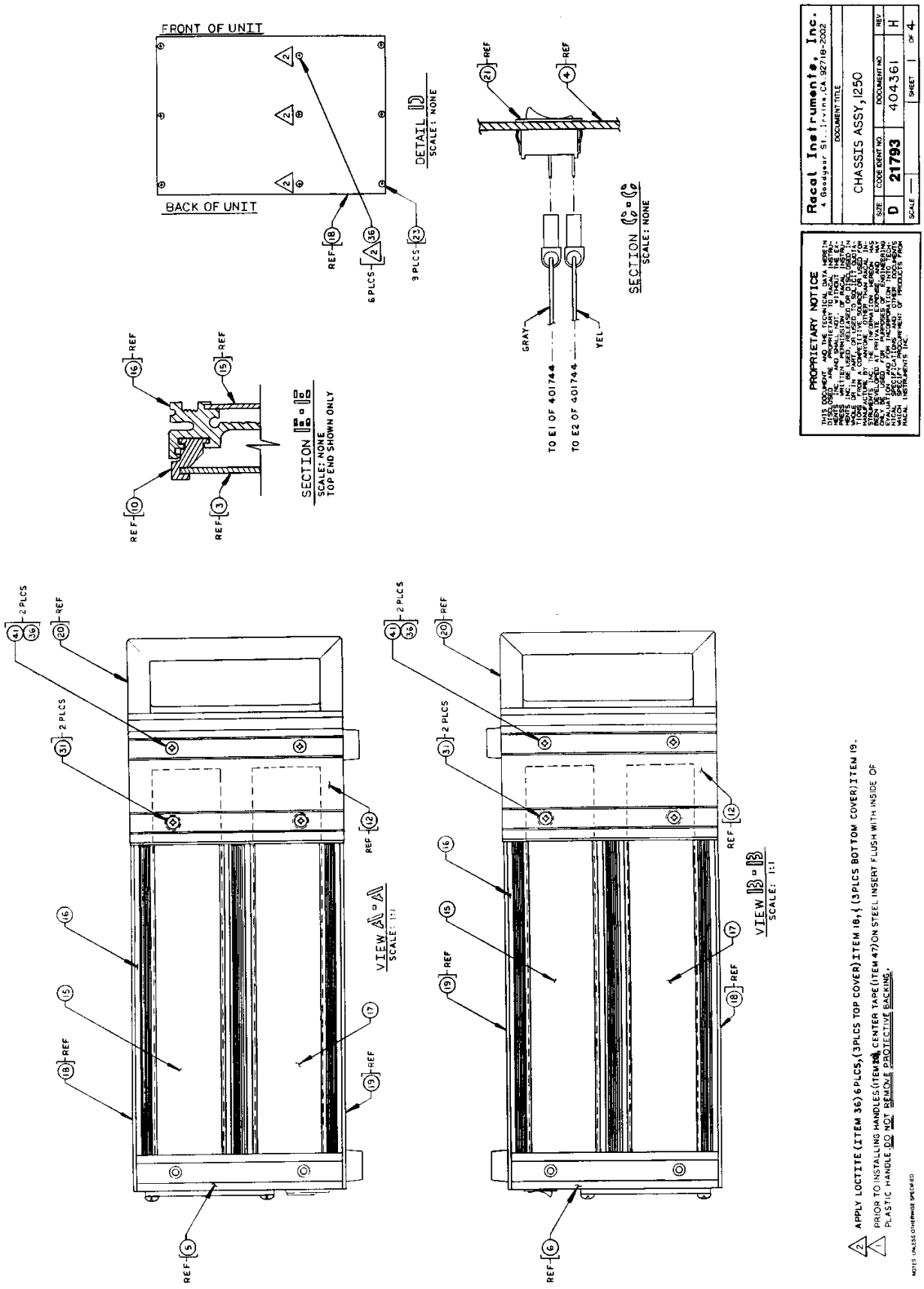
CHASSIS DRAWINGS

404361	Chassis Assembly	5-3
401744	PCB Assy., Interconnection	5-5
431744	Schematic, Interconnection	5-6
401743	PCB Assy., Computer	5-7
431743	Schematic, Computer	5-8
404362	Power Supply Assembly	5-13
401742	PCB Assy., Power Supply	5-14
431742	Schematic, Power Supply	5-15
401758	PCB Assy., Analog Bus	5-16
431758	Schematic, Analog Bus	5-17

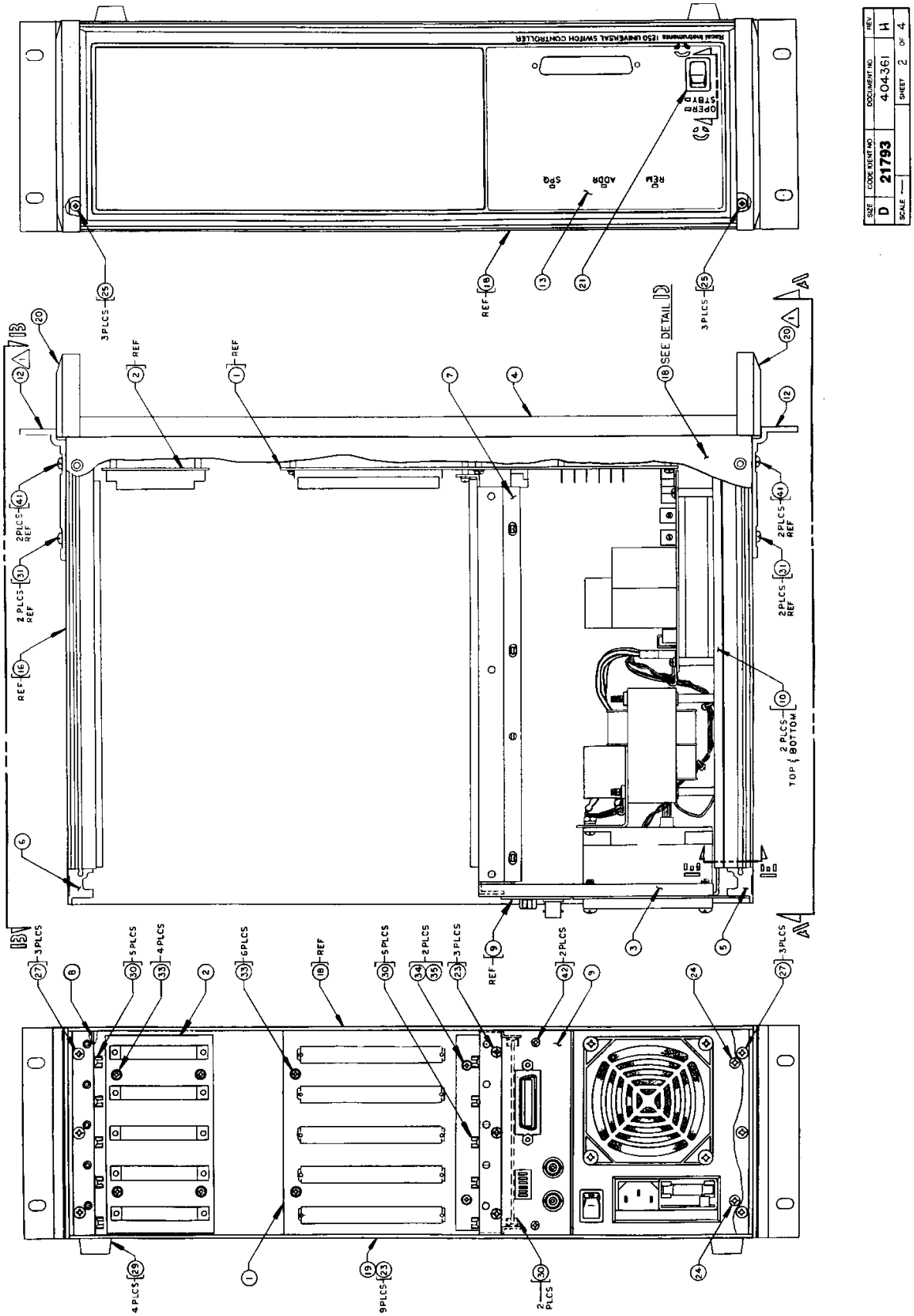
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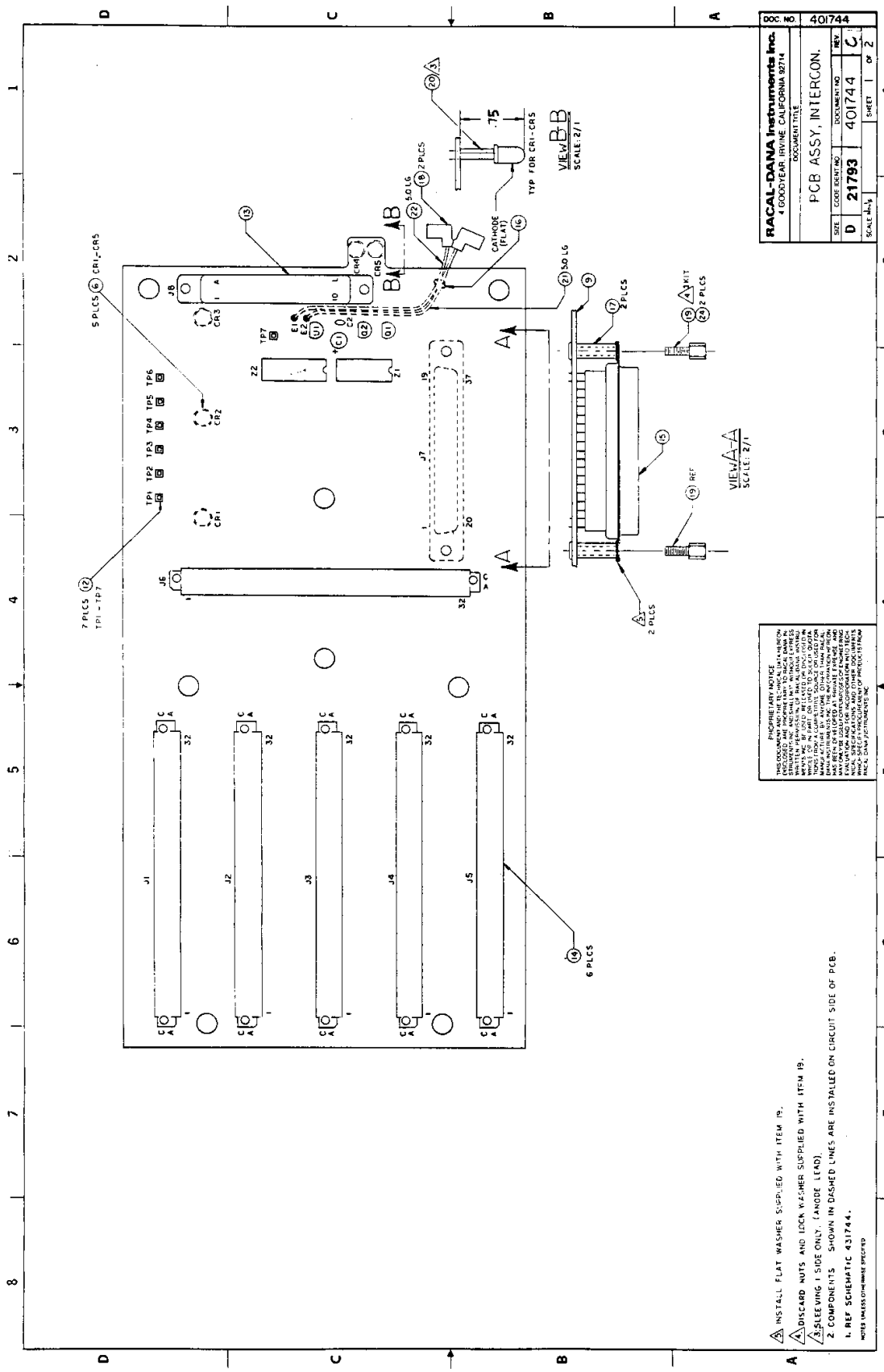
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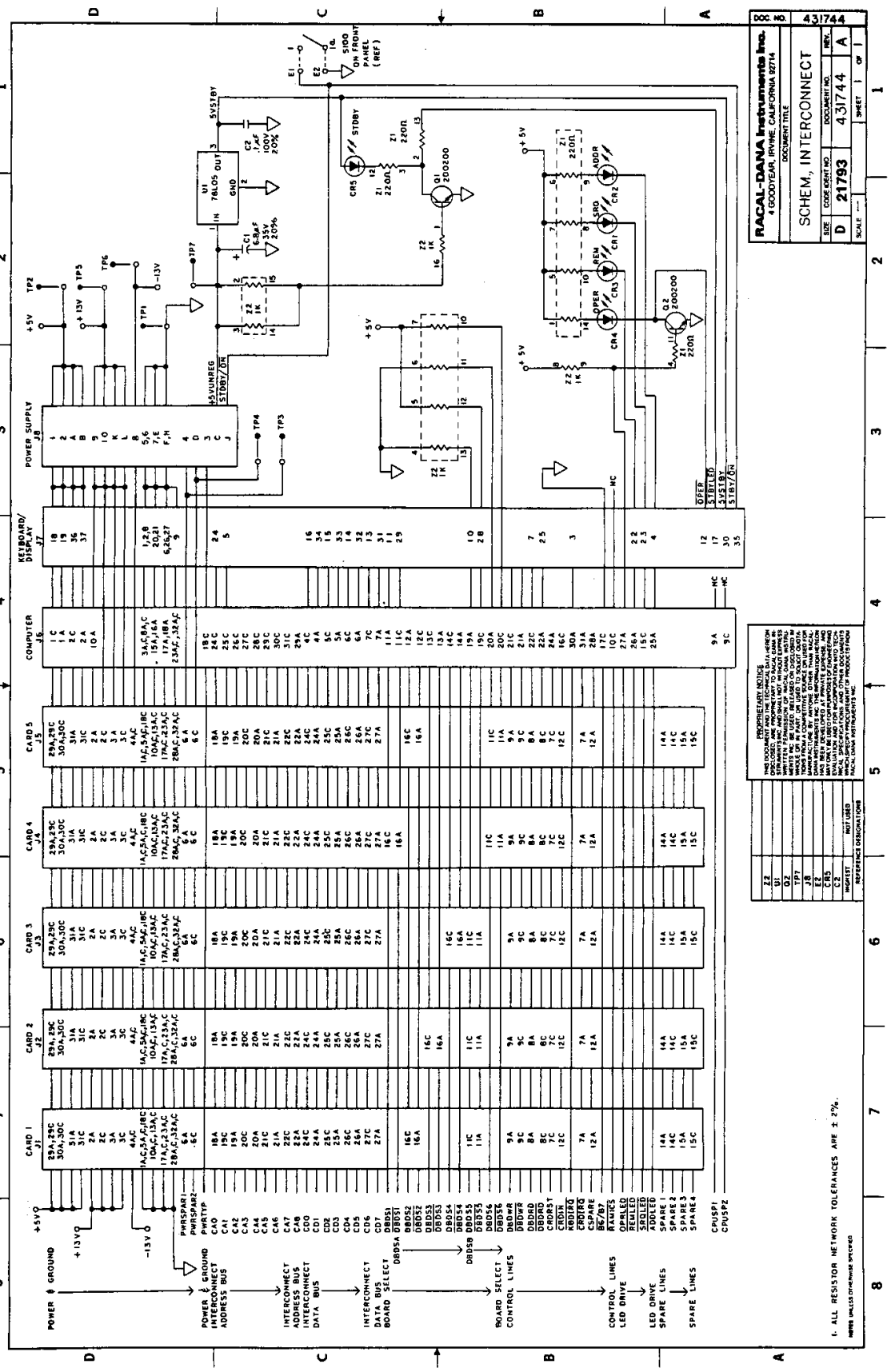
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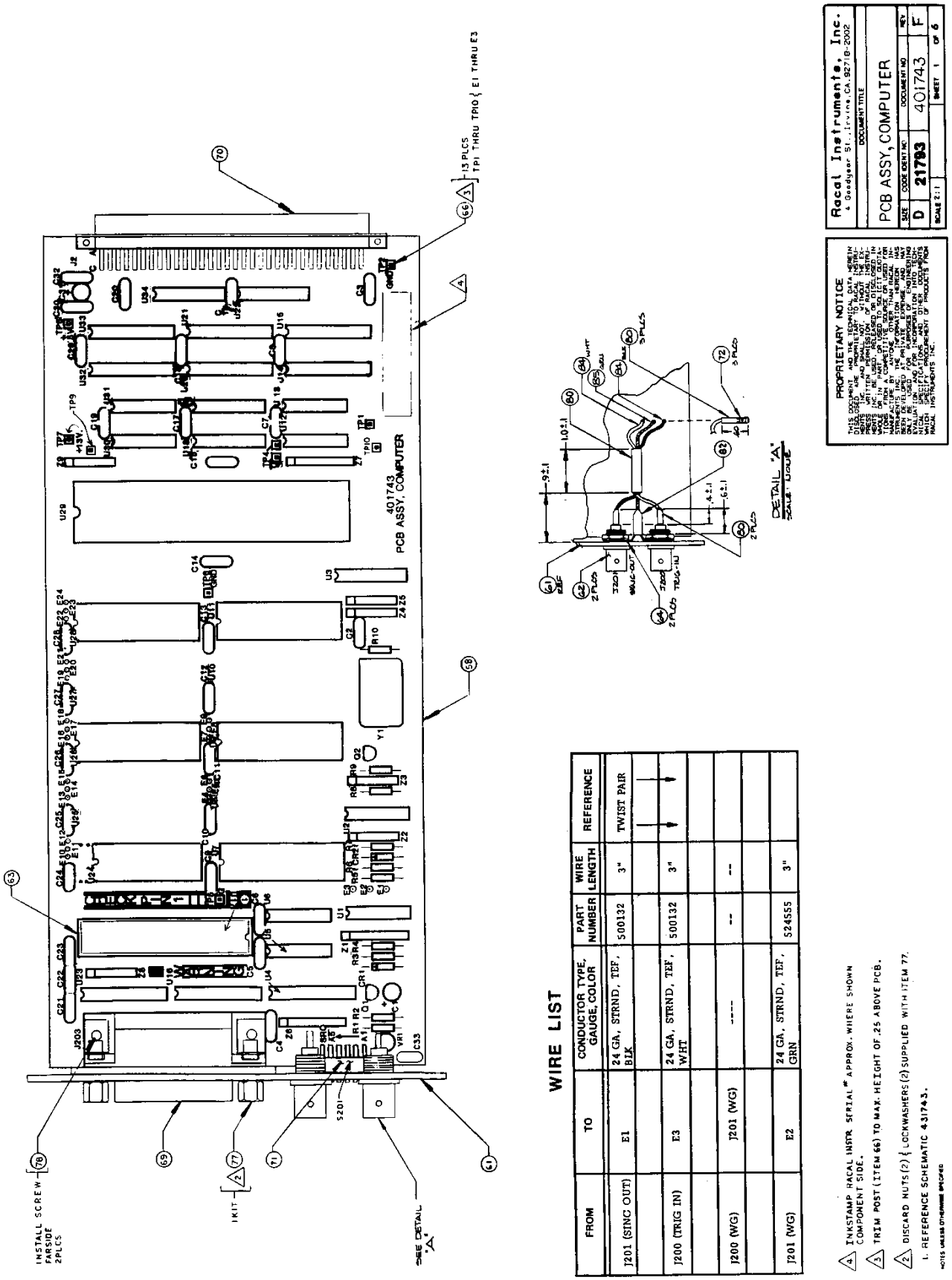
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WIRE LIST

FROM	TO	CONDUCTOR TYPE, GAUGE, COLOR	PART NUMBER	WIRE LENGTH	REFERENCE
J201 (SING OUT)	E1	24 GA, STRND, TEF, BLK	500132	3"	TWIST PAIR
J200 (TRIG IN)	E3	24 GA, STRND, TEF, WHT	500132	3"	TWIST PAIR
J200 (WG)	J201 (WG)	----	--	--	
J201 (WG)	E2	24 GA, STRND, TEF, GRN	524555	3"	

4 INKSTAMP RACAL INSTR. SERIAL # APPROX. WHERE SHOWN COMPONENT SIDE.

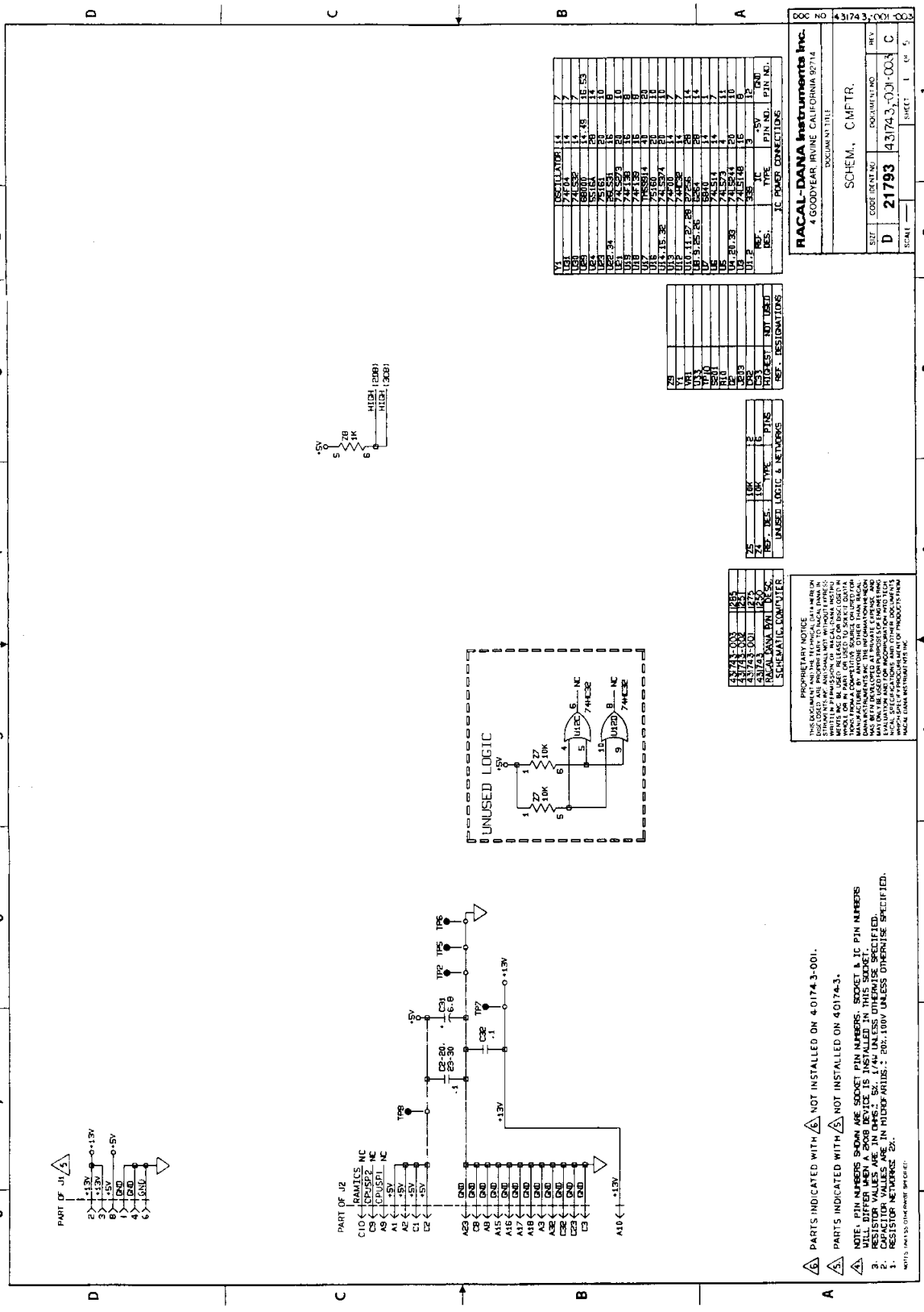
3 TRIM POST (ITEM 66) TO MAX. HEIGHT OF .25 ABOVE PCB.

2 DISCARD NUTS (2) & LOCKWASHERS (2) SUPPLIED WITH ITEM 77.

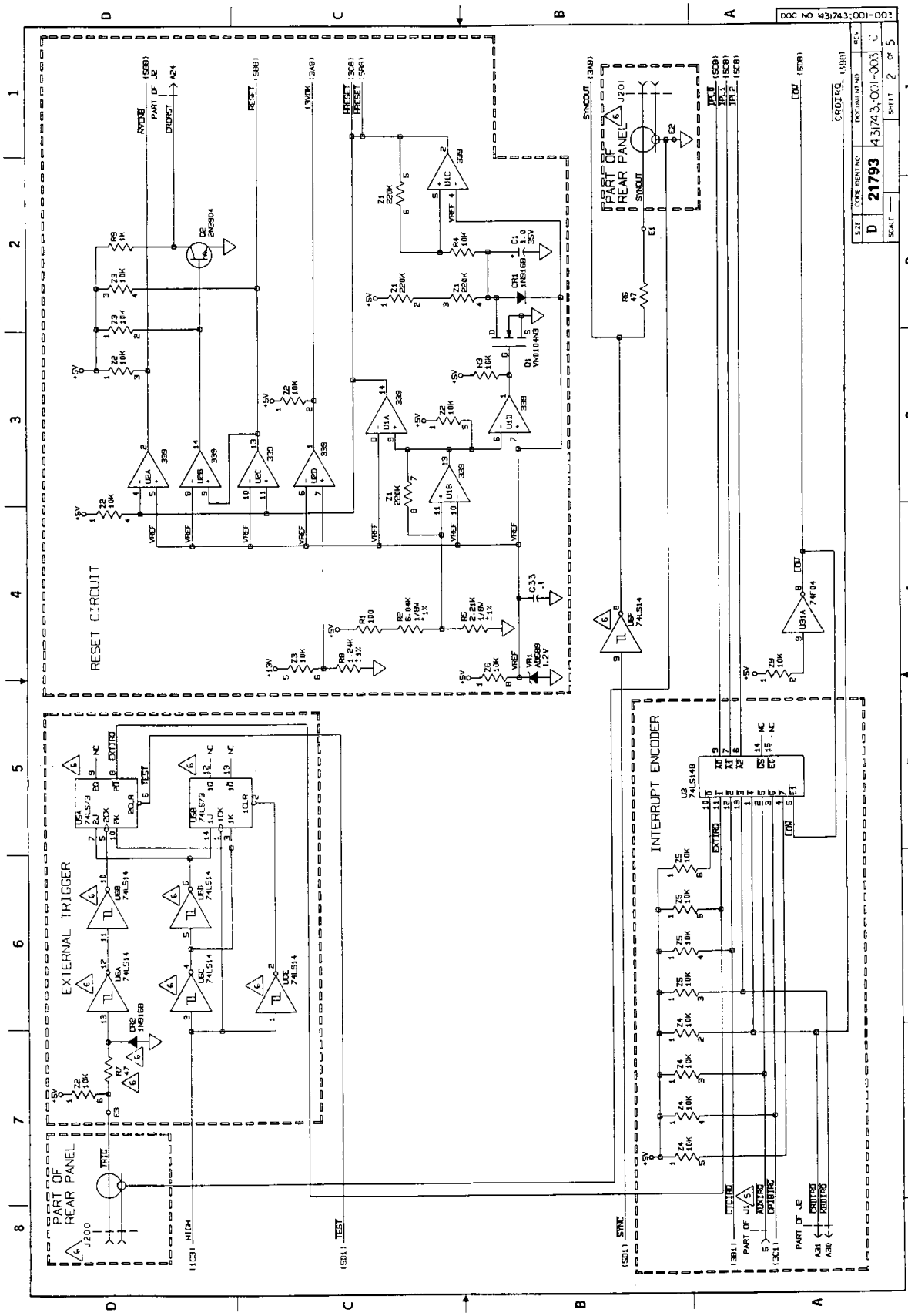
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NOTES: UNLESS OTHERWISE SPECIFIED

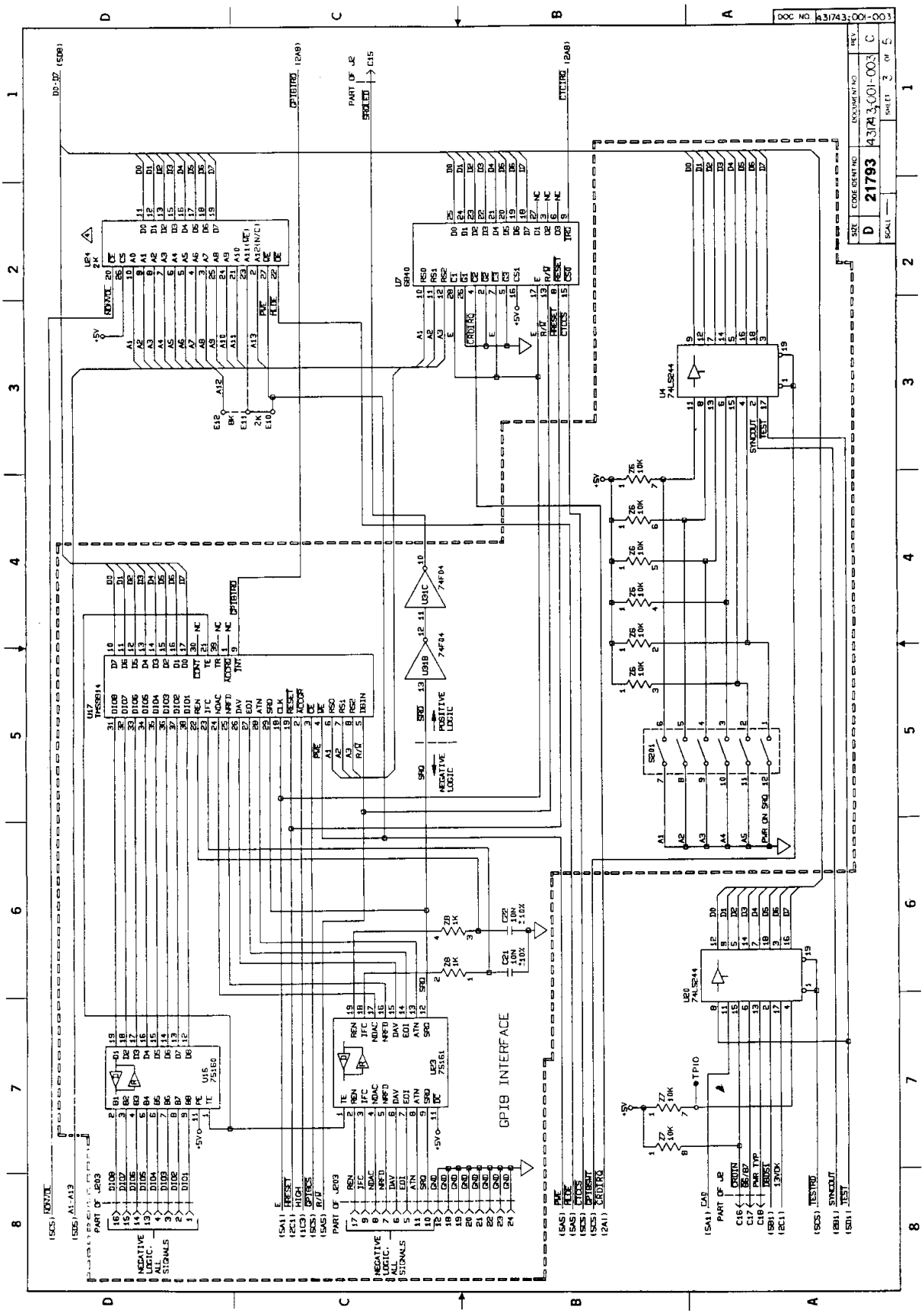
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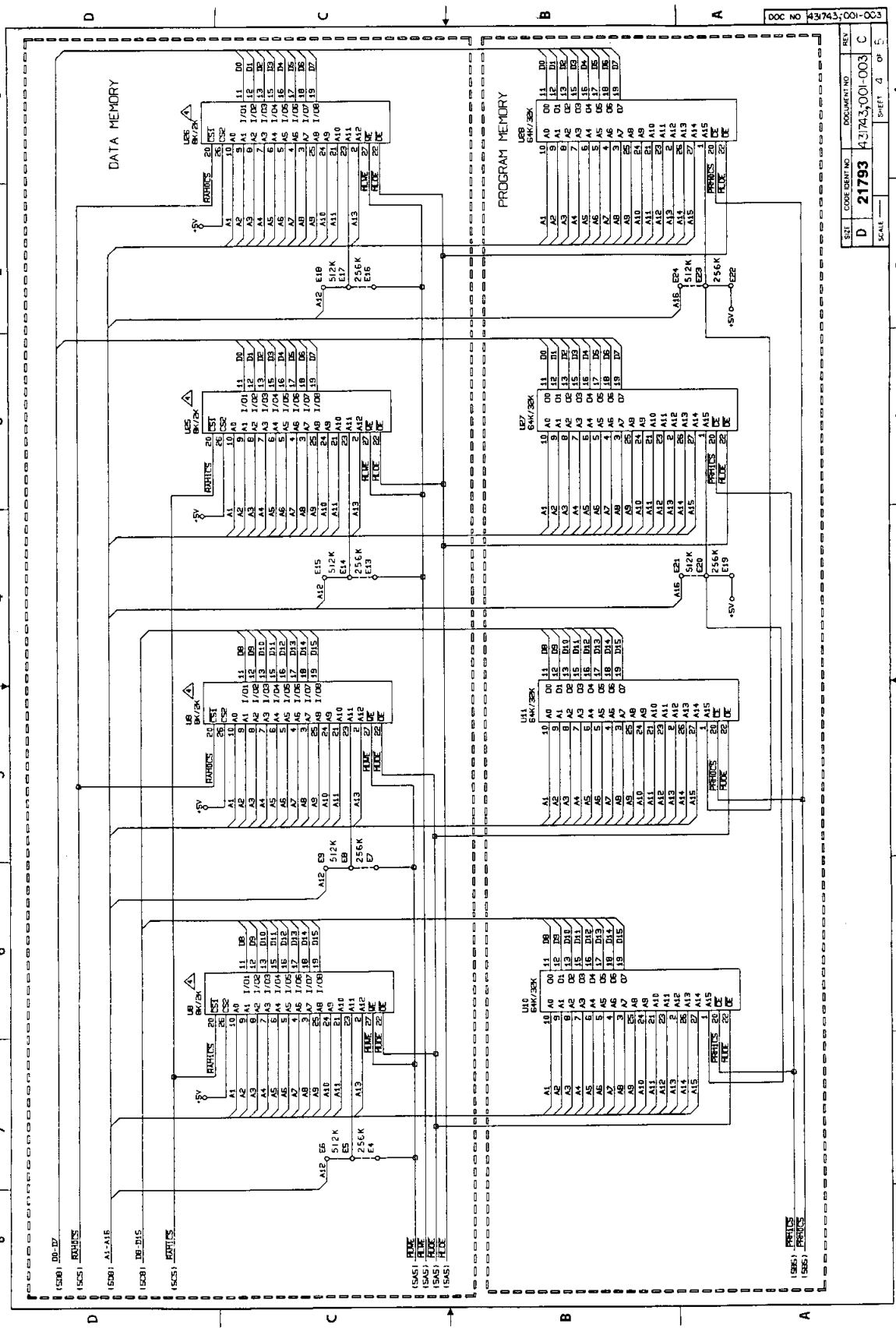
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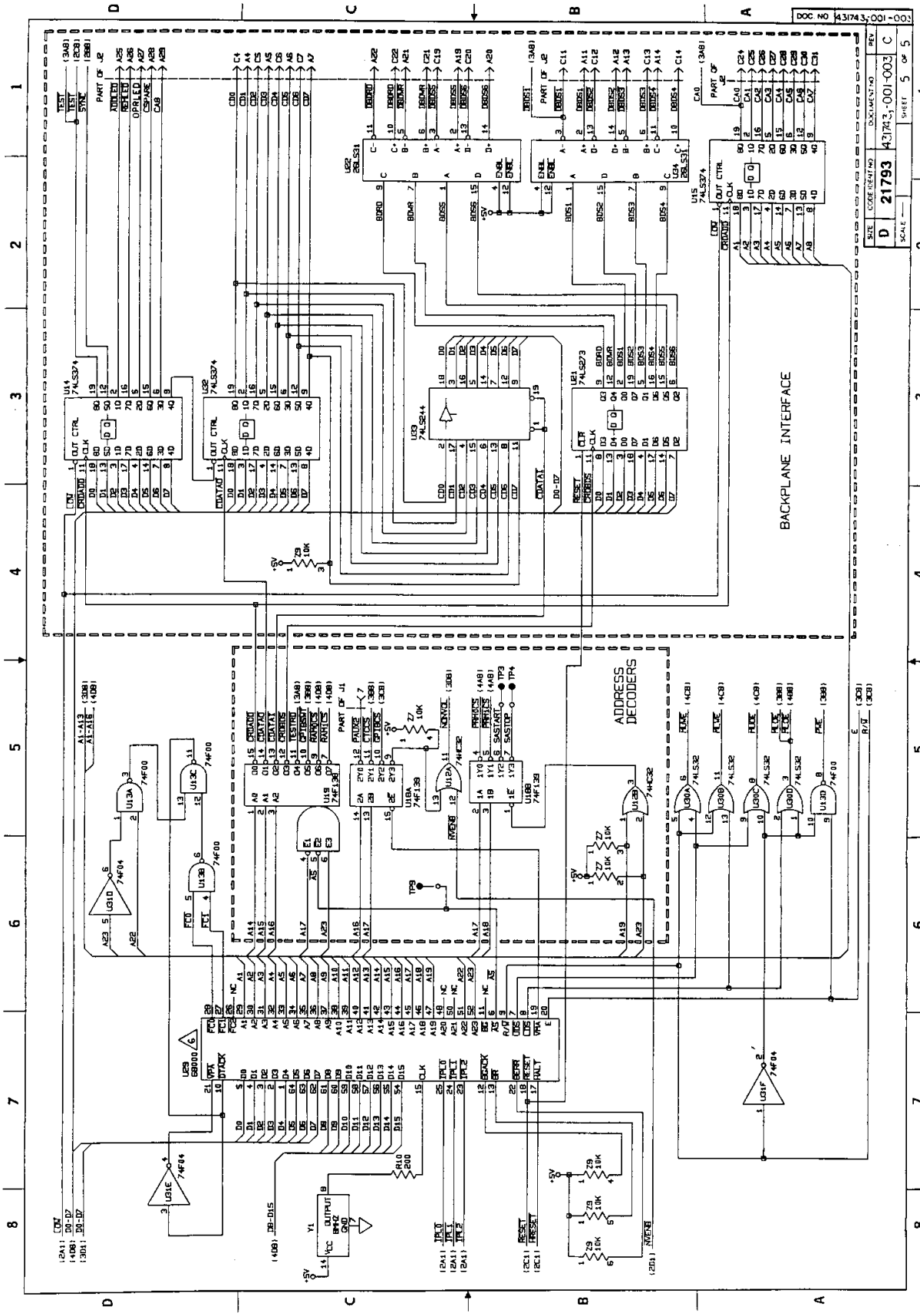
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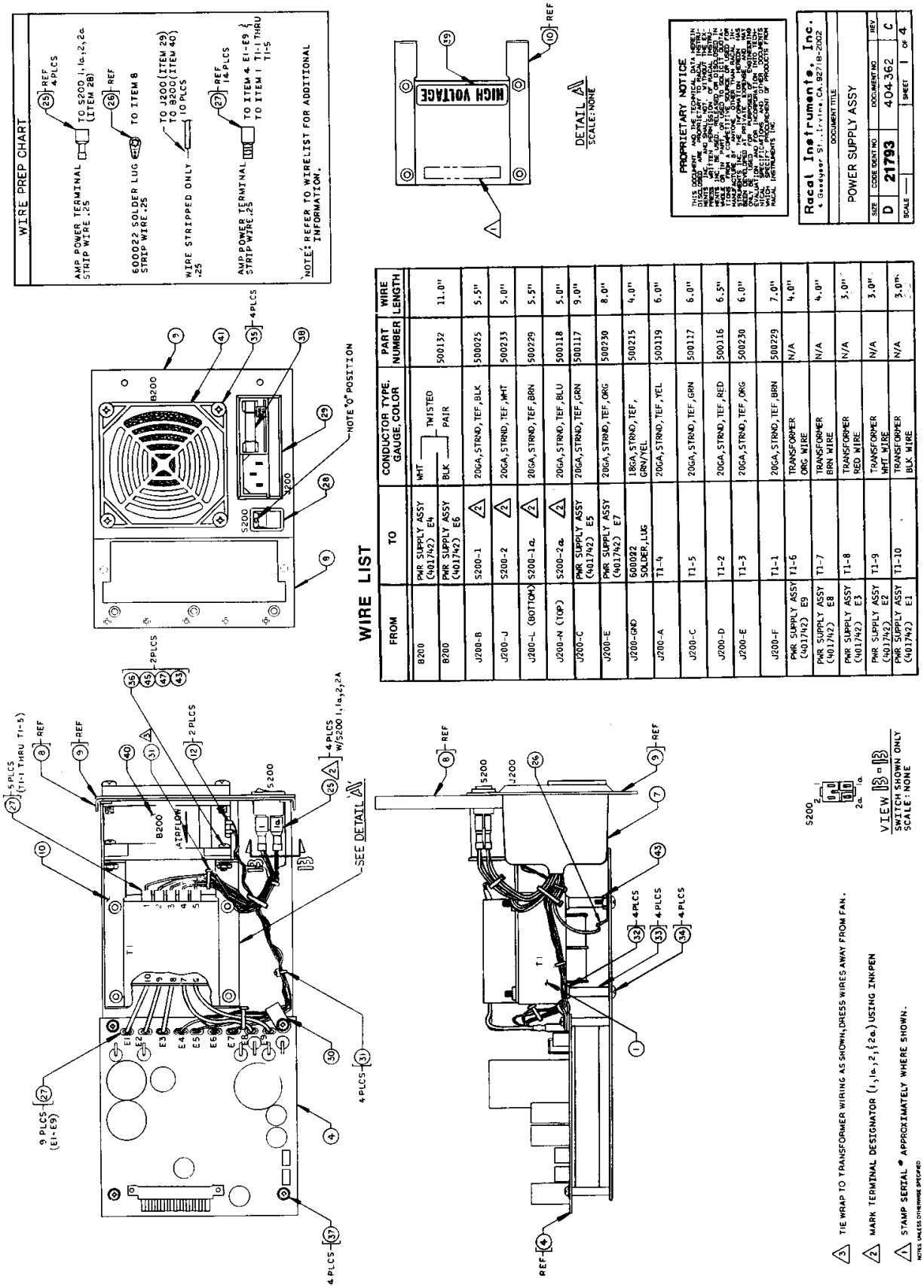
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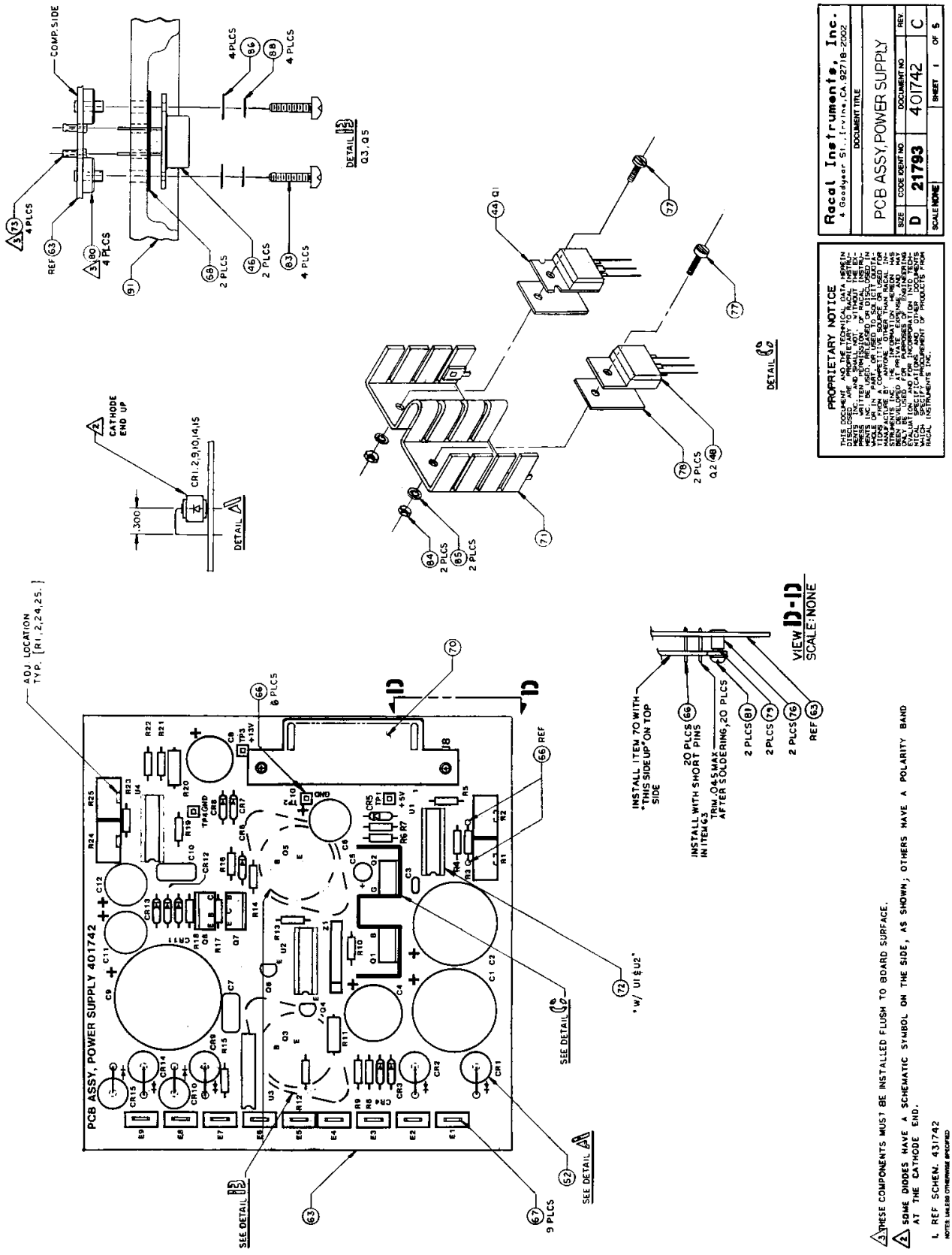
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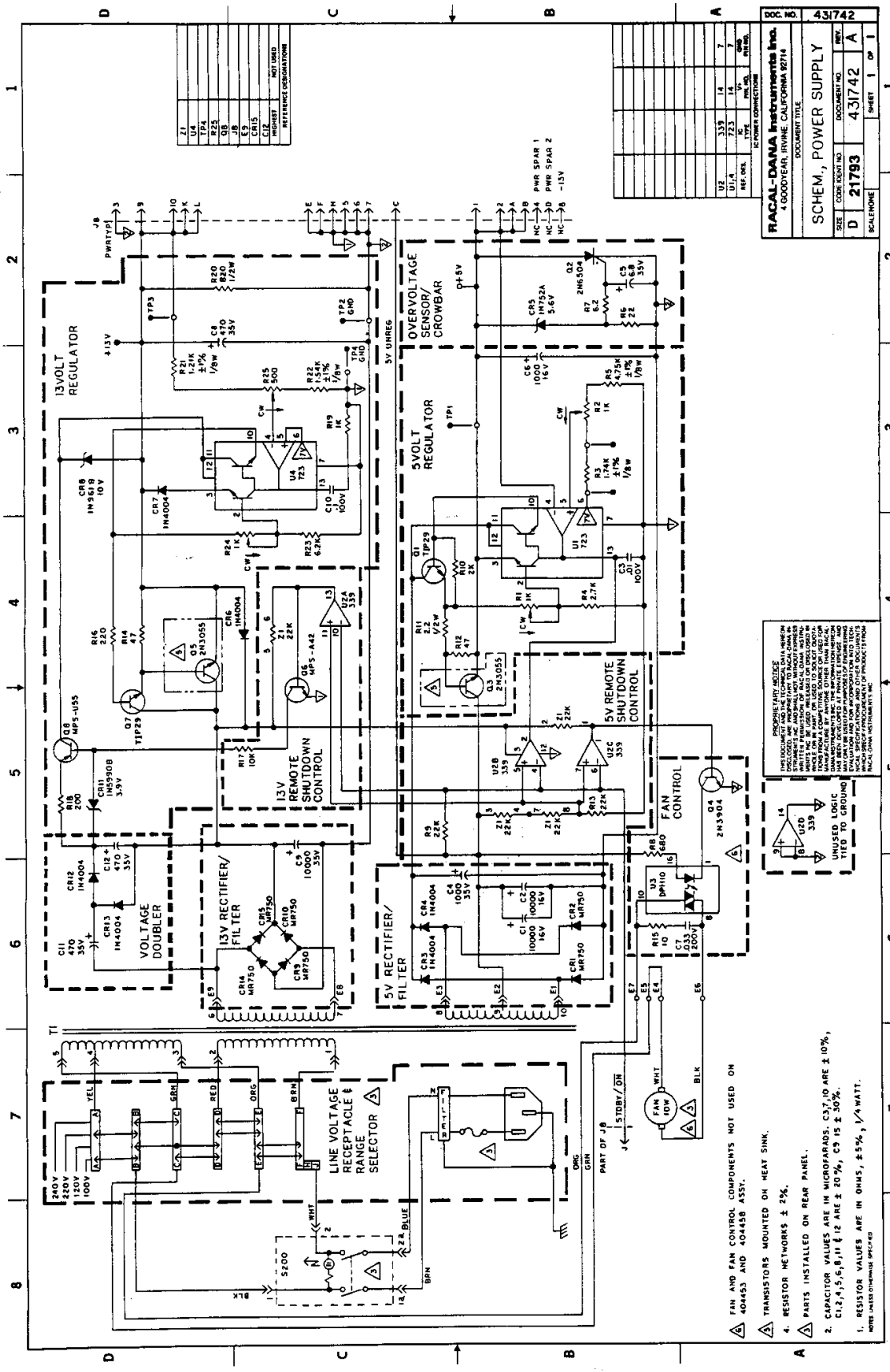
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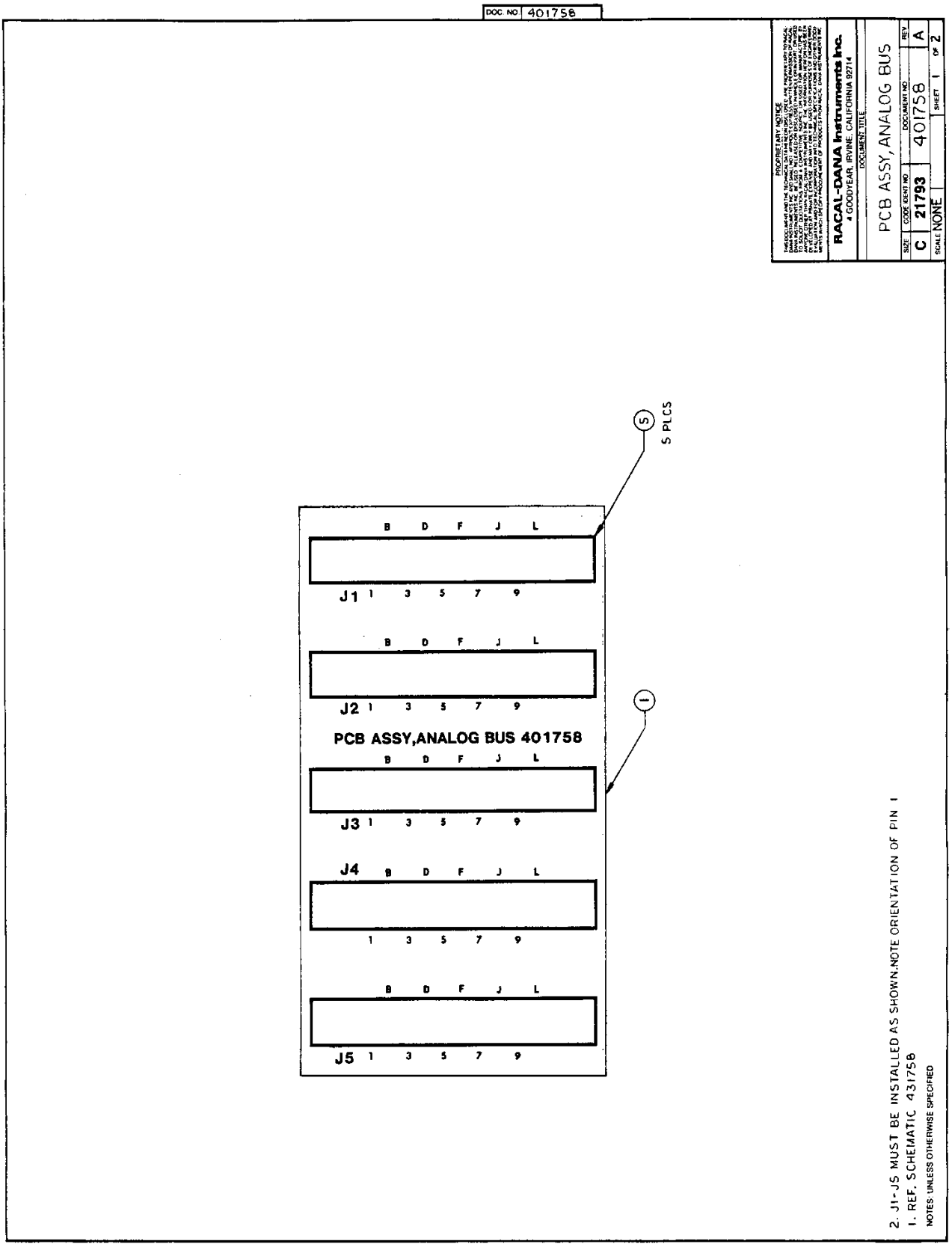
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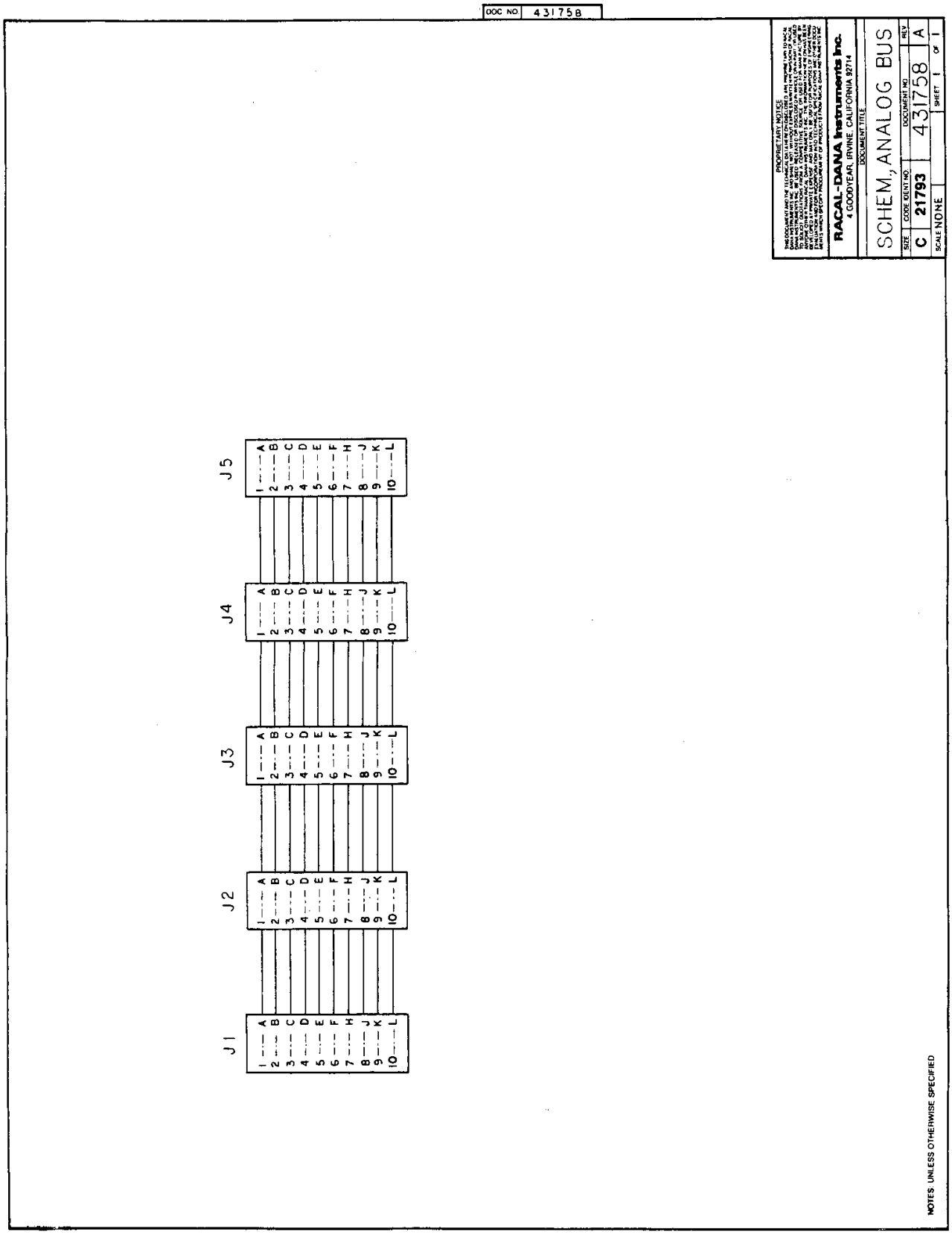
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Chapter 6

MODULE DRAWINGS

404447 Option 10, Breadboard Assembly 6-5
401754 PCB Assy., Breadboard 6-6
431754 Schematic, Breadboard 6-7

404448 Option 12, Actuator Assembly 6-9
401753 PCB Assy., Actuator 6-10
431753 Schematic, Actuator 6-11

404455 Option L12, Relay Actuator Module Assembly Mechanically Latching 6-14
404388 QD Assy., Terminal 6-15
401793 PCB Assy., Actuator 6-16
431793 Schematic, Actuator 6-17

401748 Option 14, Digital I/O Assy. 6-20
431748 Schematic, Digital I/O 6-21

404446 Option 15, Relay Driver Assembly 6-25
401759 PCB Assy., Relay Driver 6-26
431759 Schematic, Relay Driver 6-27

401954 Option 15A, PCB Assy., Relay Driver 6-29
431954 Schematic, Relay Driver 6-30

401889 Option 16, High Density Signal Switching Card 6-34
431889 Schematic, High Density Signal Switching Card 6-35

404445 Option 20, Power Module Assembly 6-40
401757 PCB Assy., Power Module 6-41
431757 Schematic, Power Module 6-42

404444 Option 30, Scanner/Mux Module Assembly 6-45
401755 PCB Assy., Scanner/Mux Module 6-46
431755 Schematic, Scanner/Mux Module 6-47

404456 Option L30, Signal Multiplexer Mechanically Latching 6-50
404388 QD Assy., Terminal 6-15
401792 PCB Assy., Signal Multiplexer 6-51
431792 Schematic, Signal Multiplexer 6-52

404707 Option 30B, Signal /Multiplexer 6-55
401900 PCB Assy., Signal /Multiplexer 6-56
431900 Schematic, Signal /Multiplexer 6-57

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404612	Option 30C, Scanner/Mux Module Assembly	6-64
401755-001	PCB Assy., Scanner/Mux Module	6-55
431755-001	Schematic, Scanner/Mux Module	6-66
404613	Option 30D, Scanner/Mux Module Assembly	6-69
401755-002	PCB Assy., Scanner/Mux Module	6-70
431755-002	Schematic, Scanner/Mux Module	6-71
401961	Option 35, Signal /Multiplexer, 4(1X6), 4-Wire	6-74
431961	Schematic, Signal /Multiplexer	6-75
404443	Option 40, Matrix Module Assembly	6-86
401756	PCB Assy., Matrix Module	6-87
431756	Schematic, Matrix Module	6-88
404457	Option L40, Signal Matrix Mechanically Latching	6-91
404388	QD Assy., Terminal	6-15
401791	PCB Assy., Signal Matrix	6-92
431791	Schematic, Signal Matrix	6-93
404711	Option 40B, Signal Matrix, 4X5, 4-Wire	6-96
401896	PCB Assy., Signal Matrix	6-97
431896	Schematic, Signal Matrix	6-98
404712,-001	Option 45, 45A, Signal Matrix, 4X12, 2-Wire	6-101
401898,-001	PCB Assy., Signal Matrix	6-102
431898,-001	Schematic, Signal Matrix	6-103
401745	Option 50, 200 MHz, 4/4:1 RF Multiplexer	6-111
431745	Schematic, 200 MHz, 4/4:1 RF Multiplexer	6-112
401749	Option 51A, 500 MHz, 2/4:1 RF Multiplexer	6-115
431749	Schematic, 500 MHz, 2/4:1 RF Multiplexer	6-116
404368	Option 51B, 500 MHz, 4/4:1 RF Multiplexer	6-119
431749	Schematic, 500 MHz, 4/4:1 RF Multiplexer	6-116
401750	Option 52A, 1 GHz X 2 RF Multiplexer	6-120
431750	Schematic, 1 GHz X 2 RF Multiplexer	6-122
404369	Option 52B, 1 GHz X 4 RF Multiplexer	6-121
431750	Schematic, 1 GHz X 4 RF Multiplexer	6-122
401790	Option L52B, RF Multiplexer 1 GHz Mechanically Latching	6-125
431790	Schematic, RF Multiplexer	6-126
404642	Option 54B, Terminated 50 Ohm 1 GHz Module	6-130
431887	Schematic, Terminated 50 Ohm 1 GHz Module	6-131
401895	Option 55B, Terminated 75 Ohm 1 GHz Module	6-137
431895	Schematic, Terminated 75 Ohm 1 GHz Module	6-138

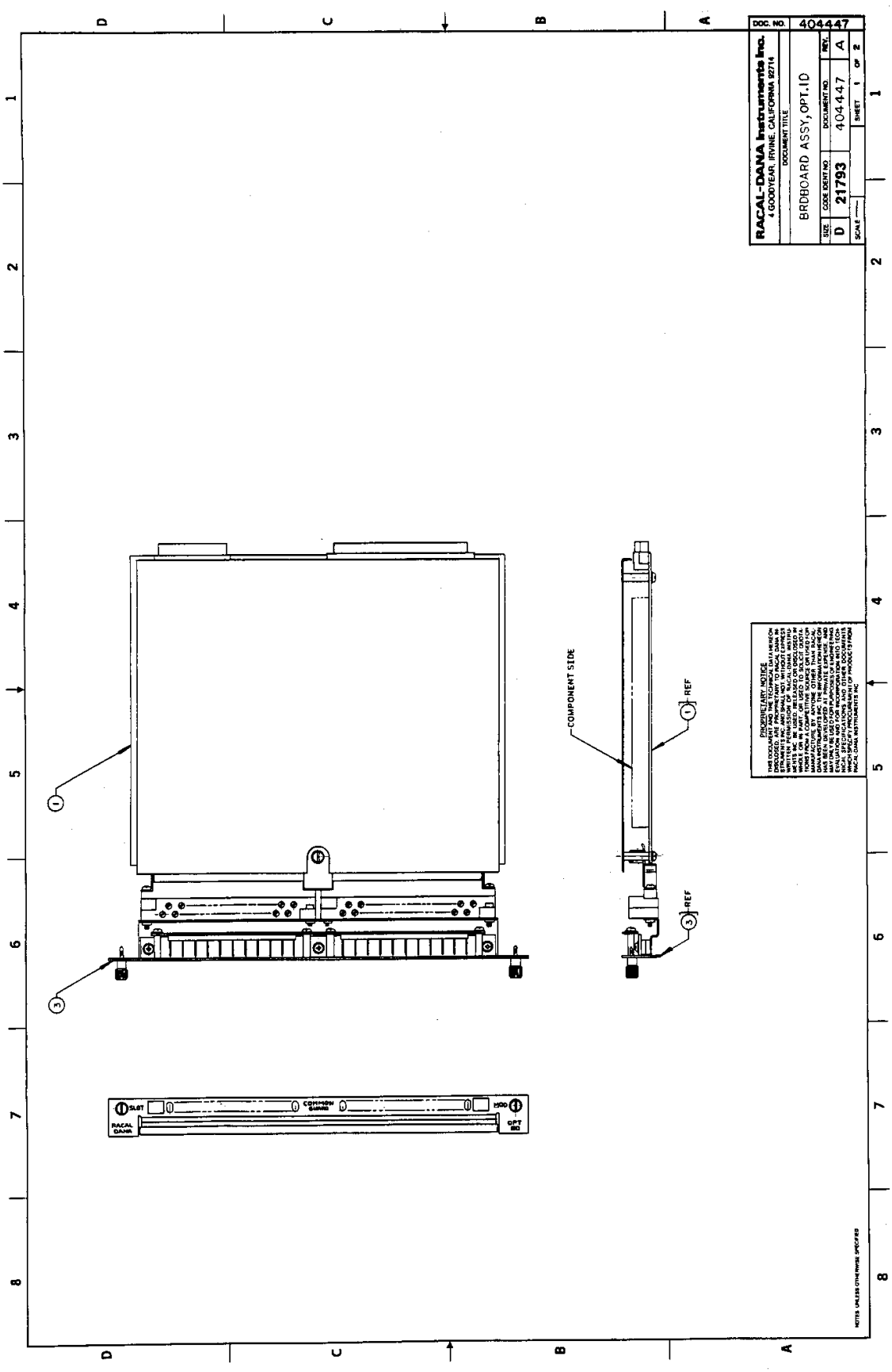
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401751	Option 60A, 18 GHz X 2 Switch Module	6-144
431751	Schematic, 18 GHz X 2 Switch Module	6-145
404370	Option 60B, 18 GHz X 4 Switch Module	6-148
431751	Schematic, 18 GHz X 4 Switch Module	6-145
404371	Option 61A, 26.5 GHz X 2 Switch Module	6-149
431751	Schematic, 26.5 GHz X 2 Switch Module	6-145
404372	Option 61B, 26.5 GHz X 4 Switch Module	6-150
431751	Schematic, 26.5 GHz X 4 Switch Module	6-145
401995	Option 65, Latching 18 GHz Microwave Switch Module	6-151
431995	Schematic, Latching 18 GHz Microwave Switch Module	6-152
404381	Option 80, Terminal Block	6-157
431761	PCB Assy., Shield Common	6-158
404363	Option 90, Keyboard/Display Assembly	6-159
401741	PCB Assy., Keyboard/Display	6-160
431741	Schematic, Keyboard/Display	6-161
405066	Option 750, 750 Ohm, 4/1:4 RF Multiplexer	6-163
435066	Schematic, 750 Ohm, 4/1:4 RF Multiplexer	6-163

