

RACAL INSTRUMENTS 1260-112 MULTIPLEXER PLUG-IN

PUBLICATION NO. 980824-112

EADS North America Defense Test and Services, Inc.
4 Goodyear, Irvine, CA 92618
Tel: (800) 722-2528, (949) 859-8999; Fax: (949) 859-7139

info@eads-nadefense.com
sales@eads-nadefense.com
helpdesk@eads-nadefense.com
<http://www.eads-nadefense.com>



PUBLICATION DATE: May 17, 2006

Copyright 2002 by EADS North America Defense Test and Services, Inc. Printed in the United States of America. All rights reserved. This book or parts thereof may not be reproduced in any form without written permission of the publisher.

THANK YOU FOR PURCHASING THIS EADS NORTH AMERICA DEFENSE TEST AND SERVICES PRODUCT

For this product, or any other EADS North America Defense Test and Services, Inc. product that incorporates software drivers, you may access our web site to verify and/or download the latest driver versions. The web address for driver downloads is:

<http://www.eads-nadefense.com/downloads>

If you have any questions about software driver downloads or our privacy policy, please contact us at

info@eads-nadefense.com

WARRANTY STATEMENT

All EADS North America Defense Test and Services, Inc. products are designed and manufactured to exacting standards and in full conformance to EADS ISO 9001:2000 processes.

This warranty does not apply to defects resulting from any modification(s) of any product or part without EADS North America Defense Test and Services, Inc. express written consent, or misuse of any product or part. The warranty also does not apply to fuses, software, non-rechargeable batteries, damage from battery leakage, or problems arising from normal wear, such as mechanical relay life, or failure to follow instructions.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. The remedies provided herein are buyer's sole and exclusive remedies.

For the specific terms of your standard warranty, or optional extended warranty or service agreement, contact your EADS North America Defense Test and Services, Inc. customer service advisor. Please have the following information available to facilitate service.

1. Product serial number
2. Product model number
3. Your company and contact information

You may contact your customer service advisor by:

E-Mail:	Helpdesk@eads-nadefense.com	
Telephone:	+1 800 722 3262	(USA)
Fax:	+1 949 859 7309	(USA)

RETURN of PRODUCT

Authorization is required from EADS North America Defense Test and Services, Inc. before you send us your product for service or calibration. Call or contact the Customer Support Department at 1-800-722-3262 or 1-949-859-8999 or via fax at 1-949-859-7139. We can be reached at: helpdesk@eads-nadefense.com.

PROPRIETARY NOTICE

This document and the technical data herein disclosed, are proprietary to EADS North America Defense Test and Services, Inc., and shall not, without express written permission of EADS North America Defense Test and Services, Inc., be used, in whole or in part to solicit quotations from a competitive source or used for manufacture by anyone other than EADS North America Defense Test and Services, Inc. The information herein has been developed at private expense, and may only be used for operation and maintenance reference purposes or for purposes of engineering evaluation and incorporation into technical specifications and other documents which specify procurement of products from EADS North America Defense Test and Services, Inc.

DISCLAIMER

Buyer acknowledges and agrees that it is responsible for the operation of the goods purchased and should ensure that they are used properly and in accordance with this handbook and any other instructions provided by Seller. EADS North America Defense Test and Services, Inc. products are not specifically designed, manufactured or intended to be used as parts, assemblies or components in planning, construction, maintenance or operation of a nuclear facility, or in life support or safety critical applications in which the failure of the EADS North America Defense Test and Services, Inc. product could create a situation where personal injury or death could occur. Should Buyer purchase EADS North America Defense Test and Services, Inc. product for such unintended application, Buyer shall indemnify and hold EADS North America Defense Test and Services, Inc., its officers, employees, subsidiaries, affiliates and distributors harmless against all claims arising out of a claim for personal injury or death associated with such unintended use.

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

Racal Instruments

EC Declaration of Conformity

We

Racal Instruments Inc.
4 Goodyear Street
Irvine, CA 92718

declare under sole responsibility that the

1260-112 Power Switch Plug In Module, P/N 407696

They conform to the following Product Specifications:

Safety: EN61010-1:1993+A2:1995

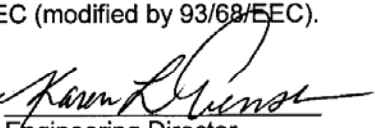
EMC: EN61326:1997+A1:1998

Supplementary Information:

The above specifications are met when the product is installed in a Racal Instruments certified mainframe with faceplates installed over all unused slots, as applicable

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC (modified by 93/68/EEC).

Irvine, CA, June 28, 2002


Engineering Director

This page was left intentionally blank.

Table of Contents

Chapter 1	1-1
SPECIFICATIONS	1-1
Introduction.....	1-1
Specifications	1-1
Power Dissipation.....	1-3
About MTBF	1-4
Ordering Information	1-5
Chapter 2	2-1
INSTALLATION INSTRUCTIONS	2-1
Unpacking and Inspection	2-1
Reshipment Instructions.....	2-1
Installation	2-2
Module Configuration	2-2
Front Panel Connectors.....	2-2
Mating Connectors.....	2-8
Chapter 3	3-1
MODULE OPERATION	3-1
Setting the Module Address	3-1
Operating Modes.....	3-2
Operating In Message-Based Mode.....	3-4
Channel Descriptors For The 1260-112	3-4
Reply To The MOD:LIST? Command.....	3-5

Operating The 1260-112 in Register-Based Mode.....3-5

 Test Points.....3-8

 1260-112 Example Code.....3-9

Chapter 44-1

DRAWINGS4-1

Chapter 55-1

PARTS LIST5-1

Chapter 66-1

OPTIONAL ASSEMBLIES6-1

Chapter 77-1

PRODUCT SUPPORT7-1

 Product Support7-1

 Warranty.....7-1

List of Figures

Figure 2-1, Front-Panel Connector Pin Numbering 2-3

Figure 3-1, Message-Based Mode of Operation 3-3

Figure 3-2, Register-Based Mode of Operation 3-3

List of Tables

Table 2-1, 1260-112 Front-Panel Connections 2-4

Table 3-1, Control Register Channel Assignments 3-7

This page was left intentionally blank.

Chapter 1

SPECIFICATIONS

Introduction

The 1260-112 is a plug-in switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. It switches 20 two-wire channels of DPDT switches. Its switching current is 2 A at 220 VDC or 250 VAC. The 3 dB bandwidth is 100 MHz minimum.

The 1260-112 includes the following features:

- Standard Adapt-a-Switch plug-in design, providing for ease of replacement
- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Specifications

Bandwidth (-3dB)	> 120MHz
Insertion Loss	
300 kHz	< 0.5 dB
1 MHz	< 0.5 dB
10 MHz	< 0.5 dB
Isolation	
300 kHz	> 70 dB
1 MHz	> 65 dB
10 MHz	> 50 dB
Crosstalk	
300 KHz	< -75 dB
1 MHz	< -70 dB
10 MHz	< -45 dB
Switching Voltage	
AC	250 V, Max
DC	220 V, Max

Switching Current	
AC	2 A, Max
DC	2 A, Max
Switching Power	
AC	125 VA, Max
DC	60 W, Max
Path resistance	< 250 M Ω
Thermal EMF	< 50 μ V
Capacitance	
Channel-Chassis	< 100 pF
Open-Channel	< 50 pF
Insulation resistance	> 10 ⁹ Ω
Relay Settling Time	< 10 ms
Shock	30g, 11 ms, 1/2 sine wave (MIL-T-28800E)
Vibration	0.013 in. P-P, 5-55 Hz (MIL-T-28800E)
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% \pm 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Power Requirements	
+5 VDC	15 mA + 28 mA per energized relay max.
Weight	13 oz. (0.45 kg.)
Mean Time Between Failures (MTBF)	>100,00 hours (MIL-HDBK-217E)
Mean Time to Repair (MTTR)	< 5 minutes

Power Dissipation

While the cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed, the carrier can normally dissipate approximately 100 W. Care must be taken, then, in the selection and loading of the plug-in modules used in the carrier. It is not possible to fully load the carrier, energize every relay, and run full power through every set of contacts, all at the same time. In practice this situation would never occur.

To properly evaluate the power dissipation of the plug-in modules, examine the path resistance, the current passing through the relay contacts, the ambient temperature, and the number of relays closed at any one time.

For example, if a 1260-112 module (containing 20 relays) has 20 relays closed, passing a current of 2 A, then:

$$\text{Total power dissipation} = [(\text{current})^2 * (\text{path resistance}) * 25] + (\text{quiescent power})$$

By substituting the actual values:

$$\text{Total power dissipation} = [(2 \text{ A})^2 * (0.5 \Omega) * 20] + (0.75 \text{ W}) = 41 \text{ W at } 55^\circ\text{C}$$

This is acceptable power dissipation for an individual plug-in module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 200 W, which is outside the cooling range available in most commercial VXIbus chassis. In practice however, rarely are more than 25% of the module's relays energized simultaneously, and rarely is full rated current run through every path. In addition, the actual contact resistance is typically one-half to one-fourth the specified maximum, and temperatures are normally not at the rated maximum. The power dissipated by each plug-in should be no more than 50 W if all six slots are used simultaneously and the 25% rule is used. This yields the following guideline:

Most users of a signal-type switch, such as the 1260-112, switch no more than a few hundred milliamperes and are able to energize all relays simultaneously, should they so desire. The numbers in the above table represent worst-case, elevated-temperature, end-of-life conditions at maximum current.

Additionally, if fewer plug-in modules are used, more power may be dissipated by the remaining cards. By using a chassis with high cooling capacity, such as the Racal Instruments 1261B, almost any configuration may be realized.

About MTBF

The 1260-112 MTBF is >100,000 hours, calculated in accordance with MIL-HDBK-217E, with the exception of the electromechanical relays. Relays are excluded from this calculation because relay life is strongly dependent upon operating conditions. Factors affecting relay life expectancy are:

1. Switched voltage
2. Switched current
3. Switched power
4. Maximum switching capacity
5. Maximum rated carrying current
6. Load type (resistive, inductive, capacitive)
7. Switching repetition rate
8. Ambient temperature

The most important factor is the maximum switching capacity, which is an interrelationship of maximum switching power, maximum switching voltage and maximum switching current. When a relay operates at a lower percentage of its maximum switching capacity, its life expectancy is longer. The maximum switching capacity specification is based on a resistive load, and must be further de-rated for inductive and capacitive loads.

For more details about the above life expectancy factors, refer to the data sheet for the switch plug-in module.

The relay used on the 1260-112 plug-in is EADS part no. 310256-001. The relay manufacturer's specifications for this relay are:

Life Expectancy:	
Mechanical	100,000 operations
Electrical	100,000 operations at full rated load (resistive)

For additional relay specifications, refer to the relay manufacturer's data sheet.

Ordering Information

Listed below are part numbers for both the 1260-112 switch module and available mating connector accessories. Each 1260-112 uses a single mating connector.