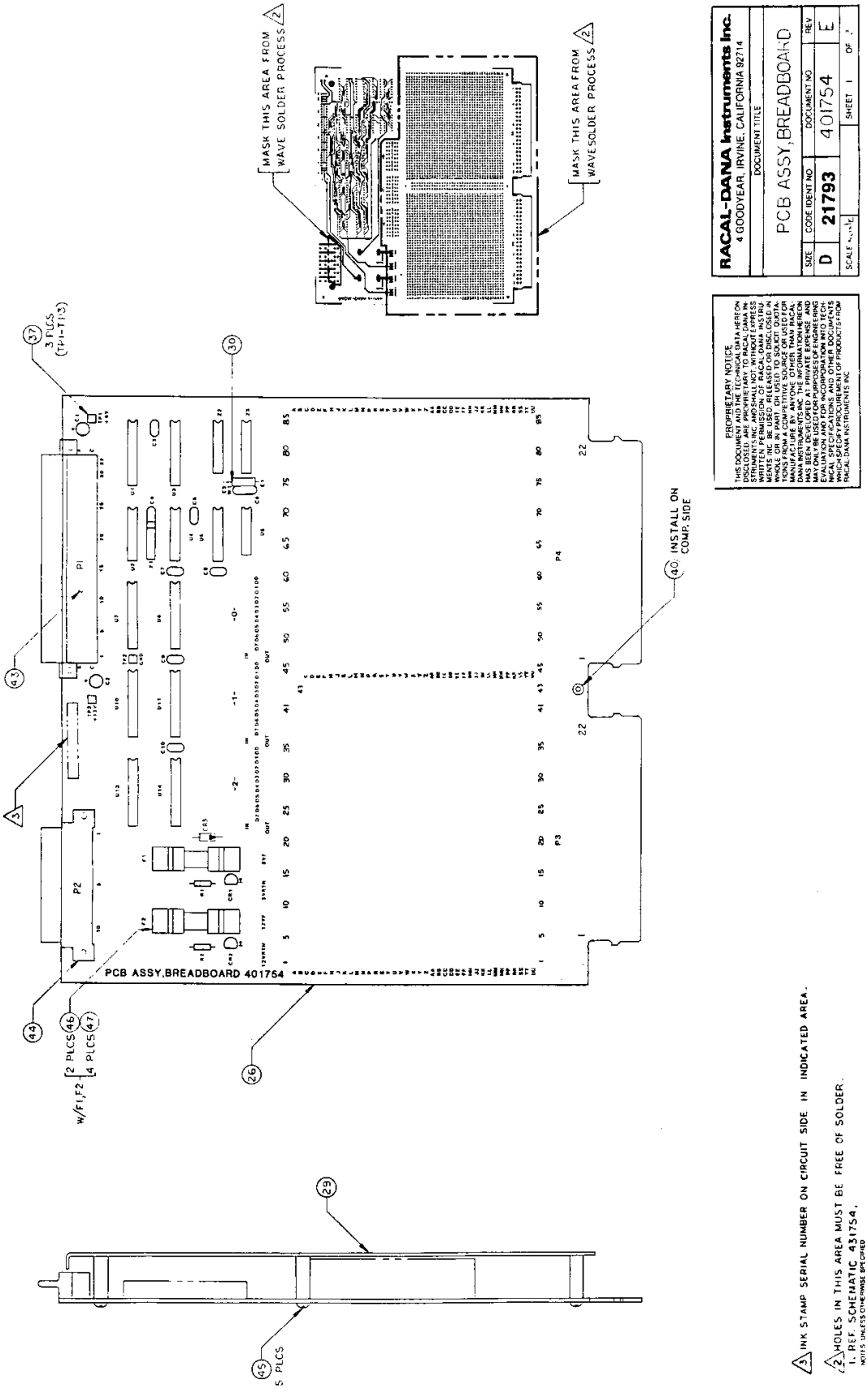
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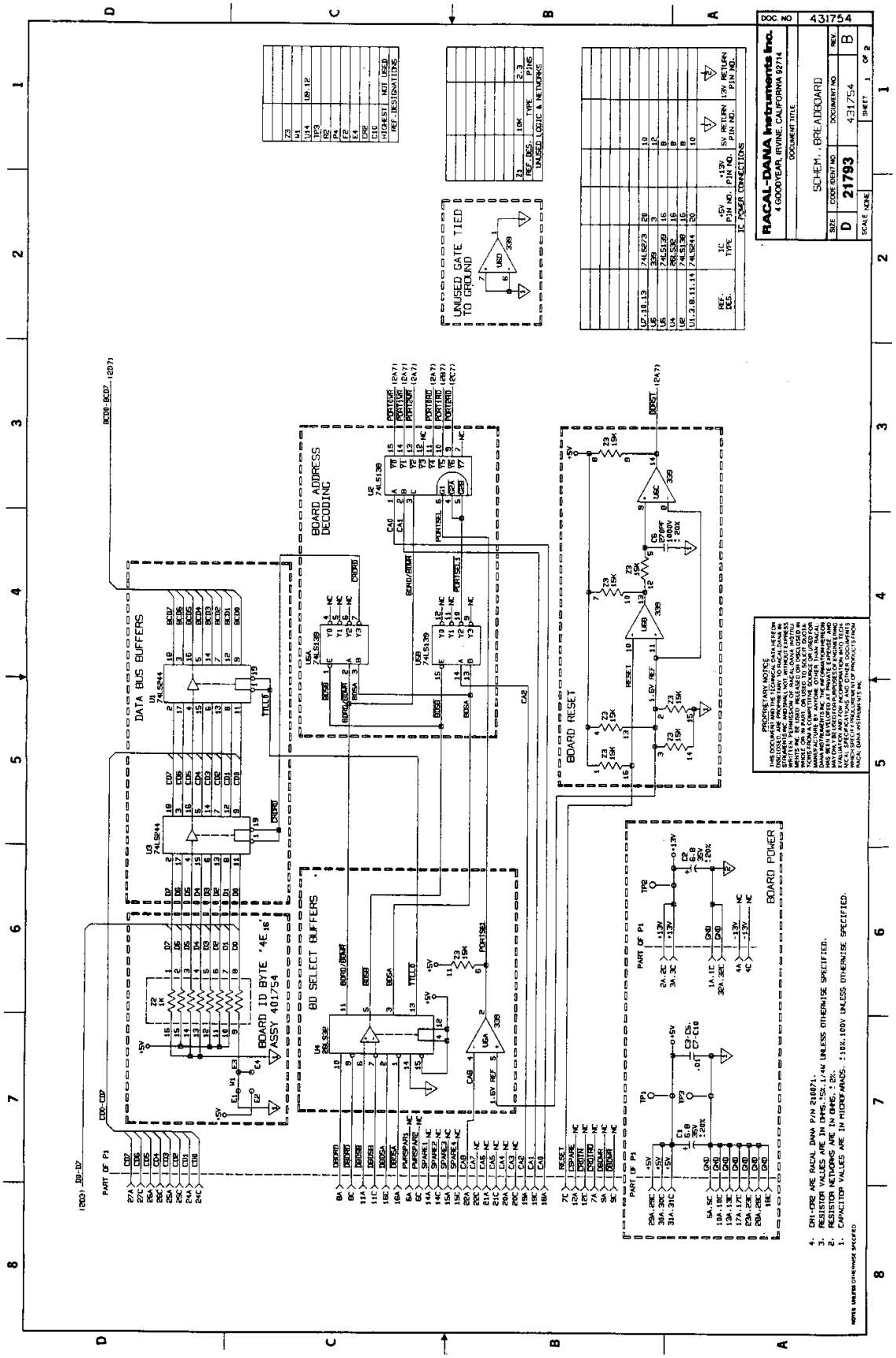
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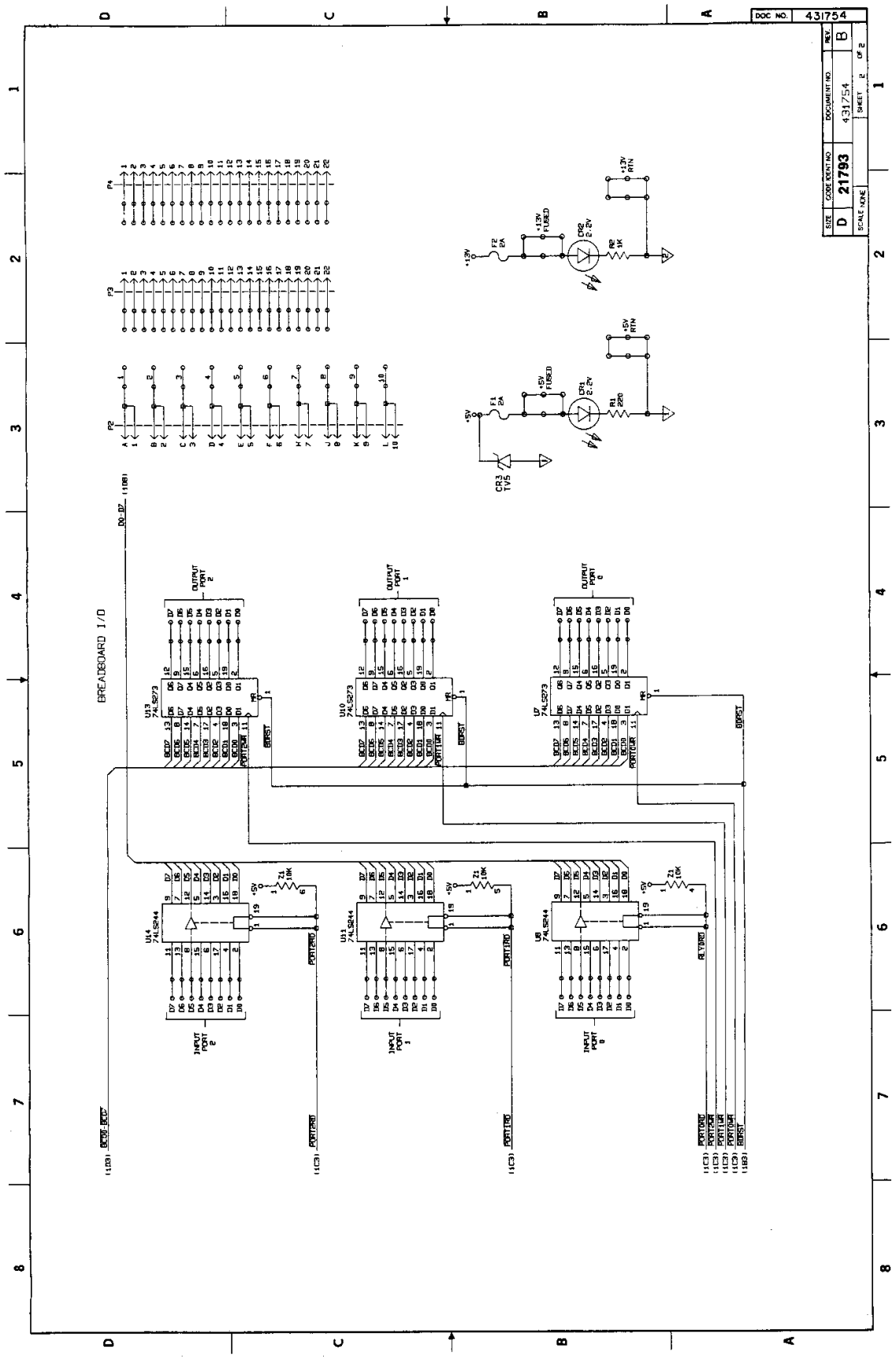
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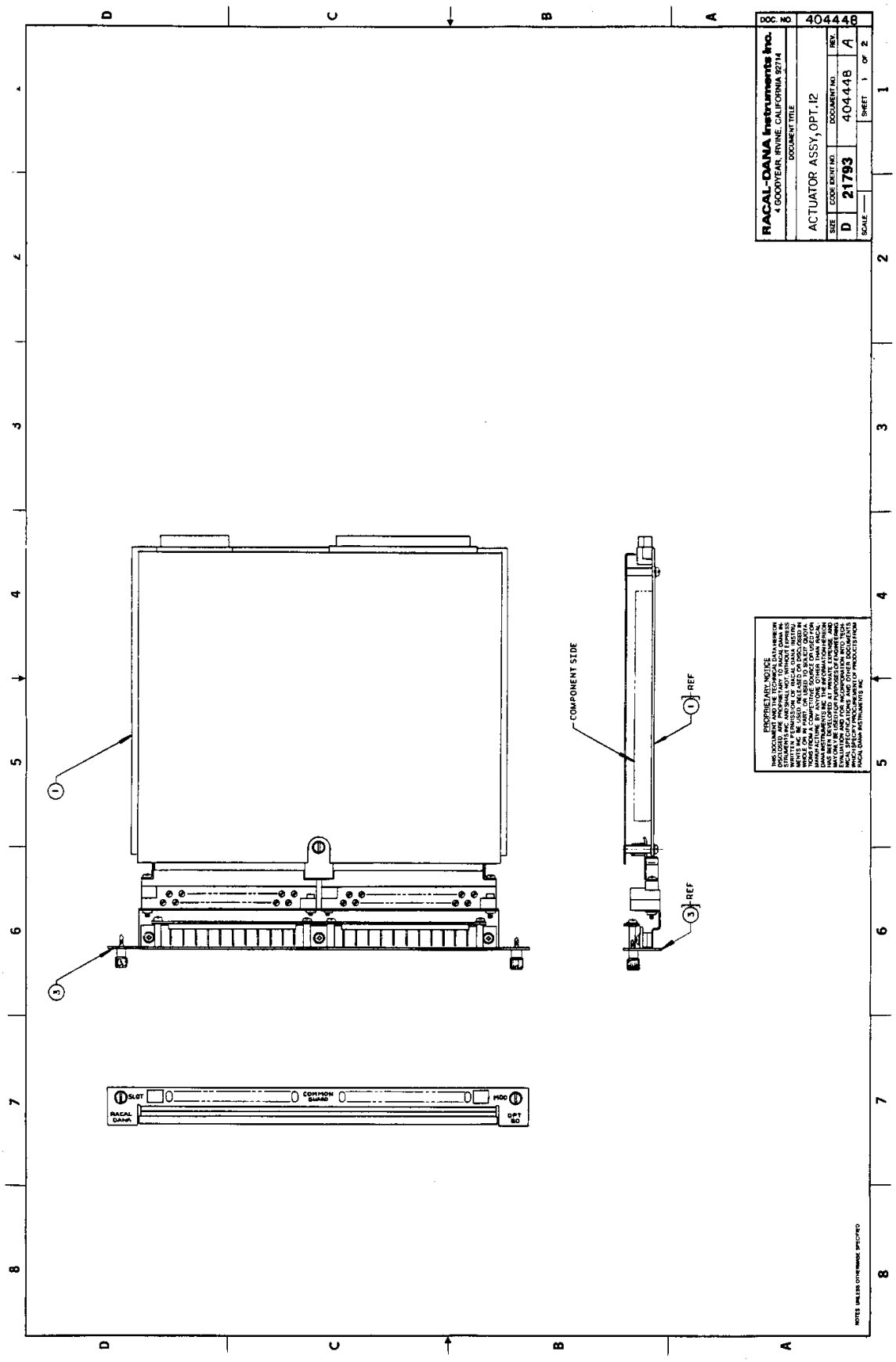
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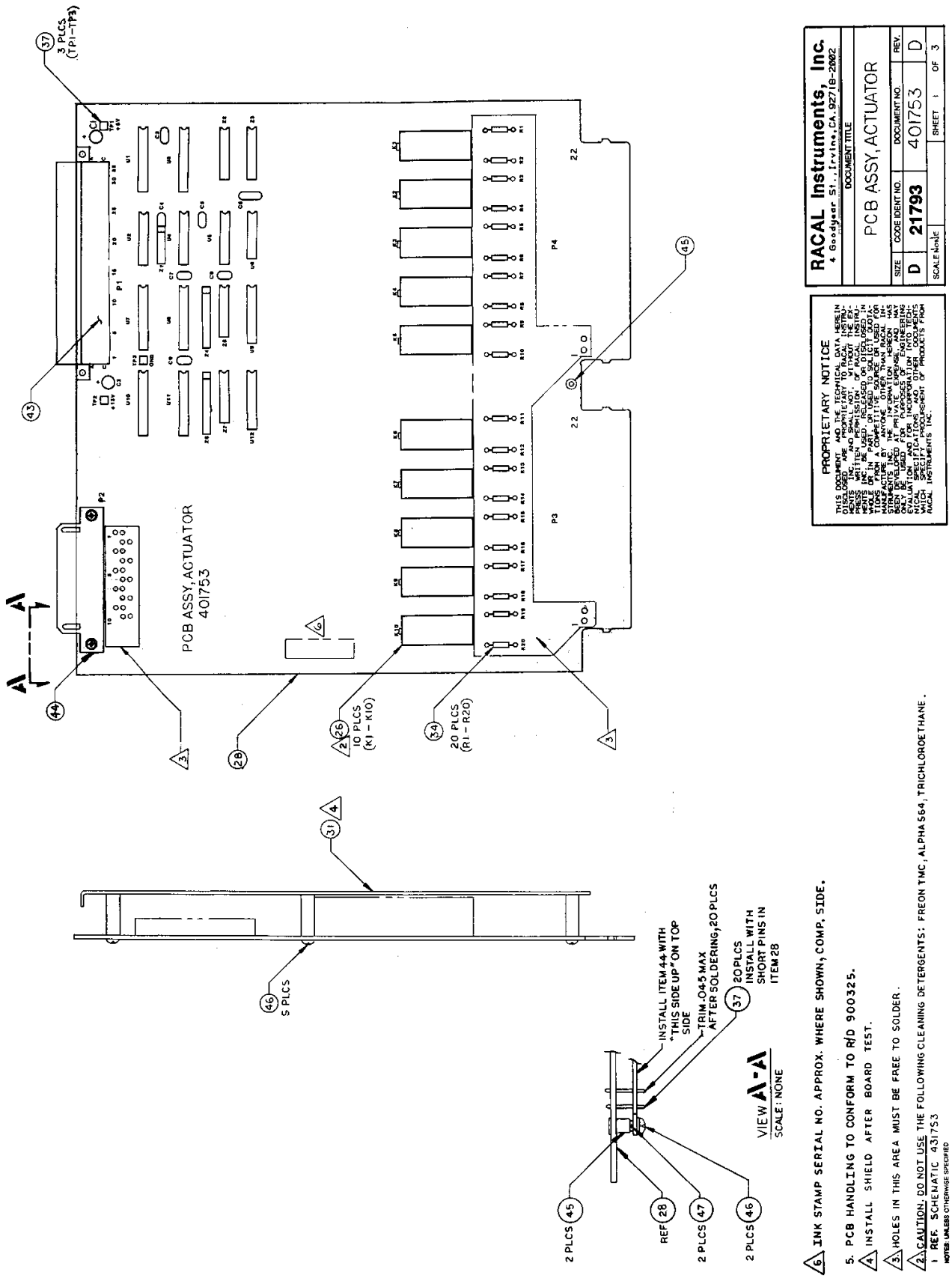
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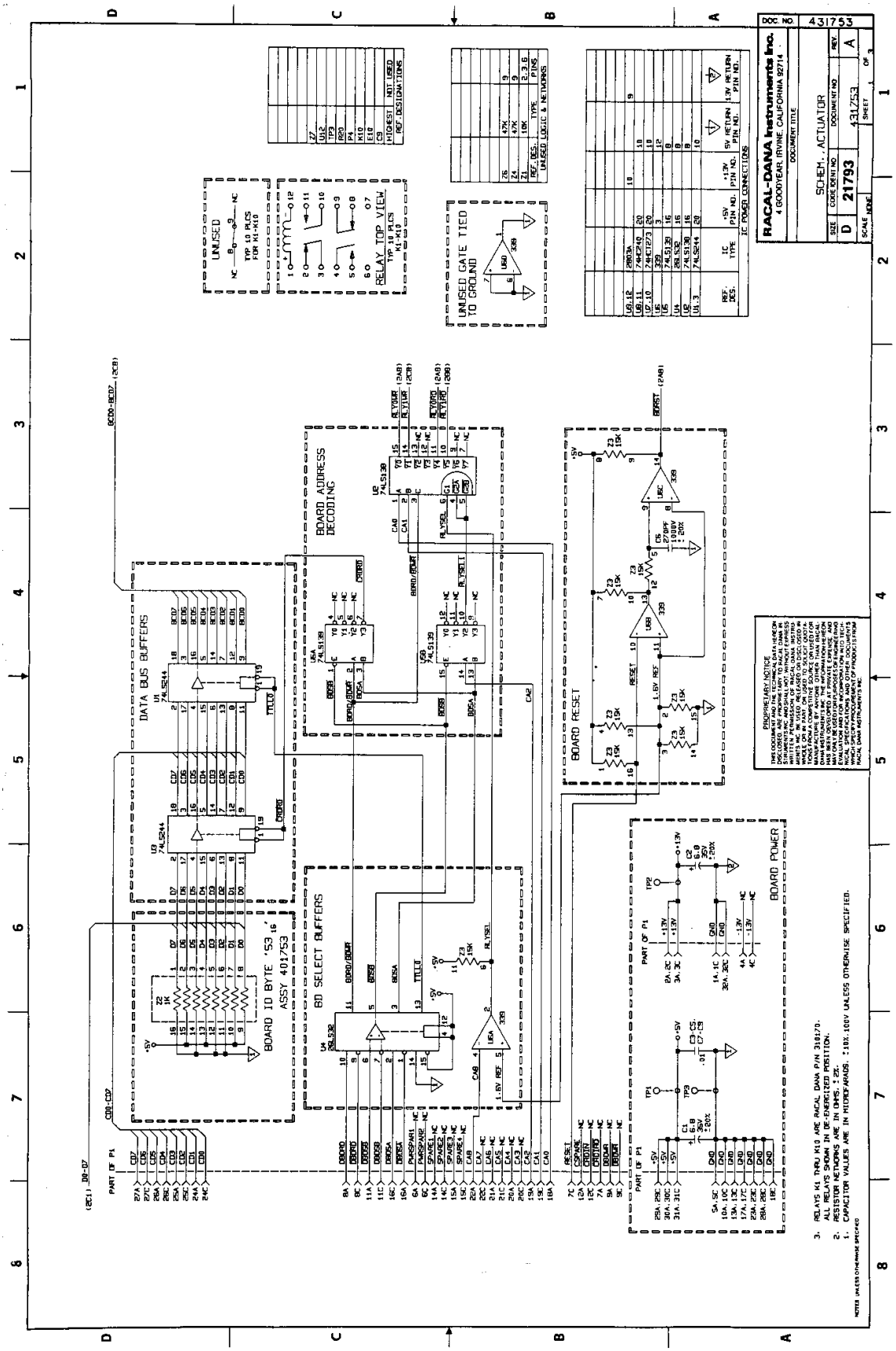
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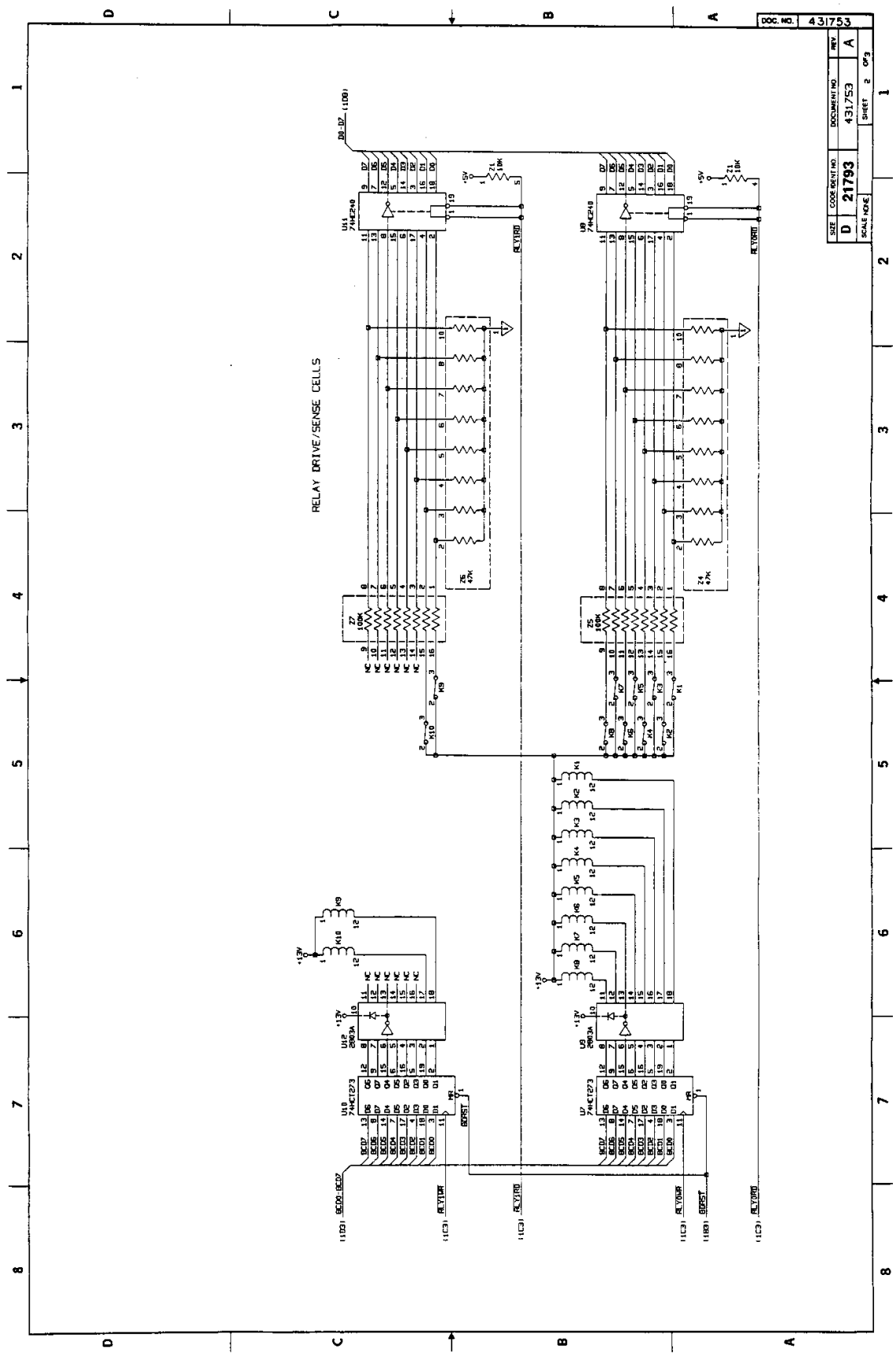
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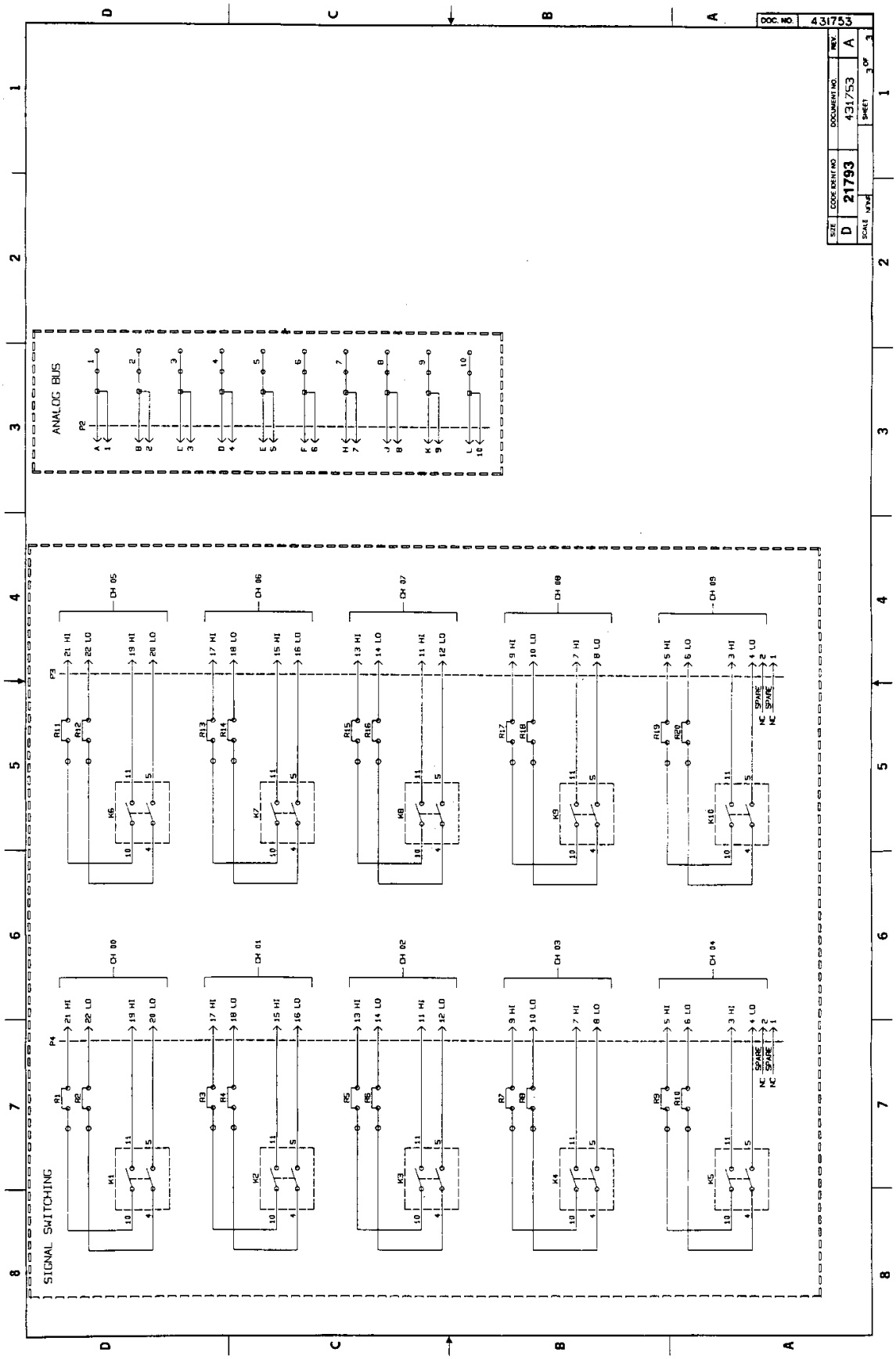
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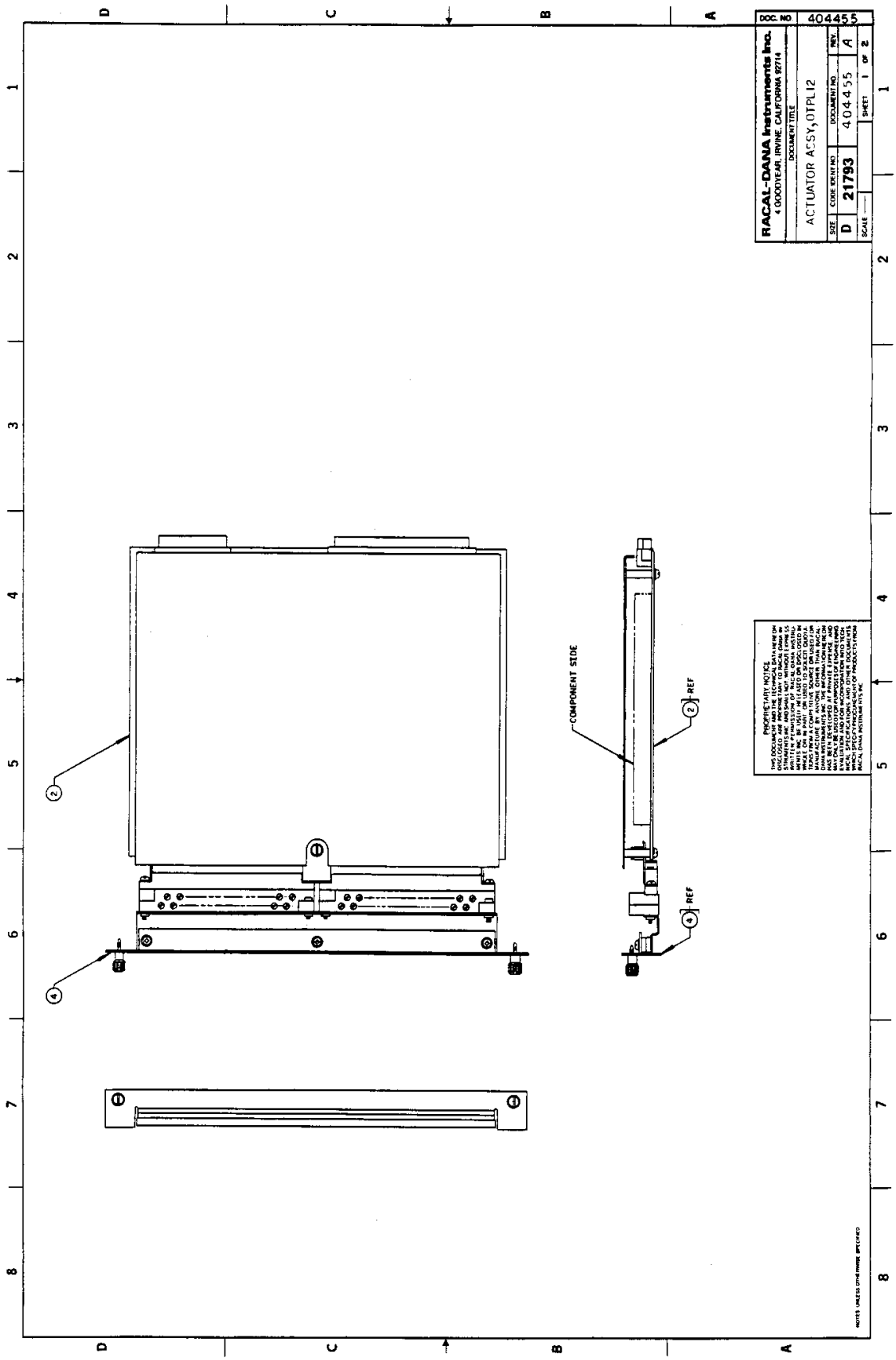
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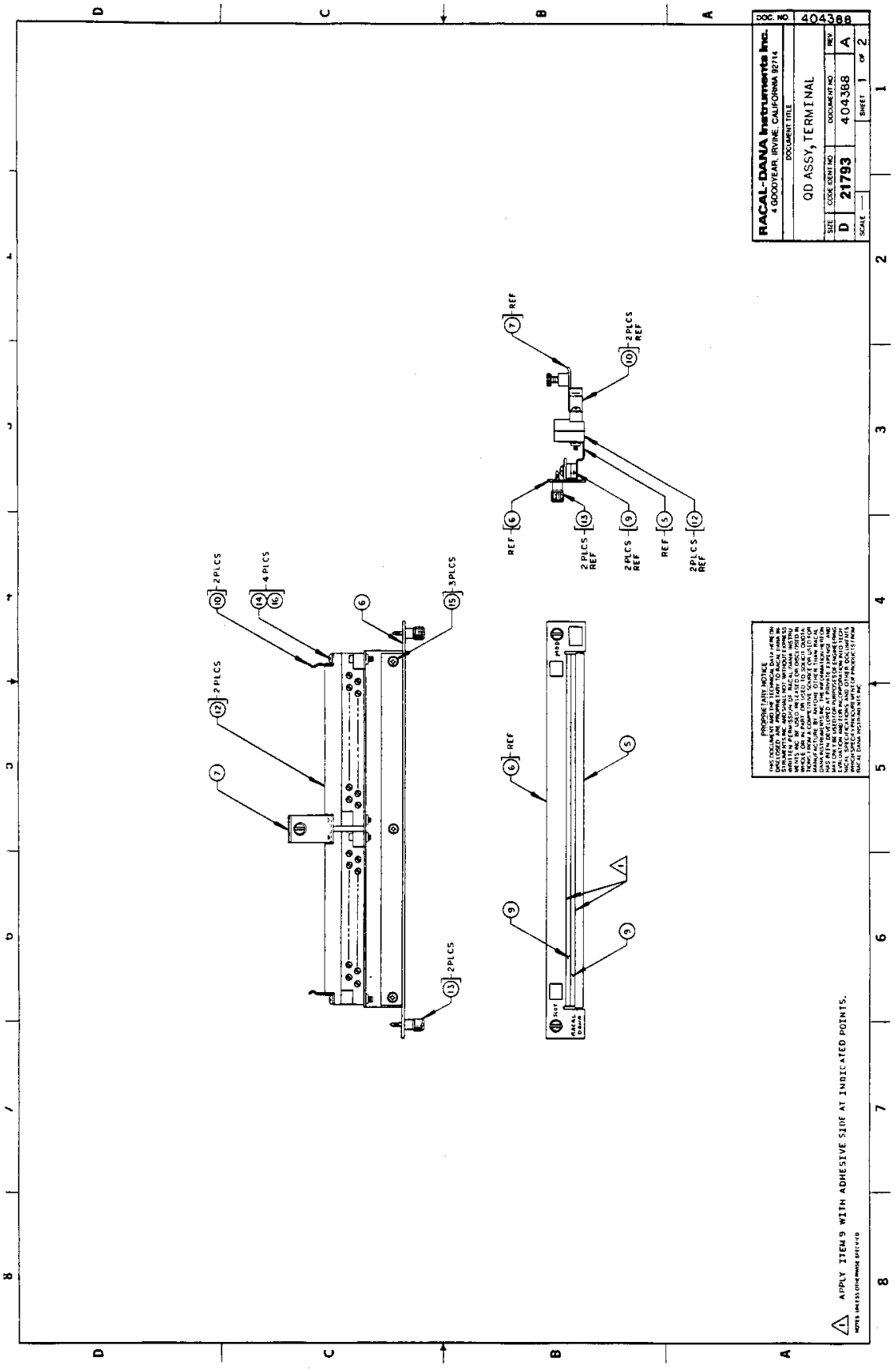
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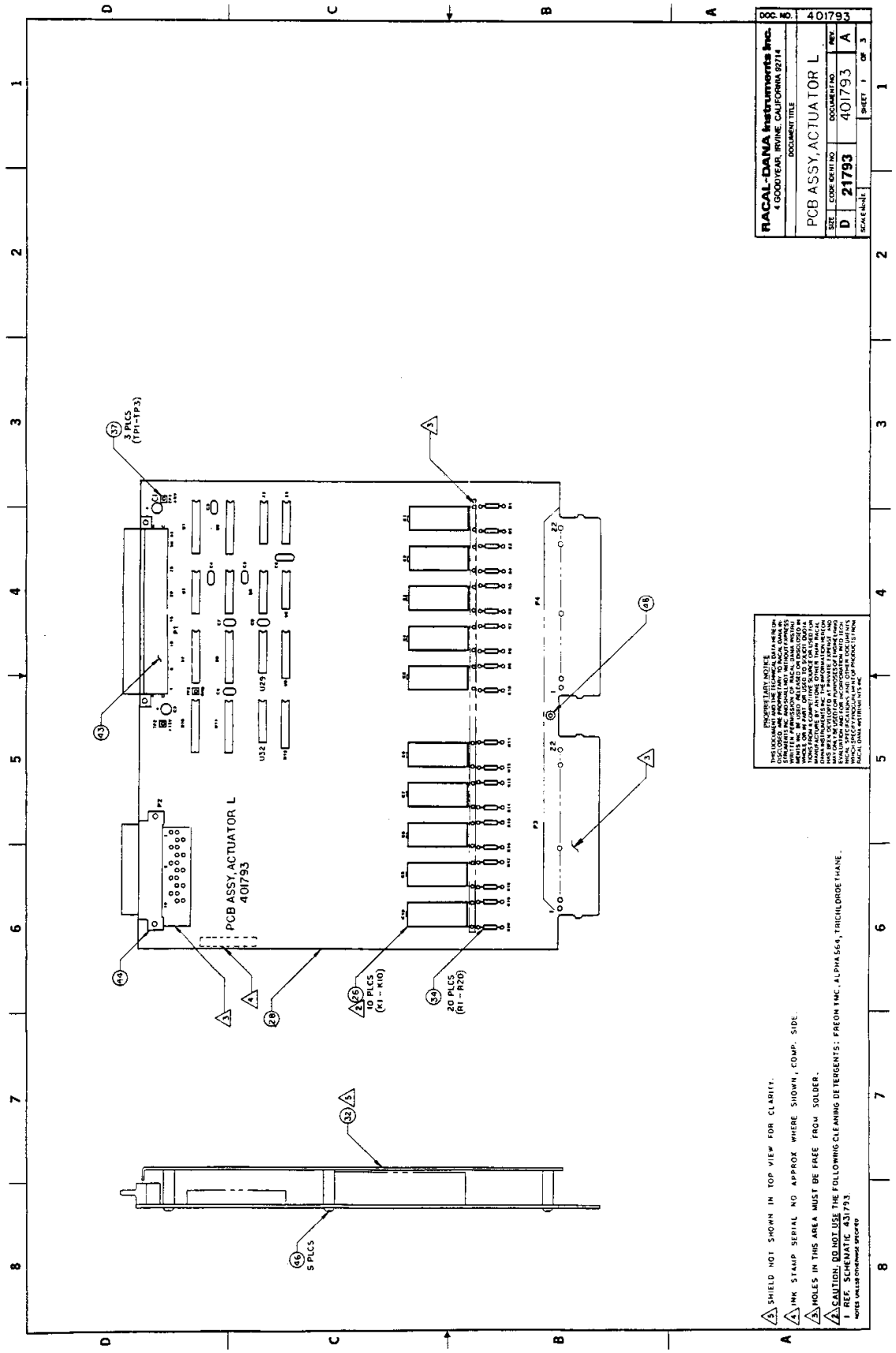
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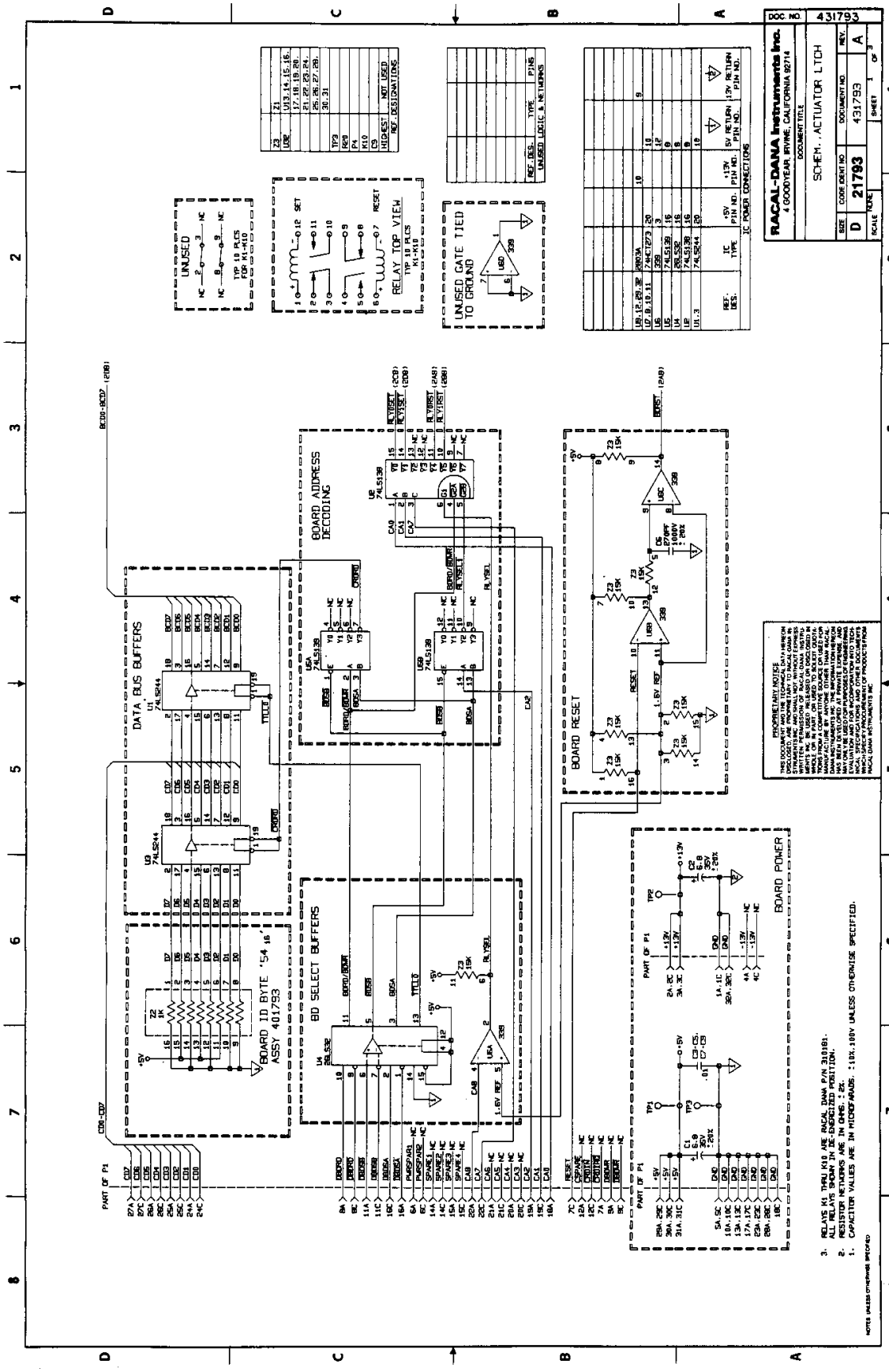
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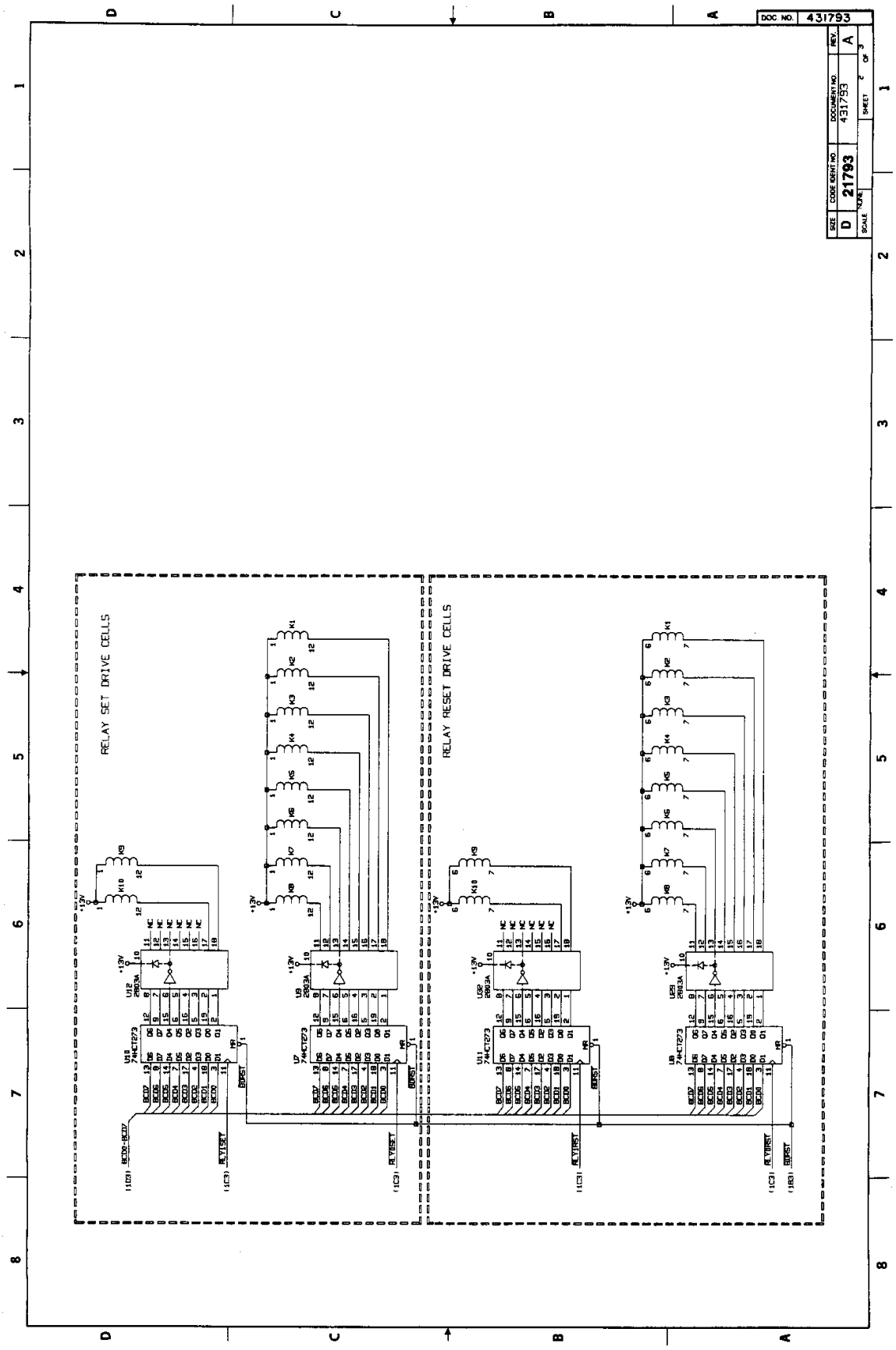
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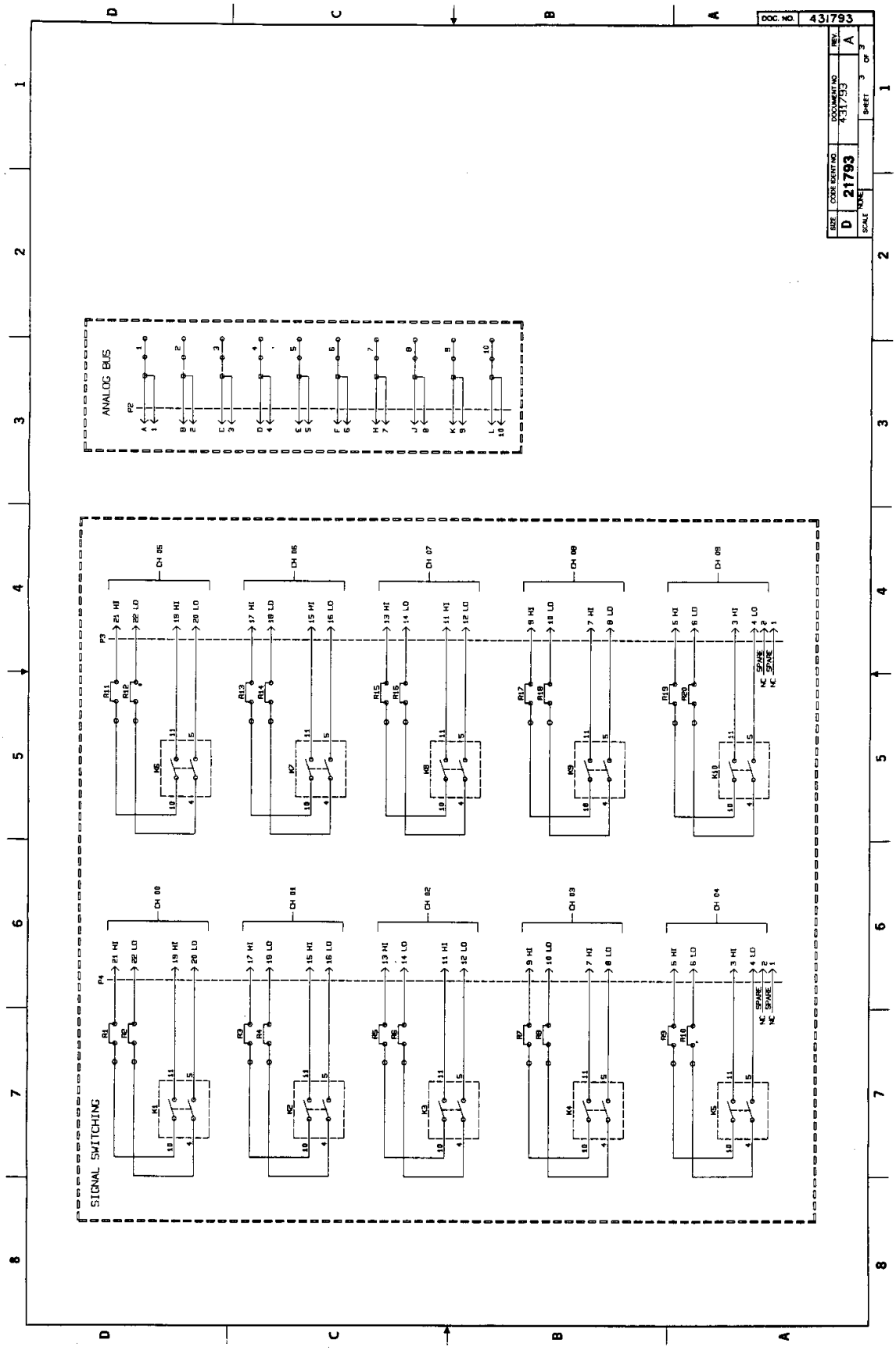
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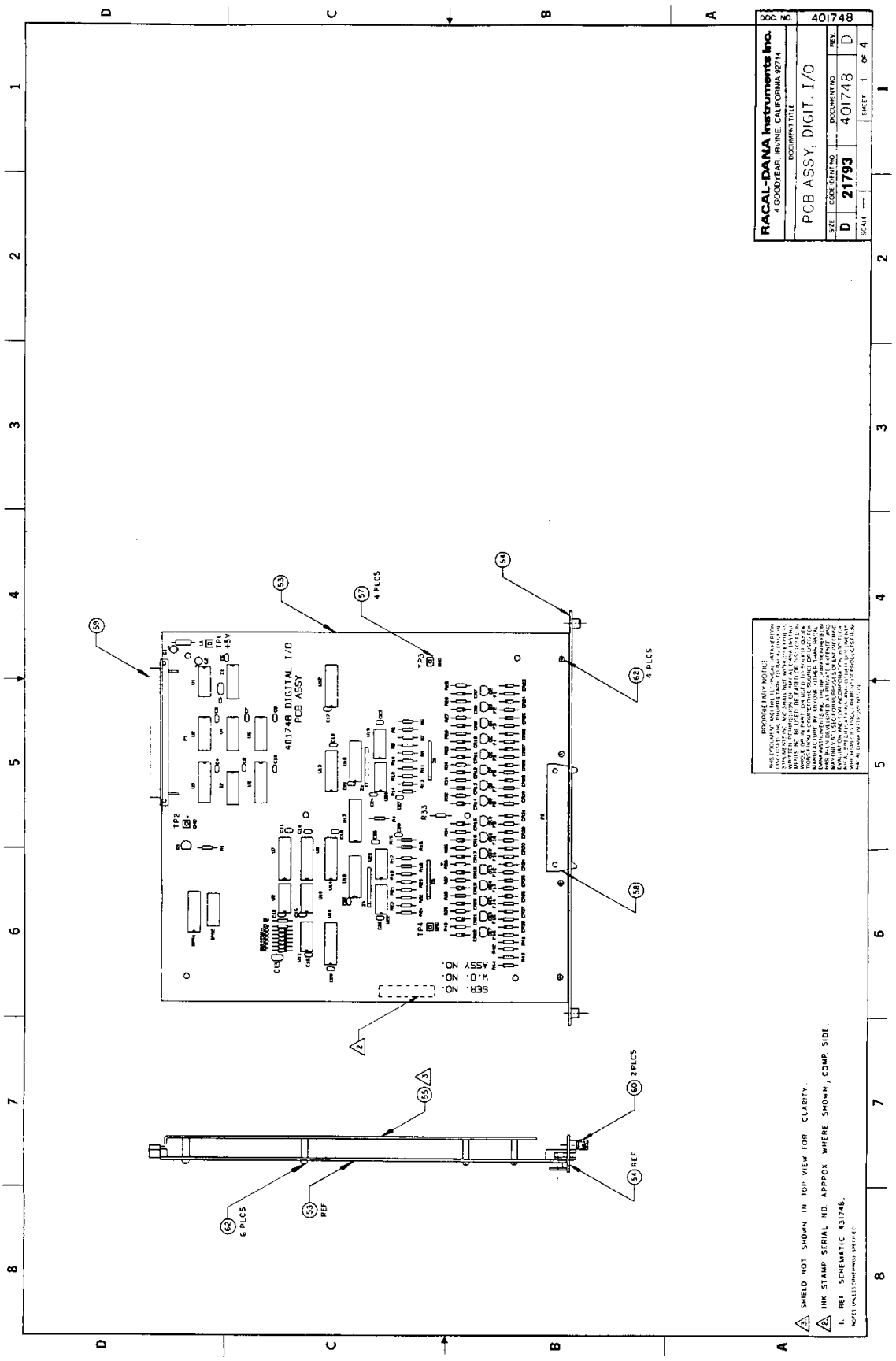
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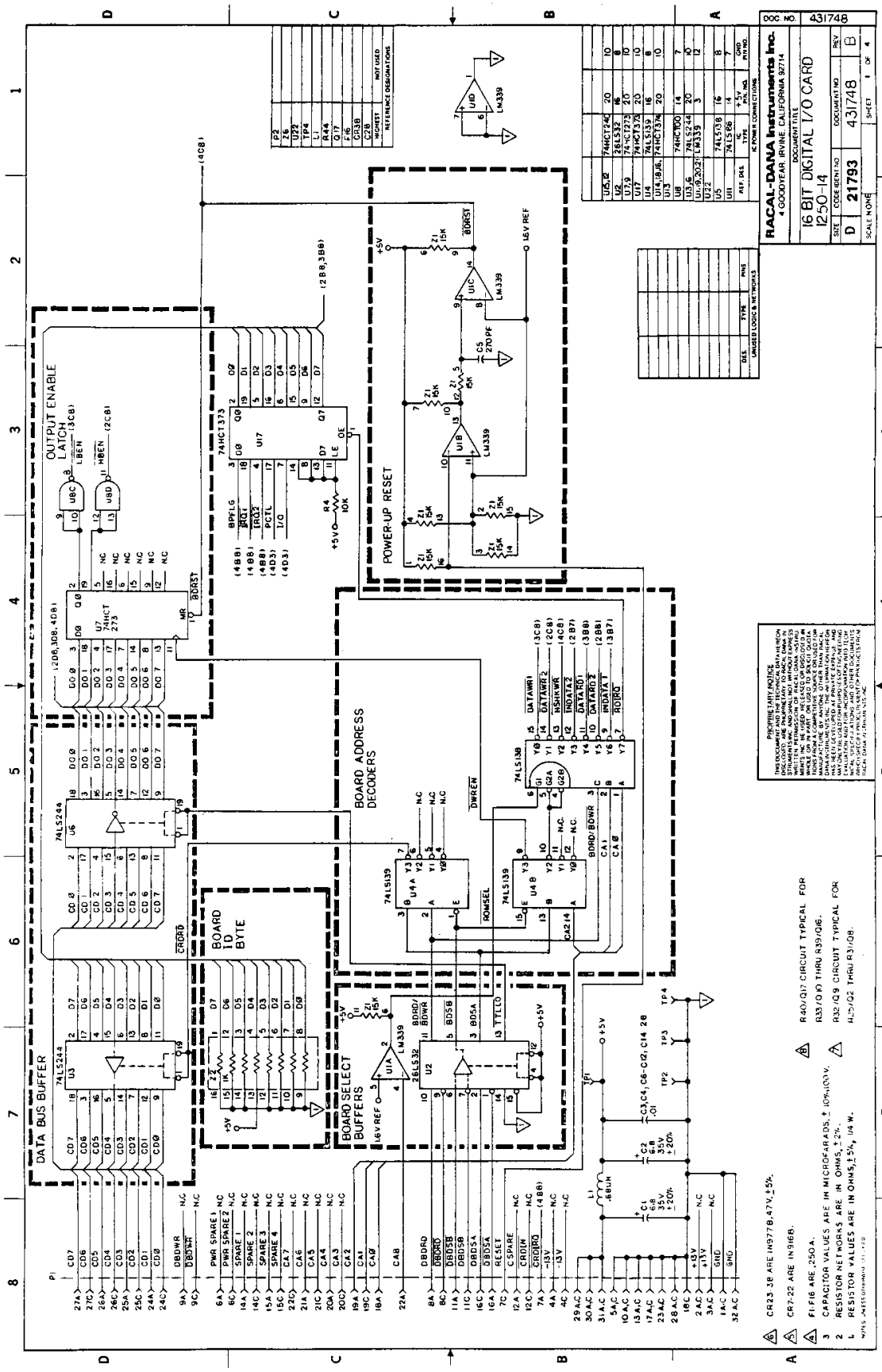
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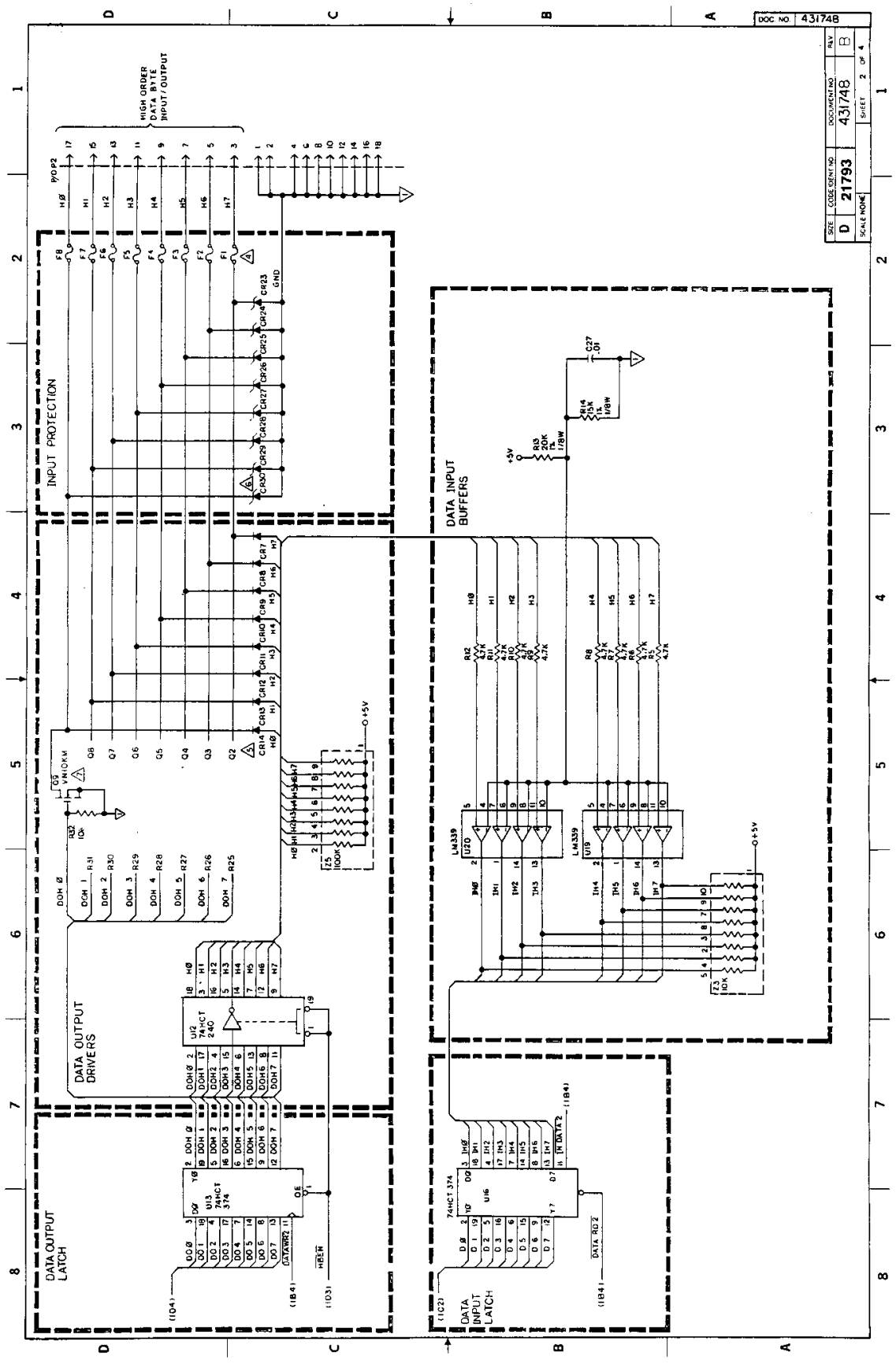
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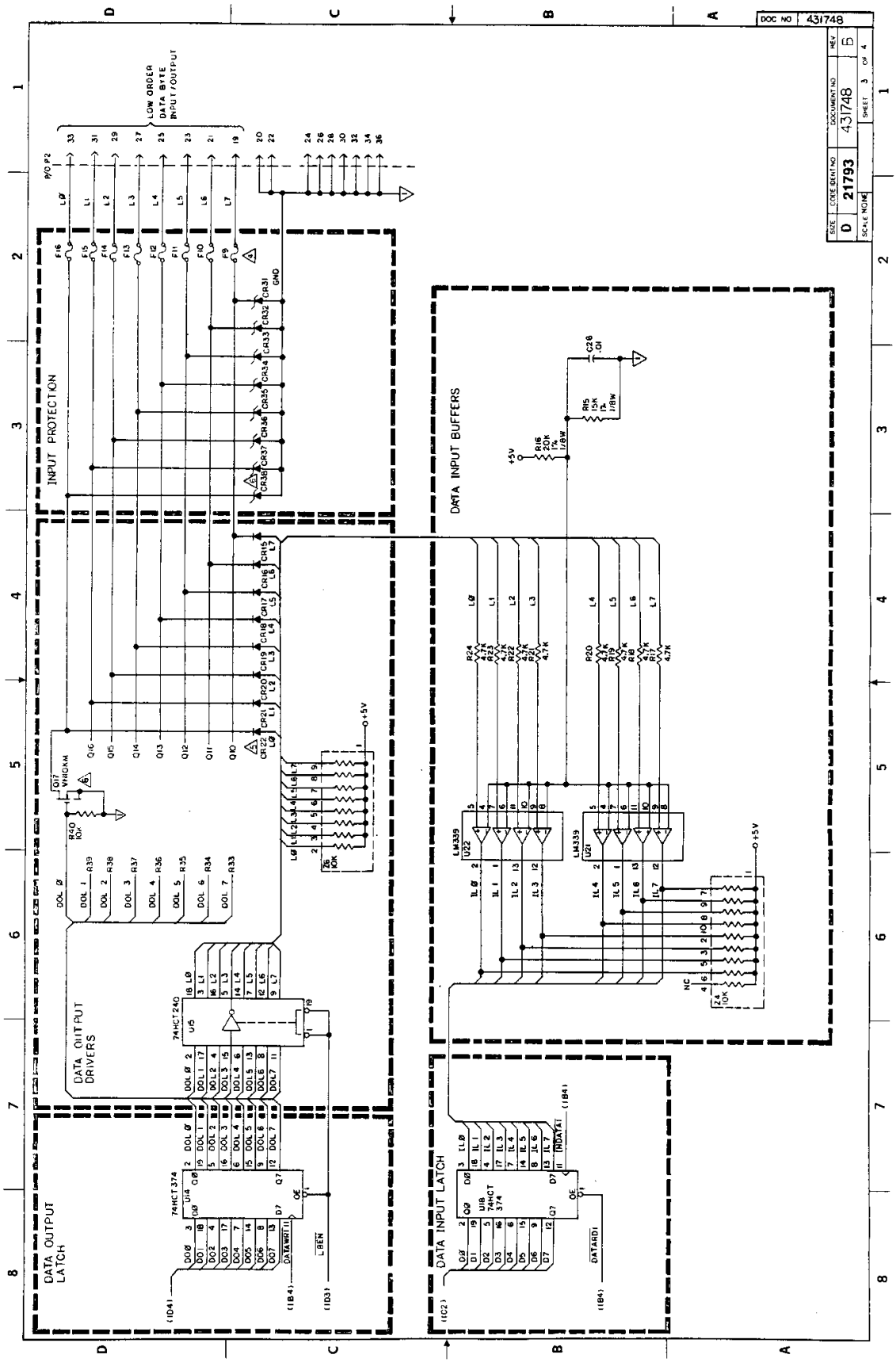
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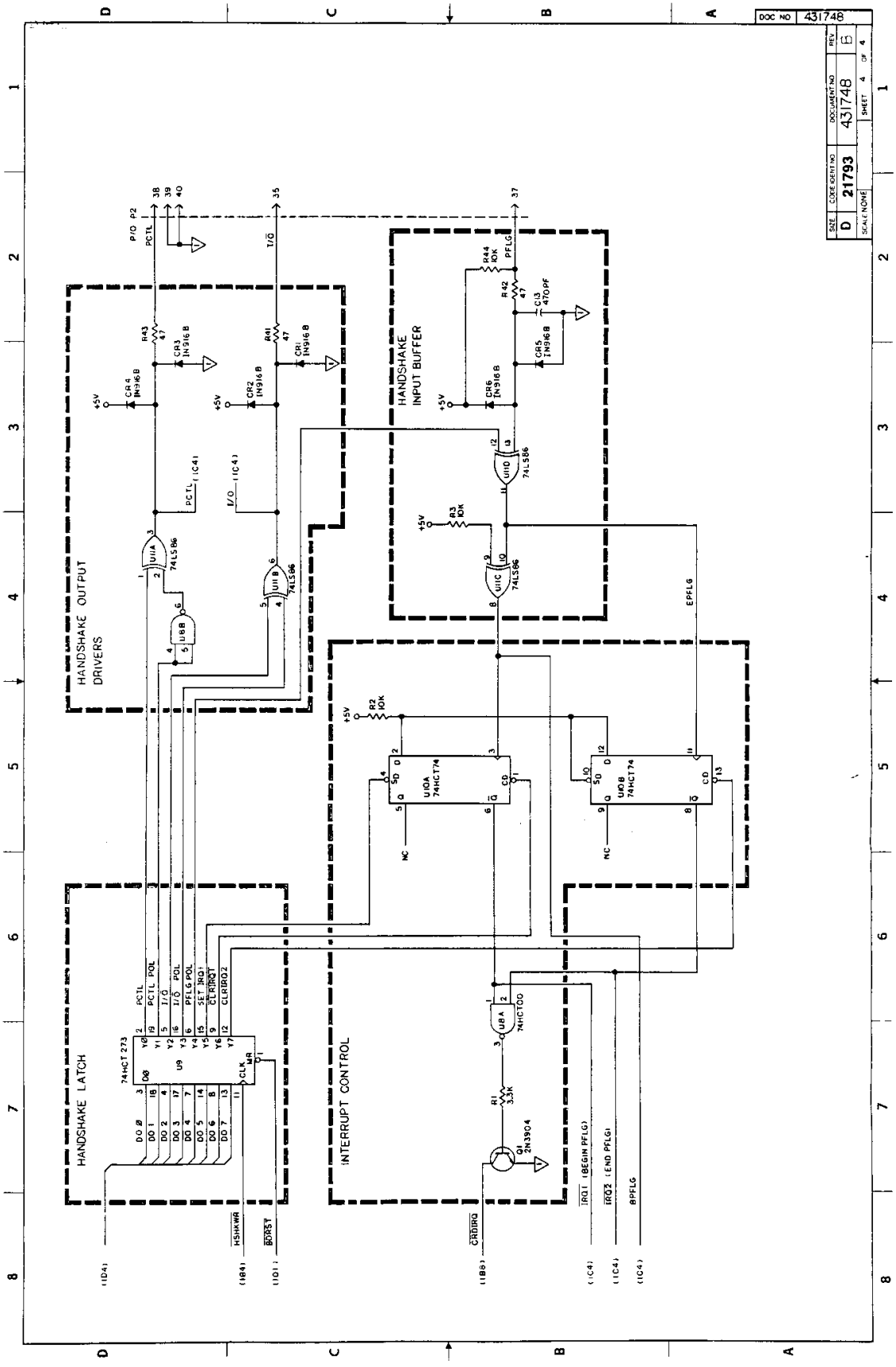
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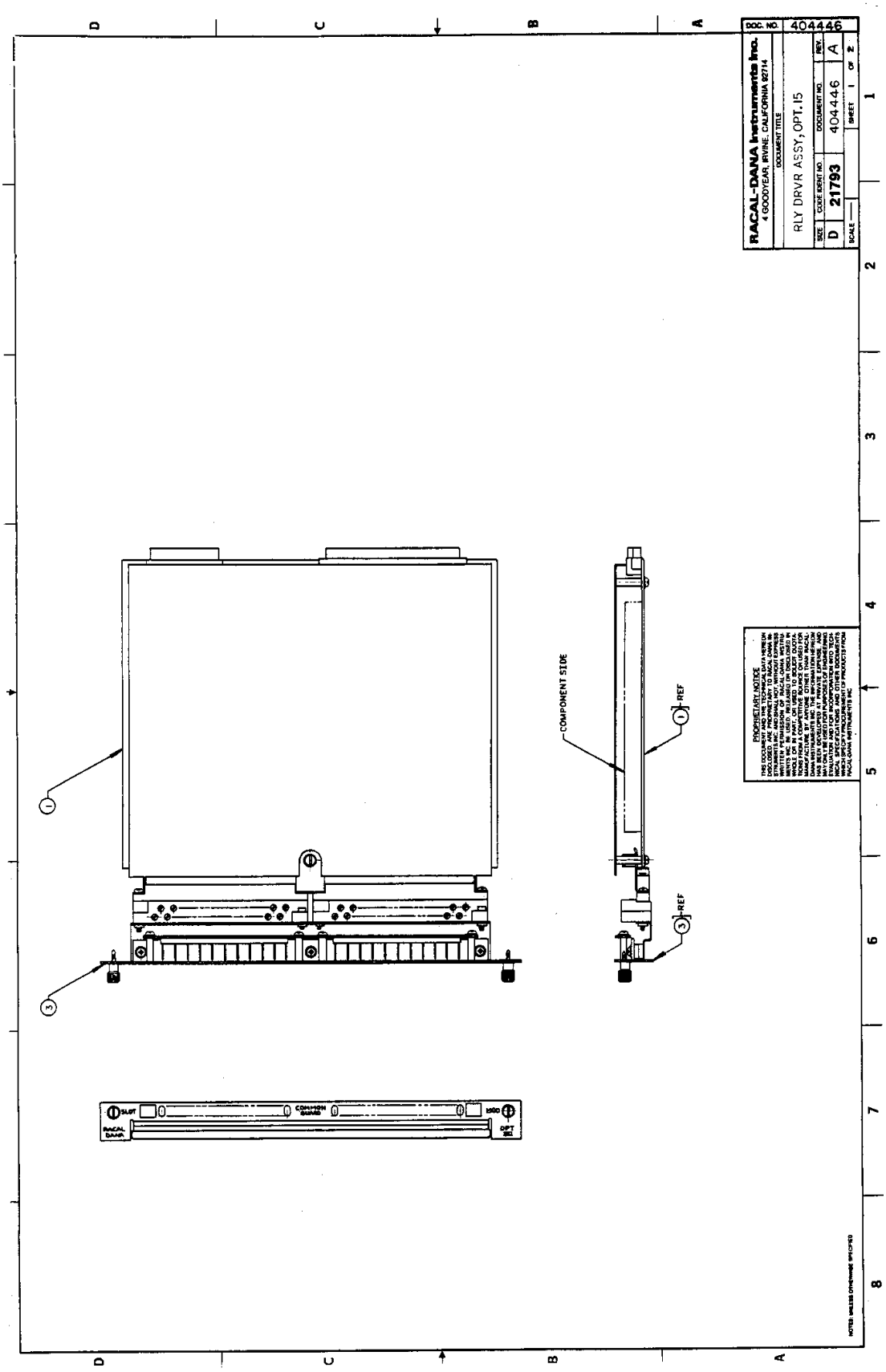
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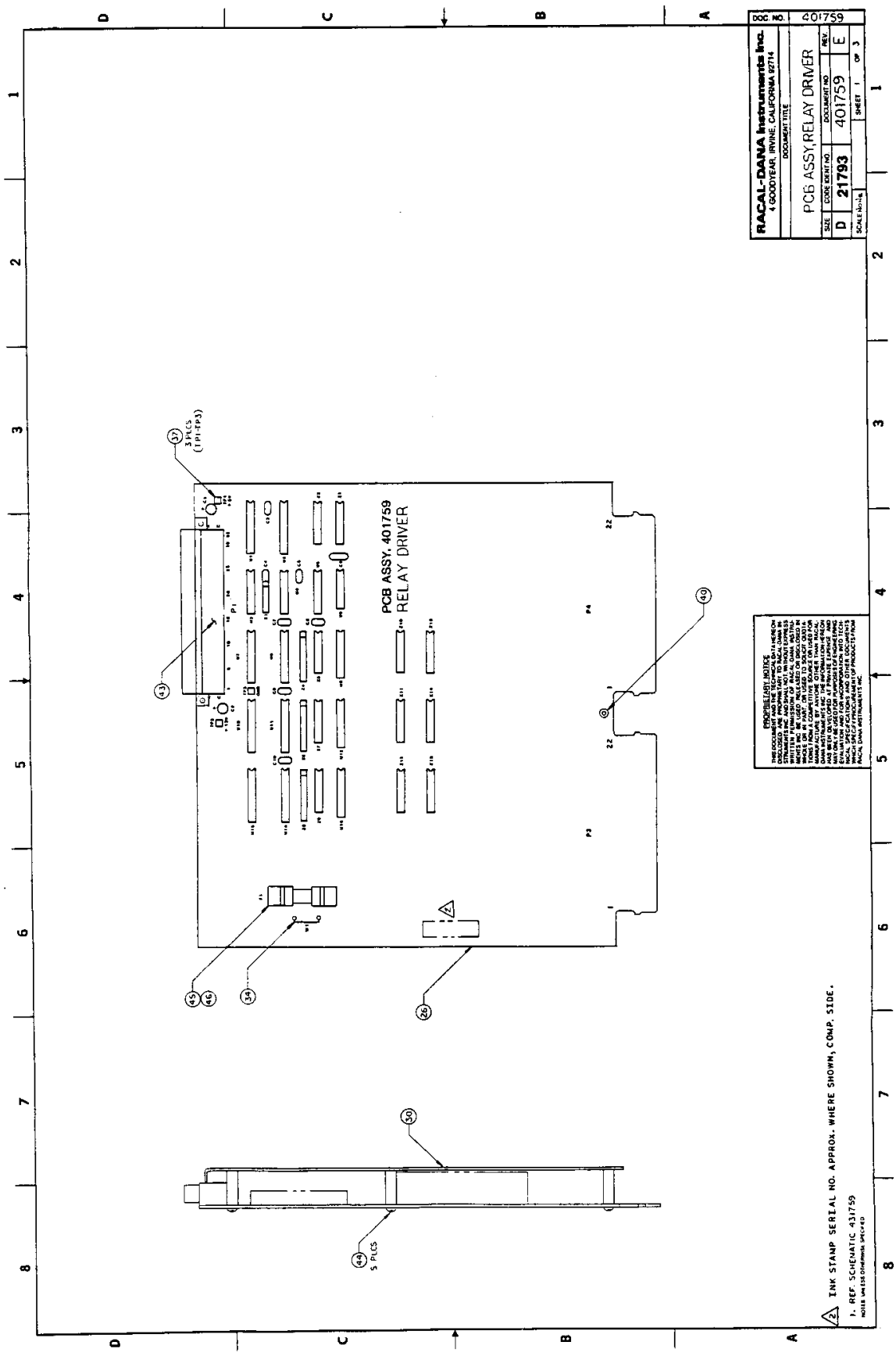
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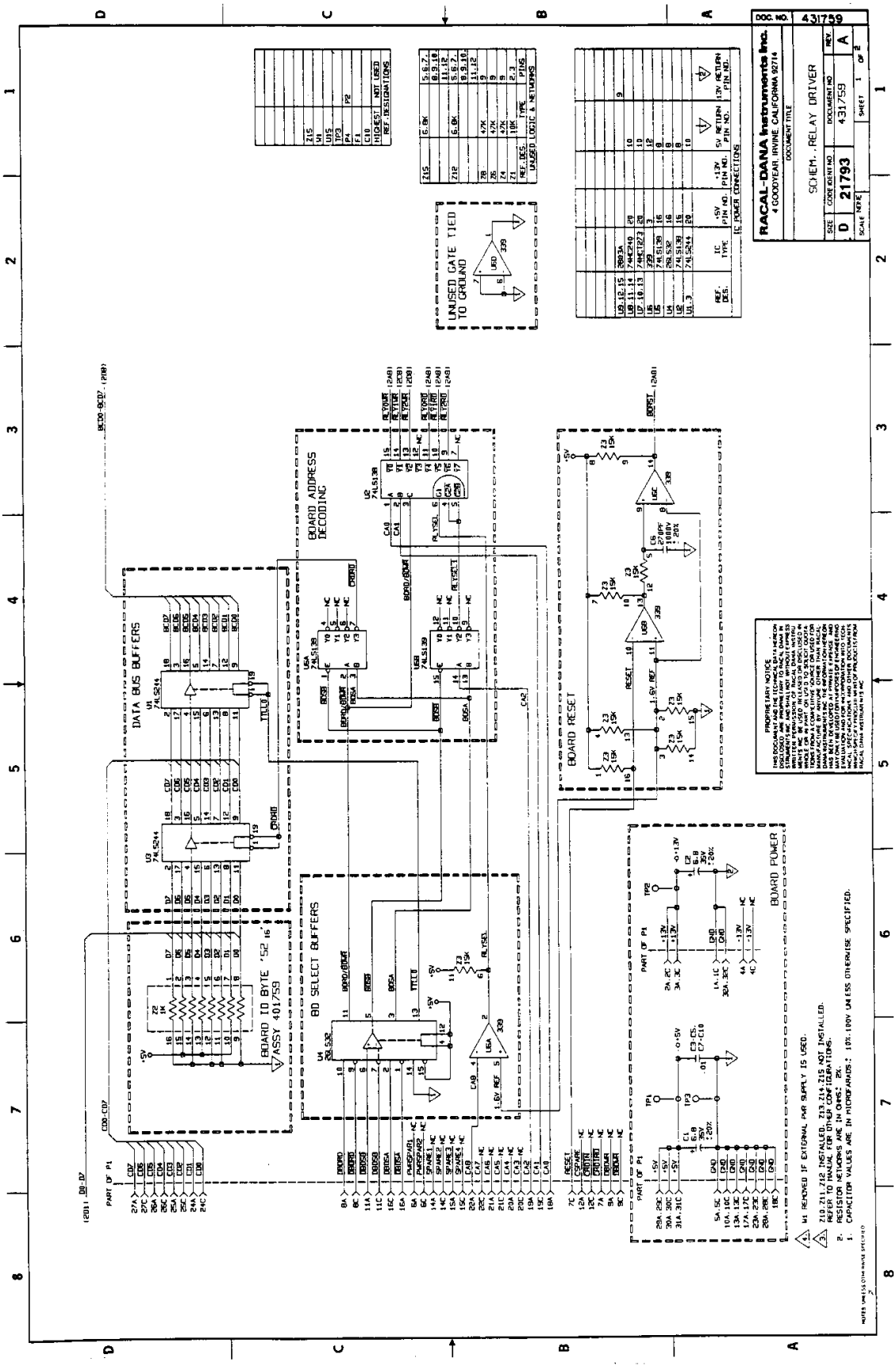
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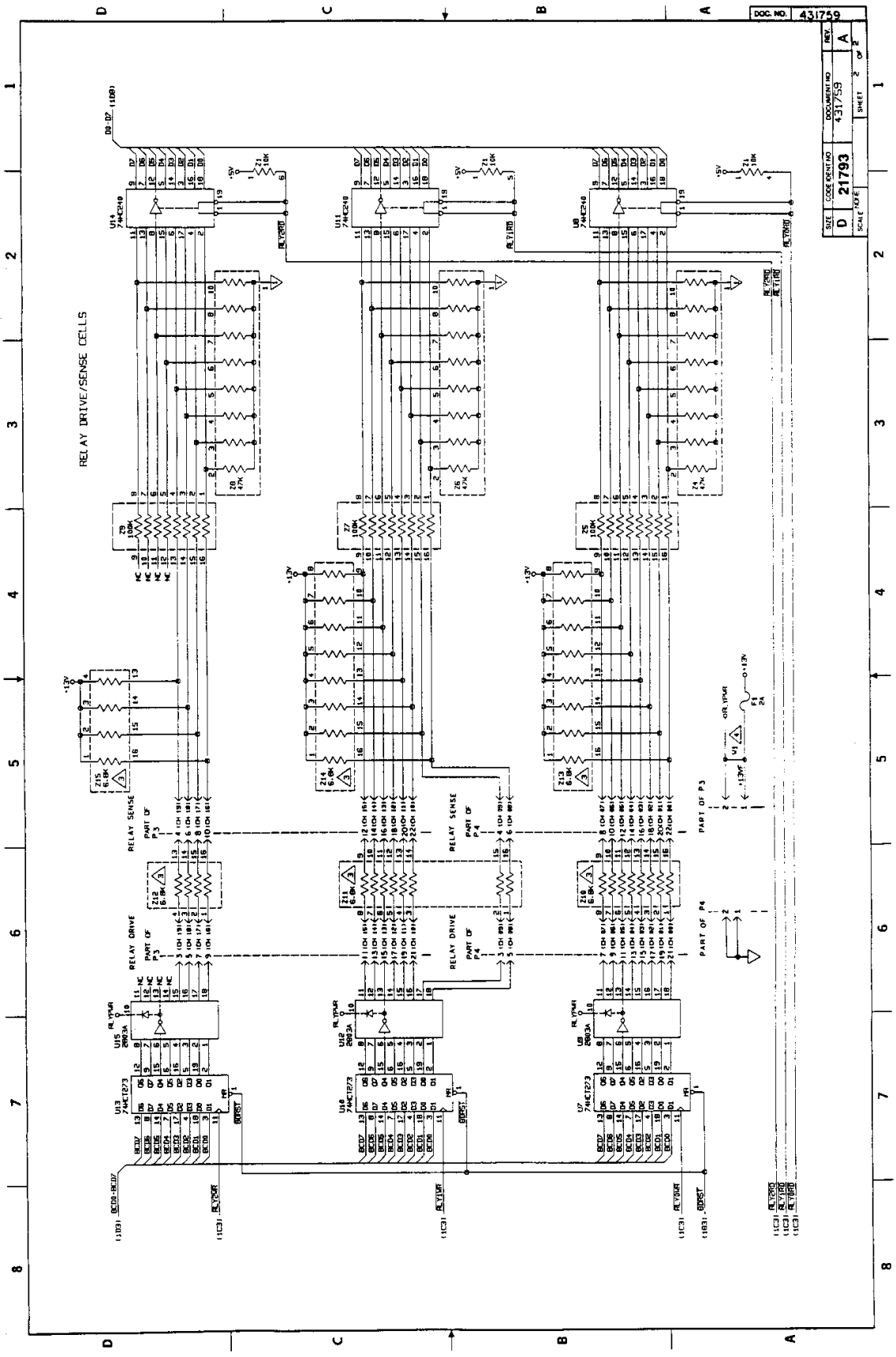
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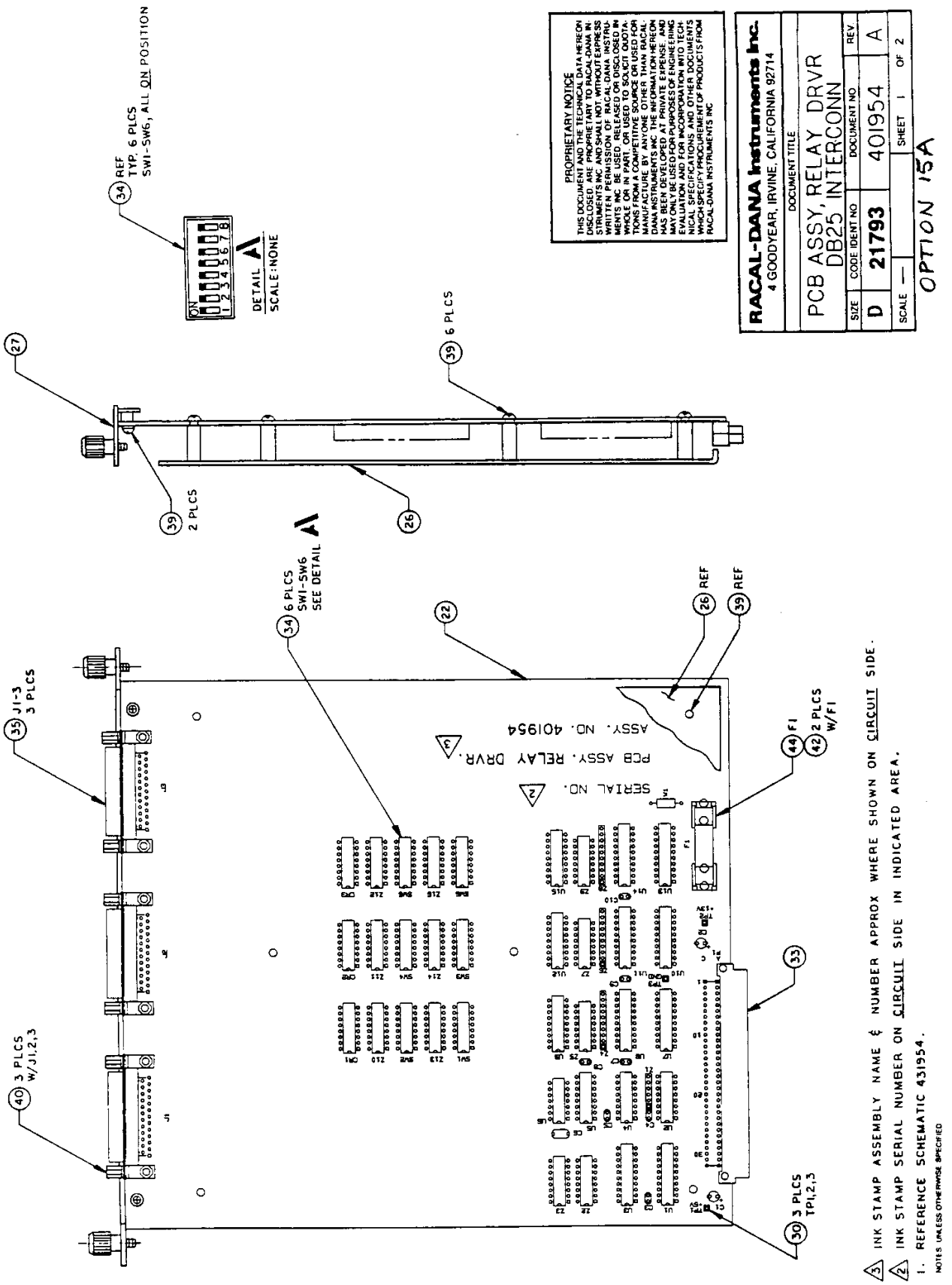
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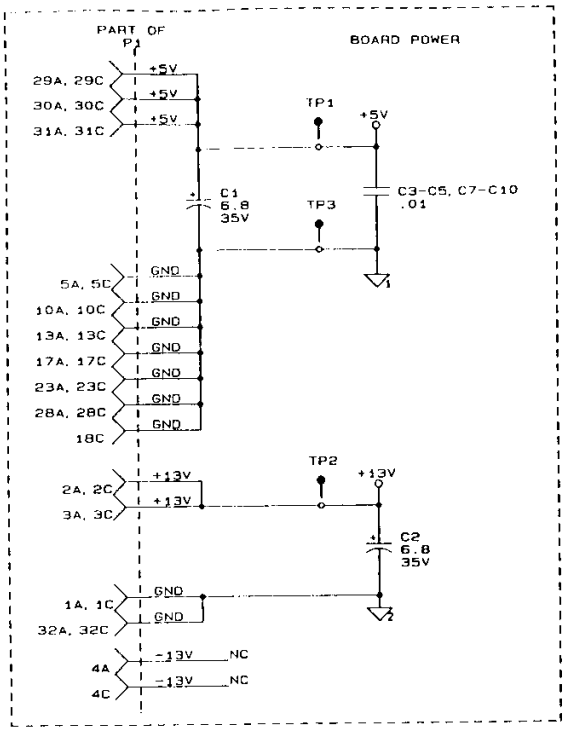
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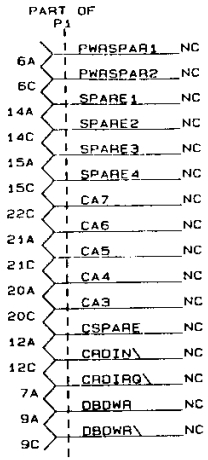


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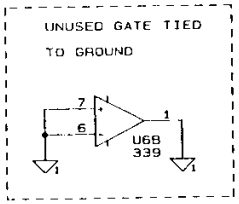


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Z15
C1
U15
TP3
SW6
P1
U3
F1
CR3
C10
HIGHEST REF. DES.



REF. DES.	IC TYPE	+5V PIN NO.	+13V PIN NO.	5V RETURN PIN NO.	13V RETURN PIN NO.
U9, 12, 15	2803		10		9
U8, 11, 14	74HC240	20		10	
U7, 10, 13	74HCT273	20		10	
U6	339	3		12	
U5	74LS139	16		8	
U4	26LS32	16		8	
U2	74LS138	16		8	
U1, 3	74LS244	20		10	

IC POWER CONNECTIONS

4 REMOVE W1 IF AN EXTERNAL PWR SUPPLY IS USED.

3 REFER TO MANUAL FOR SWITCH CONFIGURATION.

2. RESISTOR NETWORKS ARE IN OHMS ±2%.

1. CAPACITOR VALUES ARE IN MICROFARADS ±10% 100V UNLESS OTHERWISE SPECIFIED.

NOTES: UNLESS OTHERWISE SPECIFIED

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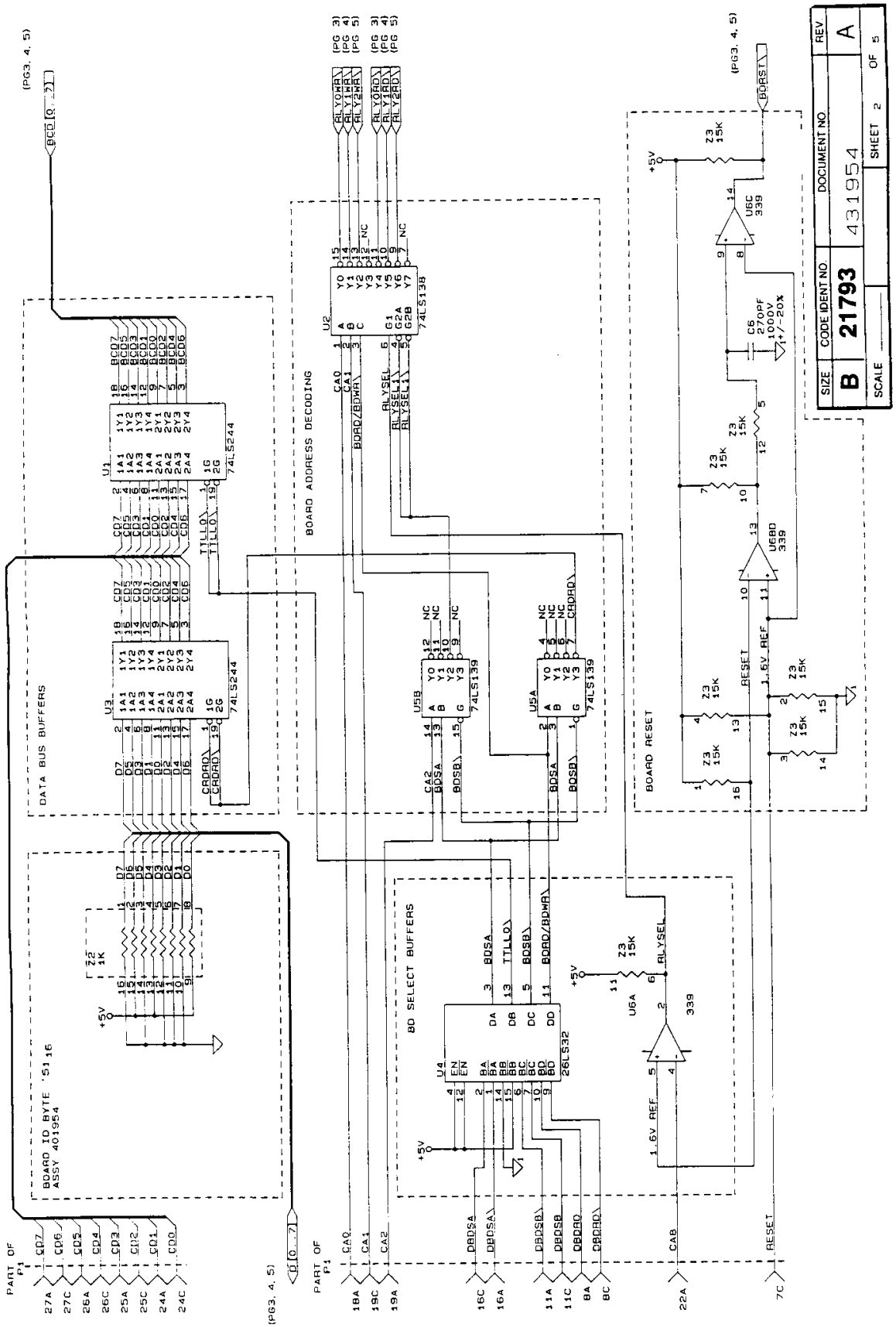
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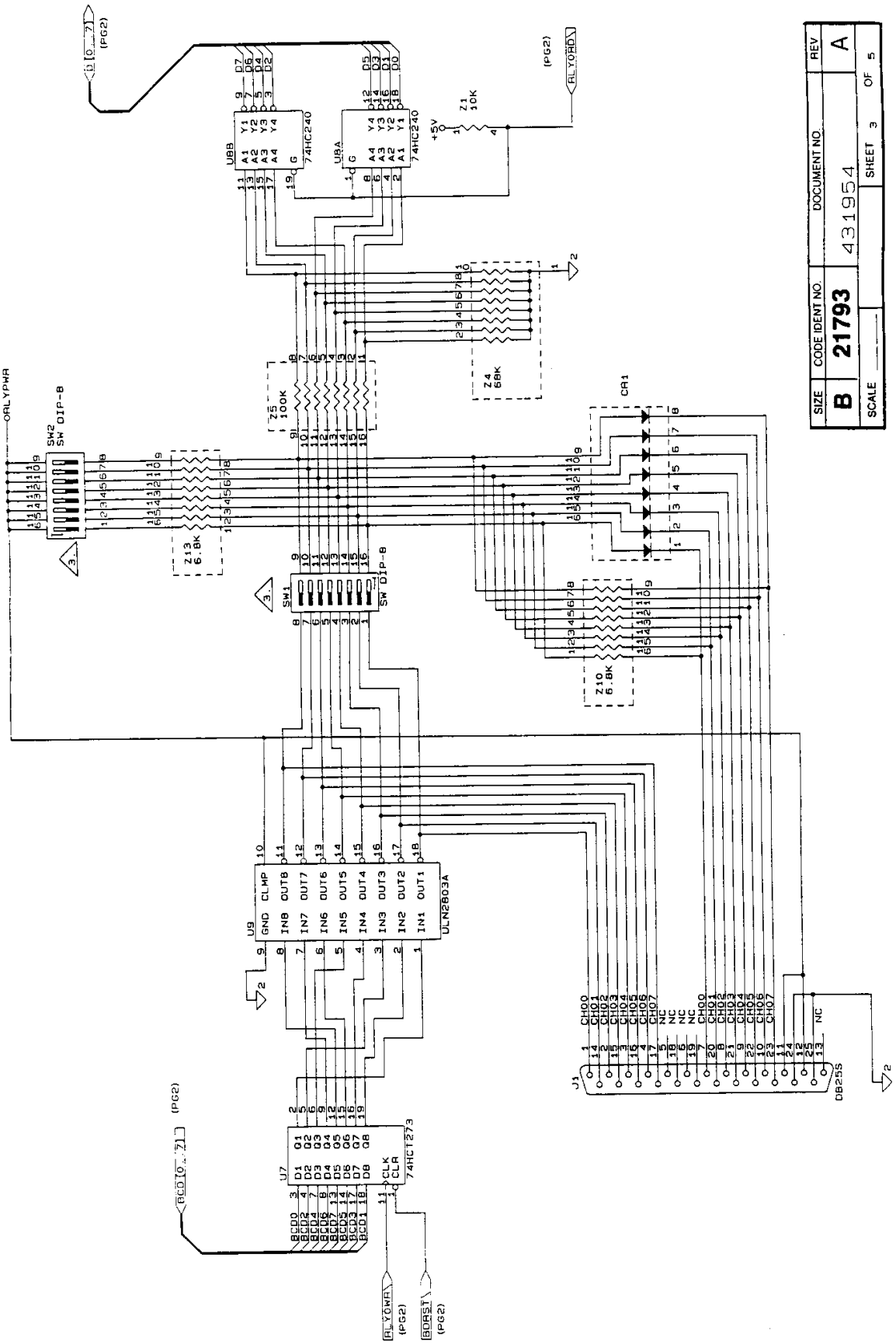
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SCALE —— SHEET 1 OF 5

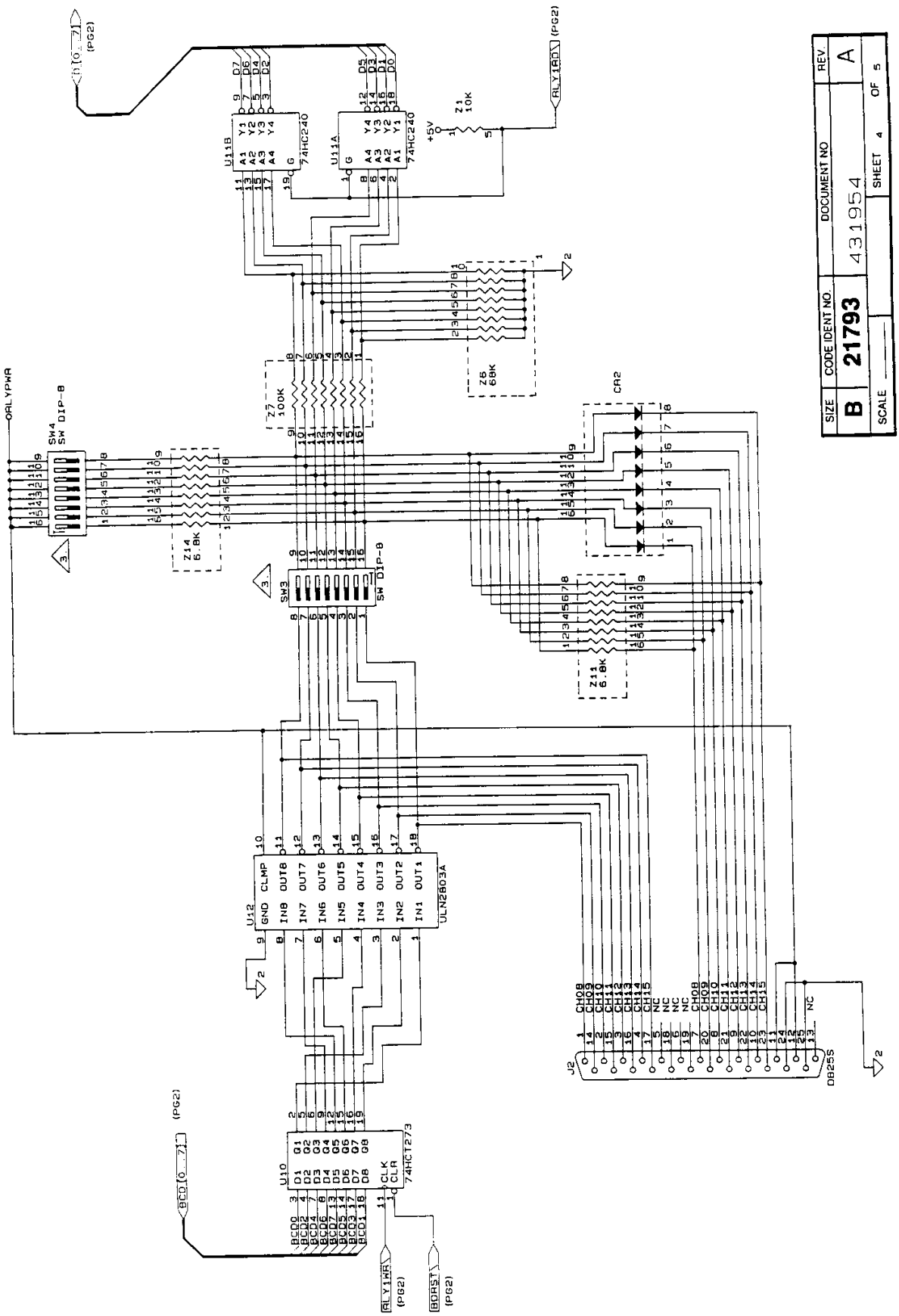
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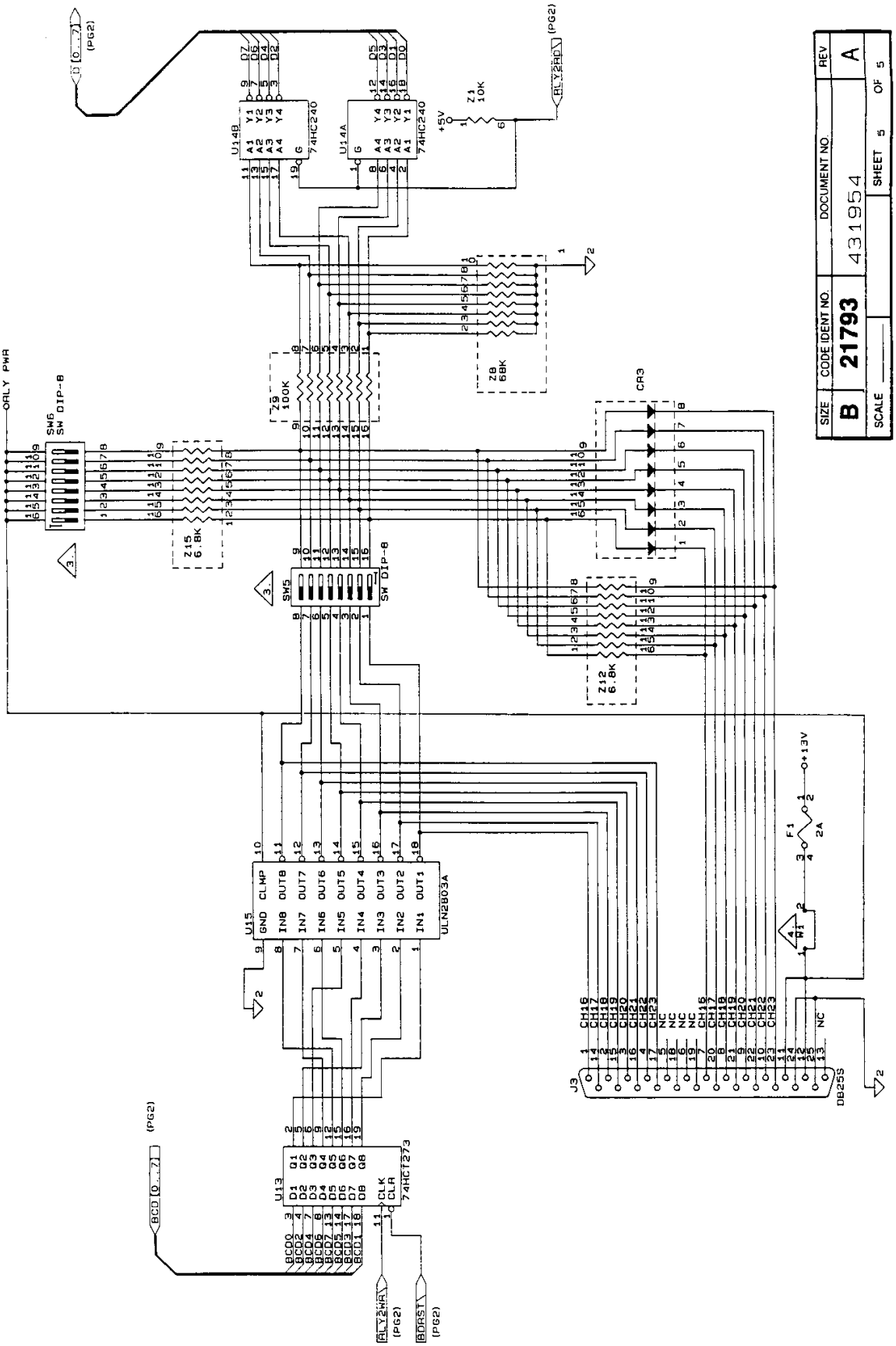
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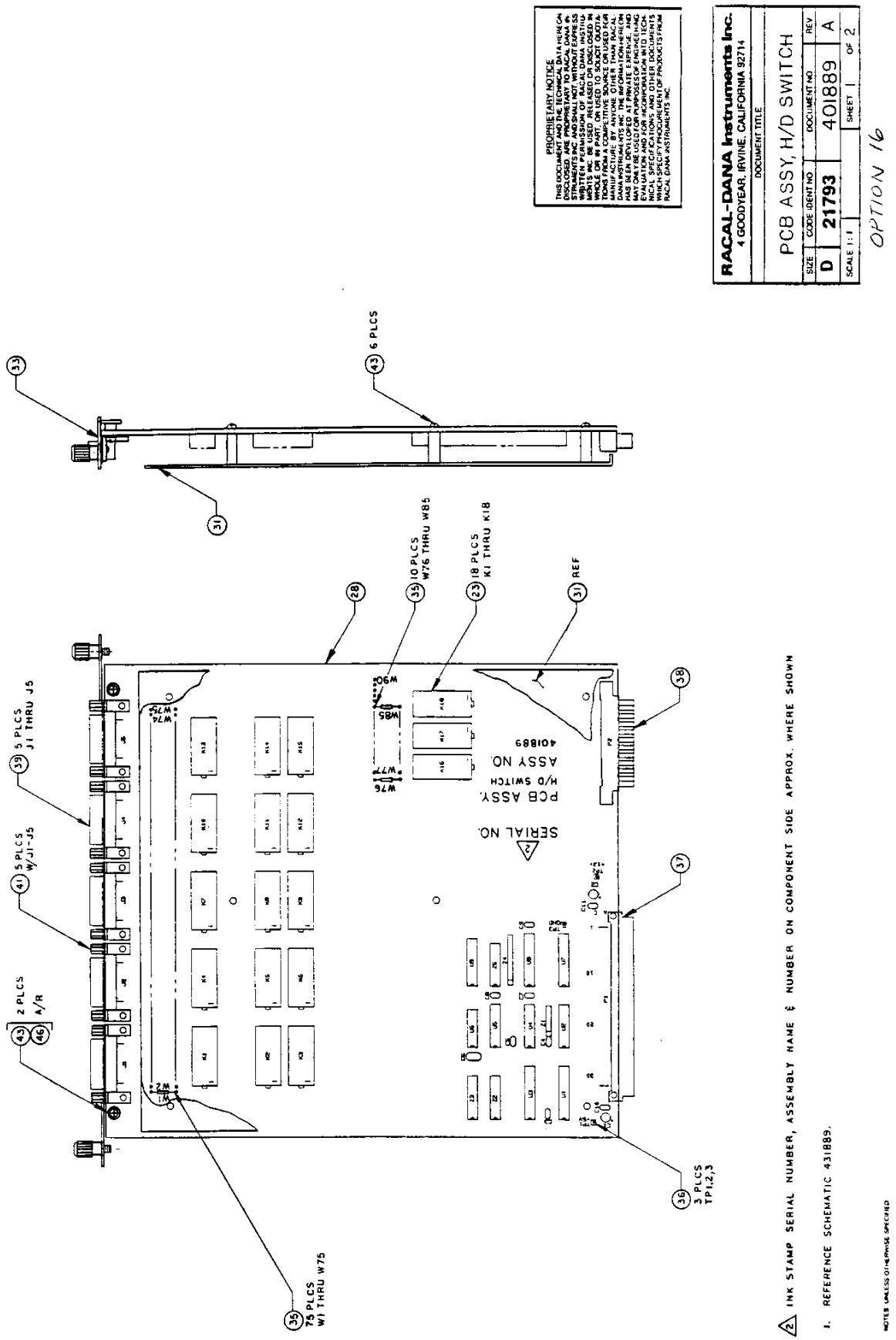
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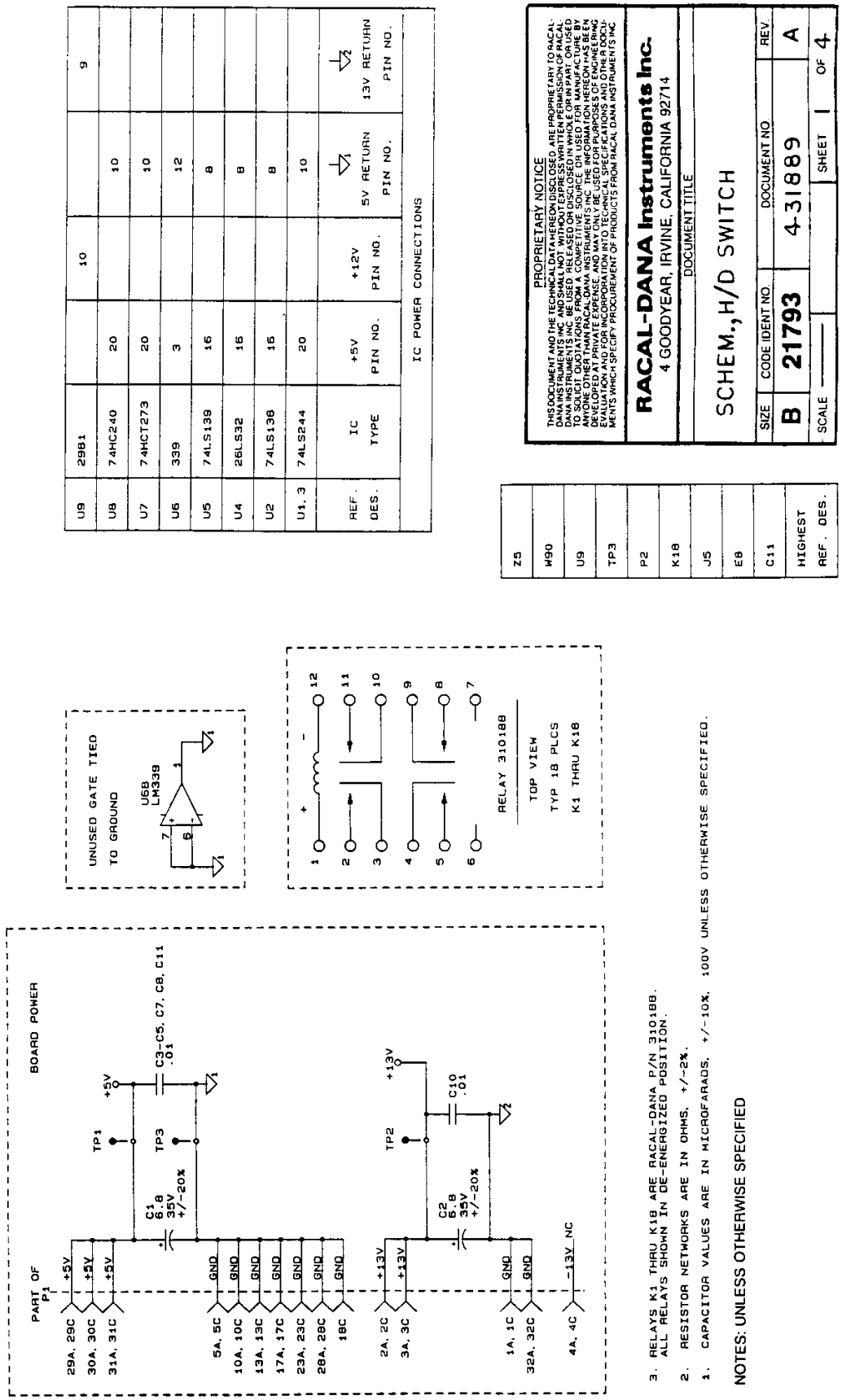
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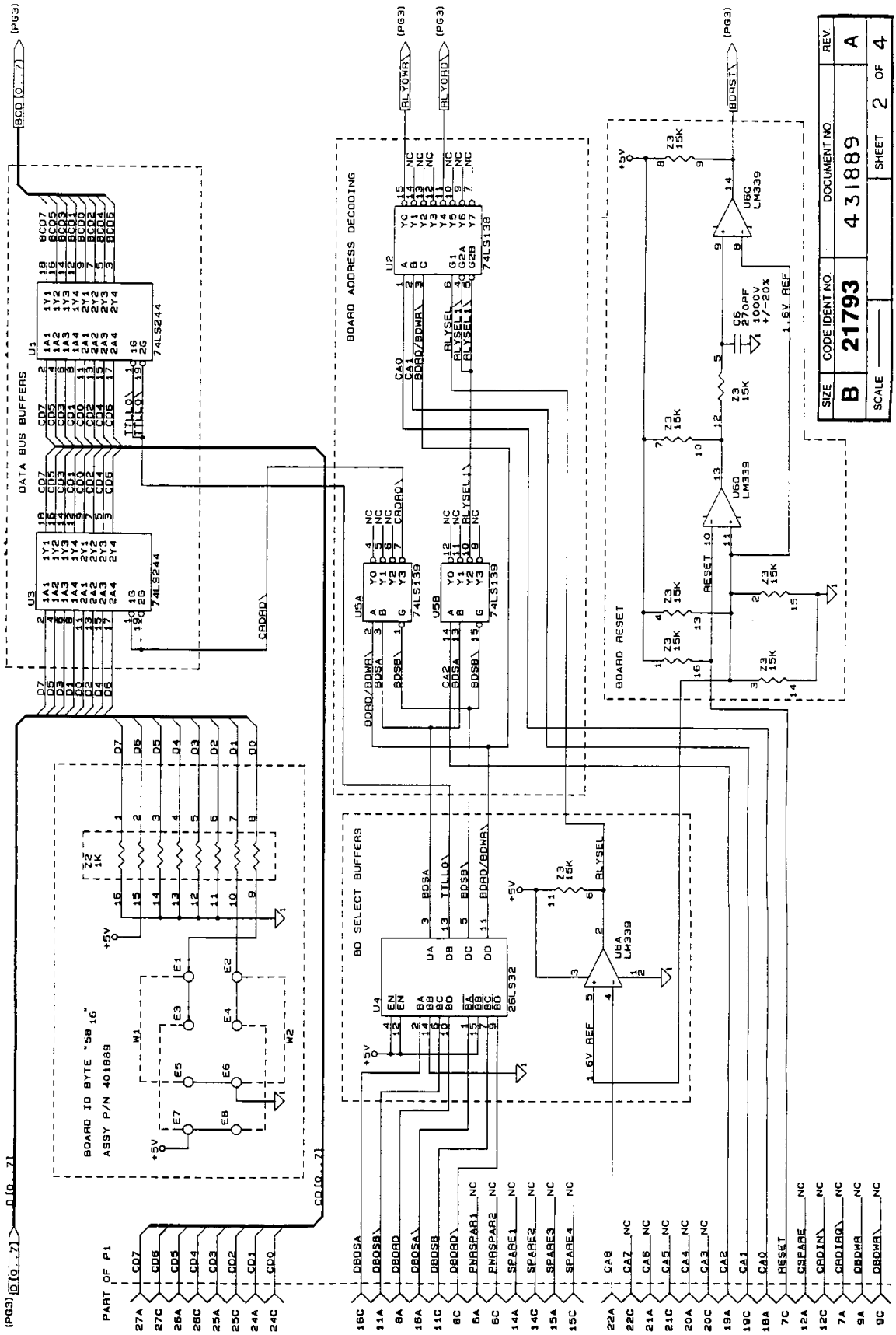
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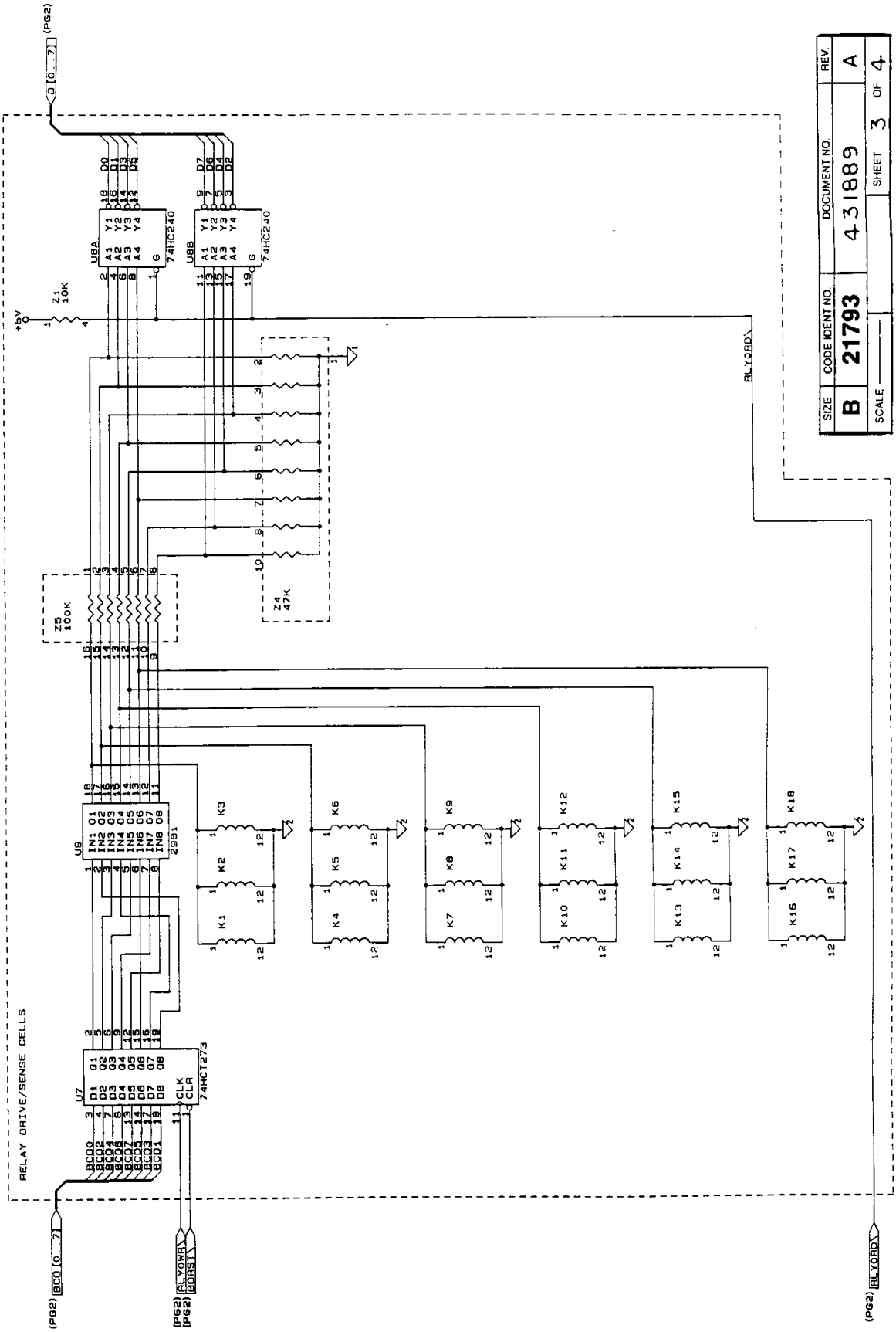
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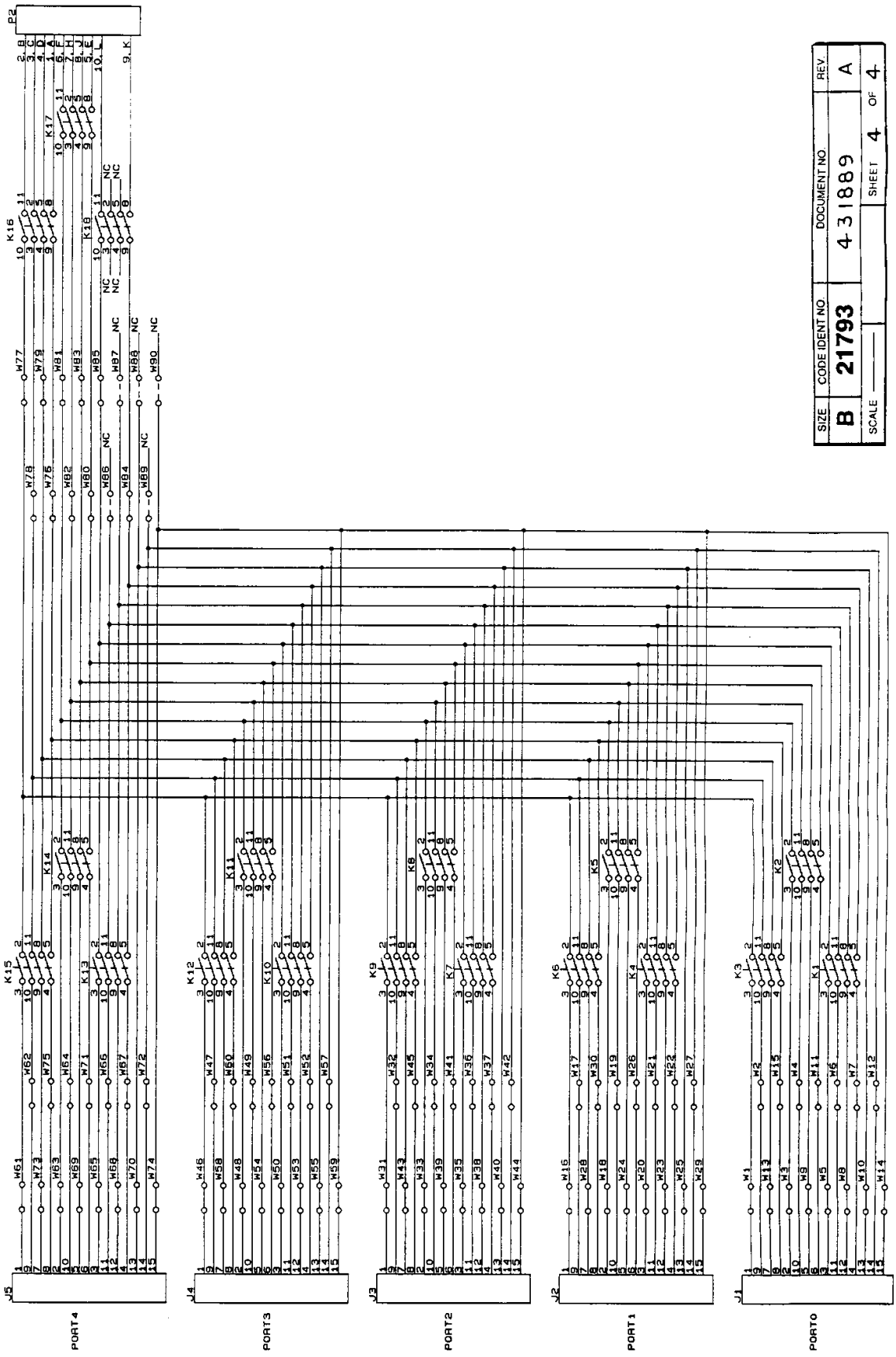
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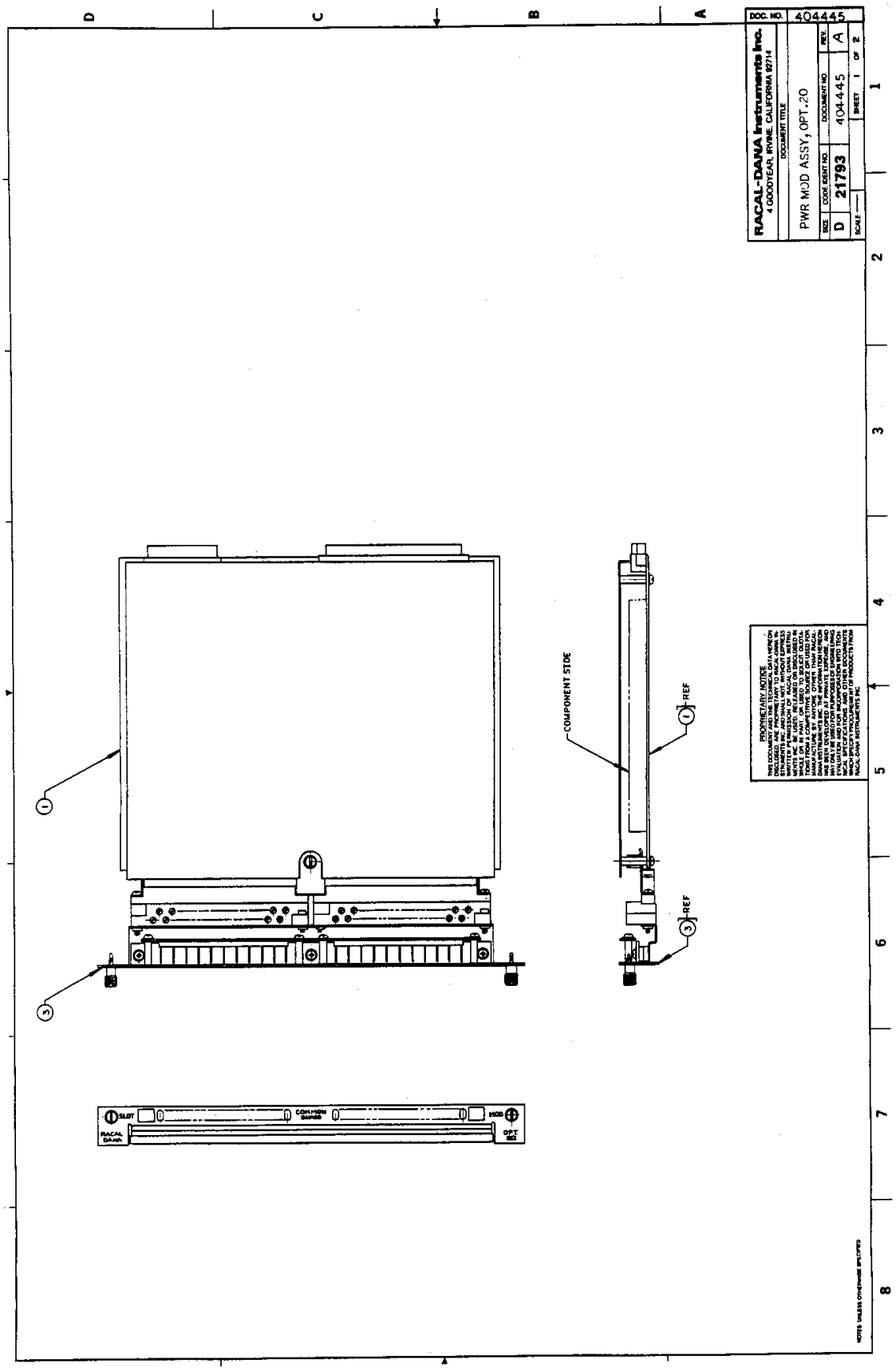
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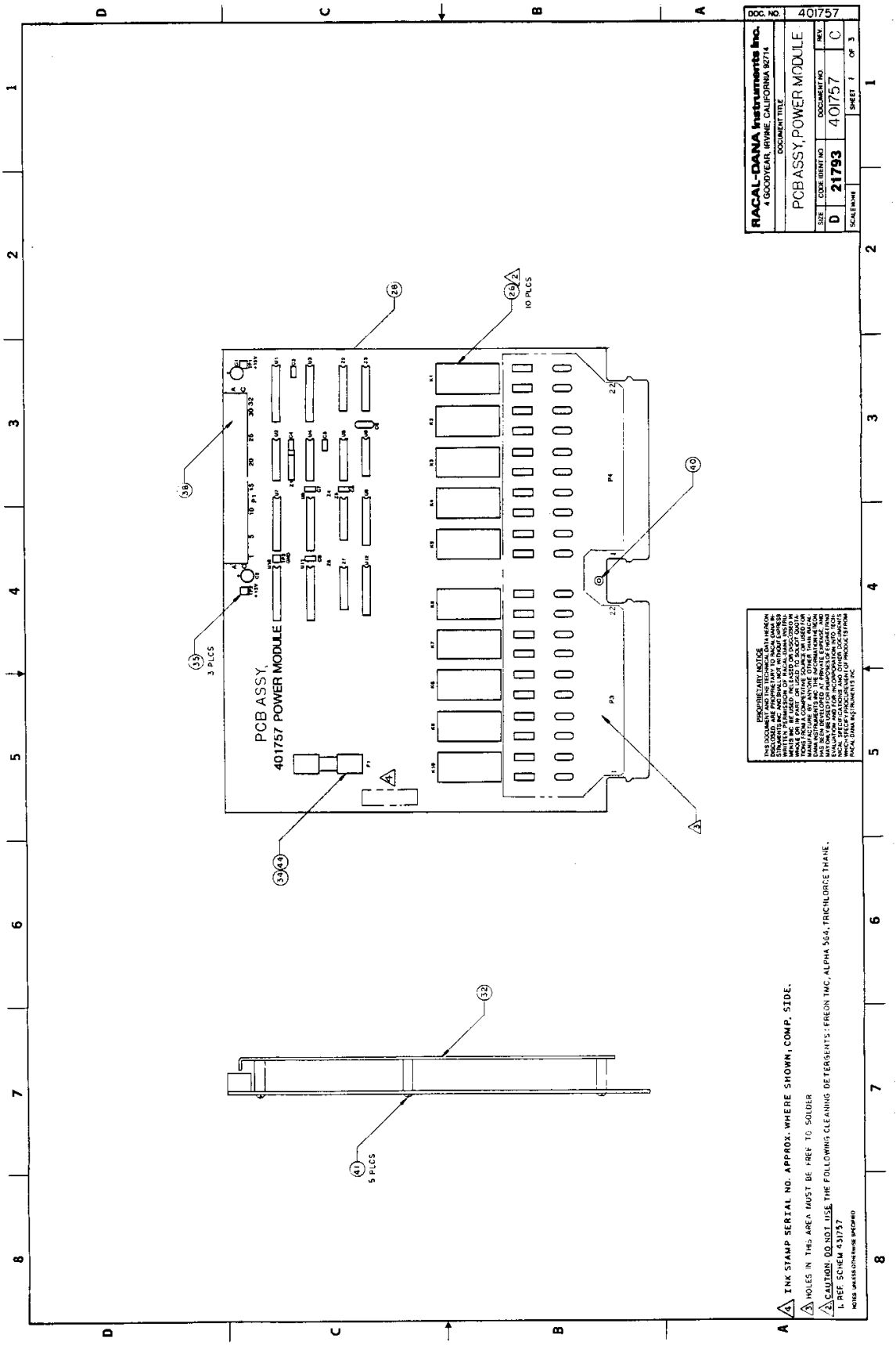
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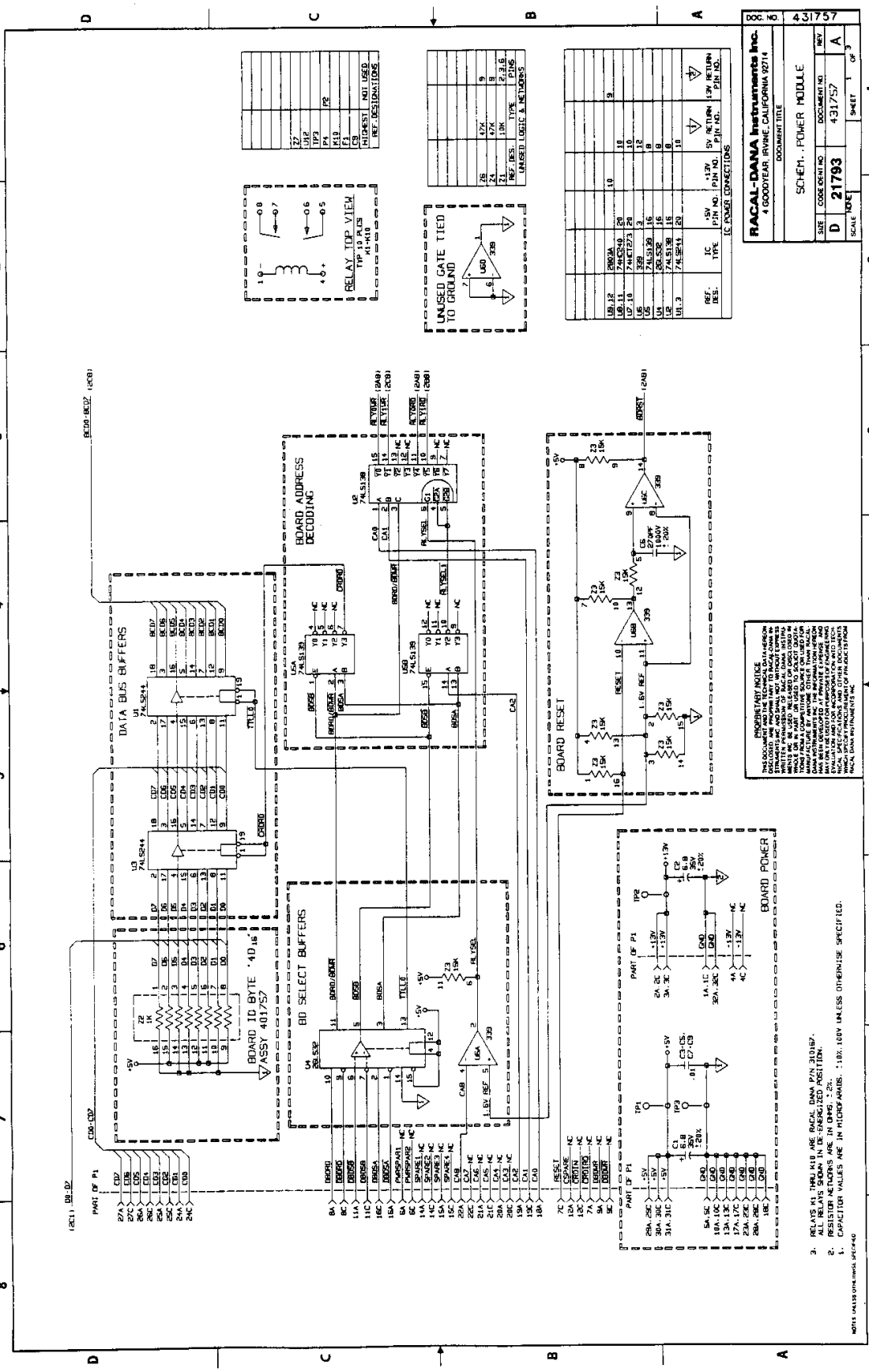
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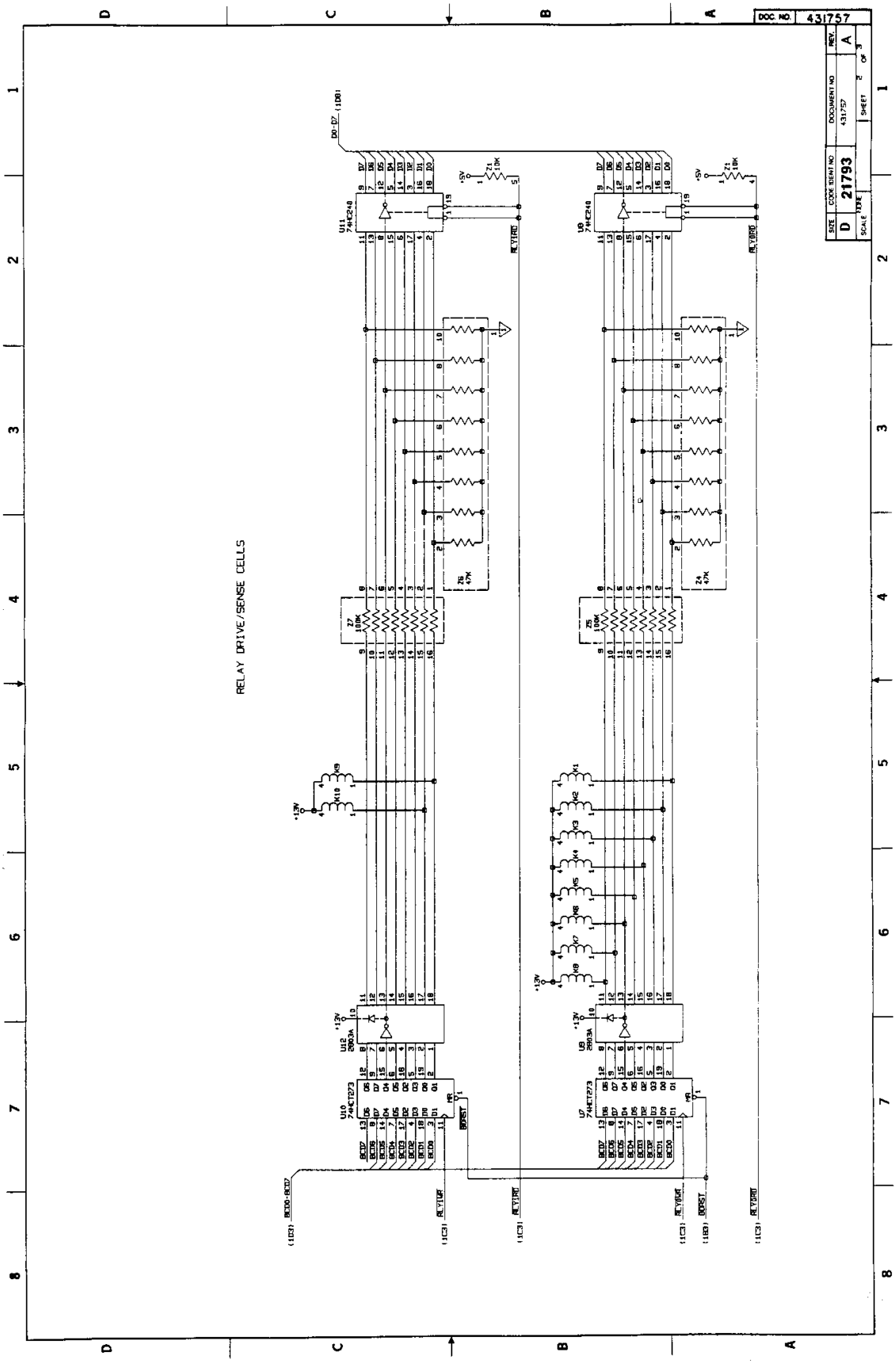
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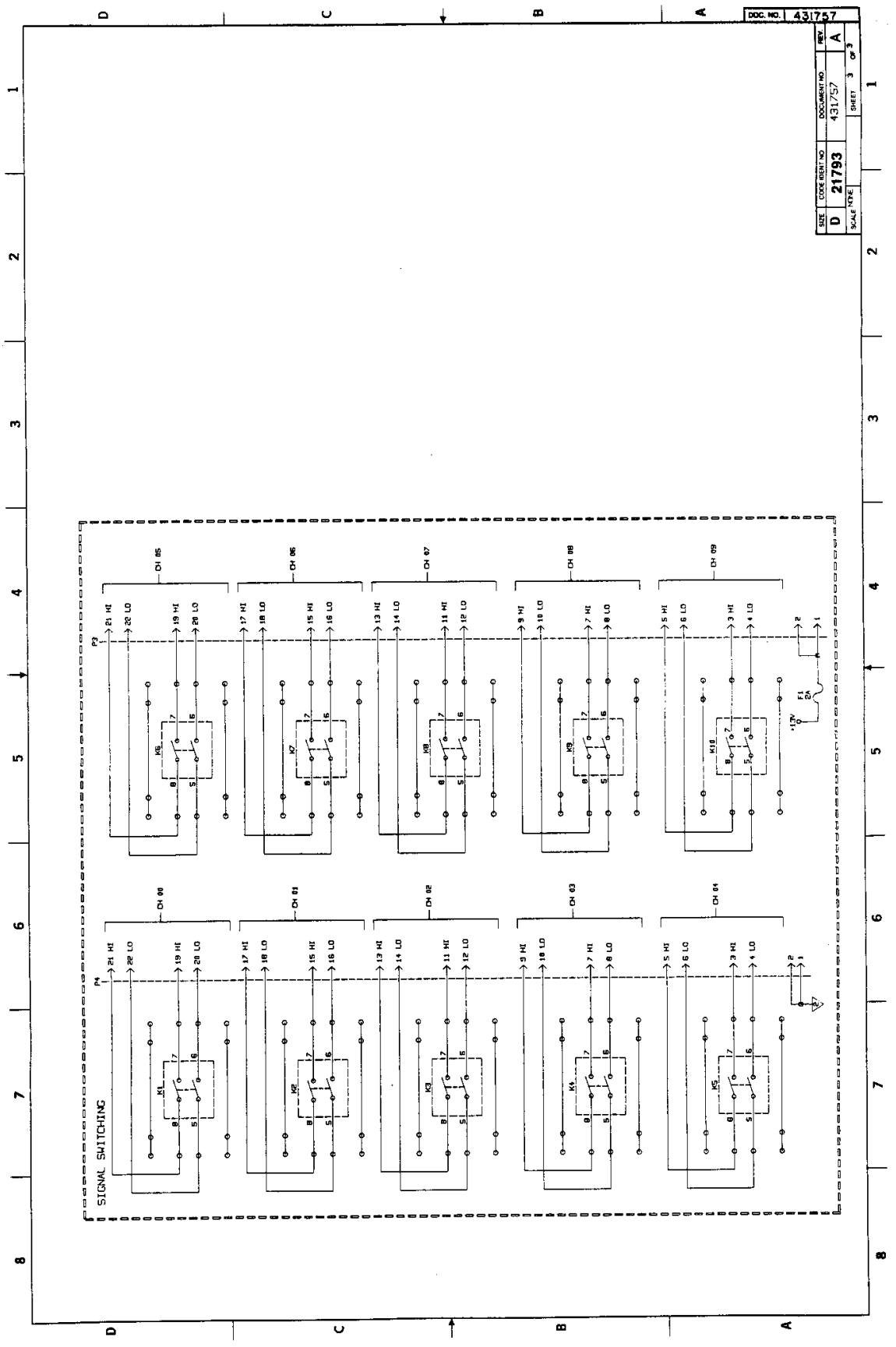
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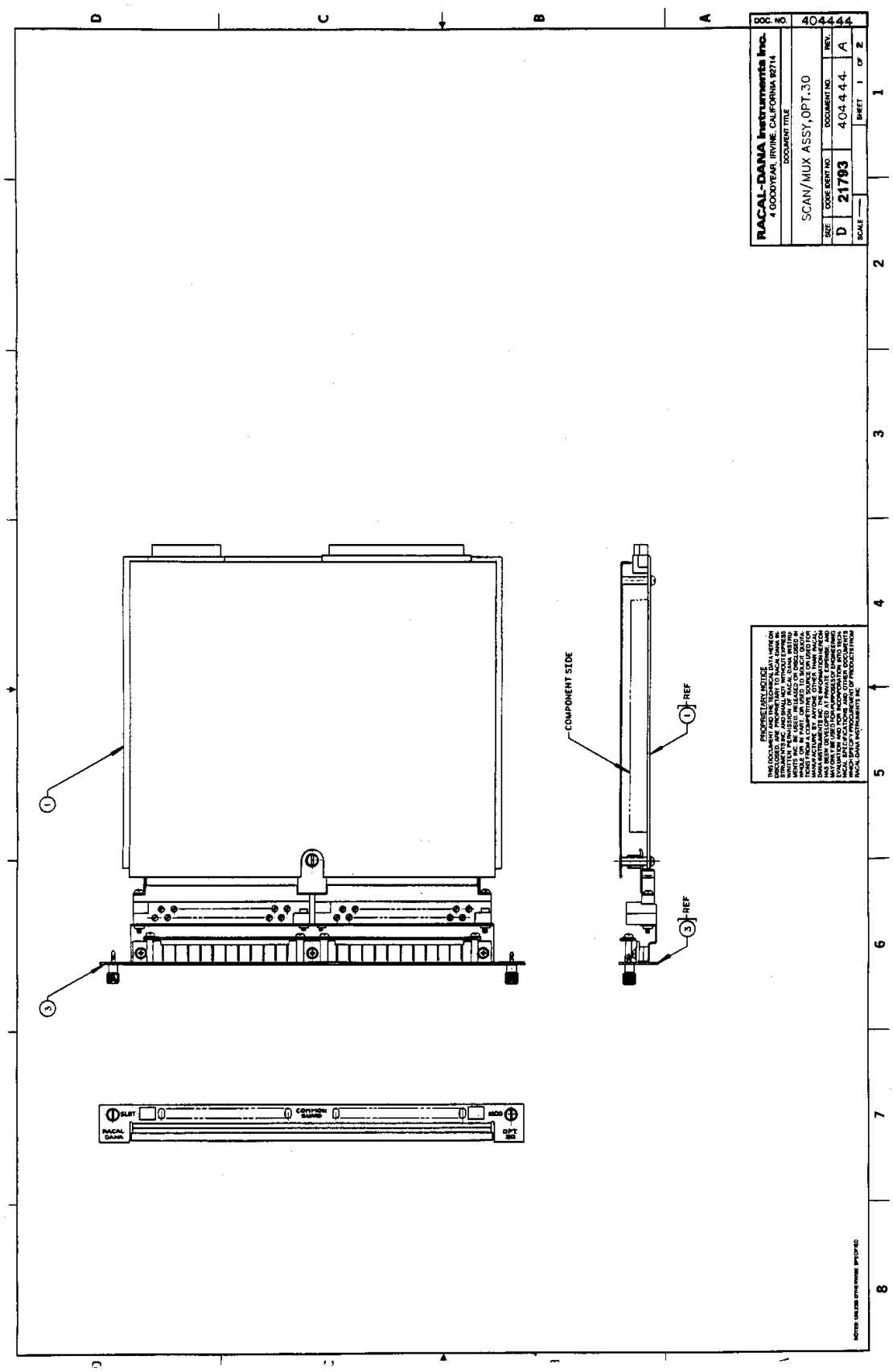
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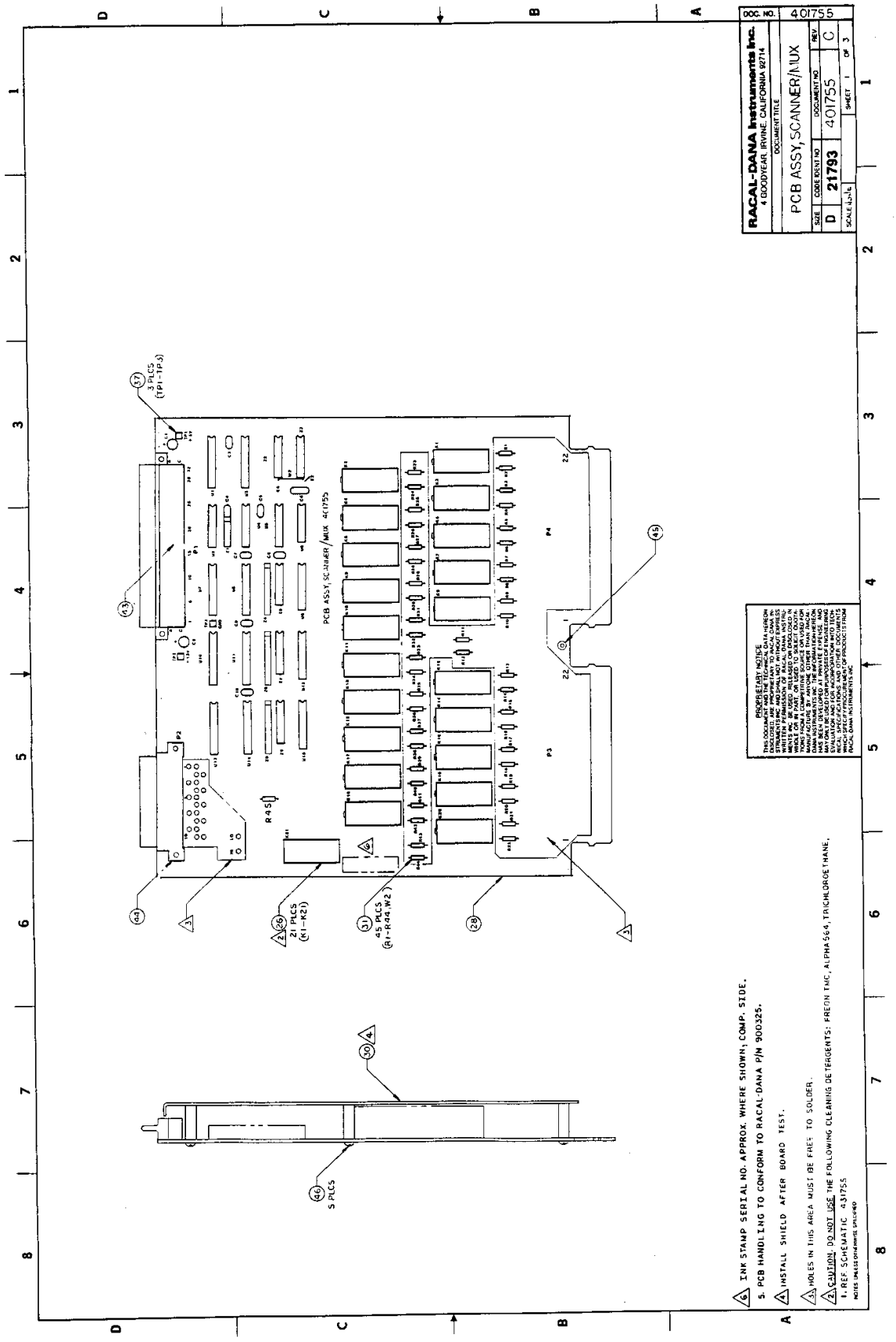
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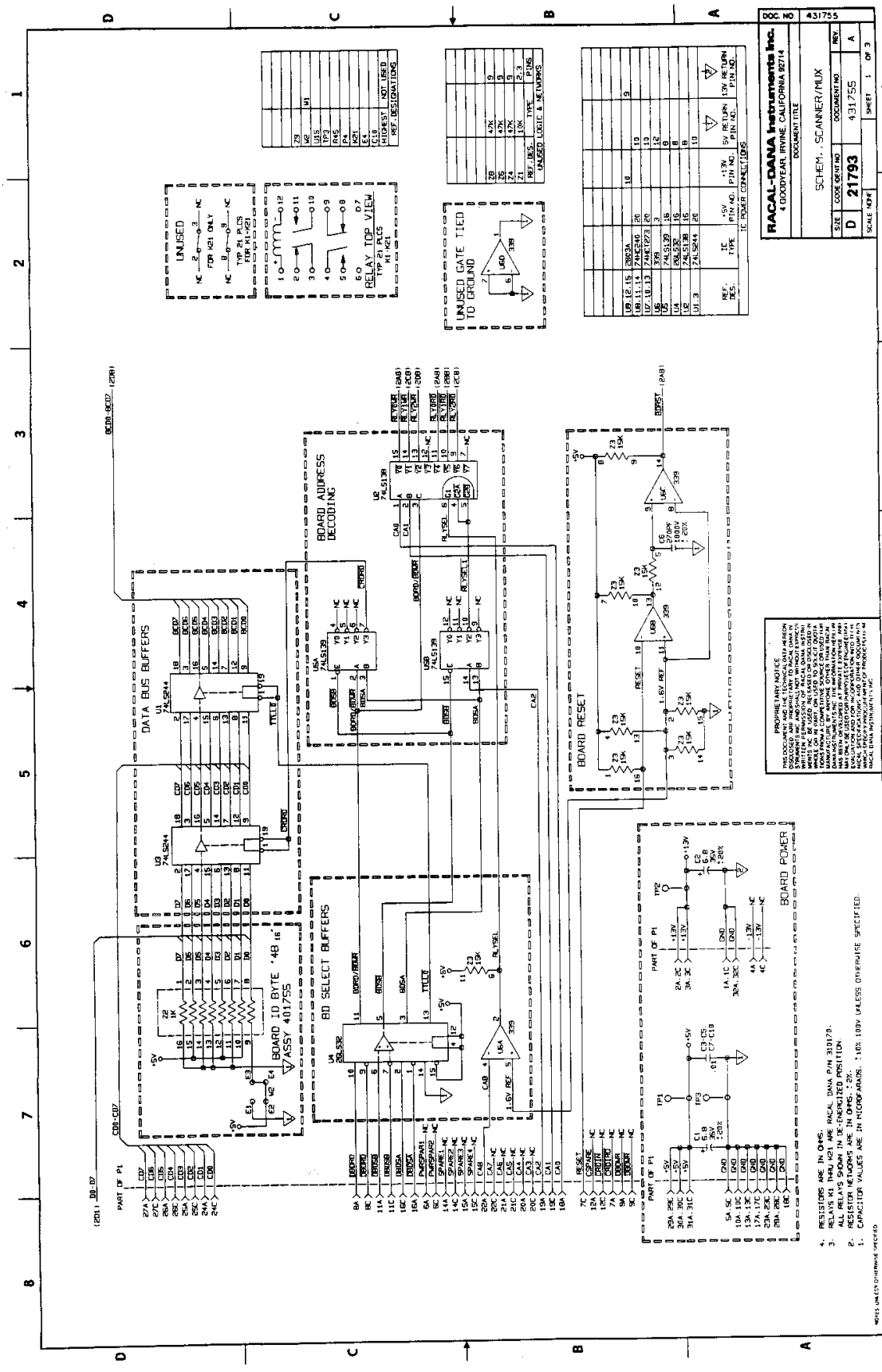
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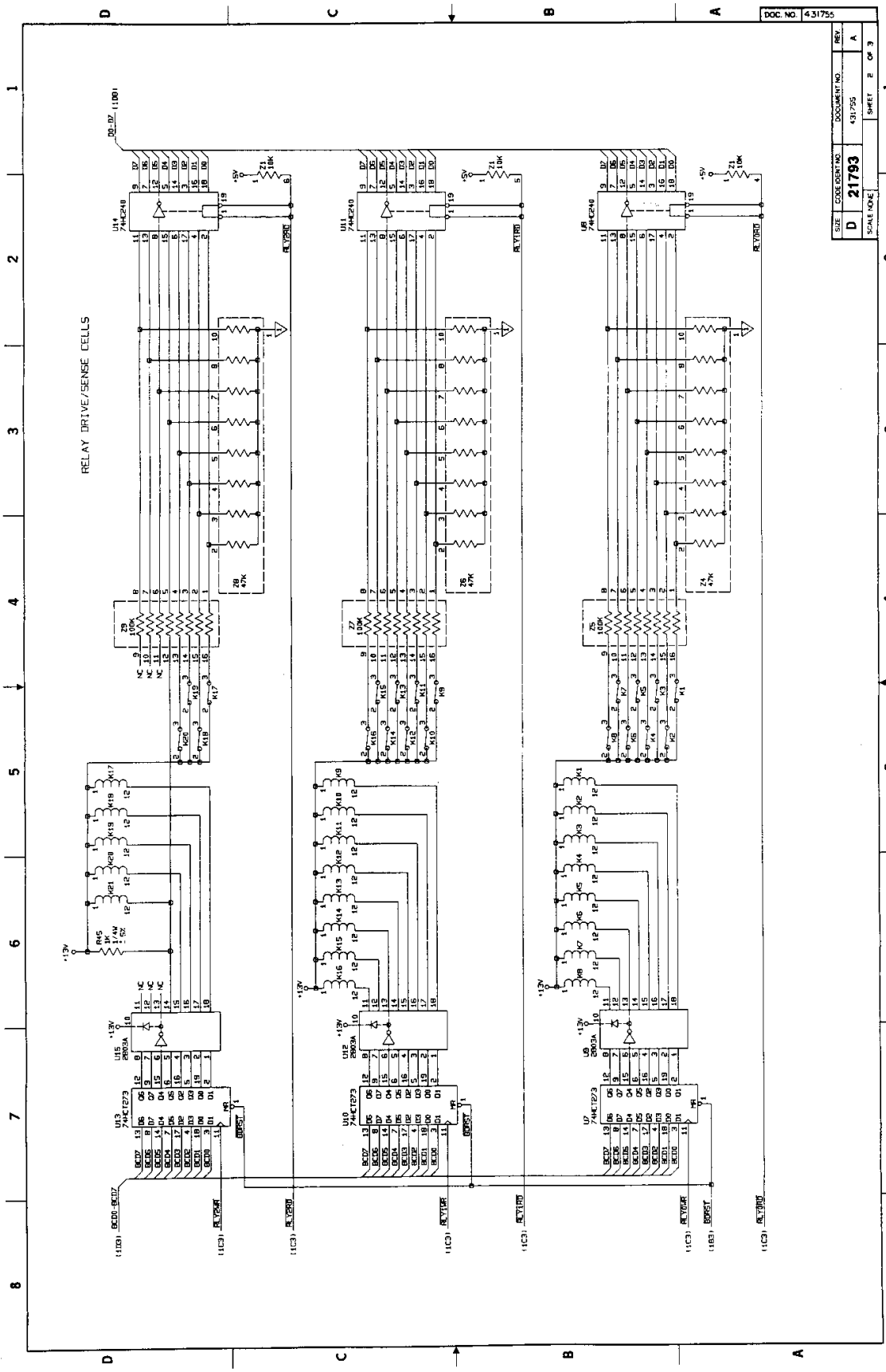
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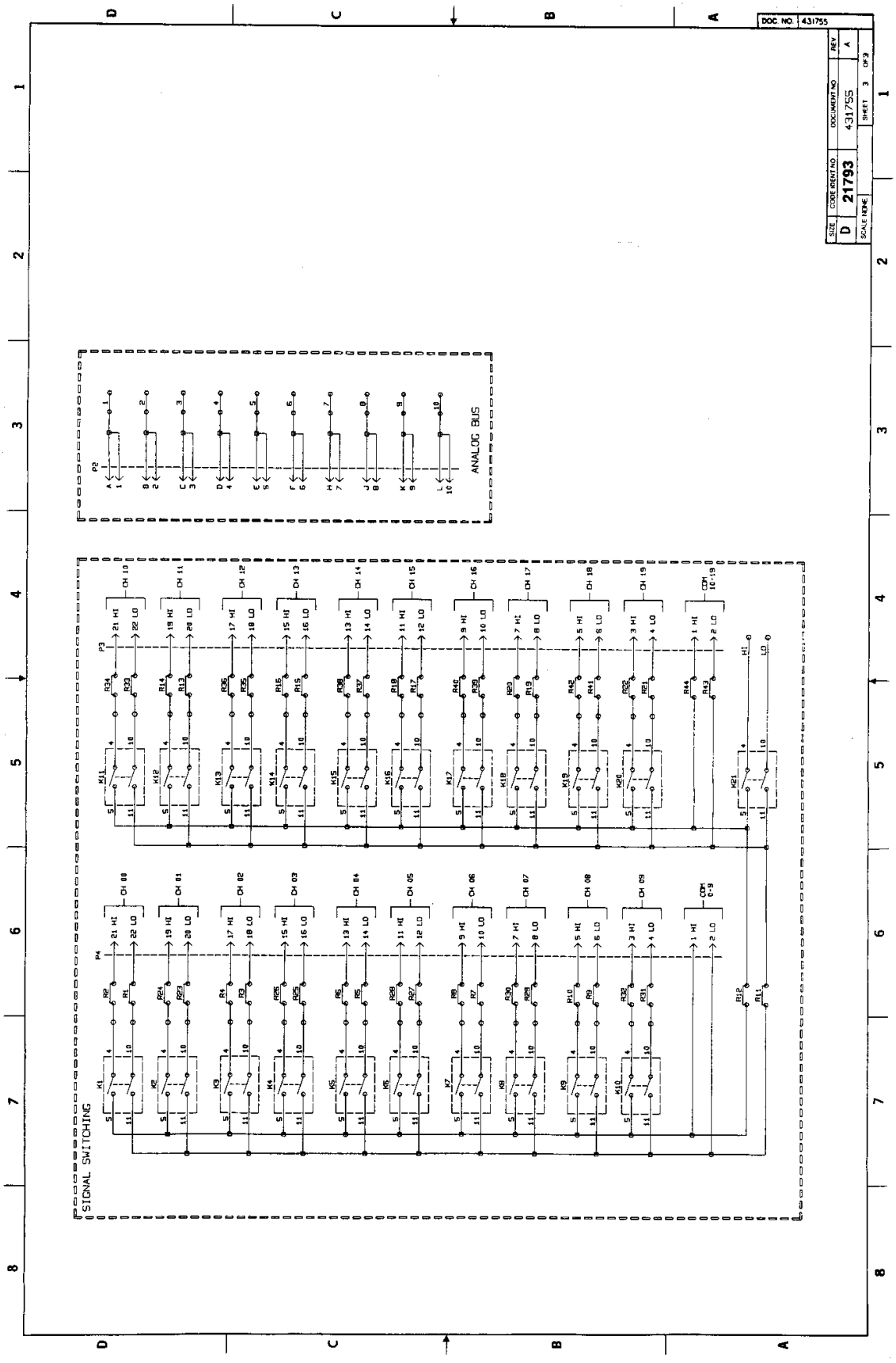
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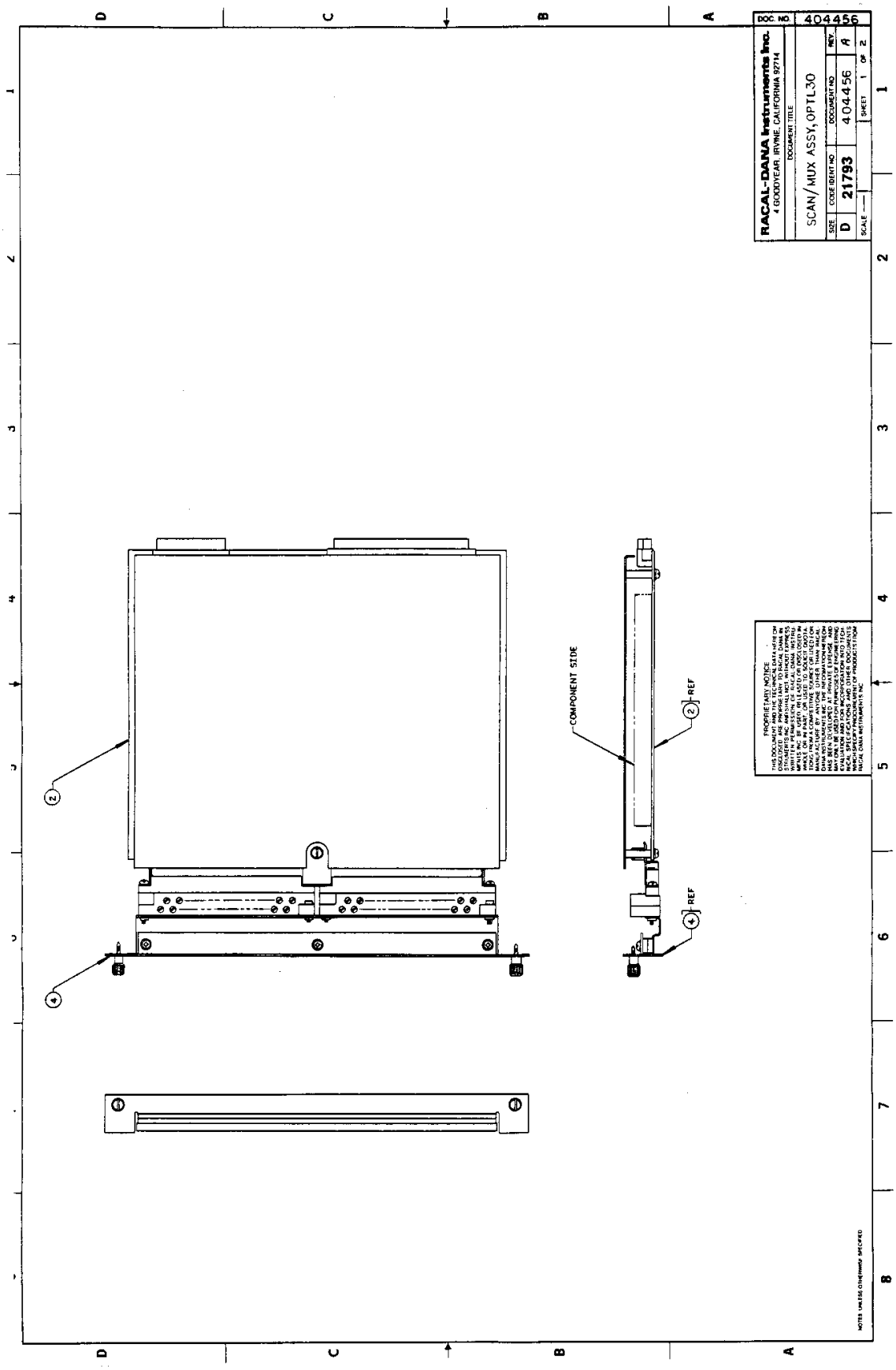
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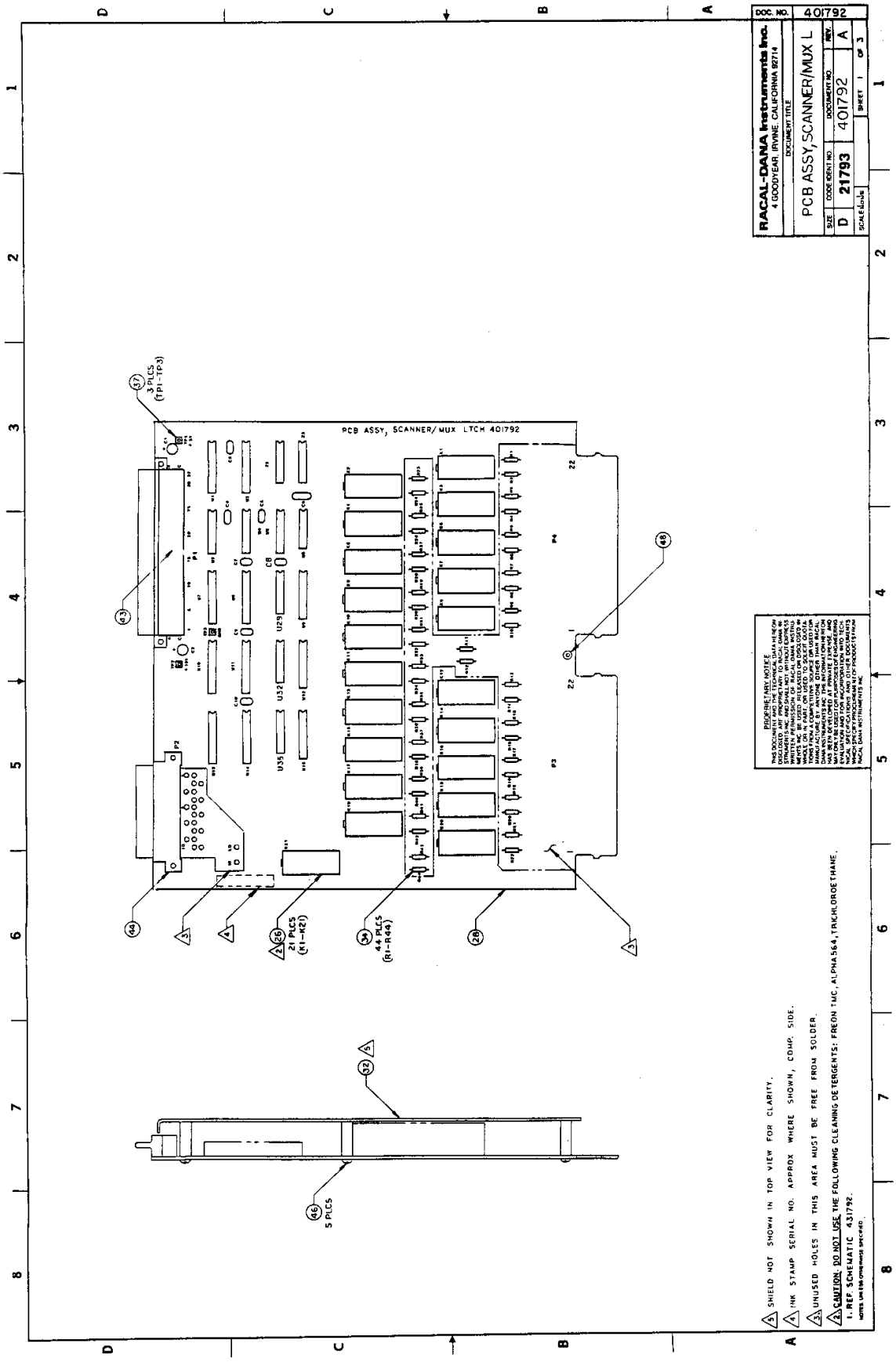
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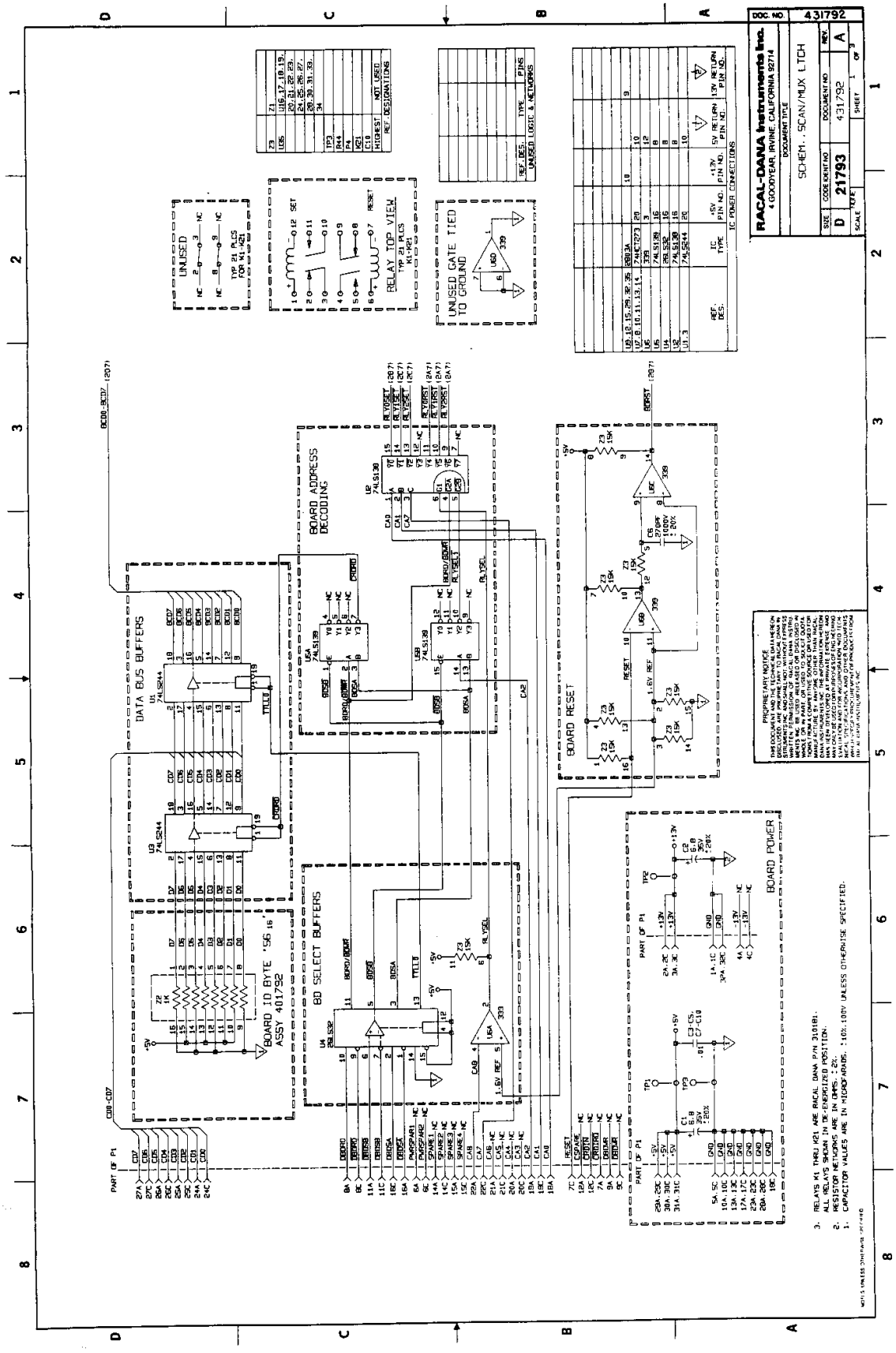
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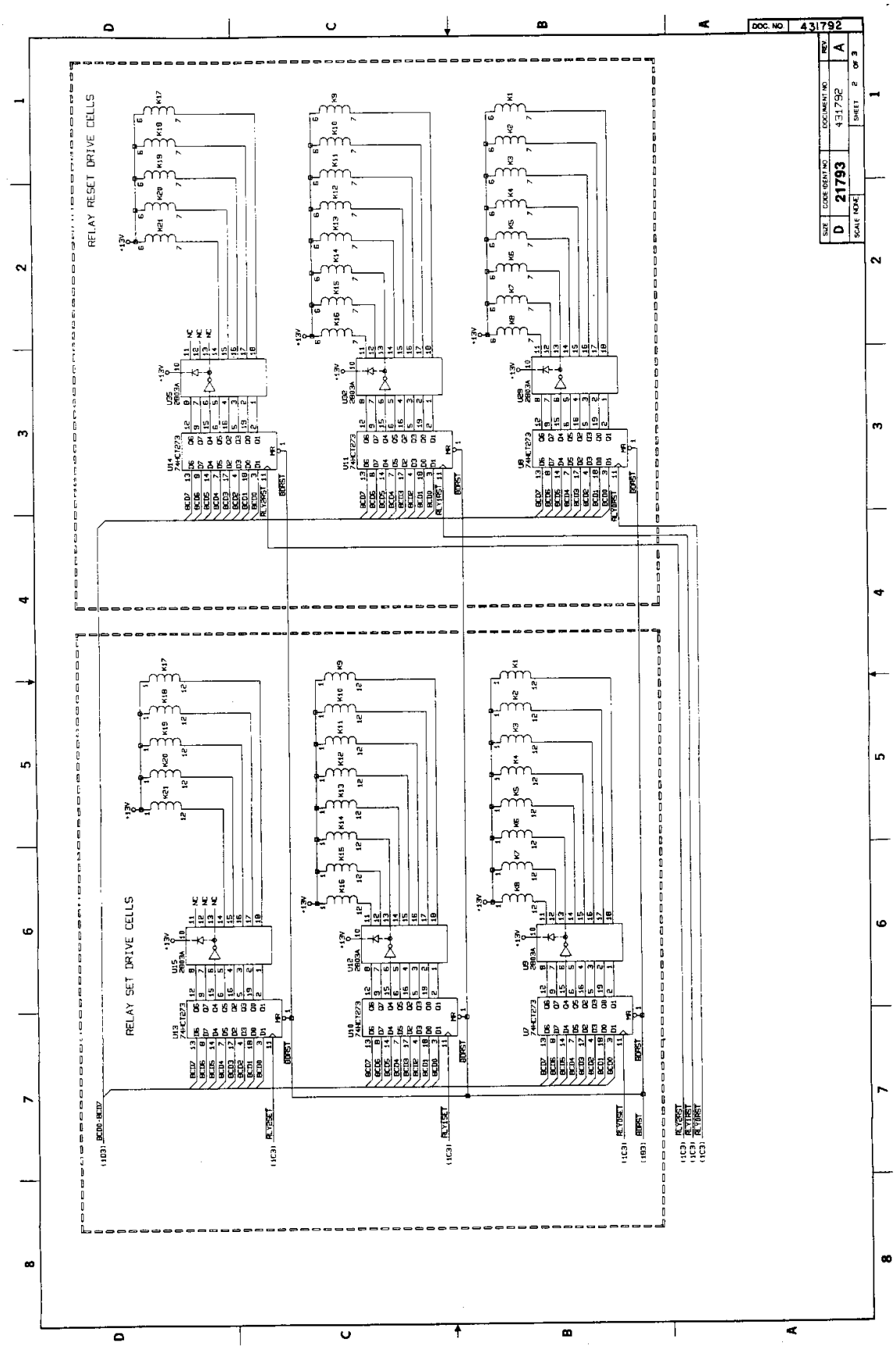
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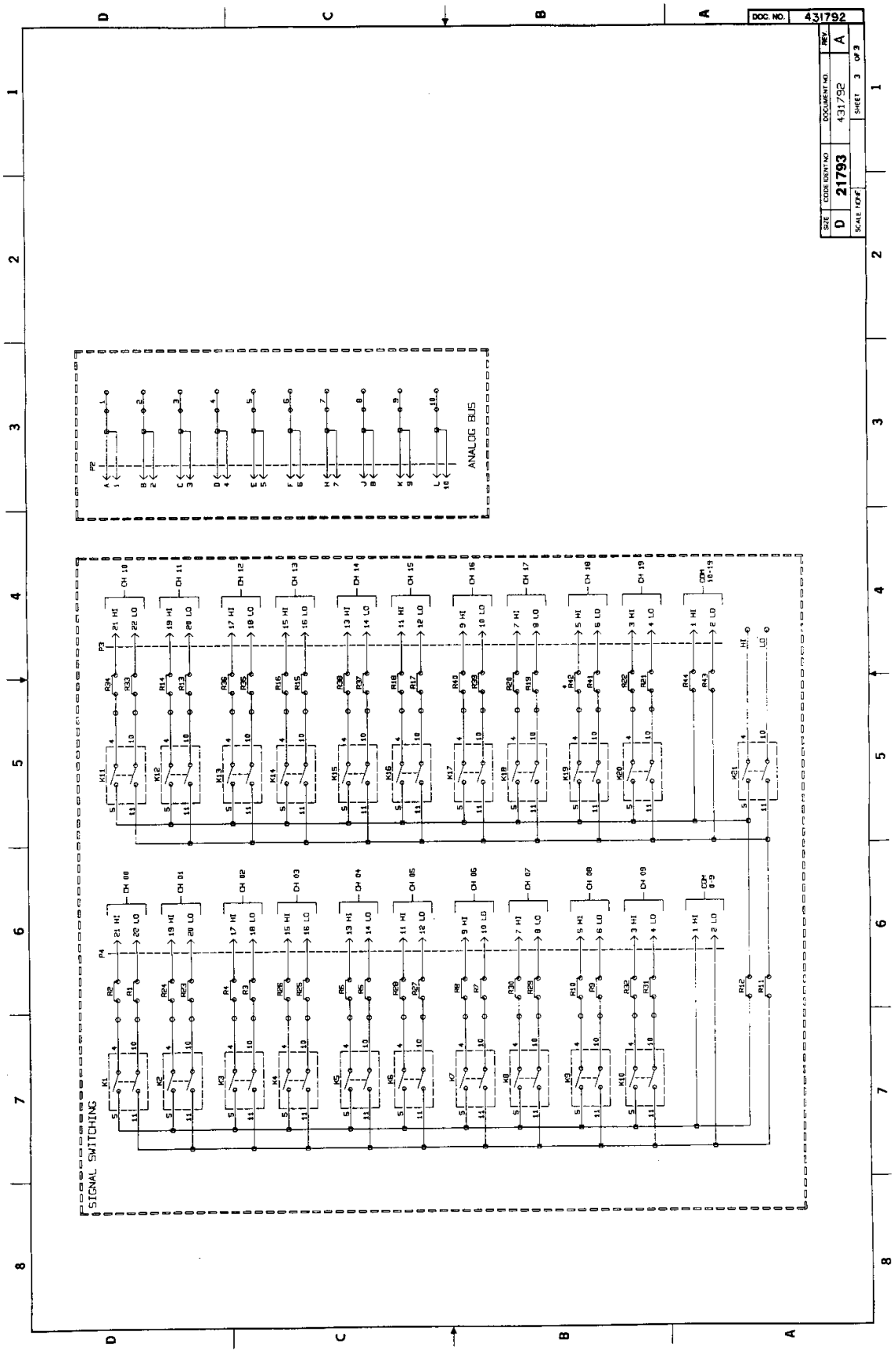
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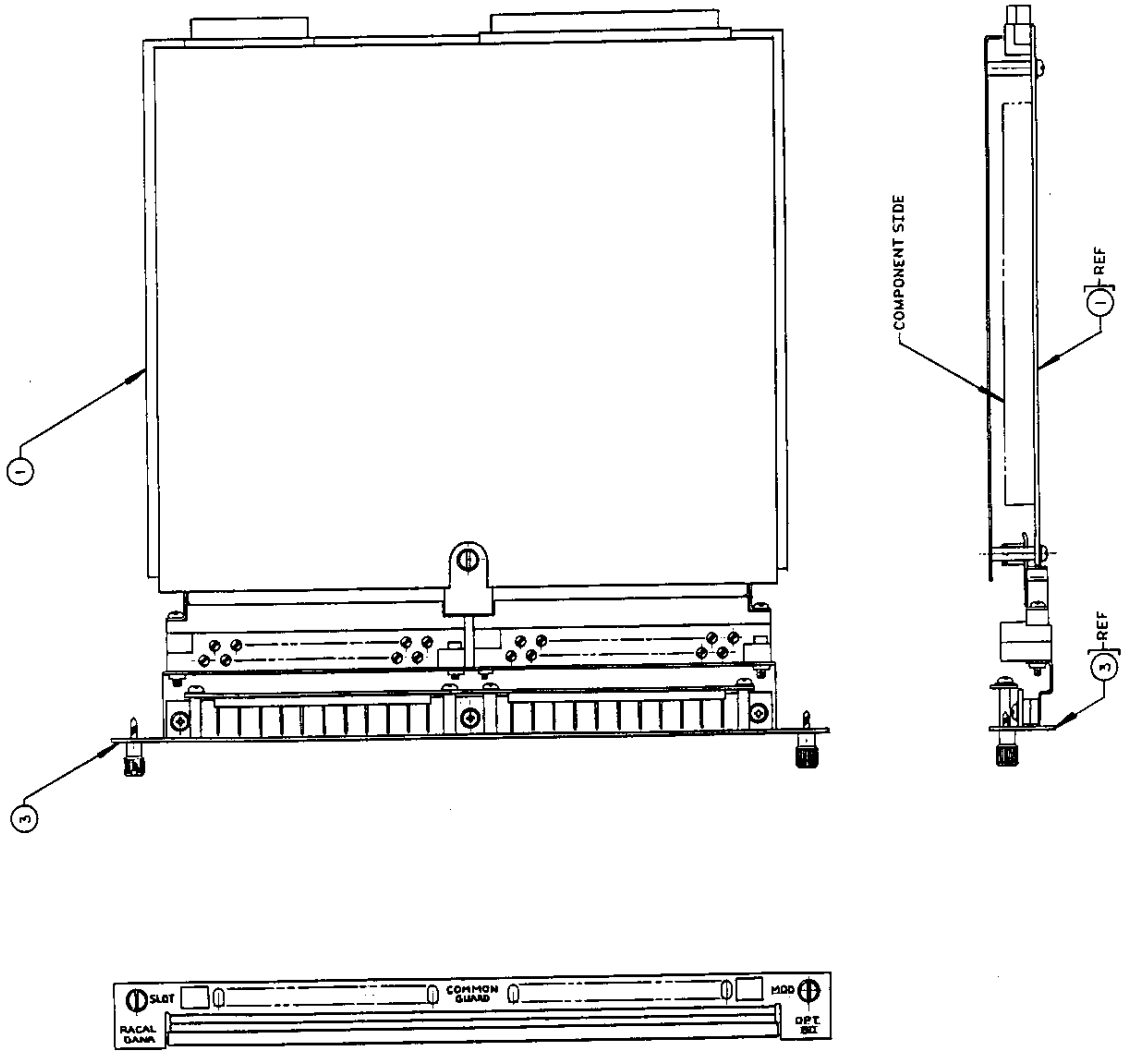
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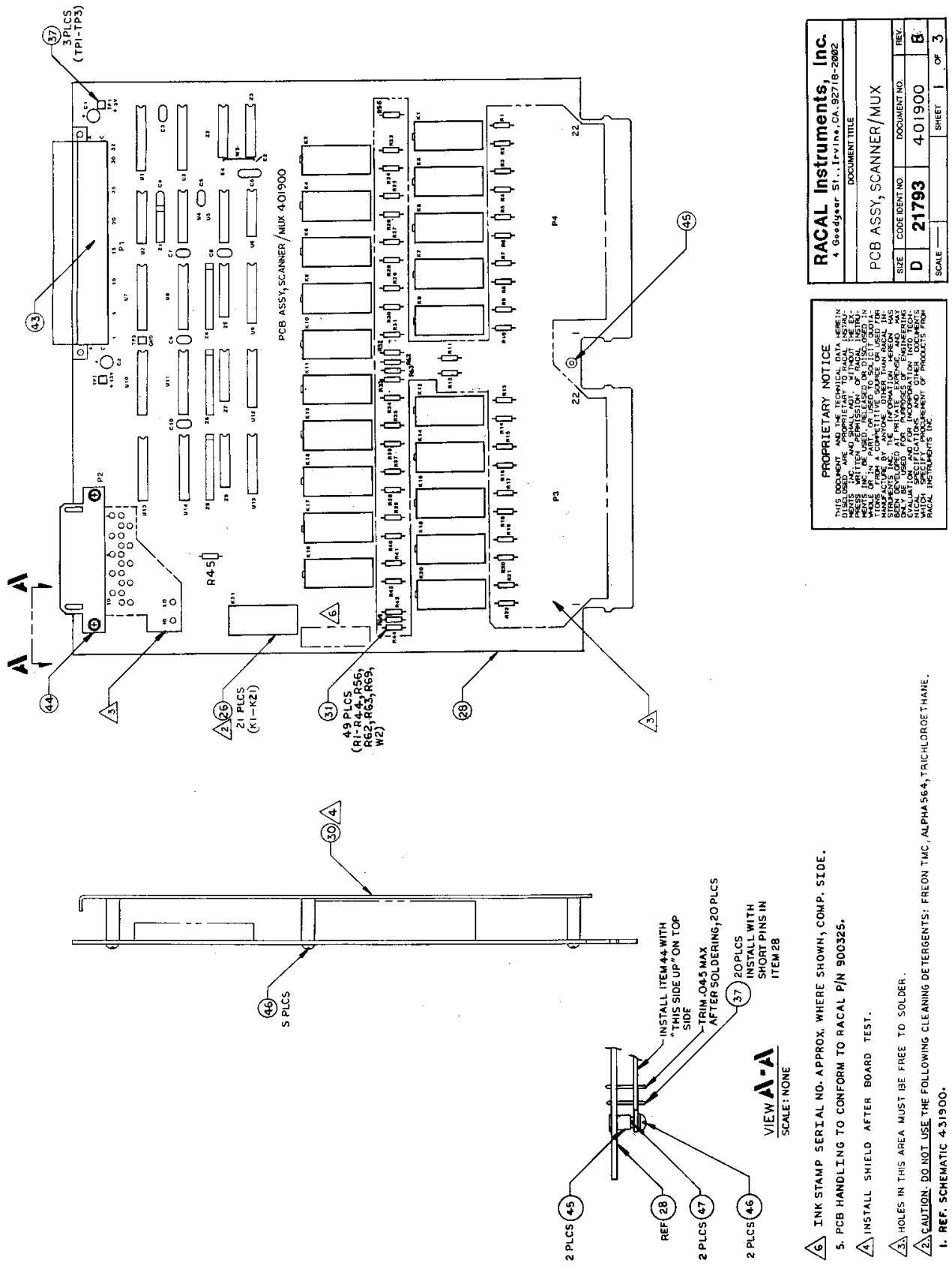
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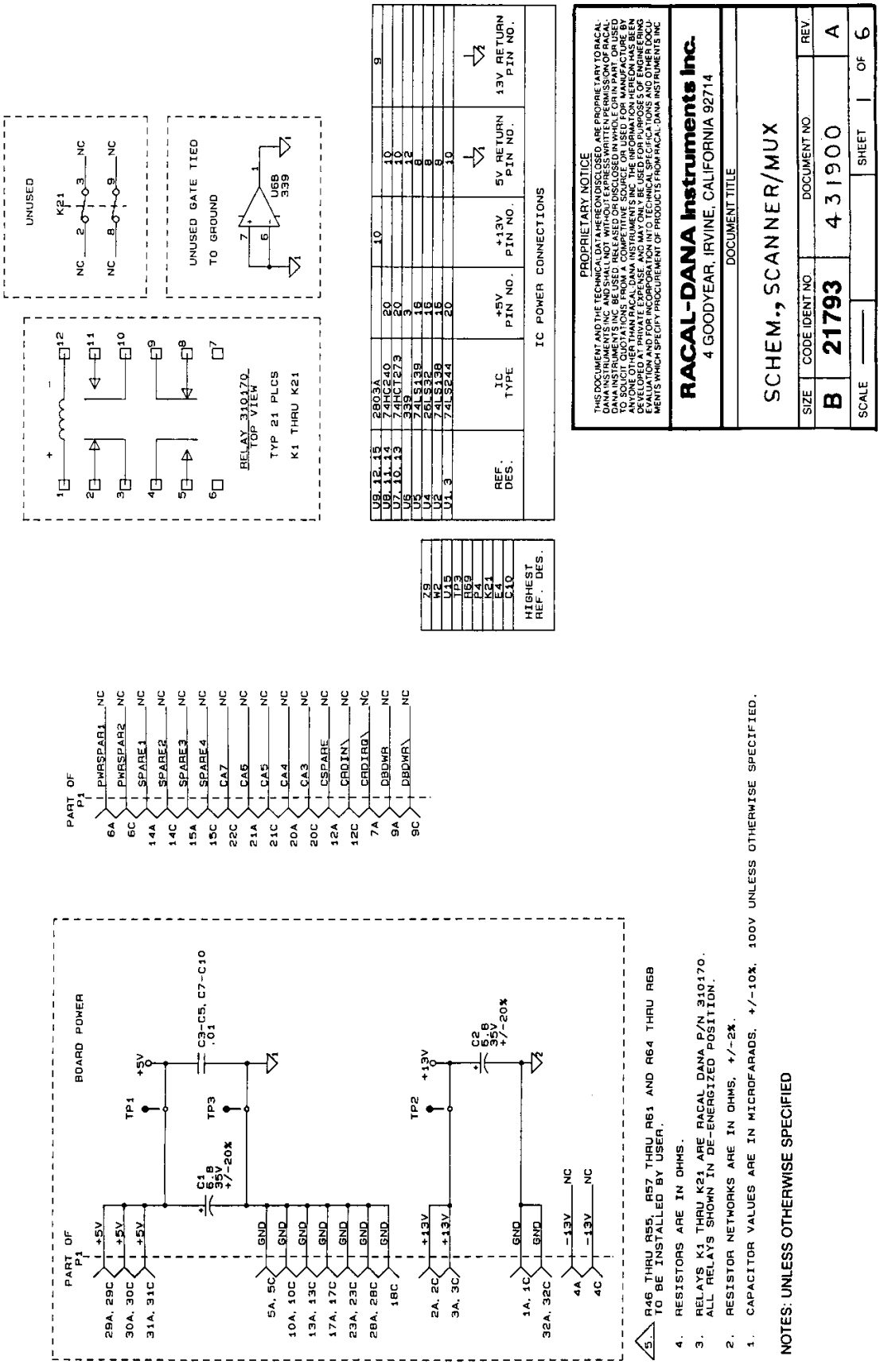