ITEM	DESCRIPTION	PART #
1260-112 Switch Module	Switch Module, 20-Channel DPDT, 2 A Consists of: P/N 405151 PCB Assembly P/N 980824-112 Manual	407696
160-pin Mating Connector	160 Pin Conn. Kit with pins	407664
Cable Assy. 6ft, Sleeved	160 Pin Cable Assy, 6 Ft, 24 AWG	407408-001
Connector Bracket	Bracket, Strain Relief	456673
Additional Manual		980824-112

This page was left intentionally blank.

INSTALLATION INSTRUCTIONS

Unpacking and Inspection



1. Remove the 1260-112 module and inspect it for damage. If any damage is apparent, inform the carrier immediately. Retain shipping carton and packing material for the carrier's inspection.
2. Verify that the pieces in the package you received contain the correct 1260-112 module option and the 1260-112 Users Manual. Notify EADS North America Defense Test and Services, Inc. if the module appears damaged in any way. Do not attempt to install a damaged module into a VXI chassis.
3. The 1260-112 module is shipped in an anti-static bag to prevent electrostatic damage to the module. Do not remove the module from the anti-static bag unless it is in a static-controlled area.

CAUTION

ESD sensitive devices, open the instrument at an ESD safe work station.

Reshipment Instructions

1. Use the original packing material when returning the switching module to EADS North America Defense Test and Services, Inc. for servicing. The original shipping carton and the instrument's plastic foam will provide the necessary support for safe reshipment.
2. If the original packing material is unavailable, wrap the switching module in an ESD Shielding bag and use plastic spray foam to surround and protect the instrument.
3. Reship in either the original or a new shipping carton.

Installation

Installation of the 1260-112 Switching Module into a 1260-100 Carrier assembly is described in the Installation section of the 1260-100 Adapt-a-Switch Carrier Manual.

Module Configuration

The 1260-112 is a 20-channel, two-wire plug-in for the Adapt-a-Switch Series. Its relay architecture permits it to be organized via software into any configuration from twenty DPDTs to one 20PDT, or any combination in between. These configurations are equivalent to 2-wire, 4-wire, ... n-wire switches. The software command *Include* provides this flexibility without the use of hardware jumpers.

For connector pin assignments, refer to **Figure 2-1**.

Front Panel Connectors

The 1260-112 has one 160-pin front-panel connector, labeled J200. It is a 160-pin, modified DIN style, with 0.025" square posts as pins. It has one pin for each input and one for each output. See **Figure 2-1** for pin numbering. **Table 2-1** shows the mapping of channel numbers to connector pins. Information about available mating connectors is provided immediately after **Table 2-1**.

Figure 2-1, Front-Panel Connector Pin Numbering

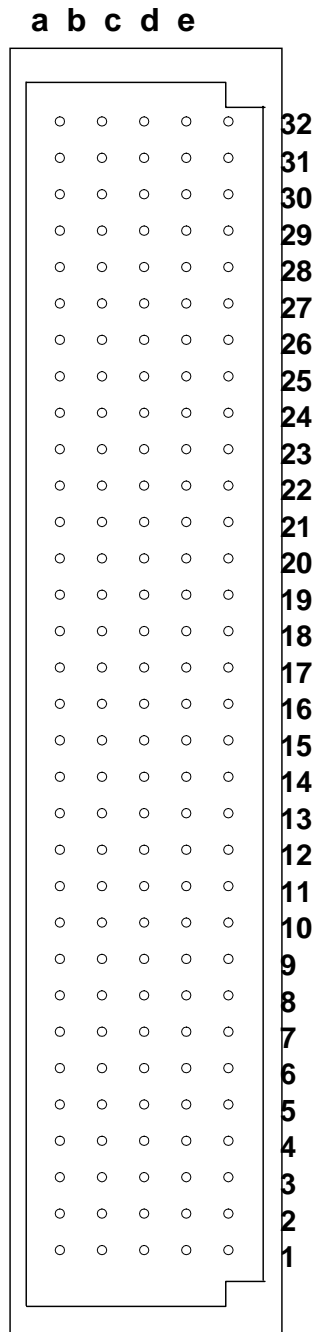


Table 2-1, 1260-112 Front-Panel Connections

Channel	Connector	Pin
COM 0H	J200	P28B
0000H NC	J200	P29B
0000H NO	J200	P27B
COM 0L	J200	P28A
0000L NC	J200	P29A
0000L NO	J200	P27A
COM 1H	J200	P31B
0001H NC	J200	P32B
0001H NO	J200	P30B
COM 1L	J200	P31A
0001L NC	J200	P32A
0001L NO	J200	P30A
COM 2H	J200	P28E
0002H NC	J200	P29E
0002H NO	J200	P27E
COM 2L	J200	P28D
0002L NC	J200	P29D
0002L NO	J200	P27D
COM 3H	J200	P31E
0003H NC	J200	P32E
0003H NO	J200	P30E
COM 3L	J200	P31D
0003L NC	J200	P32D
0003L NO	J200	P30D
COM 4H	J200	P22B
0004H NC	J200	P23B
0004H NO	J200	P21B
COM 4L	J200	P22A
0004L NC	J200	P23A
0004L NO	J200	P21A
COM 5H	J200	P25B
0005H NC	J200	P26B
0005H NO	J200	P24B
COM 5L	J200	P25A
0005L NC	J200	P26A
0005L NO	J200	P24A
COM 6H	J200	P22E
0006H NC	J200	P23E
0006H NO	J200	P21E
COM 6	J200	P22D

Channel	Connector	Pin
0006L NC	J200	P23D
0006L NO	J200	P21D
COM 7H	J200	P25E
0007H NC	J200	P26E
0007H NO	J200	P24E
COM7L	J200	P25D
0007L NC	J200	P26D
0007L NO	J200	P24D
COM 8H	J200	P15B
0008H NC	J200	P16B
0008H NO	J200	P14B
COM 8L	J200	P15A
0008L NC	J200	P16A
0008L NO	J200	P14A
COM 9H	J200	P18B
0009H NC	J200	P19B
0009H NO	J200	P17B
COM 9L	J200	P18A
0009L NC	J200	P19A
0009L NO	J200	P17A
COM 10H	J200	P15E
0010H NC	J200	P16E
0010H NO	J200	P14E
COM 10L	J200	P15D
0010L NC	J200	P16D
0010L NO	J200	P14D
COM 11H	J200	P18E
0011H NC	J200	P19E
0011H NO	J200	P17E
COM 11L	J200	P18D
0011L NC	J200	P19D
0011L NO	J200	P17D
COM 12H	J200	P08B
0012H NC	J200	P09B
0012H NO	J200	P07B
COM 12L	J200	P08A
0012L NC	J200	P09A
0012L NO	J200	P07A
COM 13H	J200	P11B
0013H NC	J200	P12B
0013H NO	J200	P10B

Channel	Connector	Pin
COM 13L	J200	P11A
0013L NC	J200	P12A
0013L NO	J200	P10A
COM 14H	J200	P08E
0014H NC	J200	P09E
0014H NO	J200	P07E
COM 14L	J200	P08D
0014L NC	J200	P09D
0014L NO	J200	P07D
COM 15H	J200	P11E
0015H NC	J200	P12E
0015H NO	J200	P10E
COM 15L	J200	P11D
0015L NC	J200	P12D
0015L NO	J200	P10D
COM 16H	J200	P02B
0016H NC	J200	P03B
0016H NO	J200	P01B
COM 16L	J200	P02A
0016L NC	J200	P03A
0016L NO	J200	P01A
COM 17H	J200	P05B
0017H NC	J200	P06B
0017H NO	J200	P04B
COM 17L	J200	P05A
0017L NC	J200	P106A
0017L NO	J200	P04A
COM 18H	J200	P02E
0018H NC	J200	P03E
0018H NO	J200	P01E
COM 18L	J200	P02D
0018L NC	J200	P03D
0018L NO	J200	P01D
COM 19H	J200	P05E
0019H NC	J200	P06E
0019H NO	J200	P04E
COM 19L	J200	P05D
0019L NC	J200	P06D
0019L NO	J200	P04D
GND	J200	P13A
GND	J200	P20A

Channel	Connector	Pin
GND	J200	P13B
GND	J200	P20B
GND	J200	P01C
GND	J200	P02C
GND	J200	P03C
GND	J200	P04C
GND	J200	P05C
GND	J200	P06C
GND	J200	P07C
GND	J200	P08C
GND	J200	P09C
GND	J200	P10C
GND	J200	P11C
GND	J200	P12C
GND	J200	P13C
GND	J200	P14C
GND	J200	P15C
GND	J200	P16C
GND	J200	P17C
GND	J200	P18C
GND	J200	P19C
GND	J200	P20C
GND	J200	P21C
GND	J200	P22C
GND	J200	P23C
GND	J200	P24C
GND	J200	P25C
GND	J200	P26C
GND	J200	P27C
GND	J200	P28C
GND	J200	P29C
GND	J200	P30C
GND	J200	P31C
GND	J200	P32C
GND	J200	P13D
GND	J200	P20D
GND	J200	P13E
GND	J200	P20E

Mating Connectors

Mating connector accessories are available:

160-Pin Connector Kit with backshell and pins,
P/N 407664

160-Pin Cable Assembly, 6 Ft., 24 AWG,
P/N 407408-001

The 160-Pin Connector Kit consists of a connector housing, and 170 crimp pins. After wire attachment, the pin is inserted into the housing and will snap into place, providing positive retention.

The suggested hand tool for the crimp pins is P/N 990898. The corresponding pin removal tool is P/N 990899.

The 160-Pin Cable Assembly uses 24 AWG cable with crimp pins to mate with the 1260-112. The other cable end is unterminated. Refer to **Table 2-1** for channel-to-pin mapping information.

Chapter 3

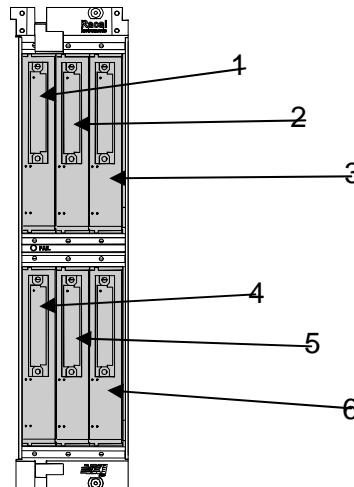
MODULE OPERATION

Setting the Module Address

The Option-01T switch controller identifies each Adapt-a-Switch plug-in or conventional 1260-Series module by a *module address* that is unique to that module. The module address is a number from 1 through 12, inclusive.

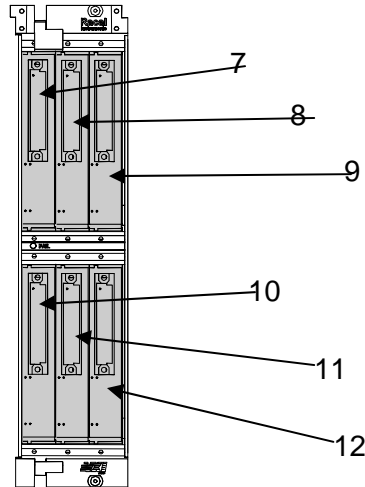
The module address assigned to the 1260-112 depends on the carrier slot into which the 1260-112 is inserted, and on the position of the logical address DIP switch on the carrier side panel. The switch has two settings:

- 1-6 (closed): When the switch is set to this position, the module addresses of the plug-ins in the 1260-100 Carrier are from 1 through 6. The module with address 1 is in the left slot of the top row. The plug-ins are addressed in the following pattern:



Front View – Module Addresses for 1260-100 Carrier

- 7-12 (open): When the switch is set to this position, the module addresses of the plug-ins in the 1260-100 Carrier are from 7 through 12, in the following pattern:



Front View – Module Addresses for 1260-100 Carrier

When setting module addresses for Adapt-a-Switch Carriers and conventional 1260-Series modules, be sure that no address is used by more than one plug-in or 1260-Series module.