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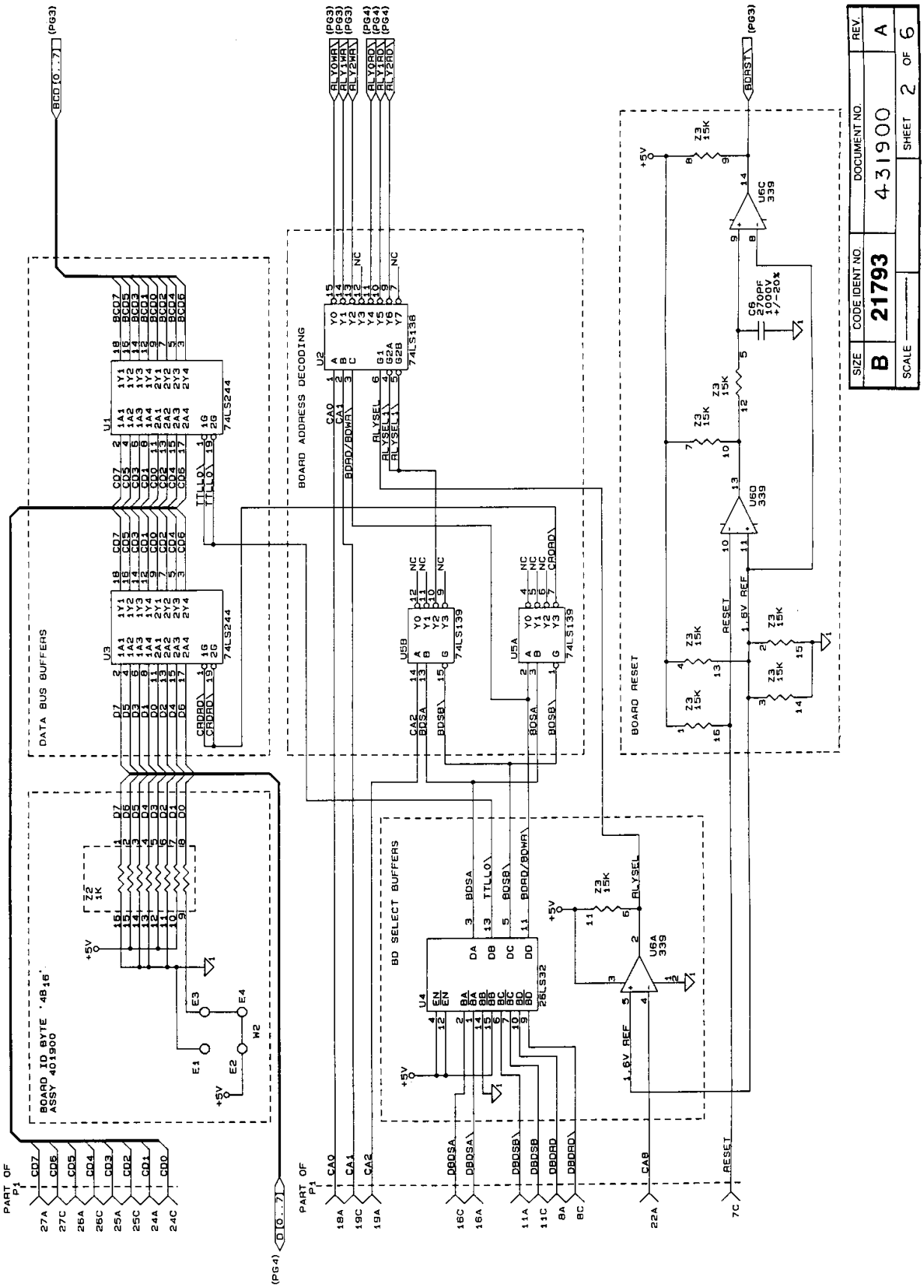
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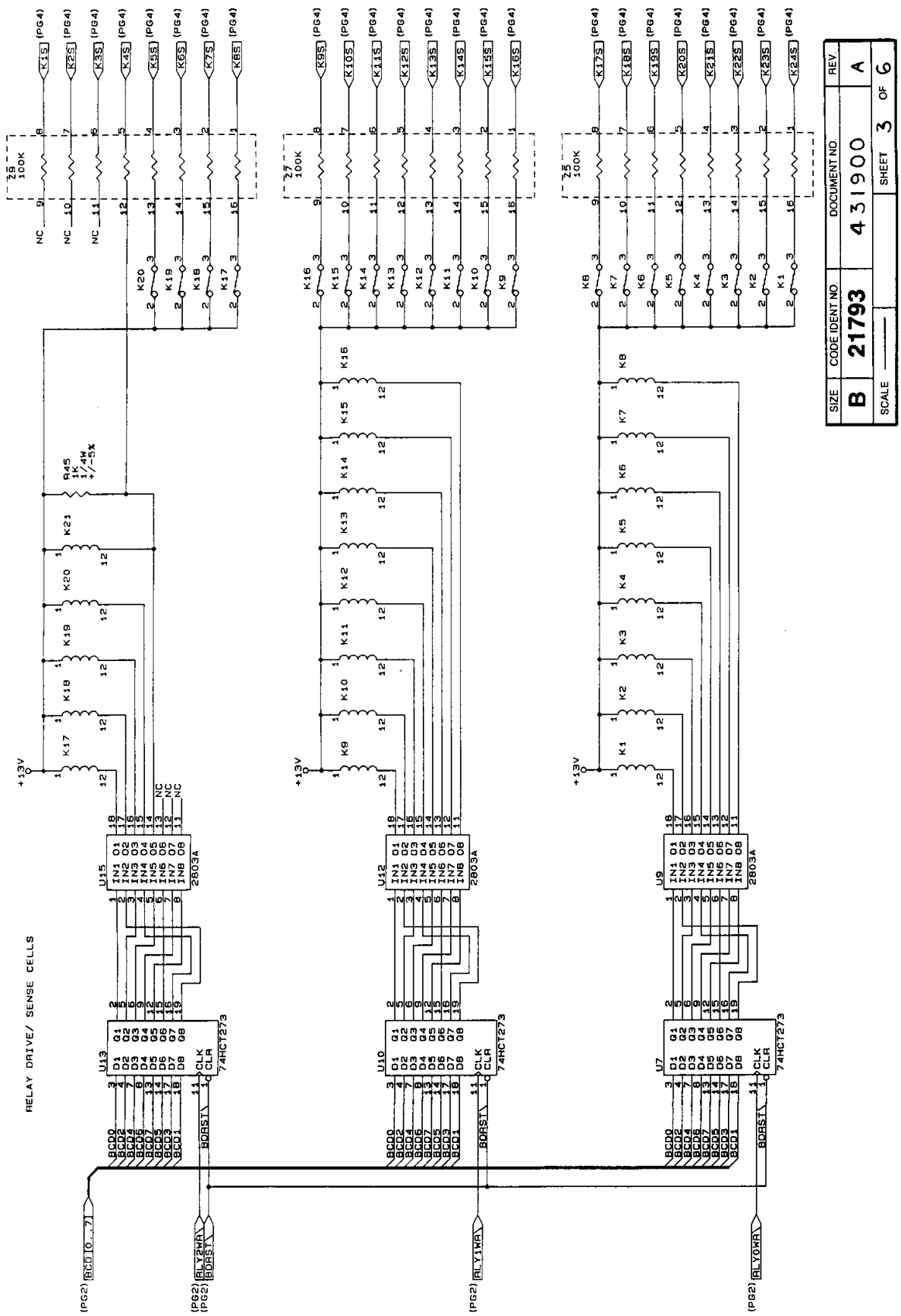
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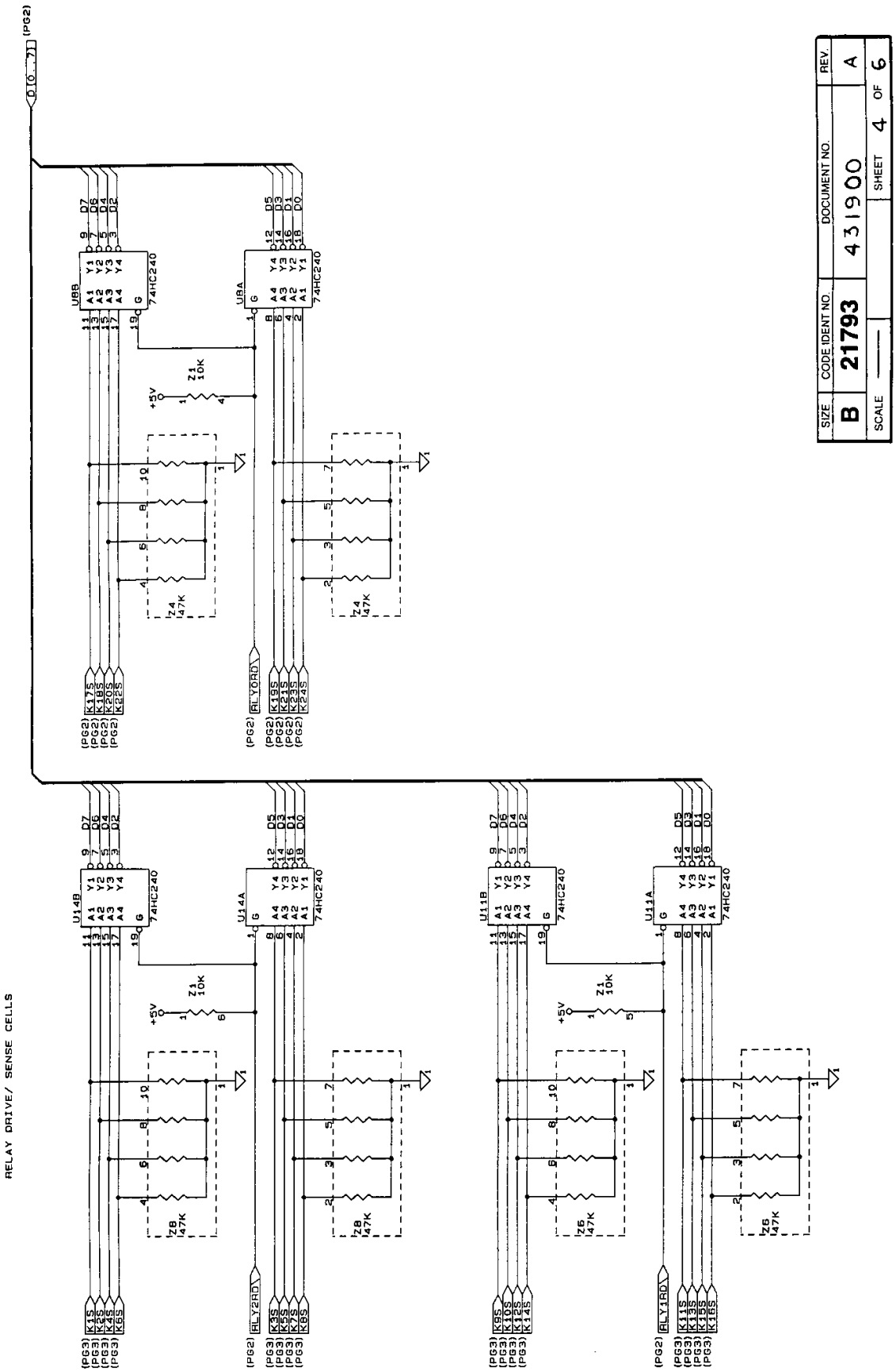
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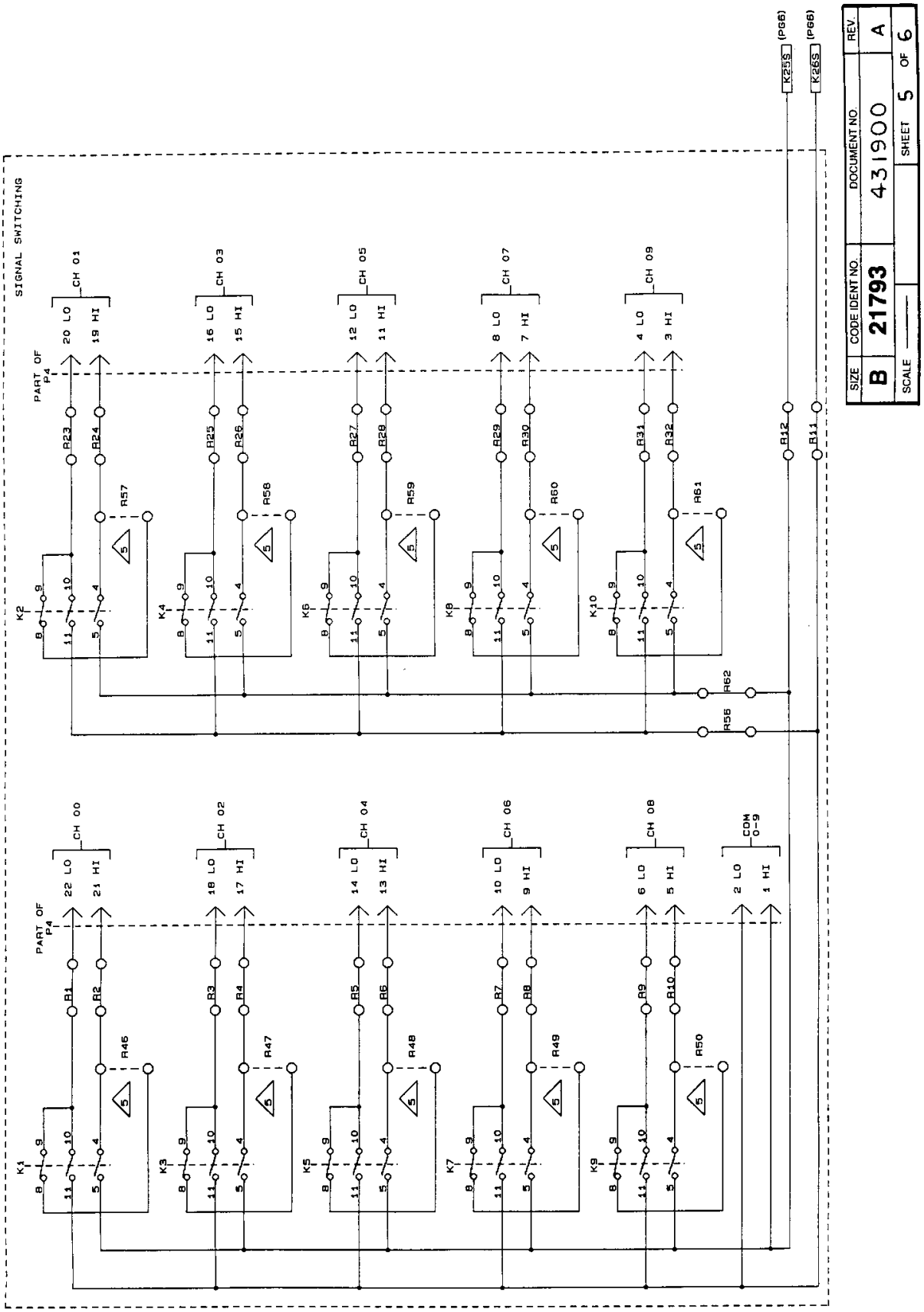
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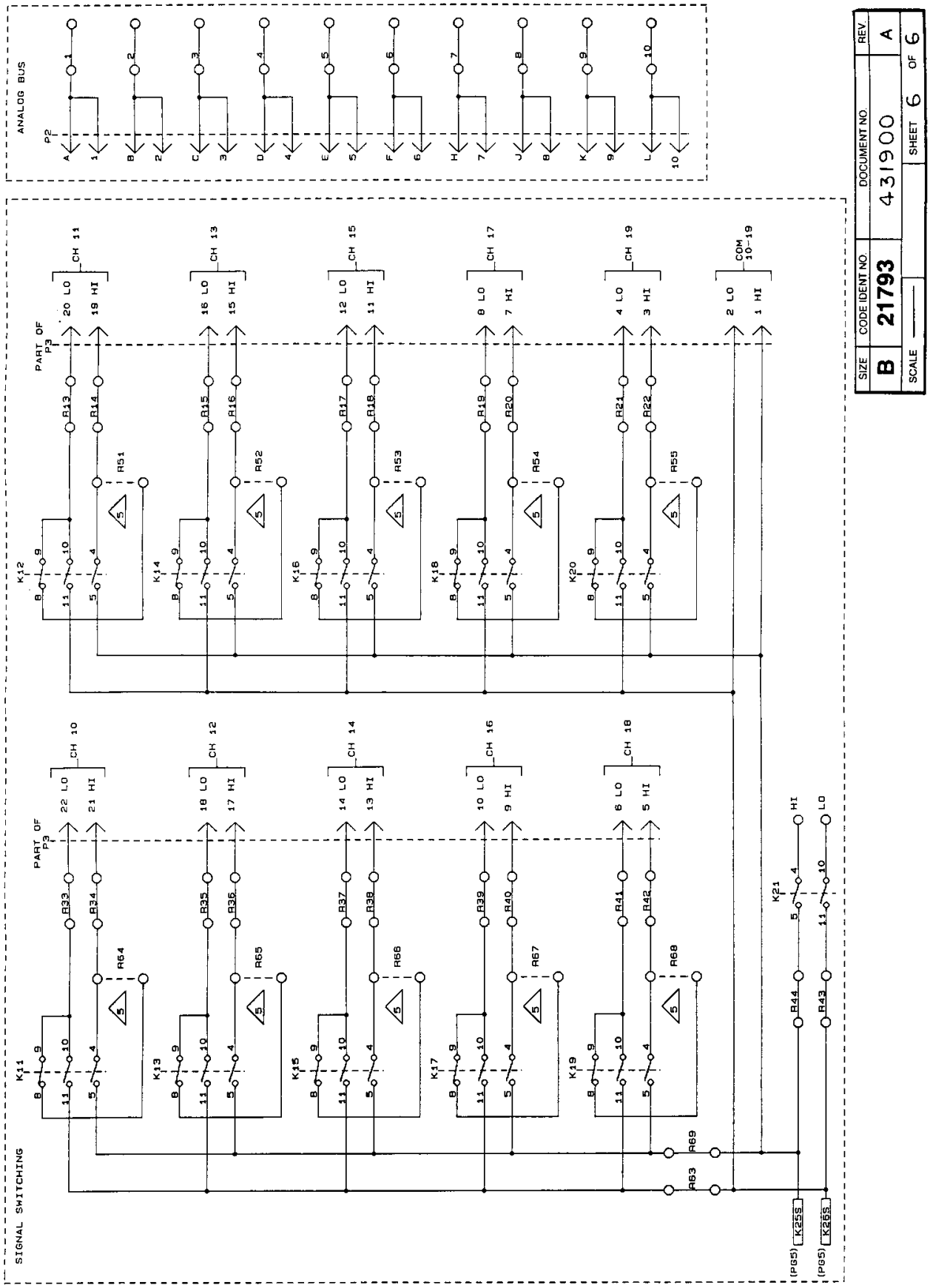
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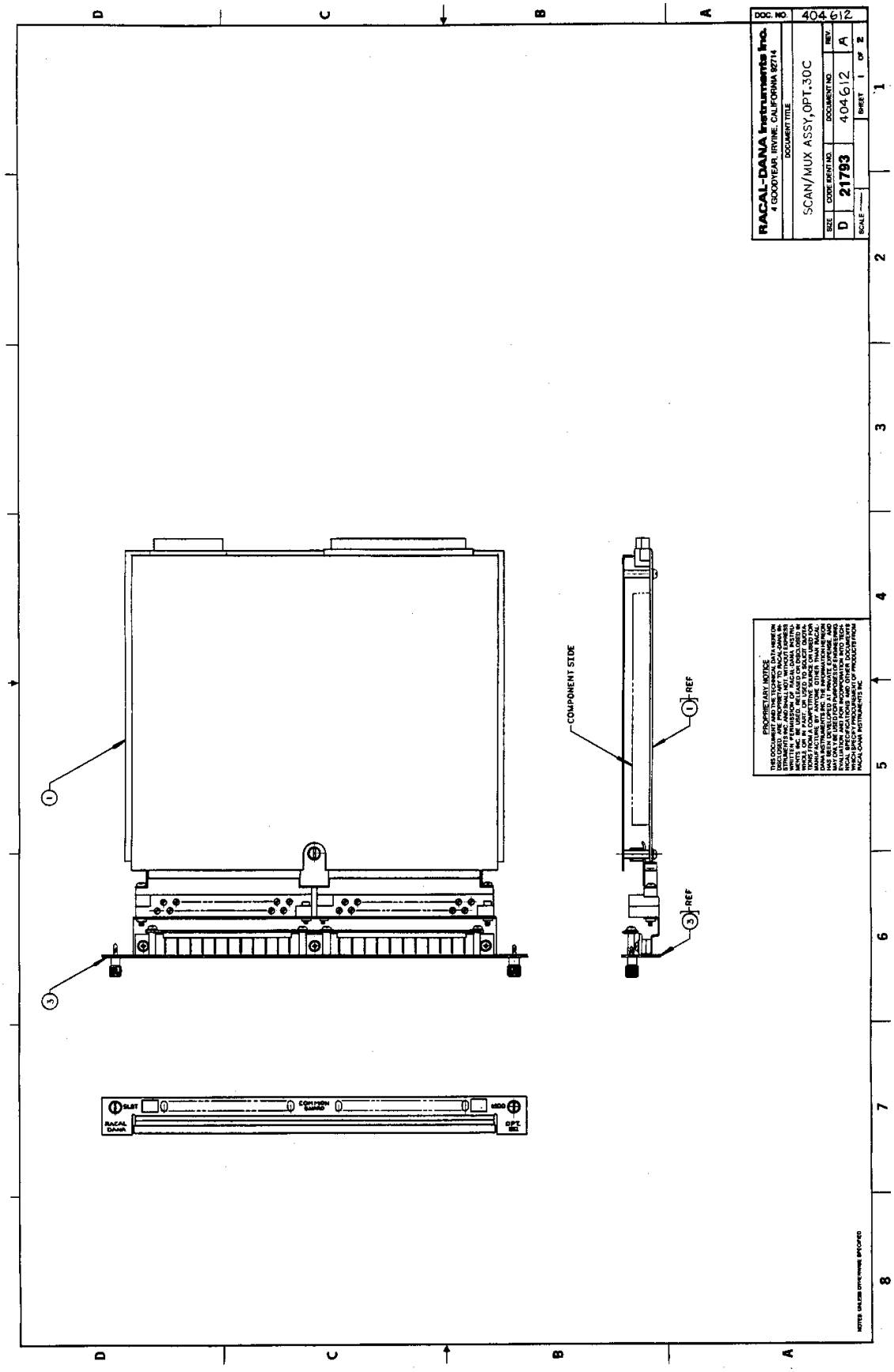
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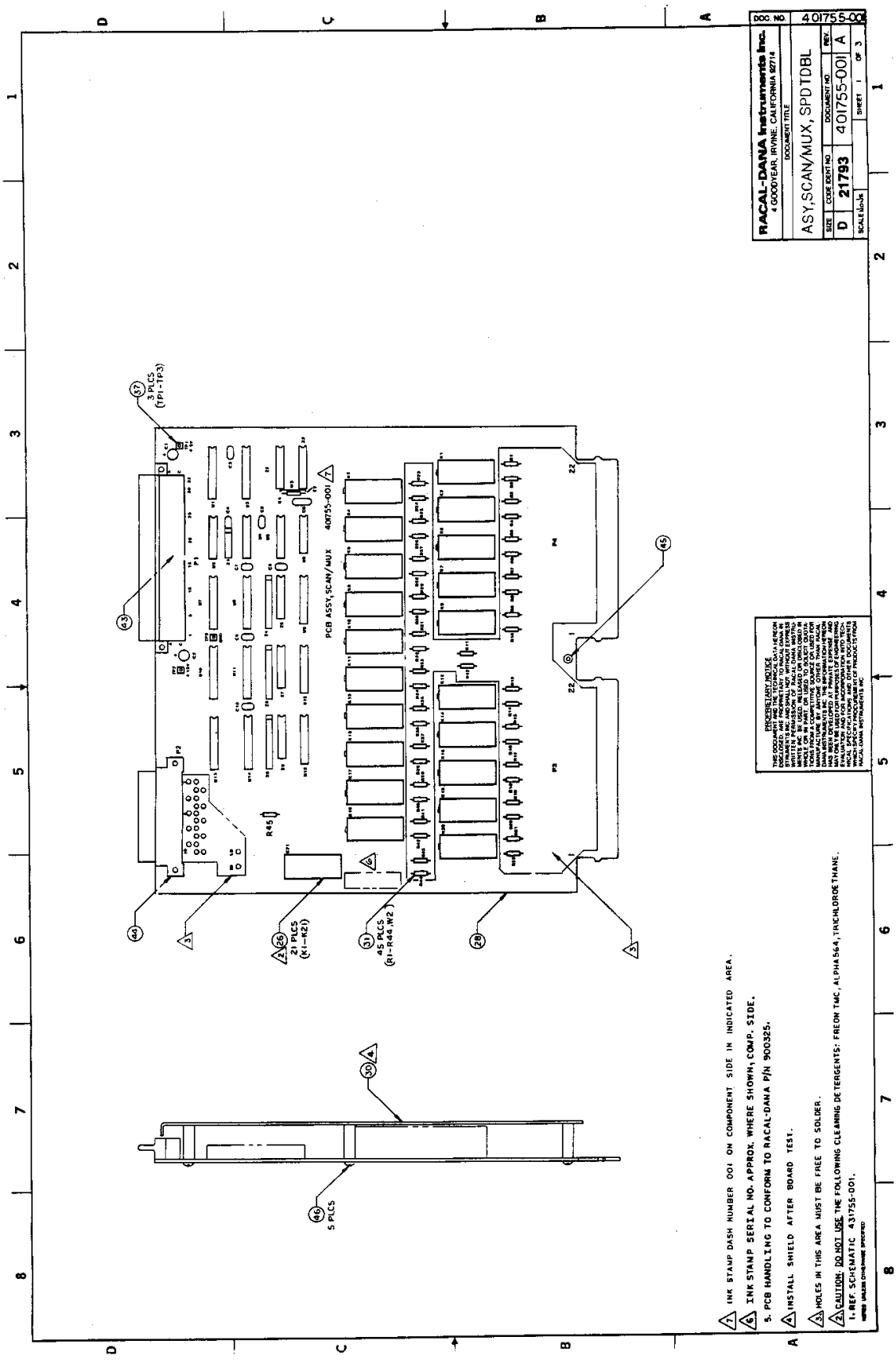
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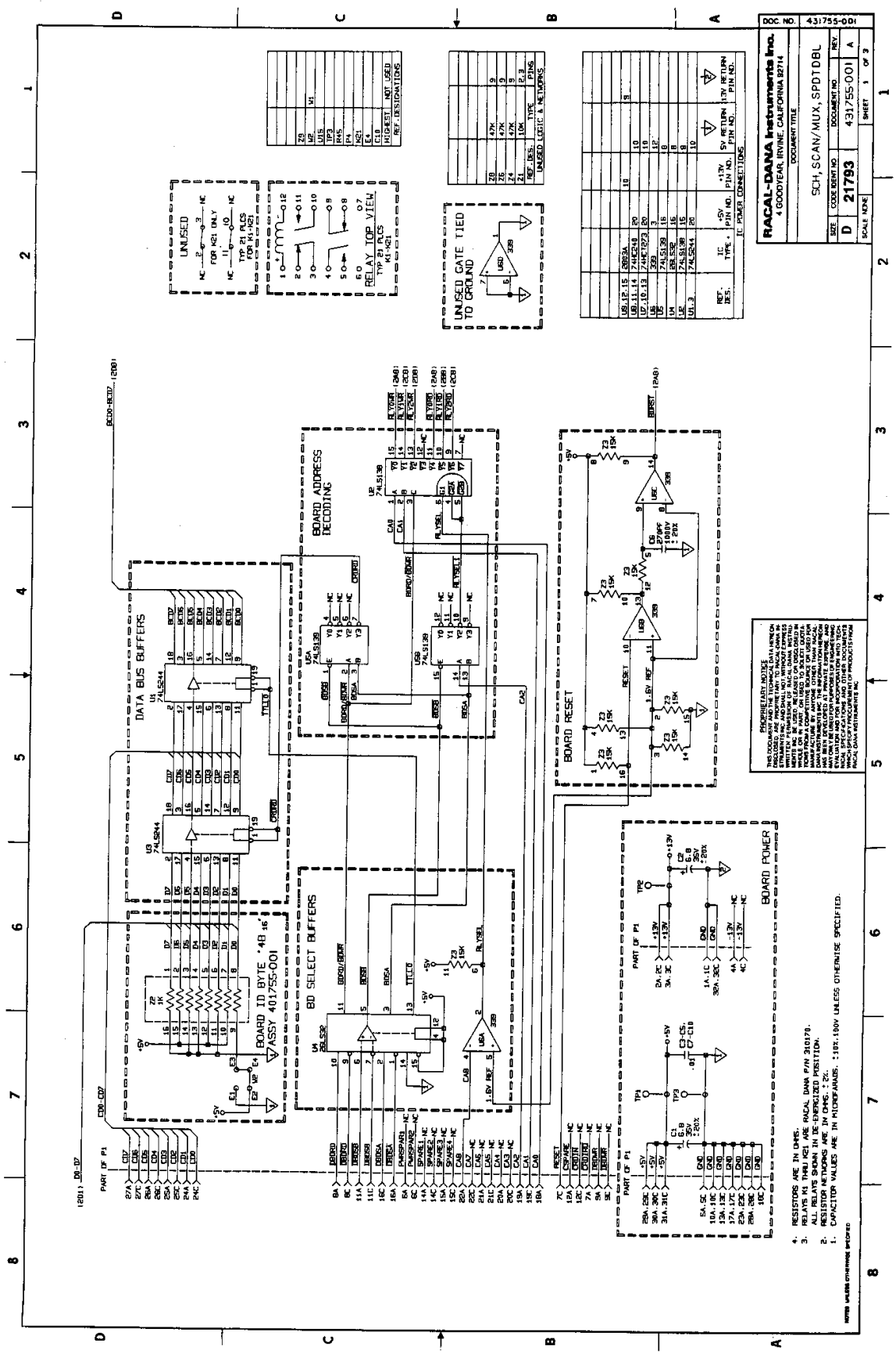
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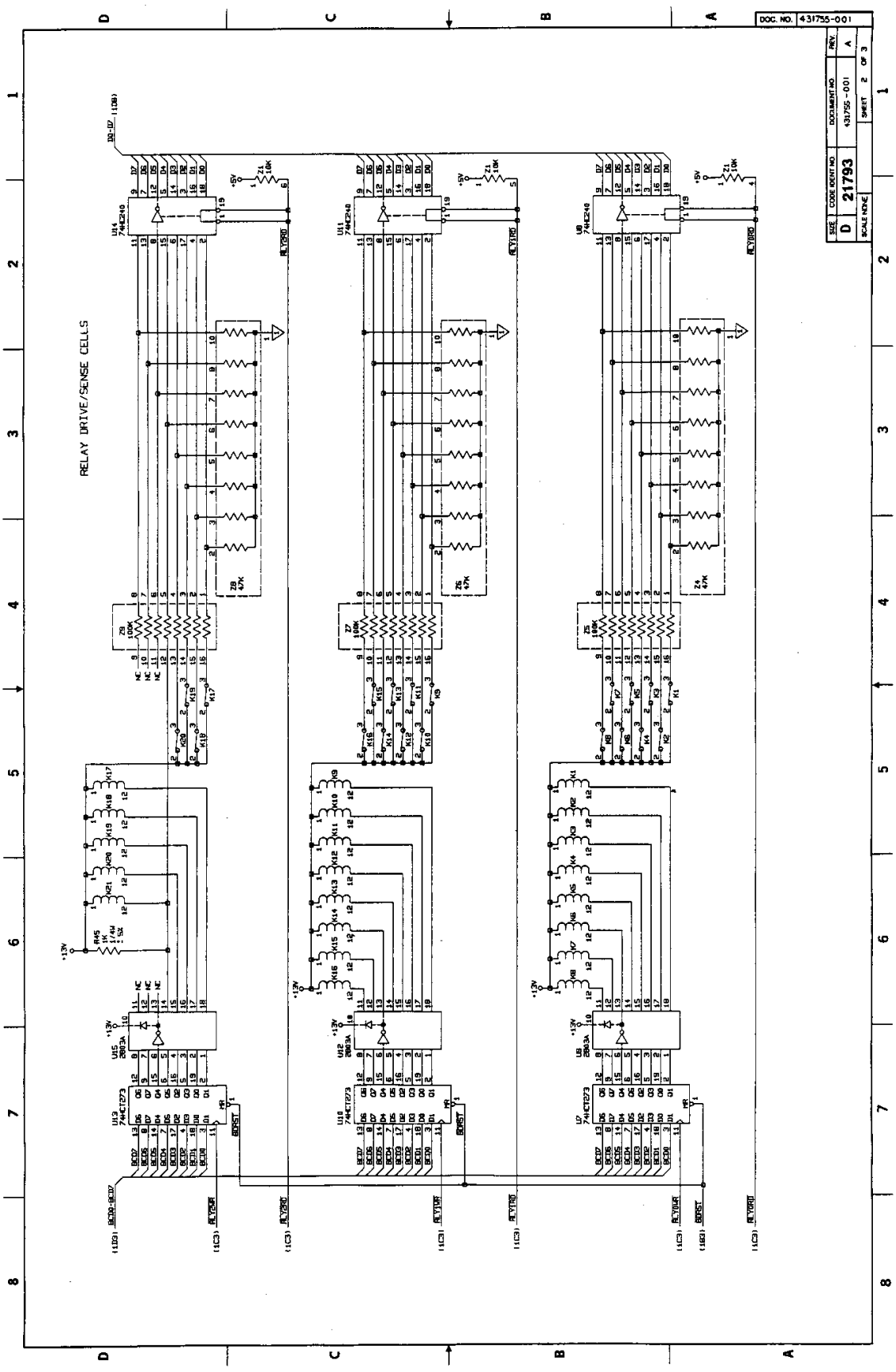
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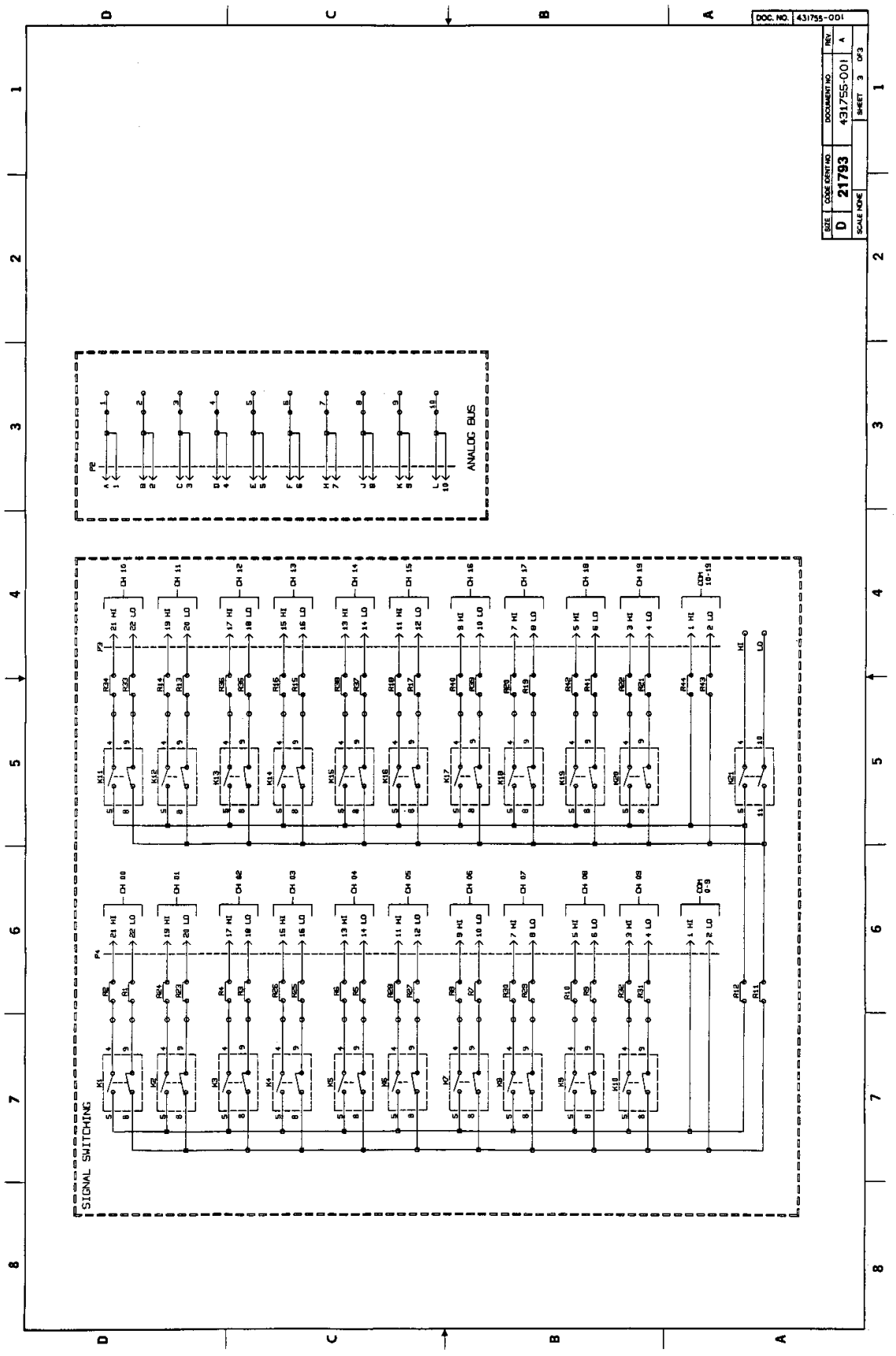
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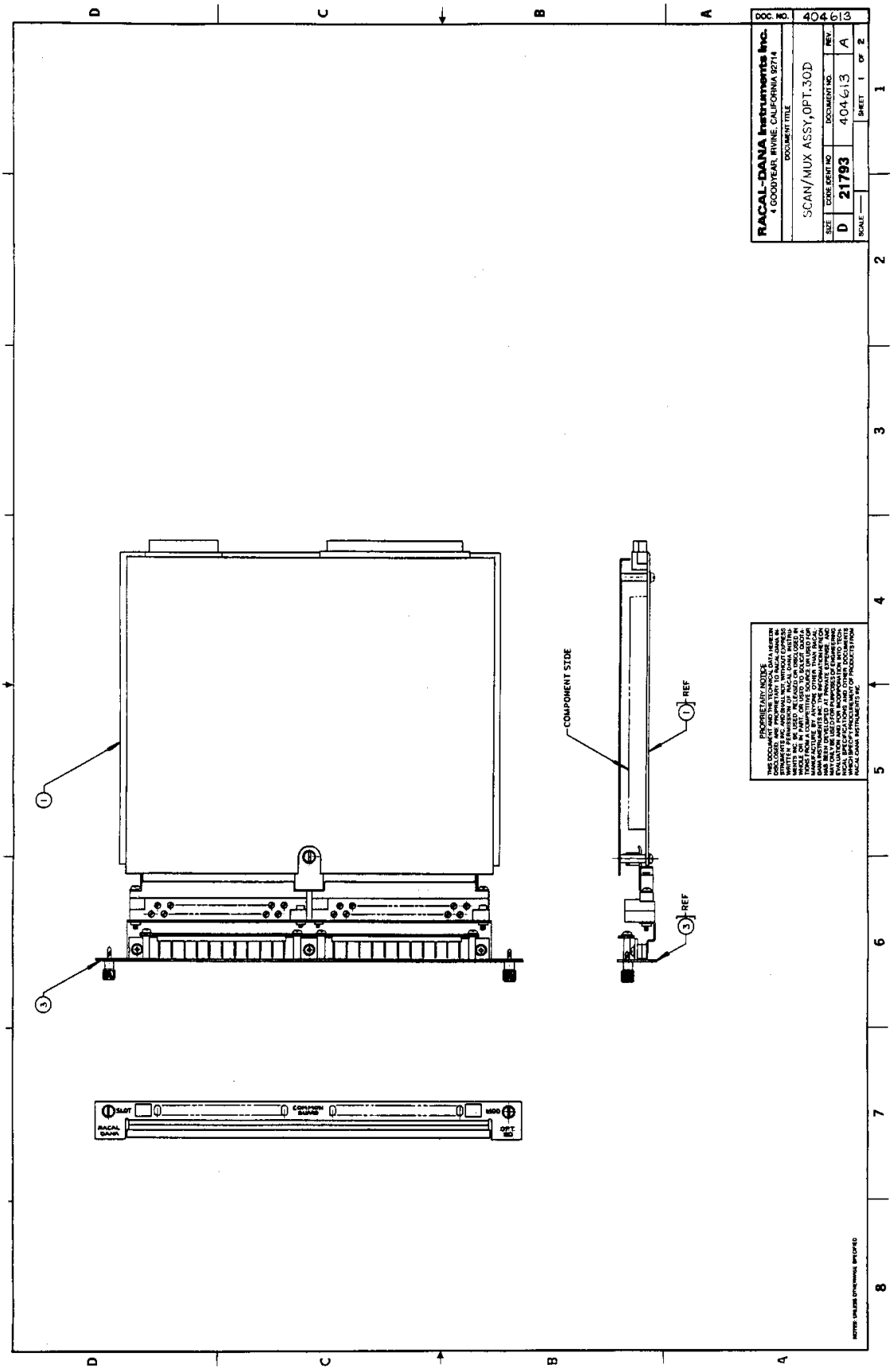
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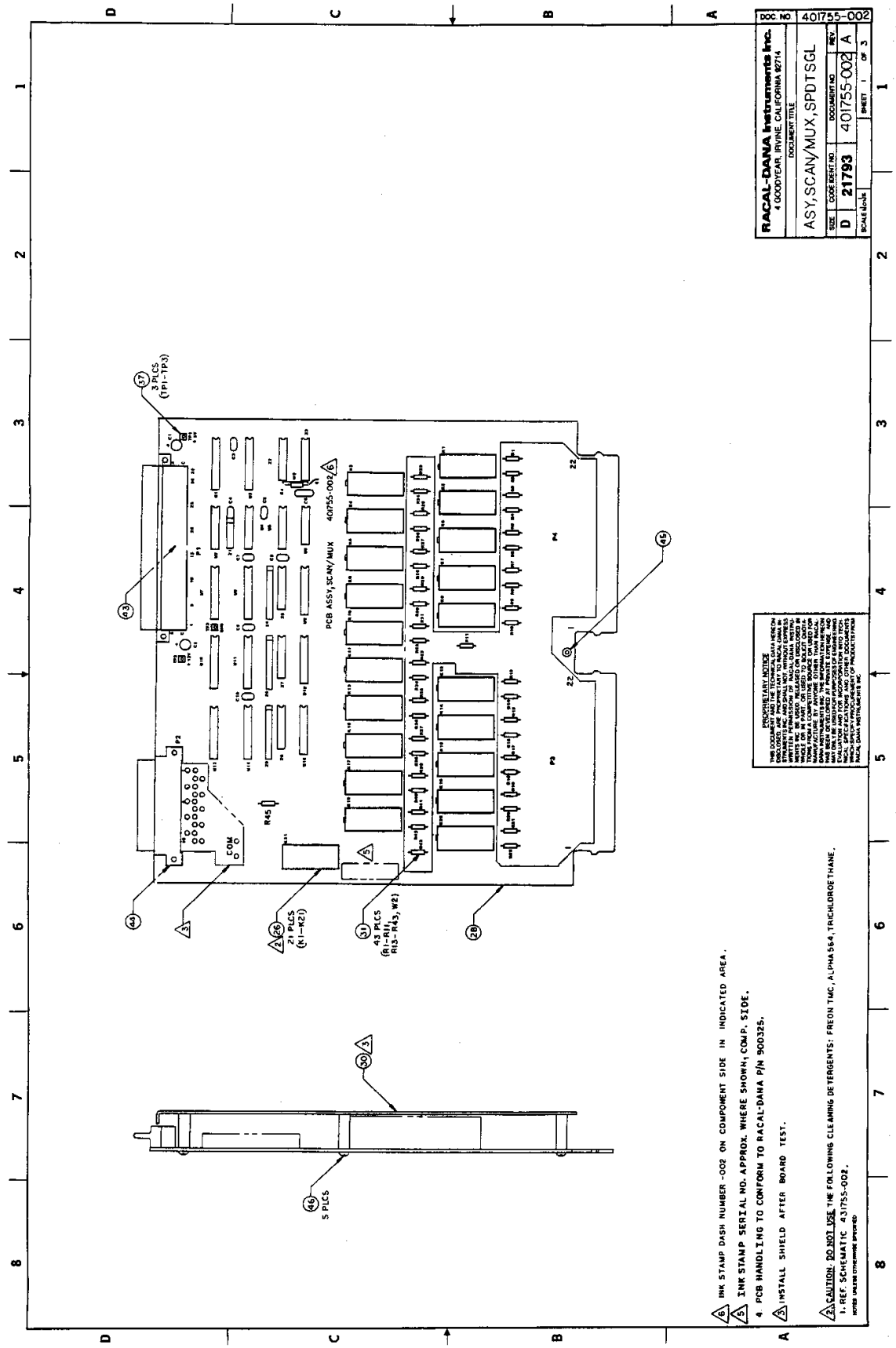
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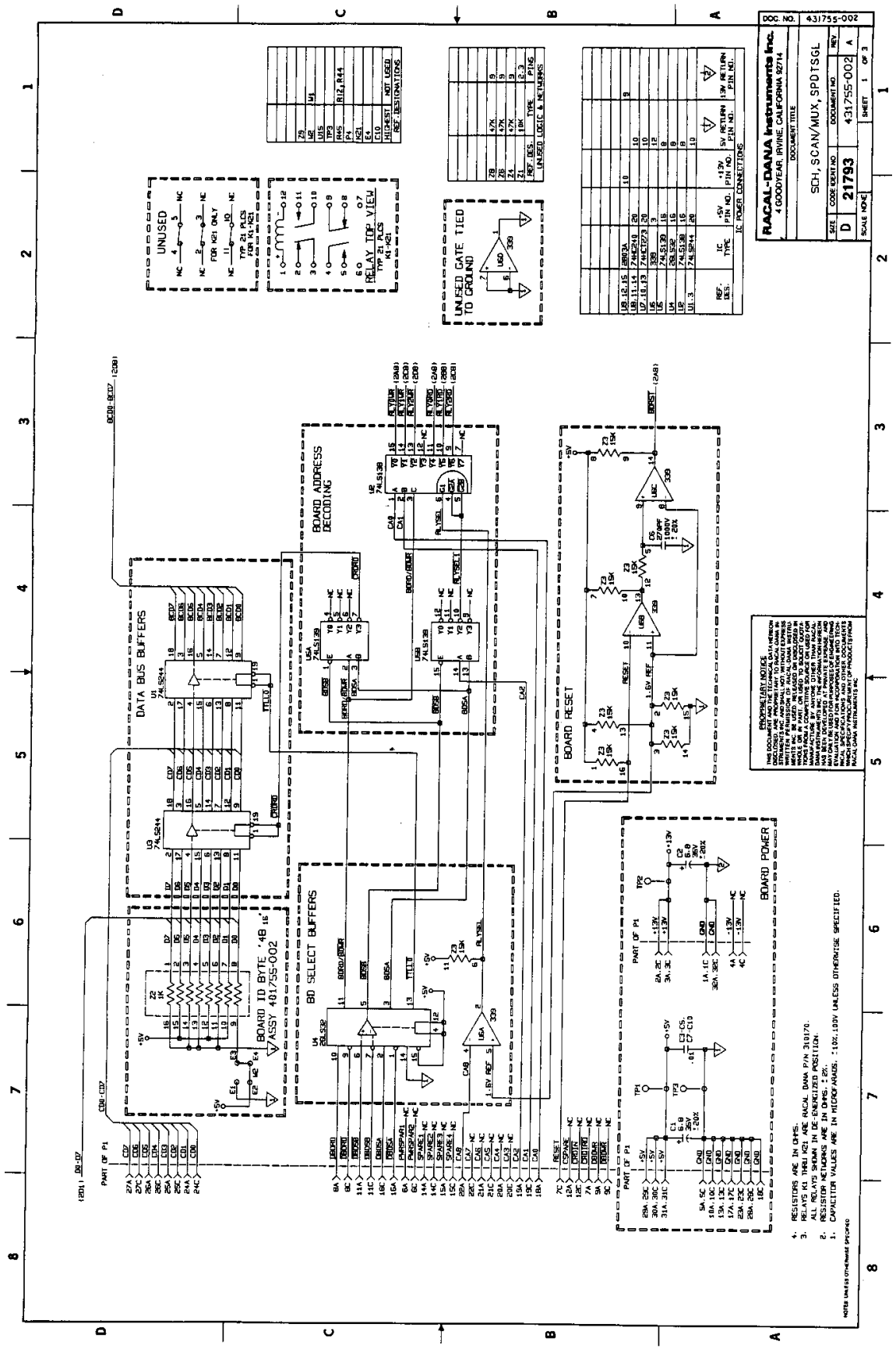
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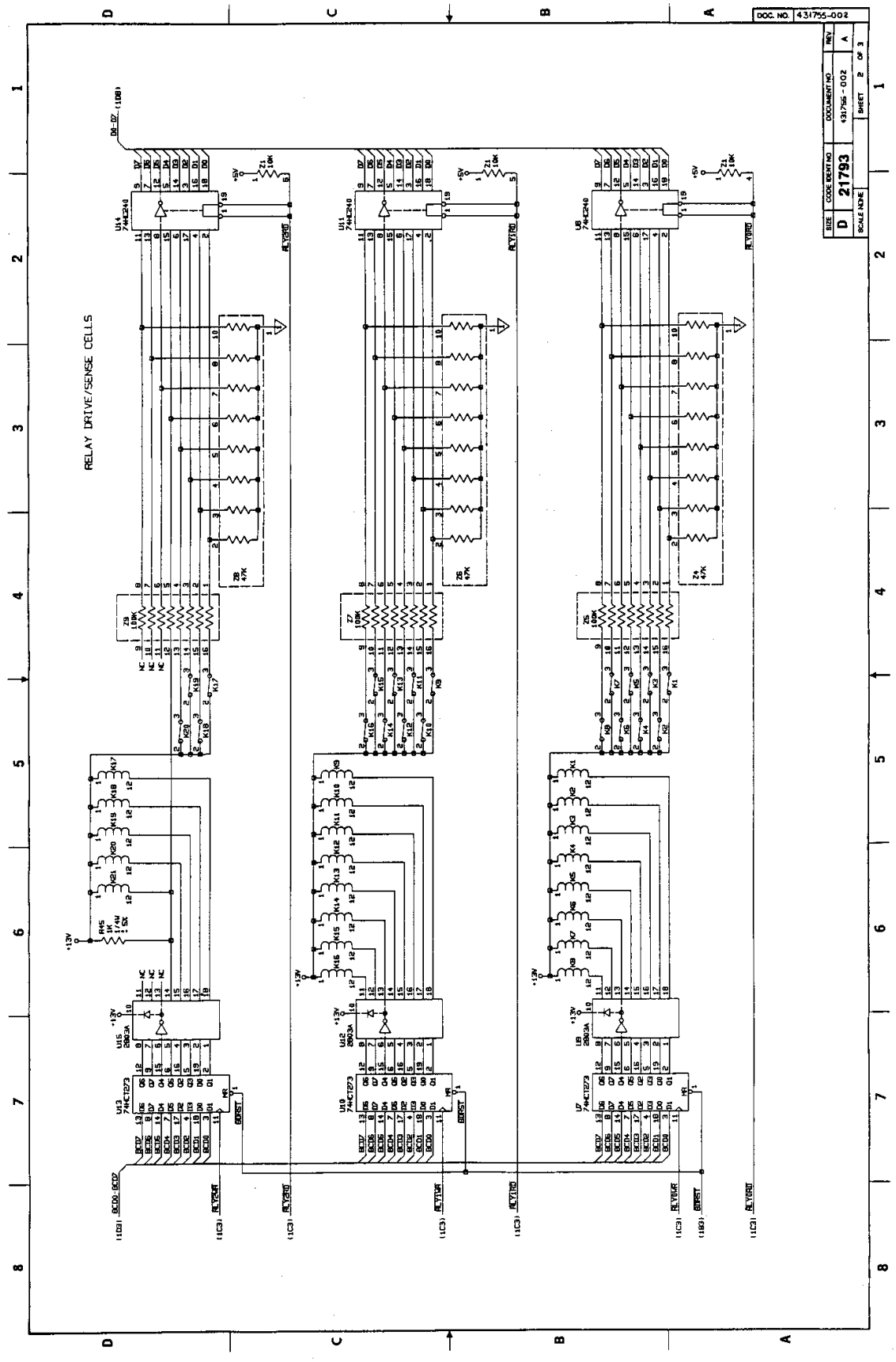
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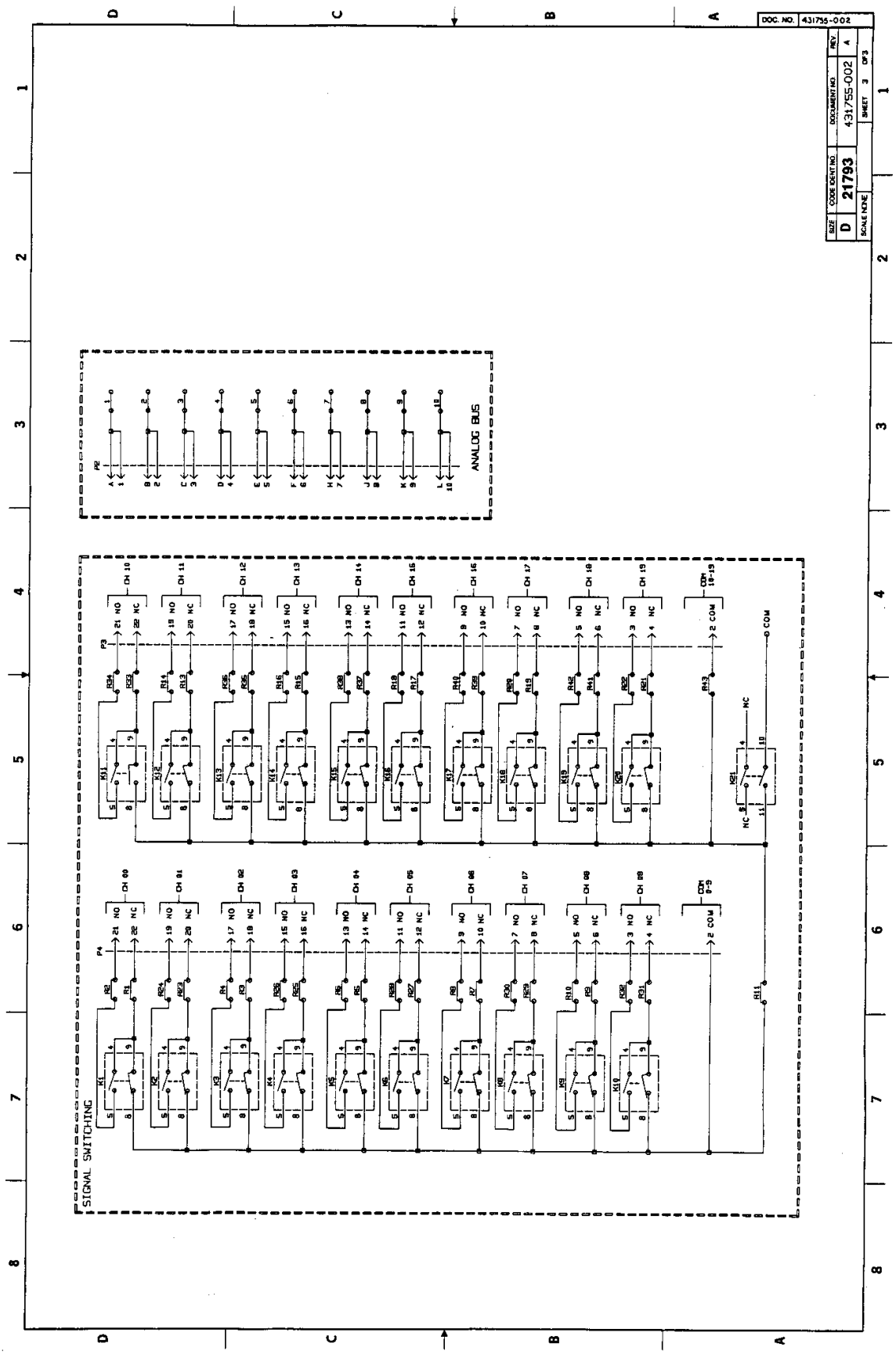
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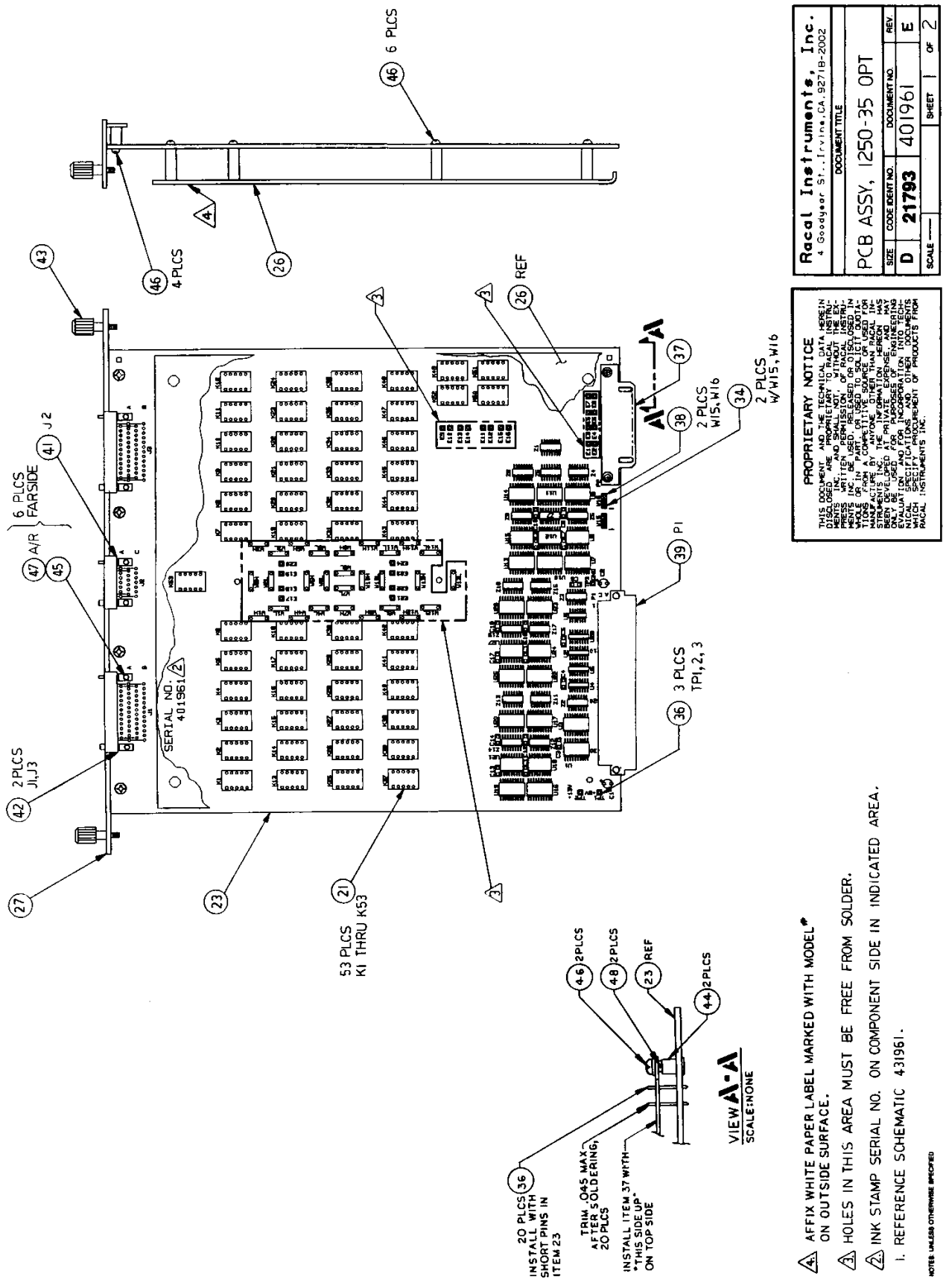
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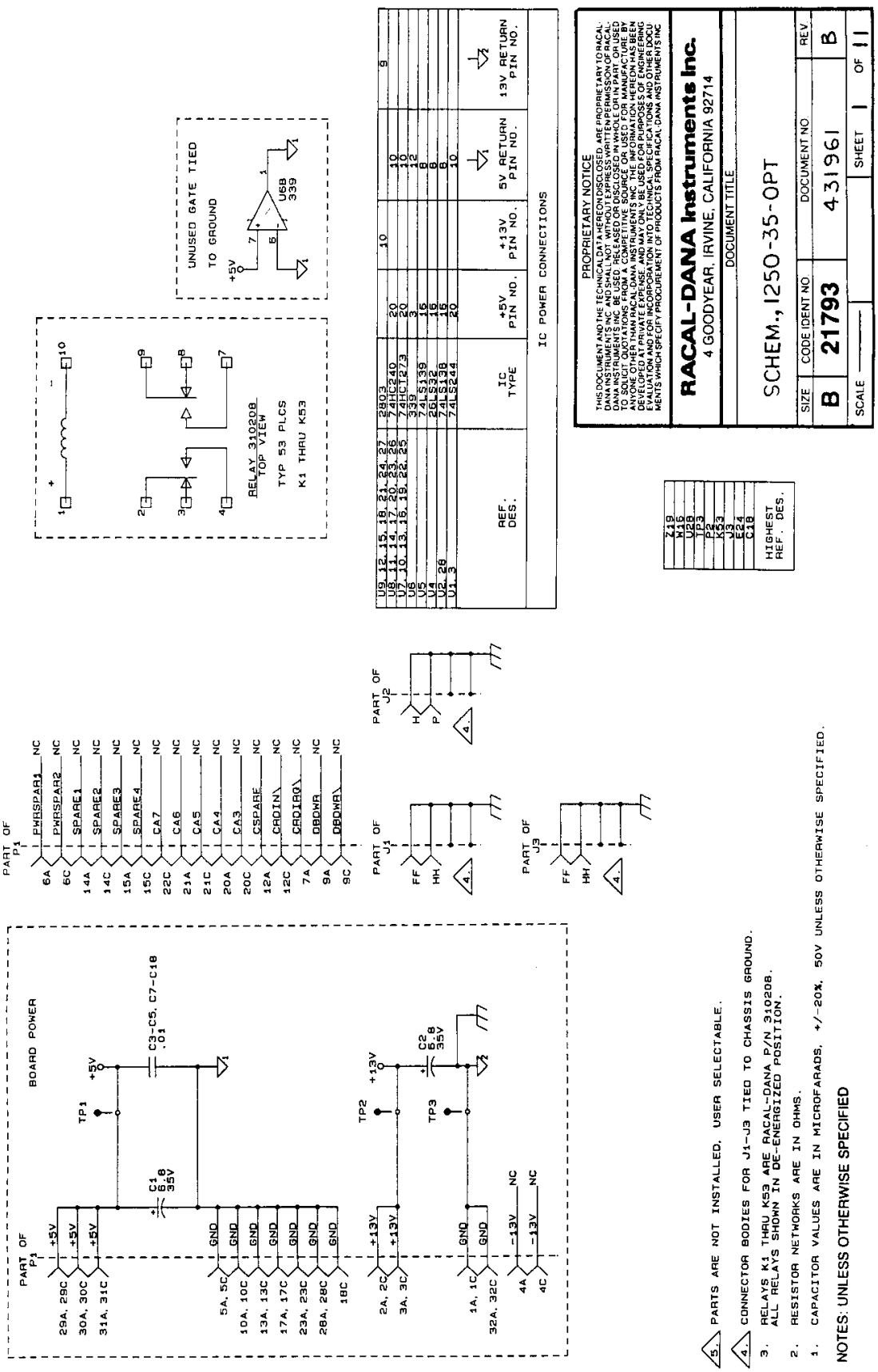
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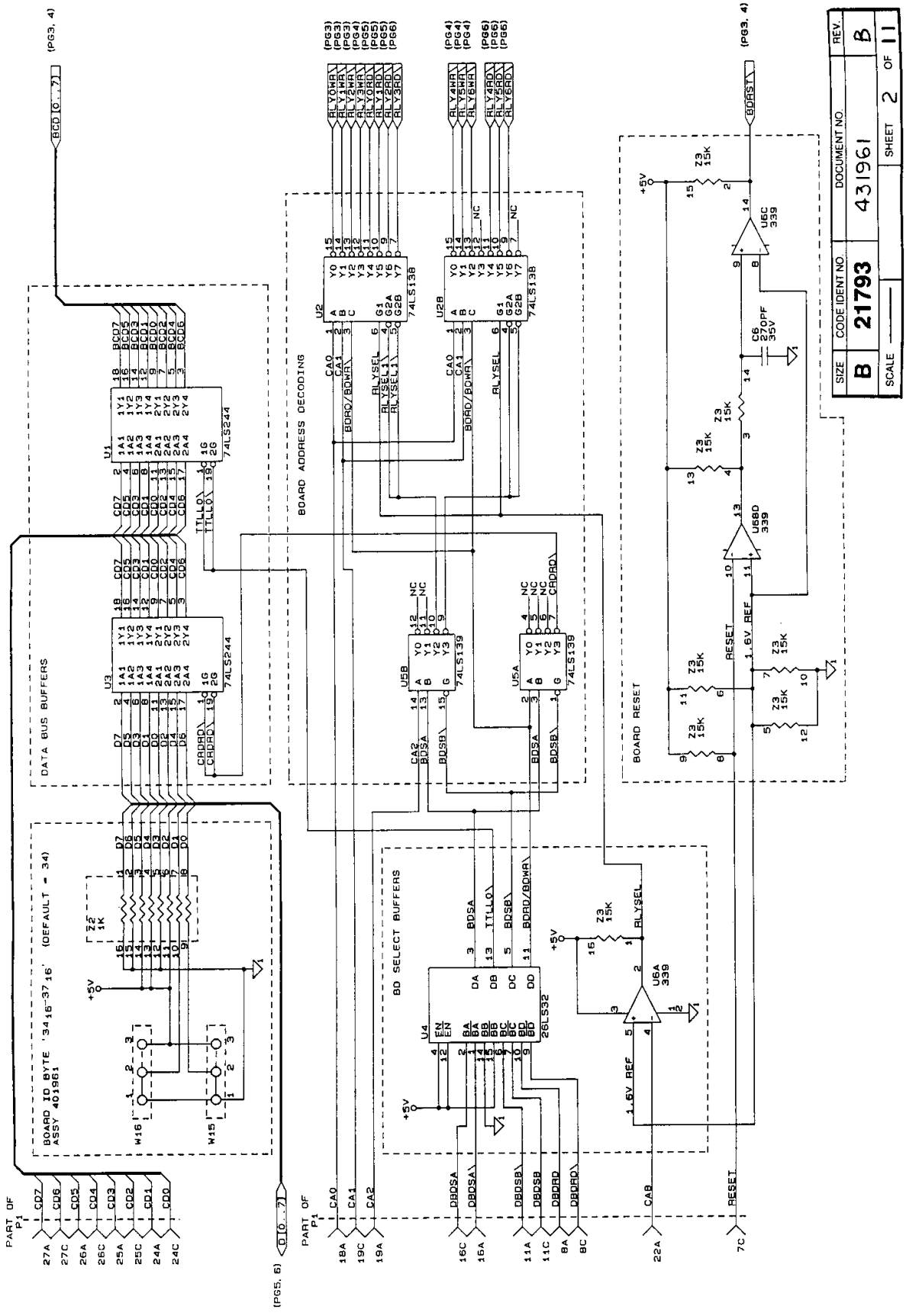
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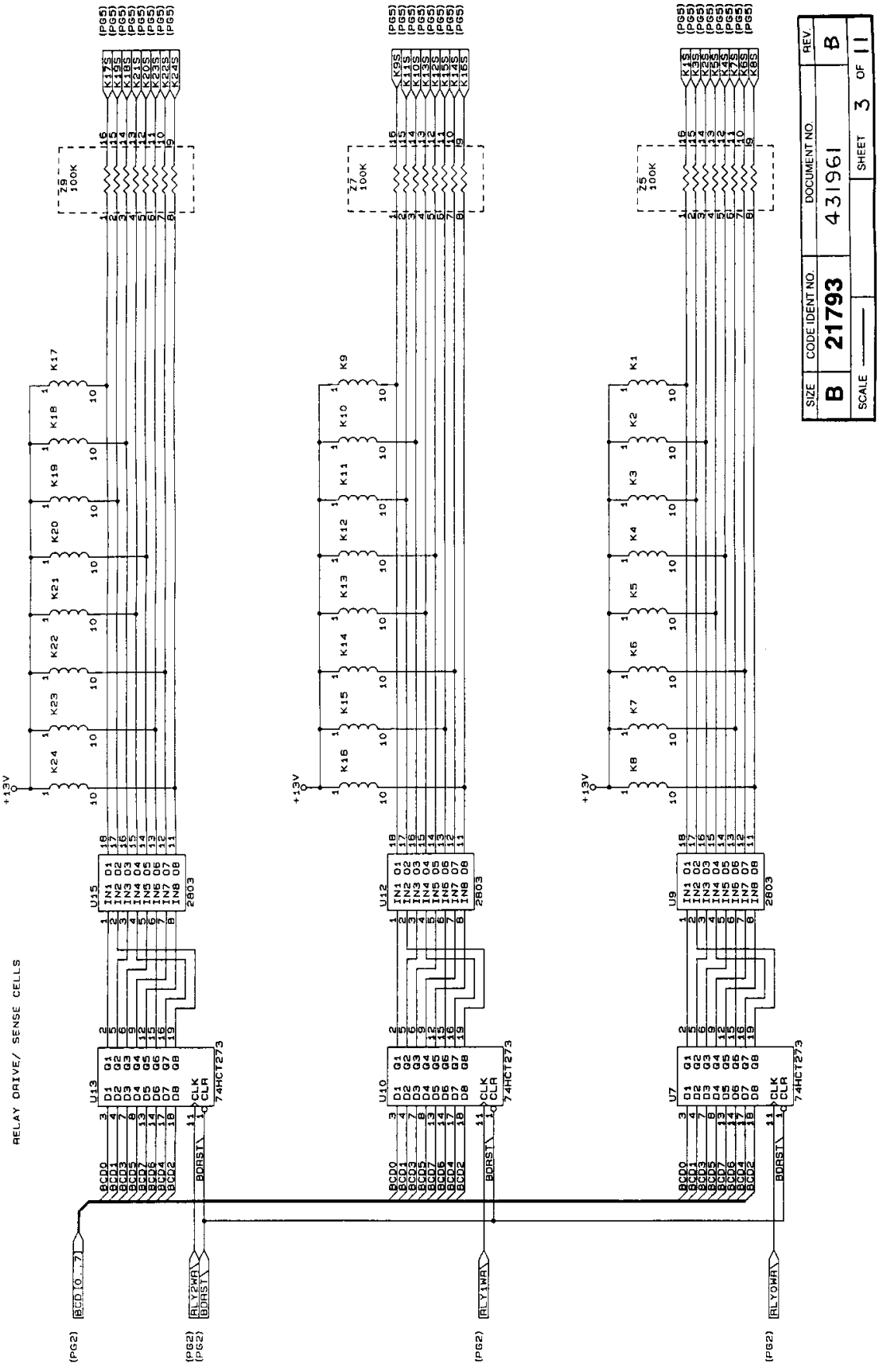
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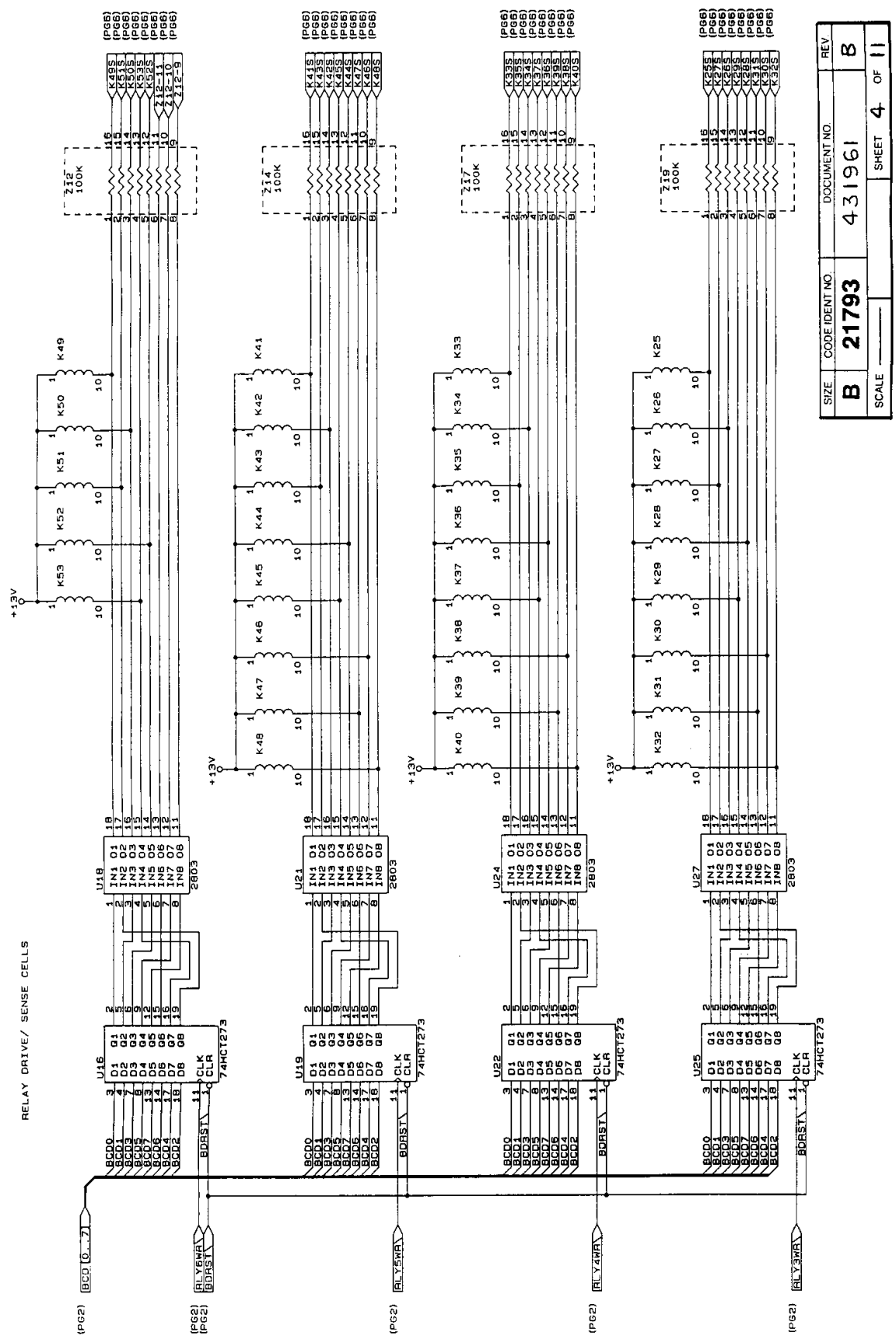
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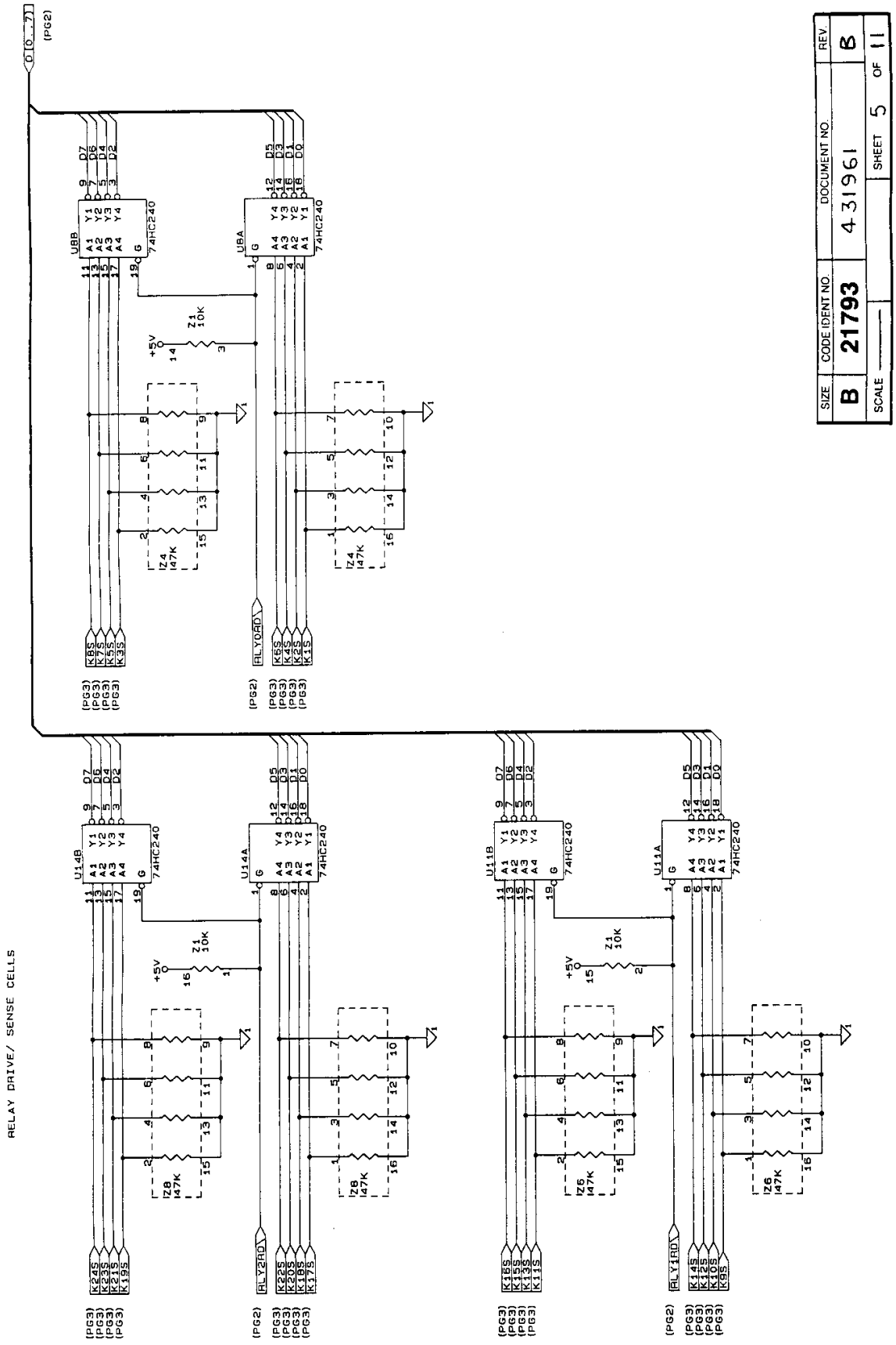
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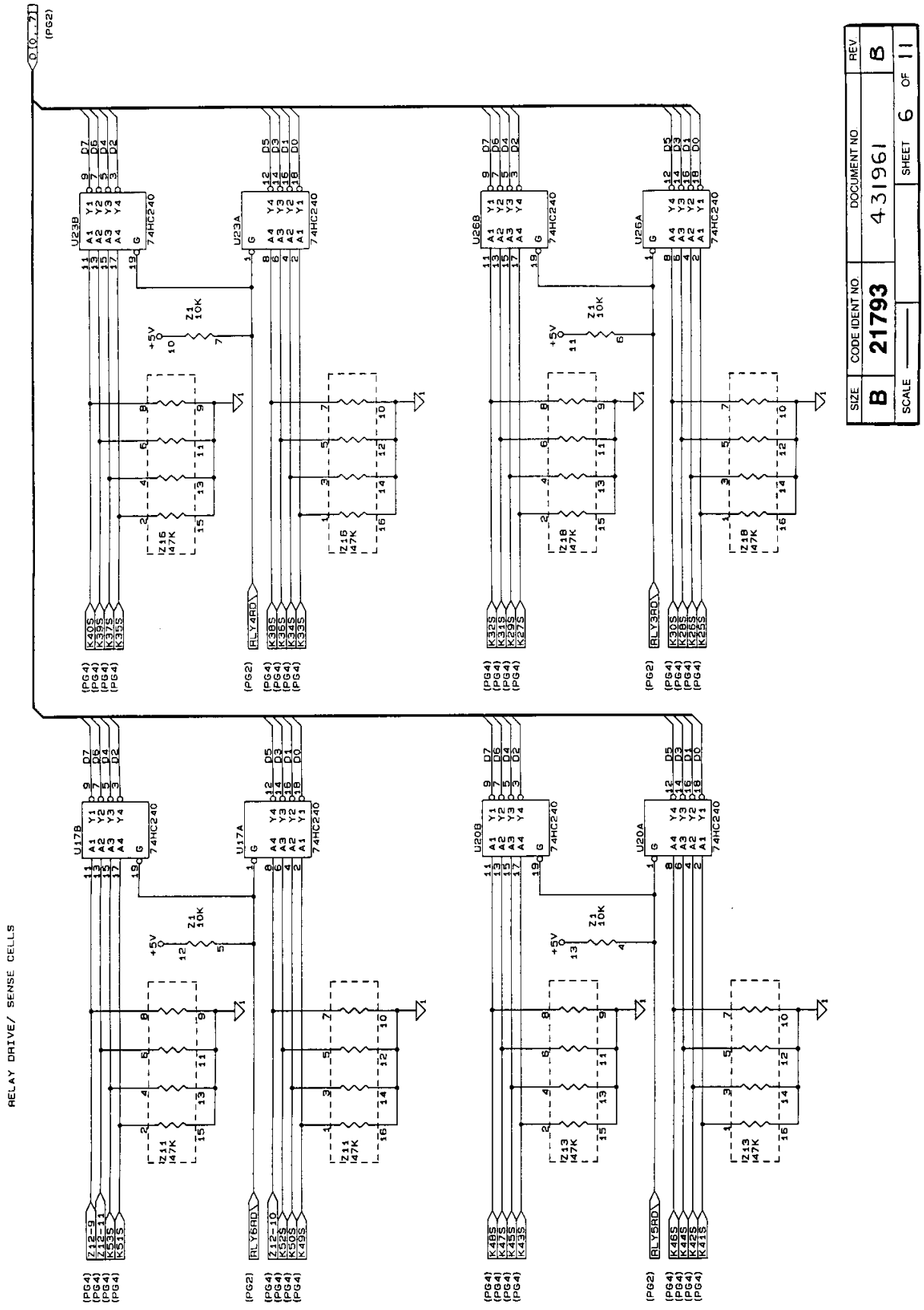
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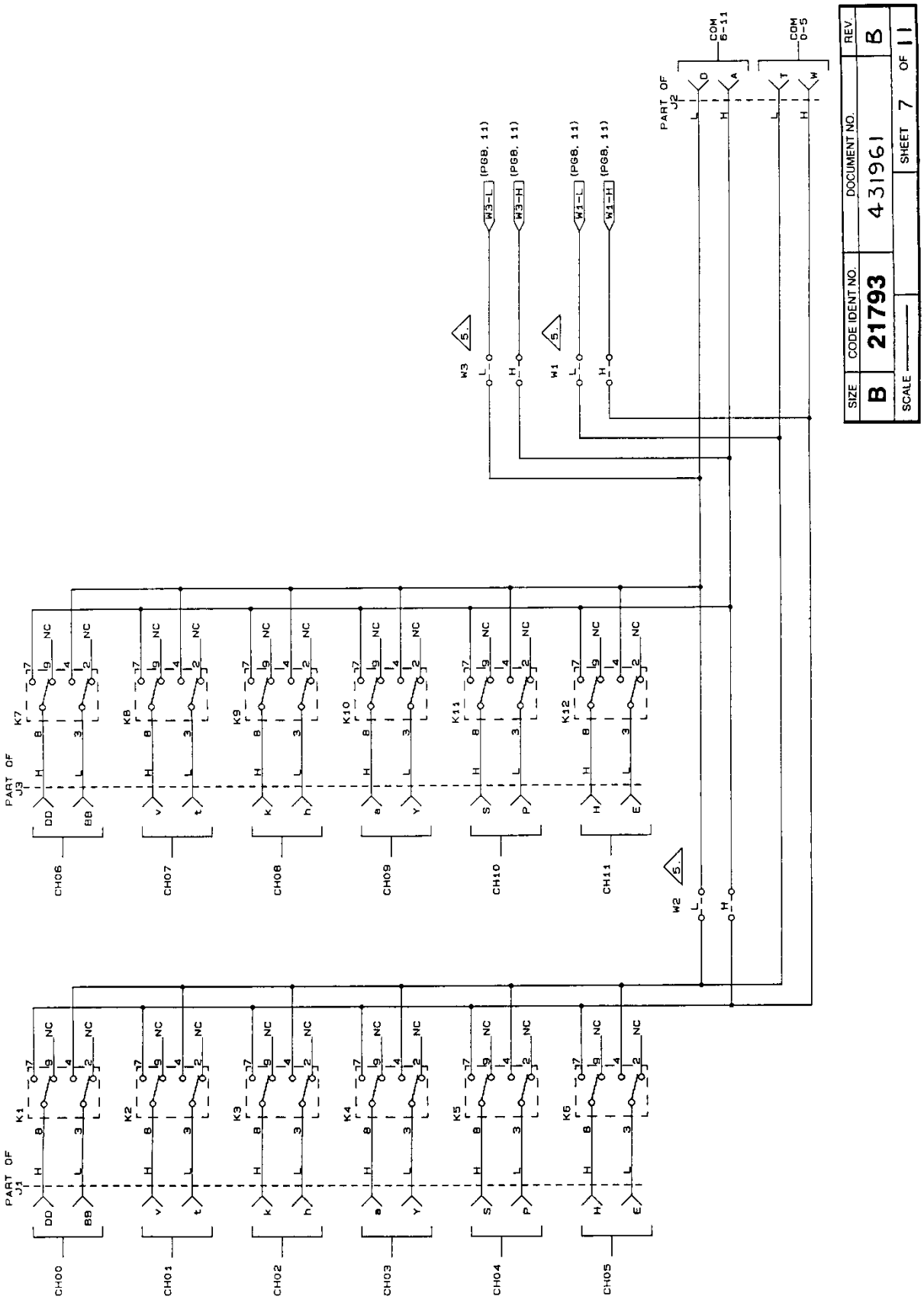
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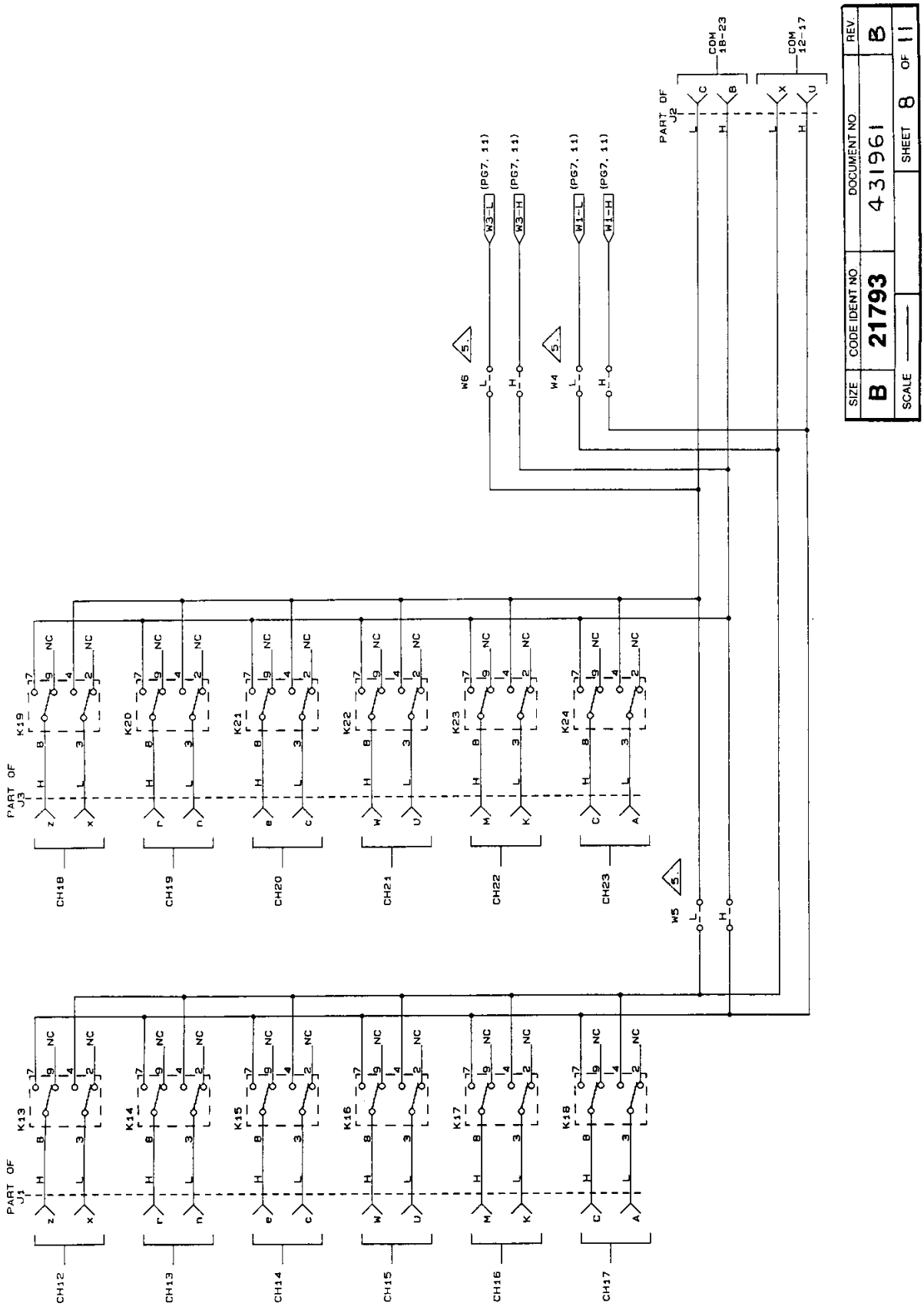
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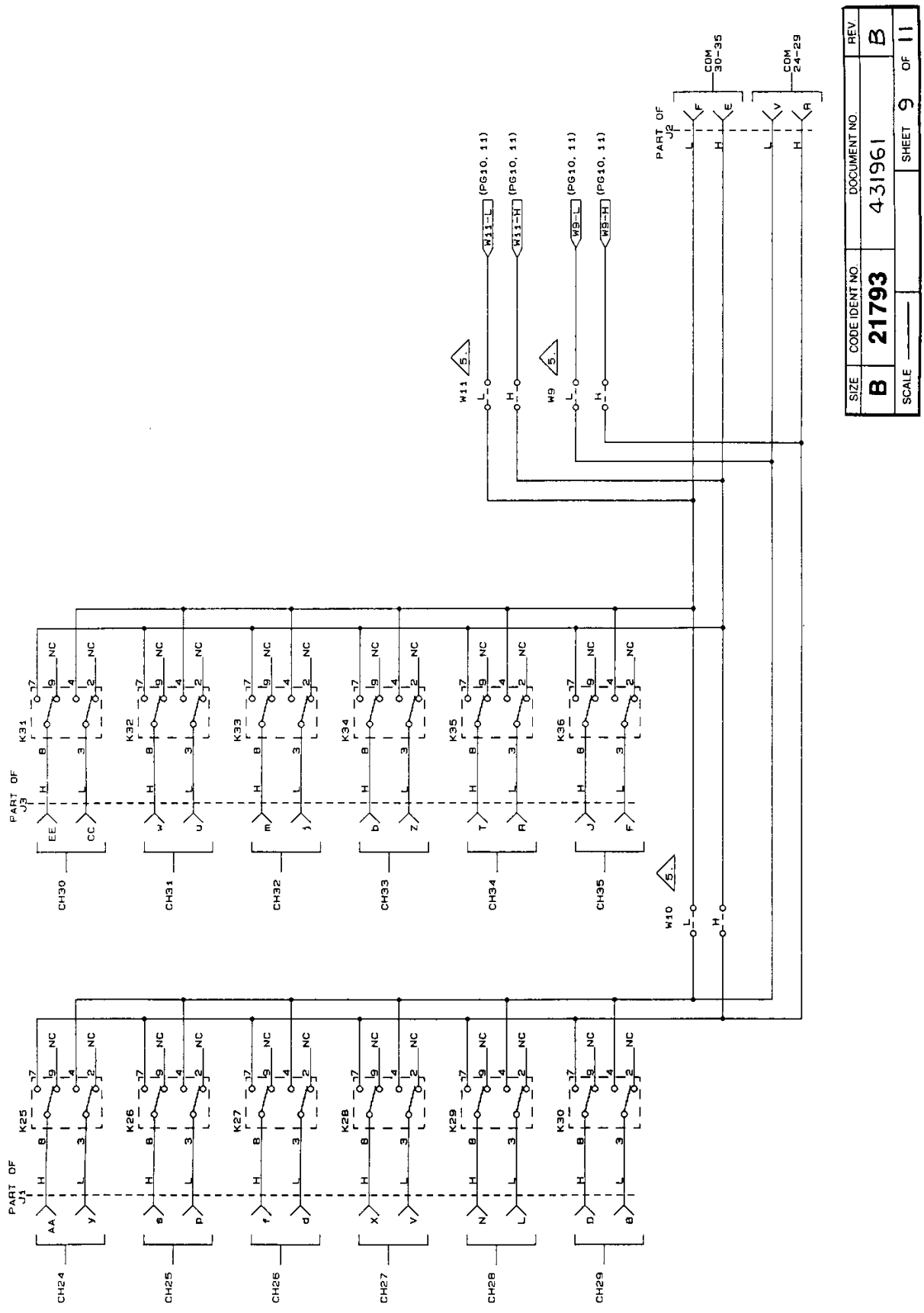
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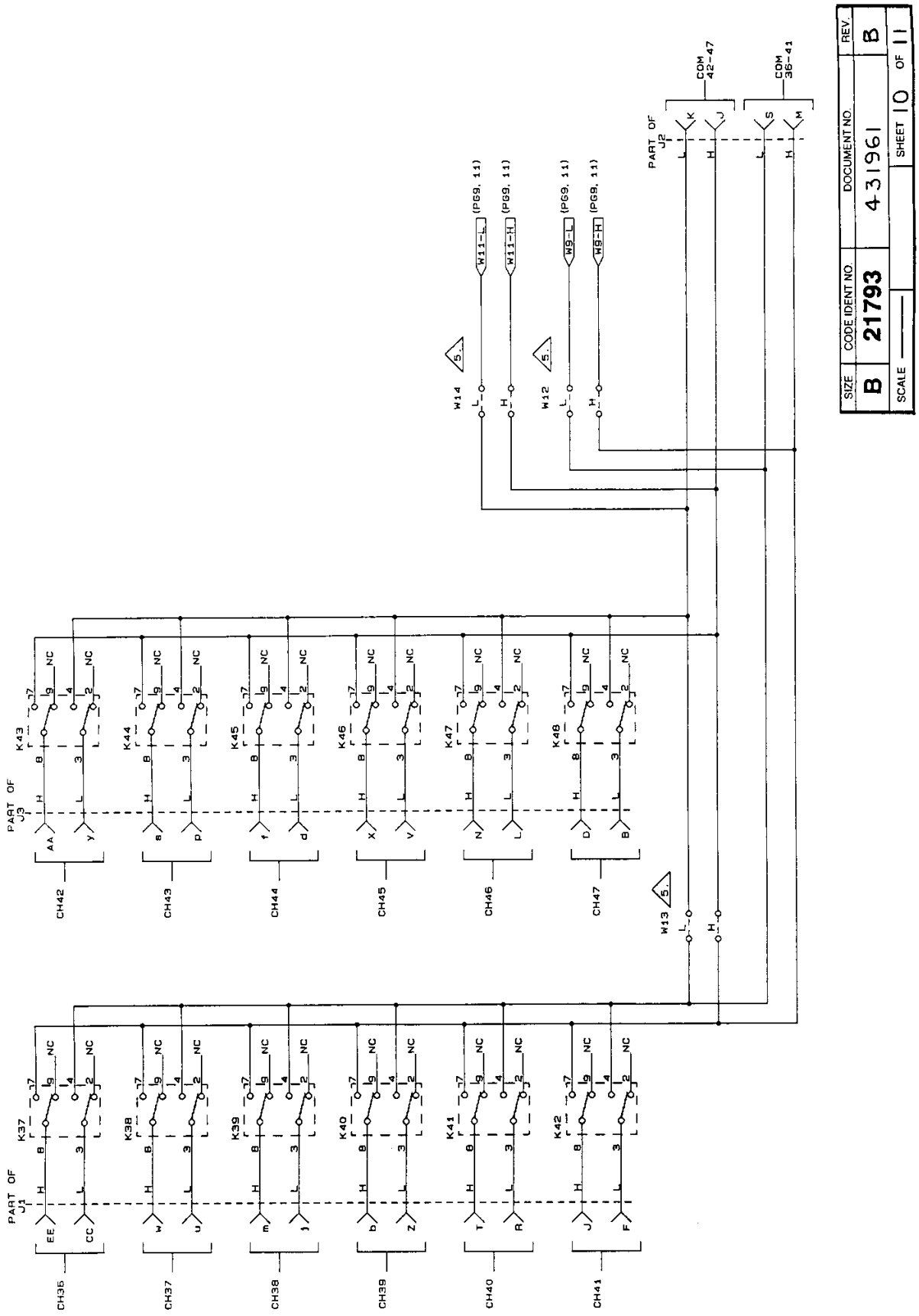
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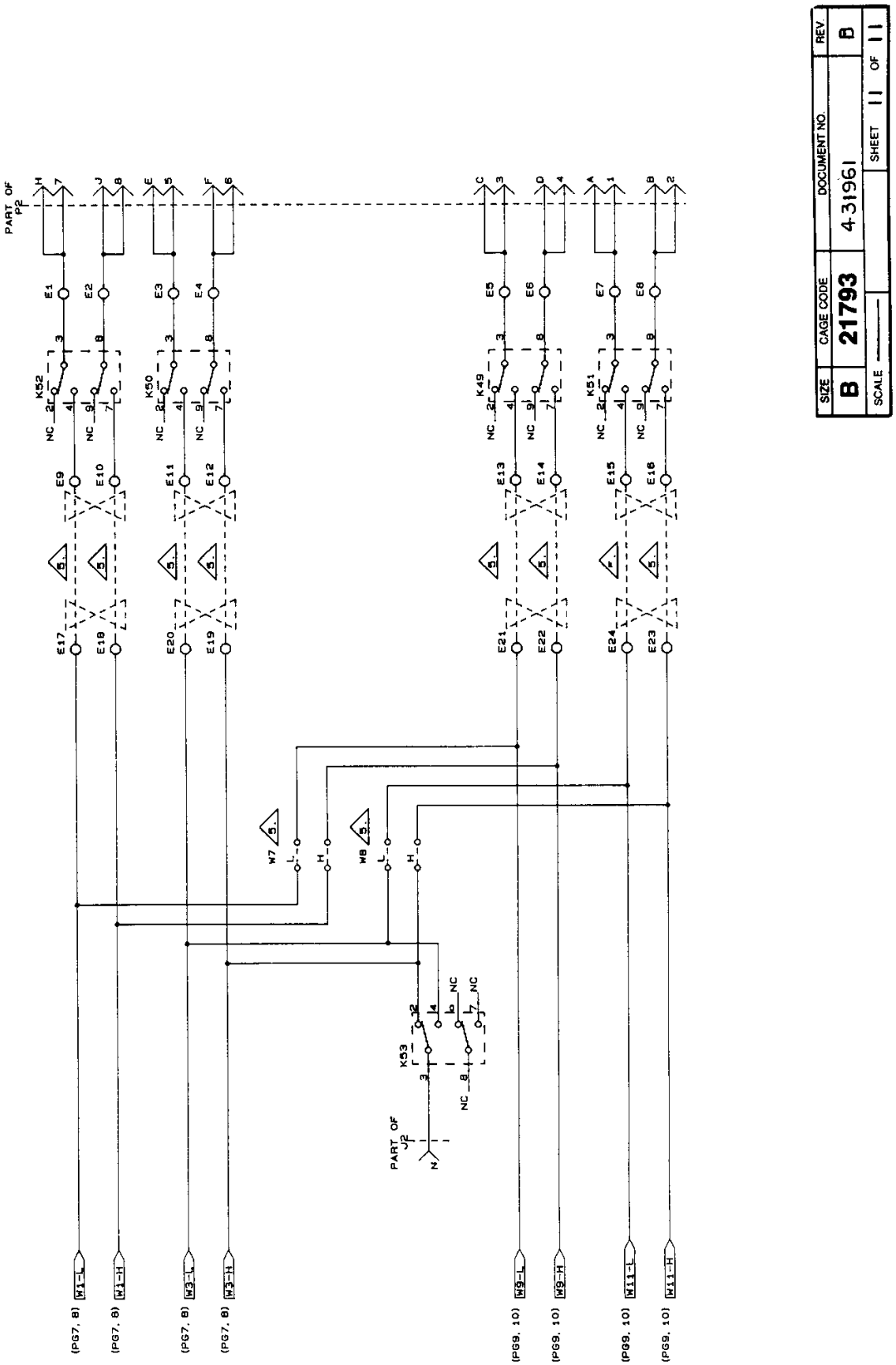
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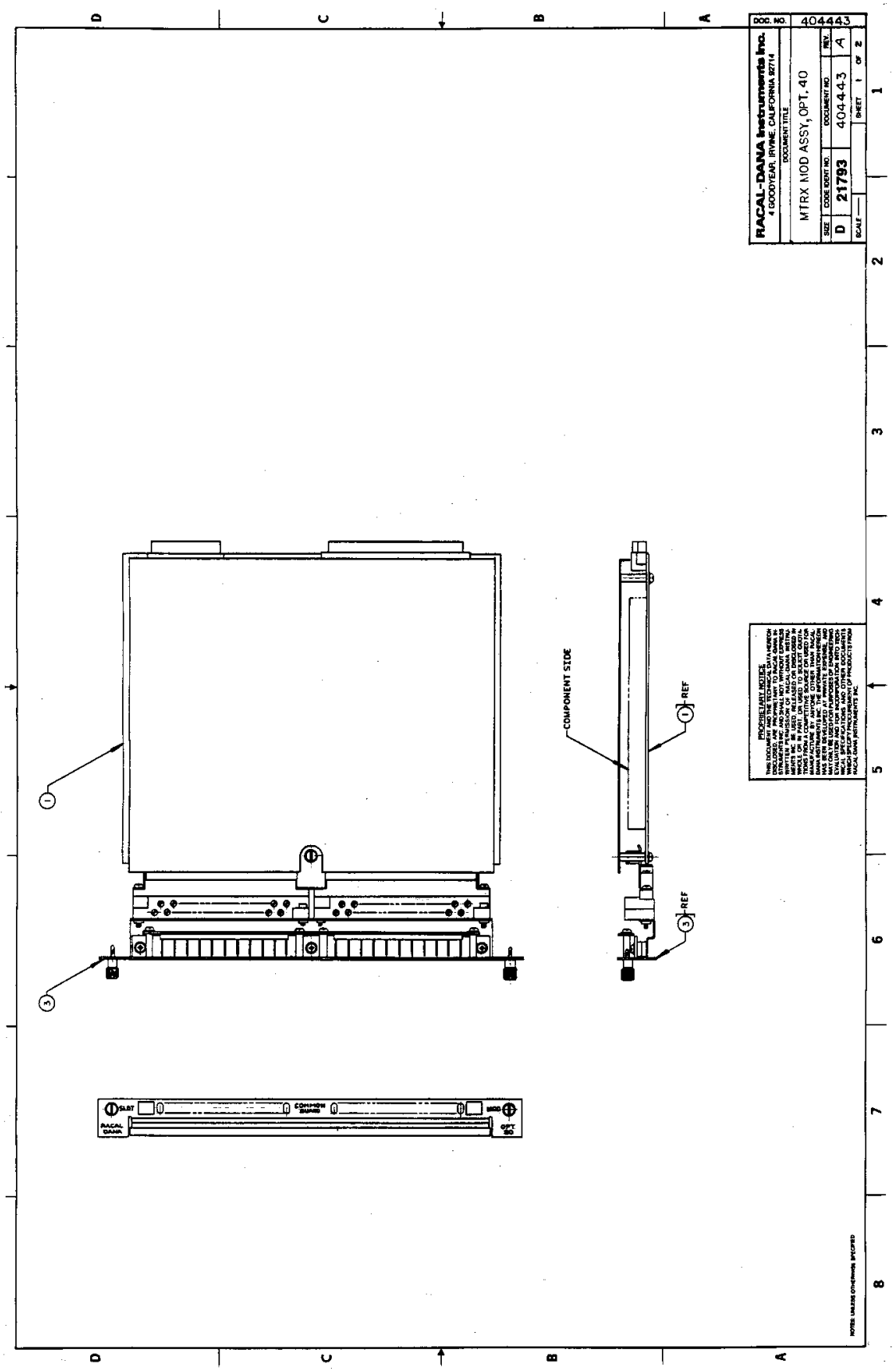
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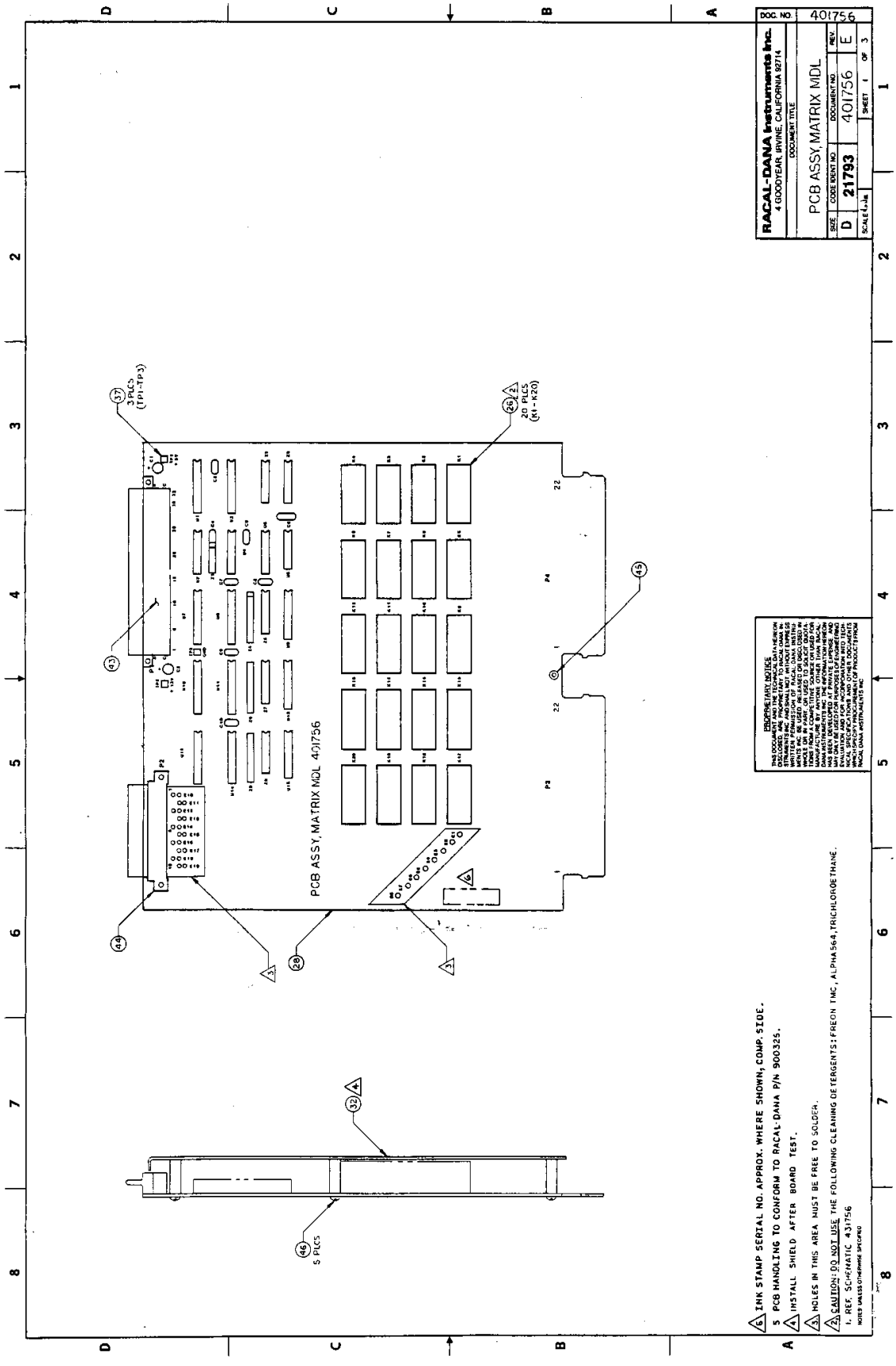
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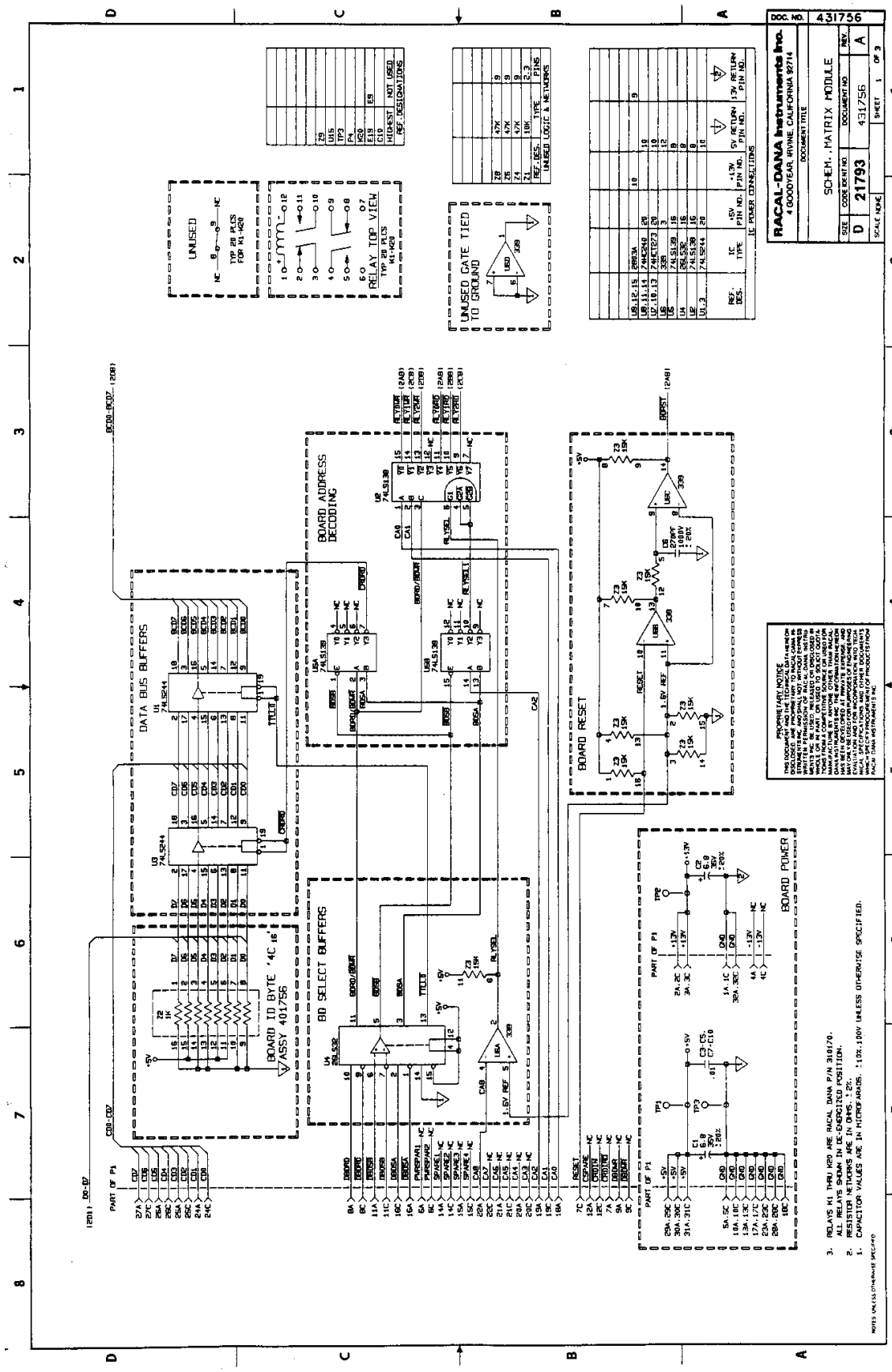
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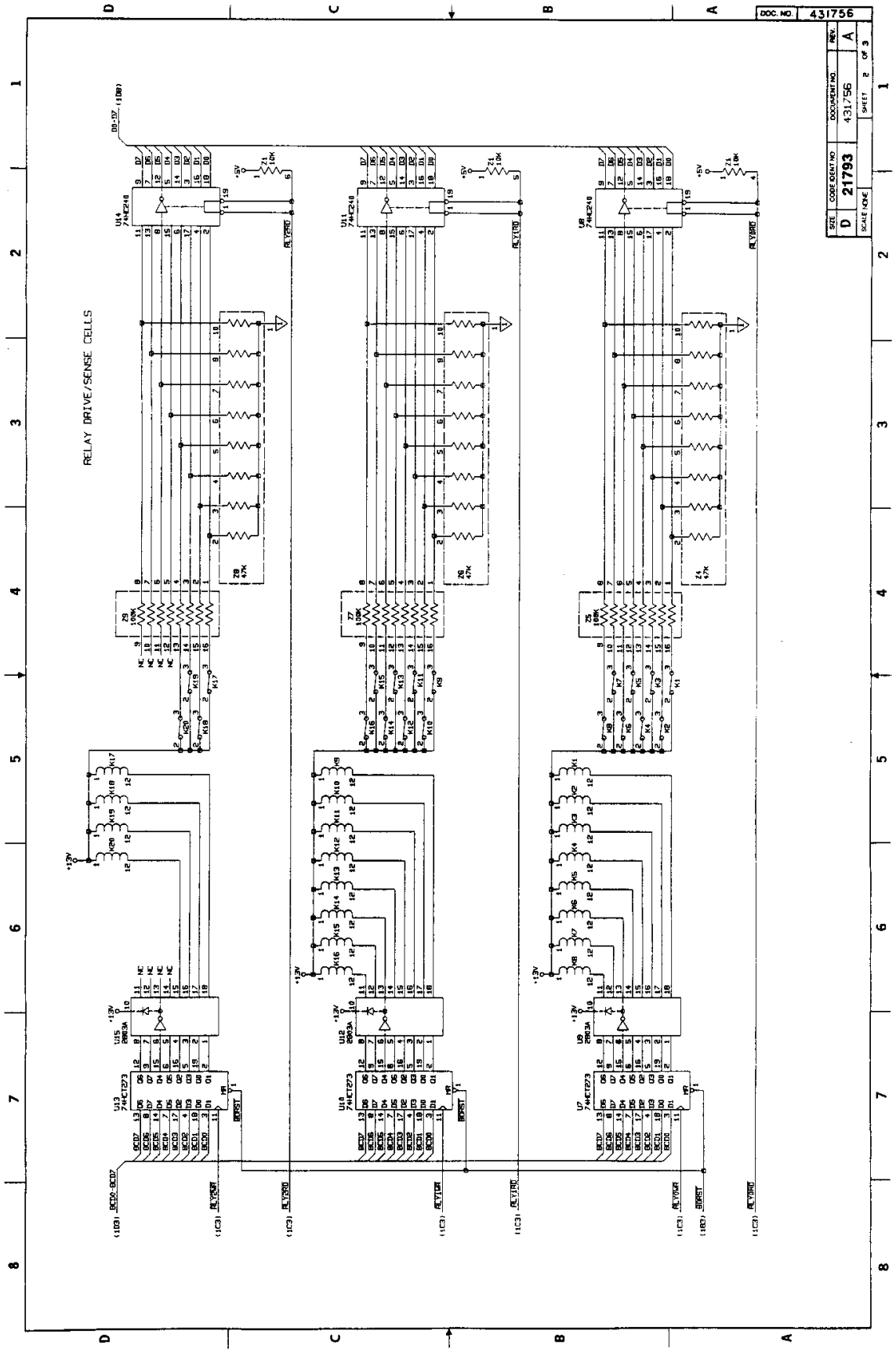
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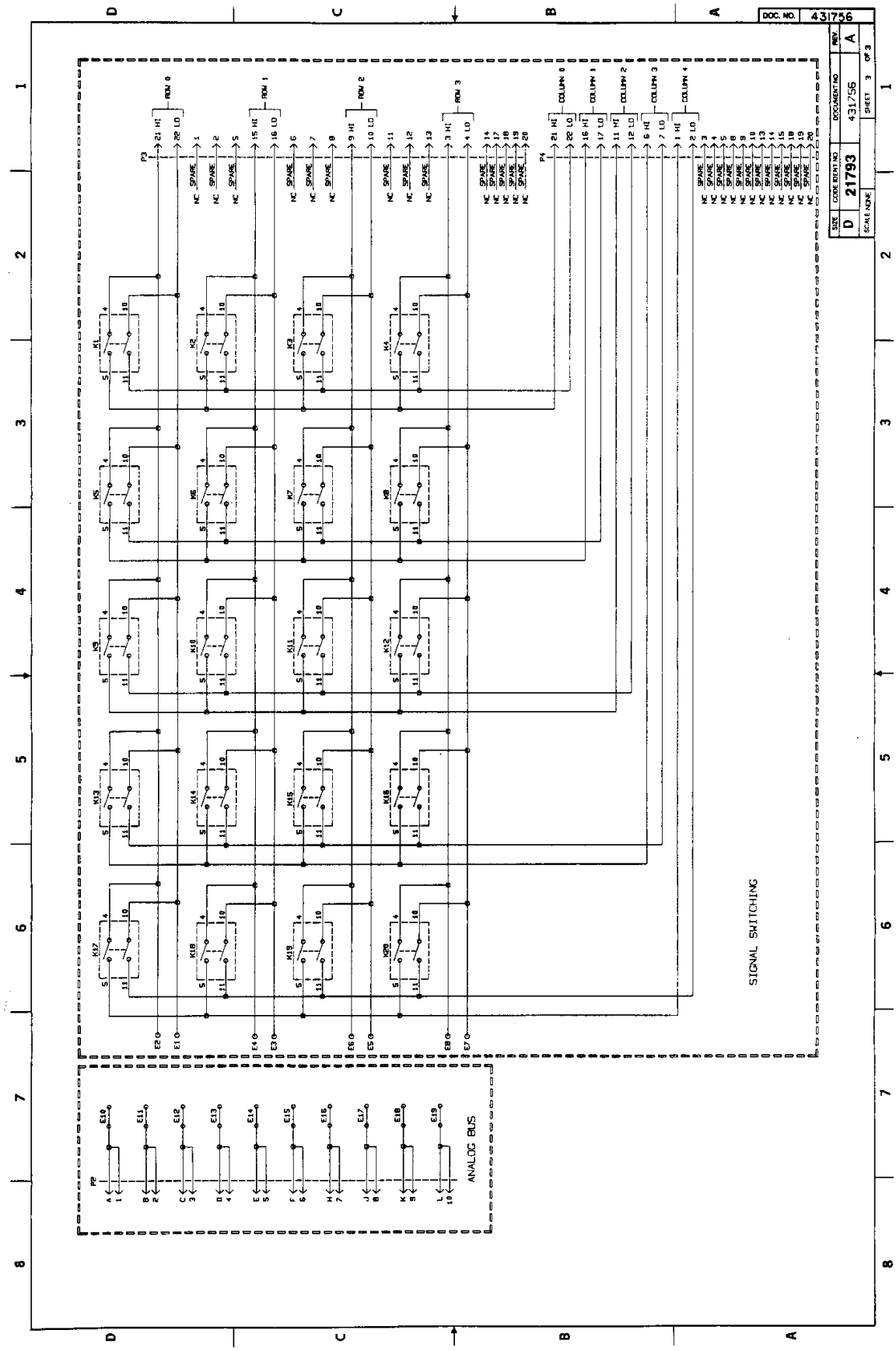
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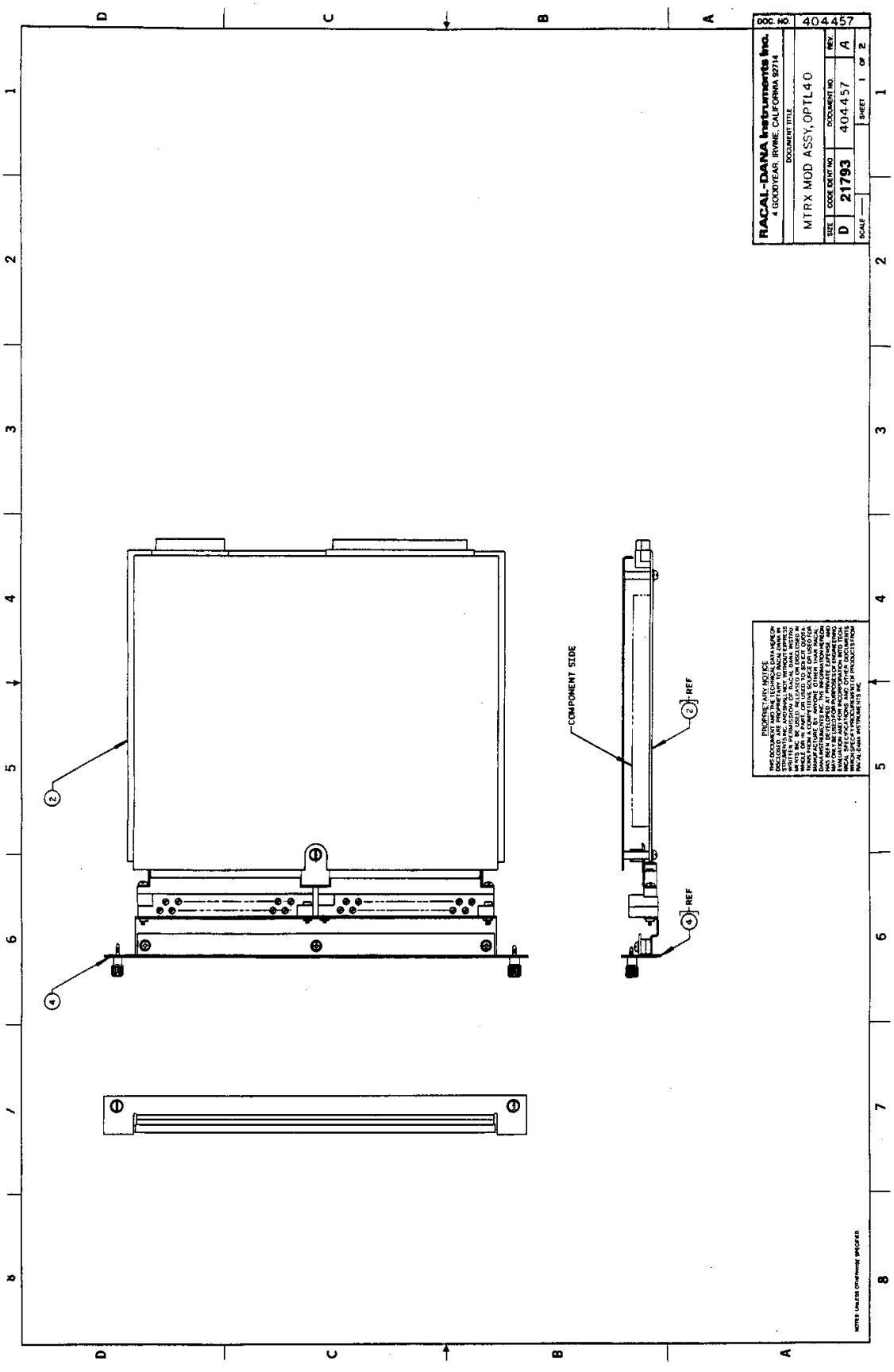
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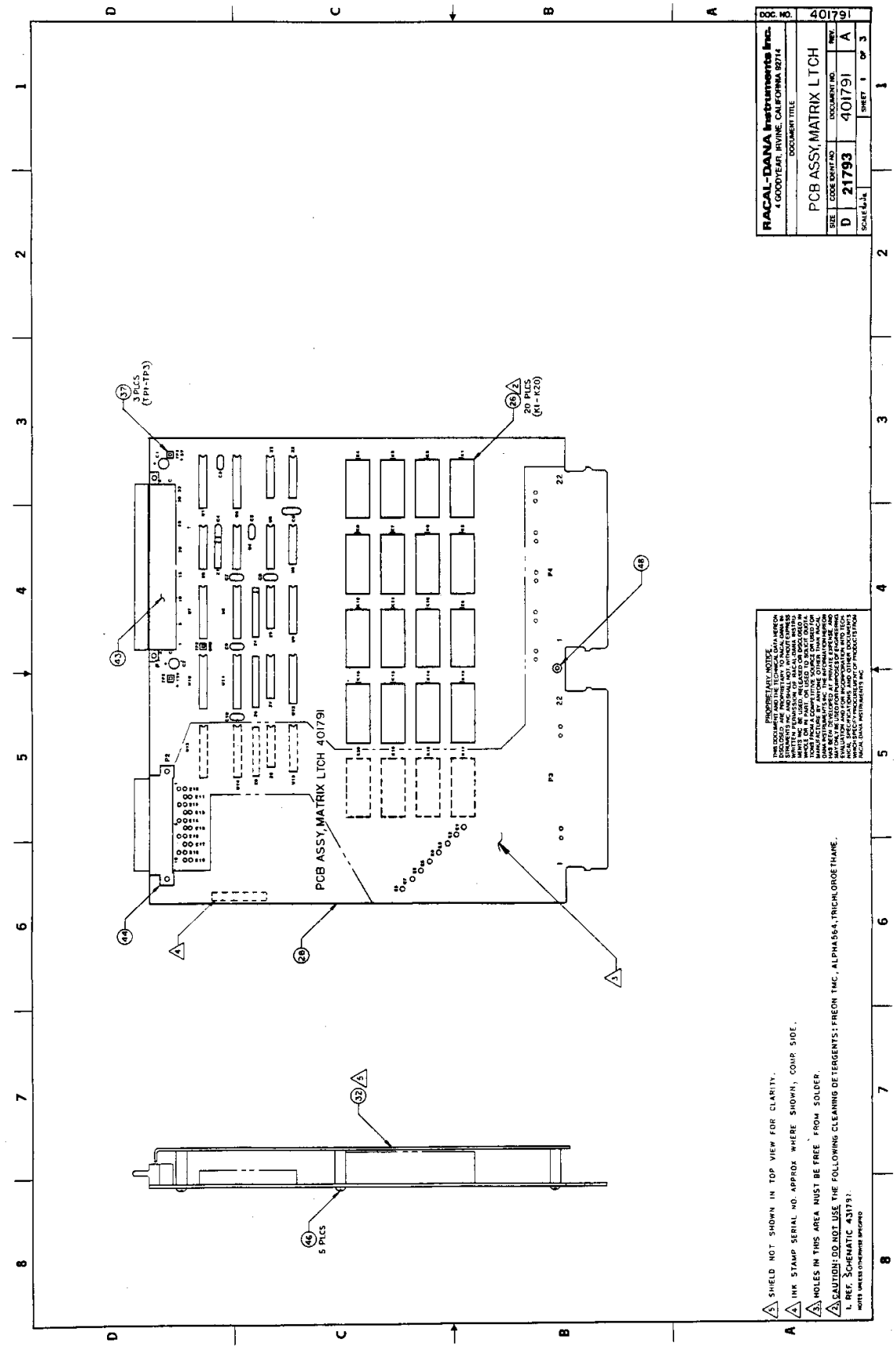
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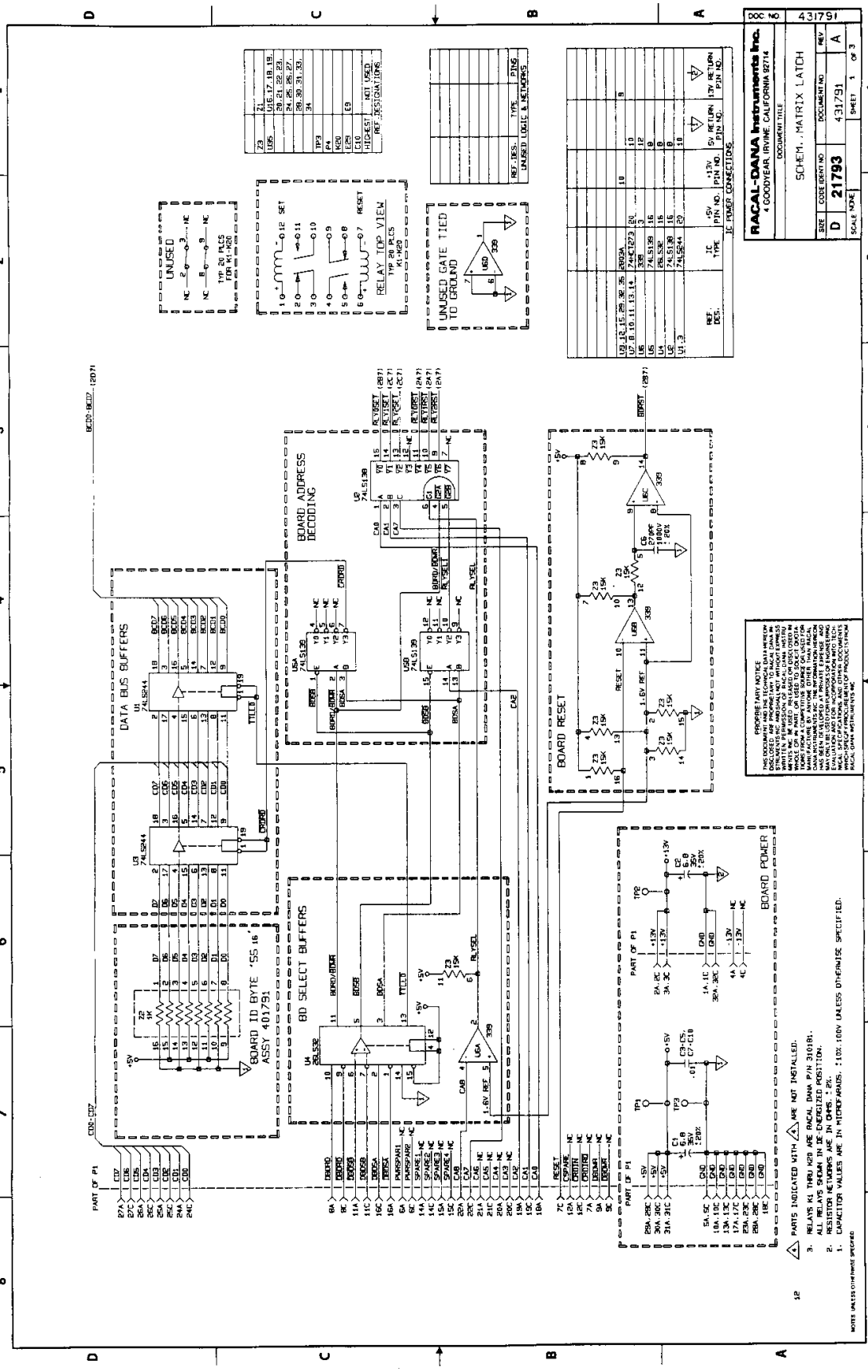
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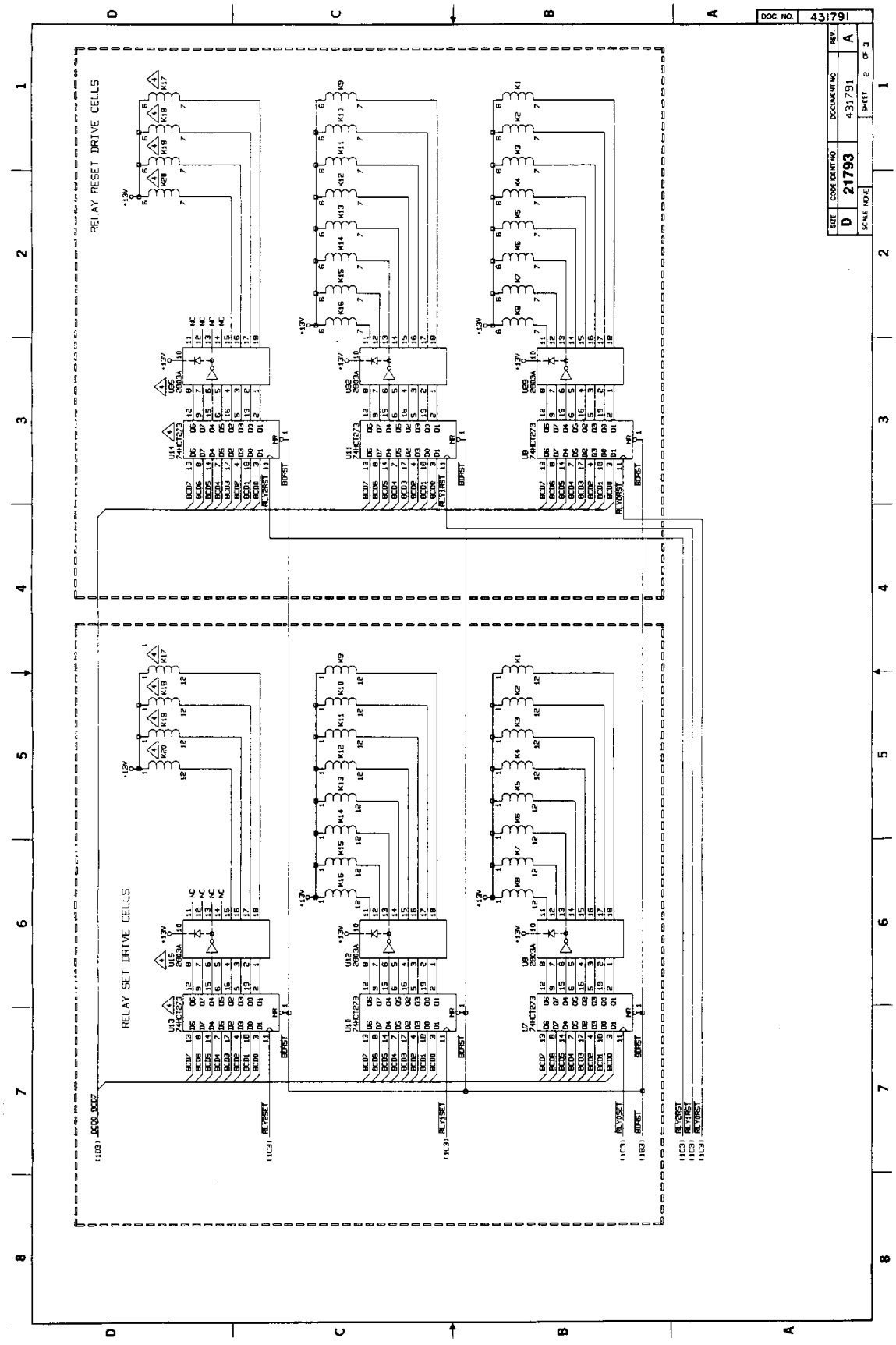
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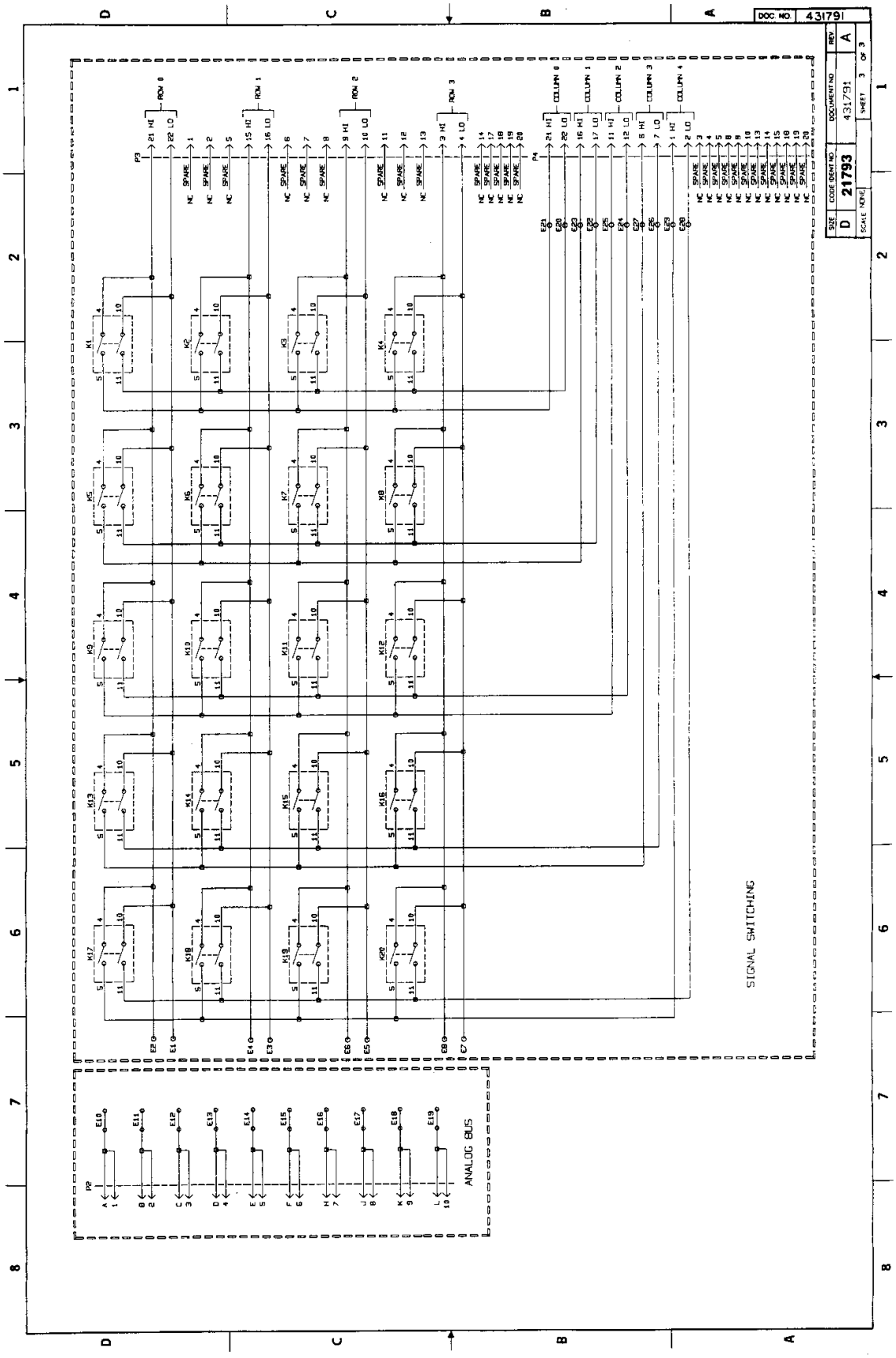
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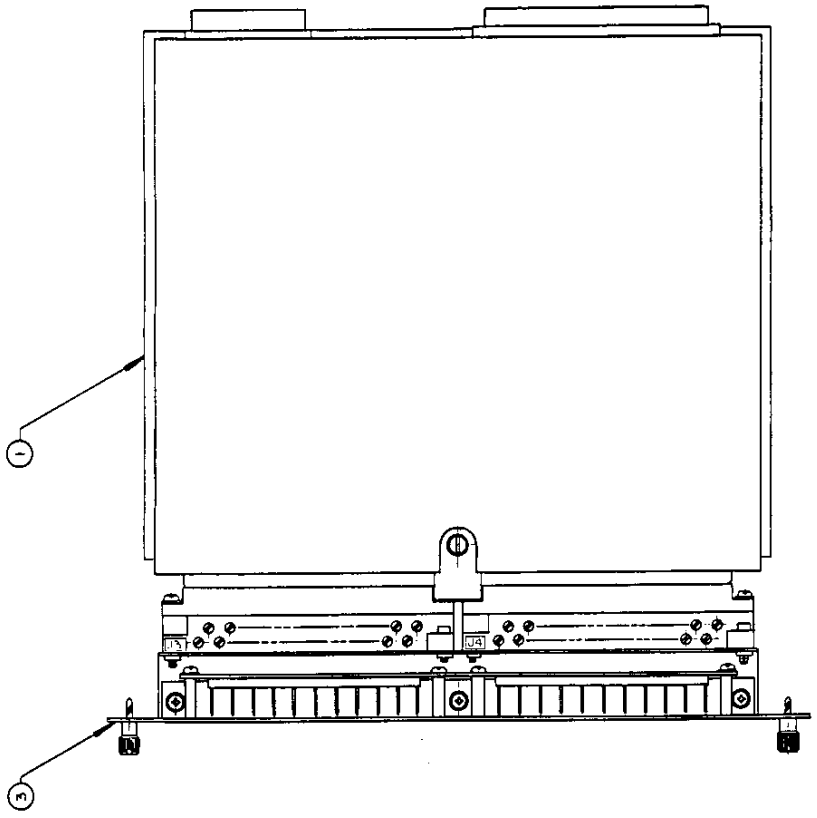
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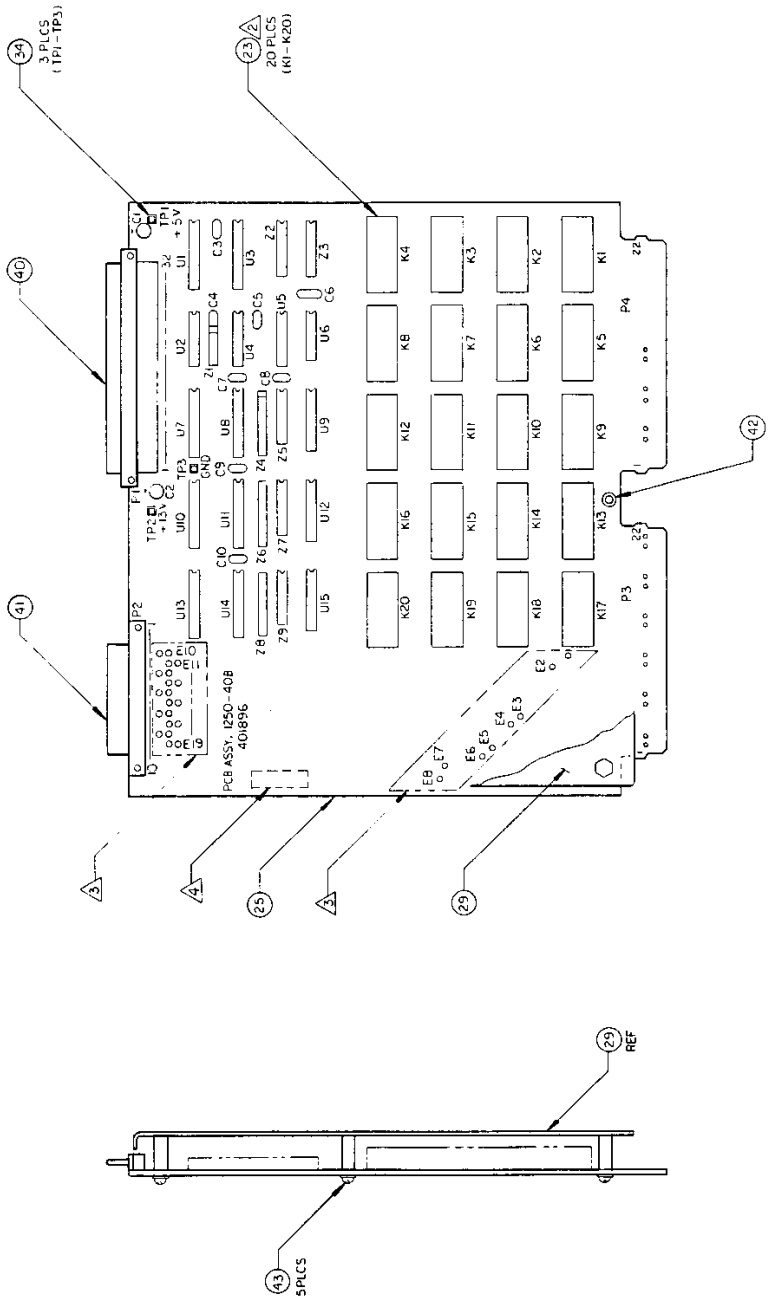
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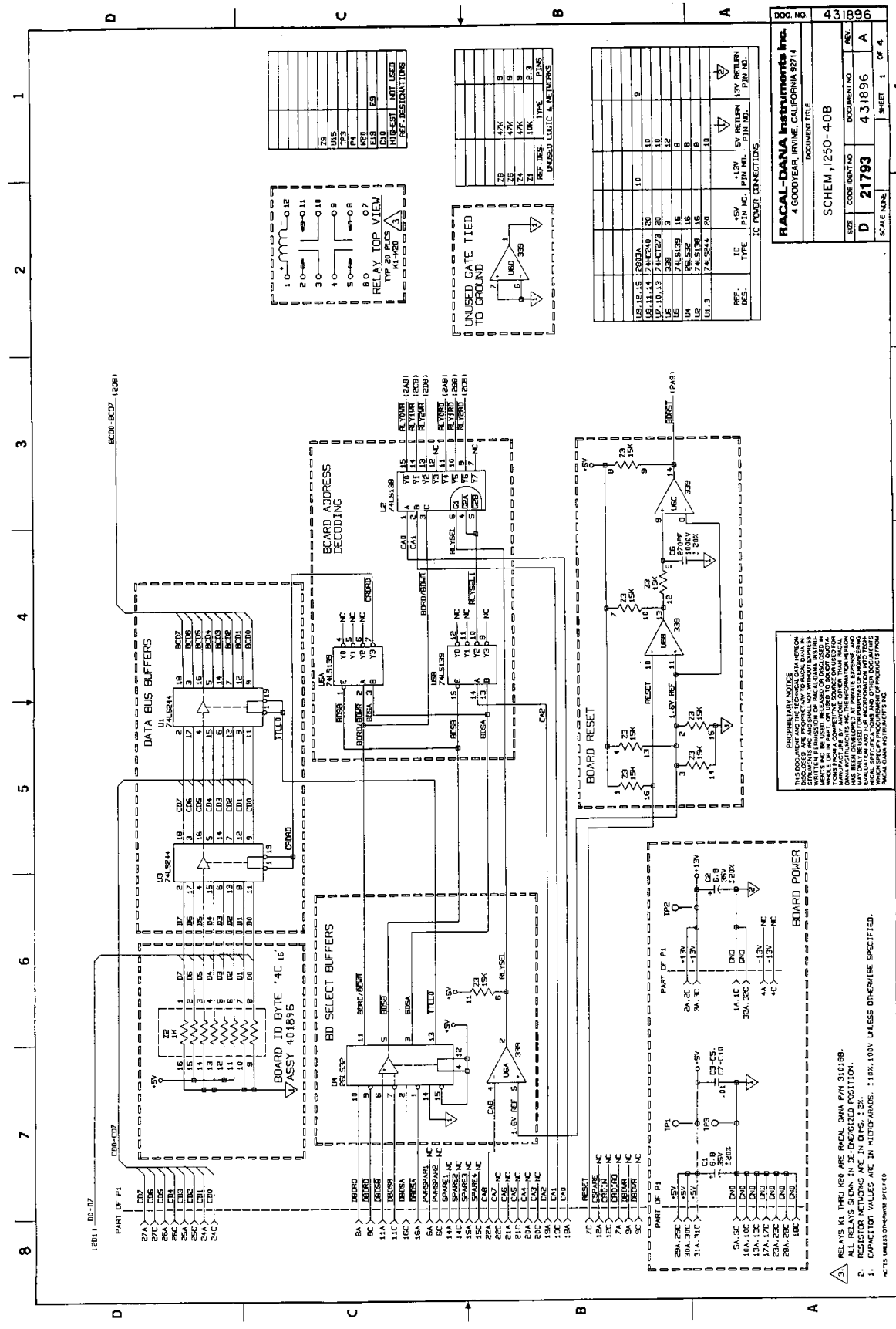
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⚠ CAUTION. DO NOT USE THE FOLLOWING CLEANING DETERGENT: FREON TMC, ALPHA 564, TRICHLOROETHANE.

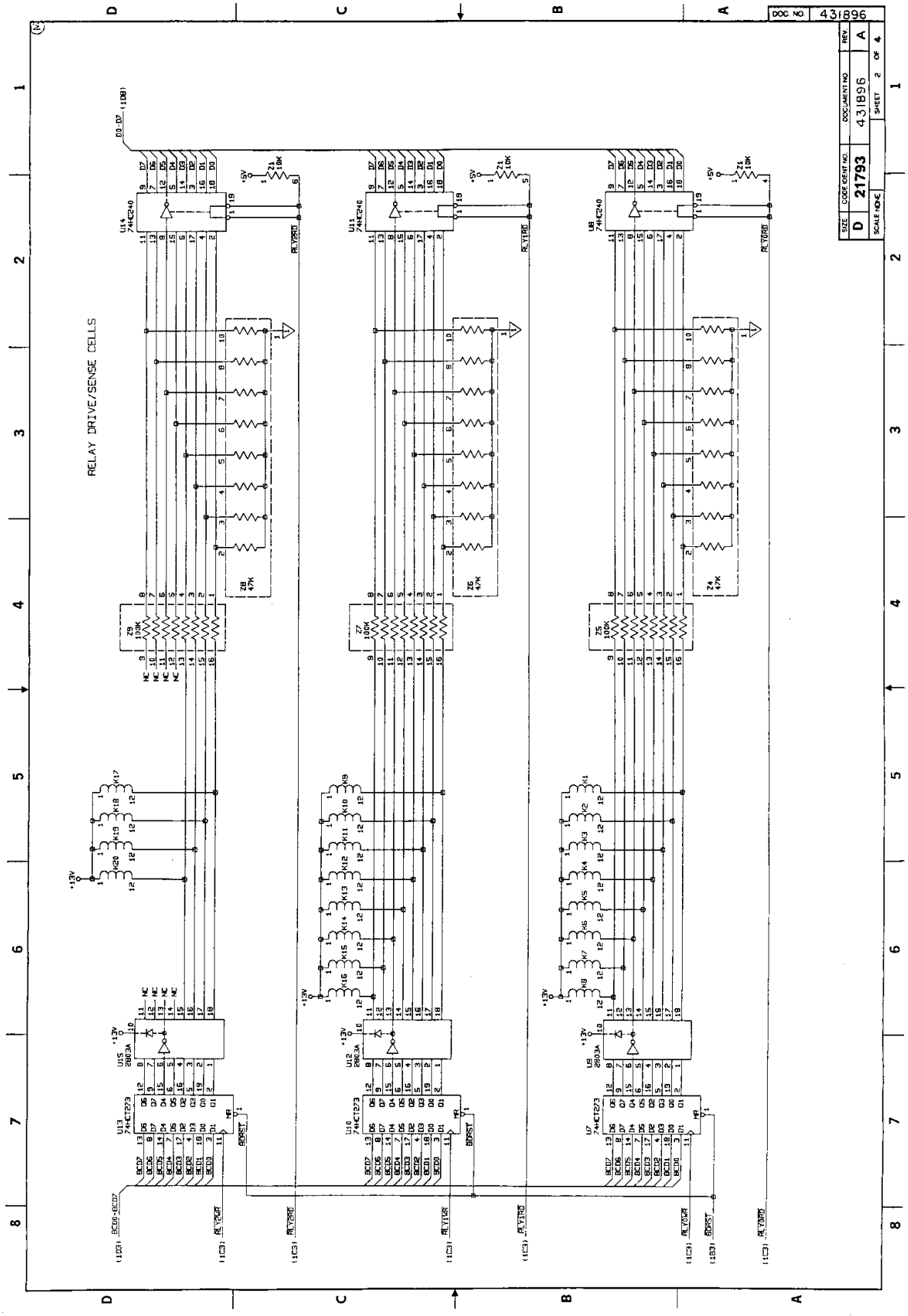
⚠ HOLES IN THIS AREA MUST BE FREE FROM SOLDER.

⚠ INK STAMP SERIAL NO. APPROX. WHERE SHOWN COMP. SIDE

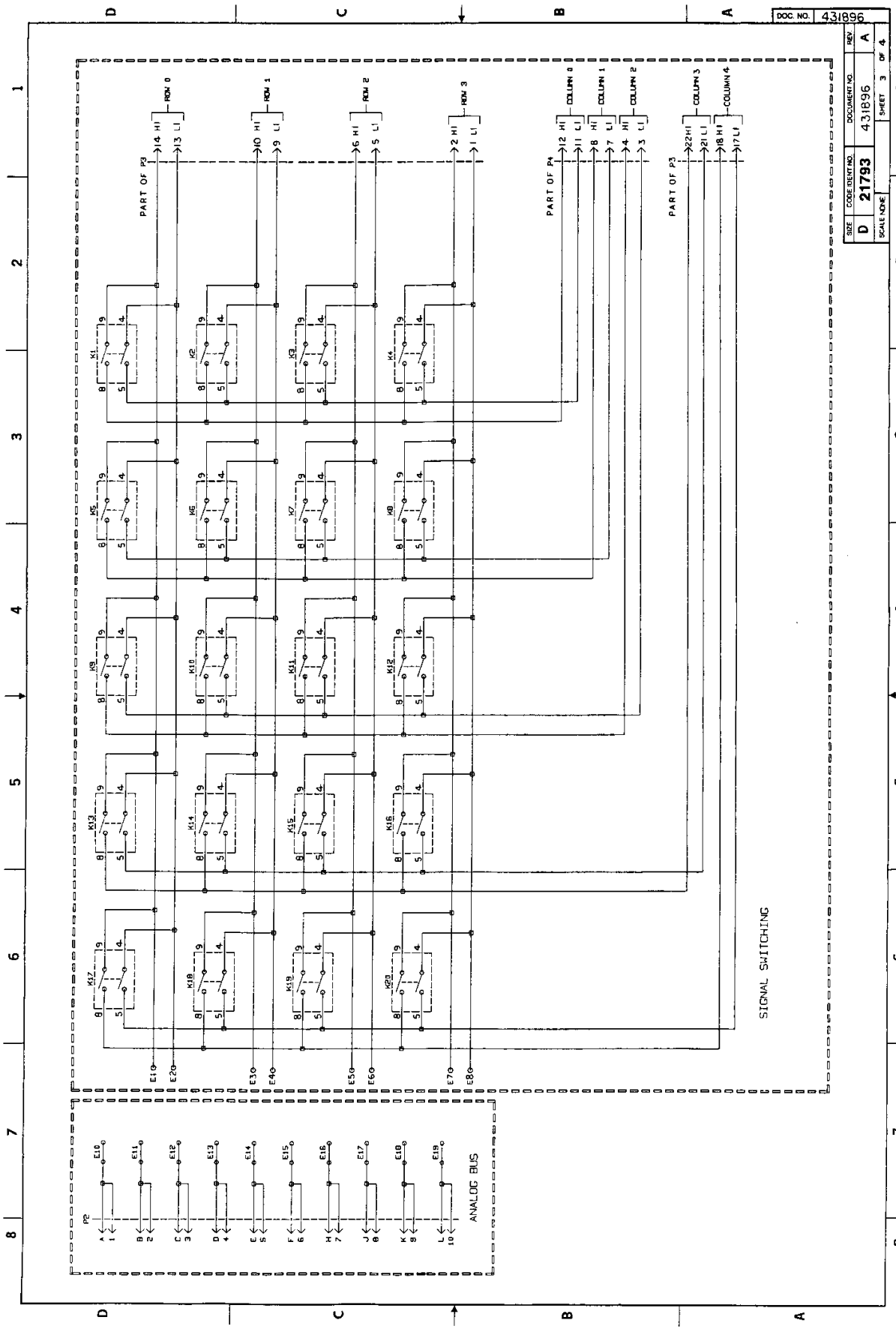
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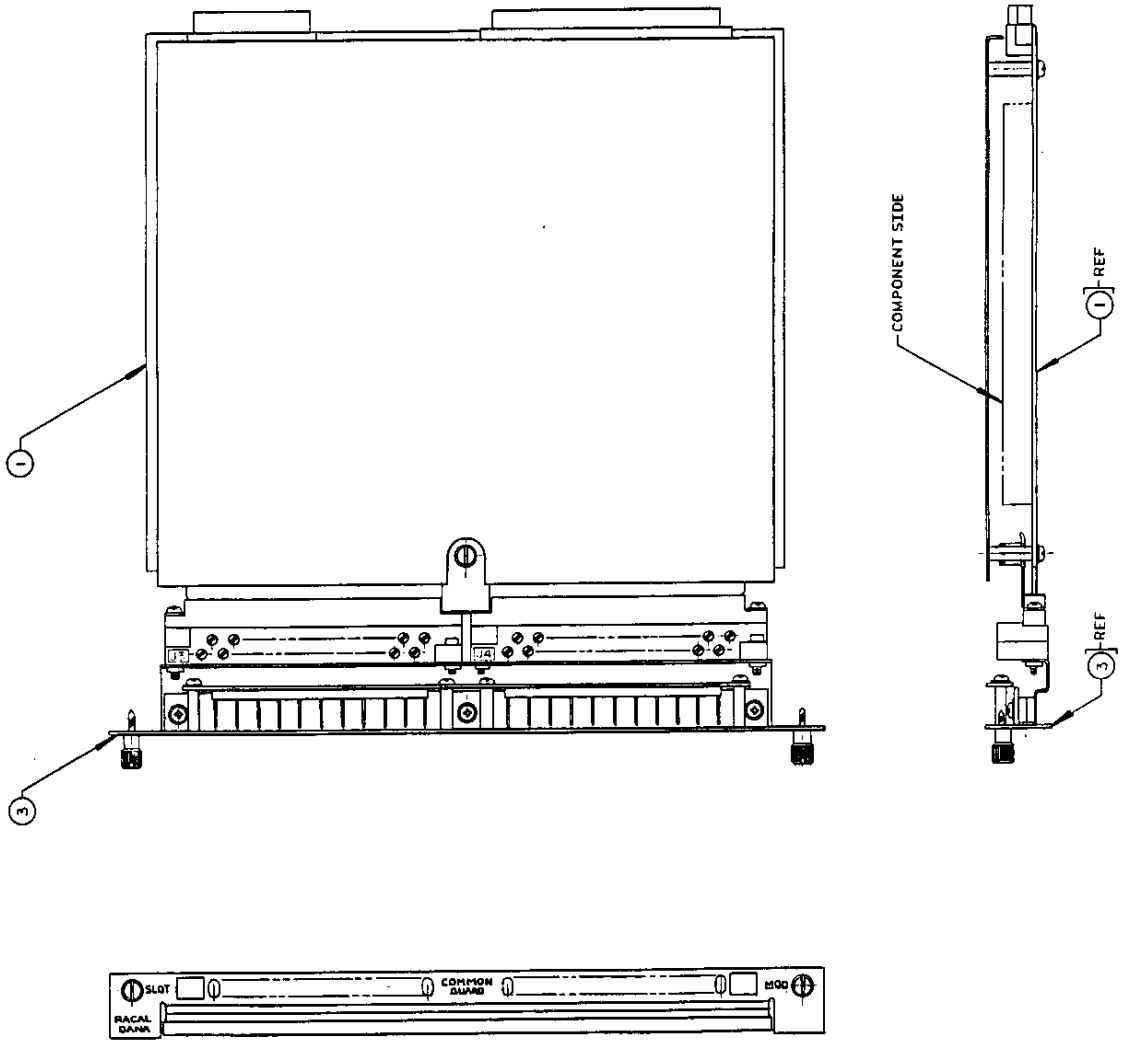
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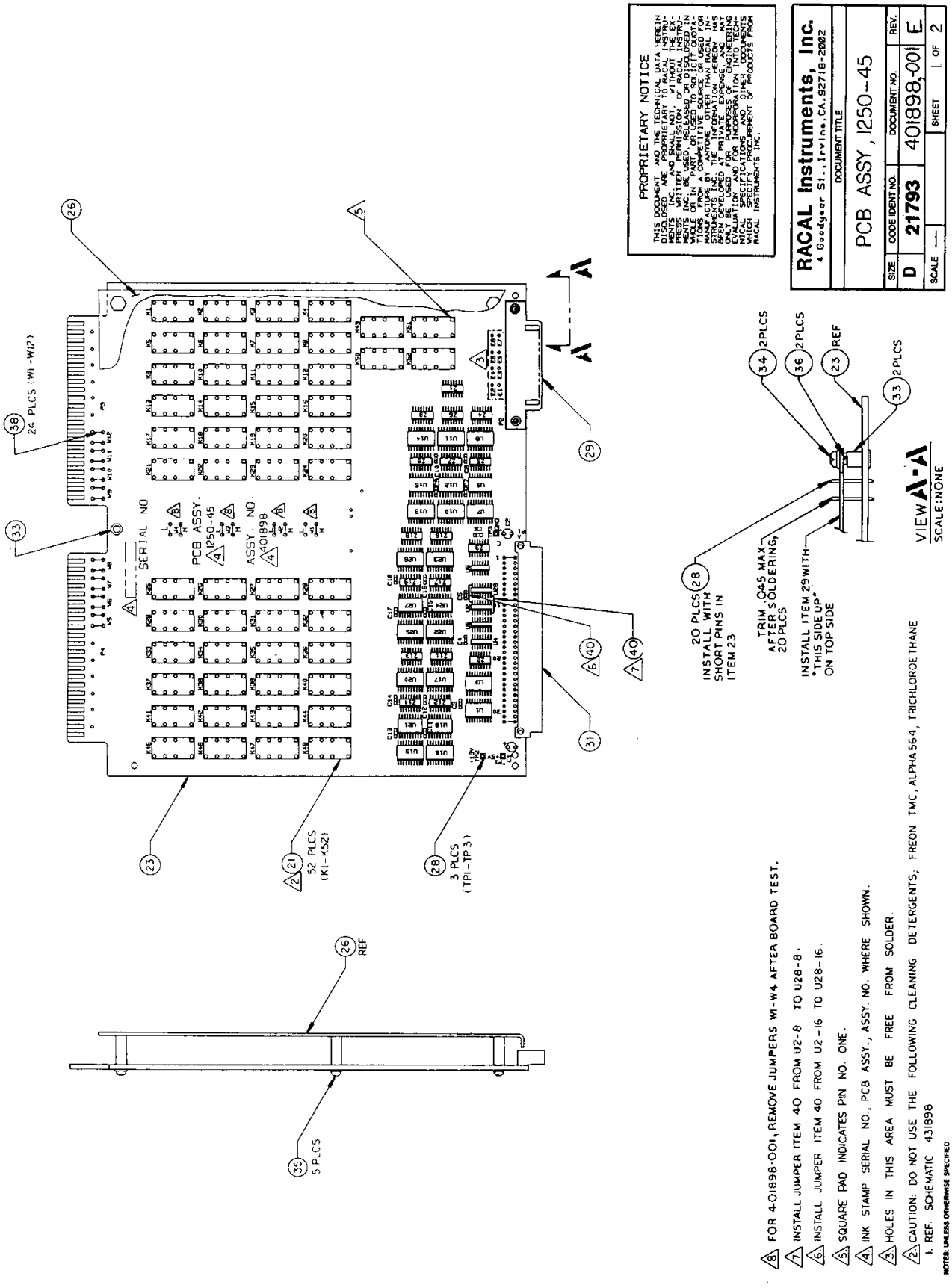
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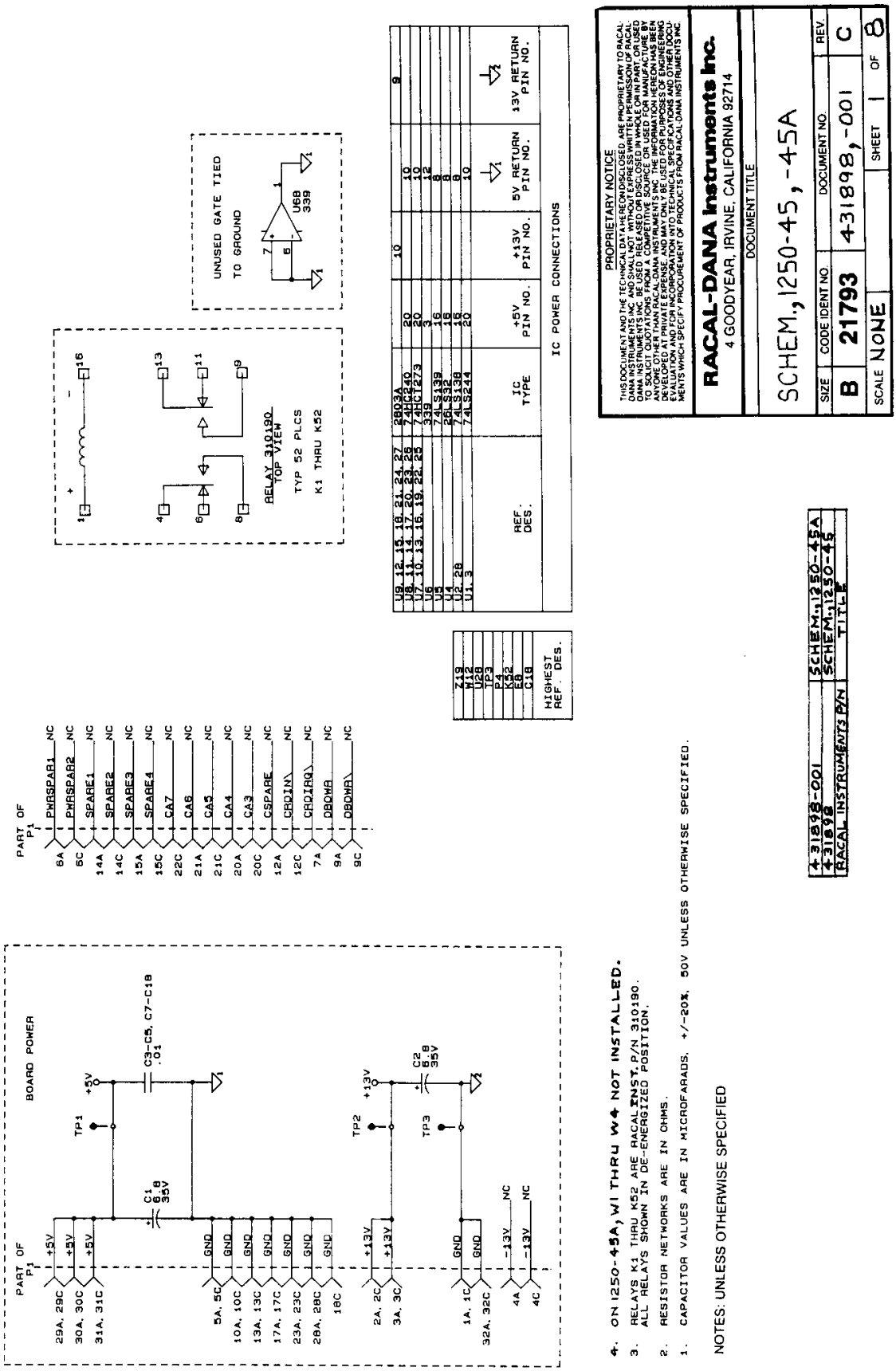
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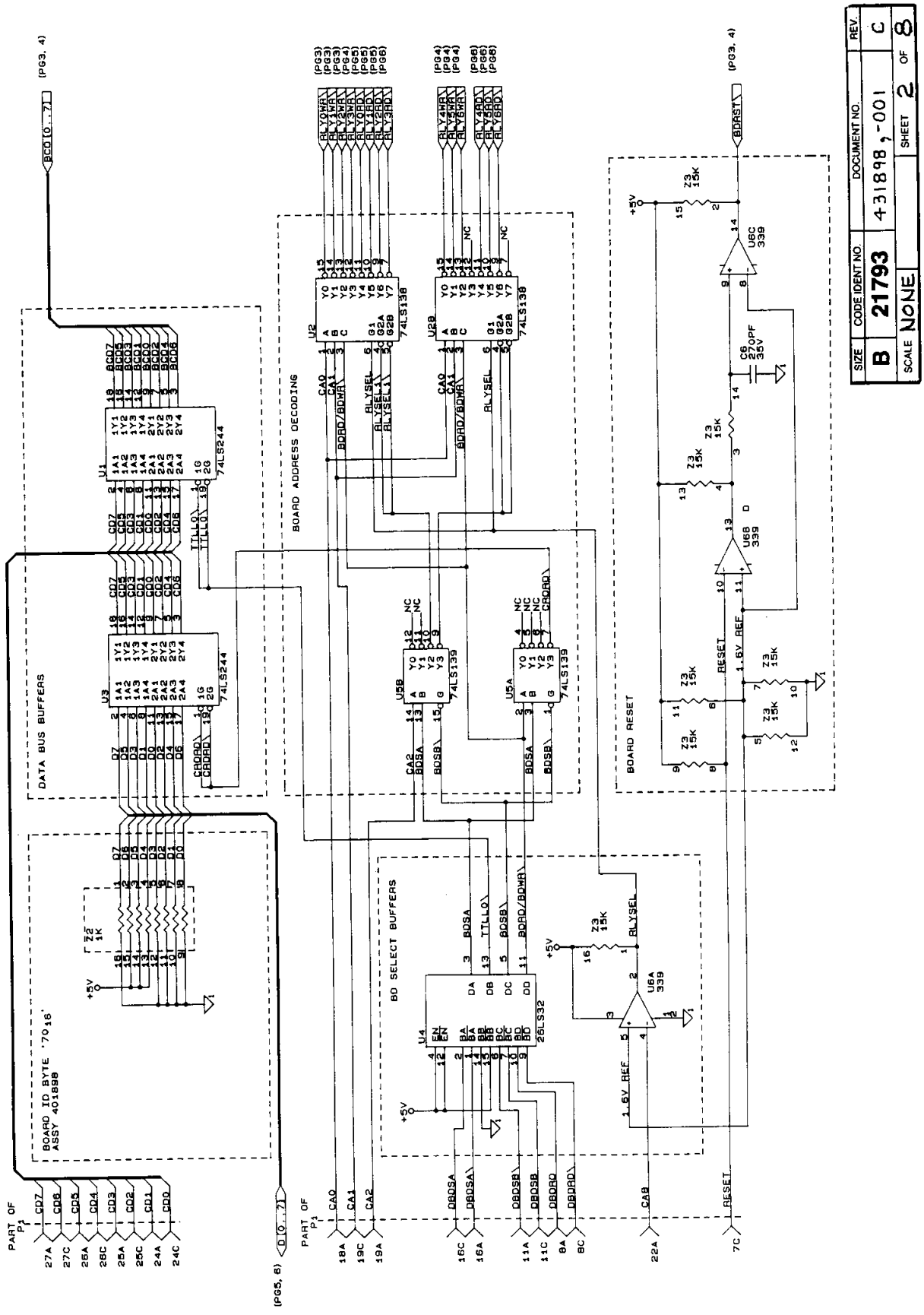
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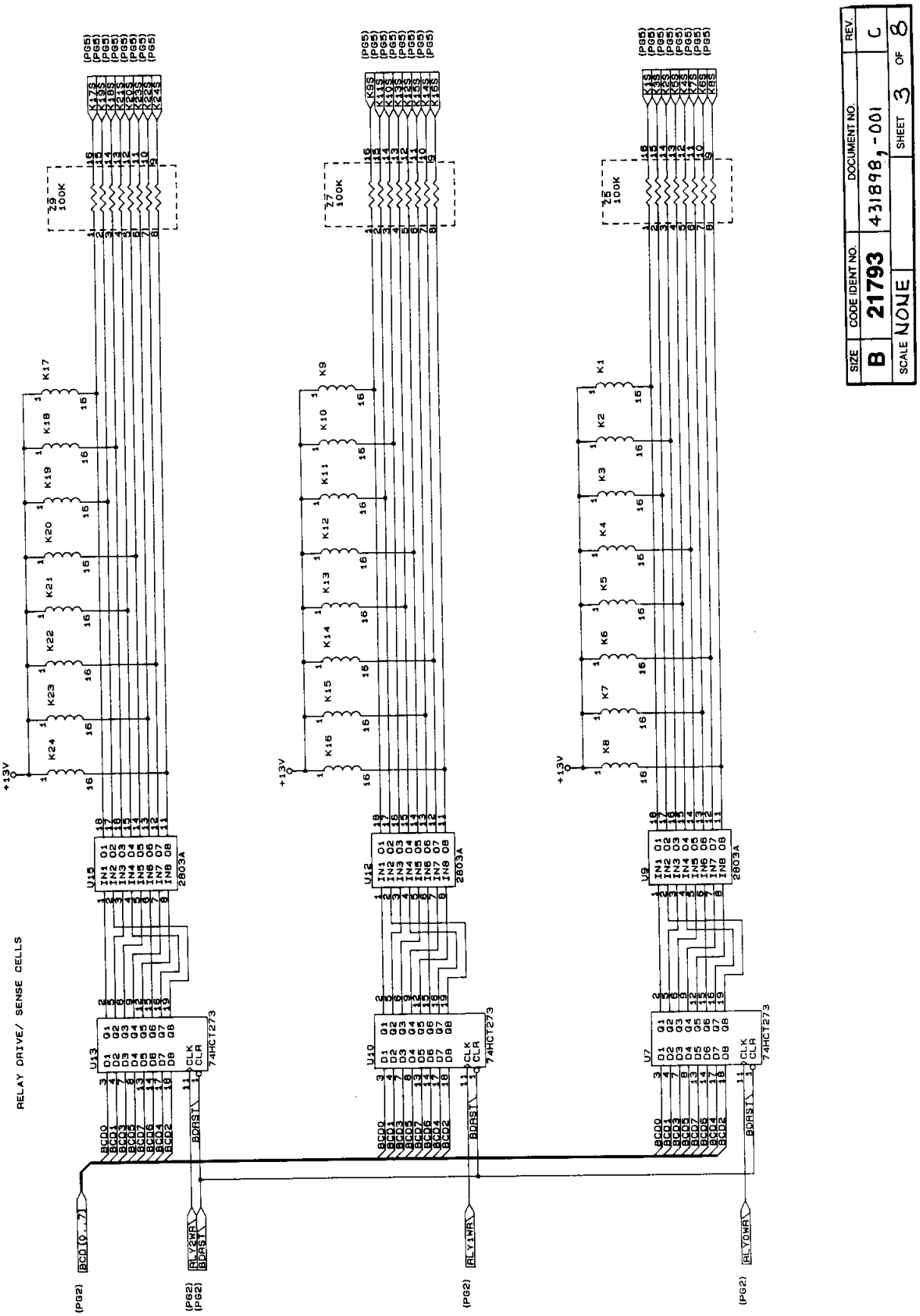
4. ON 1250-45A, W1 THRU W4 NOT INSTALLED.
3. RELAYS K1 THRU K52 ARE RACAL INST. P/N 310190. ALL RELAYS SHOWN IN DE-ENERGIZED POSITION.
2. RESISTOR NETWORKS ARE IN OHMS.
1. CAPACITOR VALUES ARE IN MICROFARADS, +/-20%, 50V UNLESS OTHERWISE SPECIFIED.