For instructions on setting module addresses for a conventional 1260-Series module, see the label on the side panel of the module.

Operating Modes

The 1260-112 may be operated either in *message-based* mode or in *register-based* mode.

In the *message-based* mode, the 1260-01T switch controller interprets commands sent by the slot 0 controller, and determines the appropriate data to send to the control registers of the 1260-112 module.

A conceptual view of the message-based mode of operation is shown in **Figure 3-1** below.

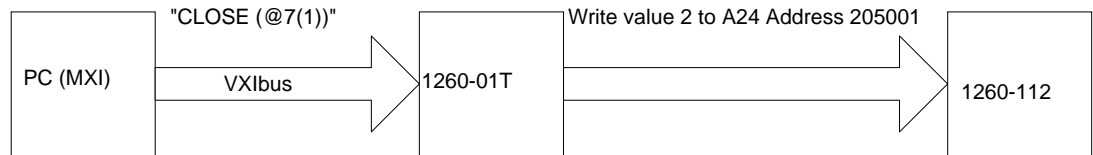


Figure 3-1, Message-Based Mode of Operation

In the *register-based* mode, the user writes directly to the control registers on the 1260-112 module. The 1260-01T command module does not monitor these operations, and does not keep track of the relay states on the 1260-112 module in this mode.

A conceptual view of the register-based mode is shown in **Figure 3-2** below.

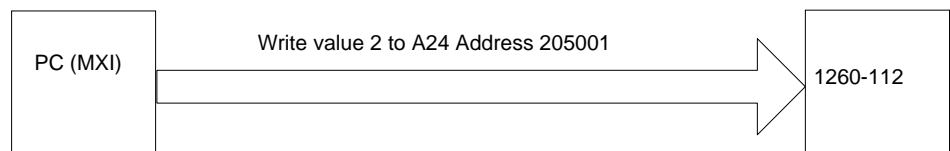


Figure 3-2, Register-Based Mode of Operation

Since the 1260-01T switch controller does not keep track of relay states during the register-based mode, it is advisable to use **either** the message-based or the register-based mode, and continue to use the same mode throughout the application program.

In general, the message-based mode of operation is easier to use with utility software such as the National Instruments VXI Interactive Control (VIC) program. The message-based mode allows the user to send ASCII text commands to the 1260-01T and to read replies from the 1260-01T. In addition, some features, such as the SCAN list, are available only in the message-based mode of operation.

The register-based mode provides faster control of relay channels. In this mode, relay operations are processed in less than 9 microseconds, not counting relay settling time or software overhead inherent in I/O libraries such as VISA. To determine the relay settling time, refer to Relay Settling Time in the Specifications section.

Consult the 1260-01T User's Manual for a comparison of the message-based and register-based modes of operation.

Operating In Message-Based Mode

Channel Descriptors For The 1260-112

The standard 1260-01T commands are used to operate the 1260-112 module. These commands are described in the 1260-01T User's Manual.

Each 1260-01T relay command uses a *channel descriptor* to select the channel(s) of interest. The syntax for a channel descriptor is the same for all 1260 series modules. In general, the following syntax is used to select a single channel:

```
(@ <module address> ( <channel> ) )
```

Where:

- <module address> is the address of the 1260-112 module. This is a number in the range from 1 through 12, inclusive.
- <channel> is the 1260-112 channel to operate. This is a number in the range from 0 through 20, inclusive.

Multiple individual channels may be specified using the following channel descriptor syntax:

```
@ <module address> ( <chan1> , <chan2>  
, . . . , <chanN> ) )
```

A range of channels may be specified using the following channel descriptor syntax:

```
@ <module address> ( <first channel> :  
<last channel> ) )
```

The following examples illustrate the use of the channel descriptors for the 1260-112:

OPEN (@8(0))	Open channel 0 on the 1260-112 that has module address 8.
CLOSE (@8(0,7))	Close channels 0 and 7 on the 1260-112 that has module address 8.
CLOSE (@2(7:12))	Close channels 7 through 12 inclusive on the 1260-112 that has module address 2.

Reply To The MOD:LIST? Command

The 1260-01T returns a reply to the MOD:LIST? command. This reply is unique for each different 1260 series switch module. The syntax for the reply is:

<module address> : <module-specific identification string>

The <module-specific identification string> for the 1260-112 is:

```
1260-112 20-CHANNEL DPDT 2A SWITCH MODULE
```

So, for a 1260-112 whose <module address> is set to 8, the reply to this query would be:

```
8 : 1260-112 20-CHANNEL DPDT 2A SWITCH  
MODULE
```

Operating The 1260-112 in Register-Based Mode

In register-based mode, the 1260-112 is operated by directly writing and reading control registers on the 1260-112 module. The first control register on the module operates channels 0 through 7. The second control register operates channels 8 through 15. The third control register operates channels 16 through 19, etc. When a control register is written to, all channels controlled by that register are operated simultaneously.

The control registers are located in the VXIbus A24 Address Space. The A24 address for a control register depends on:

1. The A24 Address Offset assigned to the 1260-01T module by the Resource Manager program. The Resource Manager program is provided by the VXIbus slot-0 controller vendor. The A24 Address Offset is placed into the "Offset Register" of the 1260-01T by the Resource Manager.
2. The <module address> of the 1260-112 module. This is a value in the range from 1 and 12 inclusive.
3. The 1260-112 control register to be written to or read from. Each control register on the 1260-112 has a unique address.

The base A24 address for the 1260-112 module may be calculated by:

(A24 Offset of the 1260-01T) + (1024 x Module Address of 1260-112).

The A24 address offset is usually expressed in hexadecimal. A typical value of 204000₁₆ is used in the examples that follow.

A 1260-112 with a module address of 7 would have the base A24 address computed as follows:

$$\begin{aligned}\text{Base A24 Address of 1260-112} &= 204000_{16} + (400_{16} \times 7_{10}) \\ &= 205C00_{16}\end{aligned}$$

The control registers for Adapt-a-Switch plug-ins and conventional 1260-Series modules are always on odd-numbered A24 addresses. The three control registers for the 1260-112 reside at the first three odd-numbered A24 addresses for the module:

$$(\text{Base A24 Address of 1260-112}) + 1 = \text{Control Register 0}$$

$$(\text{Base A24 Address of 1260-112}) + 3 = \text{Control Register 1}$$

$$(\text{Base A24 Address of 1260-112}) + 5 = \text{Control Register 2}$$

So, for our example, the three control registers are located at:

205C01	Control Register 0, controls channels 0 through 7
205C03	Control Register 1, controls channels 8 through 15
205C05	Control Register 2, controls channels 16 through 19.

Table 3-1 shows the channel assignments for each control register.

Table 3-1, Control Register Channel Assignments

Control Register	Channels							
	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)
0	7	6	5	4	3	2	1	0
1	15	14	13	12	11	10	9	8
2	23	22	21	20	19	18	17	16
3	31	30	29	28	27	26	25	24
4	39	38	37	36	35	34	33	32
5	47	46	45	44	43	42	41	40
6	55	54	53	52	51	50	49	48
7	63	62	61	60	59	58	57	56
8	71	70	69	68	67	66	65	64
9	79	78	77	76	75	74	73	72

Setting a control bit to 1 closes the corresponding channel, and clearing the bit to zero opens the corresponding channel. Thus, if you write the value 1000 0101 binary = 133 decimal = 85 hexadecimal to Control Register 0, channels 0, 2, and 7 will close, while channels 1, 3, 4, 5, and 6 will open.

The present control register value may be read back by reading an 8-bit value from the control register address. **The value is inverted.** In other words, the eight-bit value read back is the one's complement of the value written.

If you want to change the state of a single relay without affecting the present state of the other relays controlled by the control register, you must:

1. Read the control register
2. Invert the bits (perform a one's complement on the register data)
3. Perform a bit-wise AND operation, leaving all but the specific control register bit for the relay to change
4. **To open:** continue to step 5. **To close:** OR in the bit for the relay to close.
5. Write the modified value back to the control register.

For example, to close channel 13:

1. Read Control Register 1 (this register controls channels 8 through 15, with channel 8 represented by the LSB)
2. Invert the bits in the value read in step 1
3. AND with 1101 1111 binary (the zero is in the position corresponding to channel 13)
4. OR with 0010 0000 binary
5. Write the value to Control Register 1

The VISA I/O library may be used to control the module. The VISA function `viOut8()` is used to write a single 8-bit byte to a control register, while `viIn8()` is used to read a single 8-bit byte from the control register. The following code example shows the use of `viOut8()` to update the 1260-112 module.

Test Points

The following test points are available: GND, +5V (V_{CC}) and LBOARDSEL. LBOARDSEL is useful as a SYNC pulses to view logic events and verify individual board addressing.

1260-112 Example Code

```
#include <visa.h>

/* This example shows a 1260-01T at logical address 16 and a VXI/MXI */
/* interface */
#define RI1260_01_DESC  "VXI::16"

/* For a GPIB-VXI interface, and a logical address of 77 */
/* the descriptor would be: "GPIB-VXI::77" */

/* this example shows a 1260-112 with module address 7 */
#define MOD_ADDR_120    7

void example_operate_1260_112(void)
{
    ViUInt8  creg_val;
    ViBusAddress  creg0_addr;
    ViBusAddress  creg1_addr;
    ViBusAddress  creg2_addr;
    ViSession  hdl1260;      /* VISA handle to the 1260-01T */
    ViSession  hdlRM;       /* VISA handle to the resource manager */
    ViStatus  error;        /* VISA error code */

    /* open the resource manager */
    /* this must be done once in application program */
    error = viOpenDefaultRM (&hdlRM);

    if (error < 0) {
        /* error handling code goes here */
    }

    /* get a handle for the 1260-01T */
    error = viOpen (hdlRM, RI1260_01_DESC, VI_NULL,VI_NULL, &hdl1260);
    if (error < 0) {
        /* error handling code goes here */
    }

    /* form the offset for control register 0 */
    /* note that the base A24 Address for the 1260-01T */
    /* is already accounted for by VISA calls viIn8() and */
    /* viOut8() */

    /* module address shifted 10 places = module address x 1024 */

```

```
creg0_addr = (MOD_ADDR_118 << 10) + 1;
creg1_addr = creg0_addr + 2;
creg2_addr = creg1_addr + 2;

/* close channel 13 without affecting the state of */
/* channels 8, 9, 10, 11, 12, 14, and 15 */
error = viIn8 (hdl1260, VI_A24_SPACE, creg1_addr, &creg_val);
if (error < 0) {
    /* error handling code goes here */
}

/* invert the bits to get the present control register value */
creg_val = ~creg_val;

/* AND to leave every channel except 13 unchanged */
creg_val &= ~ (0x20);

/* OR in the bit to close channel 13 */
creg_val |= 0x20;

/* write the updated control register value */
error = viOut8 (hdl1260, VI_A24_SPACE, creg1_addr, creg_val);
if (error < 0) {
    /* error handling code goes here */
}

/* open channel 16 without affecting channels 17 through 23 */
error = viIn8 (hdl1260, VI_A24_SPACE, creg2_addr, &creg_val);
if (error < 0) {
    /* error handling code goes here */
}

/* invert the bits to get the present control register value */
creg_val = ~creg_val;

/* AND to leave every channel except 16 unchanged */
/* leave bit 0 clear to open channel 16 */
creg_val &= ~ (0x01);

/* write the updated control register value */
error = viOut8 (hdl1260, VI_A24_SPACE, creg2_addr, creg_val);
if (error < 0) {
    /* error handling code goes here */
}

/* close the VISA session */
error = viClose( hdl1260 );
if (error < 0) {
    /* error handling code goes here */
}
```

}

Chapter 4
DRAWINGS

405151	PCB Assy, 1260-112	4-3
435151	Schematic, 1260-112.....	4-4

This page was left intentionally blank.