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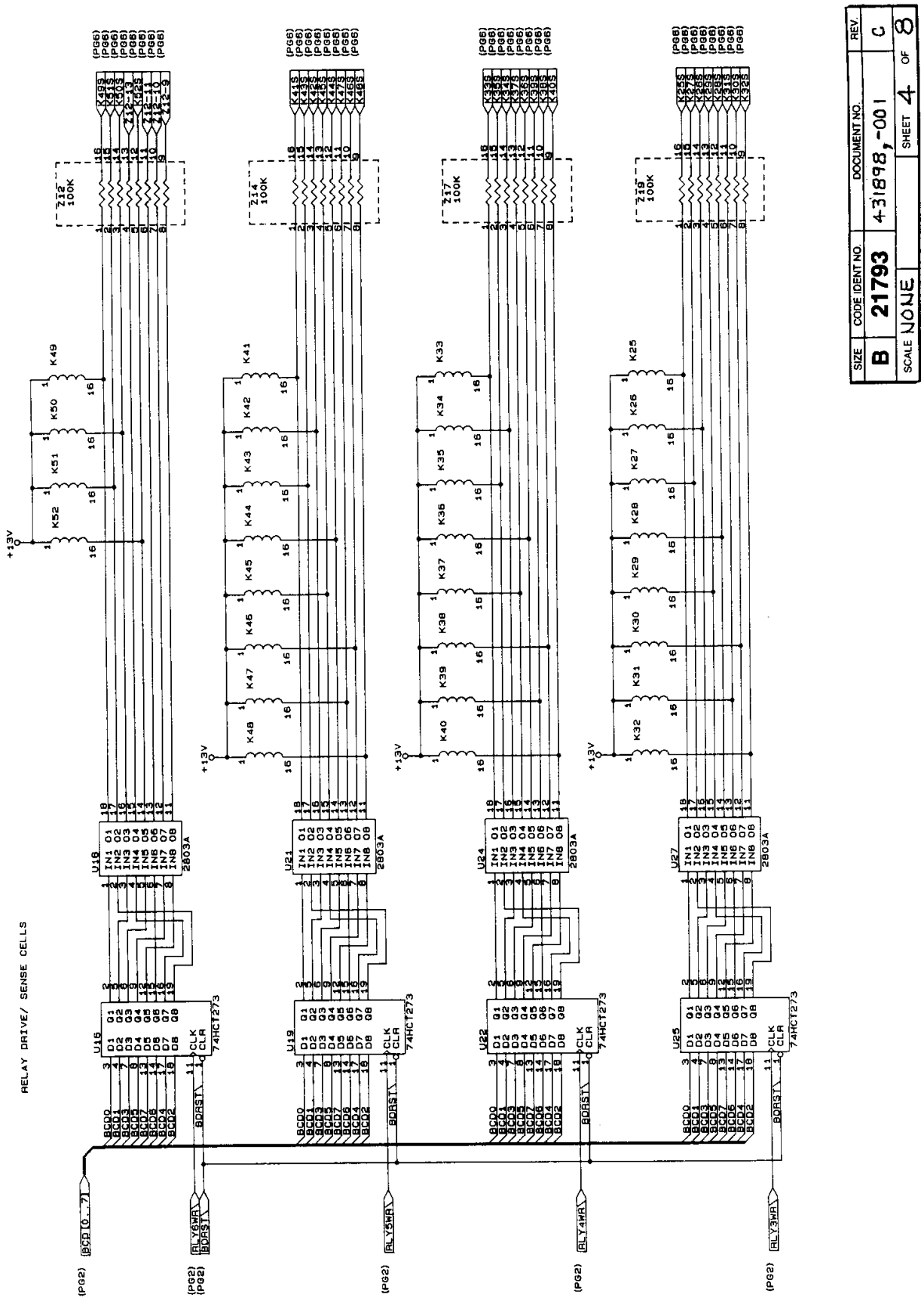
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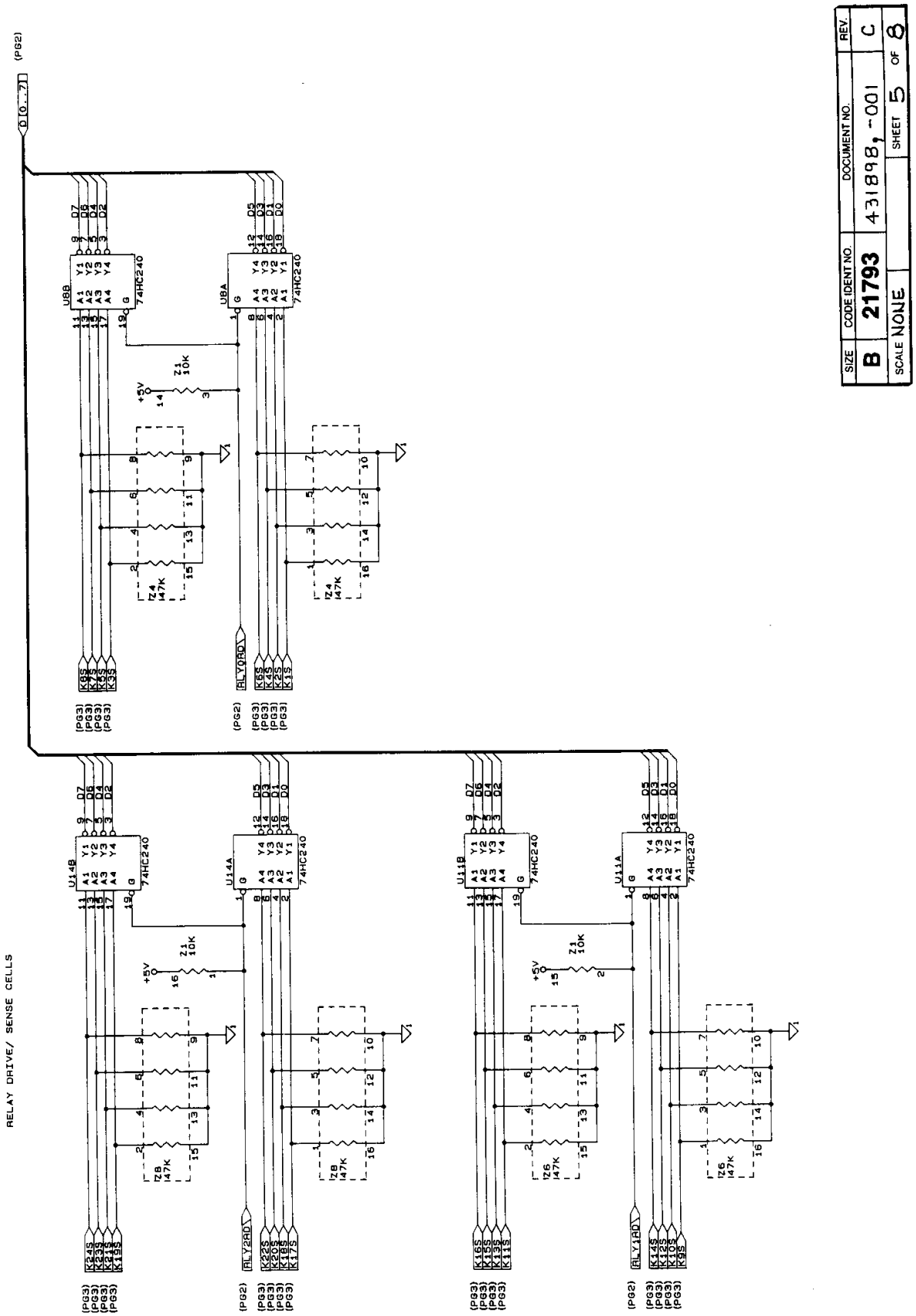
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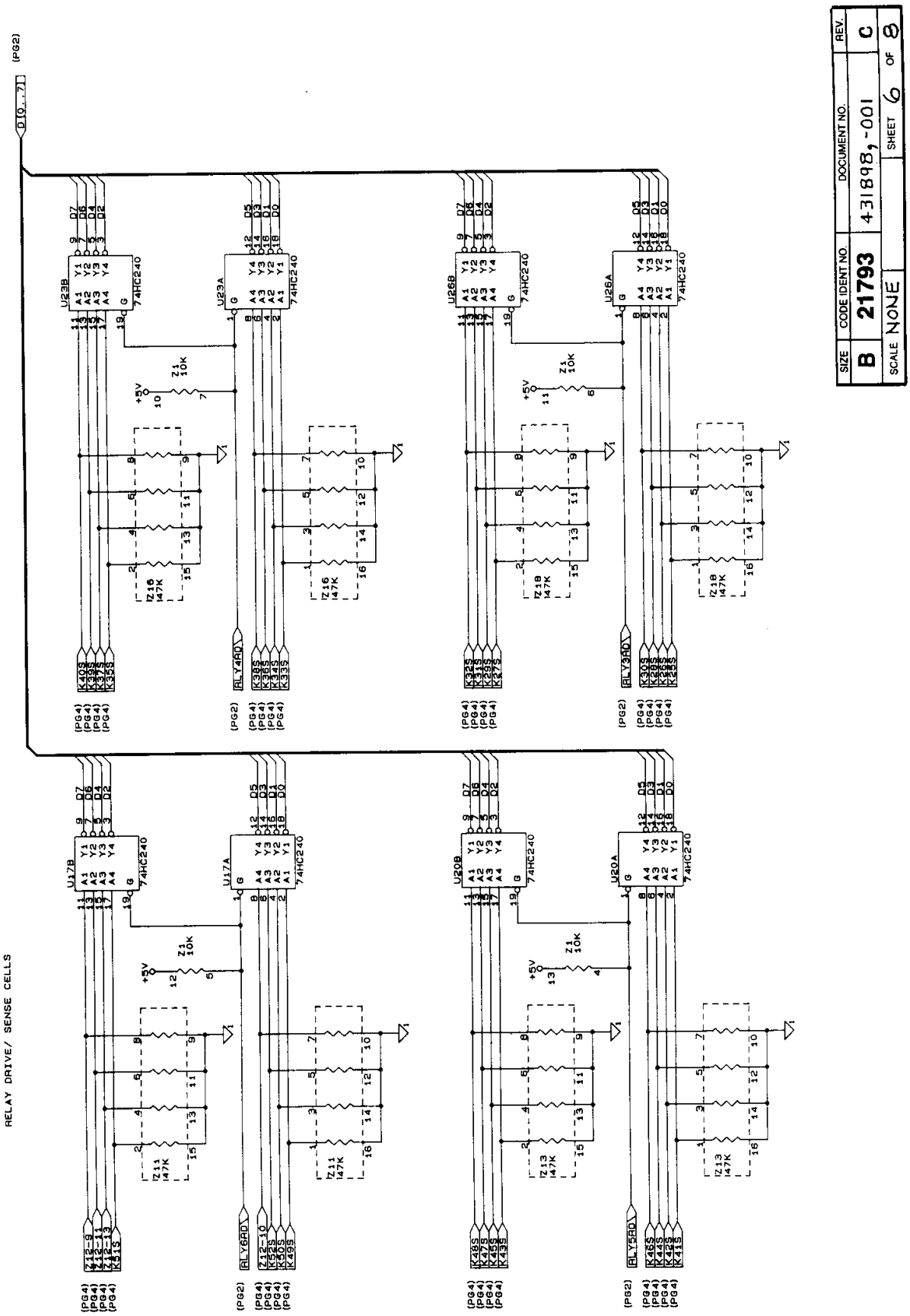
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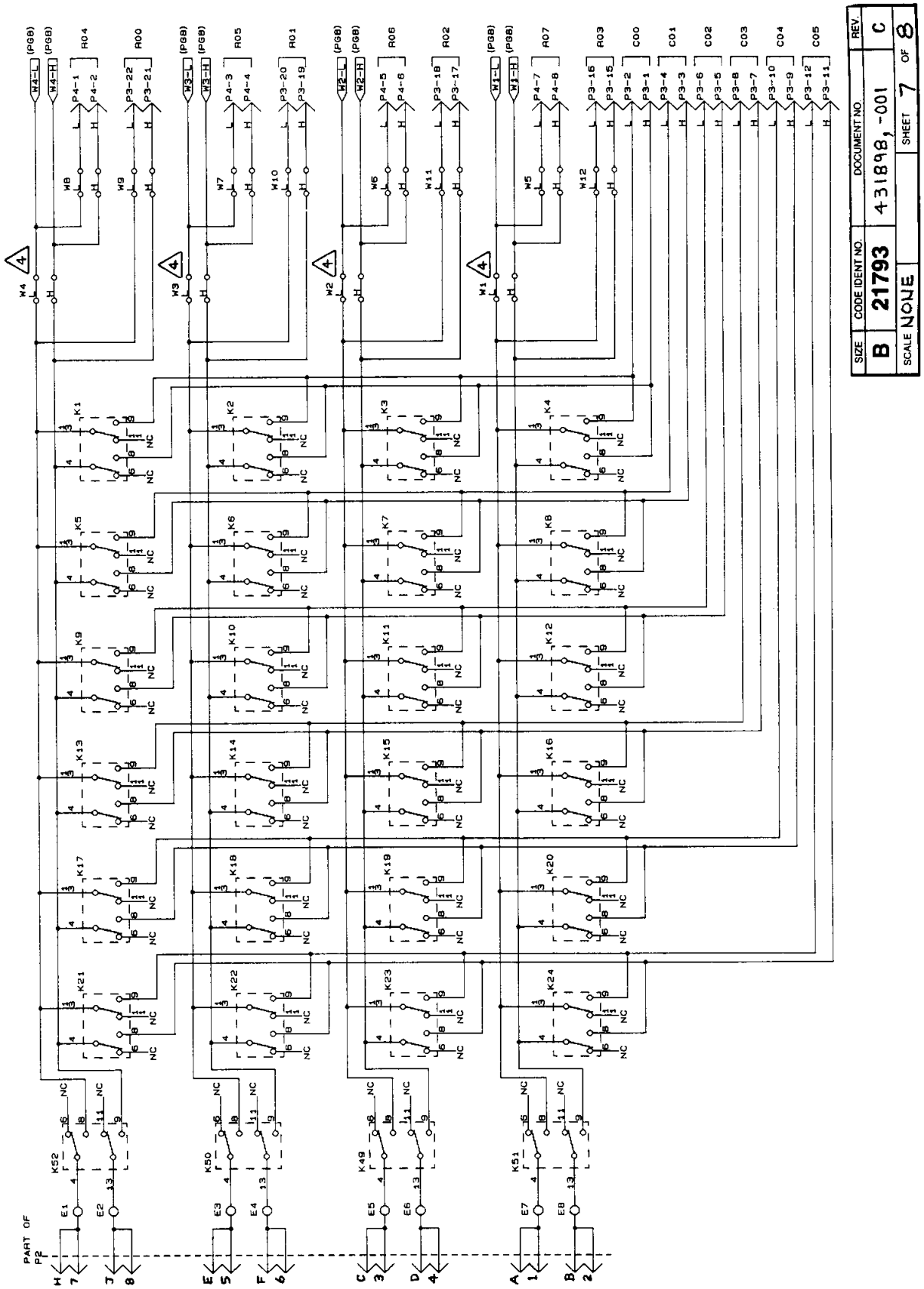
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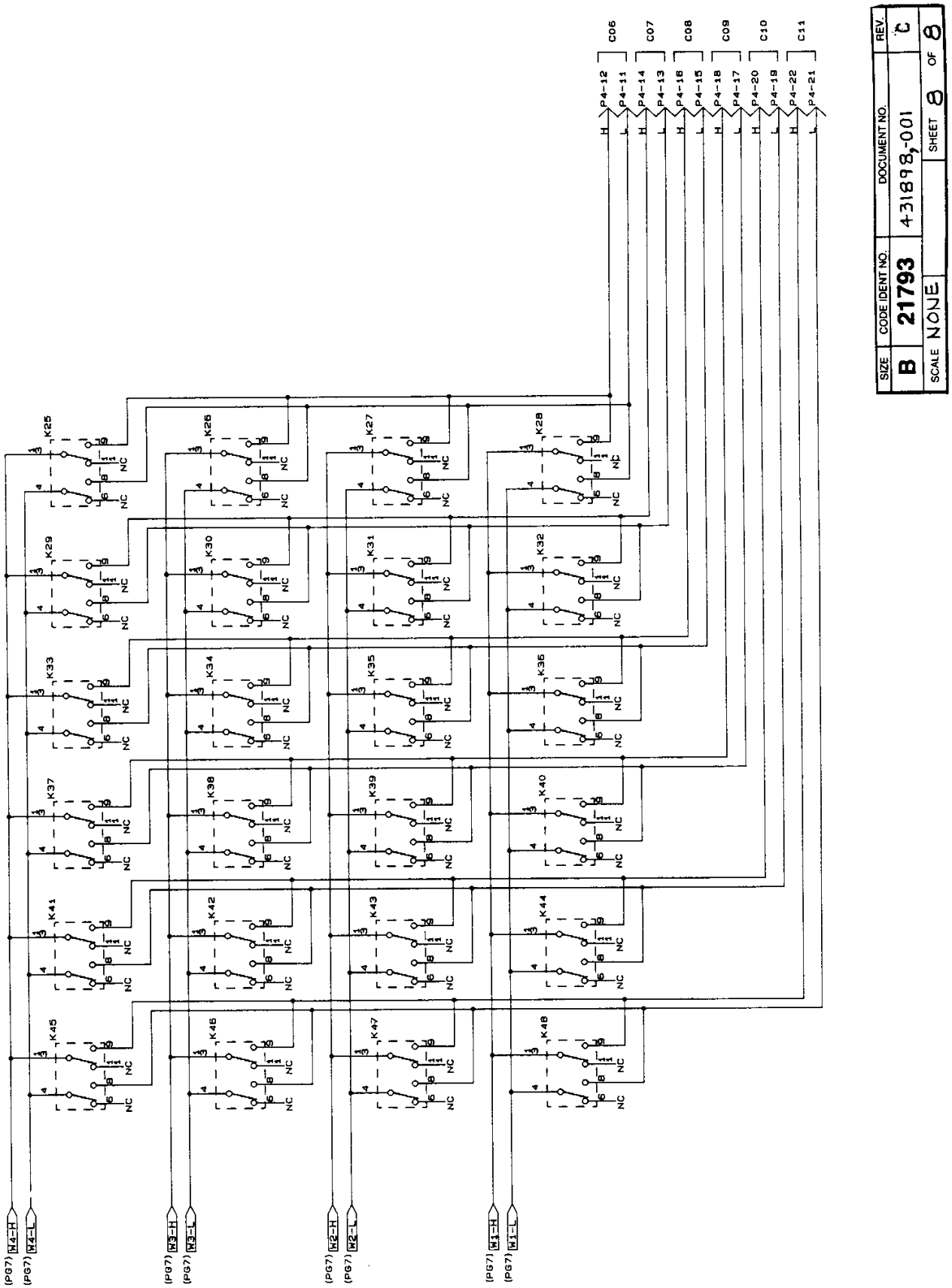
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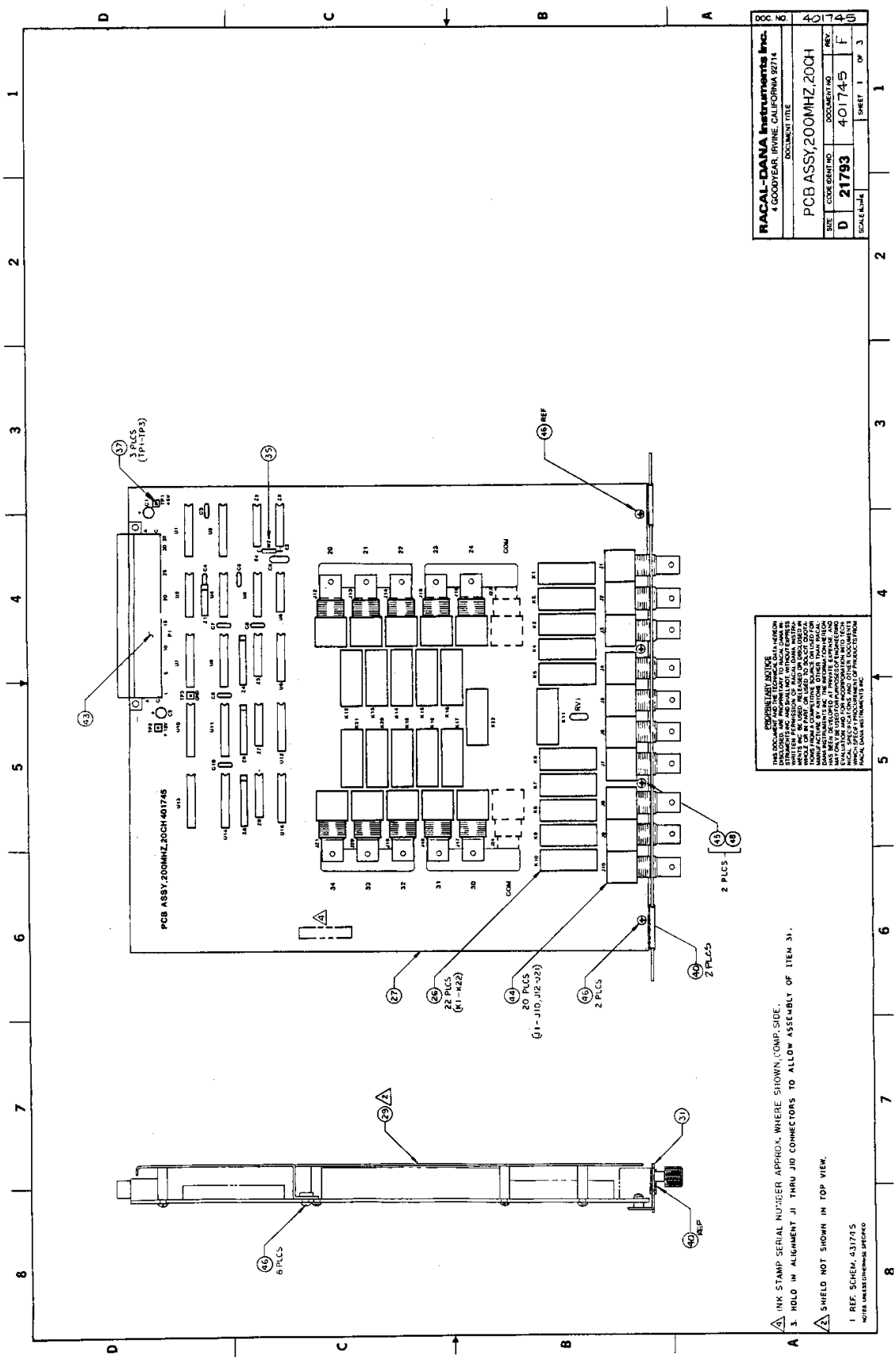
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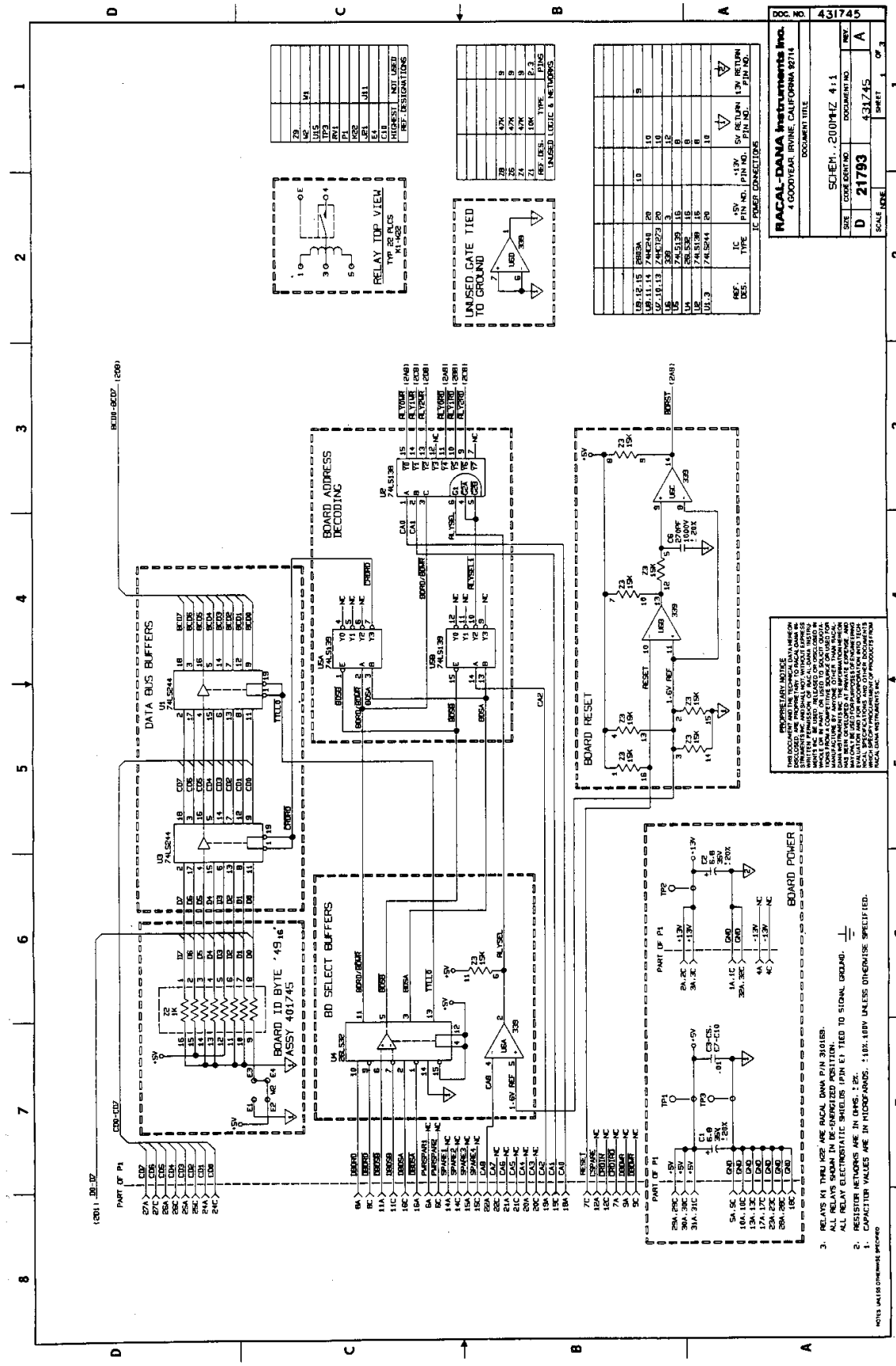
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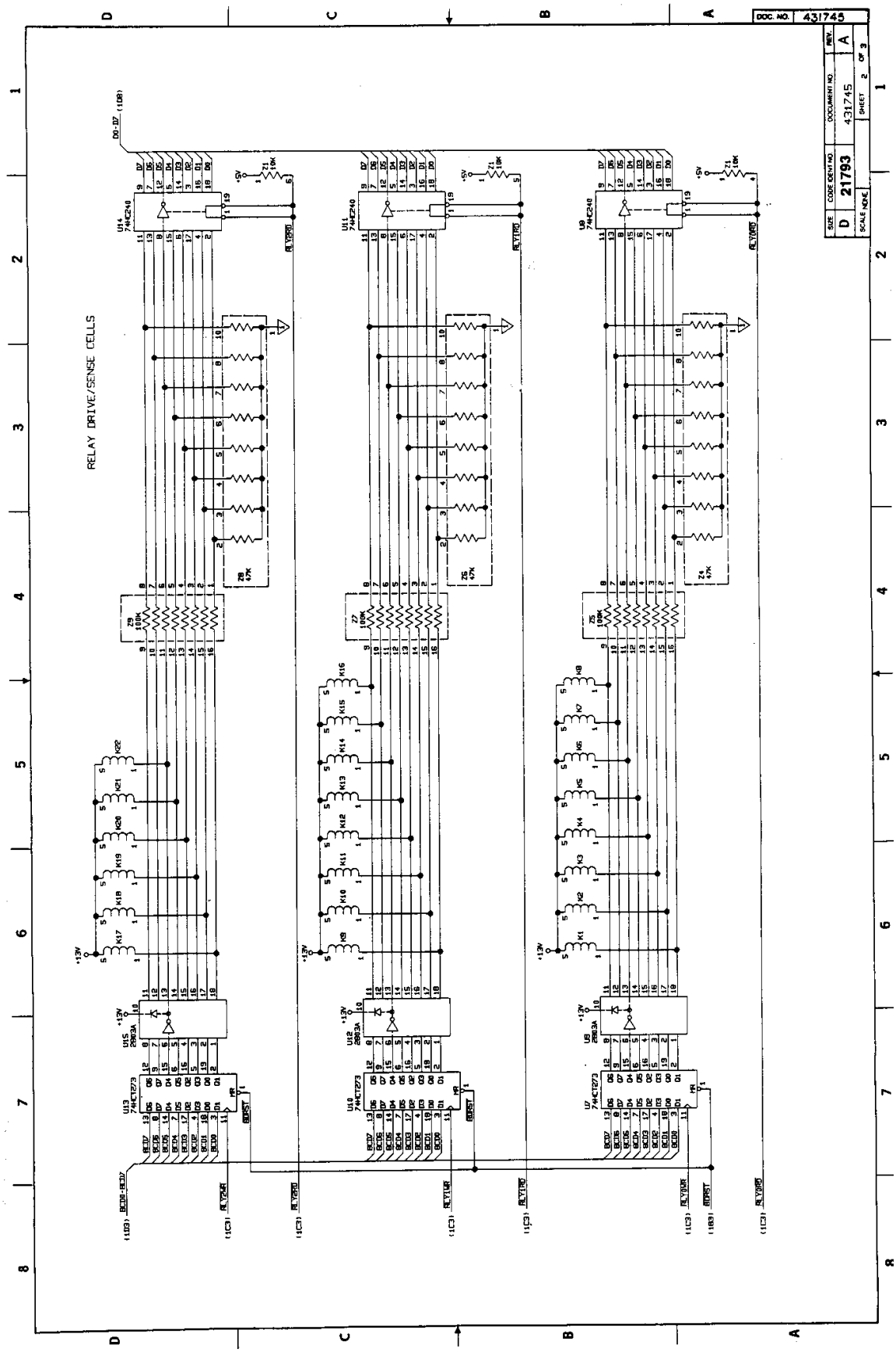
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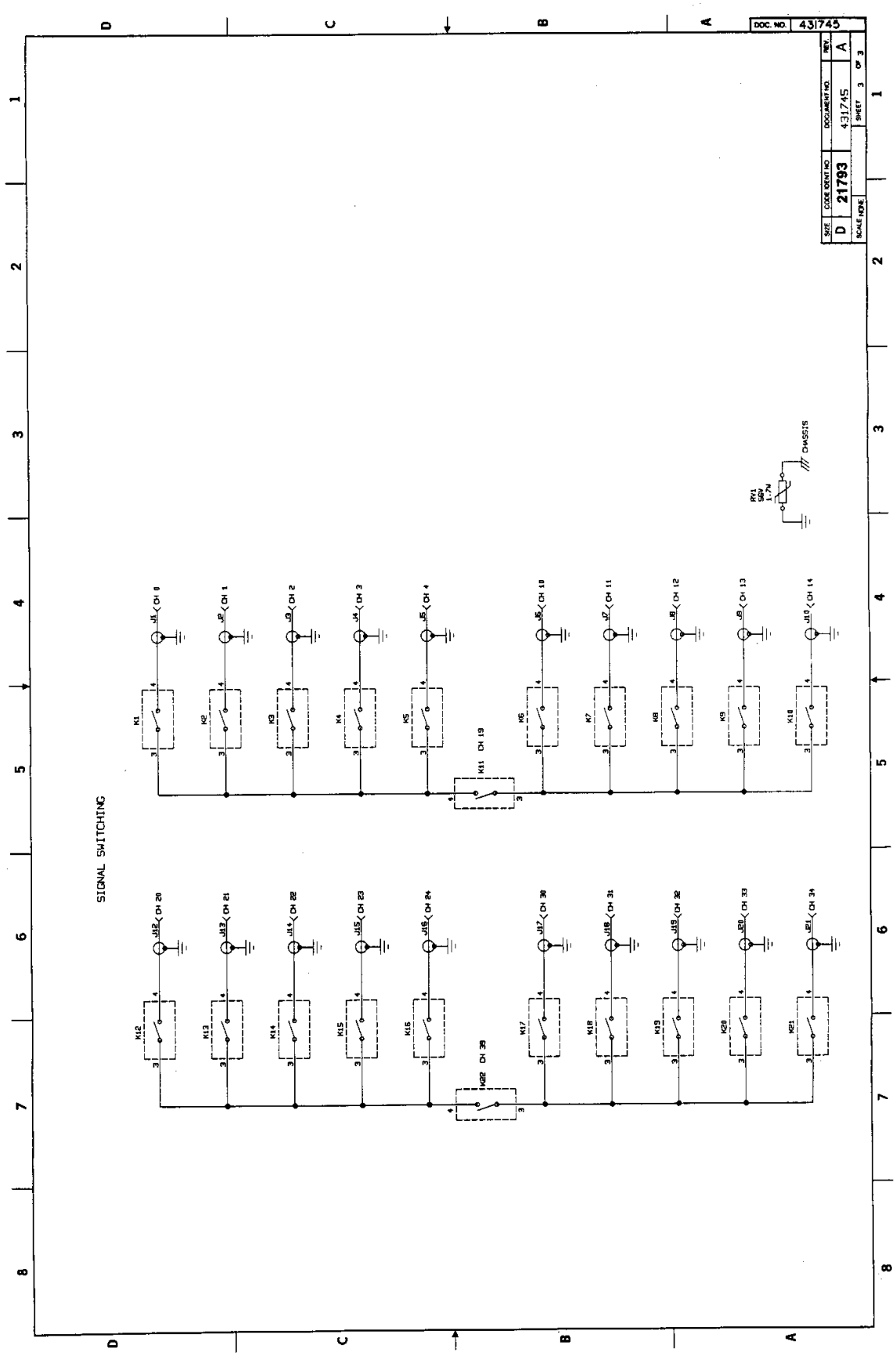
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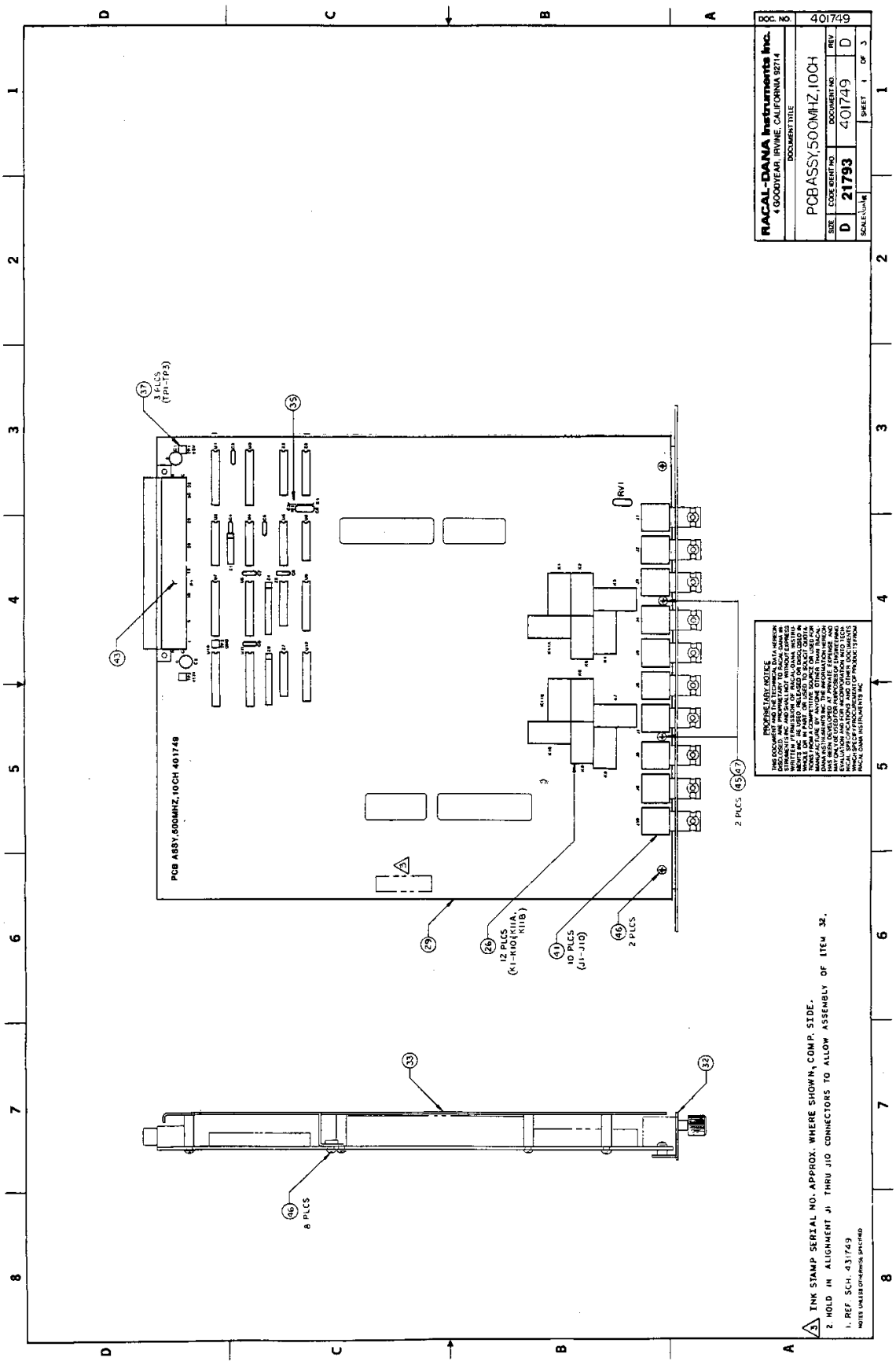
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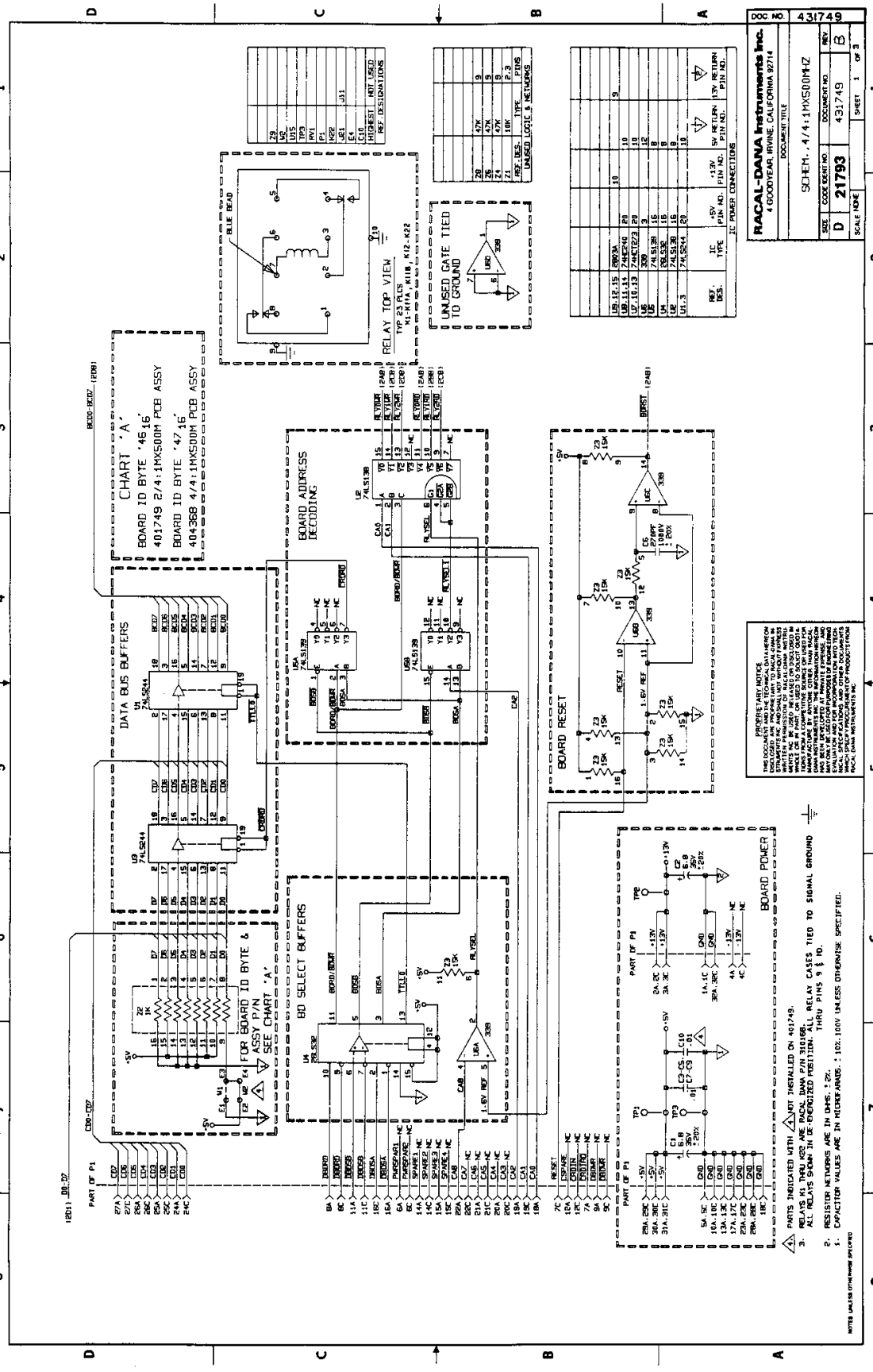
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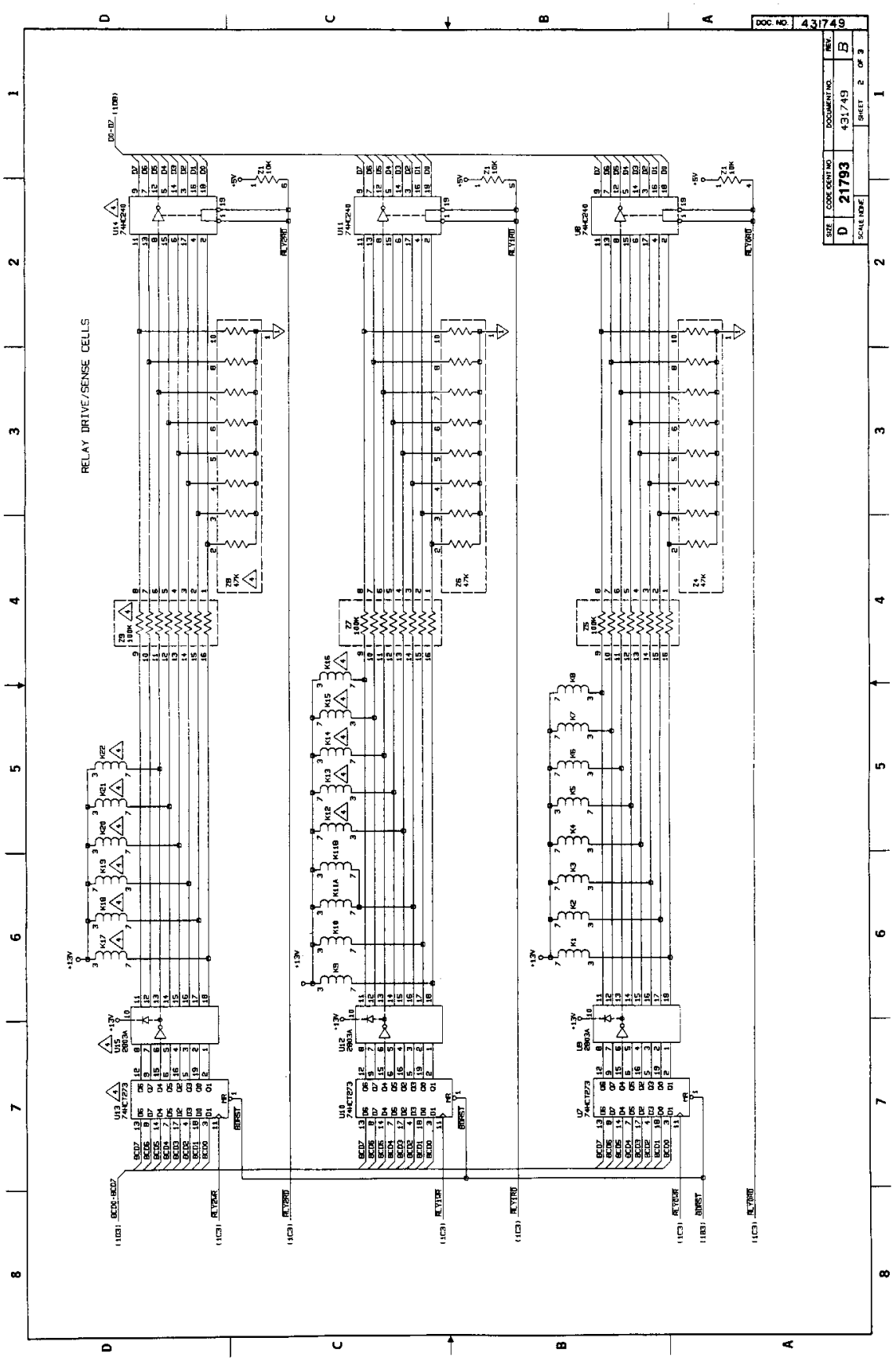
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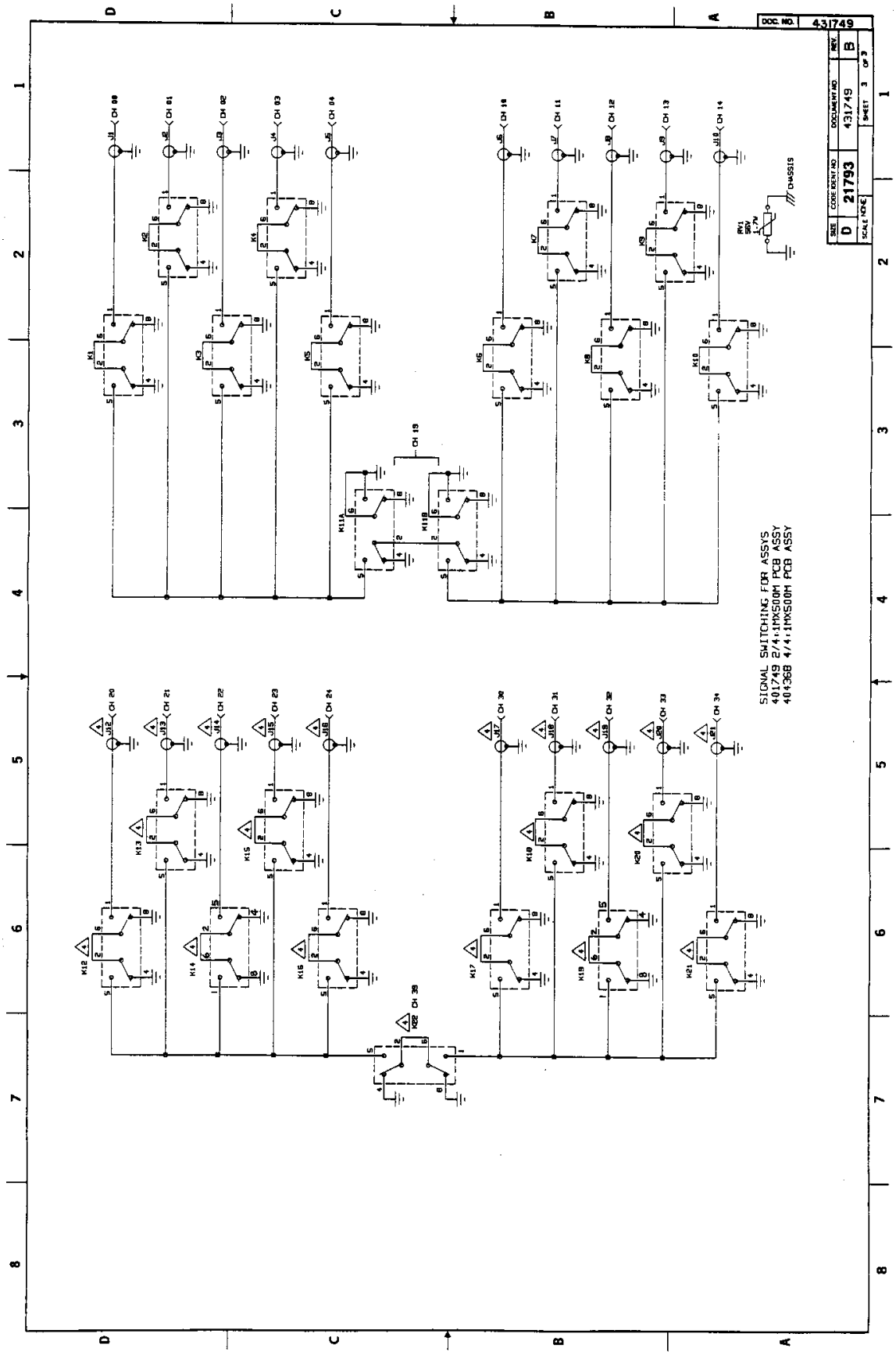
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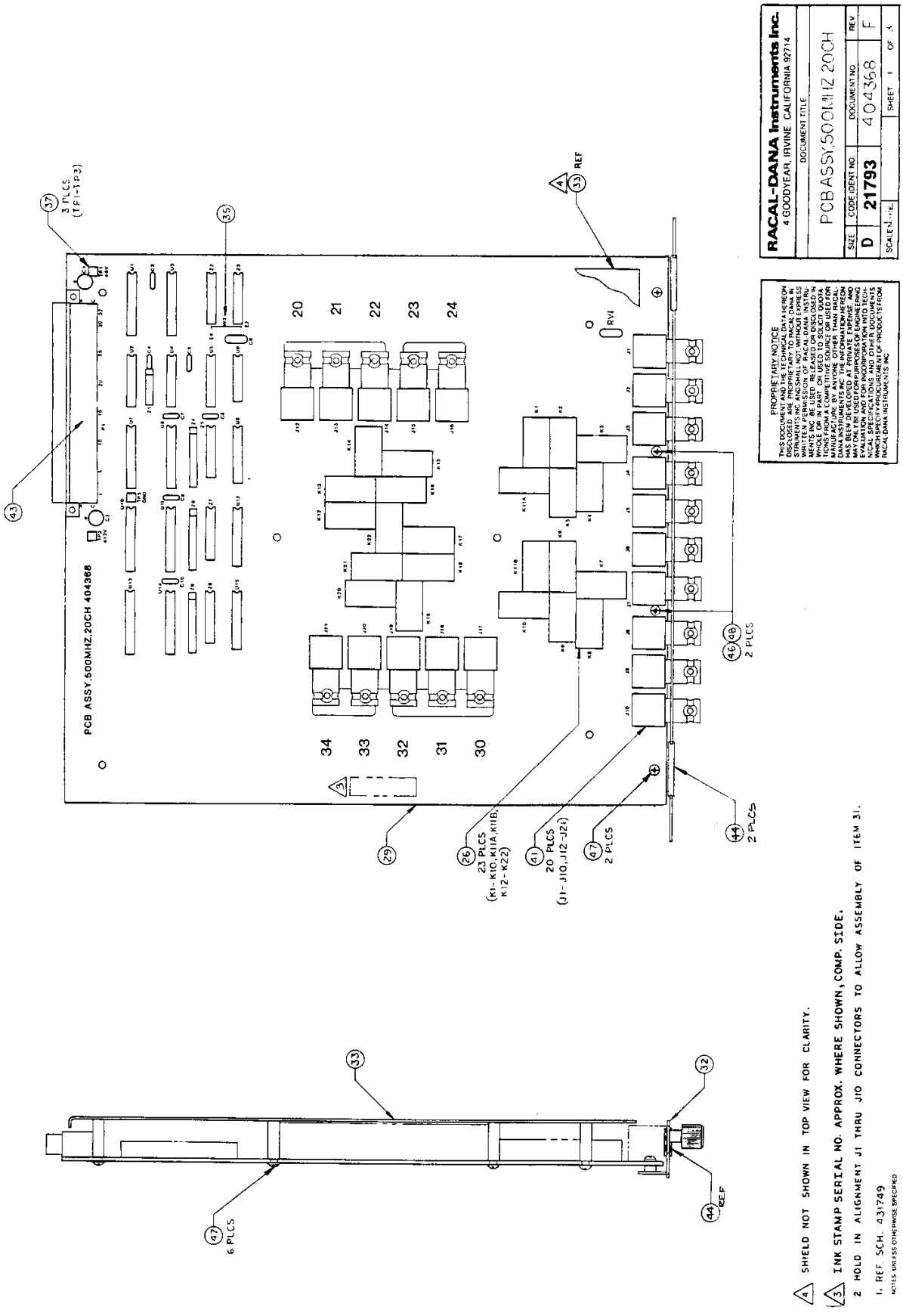
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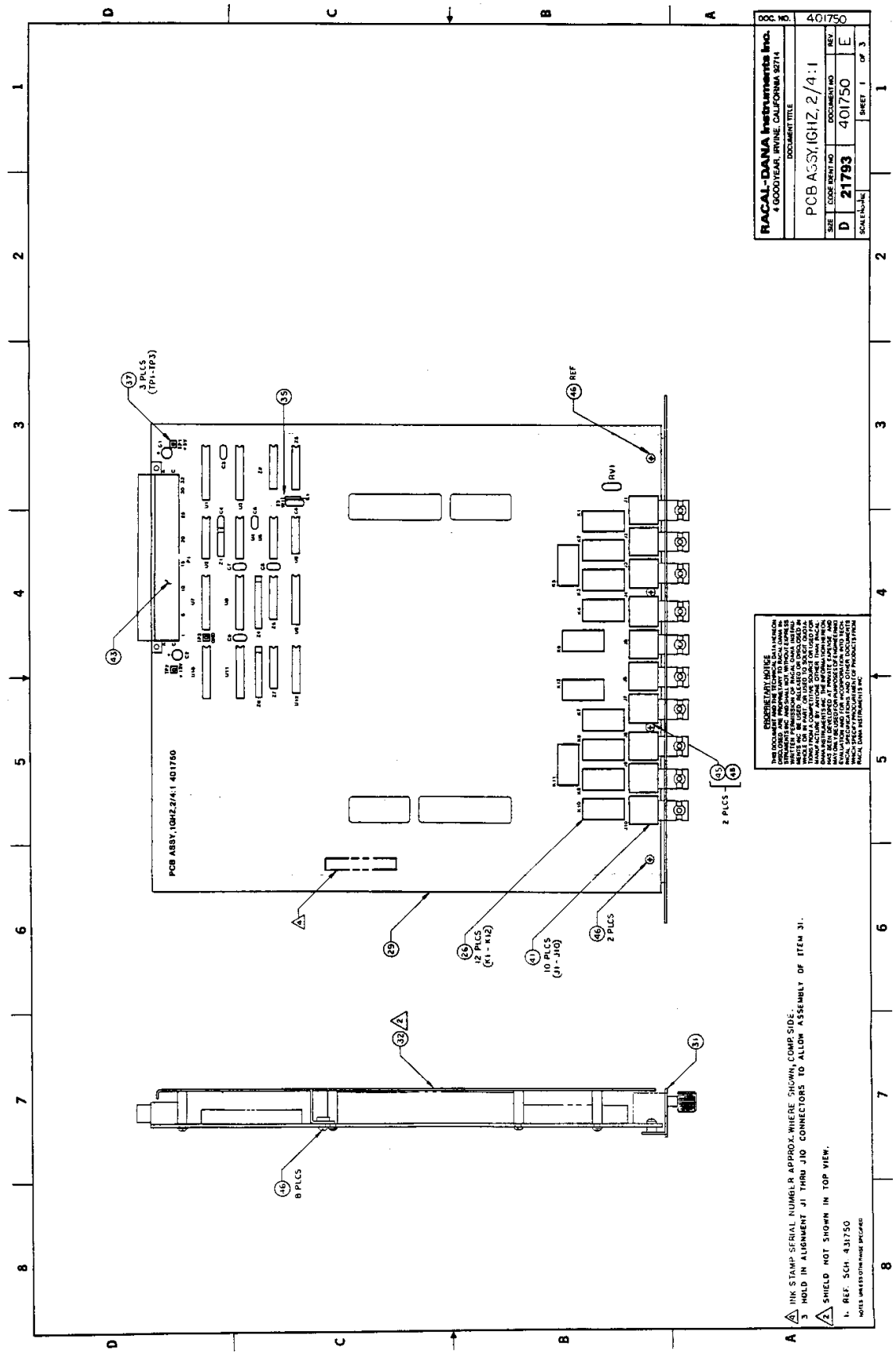
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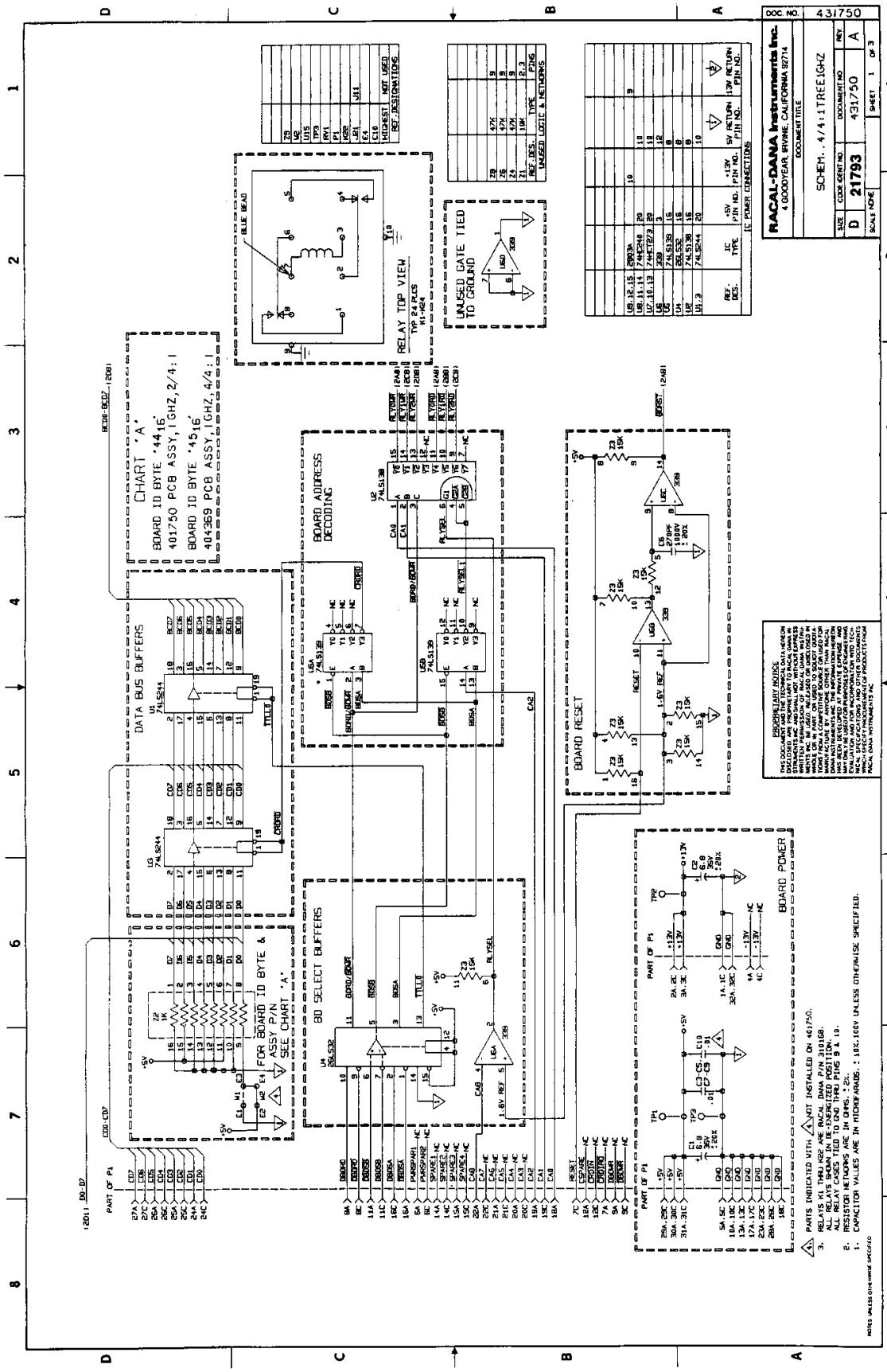
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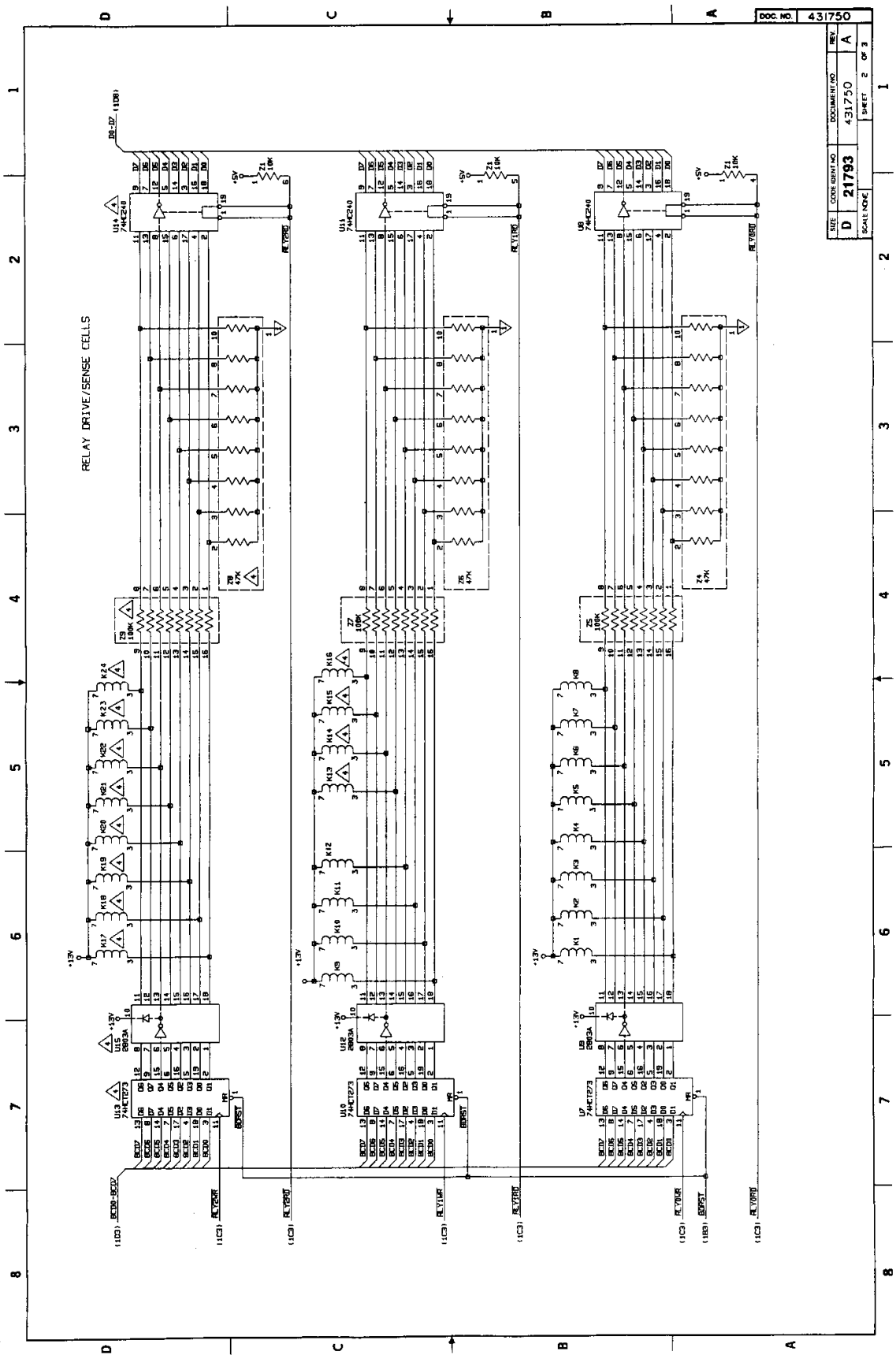
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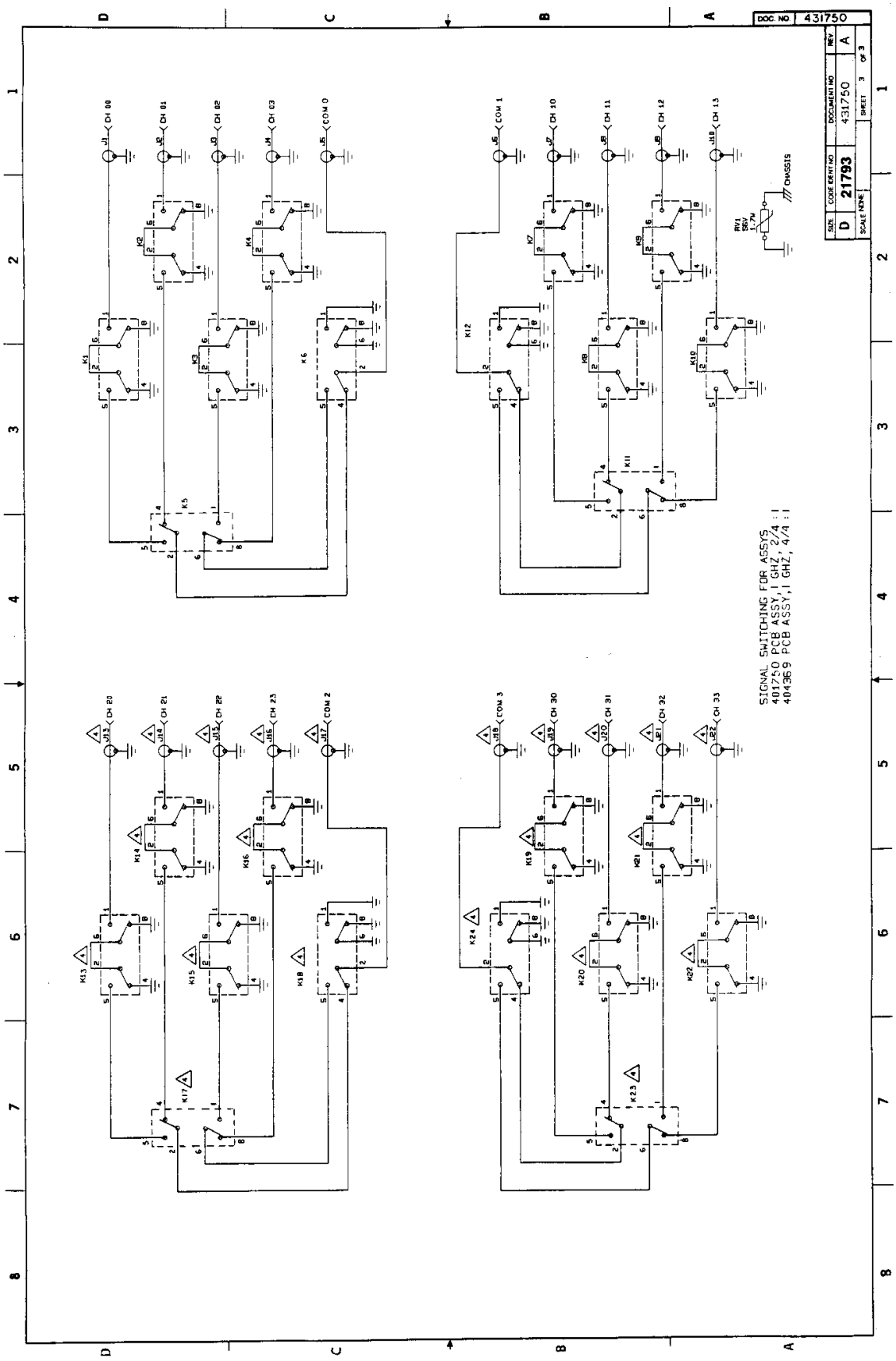
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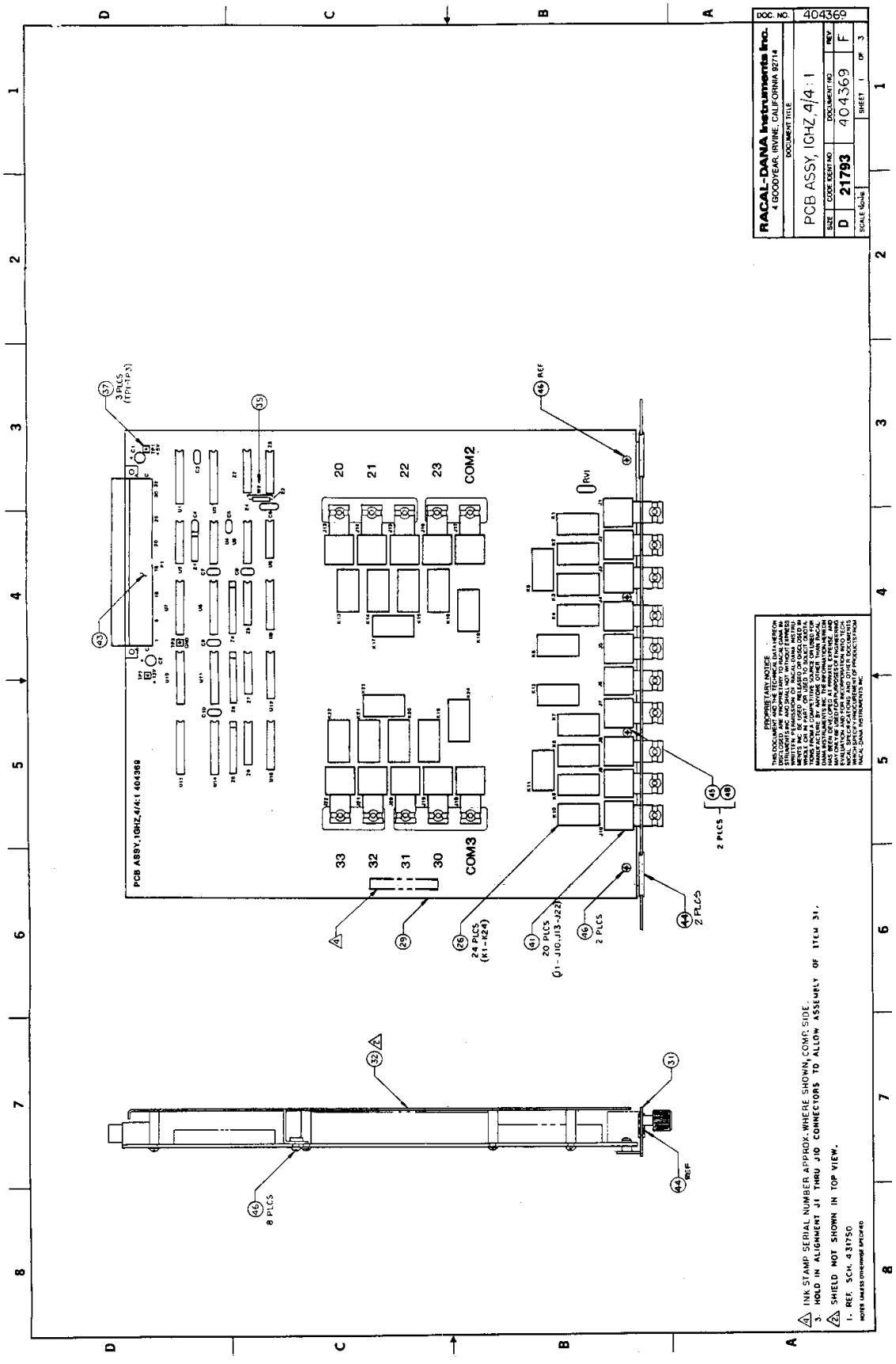
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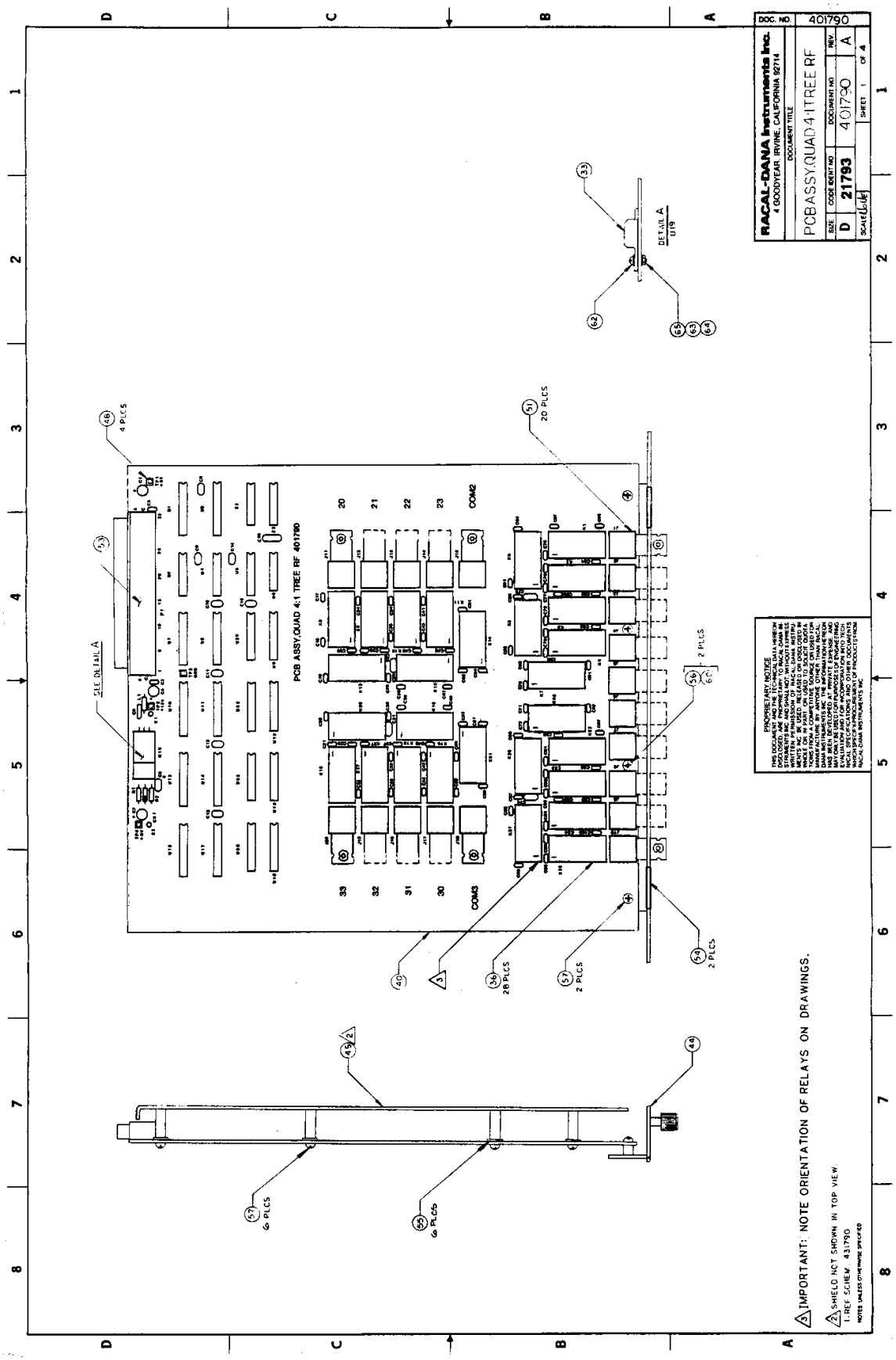
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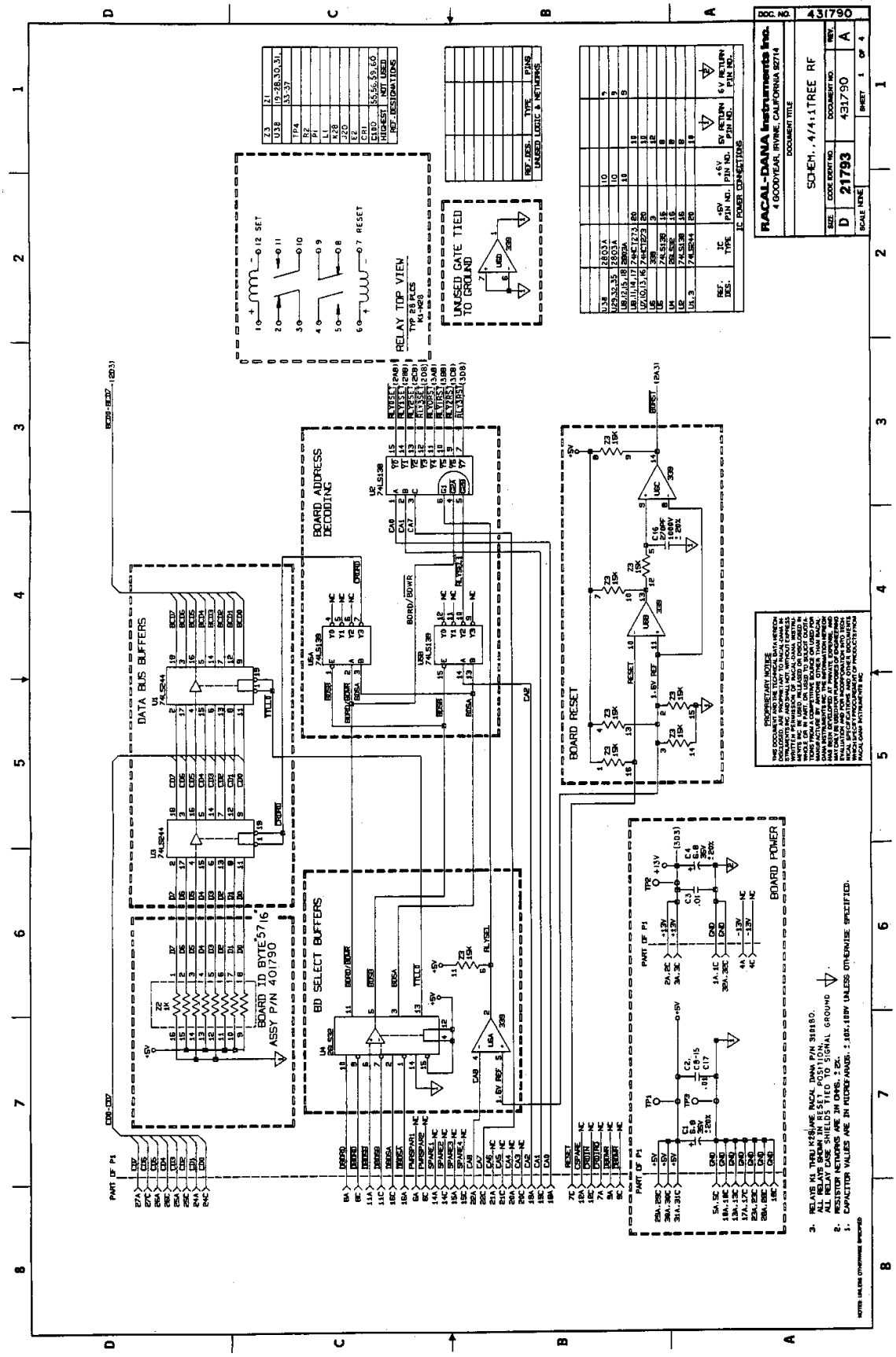
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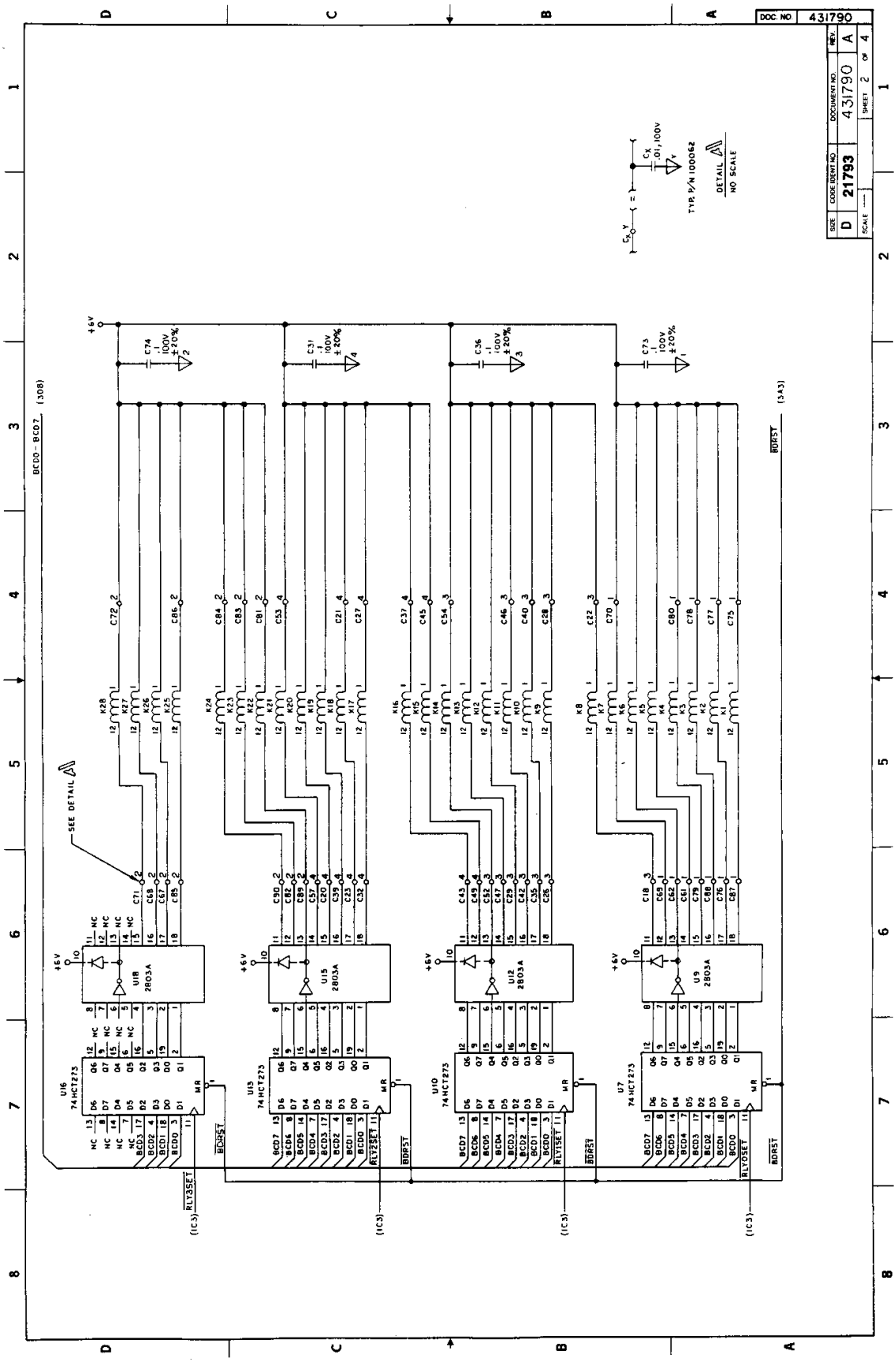
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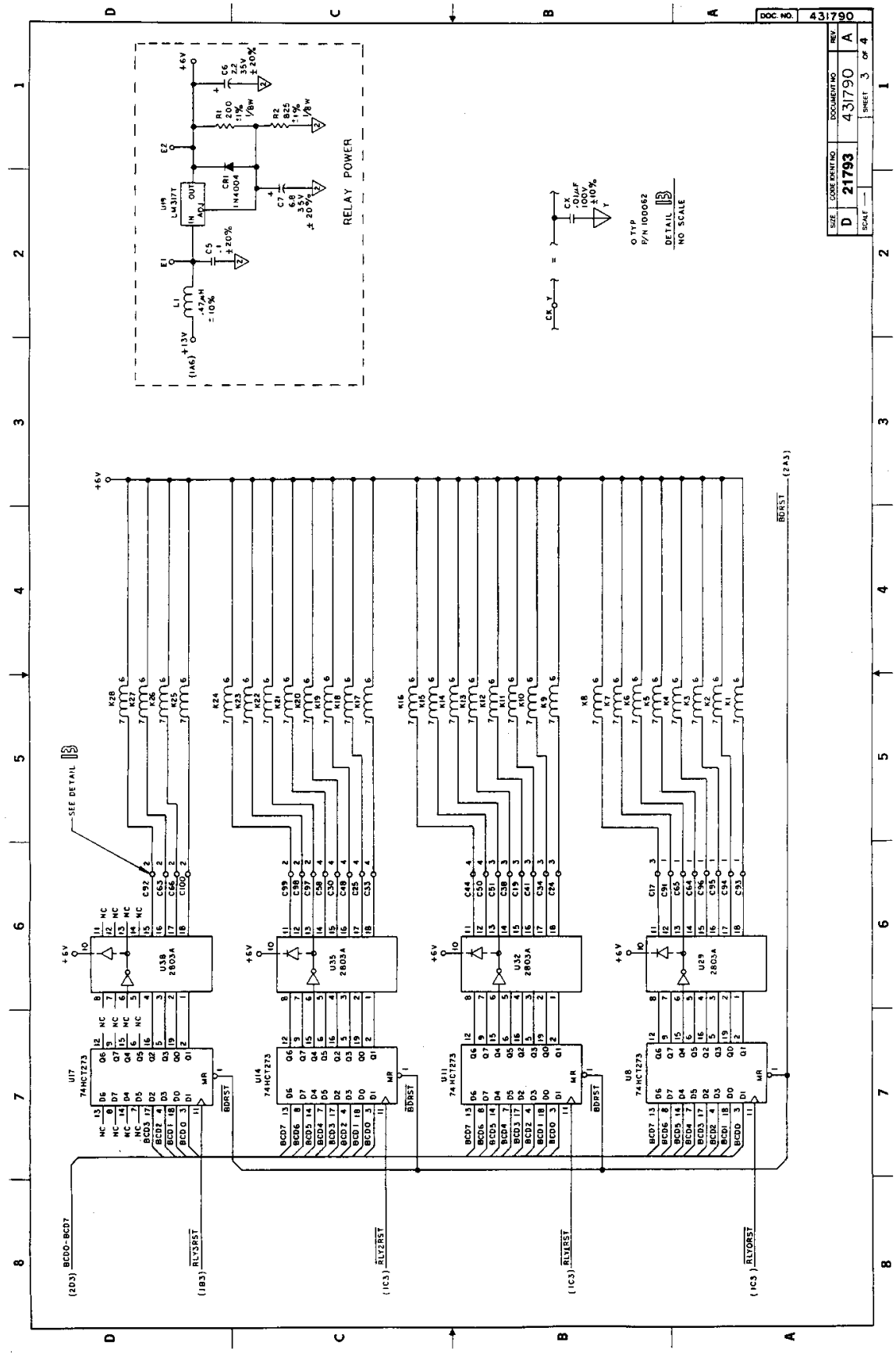
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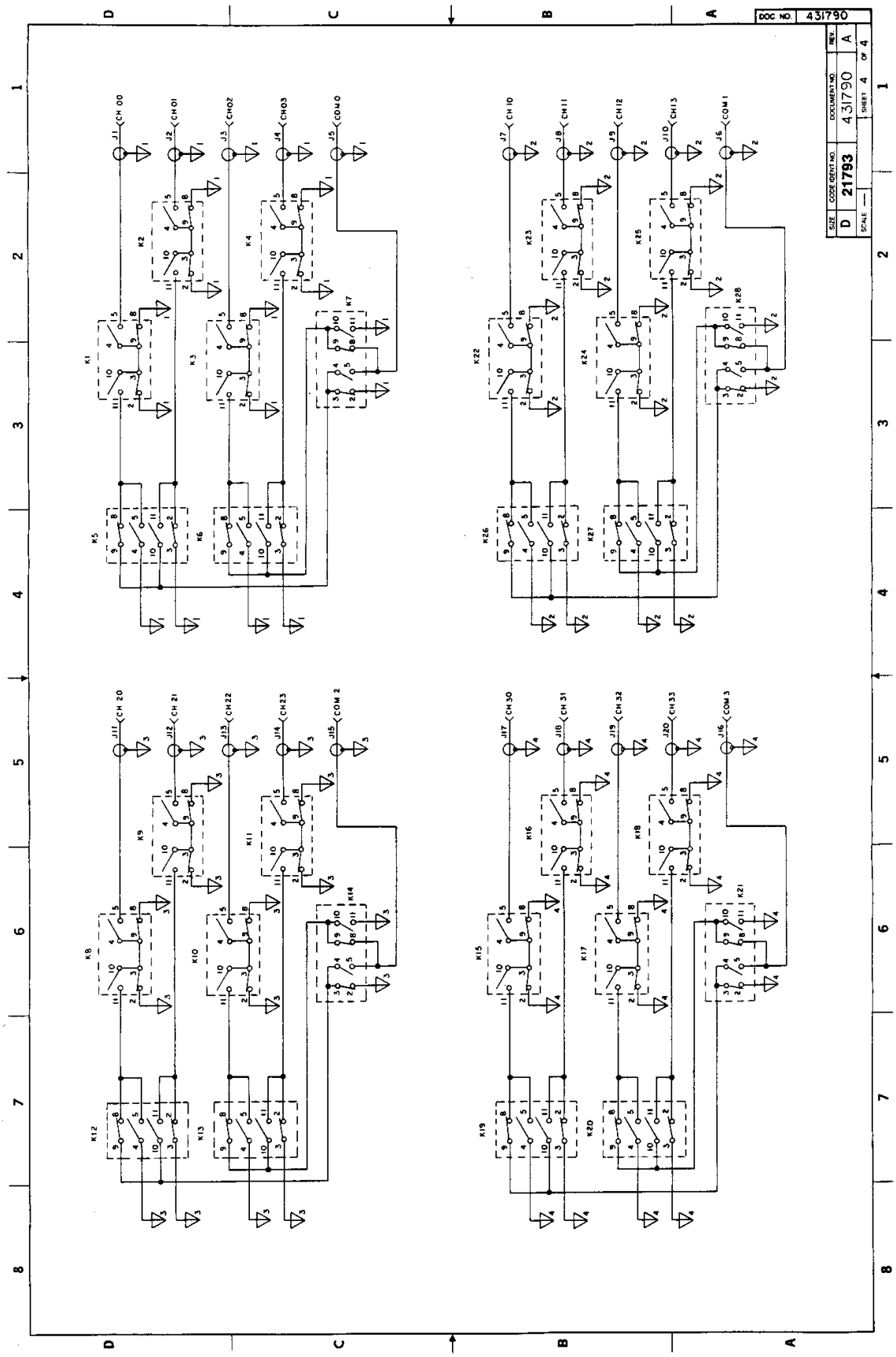
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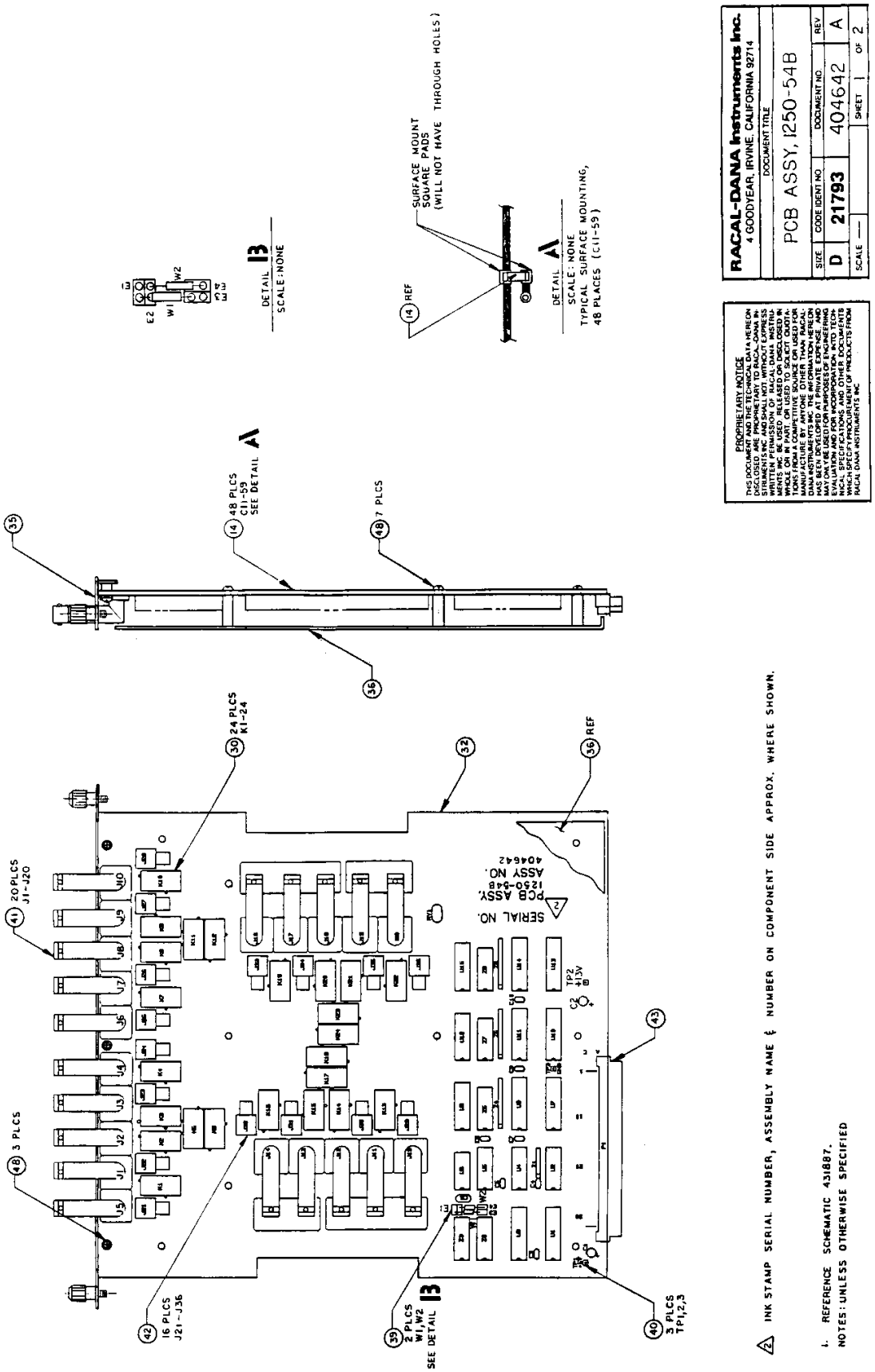
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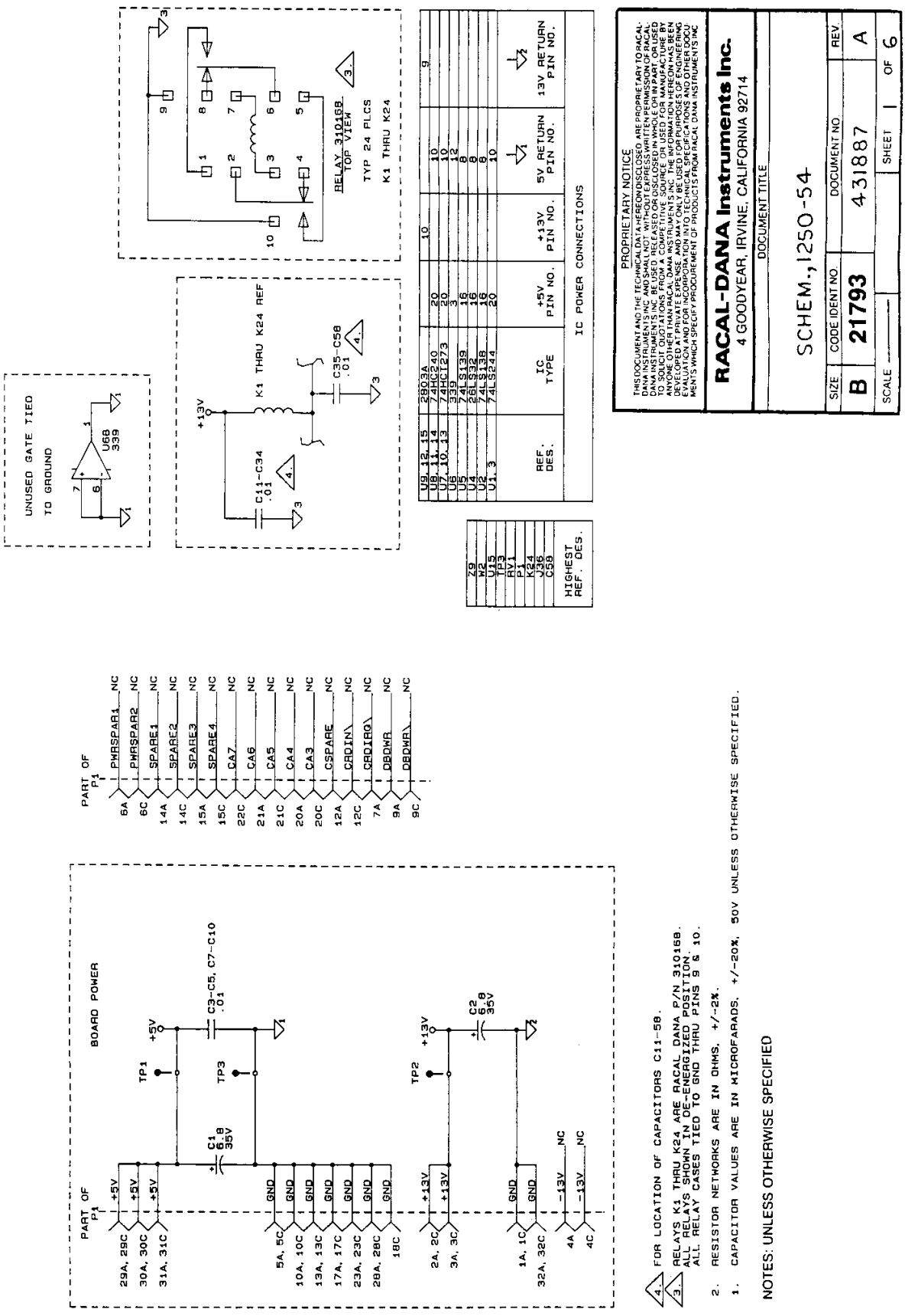
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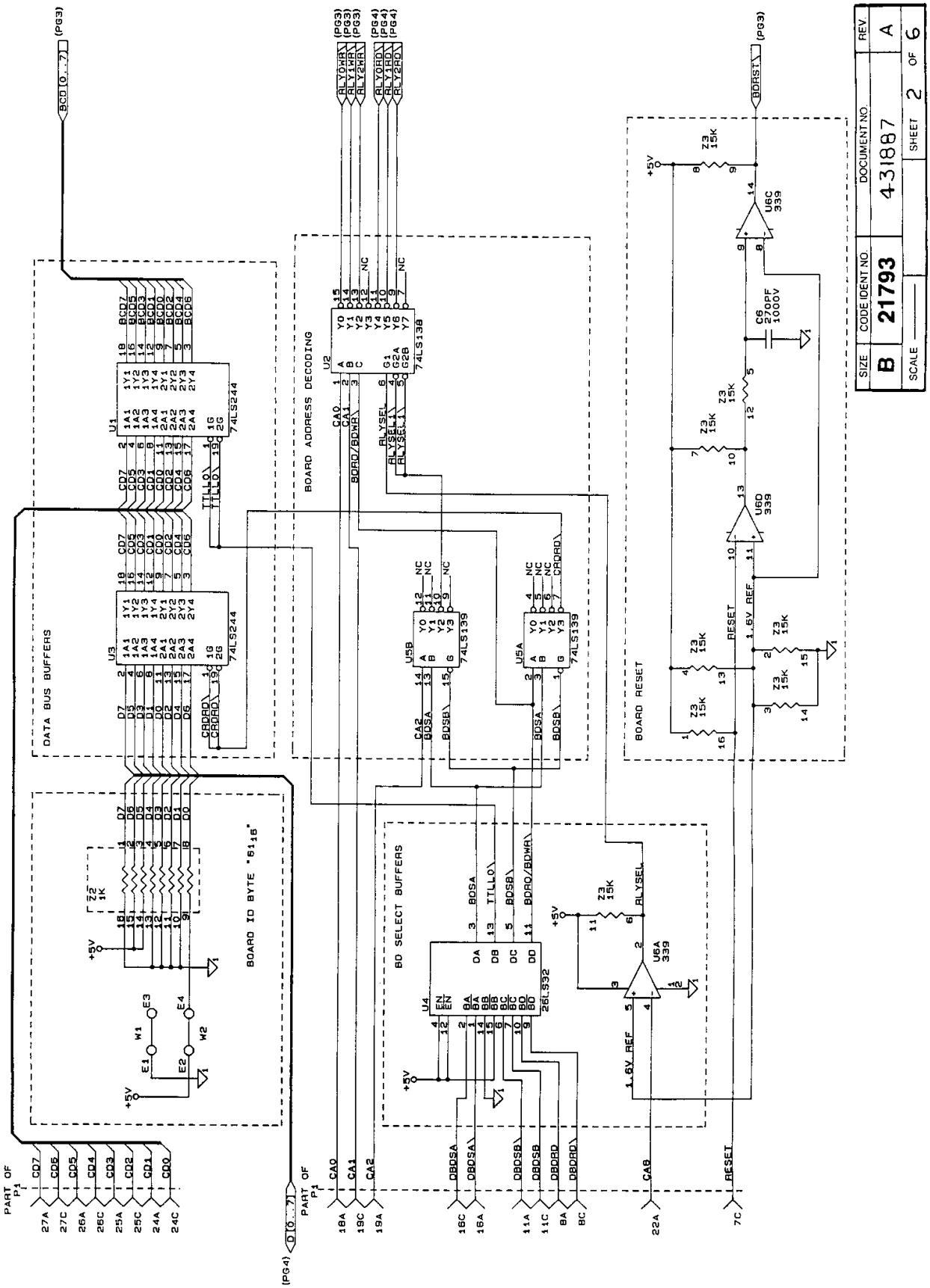
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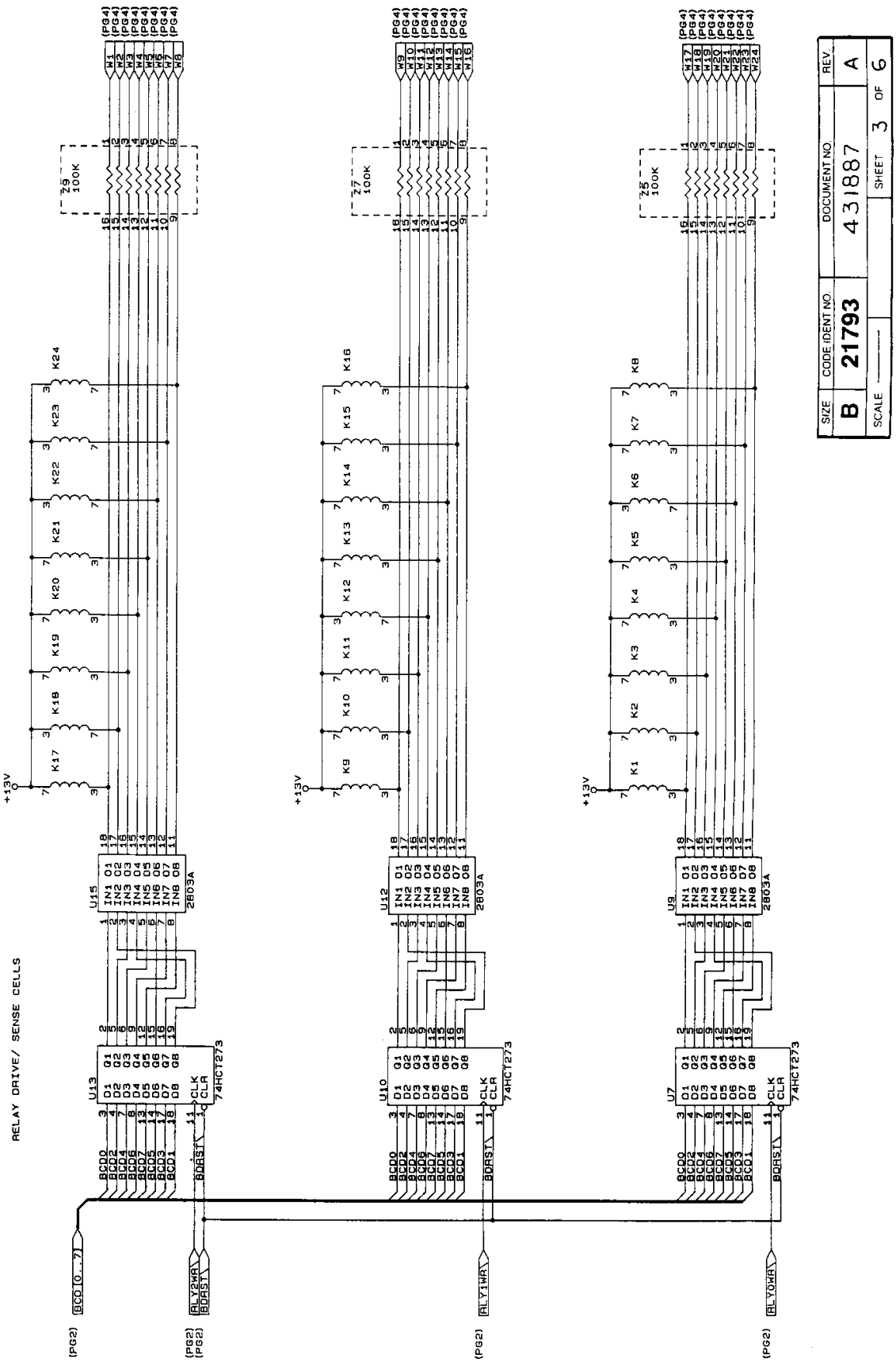
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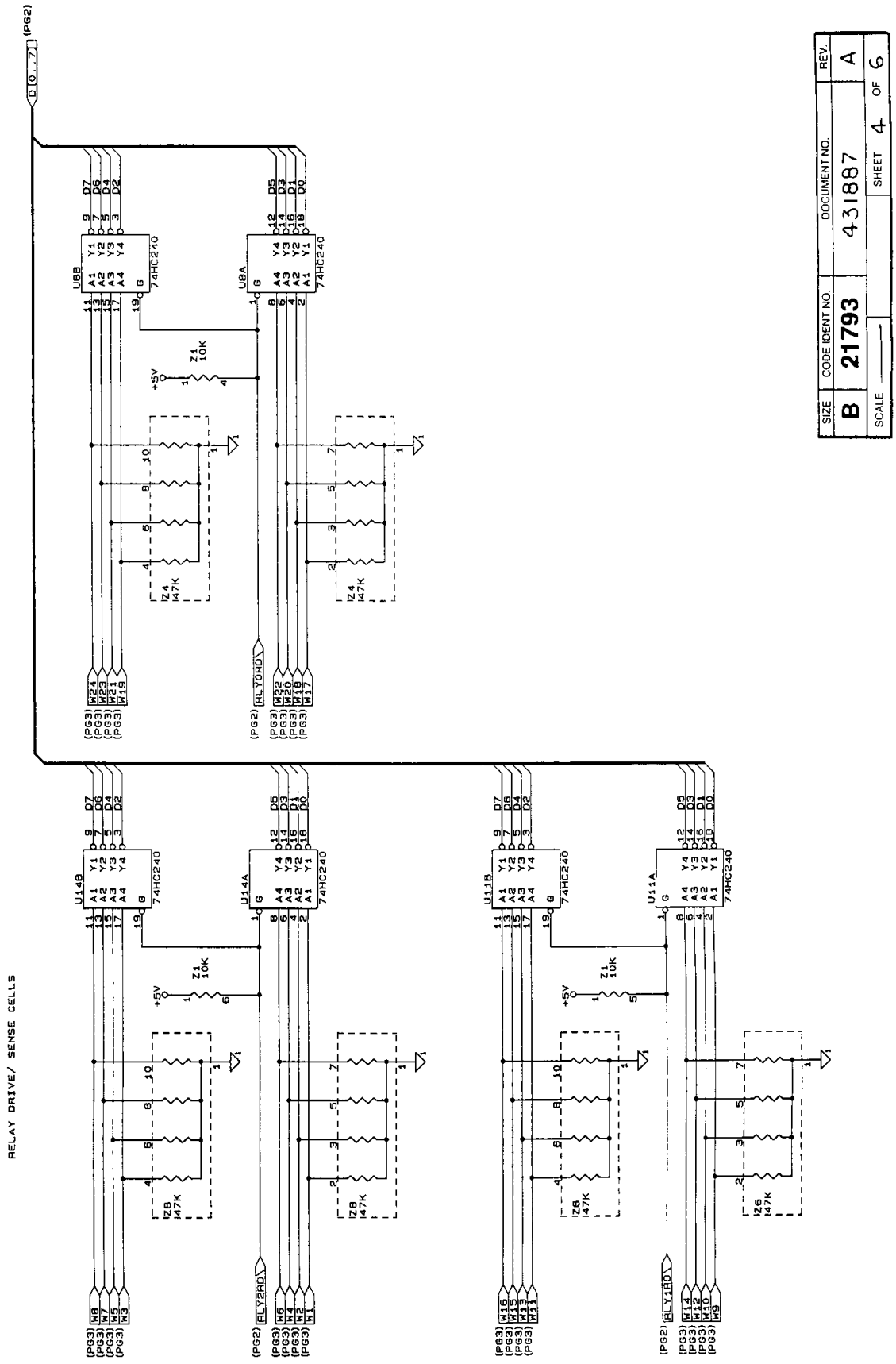
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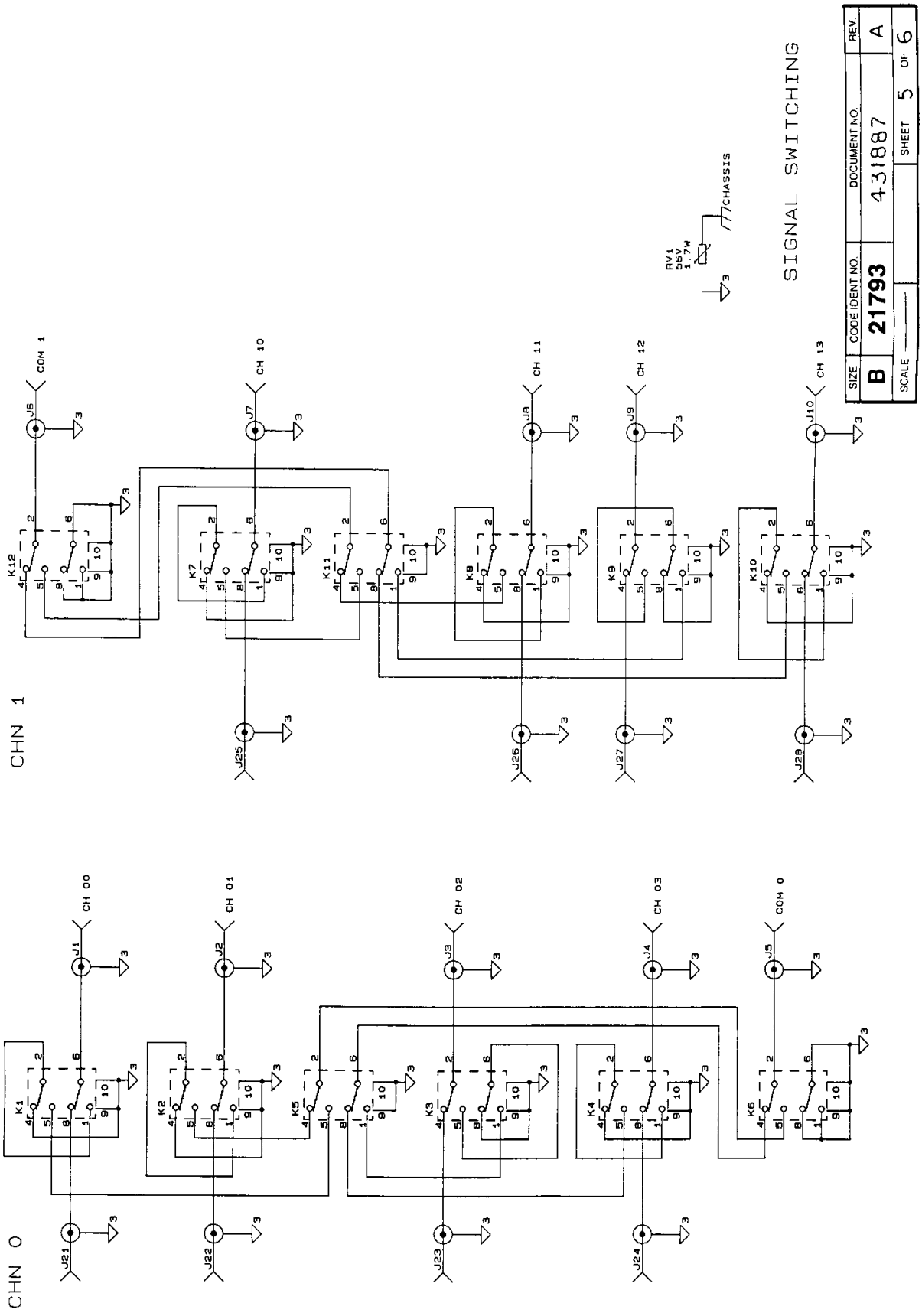
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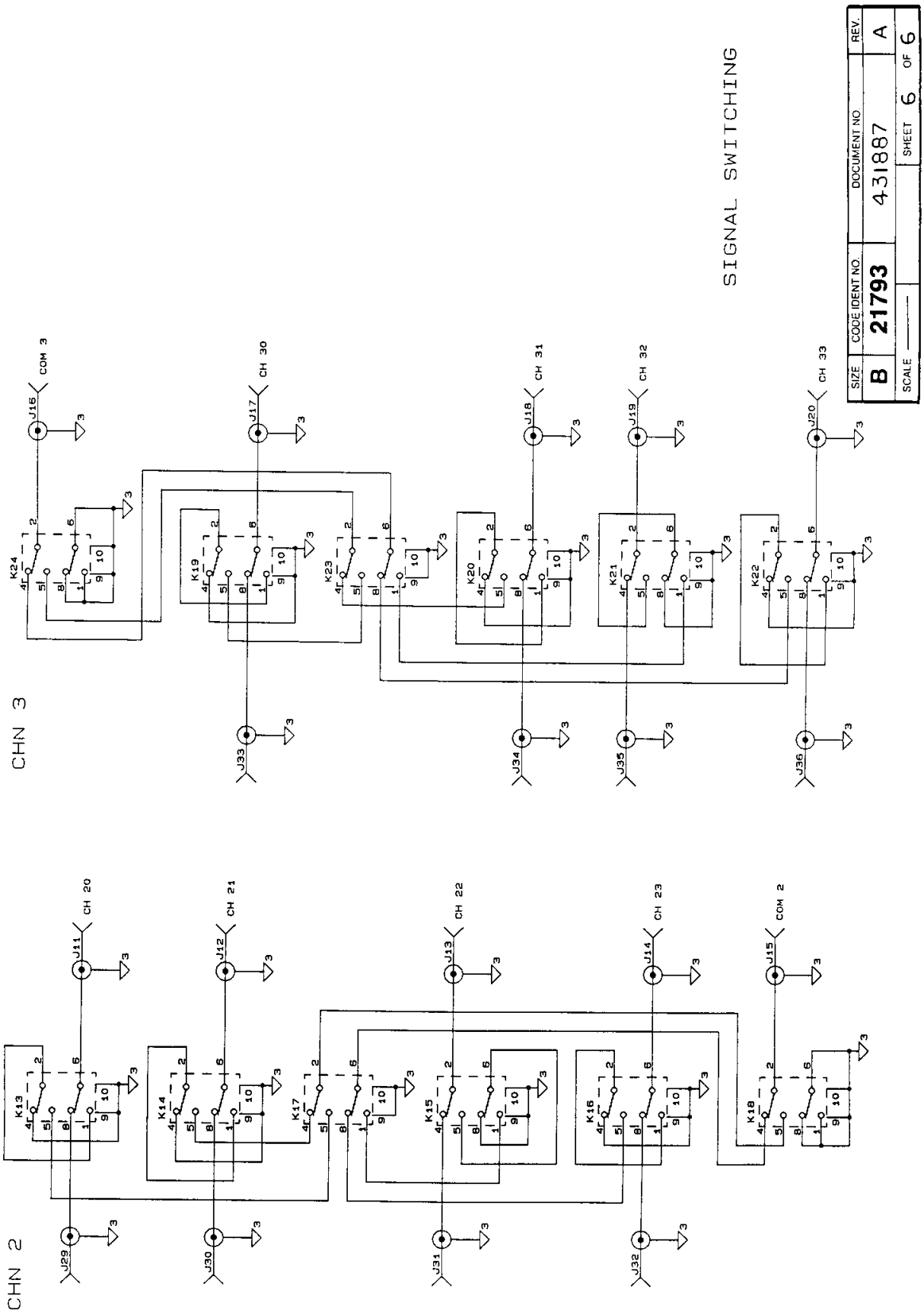
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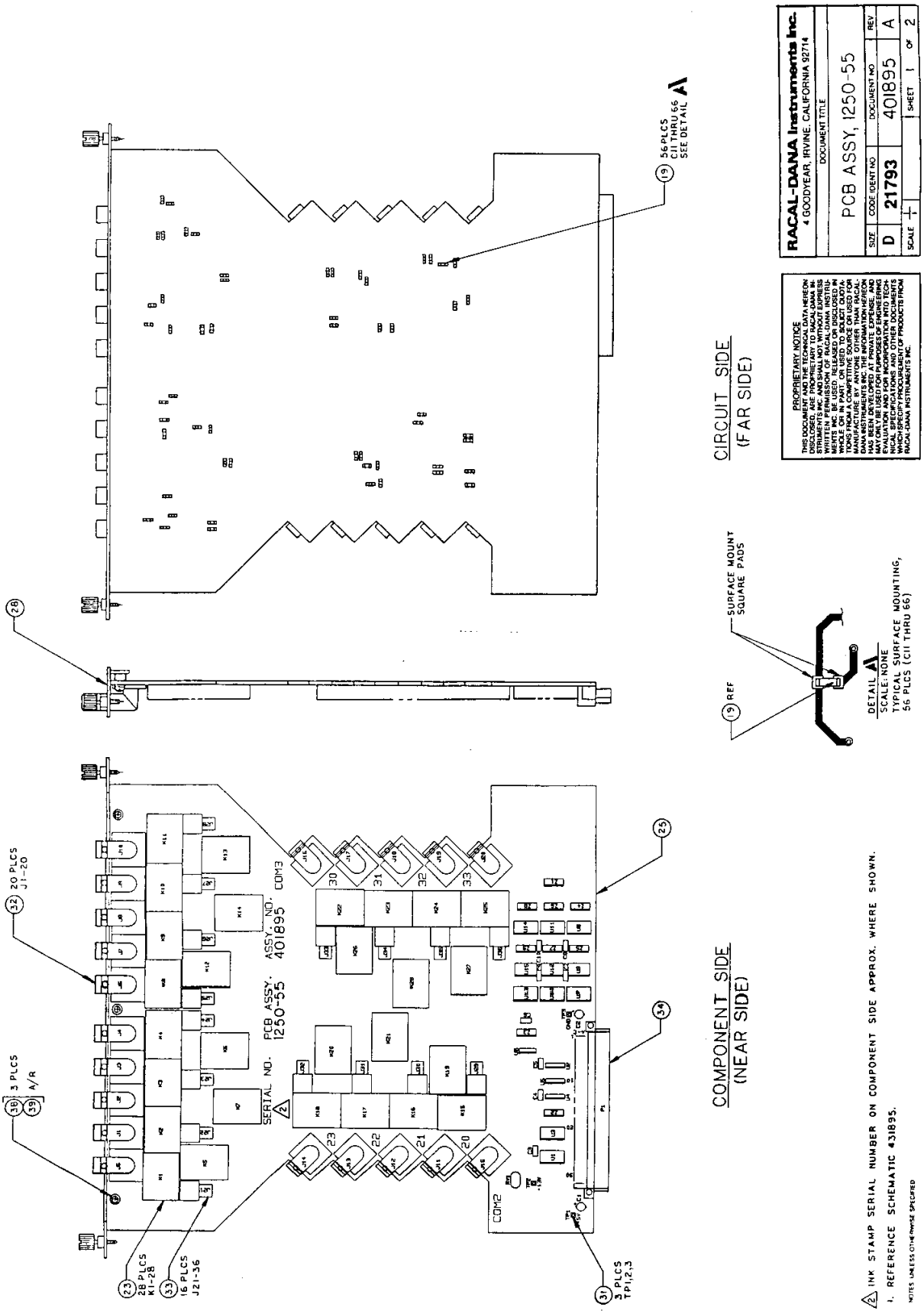
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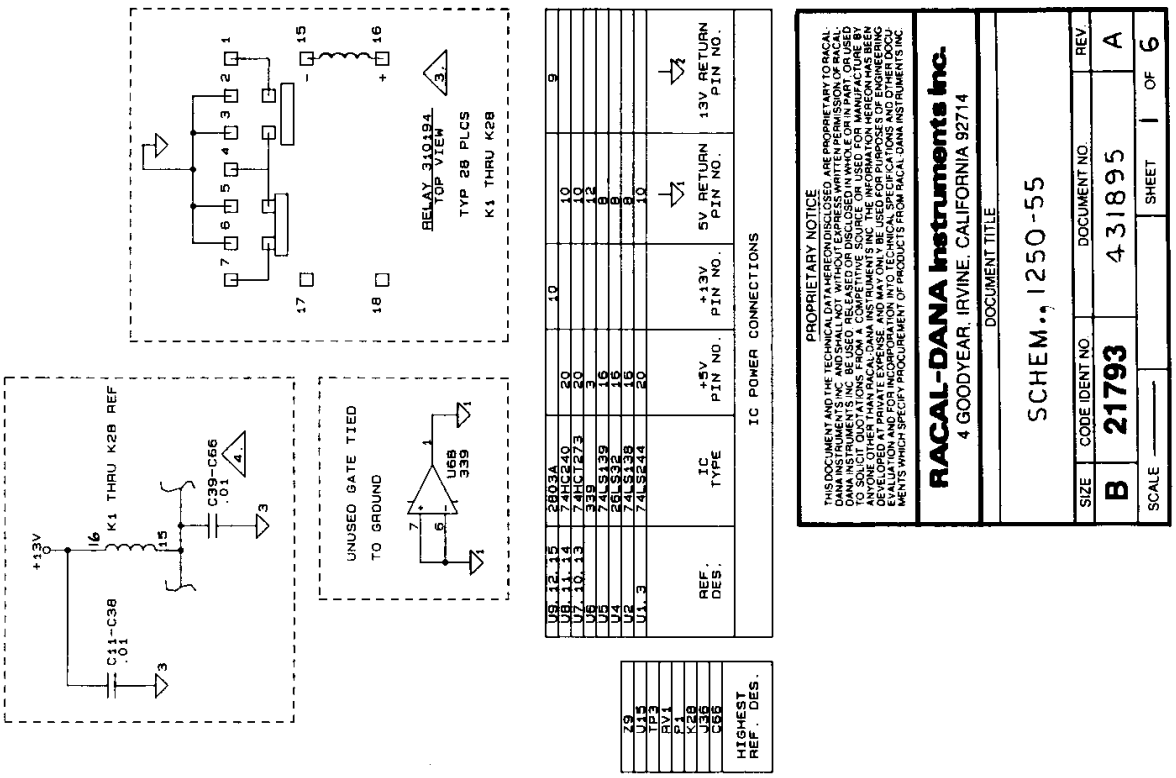
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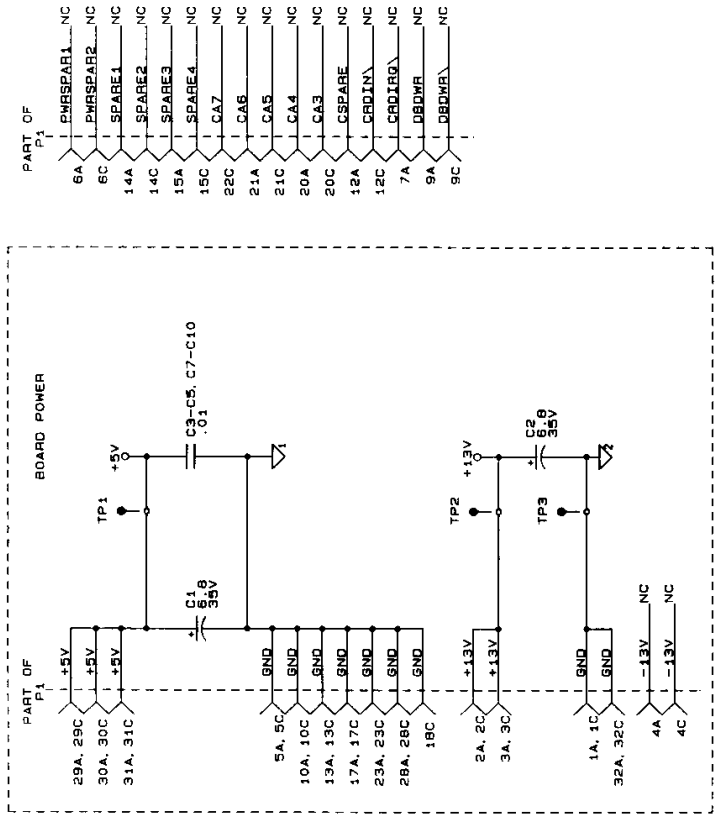


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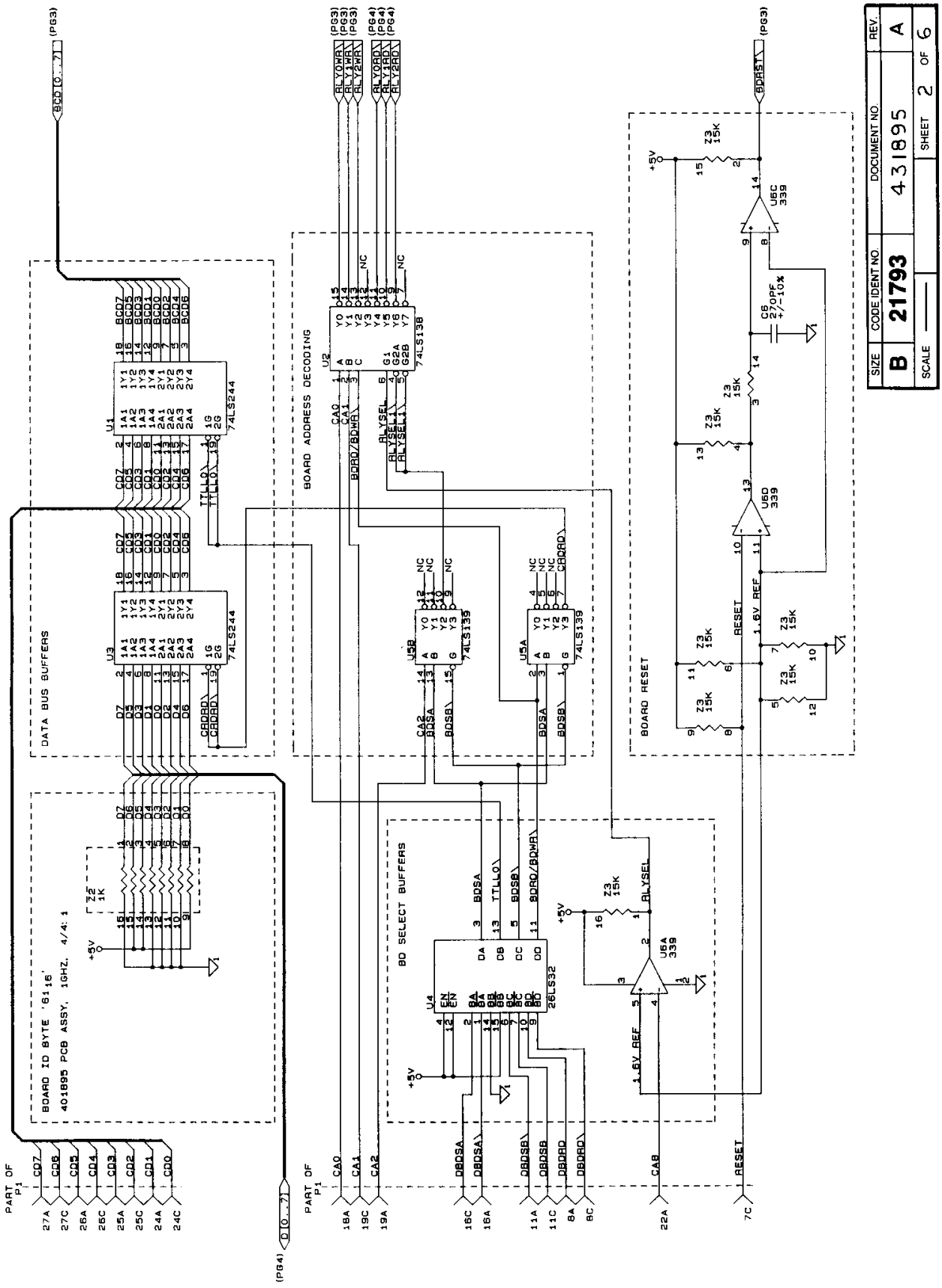




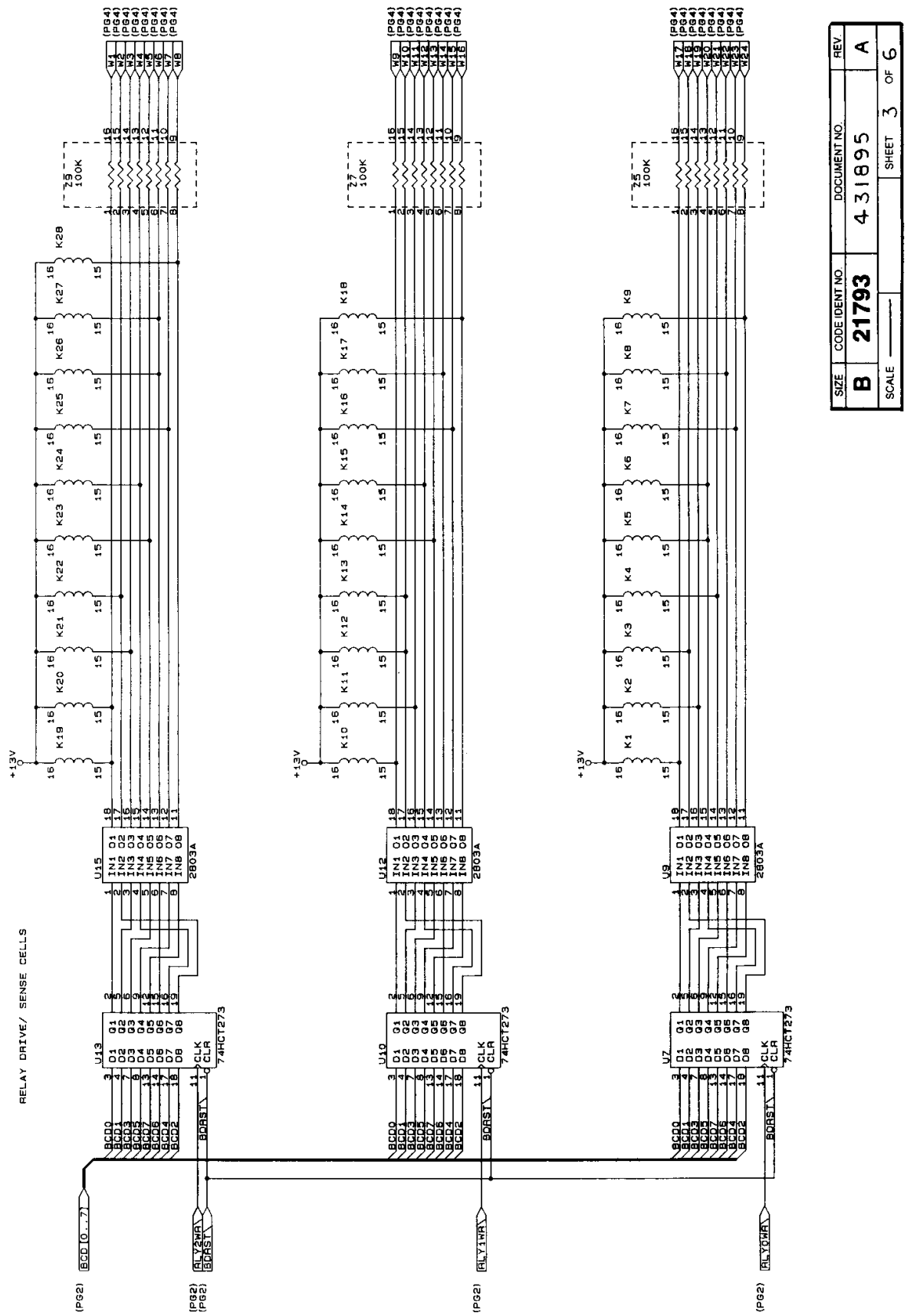
4. FOR LOCATION OF CAPACITORS C39-C66.
3. RELAYS K1 THRU K28 ARE RACAL DANA P/N 310194. ALL RELAYS SHOWN IN DE-ENERGIZED POSITION.
2. RESISTOR NETWORKS ARE IN OHMS.
1. CAPACITOR VALUES ARE IN MICROFARADS, +/-20%. 50V UNLESS OTHERWISE SPECIFIED.

NOTES: UNLESS OTHERWISE SPECIFIED

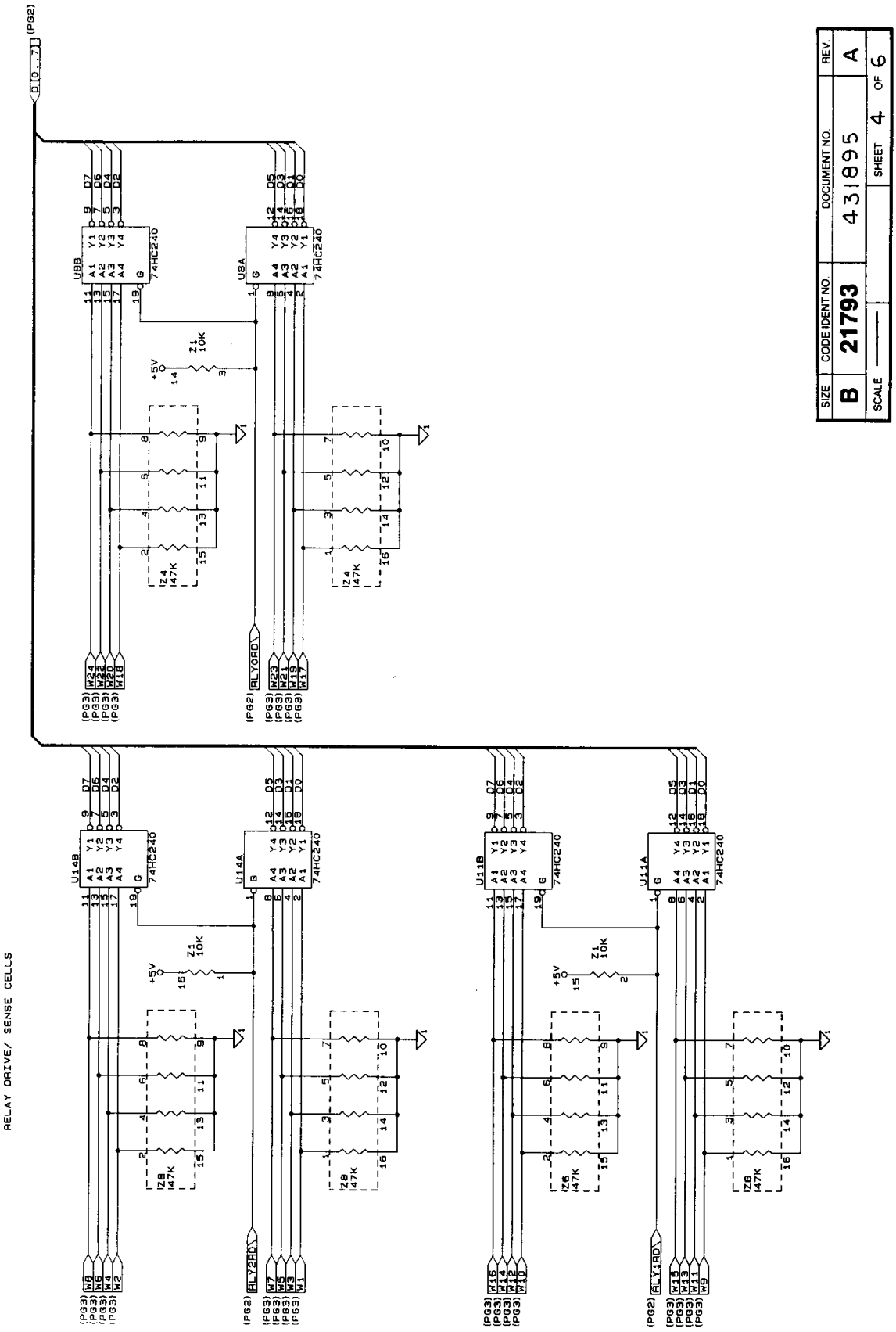
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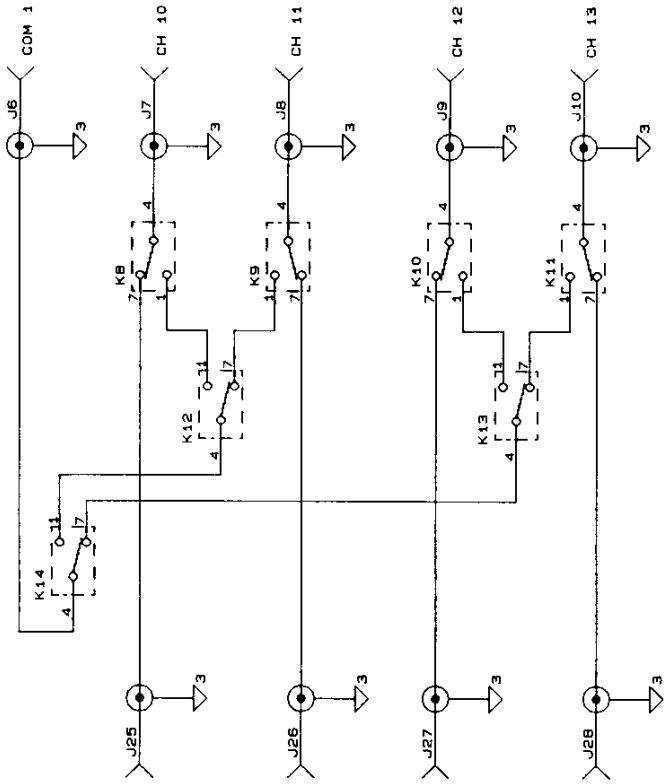
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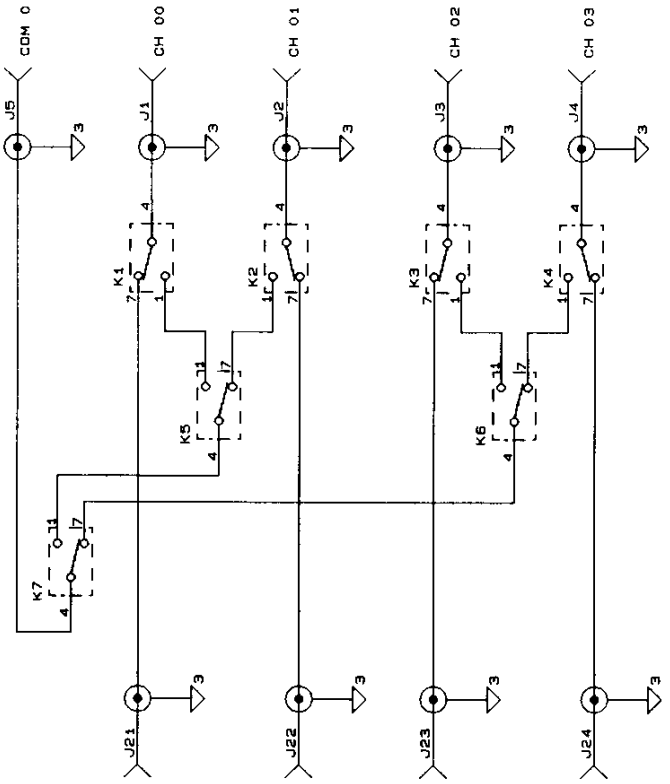


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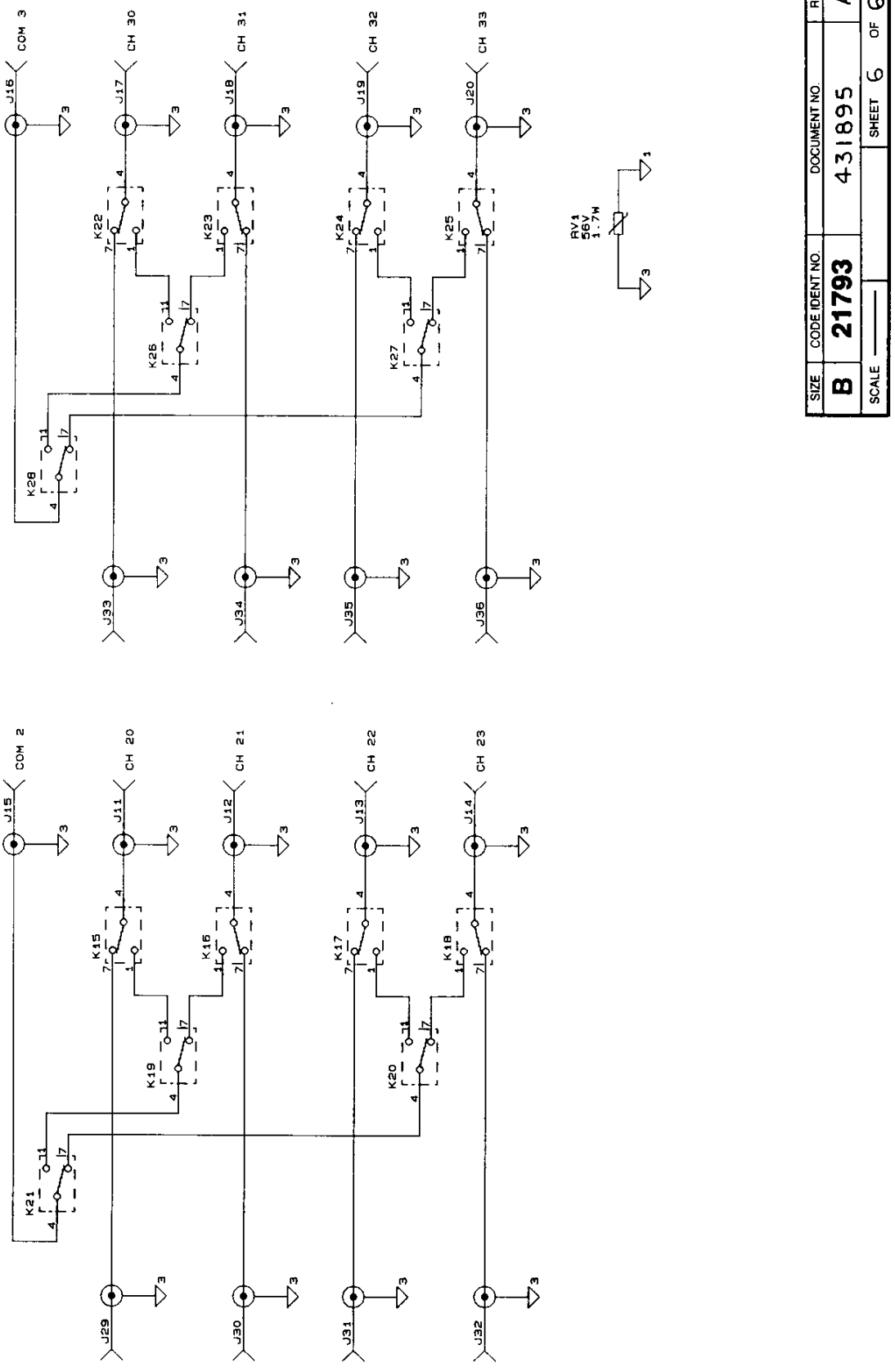
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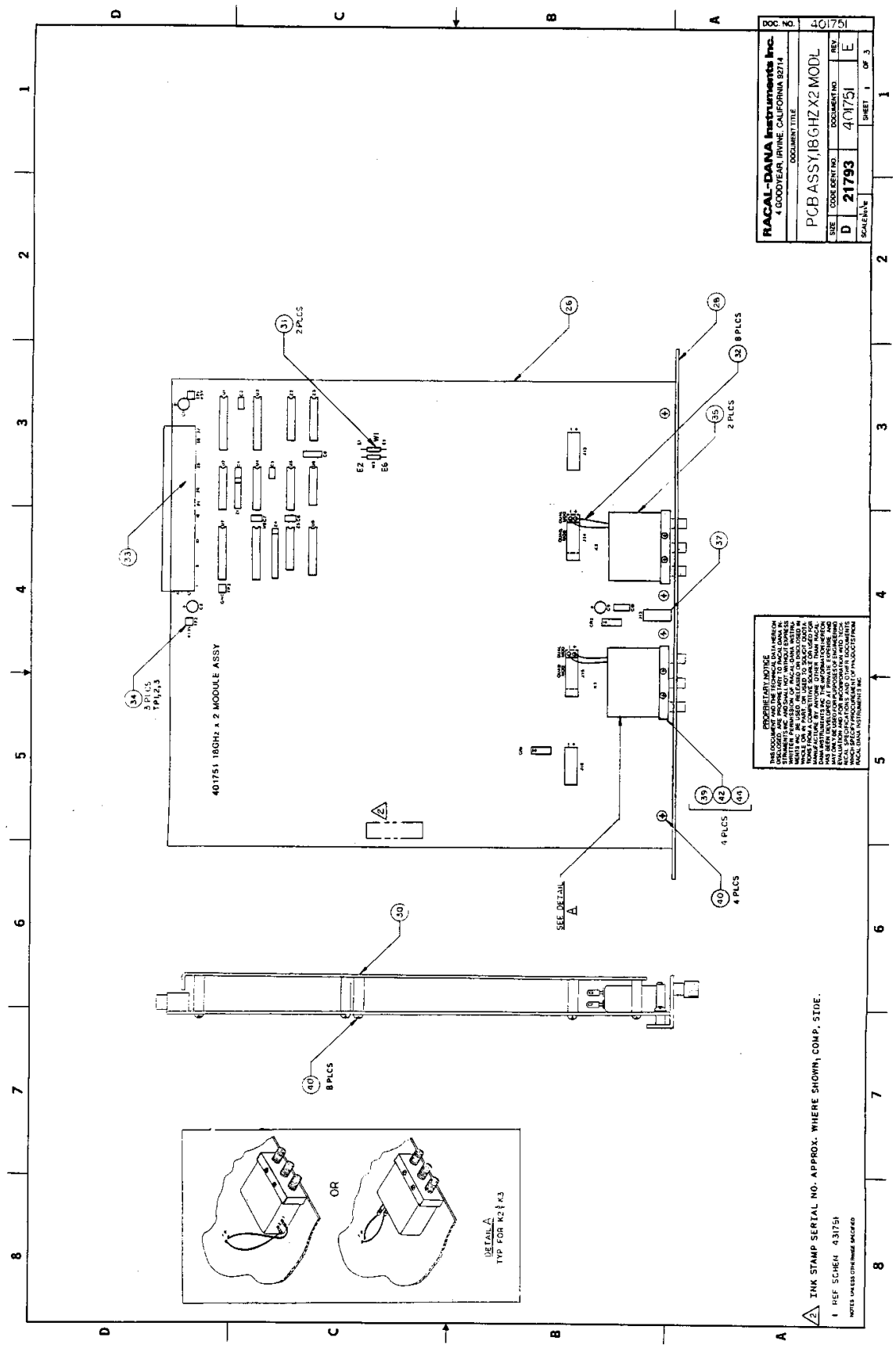


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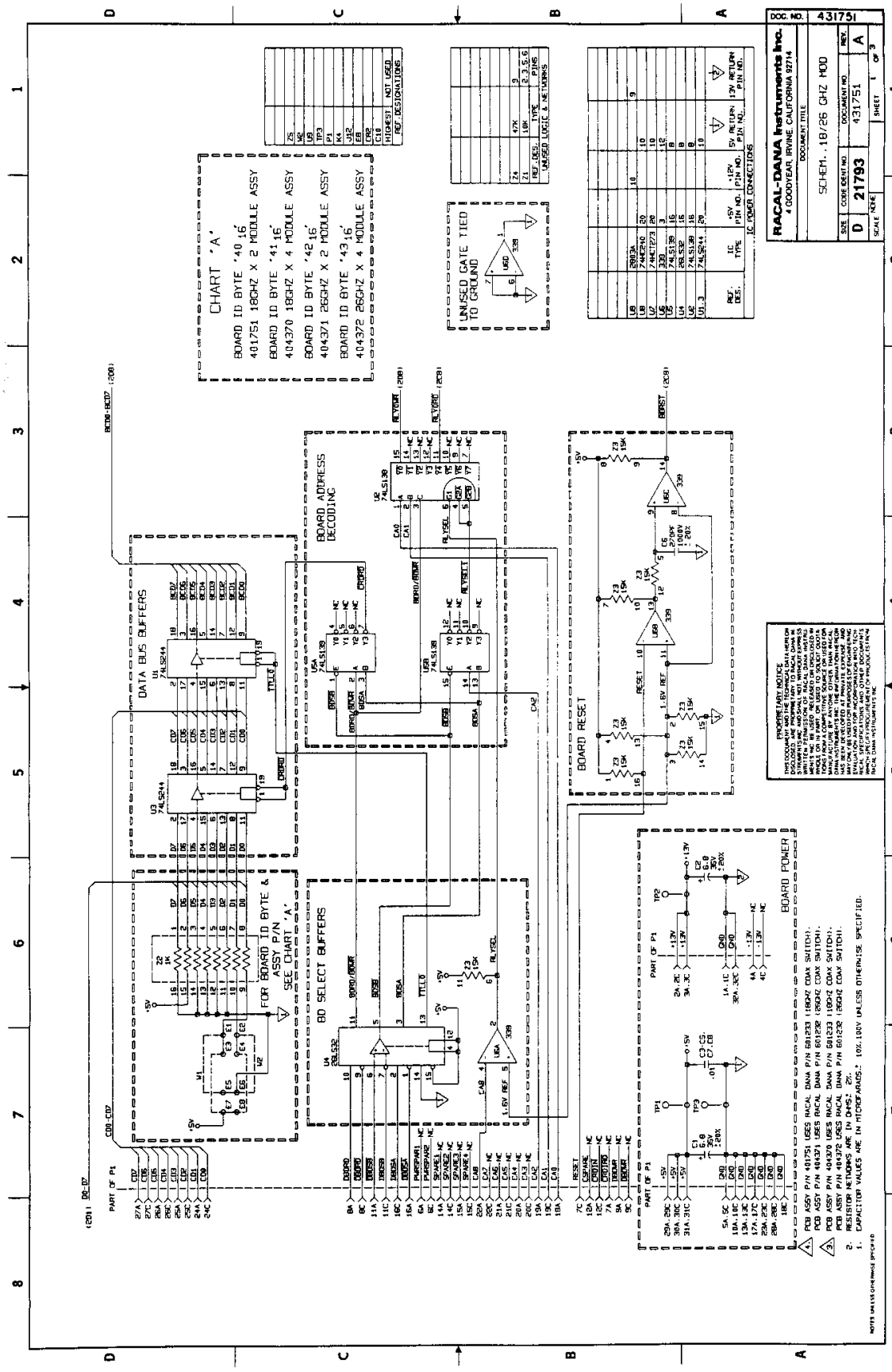
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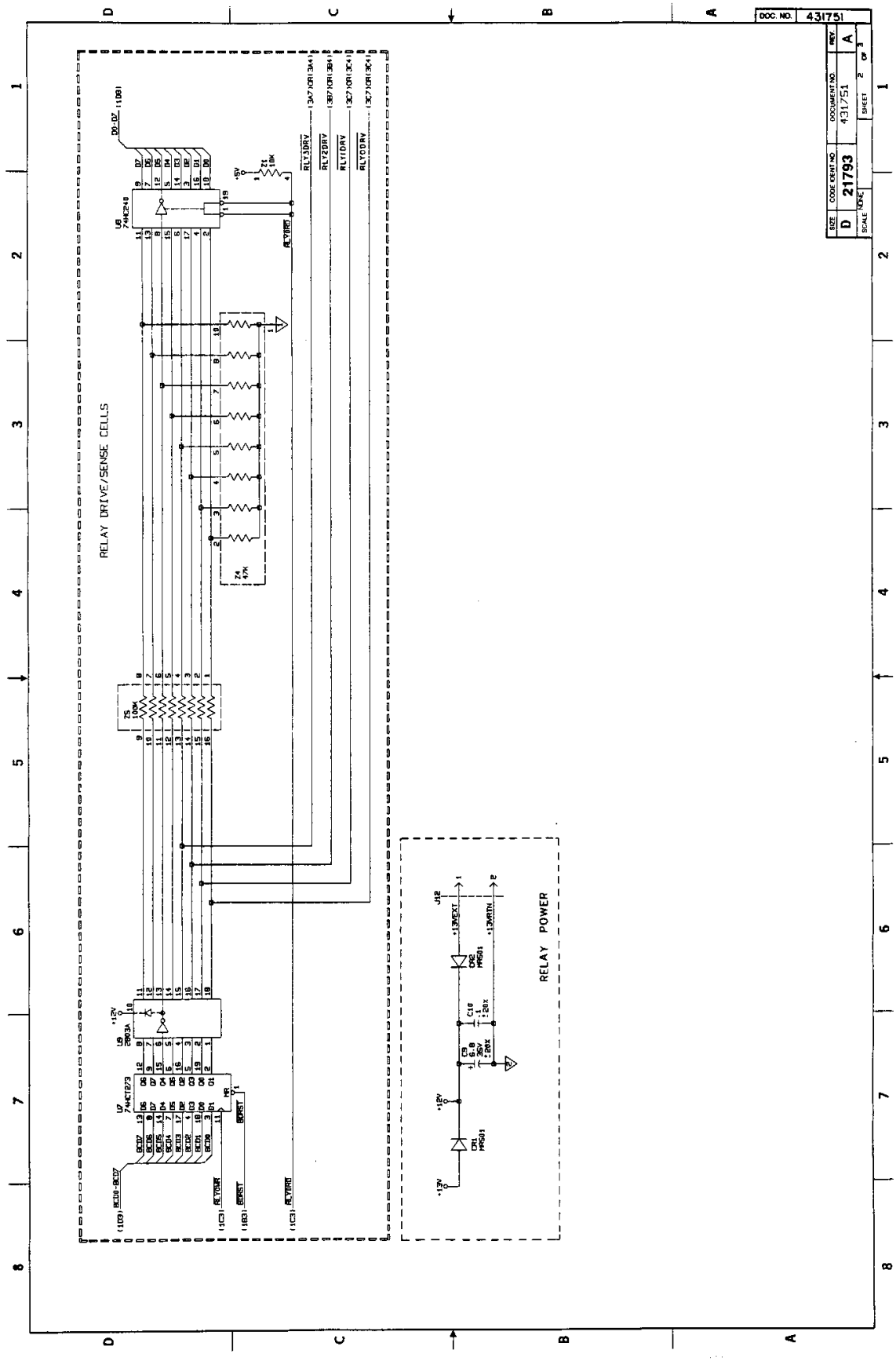
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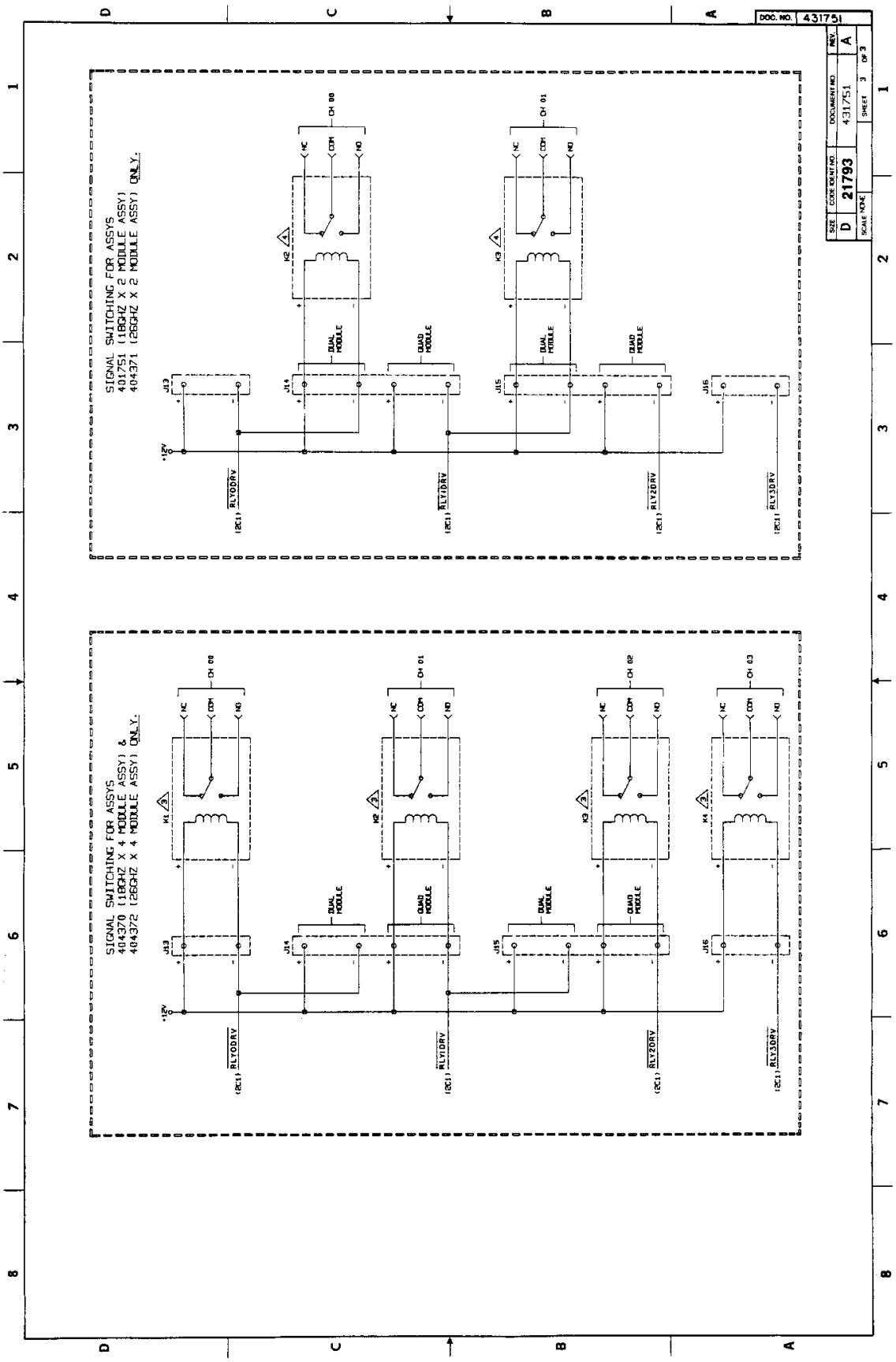
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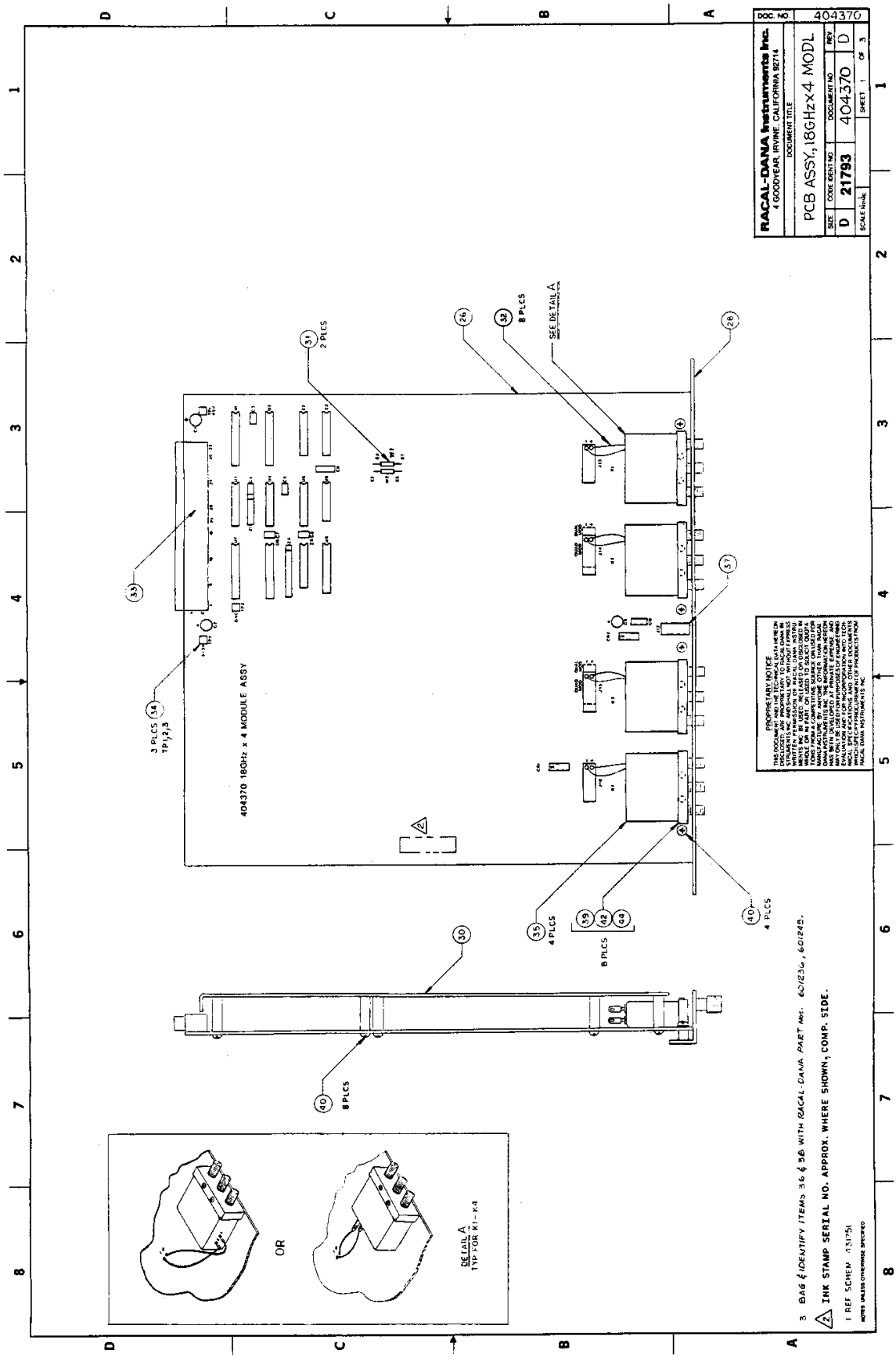
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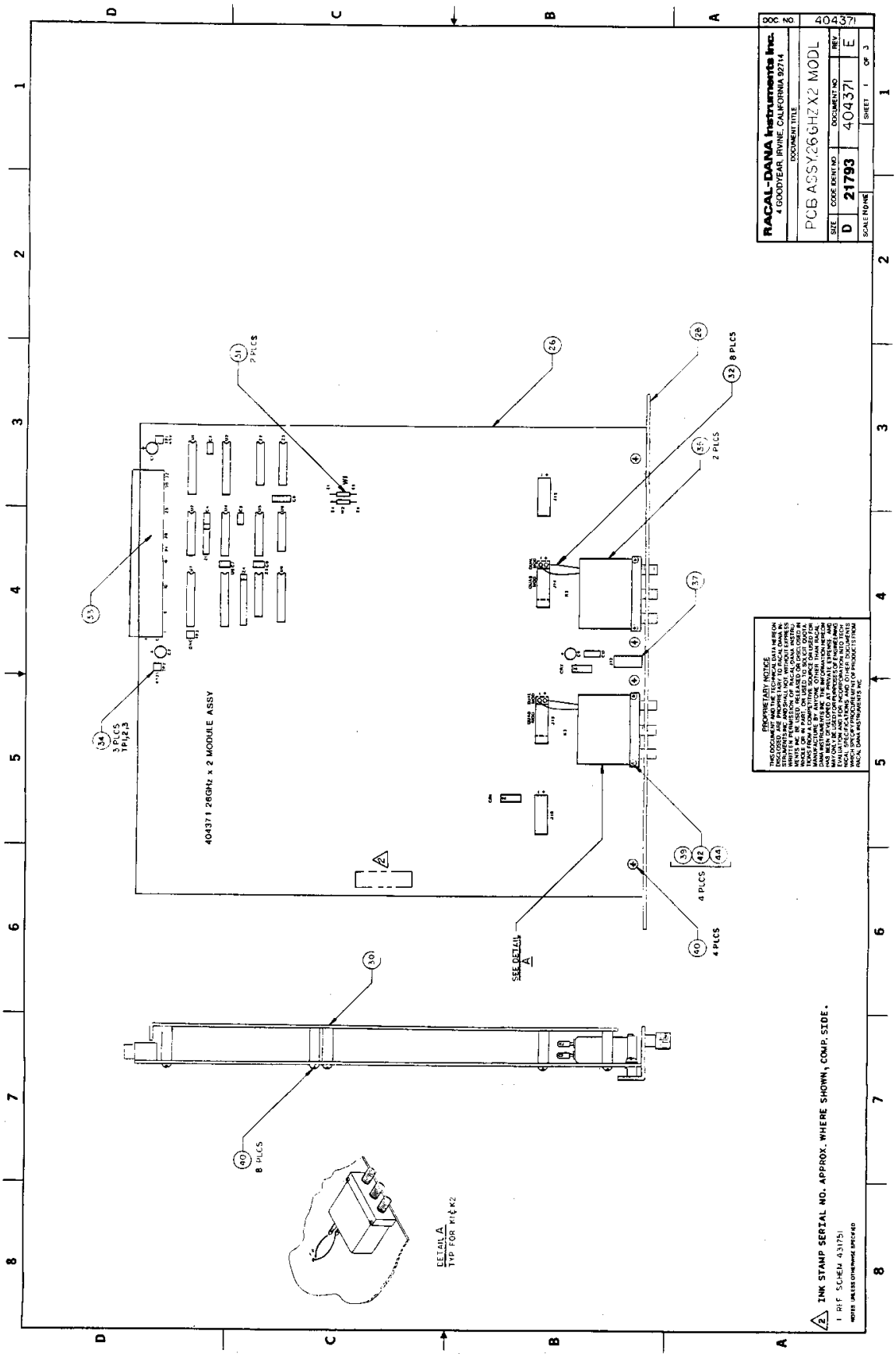
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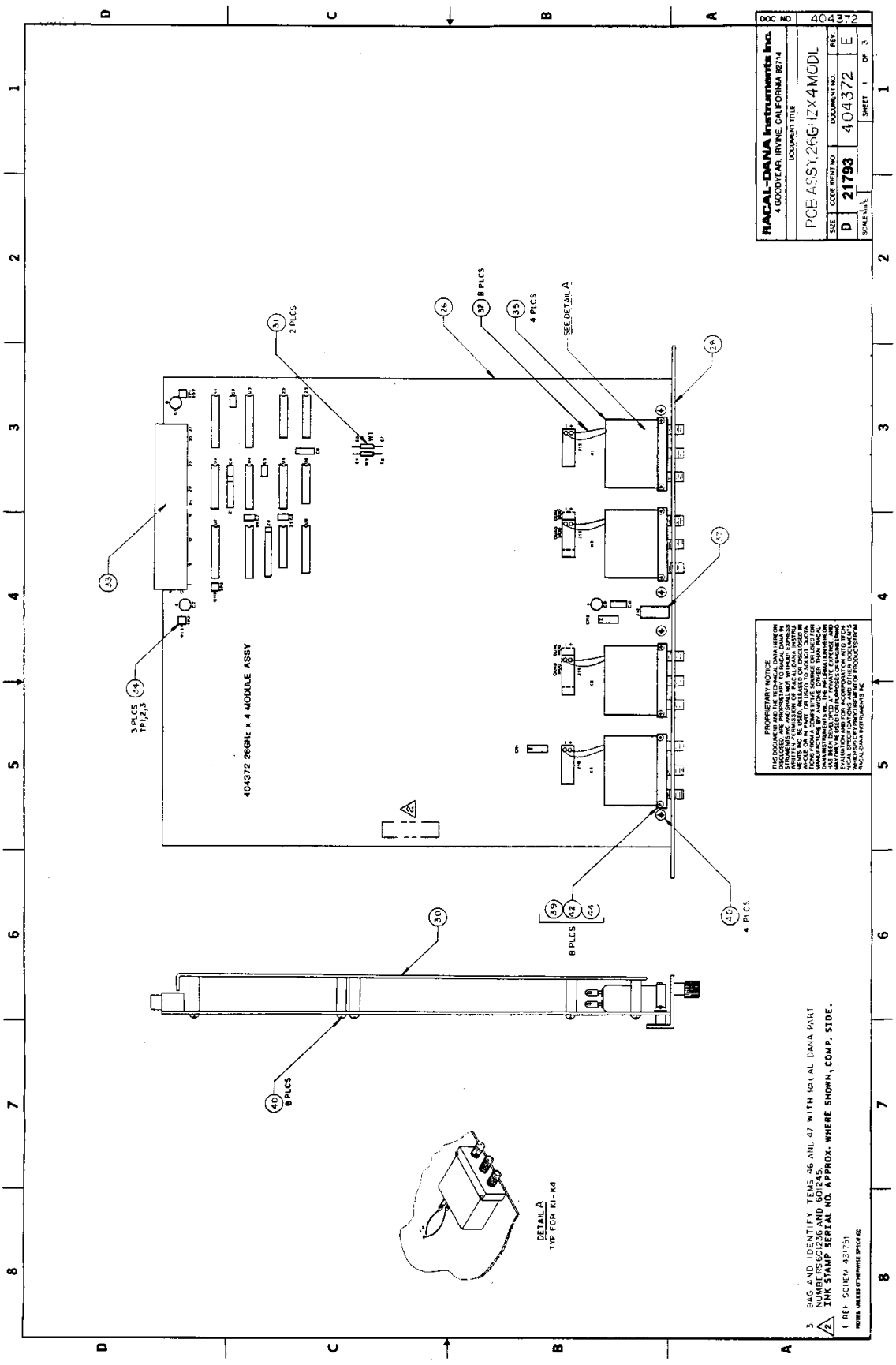
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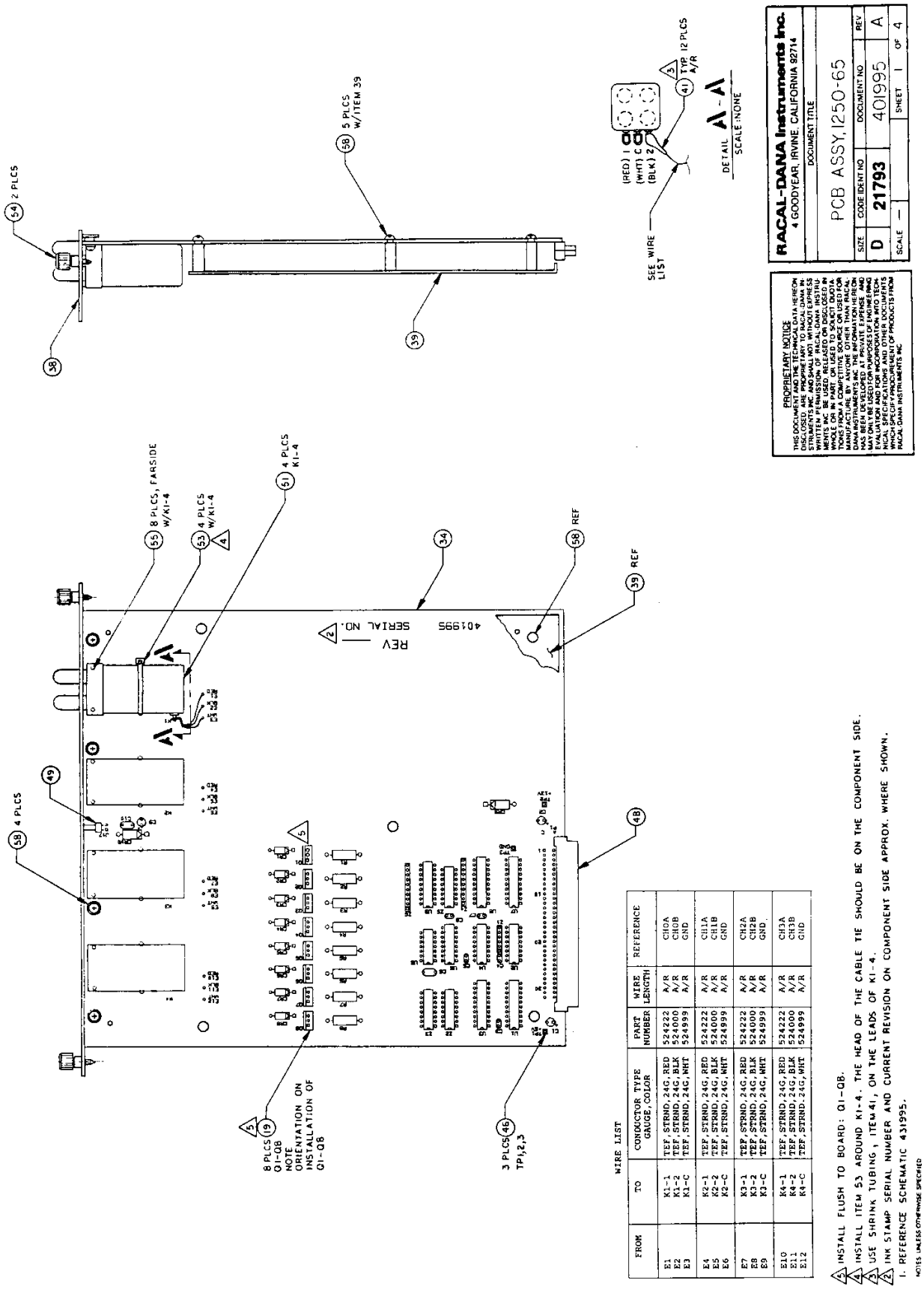
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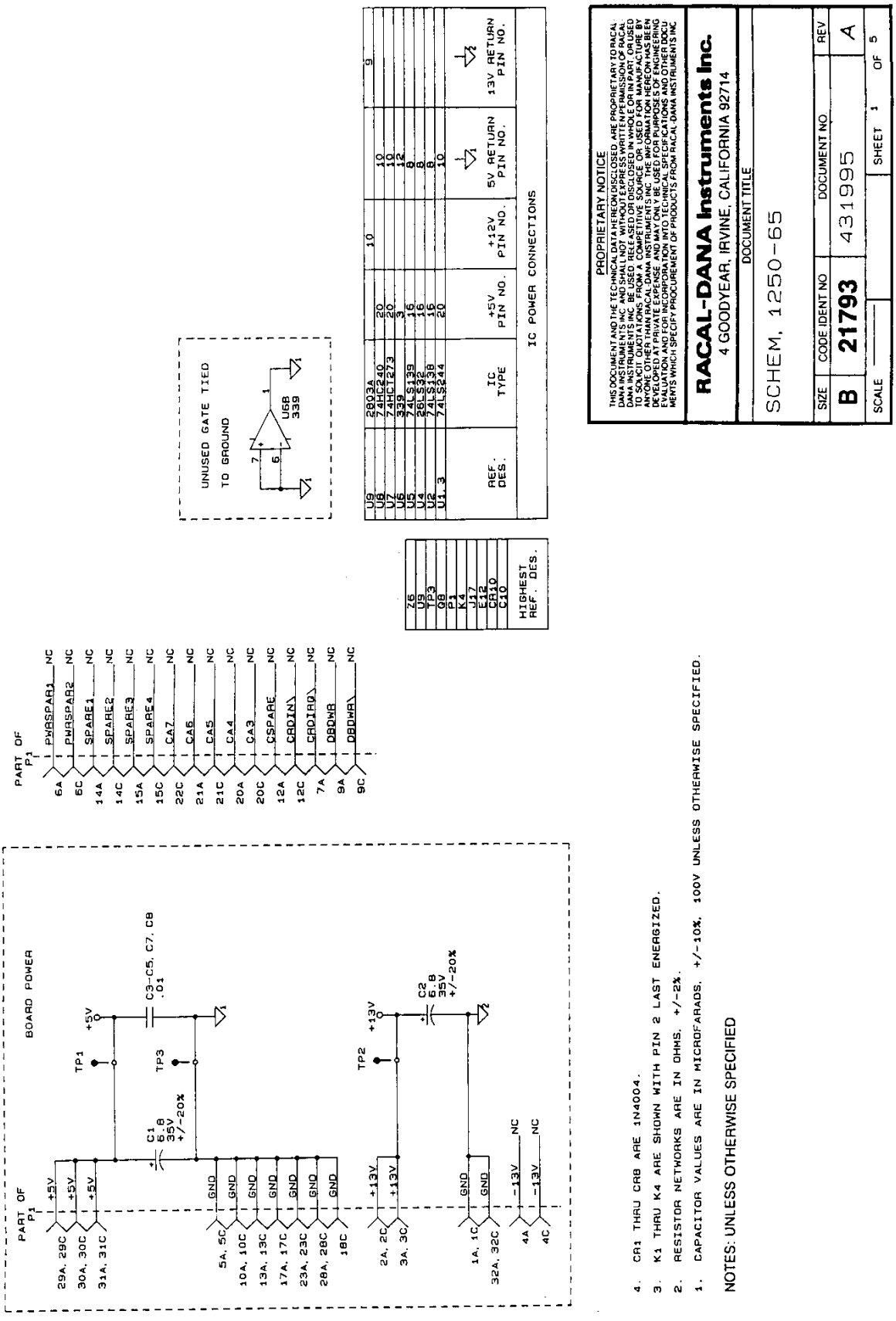
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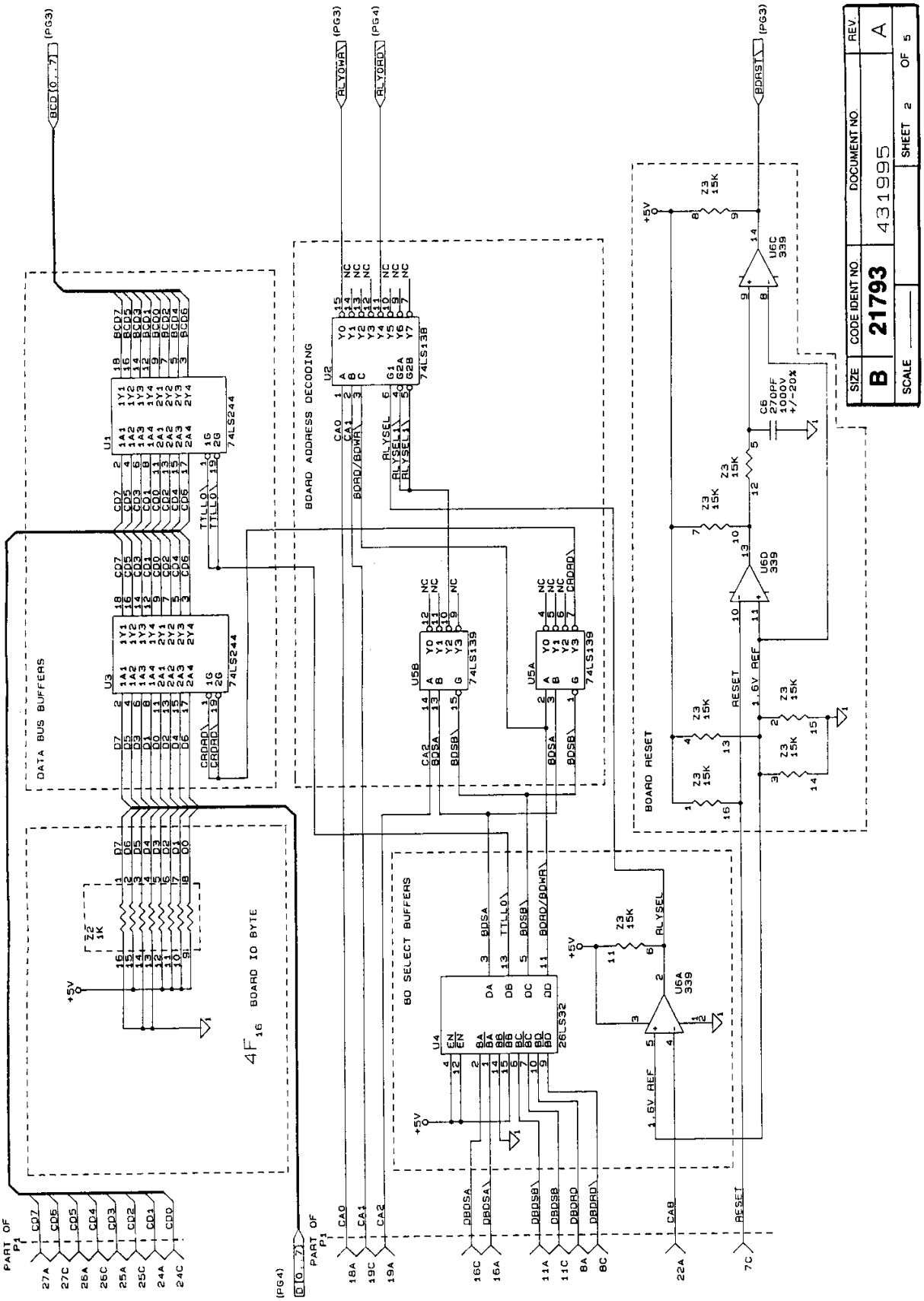
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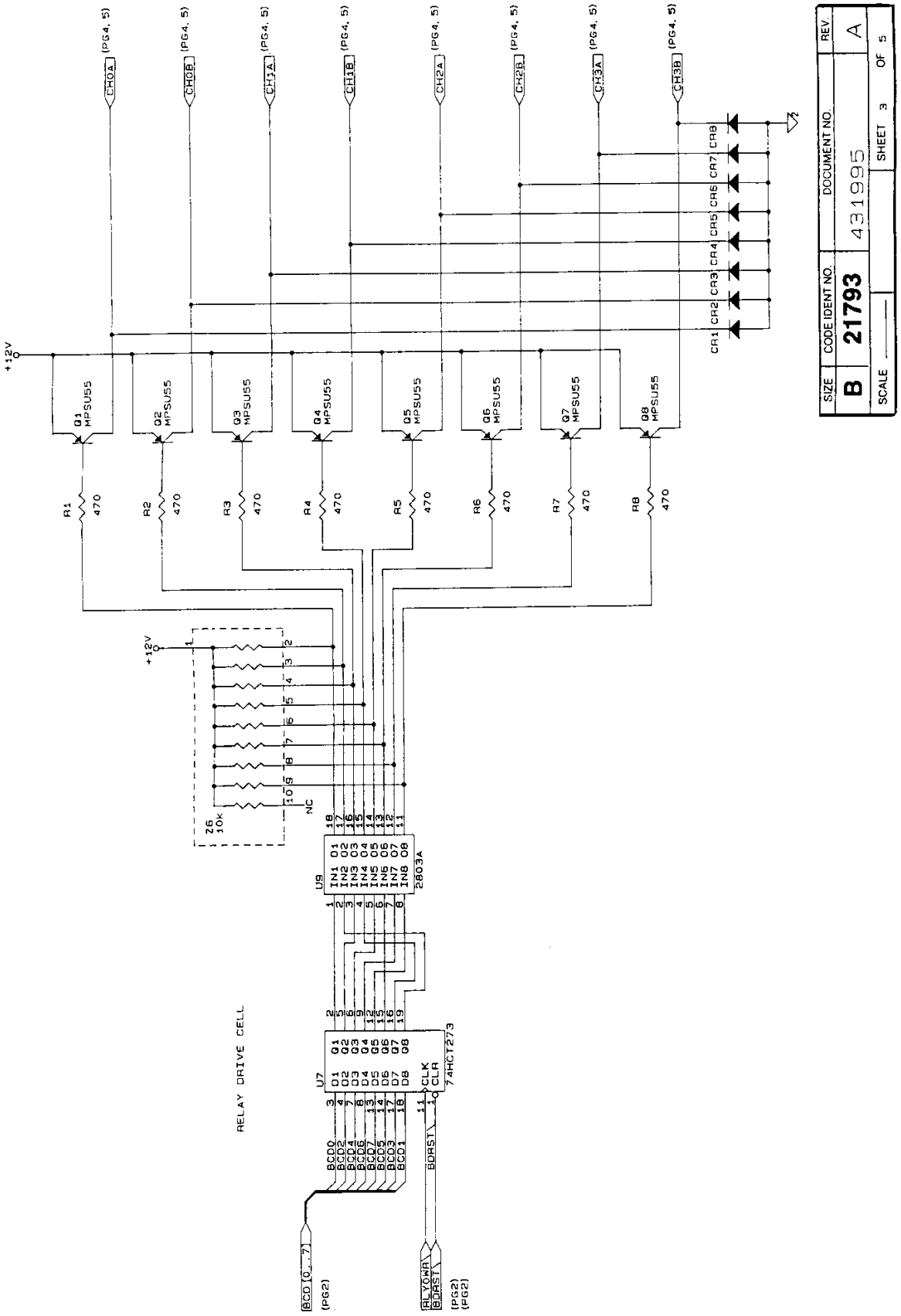
NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITOR VALUES ARE IN MICROFARADS, +/-10%, 100V UNLESS OTHERWISE SPECIFIED.
2. RESISTOR NETWORKS ARE IN OHMS, +/-2%.
3. K1 THRU K4 ARE SHOWN WITH PIN 2 LAST ENERGIZED.
4. CR1 THRU CR8 ARE 1N4004.

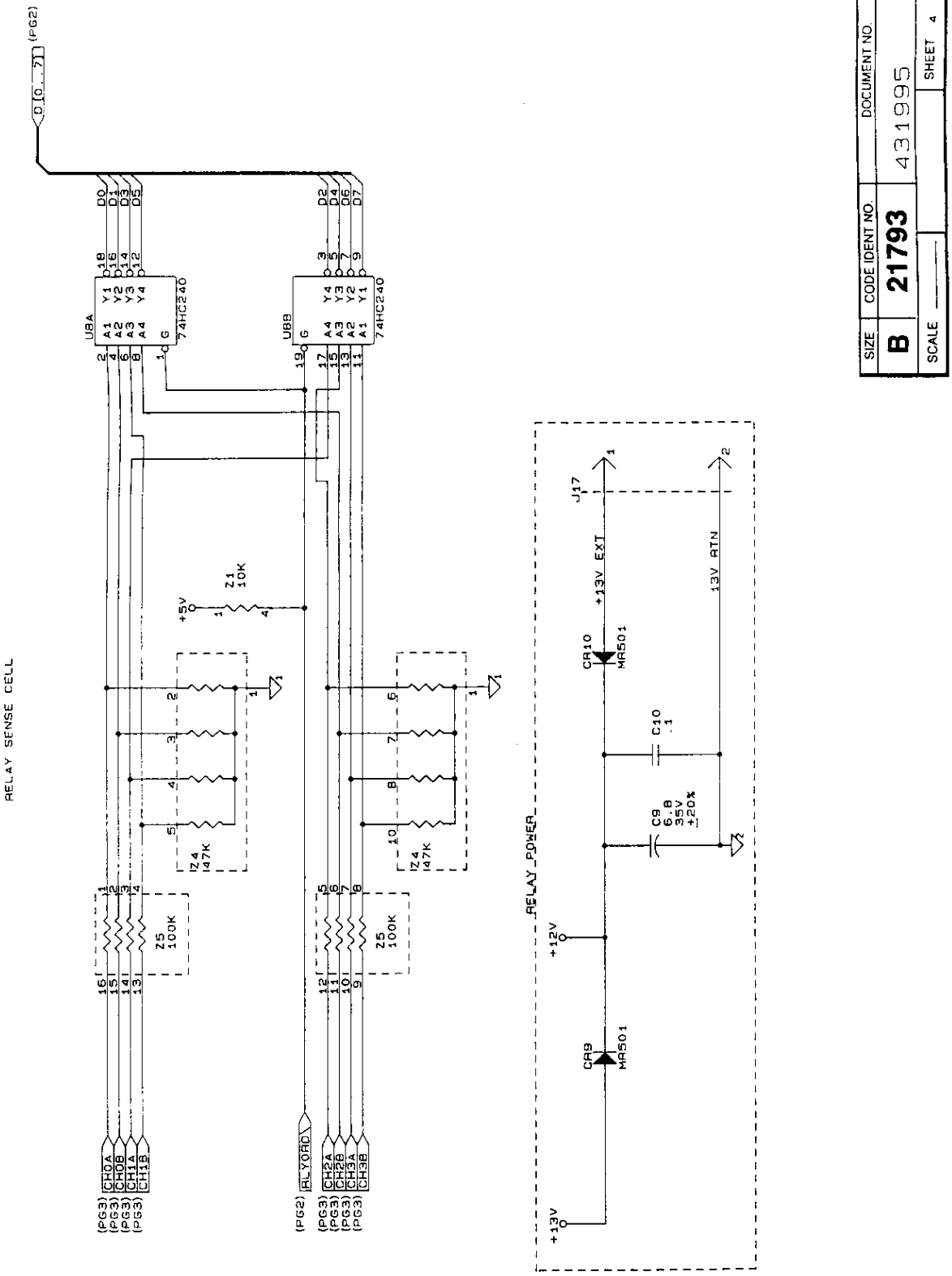
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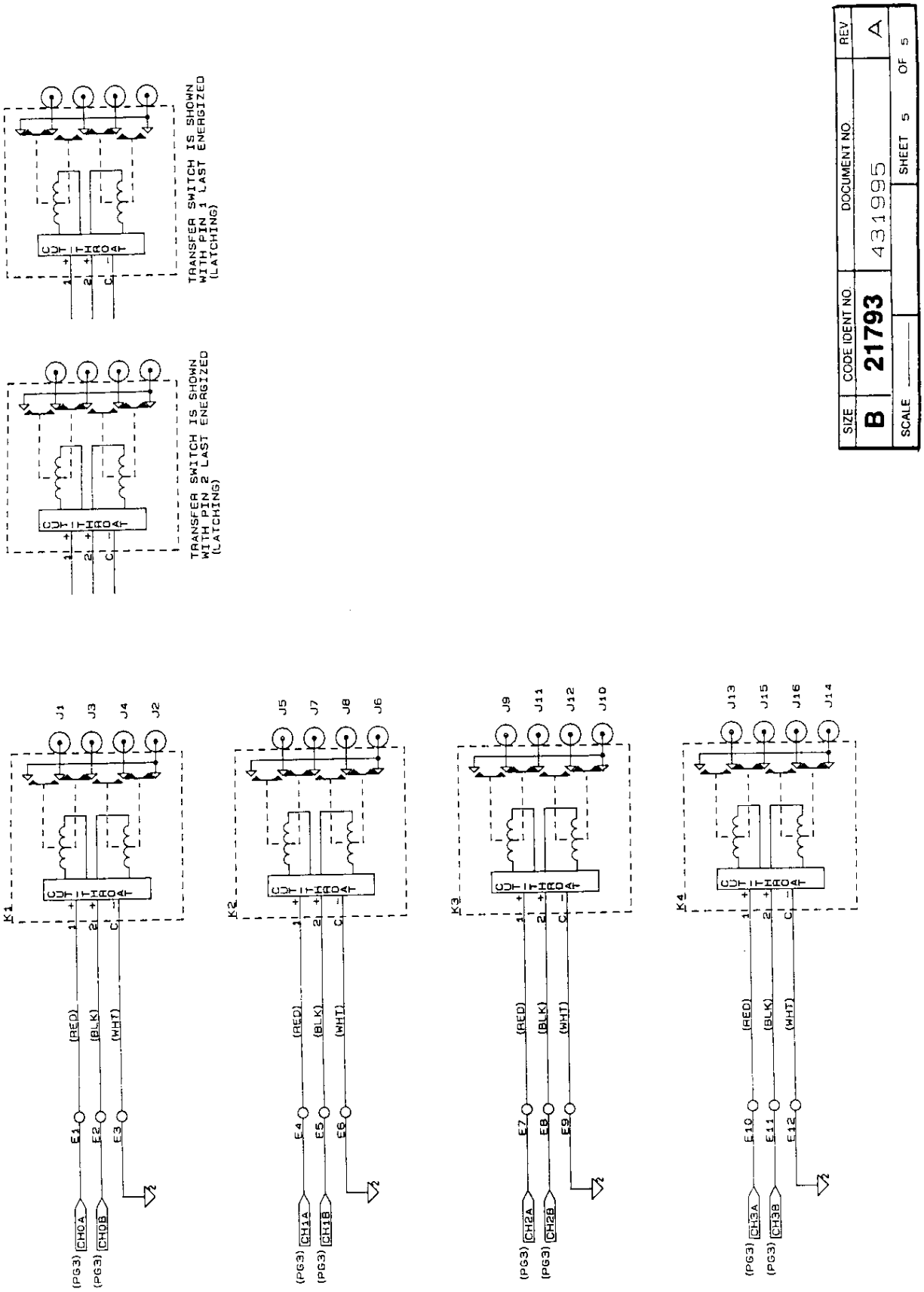


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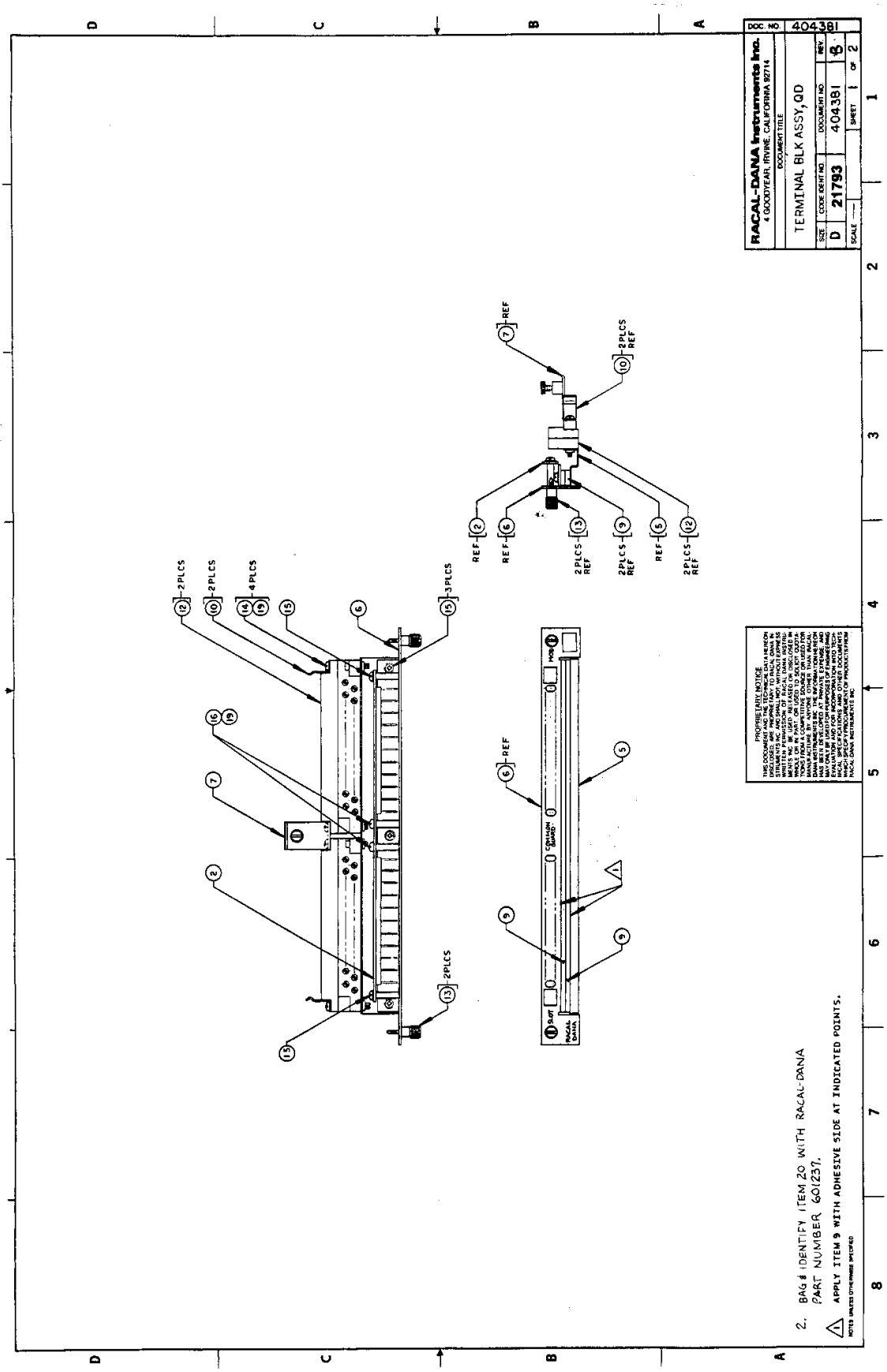


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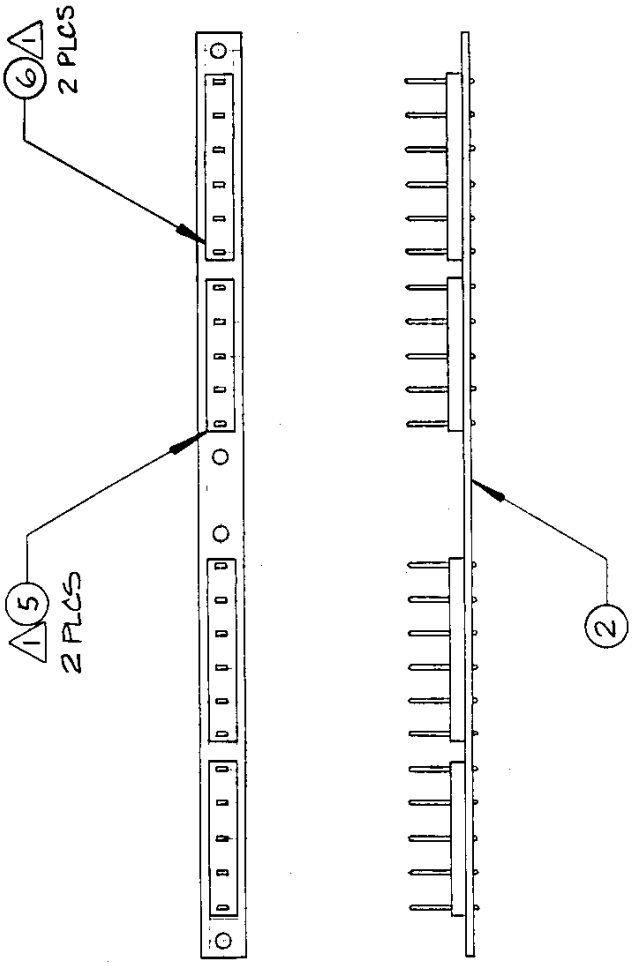
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2. PCB HANDLING TO CONFORM TO CLEANING CODE A OF RACAL-DANA DOCUMENT 900325.

1. ITEM # 5 & 6 SHOULD BE FLUSH TO PCBOARD.

NOTES: UNLESS OTHERWISE SPECIFIED

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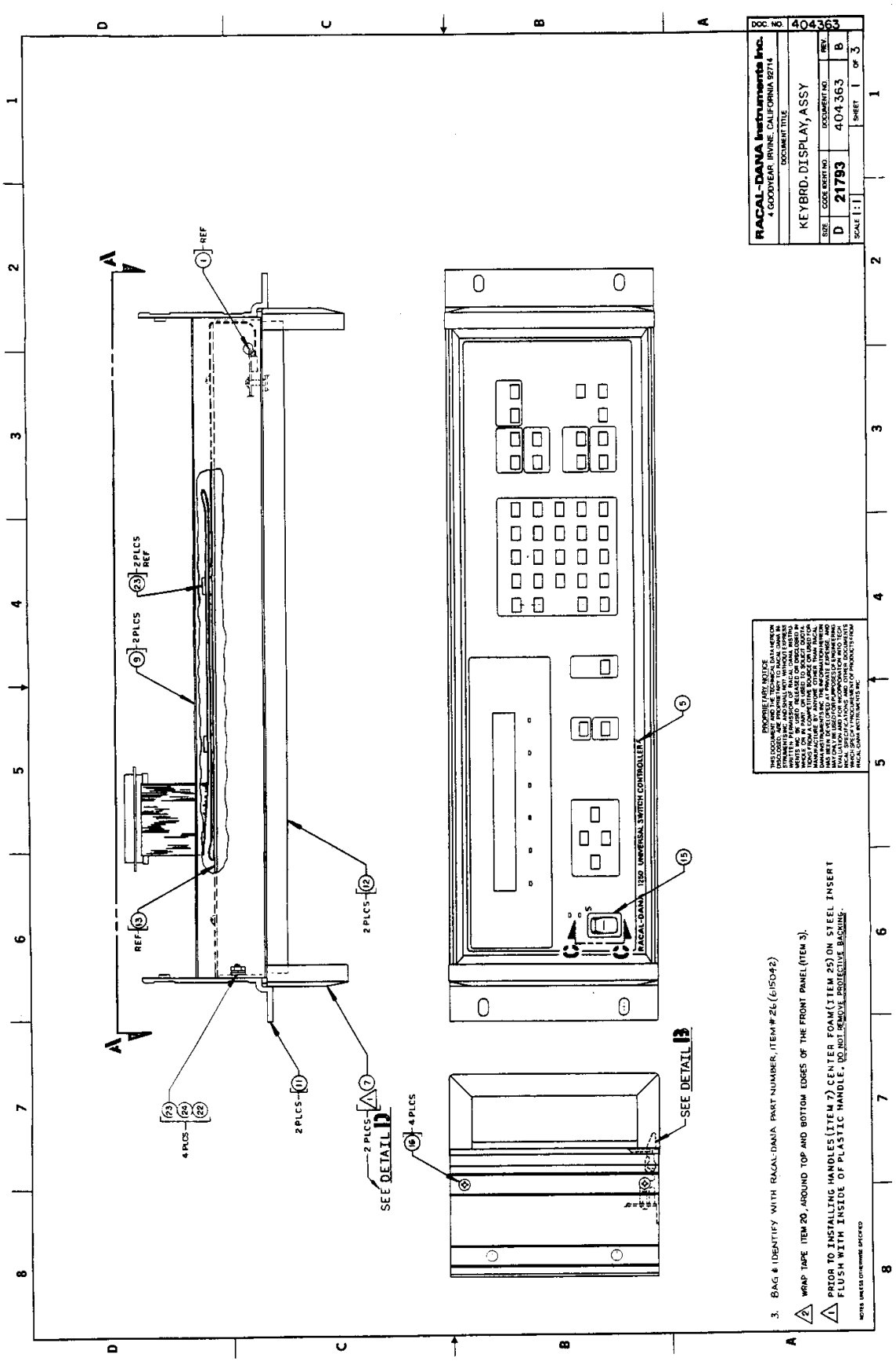
RACAL-DANA Instruments Inc.
4 GOODYEAR, IRVINE, CALIFORNIA 92714

DOCUMENT TITLE: PCB ASSY, SHIELD COM.

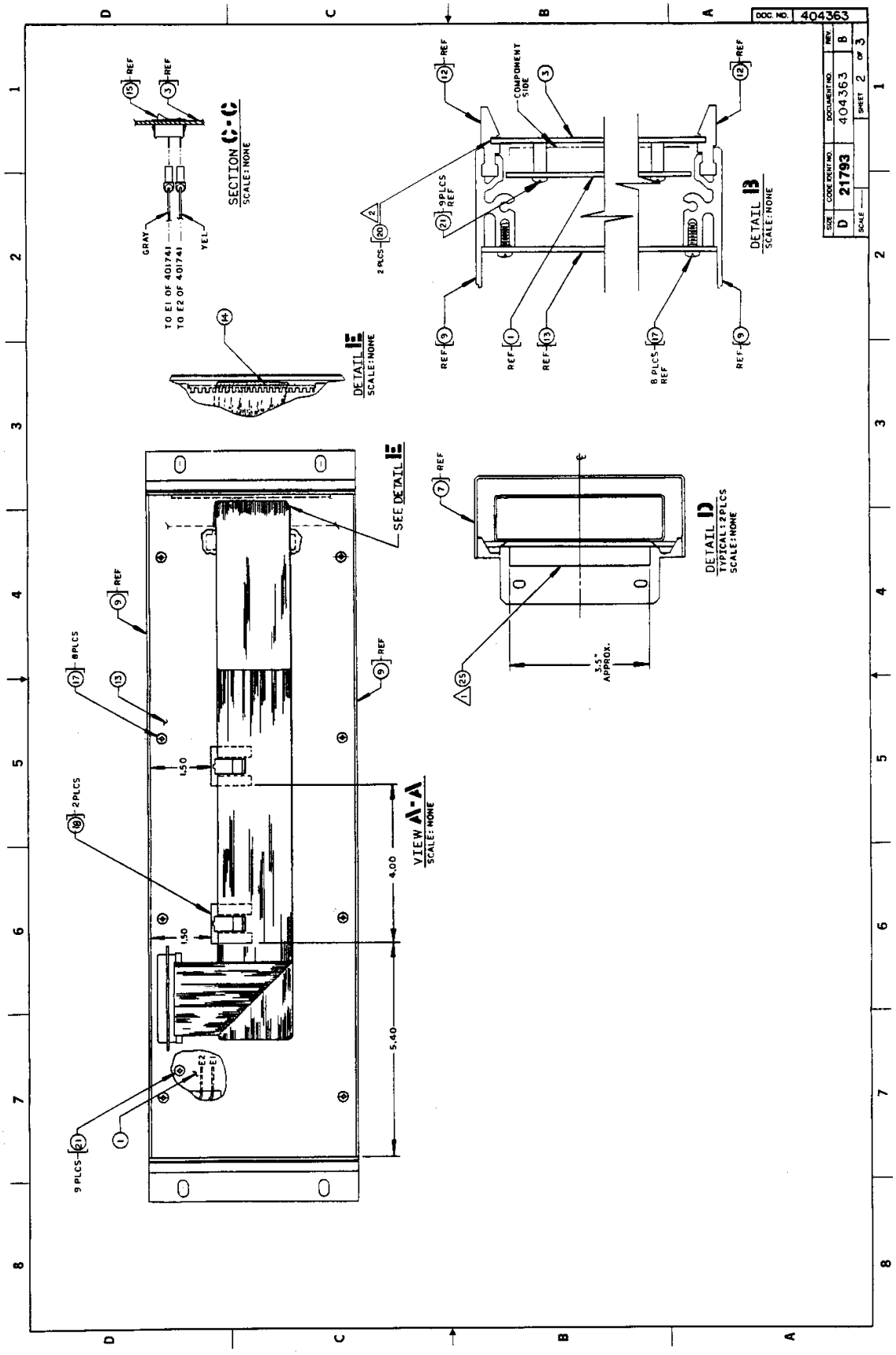
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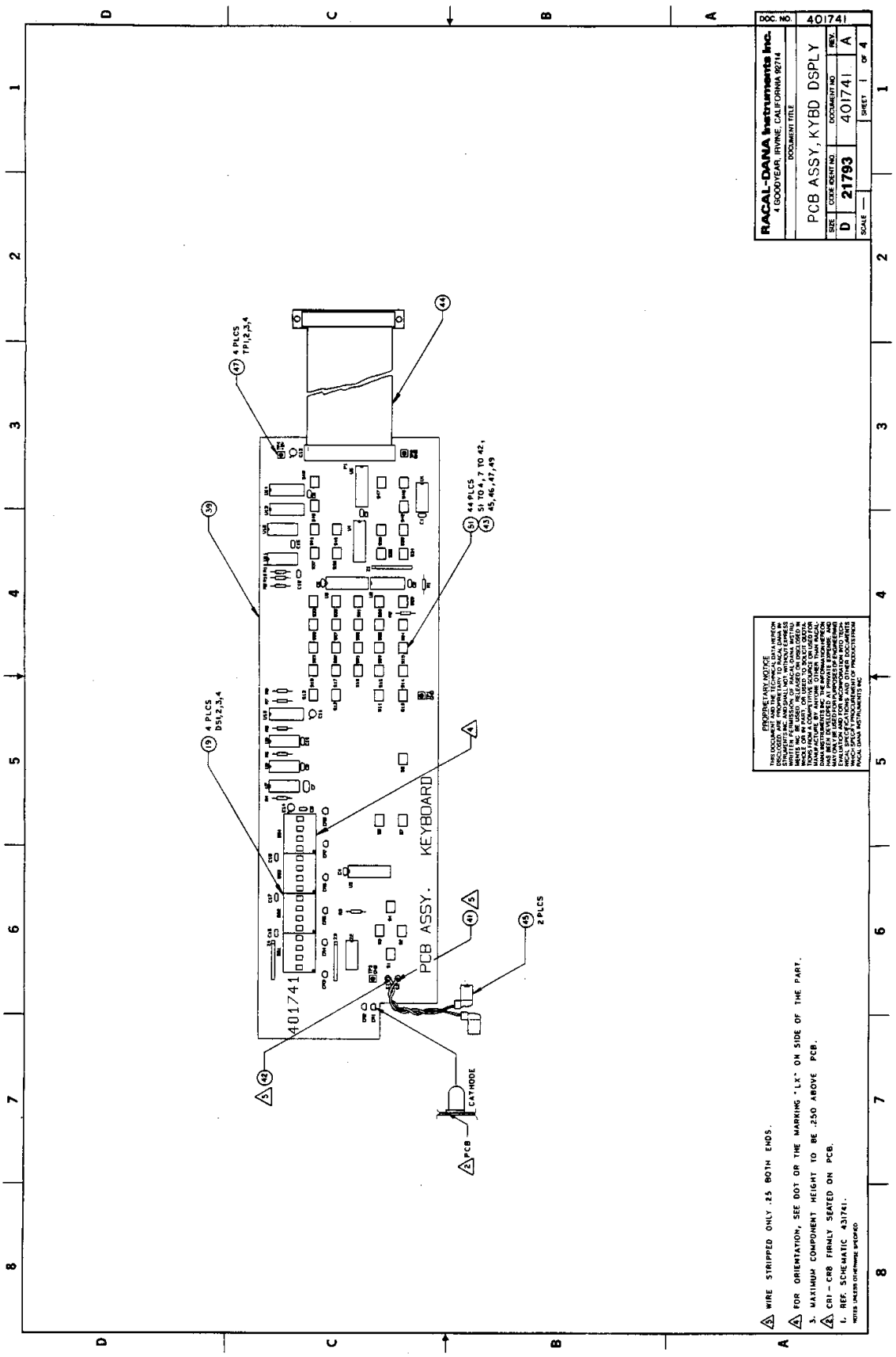
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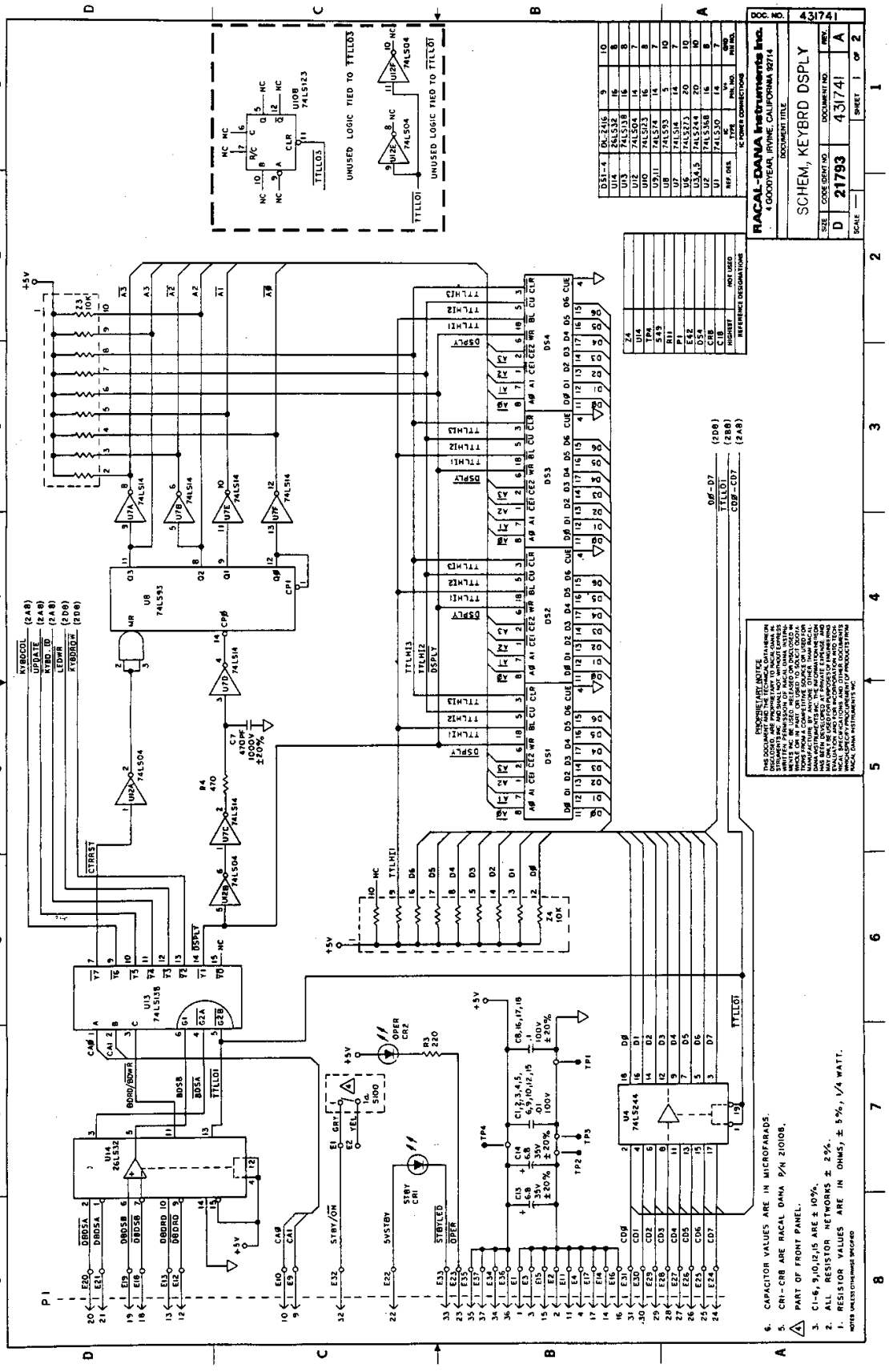
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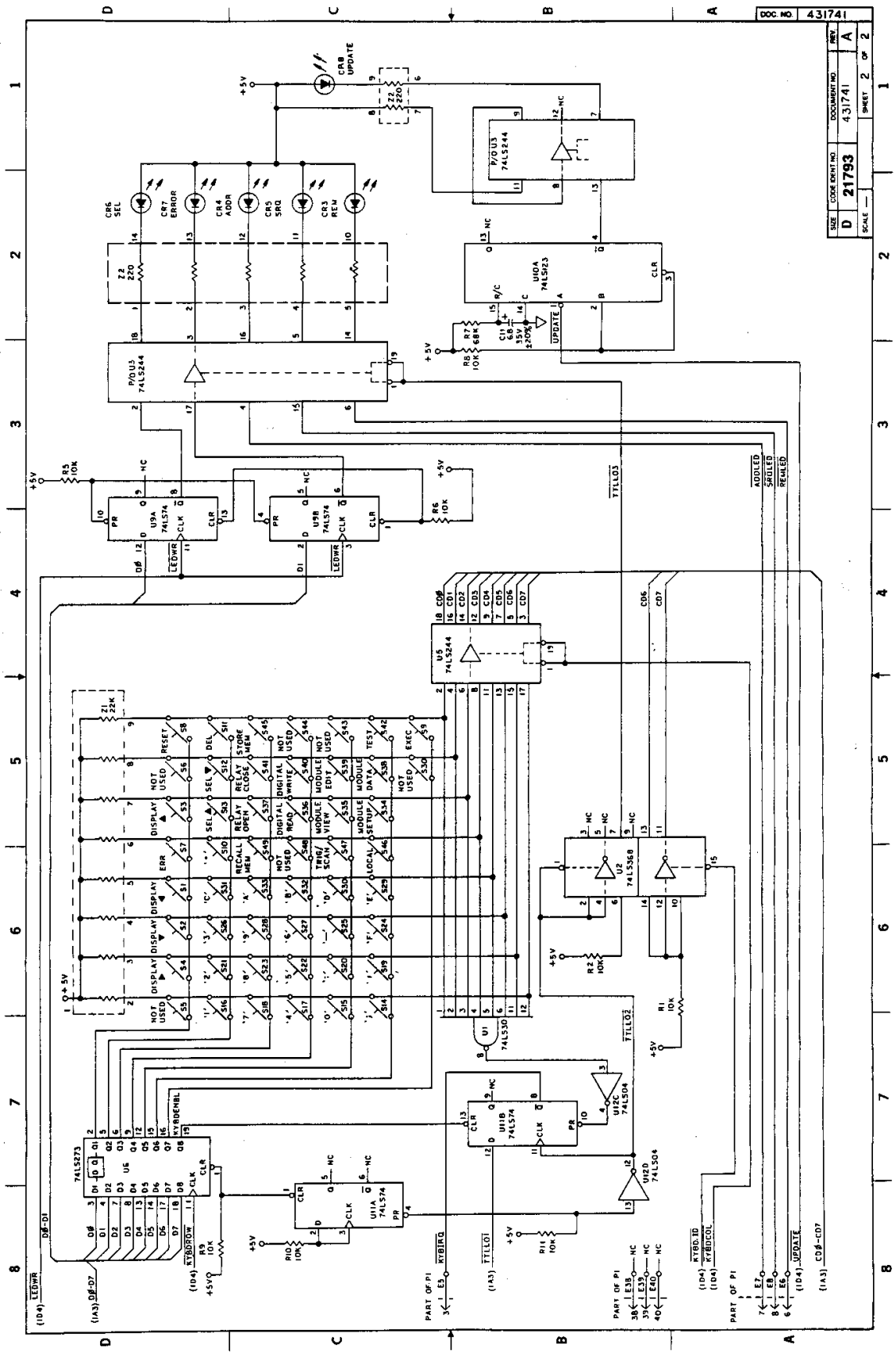
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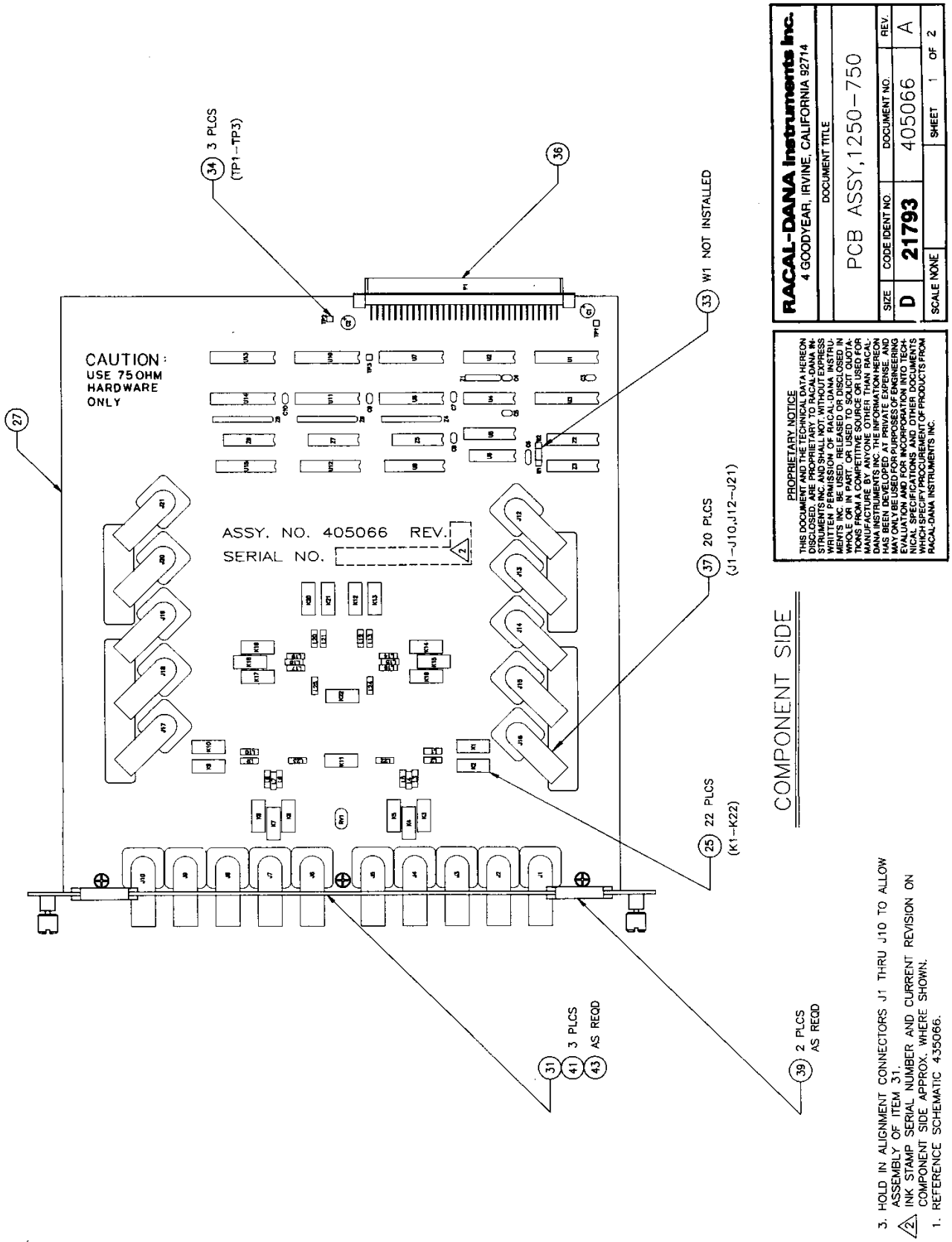
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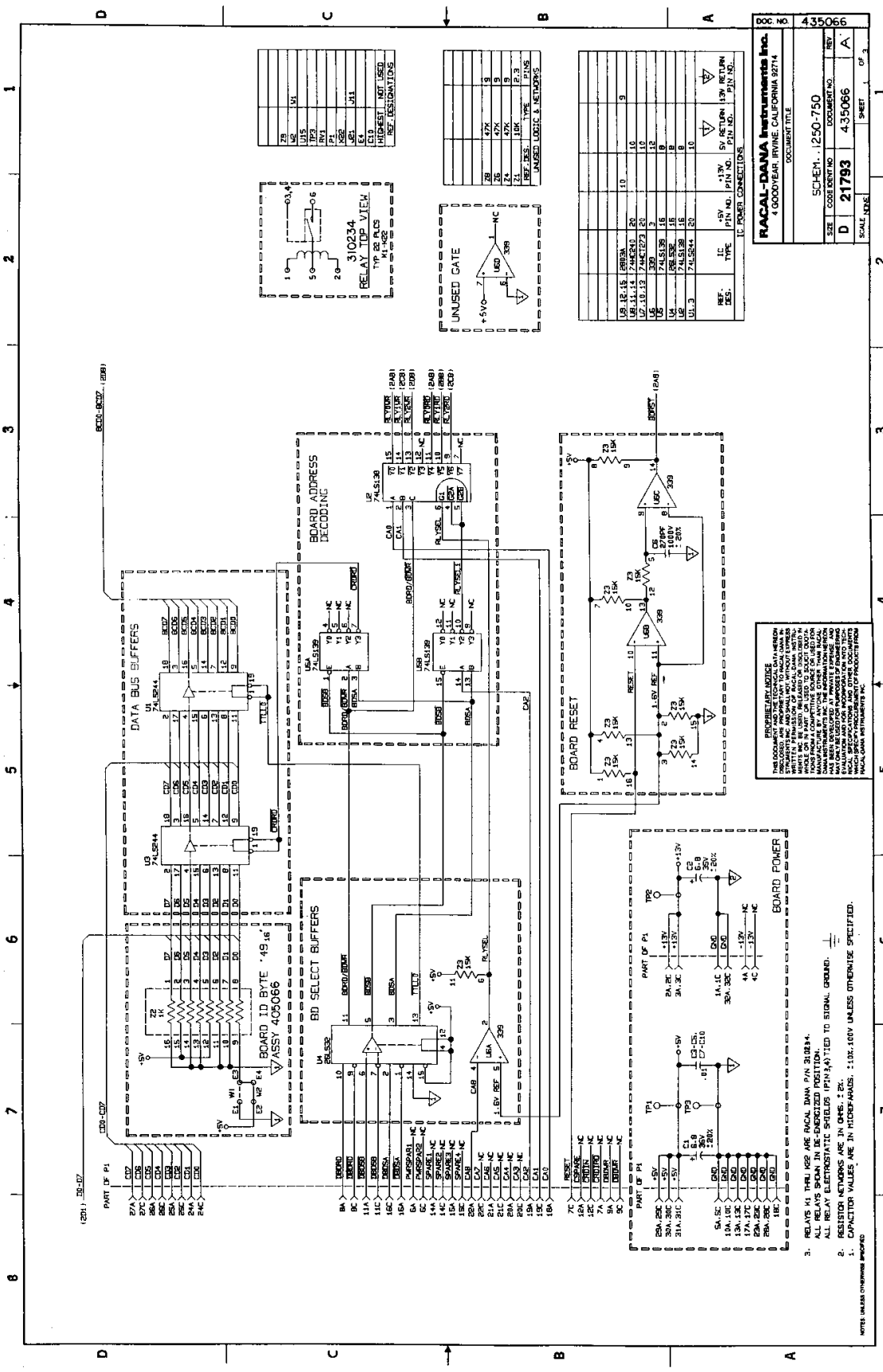
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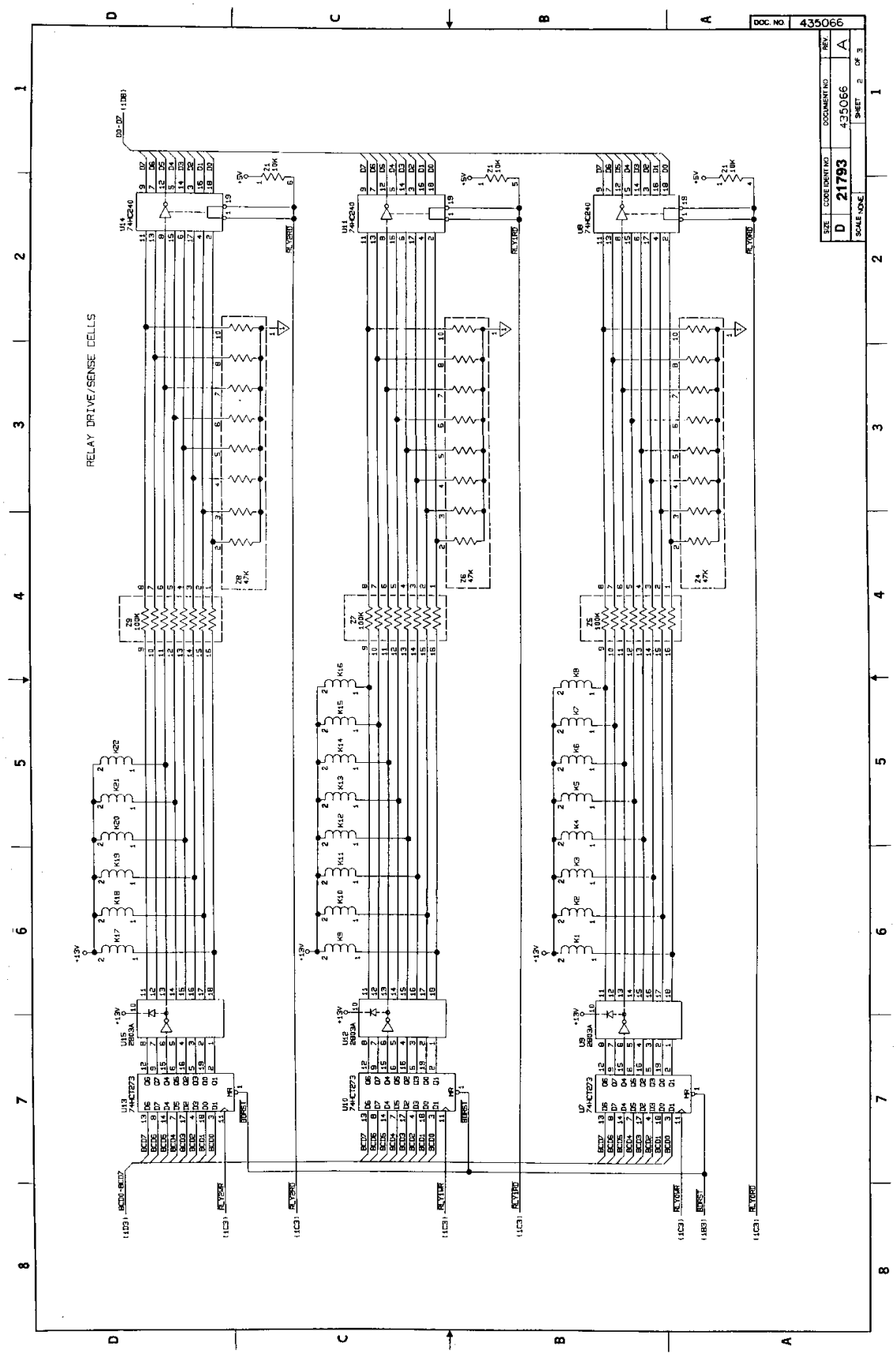
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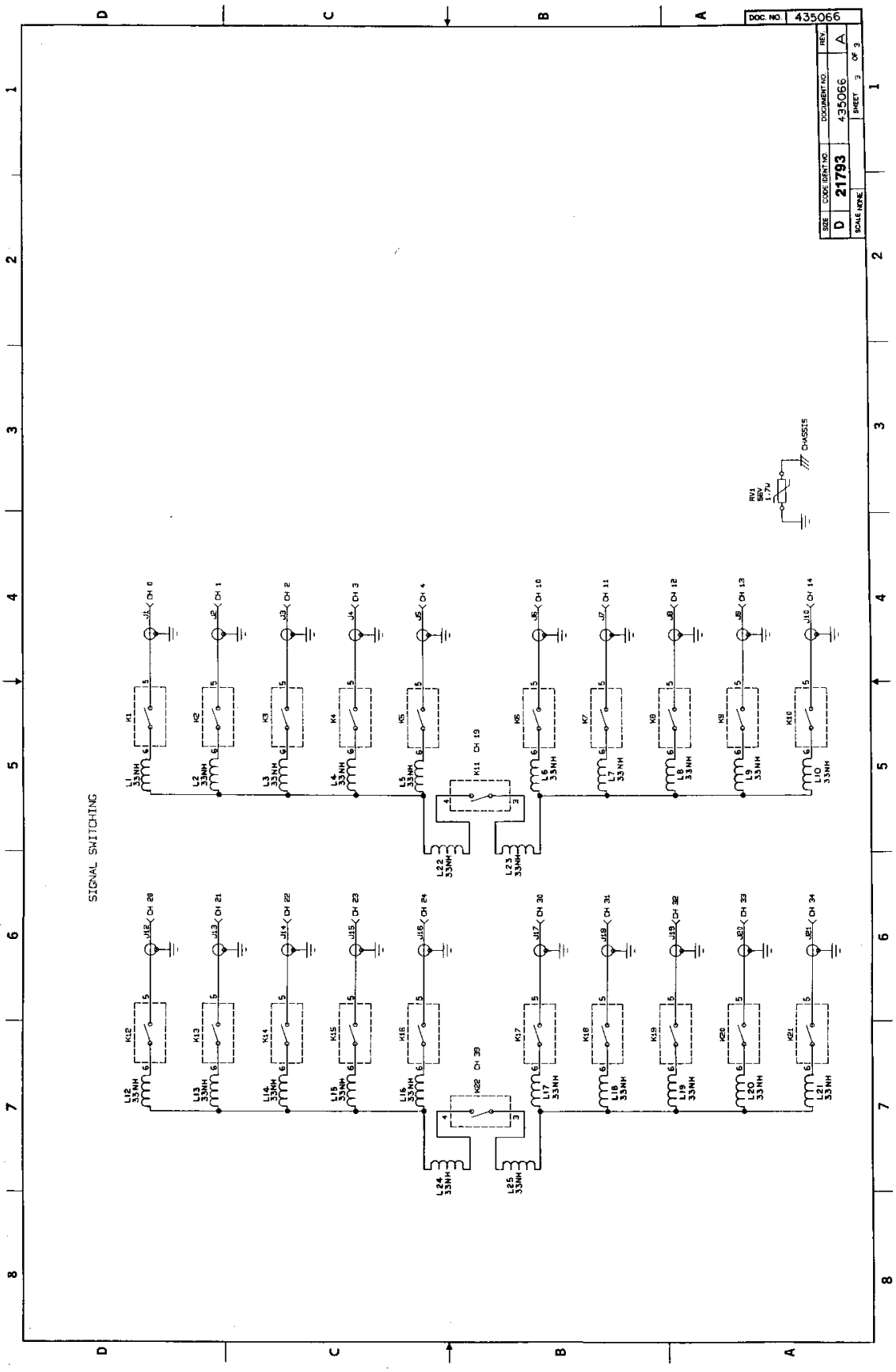
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Chapter 7

CHASSIS PARTS LIST

404361	CHASSIS ASSEMBLY	7-3
401744	PCB Assy., Interconnection	7-4
401743	PCB Assy., Computer	7-5
404363	POWER SUPPLY ASSEMBLY	7-8
401742	PCB Assy., Power Supply	7-9
401758	PCB Assy., Analog Bus	7-12

Manufacturers are identified by FSC numbers listed in the table on page 7-13, “List of Suppliers”. The code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbook H4-1, H4-2, and their supplements.

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404361 - CHASSIS ASSEMBLY

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
1	401744	PCB ASSY., INTERCONNECT	21793	401744
2	401758	PCB ASSY., ANALOG BUS	21793	401758
3	404362	POWER SUPPLY ASSY.	21793	404362
4	454830	FRONT PANEL	21793	454830
5	454833	CORNER POST, RH	21793	454833
6	454834	CORNER POST, LH	21793	454834
7	454835	PANEL, CENTER SUPPORT	21793	454835
8	454836	PLATE, CARD GUIDE	21793	454836
9	401743	PCB ASSY., COMPUTER	21793	401743
10	454845	CHASSIS RAIL (2 REQ'D)	21793	454845
12	454851	EXTRUSION, RACK FLANGE, 5.25 LG (2 REQ'D)	21793	454851
13	454852	OVERLAY, FRONT PANEL	21793	454852
15	454872	TRIM, SIDE PANEL (2 REQ'D)	21793	454872
16	454873	EXTRUSION, SIDE PANEL (2 REQ'D)	21793	454873
17	454874	TRIM, SIDE PANEL (2 REQ'D)	21793	454874
18	454875	COVER, TOP	21793	454875
19	454876	COVER, BOTTOM	21793	454876
20	454877	HANDLE, 5.25 (2 REQ'D)	21793	454877
21	601246	SWITCH, ROCKER, SPDT	SEE NOTE 1 TABLE 6.1	1801-1143
23	610887	SCREW, PFH, 6-32 X .375 (21 REQ'D)	08226	507C632R6
24	610890	SCREW, TAPTITE, THREAD FORMING, 6-32 X .375 (2 REQ'D)	78189	---
25	610909	SCREW, PPH, 6-32 X .500 (6 REQ'D)	78189	---
27	610925	SCREW, PPH, 6-32 X 1.00 (6 REQ'D)	78189	---
29	611062	FOOT, BUTTON, FAST (4 REQ'D)	06915	FF-004
30	611064	CARD GUIDE, 9.6 LG (12 REQ'D)	23880	1962F
31	615074	SCREW, PPH, 8-32 X .375 (4 REQ'D)	---	---
33	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (10 REQ'D)	78189	SEMS W/SQ CONE WA.
34	615046	SCREW, PPH, 4-40 X .500 (2 REQ'D)	---	---
35	617127	WASHER, LOCK, #4, LIGHT SERIES (2 REQ'D)	---	---
36	920962	LOCTITE, 242, MED STR	05972	242
41	615076	SCREW, PPH, 8-32 X .500 (4 REQ'D)	---	---
42	615057	SCREW, PPH, 6-32 X .250 (2 REQ'D)	---	---
47	920748	TAPE, DOUBLE SIDED, ADHESIVE, FOAM	23039	2132

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401744 - PCB ASSY., INTERCONNECT

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
C1	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C2	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1	210071	CAMP, HI EFFICIENCY RED, SOLID STATE	50434	HP5082-4650
CR2	210071	CAMP, HI EFFICIENCY RED, SOLID STATE	50434	HP5082-4650
CR3	210071	CAMP, HI EFFICIENCY RED, SOLID STATE	50434	HP5082-4650
CR4	210071	CAMP, HI EFFICIENCY RED, SOLID STATE	50434	HP5082-4650
CR5	210071	CAMP, HI EFFICIENCY RED, SOLID STATE	50434	HP5082-4650
J1	601228	CONNECTOR, PCB, 64 PIN	00779	532523-2
J2	601228	CONNECTOR, PCB, 64 PIN	00779	532523-2
J3	601228	CONNECTOR, PCB, 64 PIN	00779	532523-2
J4	601228	CONNECTOR, PCB, 64 PIN	00779	532523-2
J5	601228	CONNECTOR, PCB, 64 PIN	00779	532523-2
J6	601228	CONNECTOR, PCB, 64 PIN	00779	532523-2
J7	601229	CONNECTOR, PLUG, 37 PIN	00779	745189-7
J8	600670	CONNECTOR, 10 PIN	71785	252-10-30-160
Q1	200200	TRANSISTOR, NPN	21793	200200
Q2	200200	TRANSISTOR, NPN	21793	200200
U1	230767	IC, REGULATOR, 5V	27014	LM78L05AC
Z1	080022	RES NETWORK, CERMET, 220 OHM, 14P7R, 2%	11236	760-3-R220
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
9	411744	PCB, INTERCONNECT (UNLOADED)	21793	411744
12	600786	POST, MACHINE APPLIED STRIP (7 REQ'D: TP1-TP7)	00779	1-87022-0
16	610777	CABLE TIE	53421	T18R
17	611045	STANDOFF, SWAGE, .187 X .500 LG (2 REQ'D)	51506	41086-R-A-105-22
18	601238	TERMINAL, CRIMP, SPADE, 16-22 GA (2 REQ'D)	00779	2-520337-2
19	630014	CONNECTOR, RETAINER KIT, FEMALE SCREWLOCK	00779	205817-1
20	501376	TUBING, TEFLON, .036 ID, CLR	29005	TW20GA
21	523444	WIRE, TEFLON, STRANDED, 22G, YEL	---	---
22	523888	WIRE, TEFLON, STRANDED, 22G, GRAY	---	---
24	920962	LOCTITE, 242, MED. STR.	05972	242

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401743 - PCB ASSY., COMPUTER

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
C1	110143	CAP, TANTA, 1 MFD, 35V, 20%	05397	T368A105M035AS
C2-20	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
C21	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C22	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C23-29	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
C30	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
C31	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C32	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
C33	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1	211083	DIODE, SILICO	81349	1N916B
CR2	211083	DIODE, SILICO	81349	1N916B
J2	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
J200	600567	CONNECTOR, RECEPTACLE	02660	31-236
J201	600567	CONNECTOR, RECEPTACLE	02660	31-236
J203	601253	CONNECTOR, GPIB, 24 PIN	00779	553811-3
Q1	200295	TRANSISTOR, N-CHAN, MOS FET	17856	VN0104N3
Q2	200298	TRANSISTOR, NPN	04713	2N3904
R1	000101	RES, CARBON, 100 OHM, 1/4W, 5%	81349	RC07GF101J
R2	010985	RES, METAL, 6.04K, 1/8W, 1%	81349	RN55C6041F
R3	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R4	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R5	010873	RES, METAL, 2.21K, 1/8W, 1%	81349	RN55C2211F
R6	000470	RES, CARBON, 47 OHM, 1/4W, 5%	81349	RC07GF470J
R7	000470	RES, CARBON, 47 OHM, 1/4W, 5%	81349	RC07GF470J
R8	010924	RES, METAL, 1.24K, 1/8W, 1%	81349	RN55C1241F
R9	000102	RES, CARBON, 1K, 1/4W, 5%	81349	RC07GF102J
R10	000201	RES, CARBON, 200 OHM, 1/4W, 5%	81349	RC07GF201J
S201	601278	SWITCH, DIP, RT. ANGLE, 6P	09353	BD06-AV
U1	230547	IC, QUAD COMPARATOR	27014	LM311N
U2	230547	IC, QUAD COMPARATOR	27014	LM311N
U3	230742	IC, DIGITAL, PRIORITY ENCODER	04713	SN7545KN
U4	230577	IC, OCTAL BUFFER	27014	74LS244

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401743 - PCB ASSY., COMPUTER (CONT'D)

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
U5	230357	IC, DIGITAL, DUAL	27014	74LS73N
U6	230336	IC, HEX SCHMITT TRIGGER	01295	74LS14
U7	230780	IC, DIGITAL	04713	MC6840P
U9	230740	IC, MEMORY, RAM, 8K, 150 NS	52531	HM6264P-15
U11	230841	IC, EPROM	21793	230841
U12	230760	IC, DIGITAL, QUAD	27014	MM74HC37
U13	230719	IC, FAST NAND	07263	74F00
U14	230550	IC, OCTAL LATCH	27014	74LS374N
U15	230550	IC, OCTAL LATCH	27014	74LS374N
U16	230459	IC, OCTAL GPIB TRANS	01295	SN75160
U17	230793	IC, DIGITAL, GPIB CONTROLLER	01295	TMS9914ANL
U18	230782	IC, DIGITAL	07263	74F139PC
U19	230710	IC, DIGITAL, DECODER	07263	74F138
U20	230577	IC, OCTAL BUFFER	27014	74LS244
U21	230386	IC, 8-BIT REGISTER	27014	74LS273
U22	230779	IC, LINE DRIVER, QUAD 3-STATE OUTPUTS	04713	AM26LS31P
U23	230472	IC, OCTAL GPIB TRANS	01295	SN75161
U24	230758	IC, MEMORY, NON VOL	61394	DQ2816A-350
U26	230740	IC, MEMORY, RAM, 8K, ISONS	52531	HM6264P-15
U28	230842	IC, EPROM	21793	230842
U29	230744	IC, MICRO, 68000, 8 MHZ	04713	MC68000G8
U30	230428	IC, QUAD 2 INPUT OR GATE	27014	DM74LS32N
U31	230705	IC, DIGITAL	04713	74F04
U32	230550	IC, OCTAL LATCH	27014	74LS374N
U33	230577	IC, OCTAL BUFFER	27014	74LS244
U34	230779	IC, LINE DRIVER, QUAD 3-STATE OUTPUTS	04713	AM26LS31P
VR1	230551	IC, VOLTAGE REFERENCE	24355	AD589JH
Y1	921005	OSC, CLOCK, 8 MHZ, .01%	04713	RASCO-3
Z1	080077	RES NETWORK, 220K, 1.1W, 2%	11236	750-83-R220K
Z2	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z3	080076	RES NETWORK, 10K, .9W, 2%	11236	750-63-R10K
Z4	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z5	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z6,7	080020	RES NETWORK, CERMET, 10K, 8P7R, 2%	11236	750-81-R10K

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401743 - PCB ASSY., COMPUTER (CONT'D)

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
Z8	080037	RES NETWORK, CERMET, 220 OHM, .9W, 6P5R, 2%	11236	750-61-R220
Z9	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
59	411743	PCB, COMPUTER (UNLOADED)	21793	411743
61	454815	PLATE, BUTCH, COMPUTER	21793	454815
63	600823	SOCKET, DUAL IN-LINE, 40-P	52072	CA40S-TSO-BC
64	600894	LUG, SOLDER (2 REQ'D)	86928	5413-20
66	600786	POST, MACHINE APPLIED STRIP (13 REQ'D: TP1-10, E1-3)	00779	1-87022-0
72	611053	TERMINAL, CRIMP (3 REQ'D)	00779	530553-2
77	630010	KIT, HARDWARE, STANDOFF, STUD MOUNT	00779	552633-3
78	616252	SCREW, PPH, SEMS ASSY., 4-40 X .312 (2 REQ'D)	78189	SEMS W/SQ CONE WA.
80	500009	TUBING, SHRINK, .120 ID, BLK	29005	RNF-100-1-1/8
82	500159	SLEEVING, PVC, .118 ID	92194	PVC-9
84	500132	WIRE, TEFLON, STRANDED, TWISTED PR, 24 GA BLK/WHT	---	---
85	524555	WIRE, TEFLON, STRANDED, 24 GA, GRN	---	---

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404362 - POWER SUPPLY ASSEMBLY

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
B200	920982	FAN, BOXER, 34 CFM	28875	3115
J200	601219	CONNECTOR, PWR, EMI FILTER	05245	6J4
S200	601112	SWITCH, ROCKER, DPST	SEE NOTE 1 TABLE 6.1	1855.1102
T1	300105	TRANSFORMER, POWER, +5V, +13V	55167	2968
4	401742	PCB ASSY., POWER SUPPLY	21793	401742
7	454592	BOOT-CONN. INSULATOR	21793	454592
8	454829	CHASSIS, POWER SUPPLY	21793	454829
9	454881	PLATE, REAR	21793	454881
10	454994	BRACKET, POWER SUPPLY	21793	454994
12	500009	TUBING, SHRINK, .125 ID, BLK	29005	RNF-100-1-1/8
13	500025	WIRE, TEFLON, STRANDED, 20G, BLK	---	---
14	500116	WIRE, TEFLON, STRANDED, 20G, RED	---	---
15	500117	WIRE, TEFLON, STRANDED, 20G, GRN	---	---
16	500118	WIRE, TEFLON, STRANDED, 20G, BLU	---	---
17	500119	WIRE, TEFLON, STRANDED, 20G, YEL	---	---
18	500132	WIRE, TEFLON, STRANDED, 24G, TW PR, BLK/WHT	---	---
19	500215	WIRE, TEFLON, STRANDED, 18G, GRN/YEL	---	---
20	500229	WIRE, TEFLON, STRANDED, 20G, BRN	---	---
21	500230	WIRE, TEFLON, STRANDED, 20G, ORG	---	---
22	500233	WIRE, TEFLON, STRANDED, 20G, WHT	---	---
25	600745	TERMINAL, RECEPTACLE (4 REQ'D)	00779	60196-3

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404362 - POWER SUPPLY ASSEMBLY (CONT'D)

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
26	600022	LUG, SOLDER	83330	1416-6
27	601022	TERMINAL, RECEPTACLE (14 REQ'D)	00779	2-350800-2
30	610180	CLAMP, CABLE	09922	HP3N-7/32
31	610777	CABLE TIE (5 REQ'D)	53421	T18R
32	611107	WASHER, SHOULDER, #8 X .437 (4 REQ'D)	86928	5607-19
33	611122	SPACER, 1.00 LG, .250 O.D. (4 REQ'D)	06540	9236-A171-16
34	611123	SCREW, PPH, 8-32 X 2.625 (4 REQ'D)	---	---
35	611124	SCREW, PPH, 10-32 X .750 (4 REQ'D)	---	---
36	615060	SCREW, PPH, 6-32 X .437 (2 REQ'D)	---	---
37	616255	SCREW, PPH, SEMS ASSY., 6-32 X .312 (4 REQ'D)	78189	SEMS W/SQ CONE WA.
38	920580	FUSE, SLO-BLO, 1.5A, 250V	71400	MDX1-1/2
39	920729	LABEL, WARNING	21793	920729
41	921018	GRILL, FAN FILTER	62292	10020-1-5170
43	617005	NUT, HEX, 6-32 (3 REQ'D)	---	---
44	617006	NUT, HEX, 8-32	---	---
45	617103	WASHER, FLAT, #6, LIGHT SERIES (2 REQ'D)	---	---
47	617128	WASHER, LOCK, #6, LIGHT SERIES (2 REQ'D)	---	---

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401742 - PCB ASSY., POWER SUPPLY

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
C1	110214	CAP, AE, 10000 MFD, 16V	00853	380-103-P-16-J04
C2	110214	CAP, AE, 10000 MFD, 16V	00853	380-103-P-16-J04
C3	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C4	110217	CAP, AE, 1000 MFD, 35V, RADIAL	80031	347SKG102M035TMBS
C5	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C6	110222	CAP, ELECT, 1000 MFD, 16V, 20%	62643	SM16VB102M
C7	120355	CAP, MET. POLY, .033 MFD, 200V, 10%	56289	450P333X9250FD
C8	110221	CAP, ELECT, 470 MFD, 35V, 20%	62643	SM35VB471M
C9	110220	CAP, ELECT, 10000 MFD, 35V, +30%, -10%	90201	LP103S035E9P3
C10	120356	CAP, MET. POLY, .1 MFD, 100V, 10%	56289	450P104X9100FD
C11	110221	CAP, ELECT, 470 MFD, 35V, 20%	62643	SM35VB471M
C12	110221	CAP, ELECT, 470 MFD, 35V, 20%	62643	SM35VB471M
CR1	210107	DIODE, POWER, 6A, 50V	04713	MR750
CR2	210107	DIODE, POWER, 6A, 50V	04713	MR750
CR3	210004	DIODE, SILICO	81349	1N4004
CR4	210004	DIODE, SILICO	81349	1N4004
CR5	220019	DIODE, SILICO, ZENER	81349	1N752A
CR6	210004	DIODE, SILICO	81349	1N4004
CR7	210004	DIODE, SILICO	81349	1N4004
CR8	220004	DIODE, SILICO, ZENER	81349	1N961B
CR9	210107	DIODE, POWER, 6A, 50V	04713	MR750
CR10	210107	DIODE, POWER, 6A, 50V	04713	MR750
CR11	220098	DIODE, ZENER, 3.9V, 5%	04713	1N5990B
CR12	210004	DIODE, SILICO	81349	1N4004
CR13	210004	DIODE, SILICO	81349	1N4004
CR14	210107	DIODE, POWER, 6A, 50V	04713	MR750
CR15	210107	DIODE, POWER, 6A, 50V	04713	MR750
J8	410806	PCB, 20 PIN CONNECTOR BD	21793	410806
Q1	200131	TRANSISTOR, SILICO, NPN	01295	TIP29
Q2	200278	TRANSISTOR, POWER, SCR	04713	2N6504
Q3	200187	TRANSISTOR, SILICO, NPN	81349	2N3055
Q4	200298	TRANSISTOR, NPN	04713	2N3904
Q5	200187	TRANSISTOR, SILICO, NPN	81349	2N3055
Q6	200233	TRANSISTOR, SILICO, NPN	04713	MPS-A42

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401742 - PCB ASSY., POWER SUPPLY (CONT'D)

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
Q7	200131	TRANSISTOR, SILICO, NPN	01295	TIP29
Q8	200167	TRANSISTOR, PNP	04713	MPSU55
R1	040321	POT, CERMET, 1K, SIDE ADJ, 10%	73138	72XWR1K
R2	040321	POT, CERMET, 1K, SIDE ADJ, 10%	73138	72XWR1K
R3	012127	RES, METAL, 1.74K, 1/8W, 1%	81349	RN55C1741F
R4	000272	RES, CARBON, 2.7K, 1/4W, 5%	81349	RC07GF272J
R5	012126	RES, METAL, 4.75K, 1/8W, 1%	81349	RN55C4751F
R6	000220	RES, CARBON, 22 OHM, 1/4W, 5%	81349	RC07GF220J
R7	001781	RES, CARBON, 6.2 OHM, 1/4W, 5%	81349	RC07GF6R2J
R8	000681	RES, CARBON, 680 OHM, 1/4W, 5%	81349	RC07GF681J
R9	000223	RES, CARBON, 22K, 1/4W, 5%	81349	RC07GF223J
R10	000202	RES, CARBON, 2K, 1/4W, 5%	81349	RC07GF202J
R11	001721	RES, CARBON, 2.2 OHM, 1/2W, 5%	81349	RC20GF2R2J
R12	000470	RES, CARBON, 47 OHM, 1/4W, 5%	81349	RC07GF470J
R13	000223	RES, CARBON, 22K, 1/4W, 5%	81349	RC07GF223J
R14	000470	RES, CARBON, 47 OHM, 1/4W, 5%	81349	RC07GF470J
R15	000100	RES, CARBON, 10 OHM, 1/4W, 5%	81349	RC07GF100J
R16	000221	RES, CARBON, 220 OHM, 1/4W, 5%	81349	RC07GF221J
R17	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R18	000201	RES, CARBON, 200 OHM, 1/4W, 5%	81349	RC07GF201J
R19	000102	RES, CARBON, 1K, 1/4W, 5%	81349	RC07GF102J
R20	001705	RES, CARBON, 820 OHM, 1/2W, 5%	81349	RC20GF821J
R21	010965	RES, METAL, 1.21K, 1/8W, 1%	81349	RN55C1211F
R22	010872	RES, METAL, 1.54K, 1/8W, 1%	81349	RN55C1541F
R23	000622	RES, CARBON, 6.2K, 1/4W, 5%	81349	RC07GF622J
R24	040321	POT, CERMET, 1K, SIDE ADJ, 10%	73138	72XWR1K
R25	040320	POT, CERMET, 500 OHM, SIDE ADJ, 10%	73138	72XWR500
U1	230784	IC, LINEAR, VOLTAGE REGULATOR	04713	MC1723CP
U2	230547	IC, QUAD COMPARATOR	27014	LM339N
U3	310176	RELAY, SOLID STATE, 140 VAC, 1 AMP	59993	DP1110
U4	230784	IC, LINEAR, VOLTAGE REGULATOR	04713	MC1723CP
Z1	080040	RES NETWORK, CERMET, 22K, 1.1W, 8P4R, 2%	11236	750-83-R22K
63	411742	PCB, POWER SUPPLY (UNLOADED)	21793	411742

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401742 - PCB ASSY., POWER SUPPLY (CONT'D)

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
66	600786	POST, MACHINE APPLIED STRIP (26 REQ'D)	00779	1-87022-0
67	600977	TAB, DISCONNECT (9 REQ'D: E1-9)	79963	895
68	601013	HEATSINK, INSULATOR, 7-MIL, PLASTIC (2 REQ'D)	55285	3223-07FR-05
71	601267	HEATSINK, DUAL	30161	5786B
72	601309	CONNECTOR, DIP, LOW PROFILE, 14-PIN (2 REQ'D)	91506	214-AG39D
73	601439	CONNECTOR, PCB, RECEPTACLE (4 REQ'D)	06776	NS-441-B1
76	610252	STANDOFF, SWAGE, 1/4D, 4-40 x .125 (2 REQ'D)	06540	9531B-B-0440-3A
77	610642	SCREW, NYLON, BINDER HD, 4-40 X .250 BLK (2 REQ'D)	95987	N-440 X 1/4
78	610851	WASHER, INSULATING, TIP-32 STYLE (2 REQ'D)	18565	60-11-5791-1674
79	610872	WASHER, FLAT, #4 SS (2 REQ'D)	---	---
80	611076	NUT, INSULATING, 6-32 (4 REQ'D)	78189	8956-06-01
81	616251	SCREW, PPH, SEMS ASSY, 4-40 x .250 (2 REQ'D)	78189	SEMS W/SQ CONE WA.
83	615061	SCREW, PPH, 6-32 X .500 (4 REQ'D)	---	---
84	617016	NUT, HEX, 4-40 (2 REQ'D)	---	--
85	617077	WASHER, INTERNAL LOCK, #4 (2 REQ'D)	---	---
86	617103	WASHER, FLAT, LIGHT SERIES, #6 (4 REQ'D)	---	---
88	617128	WASHER, LOCK, LIGHT SERIES, #6 (4 REQ'D)	---	---
91	910632	HEATSINK, TO - T3, MODIFIED	21793	910632

401758 - PCB ASSY., ANALOG BUS

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
J1	600670	CONNECTOR, 10 PIN	71785	252-10-30-160
J2	600670	CONNECTOR, 10 PIN	71785	252-10-30-160
J3	600670	CONNECTOR, 10 PIN	71785	252-10-30-160
J4	600670	CONNECTOR, 10 PIN	71785	252-10-30-160
J5	600670	CONNECTOR, 10 PIN	71785	252-10-30-160
1	411758	PCB, ANALOG BUS (UNLOADED)	21793	411758

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List of Suppliers

FSC	Name
00779	Amp, Inc. Harrisburg, PA
00853	Sangamo Electric Co. Pickens, SC
01295	Texas Instruments, Inc. Dallas, TX
02660	Amphenol Corp. Broadview, IL
02735	RCA (Solid State Div.) Somerville, NJ
03296	Nylon Moulding Temple City, CA
03508	General Electric Co. (Semi-Conductor Products Div.) Electronics Park, Syracuse, NY
04713	Motorola, Inc. (Semi-Conductor Products Div.) Phoenix, AZ
04963	3M Company St. Paul, MN
05245	Corcom, Inc. Chicago, IL
05276	Pomona Electronics Co., Inc. Pomona, CA
05397	Union Carbide Corp. (Materials Systems Div.) Cleveland, OH
05693	Cherry Commercial Fasteners Division of Textron, Inc. Santa Ana, CA
05972	Loctite Corp. Hartford, CT
06383	Panduit Corp. Tinley Park, IL

FSC	Name
06540	Amatom Electronic Hardware New Rochelle, NY
06776	Robinson Nugent Inc. New Albany, IN
06915	Richo Plastics Co. Chicago, IL
07263	Fairchild (Semi-Conductor Products Div.) Mountain View, CA
08226	Reliable Industries Southgate, CA
08261	Spectra-Strip Corp. Garden Grove, CA
09353	C & K Components Watertown, MA
09922	Burndy Corp. Norwalk, CT
11236	CTS of Berne, Inc. Berne, IN
12856	Micrometals City of Industry, CA
13103	Thermalloy, Inc. Dallas, TX
16059	Devcon Corp. Danvers, MA
17377	Accurate Products Hillside, NJ
17856	Siliconix, Inc. Santa Clara, CA
18324	Signetics Corp. Sunnyvale, CA
18565	Chromerics, Inc. Woburn, MA

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FSC	Name
18677	Scanbe Manufacturing Co. El Monte, CA
19738	Avdel-Chobert Telesboro, NJ
21793	Racal-Dana Instruments Inc. Irvine, CA
23880	Stanford Applied Engineering Santa Clara, CA
24355	Analog Devices Norwood, MA
24931	Specialty Connector Co., Inc. Greenwood, IL
25088	Siemens Corp. (Comp. Group) Iselin, NJ
27014	National Semi-Conductor Corp. Santa Clara, CA
27264	Molex Products Co. Downers Grove, IL
28198	Positronic Industries, Inc. Springfield, MO
28875	IMC Magnetics Corp. Rochester, NH
29005	Storm Products Co. Los Angeles, CA
30161	Aavid Engineering Inc. Laconia, NH
34355	Advance Micro Devices Sunnyvale, CA
34359	Three (3) M Co. (Commercial Tape Division) St. Paul, MN
34785	Dek-Inc. St. Charles, IL

FSC	Name
46384	Penn Engineering & Manufacturing Co. Doylestown, PA
50434	Hewlett-Packard Co. (HPA Div.) Palo Alto, CA
50667	Dynatech/UZ Venice, CA
51506	Accurate Screw Machine Co. Nutley, NJ
51642	Centre Engineering Inc. State College, PA
52072	Circuit Assy. Corp. Costa Mesa, CA
52210	Getting Engr. & Mfg. Co. Spring Mills, PA
52531	Hitachi Magnetics Corp. Edmore, MI
53421	Tyton Corp. Milwaukee, WI
55167	Corona Magnetics Corona, CA
55210	Gettig Engrg & Mfg Co, Inc. Spring Mills, PA
55285	Bergquist Co., Inc. Minneapolis, MN
55322	Samtee, Inc. New Albany, IN
56289	Sprague Electric Co. (Pacific Div.) Los Angeles, CA
57856	Kel-Am Inc. Eldon, MO
58730	Thomas & Betts Co. Elizabeth, NJ

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FSC	Name
58982	Precision Connector Designs Winchester, MA
59311	Communication Instruments El Segundo, CA
60975	Power-one Linear Products Camarillo, CA
61394	Seeq Technology San Jose, CA
61529	Aromat Corp. Cupertino, CA
61935	Schurter, Inc. Petaluma, CA
62643	United Chemicon Rosemont, IL
6T698	Plastiglide Manufacturing Corp. Hawthorne, CA
70903	Belden Corp. Chicago, IL
71279	Cambion Cambridge, MA
71400	Bussman Manufacturing (Division of McGraw & Edison Co.) St Louis, MO
71471	Aerovox Corp. Moneks Corner, SC
71707	Coto-Coil Co., Inc. Providence, RI
71785	TRW Electronic Components (Cinch Division) Elk Grove Village, IL
72982	Erie Technological Products, Inc. Erie, PA
73138	Beckman Instruments, Inc. Fullerton, CA

FSC	Name
73631	Curtis Industries Milwaukee, WI
75915	Littelfuse, Inc. Des Plaines, IL
76493	J.W. Miller Co. Compton, CA
78189	Illinois Tool Works, Inc. (Shakeproof Div.) Elgin, IL
79963	Zierick Mfg. Corp. New Rochelle, NY
80031	Mepco-Electra Morristown, NJ
81349	Military Specification
83330	Herman H. Smith, Inc. Brooklyn, NY
86928	Seastrom Mfg. Co. Glendale, CA
8Z390	Kurt Manufacturing Inc. Oceanside, CA
90201	Mallory Capacitor, Co. Indianapolis, IN
91506	Augat, Inc. Attleboro, MA
91637	Dale Electronics Inc. Columbus, NE
92194	Alpha Wire Elizabeth, NJ
95275	Vitramon, Inc. Bridgeport, CT
95987	Weckesser Co, Inc. Chicago, IL

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FSC	Name
98291	Sealectro Corp. Mamaroneck, NY
99800	American Precision Industries Inc. (Delevan Division) East Aurora, NY
NOTE 1	Universal Components Co. Los Angeles, CA
NOTE 2	RLC Electronics Mt. Kisko, NY
NOTE 3	Worldnet Marketing Inc. Costa Mesa, CA

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Chapter 8

MODULE PARTS LIST

Options

404447	Option 10, Breadboard Assembly	8-3
401754	PCB Assembly, Breadboard	8-4
404448	Option 12, Actuator Assembly	8-5
401753	PCB Assy., Actuator	8-6
404455	Option L12, Relay Actuator Module Assembly Mechanically Latching	8-7
404388	QD Assy., Terminal	8-7
401793	PCB Assy., Actuator	8-8
401748	Option 14, Digital I/O Assembly	8-9
404446	Option 15, Relay Driver Assembly	8-11
401759	PCB Assy., Relay Driver	8-12
401954	Option 15A, pc13 Assy., Relay Driver	8-14
401889	Option 16, High Density Signal Switching Card	8-16
404445	Option 20, Power Module Assembly	8-17
401757	PCB Assy., Power Module	8-18
404444	Option 30, Scanner/Mux Module Assembly	8-19
401755	PCB Assy., Scanner/Mux Module	8-20
404456	Option 130, Signal Multiplexer Mechanically Latching	8-22
404388	QD Assy., Terminal	8-7
401792	PCB Assy., Signal Multiplexer	8-23
404707	Option 30B, Signal Multiplexer	8-24
401900	PCB Assy., Signal Multiplexer	8-25
404612	Option 30C, Scanner/Mux Module Assembly	8-19
401755-001	PCB Assy., Scanner/Mux Module	8-20
404613	Option 30D, Scanner/Mux Module Assembly	8-19
401755-002	PCB Assy., Scanner/Mux Module Assembly	8-20
404866	Option 35, Signal Multiplexer, 4(1x6), 4-Wire	8-25

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401961	PCB Assy., Signal Multiplexer, 4(1x6), 4-Wire	8-26
404443	Option 40, Matrix Module Assembly	8-28
401756	PCB Assy., Matrix Module	8-29
404457	Option L40, Signal Matrix Mechanically Latching	8-31
404388	QD Assy., Terminal	8-7
401791	PCB Assy., Signal Matrix	8-32
404711	Option 40B, Signal Matrix, 4x5, 4-Wire	8-33
401896	PCB Assy., Signal Matrix	8-34
404712	Option 45, Signal Matrix, 4x12, 2-Wire	8-35
404712, -001	Option 45A, Signal Matrix, 4x12, 2-Wire	8-35
401898, -001	PCB Assy., Signal Matrix	8-36
401745	Option 50, 200 MHz, 4/4:1 RF Multiplexer	8-37
401749	Option 51A, 500 MHz, 2/4:1, RF Multiplexer	8-39
404368	Option 51B, 500 MHz, 4/4:1 RF Multiplexer	8-41
401750	Option 52A, 1 GHz x 2 RF Multiplexer	8-43
404369	Option 52B, 1 GHz x 4 RF Multiplexer	8-45
401790	Option L52B, RF Multiplexer, 1 GHz Mechanically Latching	8-47
404642	Option 54B, Terminated 50 Ohm 1 GHz Module	8-49
401895	Option 55B, Terminated 75 Ohm 1 GHz Module	8-51
401751	Option 60A, 18 GHz x 2 Switch Module	8-53
404370	Option 60B, 18 GHz x 4 Switch Module	8-55
404371	Option 61A, 26.5 GHz x 2 Switch Module	8-57
404372	Option 61B, 26.5 GHz x 4 Switch Module	8-59
401995	Option 65, Latching 18GHz Microwave Switch Module	8-61
404381	Option 80, Terminal Block	8-63
401761	PCB Assy., Shield Common	8-63
404363	Option 90, Keyboard/Display Assembly	8-64
401741	PCB Assy., Keyboard/Display	8-65
405066	Option 750, 750 Gh3m, 4/1:4 RF Multiplexer.	8-67

Manufacturers are identified by FSC numbers listed in the table on page 7-12, “List of Suppliers”. The code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbook H4-

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1, H4-2, and their supplements.