1	2	3	4
DWG. NO. 435151		SH. 1	REV. A
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	DOCUMENT CONTROL RELEASE		
	REVISED PER ED NO.		
	REVISED PER ED NO.		
	REVISED PER ED NO.		

NOTES:

- RESISTOR VALUES ARE IN OHMS, 1/10W, +/-5% UNLESS OTHERWISE SPECIFIED.
- CAPACITOR VALUES ARE IN MICROFARADS, 50V, +/-20% UNLESS OTHERWISE SPECIFIED.
- RELAYS K1-K19 ARE RACAL INSTRUMENTS PN 310256-001.

A COMPONENTS INDICATED ARE NOT INSTALLED.

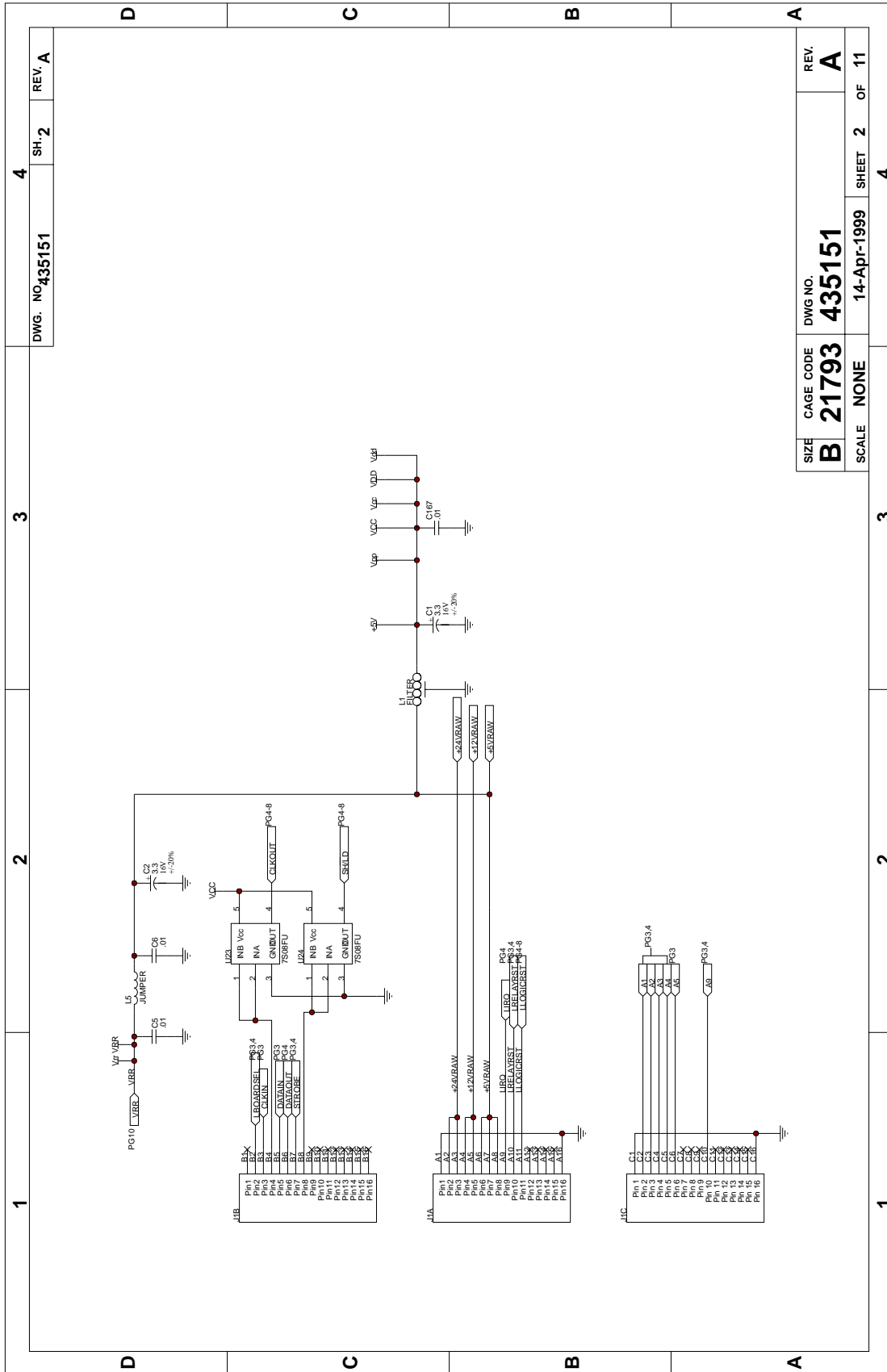
REFERENCE DESIGNATOR	DEVICE TYPE	POWER PINS		HIGHEST REF. DES.
		Vcc PIN	GND PIN	
U1	5801-T166	27	15	C 167
U3	5801	27	15	CR4
U4	74HC1166	16	8	J200
U6	74HC1166	16	8	JPT
U8	74HC1166	17	8	K19
U9	5801	27	15	L5
U11	5801	27	15	O1
U12	74HC1166	16	8	R12
U14	74HC1166	16	8	U88
U15	5801	27	15	
U17	5801	27	15	
U19	5801	27	15	
U20	74HC1166	16	8	
U21	74HC1166	16	8	
U22	7508FU	5	3	
U23	7508FU	5	3	
U24	7508FU	5	3	
U25	7508FU	5	3	
U34	74HC1138	16	8	
U35	74HC1166	16	8	
U60	74HC1166	16	8	
U61	74HC1166	16	8	
U71	74HC2530 (16.8C,2P)	16	8	
U72	74HC2530	16	8	
U73	74HC240	20	10	
U80	74HC240	20	10	
U82	74HC299	16	8	
U83	74LS161	16	8	
U85	74LS161	16	8	
U87	74LS161	16	8	
U88	74HC1166	16	8	

CAD CURRENT REV LTR
REVISION A THRU F
VERSION 4.2.2
PROTEL 99

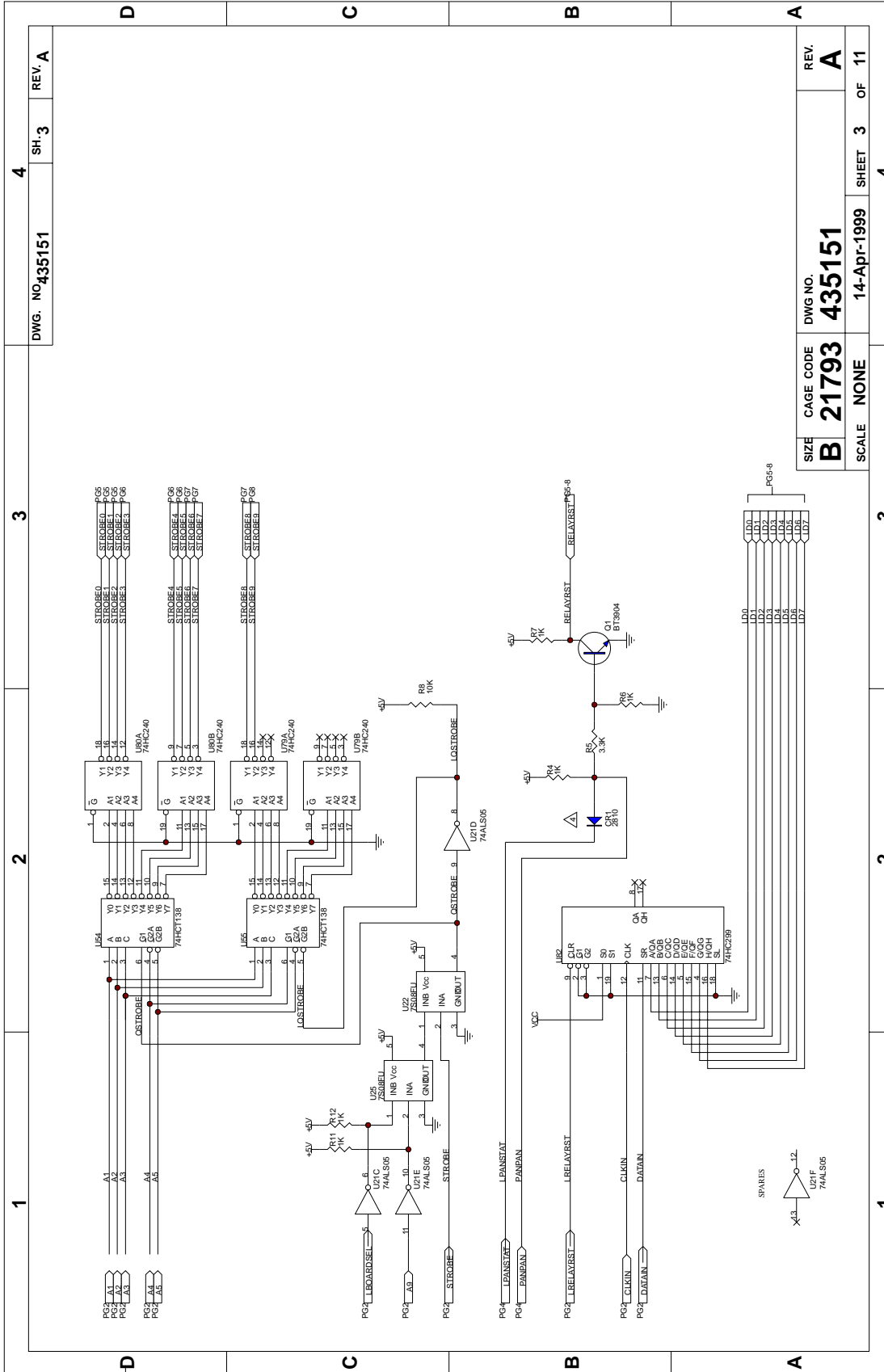
PROPRIETARY NOTICE

THIS DOCUMENT AND THE TECHNICAL DATA HEREON DISCLOSED ARE PROPRIETARY TO RACAL INSTRUMENTS INC. AND SHALL NOT BE REPRODUCED, COPIED, EITHER IN WHOLE OR IN PART, OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF RACAL INSTRUMENTS INC. RACAL INSTRUMENTS INC. IS NOT RESPONSIBLE FOR MANUFACTURE BY ANYONE OTHER THAN RACAL INSTRUMENTS INC. AND MAY ONLY BE USED FOR PURPOSES OF ENGINEERING EVALUATION AND FOR INCORPORATION INTO TECHNICAL SPECIFICATIONS AND OTHER DOCUMENTS WHICH SPECIFY PROCUREMENT OF PRODUCTS FROM RACAL INSTRUMENTS INC.