404447 - OPTION 10, BREADBOARD ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401754	PCB ASSY., BREADBOARD	21793	401754
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

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401754 - PCB ASSY., BREADBOARD (OPTION 10)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
CR1,2	210071	LAMP, HIGH EFFICIENCY RED, SOLID STATE	50434	HP5082-4650
CR3	220089	DIODE, ZENER	12969	TVS505
F1,2	920488	FUSE, 2A, 250V	75915	312.002
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT ANGLE, PLUG, 20 PIN	57856	PRE10-6101-15
R1	000221	RES, CARBON, 220 OHM, 1/4W, 5%	81349	RC07GF221J
R2	000102	RES, CARBON, 1K, 1/4W, 5%	81349	RC07GF102J
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230386	IC, 8-BIT REGISTER	27014	74LS273
U8	230577	IC, OCTAL BUFFER	27014	74LS244
U10	230386	IC, 8-BIT REGISTER	27014	74LS273
U11	230577	IC, OCTAL BUFFER	27014	74LS244
U13	230386	IC, 8-BIT REGISTER	27014	74LS273
U14	230577	IC, OCTAL BUFFER	27014	74LS244
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
26	411754	PCB, BREADBOARD (UNLOADED)	21793	411754
29	454855	SHIELD, MODULE, TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
40	610112	NUT, PRESS, SPL, 4-40	46384	KF2-440
45	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---

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404448 - OPTION 12, ACTUATOR ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401753	PCB ASSY., ACTUATOR	21793	401753
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

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401753 - PCB ASSY., ACTUATOR (OPTION 12)

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T3688685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-9	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
K1-10	310170	RELAY, 2 FORM A, 2 FORM B	61529	S2EB-12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	410806	PCB, 20 PIN CONNECTOR	21793	410806
R1-20	600245	JUMPER, INSULATED	55210	L-2007-1LP
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
(28)	411753	PCB, ACTUATOR (UNLOADED)	21793	411753
(31)	454855	SHIELD, MODULE, TOP	21793	454855
(37)	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
(45)	610252	STANDOFF, SWAGE, 1/4D, 4-40 X .125 (3 REQ'D)	06540	9531B-B-0440-3A
(46)	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (7 REQ'D)	78189	SEMS W/SQ CONE WA.
(47)	610872	WASHER, FLAT, #4, SS (2 REQ'D)	---	---

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404455 - OPTION L12, ACTUATOR

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
2	401793	PCB ASSY., ACTUATOR	21793	401793
4	404388	QD ASSY., TERMINAL	21793	404388

404388 - QD ASSY., TERMINAL

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
5	454837	BRACKET, QD TERMINAL BLOCK	21793	454837
6	454849	PLATE, QD TERMINAL BLOCK	21793	454849
7	454999	BRACKET, INTERLOCK	21793	454999
9	454857	STRAIN RELIEF, SPONGE (2 REQ'D)	21793	454857
10	454860	SPRING, RETAINING, SINGLE (2 REQ'D)	21793	454860
12	601242	CONNECTOR, RECEPTICAL, EDGE/CABLE (2 REQ'D)	58982	PCD-1-B-22
13	611095	SCREW, CAPTIVE PANEL (2 REQ'D)	06540	6102-SS-0440
14	615050	SCREW, PPH, 4-40 X 1.00 (4 REQ'D)	---	---
15	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (3 REQ'D)	78189	---
16	920962	LOCTITE, 242, MED. STR.	05972	242
17	921041	LABEL SET, 1250 (2 REQ'D)	21793	921041

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401793 - PCB ASSY., ACTUATOR (OPTION L12)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-9	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
K1-10	310181	RELAY, 2 FORM A-B, 12V, LATCHING	61529	S2EB-L2-12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT. ANGLE, PLUG, 20-PIN	57856	PRE10-6101-15
R1-20	6000245	JUMPER, INSULATED	55210	L-2007-1LP
U1	230637	IC, DIGITAL BUFFER	18324	N74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230637	IC, DIGITAL BUFFER	18324	N74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230825	IC, OCTAL LATCH	02735	74HCT273
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230825	IC, OCTAL LATCH	02735	74HCT273
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U29	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U32	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
28	411793	PCB, ACTUATOR LATCH (UNLOADED)	21793	411793
32	454855	SHIELD, MODULE TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
46	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---
48	610252	STANDOFF, SWAGE, 1/4D, 4-40 X .125	06540	9531B-B-0440-3A

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401748 - PCB ASSY., DIGITAL I/O (OPTION 14)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3,4	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C5	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C6-12	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C13	100117	CAP, CERAM, 470 PFD, 1000V, 20%	56289	C023B102E471M
C14-28	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
CR1-22	211083	DIODE, SILICO	81349	1N916B
CR23-38	220103	DIODE, ZENER	04713	1N977B
F1-16	921045	FUSE, 1/4A, 125V, SUB MIN.	75915	255.250
L1	310056	CHOKE, RF, .68 UH	76493	9230-16
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601191	CONNECTOR, PCB, 40P, RIGHT ANGLE	23880	RP6240D2RLSF
Q1	200298	TRANSISTOR, NPN	04713	2N3904
Q2-17	200271	TRANSISTOR, FET, POWER	17856	VN10KM
R1	000332	RES, CARBON, 3.3K, 1/4W, 5%	81349	RC07GF332J
R2-4	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R5-12	000472	RES, CARBON, 4.7K, 1/4W, 5%	81349	RC07GF472J
R13	010894	RES, METAL, 20K, 1/8W, 1%	81349	RN55C2002F
R14,15	010676	RES, METAL, 15K, 1/8W, 1%	81349	RN55C1502F
R16	010894	RES, CARBON, 20K, 1/8W, 1%	81349	RN55C2002F
R17-24	000472	RES, CARBON, 4.7K, 1/4W, 5%	81349	RC07GF472J
R25-40	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R41-43	000470	RES, CARBON, 47 OHM, 1/4W, 5%	81349	RC07GF470J
R44	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
U1	230547	IC, QUAD COMPARATOR	27014	LM339N
U2	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U3	230637	IC, DIGITAL BUFFER	18324	N74LS244
U4	230768	IC, DIGITAL	04713	SN74LS139N
U5	230368	IC, DEMULTIPLEXER	27014	74LS138
U6	230637	IC, DIGITAL BUFFER	18324	N74LS244
U7	230825	IC, OCTAL LATCH	02735	74HCT273

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401748 - PCB ASSY., DIGITAL I/O (OPTION 14) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U8	230796	IC, QUAD 2-INPUT NAND GATE	02735	74HCT00E
U9	230825	IC, OCTAL LATCH	02735	74HCT273
U10	230798	IC, DUAL D W/SET & RESET	02735	74HCT74E
U11	230414	IC, QUAD EXCLUSIVE OR GATE	27014	74LS86
U12	230843	IC, DIGITAL, BUFFER, 3-STATE OCTAL INV.	04713	MC74HCT240N
U13	230802	IC, OCTAL D-TYPE F-F, 3-STATE	02735	74HCT374
U14	230802	IC, OCTAL D-TYPE F-F, 3-STATE	02735	74HCT374
U15	230843	IC, DIGITAL, BUFFER, 3-STATE OCTAL INV.	04713	MC74HCT240N
U16	230802	IC, OCTAL D-TYPE F-F, 3-STATE	02735	74HCT374
U17	230806	IC, OCTAL TRANSPARENT LATCH, 3-STATE OUTPUT	02735	74HCT373E
U18	230802	IC, OCTAL D TYPE F-F, 3-STATE	02735	74HCT374
U19	230547	IC, QUAD COMPARATOR	27014	LM339N
U20	230547	IC, QUAD COMPARATOR	27014	LM339N
U21	230547	IC, QUAD COMPARATOR	27014	LM339N
U22	230547	IC, QUAD COMPARATOR	27014	LM339N
Z1	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080015	RES NETWORK, 10K, 5%	91637	CSP-10E-01103J
Z4	080015	RES NETWORK, 10K, 5%	91637	CSP-10E-01103J
Z5	080015	RES NETWORK, 10K, 5%	91637	CSP-10E-01103J
Z6	080015	RES NETWORK, 10K, 5%	91637	CSP-10E-01103J
51	600786	POST, MACHINE APPLIED STRIP (4 REQ'D: TP1-4)	00779	1-87022-0
53	411748	PCB, DIGITAL I/O (UNLOADED)	21793	411748
54	454840	PLATE, DIGITAL INTERFACE	21793	454840
55	454996	SHIELD, UW MODULE	21793	454996
60	611095	SCREW, CAPTIVE PANEL (2 REQ'D)	06540	6102-SS-0440
62	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (10 REQ'D)	78189	---

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404446 - OPTION 15, RELAY DRIVER ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401759	PCB ASSY., RELAY DRIVER	21793	401759
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

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401759 - PCB ASSY., RELAY DRIVER (OPTION 15)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
F1	920488	FUSE, 2A, 250V	75915	312.002
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z10-12	080009	RES NETWORK, CERMET, 6.8K, 16P8R, 2%	11236	761-3-R6.8K

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401759 - PCB ASSY., RELAY DRIVER (OPTION 15) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
26	411759	PCB, RELAY DRIVER (UNLOADED)	21793	411759
30	454855	SHIELD, MODULE, TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
40	610112	NUT, PRESS, SPL, 4-40	46384	KF2-440
44	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---
46	921023	CLIP, FUSE (2 REQ'D)	61935	0G751.0099
47	920735	SOCKET, IC, 16P (6 REQ'D)	71785	133-51-02-006

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401954 - PCB ASSY., RELAY DRIVER (OPTION 15A)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T3688685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
CR1-3	231294	DIODE ARRAY, 16P8D	56289	TND908
F1	920488	FUSE, 2A, 250V	75915	312.002
J1-3	601726	CONNECTOR, D-SUB, RECEPT, 25 PIN	00779	745783-4
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
SW1-6	601699	SWITCH, DIP, 8 POS, LOW PROFILE	71450	207-8-LPST
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080133	RES NETWORK, CERMET, 68K, 10P9R	11236	750-101-R68K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080133	RES NETWORK, CERMET, 68K, 10P9R	11236	750-101-R68K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K

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401954 - PCB ASSY., RELAY DRIVER (OPTION 15A) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
Z8	080133	RES NETWORK, CERMET, 68K, 10P9R	11236	750-101-R68K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z10-15	080009	RES NETWORK, CERMET, 6.8K, 16P8R, 2%	11236	761-3-R6.8K
22	411954	PCB, RELAY DRIVER (UNLOADED)	21793	411954
26	454996	SHIELD, UV MODULE	21793	454996
27	455613	PLATE, CONNECTOR MOUNTING	21793	455613
30	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
39	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (8 REQ'D)	78189	---
40	611092	HARDWARE KIT, D-SUB, 4-40F (3 REQ'D)	00779	205817-3
42	920971	CLIP, FUSE (2 REQ'D)	75915	122088

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401889 - PCB ASSY., 1250-16

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1-2	110126	CAP, TANTA, 6.8UF, 35V, 20%	05397	T355F685M035A5
C3-5	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C6	100120	CAP, CERAM, 270 PF 1000V, 20%	56289	C023B102E271M
C7-11	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
J1-5	601725	CONNECTOR, D-SUB, RECEPT, 15 PIN	00779	745782-4
K1-18	310188	RELAY, POLAR, 4A. AMBER	61529	S4EB-12V
P1	601227	CONNECTOR, PCB, 64-PIN, SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT. ANGLE PLUG, 20 PIN	57856	PRE10-6101-15
TP1-3	600786	POST, TERMINAL, MACHINE APPLIED STRIP	00779	1-87022-0
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	SN74LS138N3
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DECODER	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N/A-1
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1-85	600245	JUMPER, INSULATED	52210	L-2007-1
Z1	080005	RES NETWORK, 6P8R, 10K, 2%, .9W	11236	750-61-R10K
Z2	080008	RES NETWORK, 16P8R, 1K, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, 16P8R, 15K, 2%	11236	761-3-R15K
Z4	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z5	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
(28)	411889	PCB, 1250-16 (UNLOADED)	21793	411889
(31)	454996	SHIELD, UV MODULE	21793	454996
(33)	455345	PLATE, SIGNAL INTERFACE	21793	455345
(41)	611092	HARDWARE KIT, D-SUB, 4-40F	00779	205817-3
(43)	616251	SCREW, PPH, SEMS ASSY., 4-40X.250 (8 REQ'D)	78189	-
(46)	920962	LOCTITE, 242, MED STR	05972	272

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404445 - OPTION 20, POWER MODULE ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401757	PCB ASSY., POWER MODULE	21793	401757
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

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401757 - PCB ASSY., POWER MODULE (OPTION 20)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-9	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
F1	920488	FUSE, 2A, 250V	75915	312.002
K1-10	310167	RELAY, POWER, 2 FORM C	61529	ST2E-DC12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
28	411757	PCB, POWER MODULE (UNLOADED)	21793	411757
32	454855	SHIELD, MODULE, TOP	21793	454855
35	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
40	610112	NUT, PRESS, SPL, 4-40	46384	KF2-440
41	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---
44	921023	CLIP, FUSE (2 REQ'D)	61935	0G751.0099

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404444 - OPTION 30, SCANNER/MUX ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401755	PCB ASSY., SCANNER/MUX	21793	401755
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

404612 - OPTION 30C, SCANNER/MUX ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401755-001	PCB ASSY., SCANNER/MUX	21793	401755-001
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

404613 - OPTION 30D, SCANNER/MUX ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401755-002	PCB ASSY., SCANNER/MUX	21793	401755-002
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

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401755 - PCB ASSY., SCANNER/MUX (OPTION 30)(-001 OPTION 30C) (-002 OPTION 30D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
K1-21	310170	RELAY, ELECTRO MECHANICAL 2 FORM A, 2 FORM B	61529	S2EB-12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT. ANGLE, PLUG, 20-PIN	57856	PRE10-6101-15
R1-11	600245	JUMPER, INSULATED	55210	L-2007-1LP
R12*	600245	JUMPER, INSULATED	55210	L-2007-1LP
R13-43	600245	JUMPER, INSULATED	55210	L-2007-1LP
R44*	600245	JUMPER, INSULATED	55210	L-2007-1LP
R45	000102	RES, CARBON, 1K, 1/4W, 5%	81349	RC07GF102J
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

*NOT USED ON -002

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401755 -PCB ASSY., SCANNER/MUX (OPTION 30) (-001 OPTION 30C) (-002 OPTION 30D) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
W2	600245	JUMPER, INSUALTED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
28	411755**	PCB, SCANNER/MUX (UNLOADED)	21793	411755**
30	454855	SHIELD, MODULE, TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
45	610252	STANDOFF, SWAGE, 1/4D, 4-40 X .125	06540	9531B-B-0440-3A
46	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---

** FOR -001 USE P/N 411755-001
FOR -002 USE P/N 411755-002

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404456 - OPTION L30, SCANNER/MUX LATCH

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
2	401792	PCB ASSY., SCAN/MUX	21793	401792
4	404388	QD ASSY., TERMINAL	21793	404388

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401792 - PCB ASSY., SCANNER/MUX LATCH (OPTION L30)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
K1-21	310181	RELAY, 2 FORM A-B, 12V, LATCHING	61529	S2EB-L2-12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT ANGLE, PLUG, 20-PIN	57856	PRE10-6101-15
R1-44	600245	JUMPER, INSULATED	55210	L-2007-1LP
U1	230637	IC, DIGITAL BUFFER	18324	N74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230637	IC, DIGITAL BUFFER	18324	N74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7,8	230825	IC, OCTAL LATCH	02735	74HCT273
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10,11	230825	IC, OCTAL LATCH	02735	74HCT273
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13,14	230825	IC, OCTAL LATCH	02735	74HCT273
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U29	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U32	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U35	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
28	411792	PCB, SCANNER/MUX LATCH (UNLOADED)	21793	411792
32	454855	SHIELD, MODULE TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
46	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250	78189	---
48	610252	STANDOFF, SWAGE, 1/4D, 4-40 X .125	06540	9531B-B-0440-3A

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404707 - OPT. ASSY., 1250-30B

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
(1)	401900	PCB ASSY., SCANNER/MUX	21793	401900
(3)	404381	TERMINAL BLOCK ASSY., QUICK DISCONNECT	21793	404381

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401900 - PCB ASSY., 1250-30B

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W2	600245	JUMPER, INSULATED	52210	L-2007-1
Z1	080005	RES NETWORK, 6P8R, 10K, 2%, .9W	11236	750-61-R10K
Z2	080008	RES NETWORK, 16P8R, 1K, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, 16P8R, 15K, 2%	11236	761-3-R15K
Z4	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z5	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z6	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z7	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z8	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z9	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
(28)	411900	PCB, 1250-30B (UNLOADED)	21793	411900
(30)	454855	SHIELD, MODULE, TOP	21793	454855
(45)	610252	STANDOFF, SWAGE, 1/4D, 4-40X.125 (3 REQ'D)	06540	9531B-B-0440-3A
(46)	616251	SCREW, PPH, SEMS ASSY., 4-40X.250 (7 REQ'D)	78189	SEMS W/SQ CONE WA.
(47)	610872	WASHER, FLAT, #4, SS (2 REQ'D)	---	---

404866 - FINAL ASSY., 1250-35

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
(1)	401961	PCB ASSY., 1260-35	21793	401961
(3)	601855-020	CONNECTOR, SGMC CABLE PLUG, 20 PIN	28198	SGMC-20-MOE100J0
(4)	601855-050	CONNECTOR, SGMC CABLE PLUG, 50 PIN (2 REQ'D)	28198	SGMC-50-MOE100J0
(5)	601857	CONTACT, SGMC MALE (120 REQ'D)	28198	MS422N

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401961 - PCB ASSY., 1250-35

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
C1-2	110126	CAP, TANTA, 6. BUF, 35V, 20%	05397	T355F685M035A5
C3-5	R-21-1801	CAP, CHIP, 10 NF	95275	VJ1206Y103MF
C6	130177	CAPACITOR, CHIP, SMD, 270PF	95275	VJ1206A271KXAMT
C7-18	R-21-1801	CAP, CHIP, 10 NF	95275	VJ1206Y103MF
J1	601856-050	CONNECTOR, SMPL, PCB RECEPT.	28198	SMPL50FOTOLB
J2	601856-020	CONNECTOR, SMPL, PCB RECEPT.	28198	SMPL20FOTOLB
J3	601856-050	CONNECTOR, SMPL, PCB RECEPT.	28198	SMPL50FOTOLB
K1-53	310208	RELAY, 2 FORM C, 2P2T, 12V	61529	TQ2E-12V
P1	601785	CONNECTOR, PCB, RECEPTACLE, 64 PIN	00779	531787-2
P2	410806	PCB, 20 PIN CONNECTOR BD	21793	410806
TP1-3	601197	POST, TEST, .025 SQ	00779	6-87022-6
U1	231092	IC, TRI-STATE BUFFER	18324	74LS244D
U2	231094	IC, DEMUX DECODER	18324	N74LS138D
U3	231092	IC, TRI-STATE BUFFER	18324	74LS244D
U4	231096	IC, QUAD DIFF RECEIVER	01295	AM26LS32ACD
U5	231090	IC, DEMUX DECODER	18324	N74LS139D
U6	231093	IC, QUAD COMPARATOR	04713	LM339D
U7	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U8	231091	IC, OCTAL BUFFER	18324	74HC240D
U9	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U10	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U11	231091	IC, OCTAL BUFFER	18324	74HC240D
U12	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U13	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U14	231091	IC, OCTAL BUFFER	18324	74HC240D
U15	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U16	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U17	231091	IC, OCTAL BUFFER	18324	74HC240D
U18	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U19	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U20	231091	IC, OCTAL BUFFER	18324	74HC240D
U21	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U22	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U23	231091	IC, OCTAL BUFFER	18324	74HC240D

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401961 - PCB ASSY., 1250-35

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
U24	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U25	231130	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U26	231091	IC, OCTAL BUFFER	18324	74HC240D
U27	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U28	231094	IC, DEMUX DECODER	18324	N74LS138D
W15-16	601208-016	CONNECTOR, PLUG, 3 PIN	21793	601208-016
Z1	080116	RES NETWORK, 16P8R, 10K	73138	628-AL-103J
Z2	080115	RES NETWORK, 16P8R, 1K	73138	628-AL-102J
Z3	080114	RES NETWORK, 16P8R, 15K	73138	628-AL-153J
Z4	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z5	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z6	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z7	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z8	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z9	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z11	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z12	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z13	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z14	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z16	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z17	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z18	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z19	080118	RES NETWORK, 16PR, 100K	73138	628-AL-104J
(23)	411961	PCB, 1250-35 (UNLOADED)	21793	411961
(26)	454996	SHIELD, UW MODULES	21793	454996
(27)	455649	PANEL, FRONT, 1250-35	21793	455649
(34)	601195	PLUG, JUMPER, LOW PROFILE (2 REQ'D)	00779	531220-2
(43)	611095	SCREW, CAPTIVE PANEL (2 REQ'D)	06540	6102-SS-0440
(44)	610252	STANDOFF, SWAGE, 1/4D, 4-40 X .125 (2 REQ'D)	06540	9531B-B-0440-3A
(45)	615012	SCREW, PPH, 2-56X.125 (6 REQ'D)	-	-
(46)	616251	SCREW, PPH, SEMS ASSY., 4-40X.250 (12 REQ'D)	78189	SEMS W/SQ CONE WA.
(47)	920962	LOCTITE, 242, MED STR.	05972	242
(48)	610872	WASHER, FLAT, #4 SS (2 REQ'D)	---	---

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404443 - OPTION 40, MATRIX MODULE ASSY.

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401756	PCB ASSY., MATRIX MODULE	21793	401756
3	404381	TERMINAL BLOCK ASSY., Q.D.	21793	404381

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401756 - PCB ASSY., MATRIX MODULE (OPTION 40)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
K1-20	310170	RELAY, ELECTRO MECHANICAL 2 FORM A, 2 FORM B	61529	S2EB-12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT. ANGLE, PLUG, 20-PIN	57856	PRE10-6101-15
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N

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401756 - PCB ASSY., MATRIX MODULE (OPTION 40) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
28	411756	PCB, SCANNER/MUX (UNLOADED)	21793	411756
30	454855	SHIELD, MODULE TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
45	610252	SCREW, SWAGE, 1/4D, 4-40 X .125	06540	9531B-8-0440-3A
46	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---

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404457 - OPTION L40, MATRIX LATCH

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
2	401791	PCB ASSY., MATRIX LATCH	21793	401791
4	404388	QD ASSY., TERMINAL	21793	404388

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401791 - PCB ASSY., MATRIX LATCH (OPTION L40)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
K1-20	310181	RELAY, 2 FORM A-B, 12V, LATCHING	61529	S2EB-L2-12V
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT ANGLE, PLUG, 20-PIN	57856	PRE10-6101-15
U1	230637	IC, DIGITAL BUFFER	18324	N74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230637	IC, DIGITAL BUFFER	18324	N74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230825	IC, OCTAL LATCH	02735	74HCT273
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230825	IC, OCTAL LATCH	02735	74HCT273
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U29	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U32	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
28	411791	PCB, SCANNER/MUX LATCH (UNLOADED)	21793	411791
32	454855	SHIELD, MODULE TOP	21793	454855
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
46	616251	SCREW, PPH, SEMS ASSY., 4-40 x .250 (5 REQ'D)	78189	---
48	610252	STANDOFF, SWAGE, 1/4D, 4-40 X .125	06540	9531B-B-0440-3A

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404711 - OPT. ASSY., 1250-40B

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
(1)	401896	PCB ASSY., 1250-40B	21793	401896
(3)	404381	TERMINAL BLOCK ASSY., QUICK DISCONNECT	21793	404381

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401896 - PCB ASSY., 1250-40B

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1-2	110126	CAP, TANTA, 6.BUF, 35V, 20%	05397	T355F685M035A5
C3-5	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103KIR5CA
C6	100120	CAP, CERAM, 270 PF 1000V, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
K1-20	310188	RELAY, POLAR, 4A. AMBER	61529	S4EB-12V
P1	601227	CONNECTOR, PCB, 64-PIN, SOCKET PLUG	00779	531796-2
P2	601241	CONNECTOR, RT. ANGLE PLUG, 20 PIN	57856	PRE10-6101-15
TP1-3	601197	POST, TEST, .025 SQ	00779	6-87022-6
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	SN74LS138N3
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DECODER	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N/A-1
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z1	080005	RES NETWORK, 6P8R, 10K, 2%, .9W	11236	750-61-R10K
Z2	080008	RES NETWORK, 16P8R, 1K, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, 16P8R, 15K, 2%	11236	761-3-R15K
Z4	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z5	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z6	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z7	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z8	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z9	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
(25)	411896	PCB, 1250-40B (UNLOADED)	21793	411896
(29)	454855	SHIELD, MODULE, TOP	21793	454855
(42)	610252	STANDOFF, SWAGE, 1/4D, 4-40X.125	06540	9531B-B-0440-3A
(43)	616251	SCREW, PPH, SEMS ASSY., 4-40X.250 (5 REQ'D)	78189	-

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404712 - OPT. ASSY., 1250-45

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
(1)	401898	PCB ASSY., 1250-45	21793	401898
(3)	404381	TERMINAL BLOCK ASSY., QUICK DISCONNECT	21793	404381

404712-001 - OPT. ASSY., 1250-45A

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
(1)	401898-001	PCB ASSY., 1250-45A	21793	401898-001
(3)	404381	TERMINAL BLOCK ASSY., QUICK DISCONNECT	21793	404381

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401898 - PCB ASSY., 1250-45 & 401898-001 - PCB ASSY., 1250-45A

REF. DESIG.	RACAL INSTR P/N	DESCRIPTION	FSC	MANU P/N
C1-2	110126	CAP, TANTA, 6. BUF, 35V, 20%	05397	T355F685M035A5
C3-5	R-21-1801	CAP, CHIP, 10 NF	95275	VJ1206Y103MF
C6	130177	CAPACITOR, CHIP, SMD, 270PF	95275	VJ1206A271KXAMT
C7-18	R-21-1801	CAP, CHIP, 10 NF	95275	VJ1206Y103MF
K1-52	310190	RELAY, ELECTROMECHANICAL, 2P2T, 12V	61529	DS2YE-S-DC12V
P1	601785	CONNECTOR, PCB, RECEPTACLE, 64 PIN	00779	531787-2
P2	410806	PCB, 20 PIN CONNECTOR BOARD	21793	410806
U1	231092	IC, TRI-STATE BUFFER	18324	74LS244D
U2	231094	IC, DEMUX DECODER	18324	N74LS138D
U3	231092	IC, TRI-STATE BUFFER	18324	74LS244D
U4	231096	IC, QUAD DIFF RECEIVER	01295	AM26LS32ACD
U5	231090	IC, DEMUX DECODER	18324	N74LS139D
U6	231093	IC, QUAD COMPARATOR	04713	LM339D
U7	231130	IC, D-TYPE FLIP-FLOP	18324	PC74HC273
U8	231091	IC, OCTAL BUFFER	18324	74HC240D
U9	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U10	231130	IC, D-TYPE FLIP-FLOP	18324	PC74HC273
U11	231091	IC, OCTAL BUFFER	18324	74HC240D
U12	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U13	231130	IC, D-TYPE FLIP-FLOP	18324	PC74HC273
U14	231091	IC, OCTAL BUFFER	18324	74HC240D
U15	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U16	231130	IC, D-TYPE FLIP-FLOP	18324	PC74HC273
U17	231091	IC, OCTAL BUFFER	18324	74HC240D
U18	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U19	231130	IC, D-TYPE FLIP-FLOP	18324	PC74HC273
U20	231091	IC, OCTAL BUFFER	18324	74HC240D
U21	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U22	231130	IC, D-TYPE FLIP-FLOP	18324	PC74HC273
U23	231091	IC, OCTAL BUFFER	18324	74HC240D

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401745 - 200 MHZ, 4:1 (OPTION 50)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
J1-21	601231	CONNECTOR, BNC, PC MOUNT	00779	227161-2
K1-22	310169	RELAY, REED 1 FORM A	71707	CR-7101-12-1110
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
RV1	220102	VARISTOR, 56V, 1.7 W-S	03508	V56ZA2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	55210	ULN-2803A

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401745 - 200 MHZ, 4:1 (OPTION 50) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
27	411745	PCB, 200 MHZ (UNLOADED)	21793	411745
29	454854	SHIELD, RF MODULE	21793	454854
31	454870	PLATE, RF INTERFACE	21793	454870
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP 1-3)	00779	1-87022-0
40	610389	GROMMET, CATERPILLAR	03296	G51H-B
45	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
46	616251	SCREW, PPH, SEMS ASSY. 4-40 X .250 (10 REQ'D)	78189	---
48	920962	LOCTITE, 242, MED. STR.	05972	242

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401749 - 2/4:1 M X 500 MHZ (OPTION 51A)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-9	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
J1-10	601203	CONNECTOR, BNC, RT. ANGLE	05276	4788
K1-10	310168	RELAY, RF, 2 FORM C	59311	12103J302
K11A	310168	RELAY, RF, 2 FORM C	59311	12103J302
K11B	310168	RELAY, RF, 2 FORM C	59311	12103J302
RV1	220102	VARISTOR, 56V, 1.7 W-S	03508	V562A2
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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401749 - 2/4:1 M X 500 MHZ (OPTION 51A) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
29	411749	PCB, 500 MHZ (UNLOADED)	21793	411749
32	454841-1	PLATE, RF INTERFACE	21793	454841-1
33	454997	SHIELD, UW MODULE	21793	454997
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP 1-3)	00779	1-87022-0
45	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
46	616251	SCREW, PPH, SEMS ASSY. 4-40 X .250 (12 REQ'D)	78189	---
47	617127	WASHER, LOCK, #4, LIGHT SERIES (2 REQ'D)	---	---

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404368 - 4/4:1 M X 500 MHZ (OPTION 51B)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
J1-21	601203	CONNECTOR, BNC, RT. ANGLE	05276	4788
K1-10	310168	RELAY, RF, 2 FORM C	59311	12103J302
K11A	310168	RELAY, RF, 2 FORM C	59311	12103J302
K11B	310168	RELAY, RF, 2 FORM C	59311	12103J302
K12-22	310168	RELAY, RF, 2 FORM C	59311	12103J302
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
RV1	220102	VARISTOR, 56V, 1.7W-S	03508	V56ZA2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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404368 - 4/4:1 M X 500 MHZ (OPTION 51B) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
W2	600245	JUMPER, INSULATED	55210	L-2007-iLP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
29	411749	PCB, 500 MHZ (UNLOADED)	21793	411749
32	454842-1	PLATE, RF INTERFACE	21793	454842-1
33	454854	SHIELD, RF MODULE	21793	454854
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP 1-3)	00779	1-87022-0
44	610389	GROMMET, CATERPILLAR	03296	G51H-B
46	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
47	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (8 REQ'D)	78189	---
48	617127	WASHER, LOCK, #4, LIGHT SERIES (2 REQ'D)	---	---

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401750 - 2/4:1 TREE, 1 GHZ (OPTION 52A)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-9	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
J1-10	601203	CONNECTOR, BNC, RT. ANGLE	05276	4788
K1-12	310168	RELAY, RF, 2 FORM C	59311	12103J302
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
RV1	220102	VARISTOR, 56V, 1.7W-S	03508	V56ZA2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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401750 - 2/4:1 TREE, 1 GHZ (OPTION 52A) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
29	411750	PCB, QUAD, 4:1 TREE, 1 GHZ (UNLOADED)	21793	411750
31	454841-2	PLATE, RF INTERFACE, 1 GHZ H	21793	454841-2
32	454854	SHIELD, RF MODULE	21793	454854
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP 1-3)	00779	1-87022-0
45	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
46	616251	SCREW, PPH, SEMS ASSY. 4-40 X.250 (10 REQ'D)	78189	---
48	920962	LOCTITE, 242, MED. STR	05972	242

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404369 - 4/4:1 TREE, 1 GHZ (OPTION 52B)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T3688685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
J1-22	601203	CONNECTOR, BNC, RT. ANGLE	05276	4788
K1-24	310168	RELAY, RF, 2 FORM C	59311	12103J302
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
RV1	220102	VARISTOR, 56V, 1.7W-S	03508	V56ZA2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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404369 - 4/4:1 TREE, 1 GHZ (OPTION 52B) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	751-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
29	411750	PCB, QUAD, 4:1 TREE, 1GHZ (UNLOADED)	21793	411750
31	454842-2	PLATE, RF INTERFACE, 1 GHZ F	21793	454842-2
32	454854	SHIELD, RF MODULE	21793	454854
37	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP 1-3)	00779	1-87022-0
44	610389	GROMMET, CATERPILLAR	03296	G51H-B
45	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
46	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (10 REQ'D)	78189	---
48	920962	LOCTITE, 242, MED. STR	05972	242

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401790 - PCB ASSY., 4/4:1 TREE RF (OPTION L52B)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7-11	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C12	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
C13	110125	CAP, TANTA, 2.2 MFD, 35V, 20%	05397	T368B225M035AS
J1-20	601203	CONNECTOR, BNC, RT. ANGLE	05276	4788
K1-28	310180	RELAY, ELECTROMAGNETIC	61529	S2M-L2-12V-H10
L1	310132	CHOKE, RF, .47 UH, 10%	99800	1025-12
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
R1	010400	RES, METAL, 200 OHM, 1/8W, .1%	81349	RN55C2003B
R2	010921	RES, METAL, 825 OHM, 1/8W, 1%	81349	RN55C8250F
R3-6	000226	RES, CARBON, 22M, 1/4W, 5%	81349	RC07GF226J
U1	230637	IC, DIGITAL BUFFER	18324	N74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230637	IC, DIGITAL BUFFER	18324	N74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230825	IC, OCTAL LATCH	02735	74HCT273
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230825	IC, OCTAL LATCH	02735	74HCT273
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230825	IC, OCTAL LATCH	02735	74HCT273
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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401790 - PCB ASSY., 4/4:1 TREE RF (OPTION L52B) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U16	230825	IC, OCTAL LATCH	02735	74HCT273
U17	230825	IC, OCTAL LATCH	02735	74HCT273
U18	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U19	230844	IC, LINEAR	27014	LM317T
U29	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U32	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U35	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U38	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	751-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
40	411790	PCB, QUAD 4:1 TREE RF (UNLOADED)	21793	411790
44	454842	PLATE, RF INTERFACE	21793	454842
45	454997	SHIELD, UHF MODULE	21793	454997
48	600786	POST, MACHINE APPLIED STRIP (4 REQ'D: TP1-4)	00779	1-87022-0
56	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
57	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (10 REQ'D)	78189	---
60	920962	LOCTITE, 242, MED. STR.	05972	242

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404642 - PCB ASSY., 1250-54B

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1-2	110126	CAP, TANTA, 6.BUF, 35V, 20%	05397	T355F685M035A5
C3-5	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C6	100120	CAP, CERAM, 270 PF 1000V, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C11-59	R-21-1801	CAP, CHIP, 10NF	95275	VJ1206Y103MF
J1-20	601822	CONN., CPAX, RECEPT, 5P, 50 OHM BNC	24931	28JR428-1
J21-36	601787	CONNECTOR, COAXIAL, RECEPT	98291	51-053-000
K1-24	310168	RELAY, RF, 2 FORM C	01526	3SAV2590A2
P1	601227	CONNECTOR, PCB, 64-PIN, SOCKET PLUG	00779	531796-2
RV1	220102	VARISTOR, 56V, 1.7W	03508	V56ZA2
TP1-3	600786	POST, TEST, .025 SQ	00779	6-87022-6
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	SN74LS138N3
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DECODER	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N/A-1
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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404642 - PCB ASSY., 1250-54B

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1-2	600245	JUMPER, INSULATED	52210	L-2007-1
Z1	080005	RES NETWORK, 6P8R, 10K, 2%, .9W	11236	750-61-R10K
Z2	080008	RES NETWORK, 16P8R, 1K, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, 16P8R, 15K, 2%	11236	761-3-R15K
Z4	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z5	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z6	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z7	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z8	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z9	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
(32)	410792	PCB, 1250-54B (UNLOADED)	21793	410792
(35)	455322-001	PLATE RF, BNC	21793	455322-001
(36)	455330	SHIELD, RF	21793	455330
(48)	616251	SCREW, PPH, SEMS ASSY., 4-40X.250 (10 REQ'D)	78189	-

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401895 - PCB ASSY., 1250-55

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1-2	110126	CAP, TANTA, 6. BUF, 35V, 20%	05397	T355F685M035A5
C3-5	R-21-1801	CAP, CHIP, 10 NF	95275	VJ1206Y103MF
C6	130177	CAPACITOR, CHIP, SMD, 270PF	95275	VJ1206A271KXAMT
C7-66	R-21-1801	CAP, CHIP, 10 NF	95275	VJ1206Y103MF
K1-28	310194	RELAY, HIGH FREQUENCY 75 OHM	61529	RGIE-12V
J1-20	601821	CONNECTOR, COAXIAL, BNC, 50 OHM	24931	28JR-427-1
J21-36	601781	CONNECTOR, COAXIAL, RECEPT, 75 OHM	98291	51-153-0000
P1	601785	CONNECTOR, PCB, RECEPTACLE, 64 PIN	00779	531787-2
RV1	220102	VARISTOR, 56V. 1.7 W/S	03508	V56ZA2
TP1-3	601197	POST, TEST, .025 SQ	00779	6-87022-6
U1	231092	IC, TRI-STATE BUFFER	18324	74LS244D
U2	231094	IC, DEMUX DECODER	18324	N74LS138D
U3	231092	IC, TRI-STATE BUFFER	18324	74LS244D
U4	231096	IC, QUAD DIFF RECEIVER	01295	AM26LS32ACD
U5	231090	IC, DEMUX DECODER	18324	N74LS139D
U6	231093	IC, QUAD COMPARATOR	04713	LM339D
U7	231095	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U8	231091	IC, OCTAL BUFFER	18324	74HC240D
U9	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U10	231095	IC, D-TYPE FLIP-FLOP	18324	74HCT273D
U11	231091	IC, OCTAL BUFFER	18324	74HC240D
U12	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
U13	231095	IC, D-TYPE FLIP-FLOP	18324	74HCT273D

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401895 - PCB ASSY., 1250-55

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U14	231091	IC, OCTAL BUFFER	18324	74HC240D
U15	231098	IC, SOIC TRANSISTOR	56289	ULN-2803LW
Z1	080116	RES NETWORK, 16P8R, 10K	73138	628-AL-103J
Z2	080115	RES NETWORK, 16P8R, 1K	73138	628-AL-102J
Z3	080114	RES NETWORK, 16P8R, 15K	73138	628-AL-153J
Z4	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z5	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z6	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z7	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
Z8	080117	RES NETWORK, 16P8R, 47K	73138	628-AL-473J
Z9	080118	RES NETWORK, 16P8R, 100K	73138	628-AL-104J
(25)	411895	PCB, 1250-55 (UNLOADED)	21793	411895
(28)	455322-001	PLATE, RF, BNC	21793	455322-001
(38)	616251	SCREW, PPH, SEMS ASSY., 4-40X.250 (3 REQ'D)	78189	-
(39)	920962	LOCTITE, 242, MED STR	05972	242

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401751 - PCB ASSY., 18 GHZ X 2 MODULE (OPTION 60A)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C4	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C8	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C9	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C10	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1	210070	DIODE, POWER, 3 AMP	04713	MR501
CR2	210070	DIODE, POWER, 3 AMP	04713	MR501
J12	601244	CONNECTOR, PLUG, RT. ANGLE, 2P	27264	22-12-2024
K2	601233	SWITCH, COAX, SPDT, 18 GHZ	50667	D3-412A001
K3	601233	SWITCH, COAX, SPDT, 18 GHZ	50667	D3-412A001
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N

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401751 - PCB ASSY., 18 GHZ X 2 MODULE (OPTION 60A) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
26	411751	PCB, 18/28 GHZ MODULE (UNLOADED)	21793	411751
28	454848-060	PLATE, UWAVE INTERFACE	21793	454848-060
30	454996	SHIELD, UW MODULE	21793	454996
32	524999	WIRE, TEFLON, STRANDED, 24G, BLK	---	---
34	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
39	615019	SCREW, PPH, 2-56 X .625 (4 REQ'D)	---	---
40	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (12 REQ'D)	78189	---
42	617002	NUT, HEX, 2-56 (4 REQ'D)	---	---
44	617101	WASHER, FLAT, #2, LIGHT SERIES (4 REQ'D)	---	---

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404370 - PCB ASSY., 18 GHZ X 4 MODULE (OPTION 60B)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C4	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C8	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C9	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C10	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1	210070	DIODE, POWER, 3 AMP	04713	MR501
CR2	210070	DIODE, POWER, 3 AMP	04713	MR501
J12	601244	CONNECTOR, PLUG, RT. ANGLE, 2P	27264	22-12-2024
K1	601233	SWITCH, COAX, SPDT, 18 GHZ	50667	D3-412A001
K2	601233	SWITCH, COAX, SPDT, 18 GHZ	50667	D3-412A001
K3	601233	SWITCH, COAX, SPDT, 18 GHZ	50667	D3-412A001
K4	601233	SWITCH, COAX, SPDT, 18 GHZ	50667	D3-412A001
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244

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404370 - PCB ASSY., 18 GHZ X 4 MODULE (OPTION 60B) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
26	411751	PCB, 18/28 GHZ MODULE (UNLOADED)	21793	411751
28	454839-1	PLATE, UWAVE INTERFACE	21793	454839-1
30	454996	SHIELD, UW MODULE	21793	454996
32	524999	WIRE, TEFLON, STRANDED, 24G, BLK	---	---
34	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
39	615019	SCREW, PPH, 2-56 X .625 (8 REQ'D)	---	---
40	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (12 REQ'D)	78189	---
42	617002	NUT, HEX, 2-56 (8 REQ'D)	---	---
44	617101	WASHER, FLAT, #2, LIGHT SERIES (8 REQ'D)	---	---
45	601236	TERMINAL, CRIMP, SNAP-IN, 22-30 GUAGE (2 REQ'D)	27264	08-55-0110
46	601245	CONNECTOR, HOUSING, 2 POS RECEPTACLE	27264	22-01-2026

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404371 - PCB ASSY., 26 GHZ X 2 MODULE (OPTION 61A)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C4	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C8	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C9	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C10	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1	210070	DIODE, POWER, 3 AMP	04713	MR501
CR2	210070	DIODE, POWER, 3 AMP	04713	MR501
J12	601244	CONNECTOR, PLUG, RT. ANGLE, 2P	27264	22-12-2024
K2	601232	SWITCH, COAX, SPDT, 26 GHZ	SEE NOTE 2 TABLE 6.1	SR-2MIN-H-26
K3	601232	SWITCH, COAX, SPDT, 26 GHZ	SEE NOTE 2 TABLE 6.1	SR-2MIN-H-26
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN

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404371 - PCB ASSY., 26 GHZ X 2 MODULE (OPTION 61A) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
26	411751	PCB, 18/28 GHZ MODULE (UNLOADED)	21793	411751
28	454848-061	PLATE, UWAVE INTERFACE	21793	454848-061
30	454996	SHIELD, UW MODULE	21793	454996
32	524999	WIRE, TEFLON, STRANDED, 24G, BLK	---	---
34	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
39	615019	SCREW, PPH, 2-56 X .625 (4 REQ'D)	---	---
40	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (12 REQ'D)	78189	---
42	617002	NUT, HEX, 2-56 (4 REQ'D)	---	---
44	617101	WASHER, FLAT, #2, LIGHT SERIES (4 REQ'D)	---	---

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404372 - PCB ASSY., 26 GHZ X 4 MODULE (OPTION 61B)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C4	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1 KV, 20%	56289	C023B102E271M
C7	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C8	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C9	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C10	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1	210070	DIODE, POWER, 3 AMP	04713	MR501
CR2	210070	DIODE, POWER, 3 AMP	04713	MR501
J12	601244	CONNECTOR, PLUG, RT. ANGLE, 2P	27264	22-12-2024
K1	601232	SWITCH, COAX, SPDT, 26 GHZ	SEE NOTE 2 TABLE 6.1	SR-2MIN-H-26
K2	601232	SWITCH, COAX, SPDT, 26 GHZ	SEE NOTE 2 TABLE 6.1	SR-2MIN-H-26
K3	601232	SWITCH, COAX, SPDT, 26 GHZ	SEE NOTE 2 TABLE 6.1	SR-2MIN-H-26
K4	601232	SWITCH, COAX, SPDT, 26 GHZ	SEE NOTE 2 TABLE 6.1	SR-2MIN-H-26
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
U1	230577	IC, OCTAL BUFFER	27014	74LS244

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404372 - PCB ASSY., 26 GHZ X 4 MODULE (OPTION 61B) (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
W1	600245	JUMPER, INSULATED	55210	L-2007-1LP
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
26	411751	PCB, 18/28 GHZ MODULE (UNLOADED)	21793	411751
28	454839-2	PLATE, UWAVE INTERFACE	21793	454839-2
30	454996	SHIELD, UW MODULE	21793	454996
32	524999	WIRE, TEFLON, STRANDED, 24G, BLK	---	---
34	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP1-3)	00779	1-87022-0
39	615019	SCREW, PPH, 2-56 X .625 (8 REQ'D)	---	---
40	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (12 REQ'D)	78189	---
42	617002	NUT, HEX, 2-56 (8 REQ'D)	---	---
44	617101	WASHER, FLAT, #2, LIGHT SERIES (8 REQ'D)	---	---
46	601236	TERMINAL, CRIMP, SNAP-IN, 22-30 GUAGE (2 REQ'D)	27264	08-55-0110
47	601245	CONNECTOR, HOUSING, 2 POS RECEPTACLE	27264	22-01-2026

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401995 - PCB ASSEMBLY - 1250-65

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1	100126	CAP, TANTA, 6.8 UF, 35V, 20%	05397	T355F685M035A5
C2	110126	CAP, TANTA, 6.8 UF, 35V, 20%	05397	7355F685M035A5
C3	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C4	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C5	100062	CAP, CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C6	100120	CAP, CERAM, 270 PF 1000V, 20%	56289	C023B102E271M
C7	100062	CAP. CERAM, .01 UF 100V, 10%	05397	C320C103K1R5CA
C8	100062	CAP, CERAM,.01 UF 100V, 10%	05397	C320C103K1R5CA
C9	110126	CAP, TANTA, 6.8UF, 35V, 20%	05397	T355F685M035A5
C10	100133	CAP, CERAM, 1UF, LOW PROFILE, 20%	72982	8131LP-100-Z5U-1
CR1-CR8	210004	DIODE, SILICON	81349	1N4004
CR9	210070	DIODE, POWER, 3A	04713	MR501
CR10	210070	DIODE, POWER, 3A	04713	MR501
J7	601244	CONNECTOR, PLUG, RT. ANGLE, 2-PIN	27264	22-12-2024
K1-K4	602012	SWITCH, COAXIAL, 18GHz	12598	SR-TMIN-H-L
P1	601227	CONNECTOR, PCB, 64-PIN, SOCKET PLUG	00779	531796-2
Q1-Q8	200167	TRANSISTOR, PNP	04713	MPSU55
R1-R8	001730	RES. CARBON, 470 OHM, 1/2W, 5%	81349	RC20GF471J
TP1	600786	POST. TERMINAL, MACHINE APPLIED STRIP	00779	1-87022-0
TP2	600786	POST. TERMINAL, MACHINE APPLIED STRIP	00779	1-87022-0
TP3	600786	POST. TERMINAL, MACHINE APPLIED STRIP	00779	1-87022-0
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	SN74LS138N3
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DECODER	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N/A-1
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL INVERTING TRI-STATE BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A

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401995 - PCB ASSEMBLY - 1250-65

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
Z1	080005	RES NETWORK, 6P8R, 10K, 2%, .9W	11236	750-61-R10K
Z2	080008	RES NETWORK, 16P8R, 1K, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, 16P8R, 15K, 2%	11236	761-3-R15K
Z4	080070	RES NETWORK, 10P9R, 47K, 2%	11236	750-101-R47K
Z5	080072	RES NETWORK, 16P8R, 100K, 2%	11236	761-3-R100K
Z6	080015	RES NETWORK, 10P9R, 10K, 5%	71450	750-101-R10K
34	411995	PCB, 1250-65 (UNLOADED)	21793	411995
38	455817	PANEL, FRONT MICROWAVE	21793	455817
39	454855-001	SHIELD, MICROWAVE MODULE	21793	454855-001
41	500056	TUBING, SHRINK, CLR, 3/16 DIA	---	---
42	524000	WIRE, TEFLON, STRANDED, 24 GA, WHT	---	---
43	524222	WIRE, TEFLON, STRANDED, 24 GA, RED	---	---
44	524999	WIRE, TEFLON, STRANDED, 24 GA, BLU	---	---
53	610899	TIE, CABLE, SELF-LOCKING, 1/16 x 2 (4 REQ'D)	58730	TY-232M
54	611095	SCREW, CAPTIVE PANEL, SLOTTED (2 REQ'D)	06540	6101-SS-0440
55	615013	SCREW, PPF, 2-56 x .188 (8 REQ'D)	---	---
58	616151	SCREW, PPH, SEMS, ASSY, 4-40 x .250 (9 REQ'D)	78189	---

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404381 - TERMINAL BLOCK ASSY., QUICK DISCONNECT (OPTION 80)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
2	401761	PCB ASSY., SHIELD COMMON	21793	401761
5	454837	BRACKET, Q.D. TERMINAL BLOCK	21793	454837
6	454838	PLATE, Q.D. TERMINAL BLOCK	21793	454838
7	454999	BRACKET, INTERLOCK	21793	454999
9	454857	STRAIN RELIEF, SPONGE (2 REQ'D)	21793	454857
10	454860	SPRING, RETAINING, SINGLE (2 REQ'D)	21793	454860
12	601242	CONNECTOR, RECEPT., EDGE/CABLE (2 REQ'D)	58982	PCD-1-B-22
13	611095	SCREW, CAPTIVE PANEL (2 REQ'D)	06540	6102-SS-0440
14	615050	SCREW, PPH, 4-40 X 1.00 (4 REQ'D)	---	---
15	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (5 REQ'D)	78189	---
16	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---
17	921041	LABEL SET, 1250 (2 REQ'D)	21793	921041
19	920962	LOCTITE, 242, MED. STR	05972	242
20	601237	TERMINAL, CRIMP, SNAP-IN, 22-26 GUAGE	00779	102106-2

401761 - PCB ASSY., SHIELD COMMON

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
2	411761	PCB, SHIELD COMMON (UNLOADED)	21793	411761
5	601839-005	CONNECTOR, HEADER, 5 POST (2 REQ'D)	21793	601839-005
6	601733-006	CONNECTOR, HEADER, 6 POST (2 REQ'D)	21793	601733-006

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404363 - OPTION 90, KEYBOARD DISPLAY

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
1	401741	PCB ASSY., KEYBOARD DISPLAY	21793	401741
3	454831	PANEL, FRONT	21793	454831
5	454853	OVERLAY, CONTROL PANEL	21793	454853
7	454877	HANDLE (2 REQ'D)	21793	454877
9	454890	EXTRUSION, HOUSING FRAME (2 REQ'D)	21793	454890
11	454892	EXTRUSION, RACK FLANGE, DISPLAY (2 REQ'D)	21793	454892
12	454893	EXTRUSION, HOUSING BEZEL (2 REQ'D)	21793	454893
13	454894	PLATE, REAR, DISPLAY	21793	454894
14	610389	GROMMET, CATERPILLAR	03296	G51H-B
15	601246	SWITCH, ROCKER, SPDT	SEE NOTE 1 TABLE 6.1	1801-1143
16	610887	SCREW, PFH, 6-32 X .375 (4 REQ'D)	08226	507C632R6
17	610890	SCREW, TAPTITE, THREAD FORMING, 6-32 X .375 (8 REQ'D)	78189	---
18	610912	CLIP, FLAT, CABLE (2 REQ'D)	34785	031-0100
21	616251	SCREW, PPH, SEMS ASSY., 4-40 X .250 (9 REQ'D)	---	---
22	617006	NUT HEX, 8-32 (4 REQ'D)	---	---
23	617104	WASHER, FLAT, #8, LIGHT SERIES (4 REQ'D)	---	---
24	617129	WASHER, LOCK, #8, LIGHT SERIES (4 REQ'D)	---	---
25	910655	SPEC., TAPE, FOAM	34359	4042
26	615042	SCREW, PPH, 4-40 X .250 (2 REQ'D)	---	---

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401741 - PCB ASSY., KEYBOARD DISPLAY

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1-6	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C7	100117	CAP, CERAM, 470 PFD, 1000V, 20%	56289	C023B102E471M
C8	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
C9	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C11	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C12	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C13	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C14	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C15	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C16-18	100133	CAP, CERAM, .1 MFD, LOW PROFILE, 20%	72982	8131LP-100-651-104M
CR1-8	210108	DIODE, LIGHT EMITTING, RED	25088	LDH5122
DS1	210110	DIODE, LIGHT EMITTING	50434	HPDL-2416
DS2	210110	DIODE, LIGHT EMITTING	50434	HPDL-2416
DS3	210110	DIODE, LIGHT EMITTING	50434	HPDL-2416
DS4	210110	DIODE, LIGHT EMITTING	50434	HPDL-2416
P1	601239	CABLE ASSY.	21793	601239
R1	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R2	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R3	000221	RES, CARBON, 220 OHM, 1/4W, 5%	81349	RC07GF221J
R4	000471	RES, CARBON, 470 OHM, 1/4W, 5%	81349	RC07GF471F
R5	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R6	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R7	000683	RES, CARBON, 68K, 1/4W, 5%	81349	RC07GF683J
R8	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R9	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R10	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
R11	000103	RES, CARBON, 10K, 1/4W, 5%	81349	RC07GF103J
U1	230402	IC, DIGITAL	27014	74LS30N
U2	230619	IC, HEX, TRI-STATE INV. BUFFER	01295	SN74LS368
U3	230637	IC, DIGITAL	18324	N74LS244

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401741 - PCB ASSY., KEYBOARD DISPLAY (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
U4	230637	IC, DIGITAL BUFFER	18324	N74LS244
U5	230637	IC, DIGITAL BUFFER	18324	N74LS244
U6	230386	IC, 8-BIT REGISTER	27014	74LS273
U7	230336	IC, HEX SCHMITT TRIGGER	01295	74LS14
U8	230367	IC, DIGITAL DIVIDER	27014	74LS93
U9	230350	IC, DIGITAL DUAL	27014	74LS74
U10	230237	IC, DUAL ONE-SHOT	01295	SN74LS123N
U11	230350	IC, DIGITAL DUAL	27014	74LS74
U12	230234	IC, 14-DIP, HEX INVERTER	01295	SN74LS04N
U13	230368	IC, DEMULTIPLEXER	27014	74LS138
U14	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
Z1	080042	RES NETWORK, 22K, 10P9R	11236	750-101-R22K
Z2	080022	RES NETWORK, CERMET, 220 OHM, 14P7R, 2%	11236	760-3-R220
Z3	080015	RES NETWORK, 10K, 5%	91637	CSP-10E-01103J
Z4	080015	RES NETWORK, 10K, 5%	91637	CSP-10E-01103J
39	411741	PCB, KEYBOARD DISPLAY (UNLOADED)	21793	411741
41	523444	WIRE, TEFLON, STRANDED, 22G, YEL	___	___
42	523888	WIRE, TEFLON, STRANDED, 22G, GRAY	___	___
43	601211	SWITCH, PUSH BUTTON (44 REQ'D)	21793	601211
45	601238	TERMINAL, CRIMP, 18 GA (2 REQ'D)	00779	2-520337-2
47	220000013	TERMINAL, SOLDER (4 REQ'D: TP1-4)	21793	220000013
51	921007	CAP, SWITCH, GRAY (44 REQ'D)	21793	921007

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405066 - 75 OHM RF MUX 4(1x4) - OPTION 750

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
C1,2	110126	CAP, TANTA, 6.8 MFD, 35V, 20%	05397	T368B685M035AS
C3-5	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
C6	100120	CAP, CERAM, 270 PFD, 1KV, 20%	56289	C023B102E271M
C7-10	100062	CAP, CERAM, .01 MFD, 100V, 10%	72982	8121-100-W5R0-103K
J1-10, 12-21	601777	CONNECTOR, COAX RECEPTACLE, 75 OHM	91836	2027-5-9
K1-22	310234	RELAY, REED, 1P1T, 12V	71707	9402-12-03 1110
L1-10, 12-25	R-23-7246	INDUCTOR, RF AXIAL LEAD, 33 NH, 10%	71279	551-5172-03-02-00
P1	601227	CONNECTOR, PCB, 64 SOCKET PLUG	00779	531796-2
RV1	220102	VARISTOR, 56V, 1.7 W-S	03508	V56ZA2
U1	230577	IC, OCTAL BUFFER	27014	74LS244
U2	230368	IC, DEMULTIPLEXER	27014	74LS138
U3	230577	IC, OCTAL BUFFER	27014	74LS244
U4	230766	IC, INTERFACE, DIFFERENTIAL	27014	DS26LS32CN
U5	230768	IC, DIGITAL	04713	SN74LS139N
U6	230547	IC, QUAD COMPARATOR	27014	LM339N
U7	230825	IC, OCTAL LATCH	02735	74HCT273
U8	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U9	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U10	230825	IC, OCTAL LATCH	02735	74HCT273
U11	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U12	230774	IC, TRANSISTOR ARRAY	56289	ULN-2803A
U13	230825	IC, OCTAL LATCH	02735	74HCT273
U14	230771	IC, OCTAL, 3-STATE INV. BUFFER	04713	MC74HC240N
U15	230774	IC, TRANSISTOR ARRAY	55210	ULN-2803A

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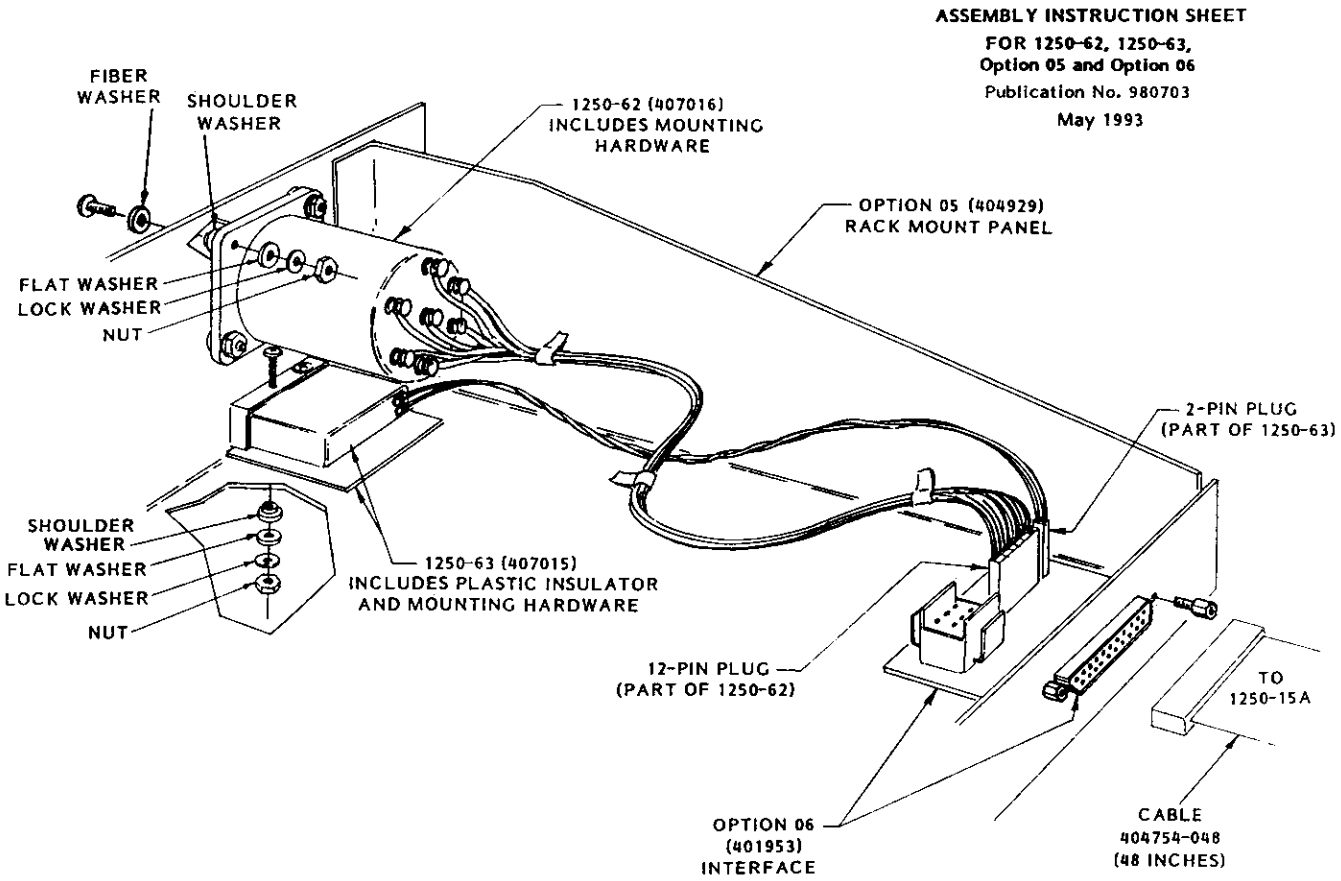
405066 - 75 OHM RF MUX 4(1x4) - OPTION 750 (CONT'D)

REF. DESIG.	RACAL-DANA P/N	DESCRIPTION	FSC	MANU P/N
W2	600245	JUMPER, INSULATED	55210	L-2007-1LP
Z1	080005	RES NETWORK, CERMET, 10K, 6P5R, 2%	11236	750-61-R10K
Z2	080008	RES NETWORK, CERMET, 1K, 16P8R, 2%	11236	761-3-R1K
Z3	080013	RES NETWORK, CERMET, 15K, 16P8R, 2%	11236	761-3-R15K
Z4	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z5	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z6	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z7	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
Z8	080070	RES ARRAY, 9 RES, 47K	11236	750-101-R47K
Z9	080072	RES ARRAY, 8 RES, 100K	11236	761-3-R100K
27	415066	PCB, 1250-750 (UNLOADED)	21793	415066
31	455322-003	PLATE, RF, BNC	21793	455322-003
34	600786	POST, MACHINE APPLIED STRIP (3 REQ'D: TP 1-3)	00779	1-87022-0
39	610389	GROMMET, CATERPILLAR	03296	G51H-B
41	616251	SCREW, PPH, SEMS ASSY. 4-40 X .250 (3 REQ'D)	78189	---
43	920962	LOCTITE, 242, MED. STR.	05972	242

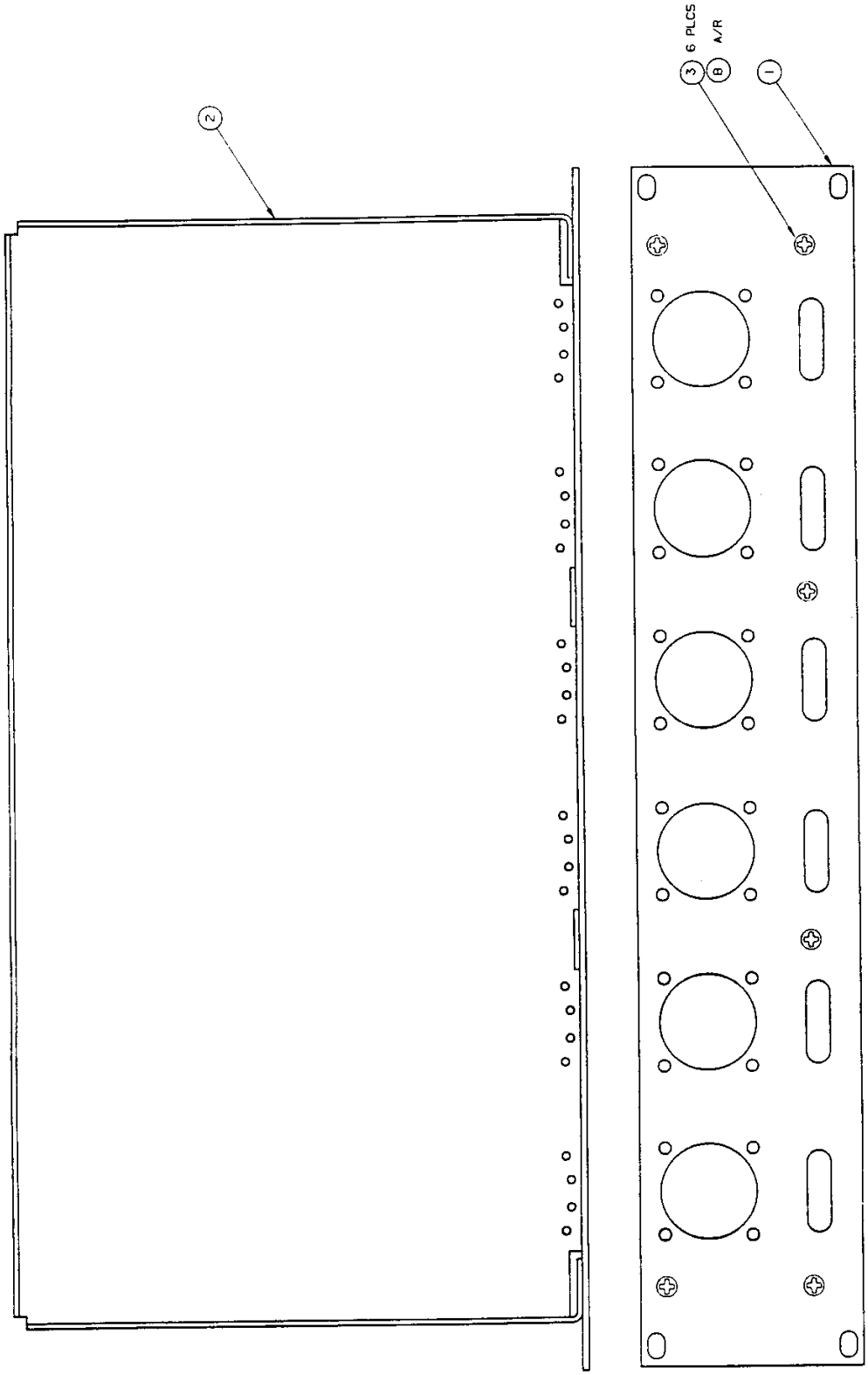
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Chapter 9

OPTION 05,06 (1250-62, 1250-63)



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DOCUMENT TITLE

CHASSIS ASSY, OPT 05

SIZE	CODE IDENT NO	DOCUMENT NO	REV
D	21793	404929	B

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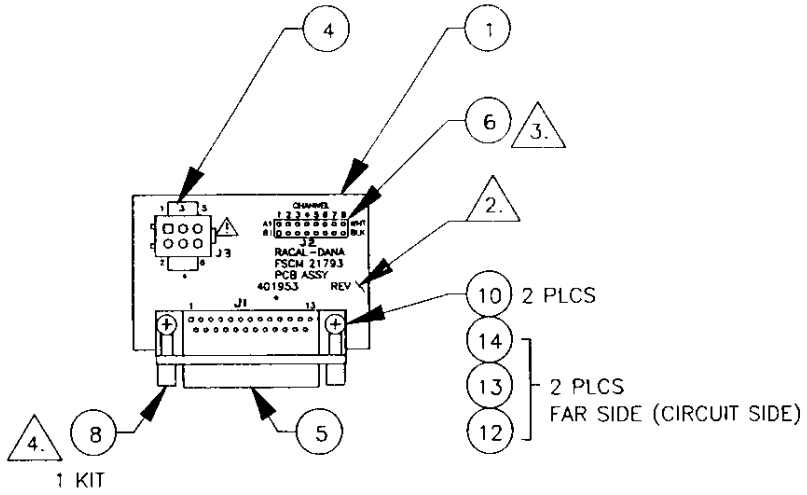
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3. INCLUDE COPY OF THIS DRAWING IN SHIPPING PACKAGE FOR CUSTOMER REFERENCE.

2 MOUNTING HARDWARE FOR ELECTRICAL COMPONENTS NOT INCLUDED.

1 BAG AND TAG ITEMS 4, 5, 6 AND 7, PRIOR TO SHIPPING.

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4. DISCARD ALL EXTRA HARDWARE PACKAGED W/ITEM 8 AND INSTALL SCREWLOCK AT J1 (ITEM 5). (WILL BE REMOVED BY CUSTOMER AND INSTALLED THRU PANEL.)

3. INSTALL ITEM 6 WITH SHORT PINS INSTALLED IN PCB (ITEM 1).

2. INKSTAMP LATEST REV. ON COMPONENT SIDE IN INDICATED AREA.

1. REFERENCE SCHEMATIC 431953.

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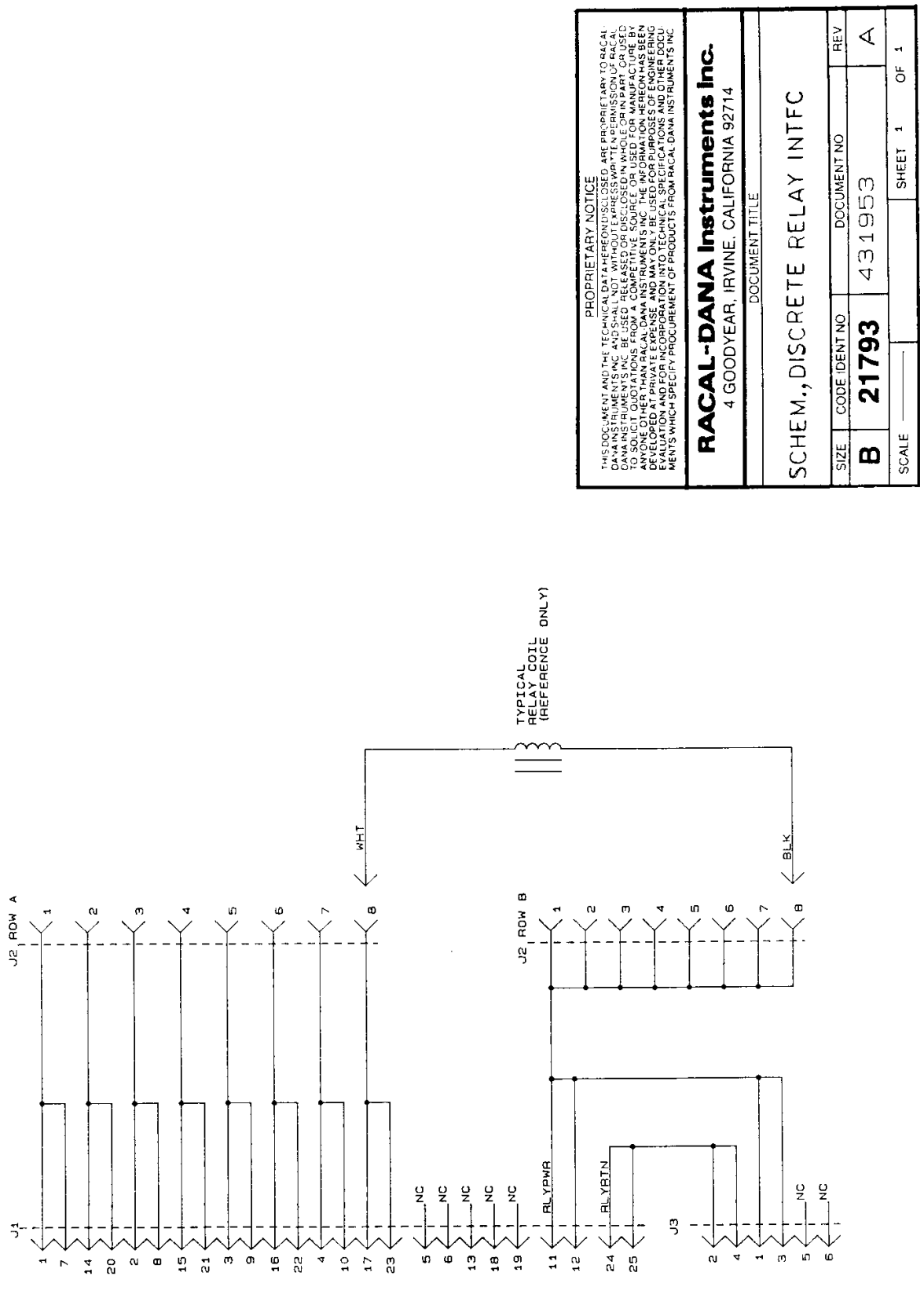
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4 GOODYEAR, IRVINE, CALIFORNIA 92714

DOCUMENT TITLE: PCB ASSY, DISCRETE RELAY INTFC

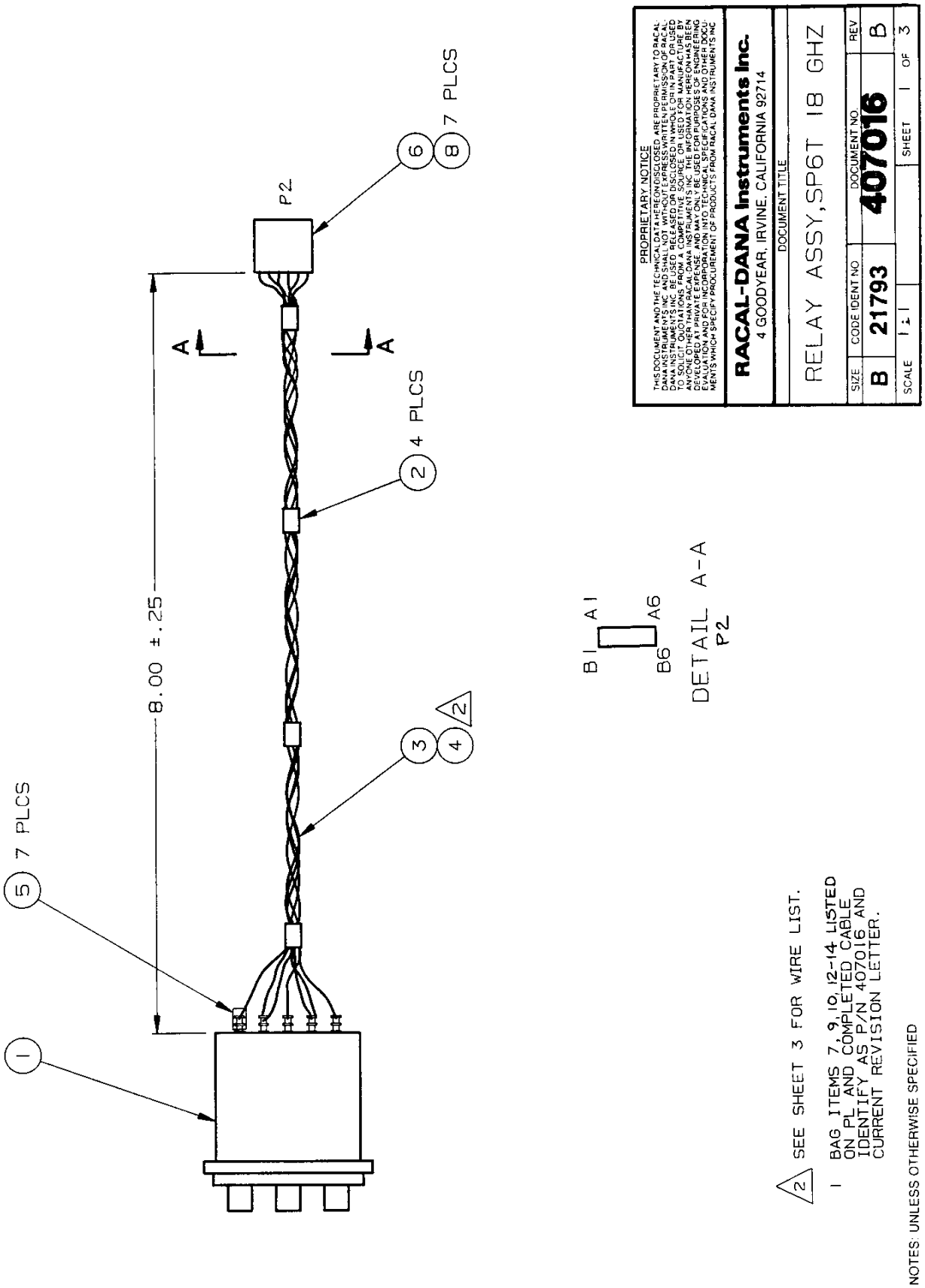
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C	21793	401953	A

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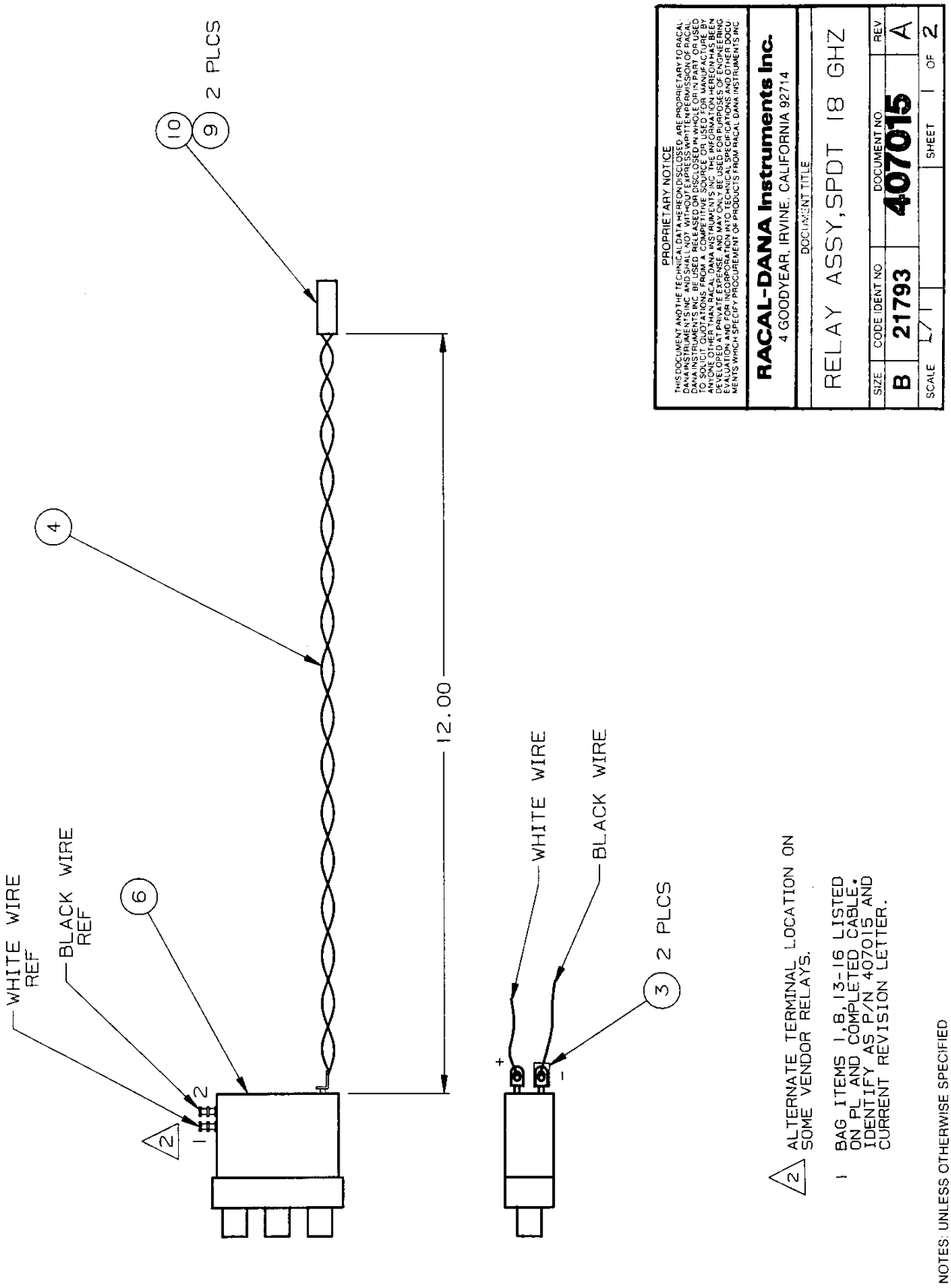
WIRE LIST

FROM	TO	CONDUCTOR TYPE GAUGE,COLOR	PART NUMBER	WIRE LENGTH	REFERENCE
COM 310203	P2-B1 611053	WIRE,TEF,STRND 24 GA, BLK	524000	8"	
1 310203	P2-A1 611053	WIRE,TEF,STRND 24 GA, WHT	524999	8"	
2 310203	P2-A2 611053	WIRE,TEF,STRND 24 GA, WHT	524999	8"	
3 310203	P2-A3 611053	WIRE,TEF,STRND 24 GA, WHT	524999	8"	
4 310203	P2-A4 611053	WIRE,TEF,STRND 24 GA, WHT	524999	8"	
5 310203	P2-A5 611053	WIRE,TEF,STRND 24 GA, WHT	524999	8"	
6 310203	P2-A6 611053	WIRE,TEF,STRND 24 GA, WHT	524999	8"	

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DOCUMENT TITLE	SIZE	CODE ID NO	DOCUMENT NO.	REV
RELAY ASSY,SP6T 18 GHZ	A	21793	407016	A
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DOCUMENT TITLE

RELAY ASSY, SPDT 18 GHZ

SIZE	CODE IDENT NO	DOCUMENT NO	REV
B	21793	407015	A

SCALE | SHEET 1 OF 2

NOTES: UNLESS OTHERWISE SPECIFIED

2 ALTERNATE TERMINAL LOCATION ON SOME VENDOR RELAYS.

1 BAG ITEMS 1,8,13-16 LISTED ON PL AND COMPLETED CABLE, IDENTIFY AS P/N 407015 AND CURRENT REVISION LETTER.

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404929 CHASSIS ASSY., OPT. 05

REF DESIG	RACAL-DANA P/N	DESCRIPTION	FSC	MANUFACTURER'S P/N
{1}1	455782	FRONT PANEL, OPTION 05	21793	455782
{2}1	455783	CHASSIS OPT. 05	21793	455783
{3}6	615558	SCREW, PFH, 100 DEG., CSK, 6-32 X .375	-	-
{4}24	610947	WASHER, SHOULDER, #6	86928	5607-73
{5}24	611620	WASHER, FIBER FLAT, #6	83330	2160
{6}12	610719	WASHER, SHOULDER, #4	06540	2705-18763-N116
{7}3	455785	INSULATOR, SWITCH COAX	21793	455785
{8}A/R	920962	LOCTITE, 242, MED STR.	05972	272

401953 PCB ASSY., DISCRETED RELAY, OPT. 06

REF DESIG	RACAL-DANA P/N	DESCRIPTION	FSC	MANUFACTURER'S P/N
J1	601722	CONNECTOR, PLUG, D-SUB, 25-PIN	59610	DBE25P-731
J2	601731	CONNECTOR, PCB, PLUG, 16-PIN	52072	CA-D16-23B-43
J3	601218	CONNECTOR, PWR, PLUG, 6-PIN	00779	9-350258-1
{1}1	411953	PCB DISCRETE RELAY (UNLOADED)	21793	411953
{8}1	611092	HARDWARE KIT, D-SUB, 4-40 THD, FEMALE	00779	205817-3
{10}2	615043	SCREW, PPH, 4-40X.312	-	-
{12}2	617016	NUT, HEX, 4-40	---	---
{13}2	617102	WASHER, FLAT, #4, LIGHT SERIES	-	-
{14}2	617127	WASHER, LOCK, #4, LIGHT SERIES	-	-

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407016 - 1250-62 RELAY ASSY., SP6T 18 GHZ

REF DESIG	RACAL-DANA P/N	DESCRIPTION	FSC	MANUFACTURER'S P/N
{1}1	310203	RELAY, 1P6T, 18 GHZ	50667	HQ6-412K3-F
{2}4	610777	CABLE TIE	16956	08-432
{3}A/R	524000	WIRE, TEFLON STRANDED, 24 GA, WHT	-	-
{4}A/R	524999	WIRE, TEFLON STRANDED, 24 GA, BLU	-	-
{5}A/R	500009	TUBING, SHRINK,. 12 ID, BLK	29005	RNF-100-1-1/8
{6}1	601511-012	CONNECTOR, RECEPT, 12-PIN	00779	2-530902-0
{7}4	610935	WASHER, SHOULDER, #6	86928	5607-72
{8}7	611053	TERMINAL, CRIMP	00779	530553-2
{9}4	611620	WASHER, FIBER FLAT, #6	83330	2160
{10}4	615062	SCREW, PPH, 6-32 X .625	-	-
{12}4	617005	NUT, HEX, 6-32	-	-
{13}4	617103	WASHER, FLAT, LIGHT, #6	-	-
{14}4	617128	WASHER, LOCK, #6, LIGHT SERIES	-	-

407015 - 1250-63 RELAY ASSY., SPDT 18 GHZ

REF DESIG	RACAL-DANA P/N	DESCRIPTION	FSC	MANUFACTURER'S P/N
{1}1	455785	INSULATOR, SWITCH COAX	21793	455785
{3}A/R	500009	TUBING, SHRINK,. 12 ID, BLK	29005	RNF-100-1-1/8
{4}A/R	500132	WIRE, TEFLON TWISTED PAIR, 24 GA, BLK/WHT	-	-
{6}1	601233	SWITCH, COAX, SPDT, 18 GHZ	25656	2S1A31
{8}2	610719	WASHER, SHOULDER, #4	06540	2705-18763-N116
{9}2	611053	TERMINAL, CRIMP	00779	530553-2
{10}1	611054	CONNECTOR, CABLE, 2-PIN	00779	530554-1
{13}2	615049	SCREW, PPH, 4-40 X .875	-	-
{14}2	617004	NUT, HEX, 4-40	-	-
{15}2	617102	WASHER, FLAT, #4, LIGHT SERIES	-	-
{16}2	617127	WASHER, LOCK, #4, LIGHT SERIES	-	-

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05972	LOCTITE CORP. HARTFORD, CT
06540	AMATOM ELECTRONIC HARDWARE NEW ROCHELLE, NY
16956	DENNISON MFG. CO. FRAMINGTON, MA
21793	RACAL-DANA INSTRUMENTS INC. IRVINE, CA
25656	DB PRODUCTS INC. PASADENA, CA
29005	STORM PRODUCTS CO. LOS ANGELES, CA
50667	DYNATECH MICROWAVE TECH CALABASAS, CA
52072	CIRCUIT ASSY. CORP. COSTA MESA, CA
59610	SOURIAU INC. VALENCIA, CA
83330	HERMAN H. SMITH, INC. BROOKLYN, NY
86928	SEASTROM MFG. CO. GLENDALE, CA

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