1	2	3	4
TITLE			
RACAL Instruments, Inc.			
4 Goodyear St., Irvine, CA. 92618			
SCHEMATIC, 1260-112 20CH DPDT			
SIZE	CAGE CODE	DWG NO.	REV.
B	21793	435151	A
SCALE	NONE	14-Apr-1999	SHEET 1 OF 11



1	2	3	4
D	C	B	A
DWG. NO 435151		SH. 2	REV. A
SIZE	CAGE CODE	DWG. NO.	REV.
B	21793	435151	A
SCALE	NONE	14-Apr-1999	SHEET 2 OF 11
		4	



1	2	3	4
---	---	---	---

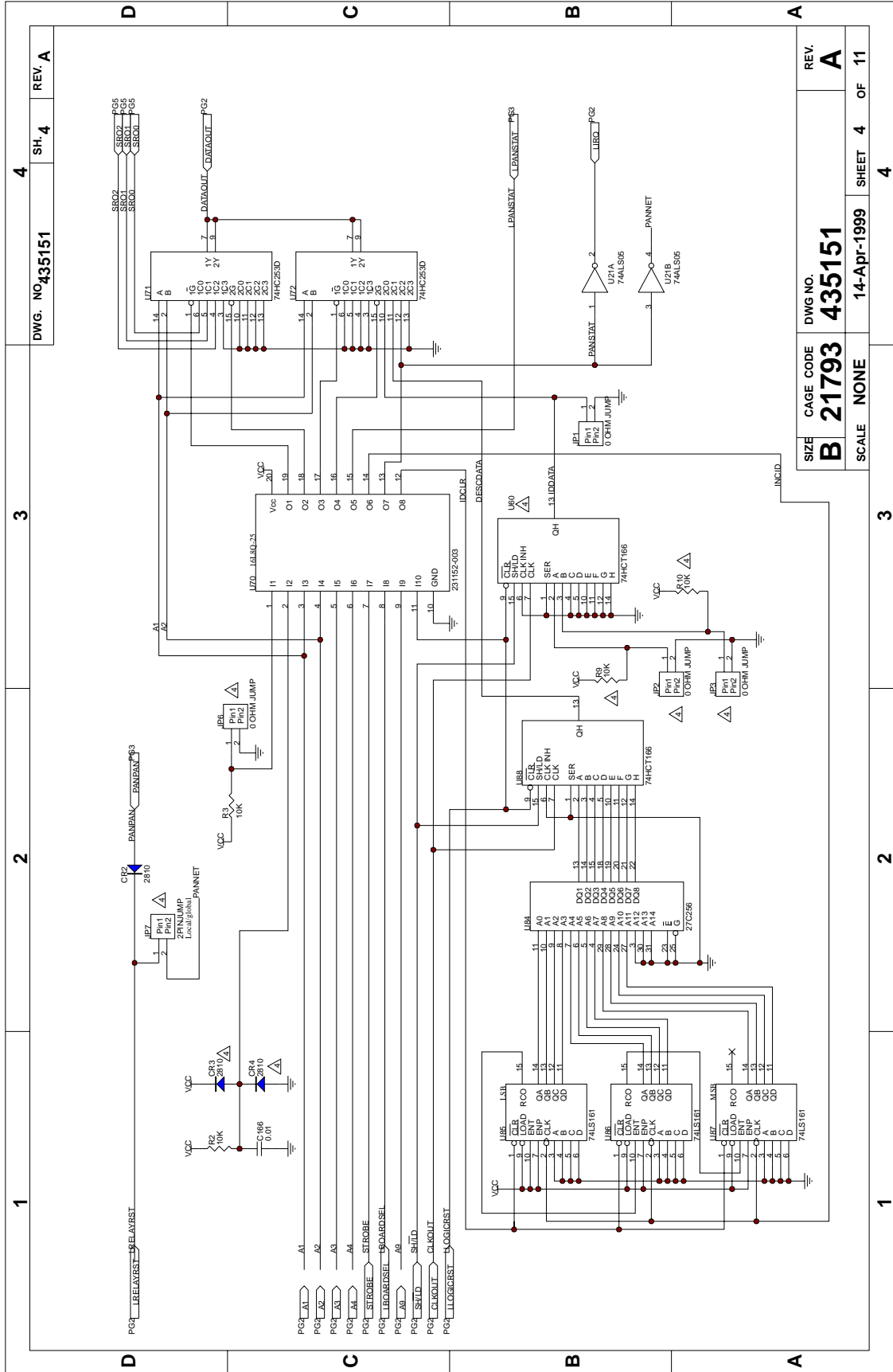
DWG. NO. 435151	SH. 3	REV. A
-----------------	-------	--------

1	2	3	4
---	---	---	---

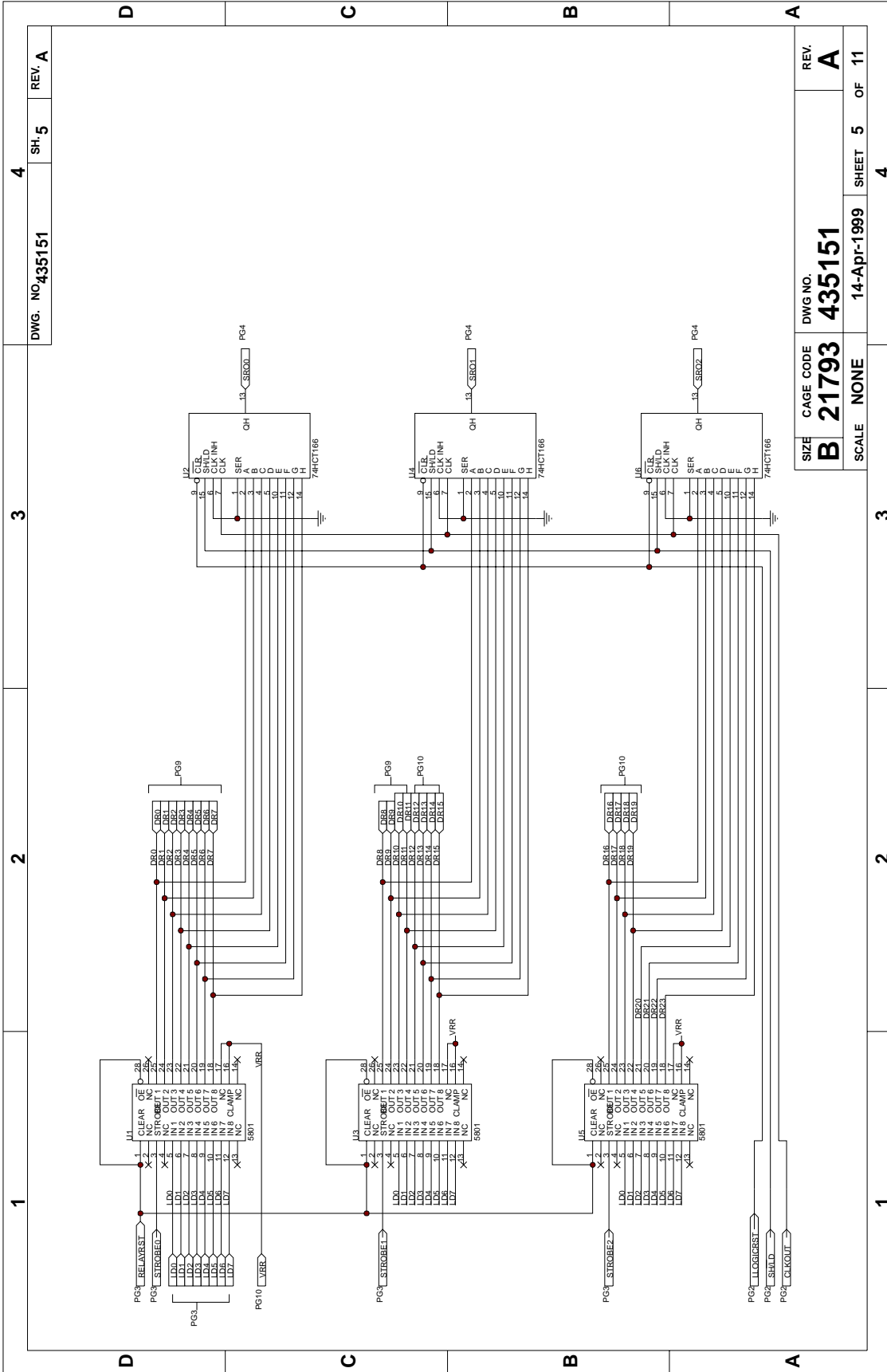
SIZE B	CAGE CODE 21793	DWG. NO. 435151	REV. A
--------	-----------------	-----------------	--------

SCALE NONE	14-Apr-1999	SHEET 3 OF 11
------------	-------------	---------------

1	2	3	4
---	---	---	---

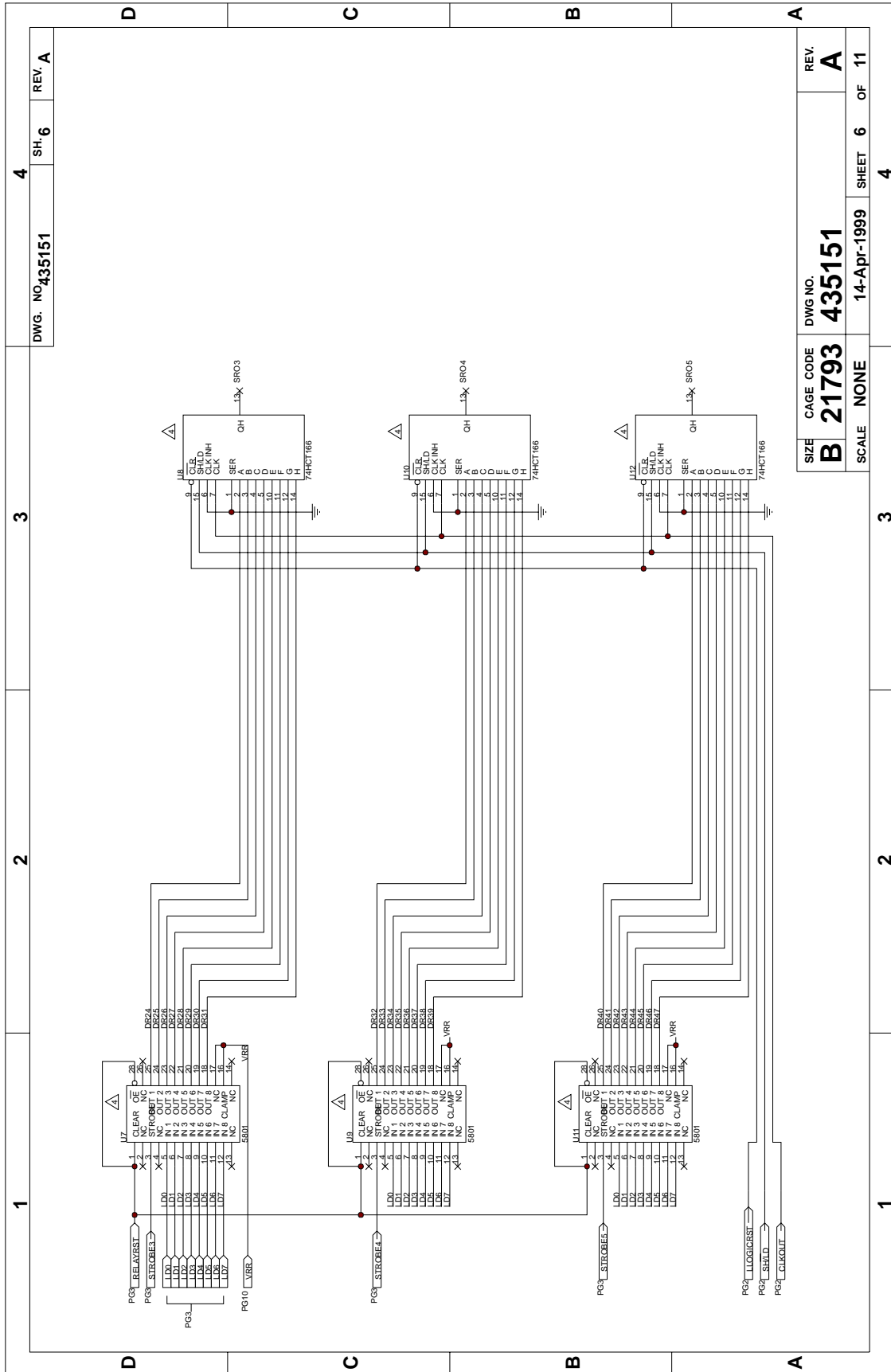


DWG. NO. 435151	SH. 4	REV. A
SIZE B	CAGE CODE 21793	DWG NO. 435151
SCALE NONE	DATE 14-Apr-1999	SHEET 4 OF 11



DWG. NO. 435151	SH-5	REV. A
4	4	4
3	3	3
2	2	2
1	1	1

SIZE	CAGE CODE	DWG NO.	REV.
B	21793	435151	A
SCALE	NONE	14-Apr-1999	SHEET 5 OF 11
4	4	4	4



DWG. NO. 435151

SH. 6

REV. A

3

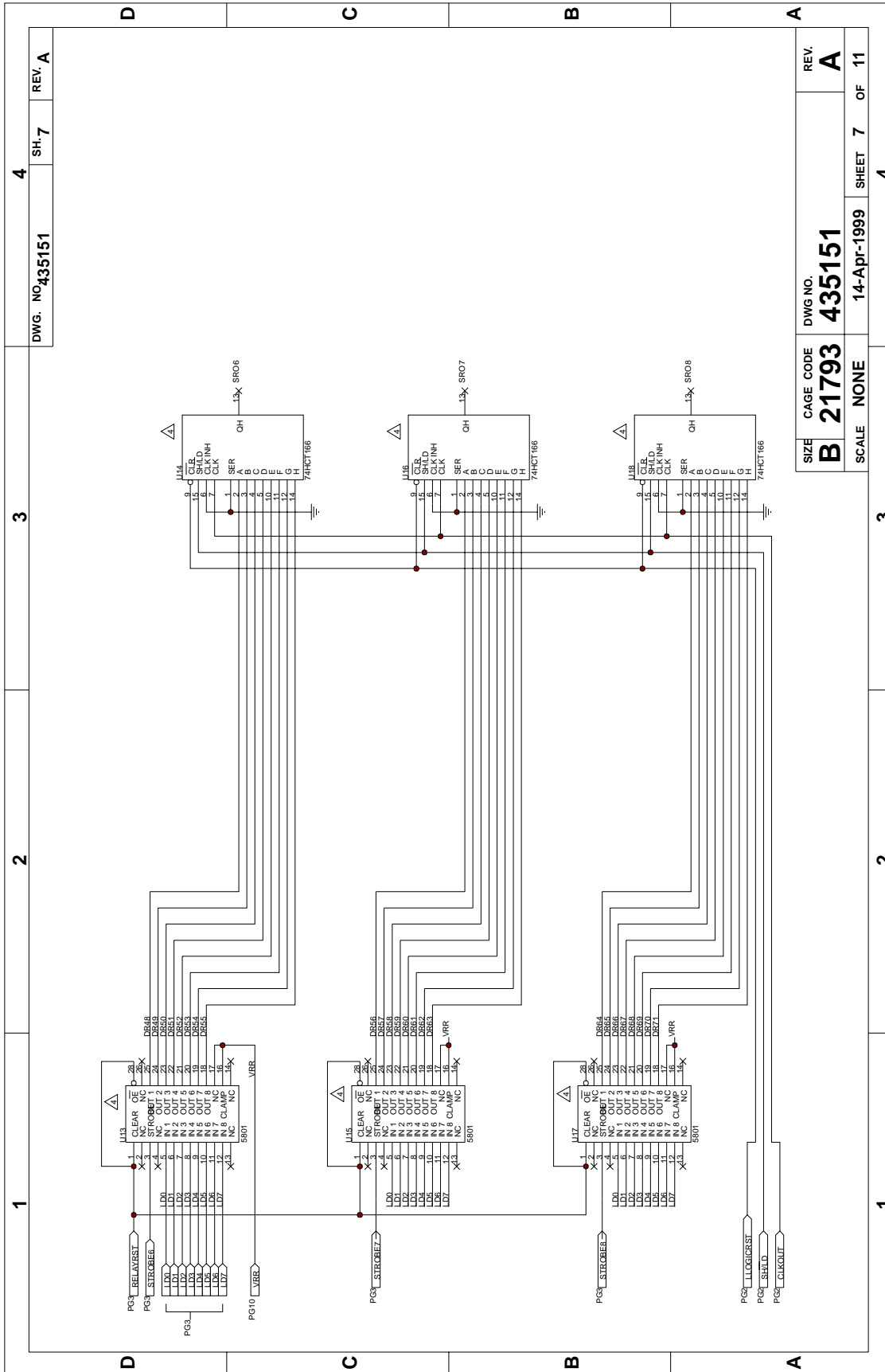
2

1

SIZE	CAGE CODE	DWG NO.	REV.
B	21793	435151	A

SCALE	NONE	14-Apr-1999	SHEET 6 OF 11
-------	------	-------------	---------------

4



DWG. NO. 435151

SH. 7

REV. A

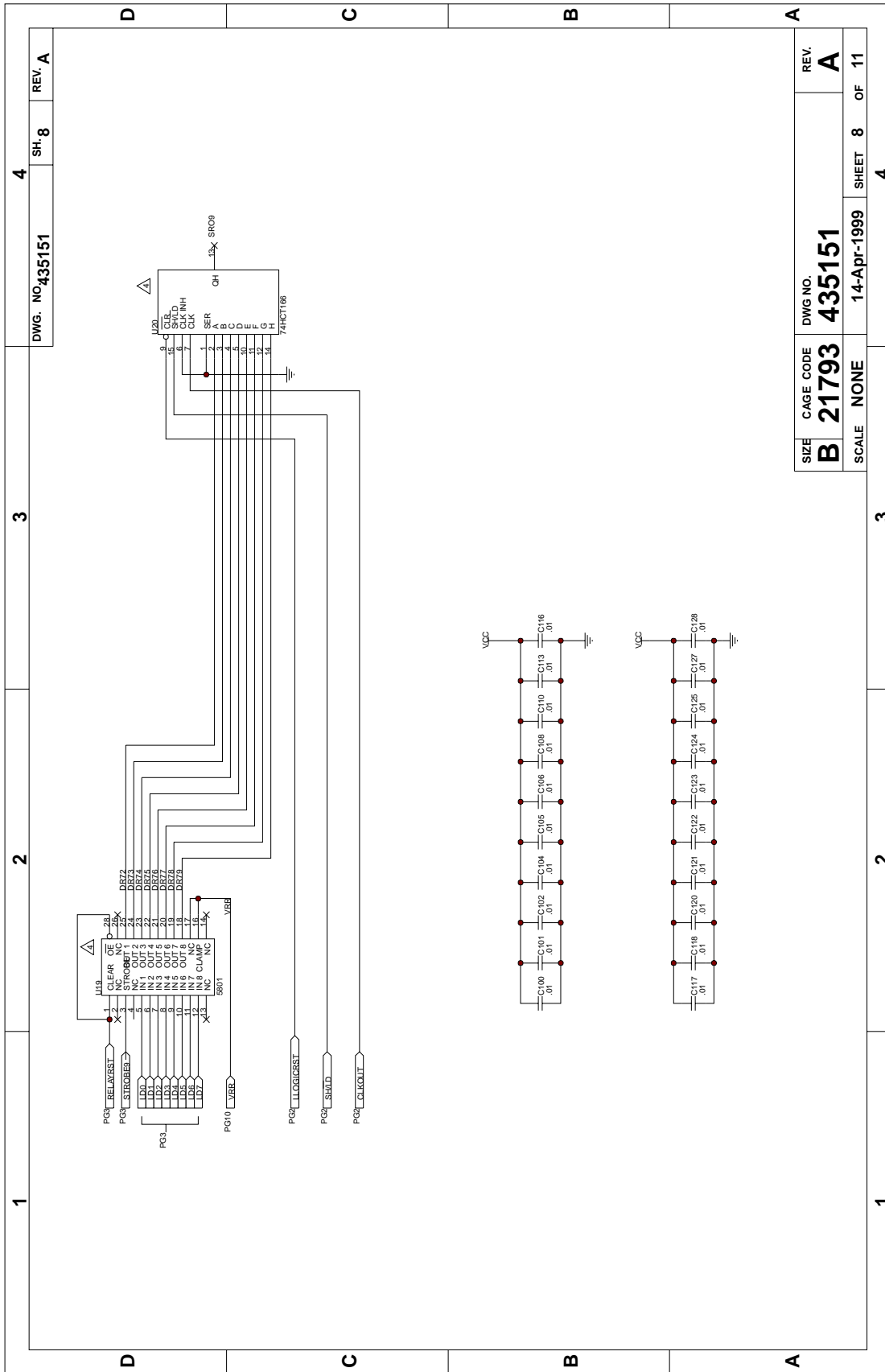
SIZE	CAGE CODE	DWG NO.	REV.
B	21793	435151	A
SCALE	NONE	14-Apr-1999	SHEET 7 OF 11

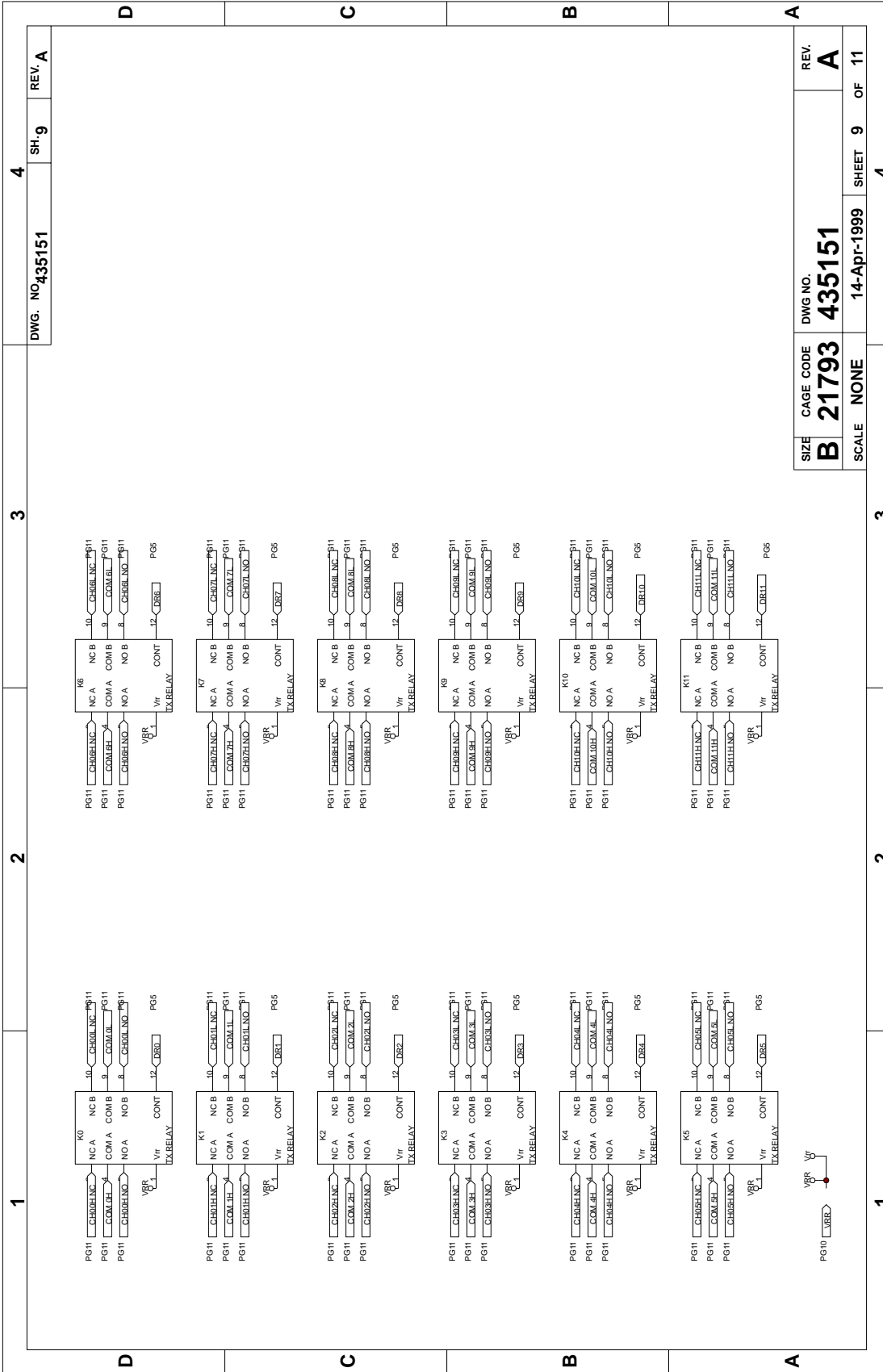
4 3 2 1

1 2 3

4 3 2 1

4



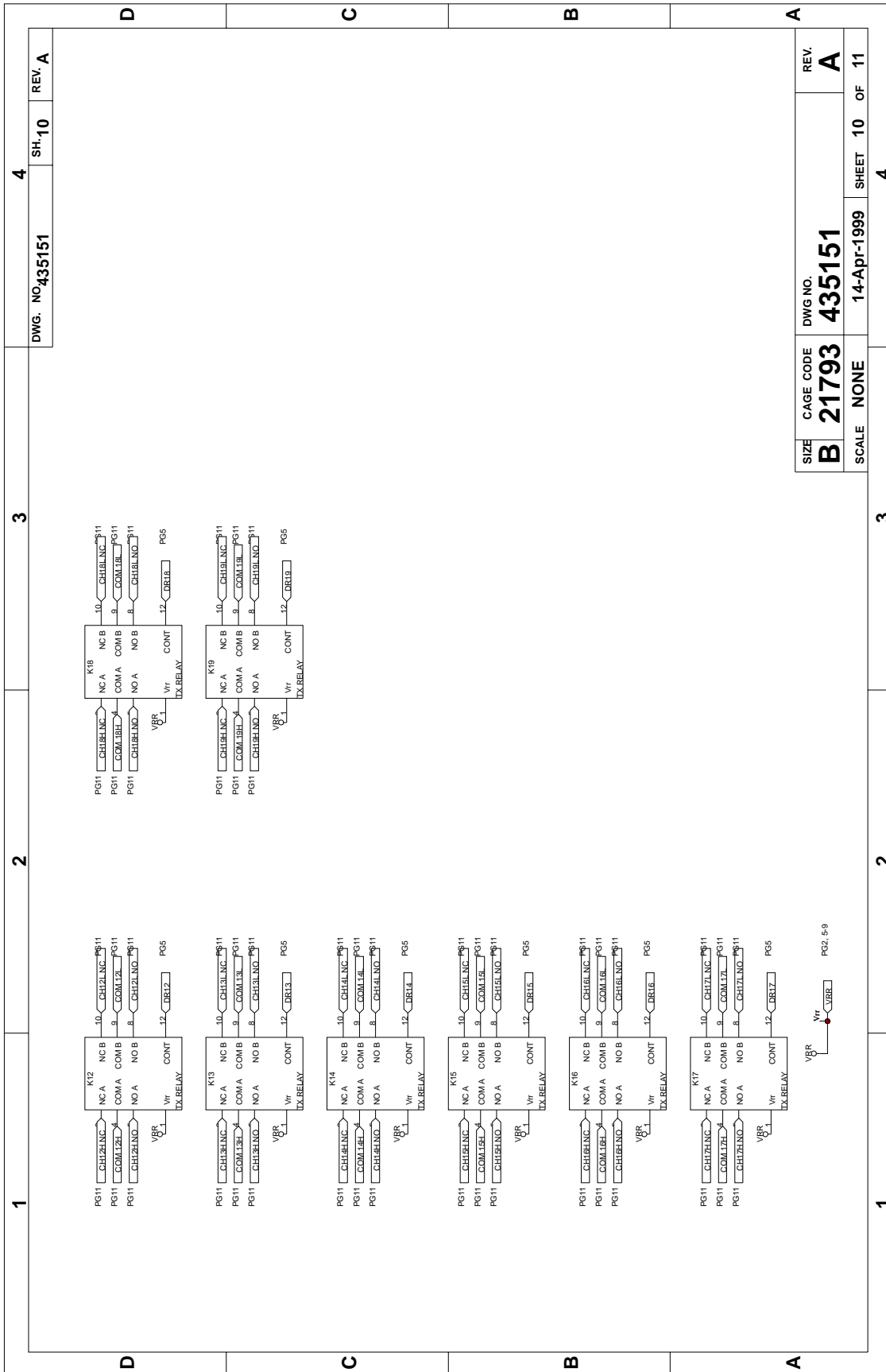


DWG. NO. 435151

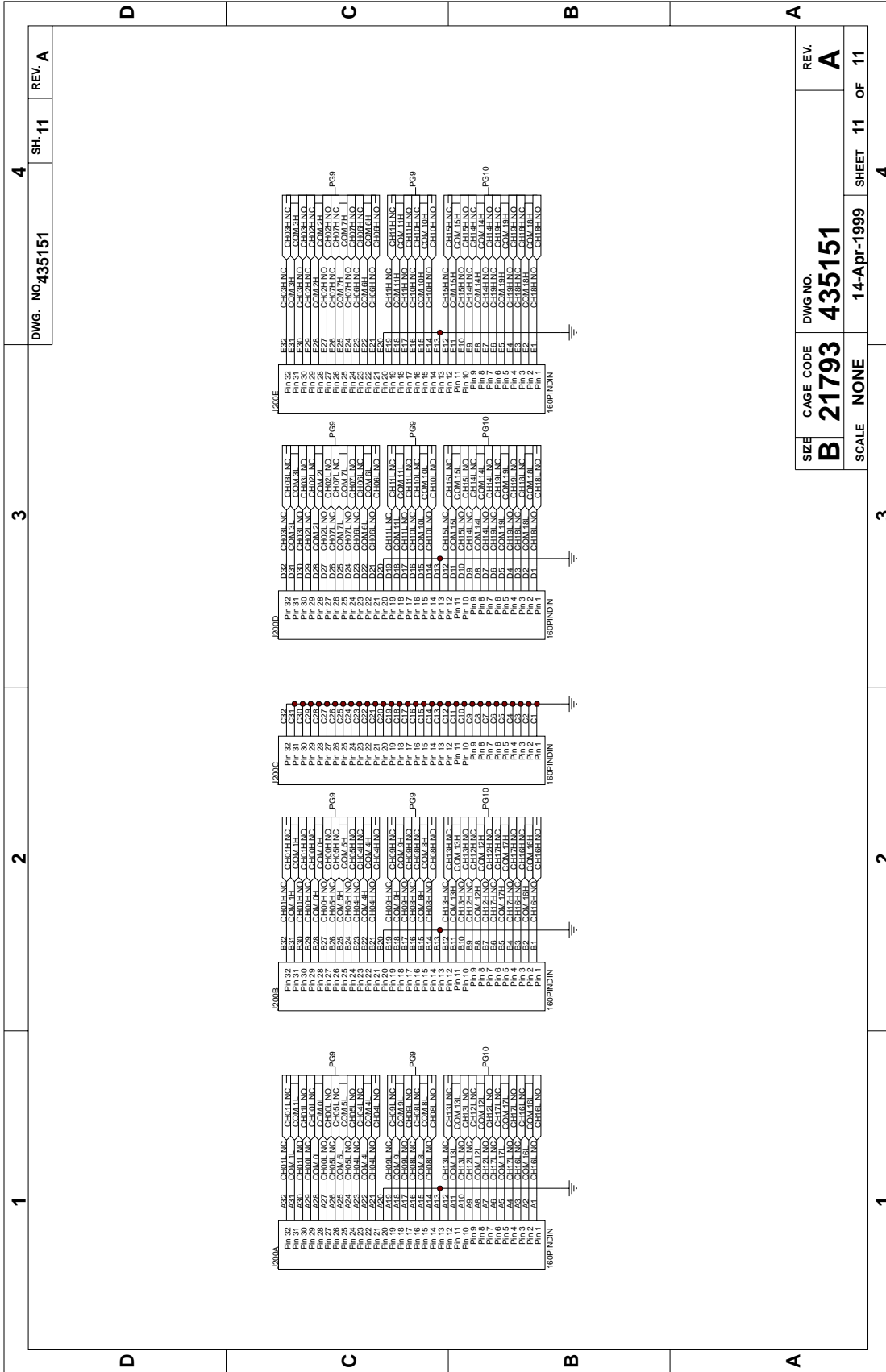
SH. 9

REV. A

SIZE	CAGE CODE	DWG. NO.	REV.
B	21793	435151	A
SCALE	NONE	14-Apr-1999	SHEET 9 OF 11



DWG. NO. 435151	SH. 10	REV. A
4	4	4
SIZE B	CAGE CODE 21793	DWG. NO. 435151
SCALE NONE	14-Apr-1999	REV. A
3	10	11
4	4	4



DWG. NO 435151 SH. 11 REV. A

SIZE B CAGE CODE 21793 DWG. NO. 435151 REV. A
SCALE NONE SHEET 11 OF 11

Chapter 5
PARTS LIST

407696	Final Assy, 1260-112.....	5-3
405151	PCB Assy, 1260-112	5-4

This page was left intentionally blank.

1260-112 User Manual

EADS North America Defense Test and Services, Inc.

Assembly 407696 1260-112,2OCH DPDT, 2A SWITCII Date 1/26/99 Revision A

#	Component	Description	U/M	Qty Req.	Ref
	405151	PCB ASSY, 1260-112 2OCH DPDT	EA	1.00000	
	980824112	MANUAL, 1260-112	EA	1.00000	

EADS North America Defense Test and Services, Inc.

Assembly 405151

PCB ASSY,1260-112 20CH DPDT

Date 4/06/99

Revision A

#	Component	Description	U/M	Qty Req.	Ref
1	R-21-1801	CPCH2-0010. 0N0050V20	EA	24.00000	C5, 6, 100-102 ,104-106,108, 110,113,116 -8,120-5,127 ,128,166-167
3	050000-000	RSCH1-000.00H. 06W005	EA	1.00000	JP1
5	050000-102	RSCH2-001.00K. 06W005	EA	5.00000	R4,R6,R7,R11, R12
6	050000-103	RSCH2-010.00K. 06W005	EA	3.00000	R2,R3,R8
8	050000-332	RSCH2-003.30K. 06W005	EA	1.00000	R5
10	100164	CPFT1-0800. 0P0050v	EA	1.00000	L1
12	110236	CPCH3-0003. 3U0016V20	EA	2.00000	C1,C2
14	200320	TRBI-NPNSG-SS60V350M	EA	1.00000	Q1
16	210118	DISHY-020. 0V00 .25W	EA	3.00000	CR2
18	231091	ICDIG-74HC240---BUFF	EA	2.00000	U79,U80
20	231119	ICDIG-74HC2 99---SHFT	EA	1.00000	U82
22	231120	ICDIG-74HCT166-SHFT	EA	4.00000	U2,U4,U6,U88
24	231147	ICDIG-7 4HC253D--MUX	EA	2.00000	U71,U72
26	231152-003	ICPLA-1 6L8Q-25-U70-PAL	EA	1.00000	U70
28	231386	ICDIG-74LS161----	EA	3.00000	U85-U87
30	231445	ICDIG-74HCT138--SOIC	EA	2.00000	U54,USS
32	231555	ICINT-5801-PLCC	EA	3.00000	U1,U3,US
34	231583	ICDIG-7S08FU-SSOP-2 INPUTAND	EA	4 00000	U22-U25
36	231584	ICDIG-7 4ALSOSD-SOIC- HEXINVER	EA	1.00000	U21
38	231588-017	ICMEM-27C256-15-U84-PLCCP	EA	1.00000	U84
40	310256-001	RLEM-2P2T05V0178-22OSMT	EA	20.00000	K0-K19
43	415151	PCB,1260-112 20CH DPDT,2A	EA	1 00000	
44	435151	SCHENATIC,1260-112 20CH DPDT	EA		
46	456765	PANEL, FRONT, 1260-112	EA	1.00000	
48	600245	JUMPER INSULATED	EA	1.00000	L5
50	602070	CON-PCB-PLG48PC. 1003	EA	1.00000	J1
52	602249-116	CON-PCB-PLG160S. 1005	EA	1.00000	J200
54	611444	S1CSBDR-M2. 5X0. 45X11	EA	2.00000	
56	616406	S1MPFL9-M2. 5X0. 45X14	EA	2.00000	
58	617041	NT1HEXM2 .5-0. 50-STL	EA	2.00000	
60	617127	W1SOO4 .202D. 020T. 115	EA	2.00000	

Chapter 6

OPTIONAL ASSEMBLIES

407664	Connector Kit, 160 Pin Crimp
407408-001	Cable Assy, 160 Pin, 6 ft, 24AWG

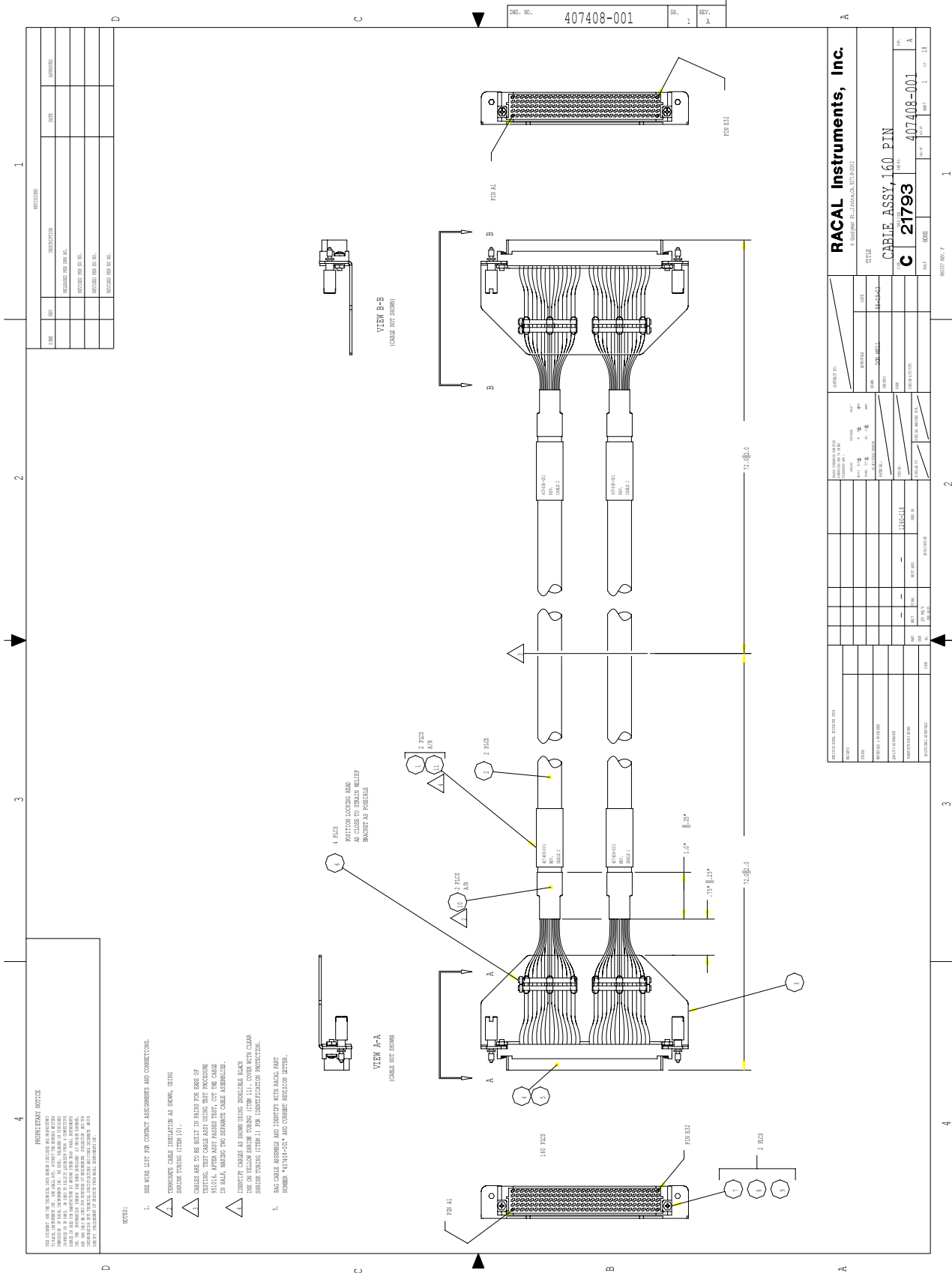
This page was left intentionally blank.

EADS North America Defense Test and Services, Inc.

Assembly 407664

Connector kit, 160 Pin, CrimpRev Date 7/30/98 Revision A

#	Component	Description	U/M	Qty Reqd.	REF
1	602258-116	CON-CAB-RCP160C, 100S	-E EA	1.000	
2	602258-900	TRMCRP-SNP-U-F26-20G	-E EA	170.000	



Chapter 7

PRODUCT SUPPORT

Product Support

EADS North America Defense Test and Services, Inc. has a complete Service and Parts Department. If you need technical assistance or should it be necessary to return your product for repair or calibration, call 1-800-722-3262. If parts are required to repair the product at your facility, call 1-949-859-8999 and ask for the Parts Department.

When sending your instrument in for repair, complete the form in the back of this manual.

For worldwide support and the office closest to your facility, refer to the website for the most complete information <http://www.eads-nadefense.com>.

Warranty

Use the original packing material when returning the 1260-112 to EADS North America Defense Test and Services, Inc. for calibration or servicing. The original shipping container and associated packaging material will provide the necessary protection for safe reshipment.

If the original packing material is unavailable, contact EADS North America Defense Test and Services, Inc. Customer Service at 1-800-722-3262 for information.

REPAIR AND CALIBRATION REQUEST FORM

To allow us to better understand your repair requests, we suggest you use the following outline when calling and include a copy with your instrument to be sent to the EADS North America Defense Test and Service, Inc. Repair Facility.

Model _____ Serial No. _____ Date _____

Company Name _____ Purchase Order # _____

Billing Address _____

City _____

State/Province _____

Zip/Postal Code _____

Country _____

Shipping Address _____

City _____

State/Province _____

Zip/Postal Code _____

Country _____

Technical Contact _____ Phone Number () _____

Purchasing Contact _____ Phone Number () _____

1. Describe, in detail, the problem and symptoms you are having. Please include all set up details, such as input/output levels, frequencies, waveform details, etc.

2. If problem is occurring when unit is in remote, please list the program strings used and the controller type.

3. Please give any additional information you feel would be beneficial in facilitating a faster repair time (i.e., modifications, etc.)

4. Is calibration data required? Yes No (please circle one)

Call before shipping Ship instruments to nearest support office.

Note: We do not accept
"collect" shipments.