Model 554
Remote Parallel Interface

9231710A

User's Manual

ISO 9001
SYSTEM
CERTIFIED

Canberra Industries, 800 Research Parkway, Meriden, CT 06450
Tel: 203-238-2351 FAX: 203-235-1347 http://www.canberra.com

The information in this manual describes the product as accurately as possible, but is subject to change without notice.

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1. Introduction

The Canberra Model 554 Remote Parallel Interface (RPI) is a single width NIM member of the ICB line of programmable front ends used to control AMX multiplexers, sample changers or similar digital devices.

The RPI provides up to 32 TTL outputs and 32 TTL compatible inputs. These outputs may be connected to four Model 8224 AMX modules to independently control up to 32 detector inputs.

In an optional configuration of the RPI, four BNC connectors are installed to allow easy connection to two Sample Changers.

2. Controls and Connectors

2.1. Front Panel

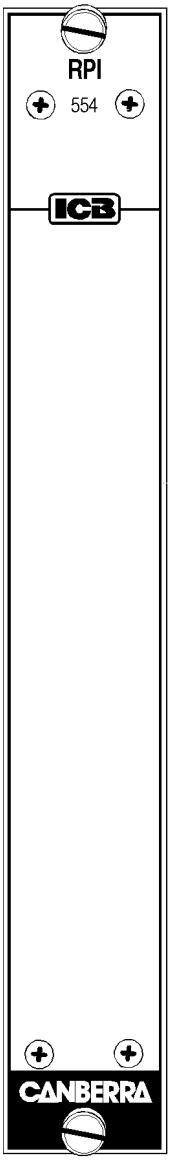


Figure 2.1 Front Panel
(No indicators or user controls)

2.2. Rear Panel

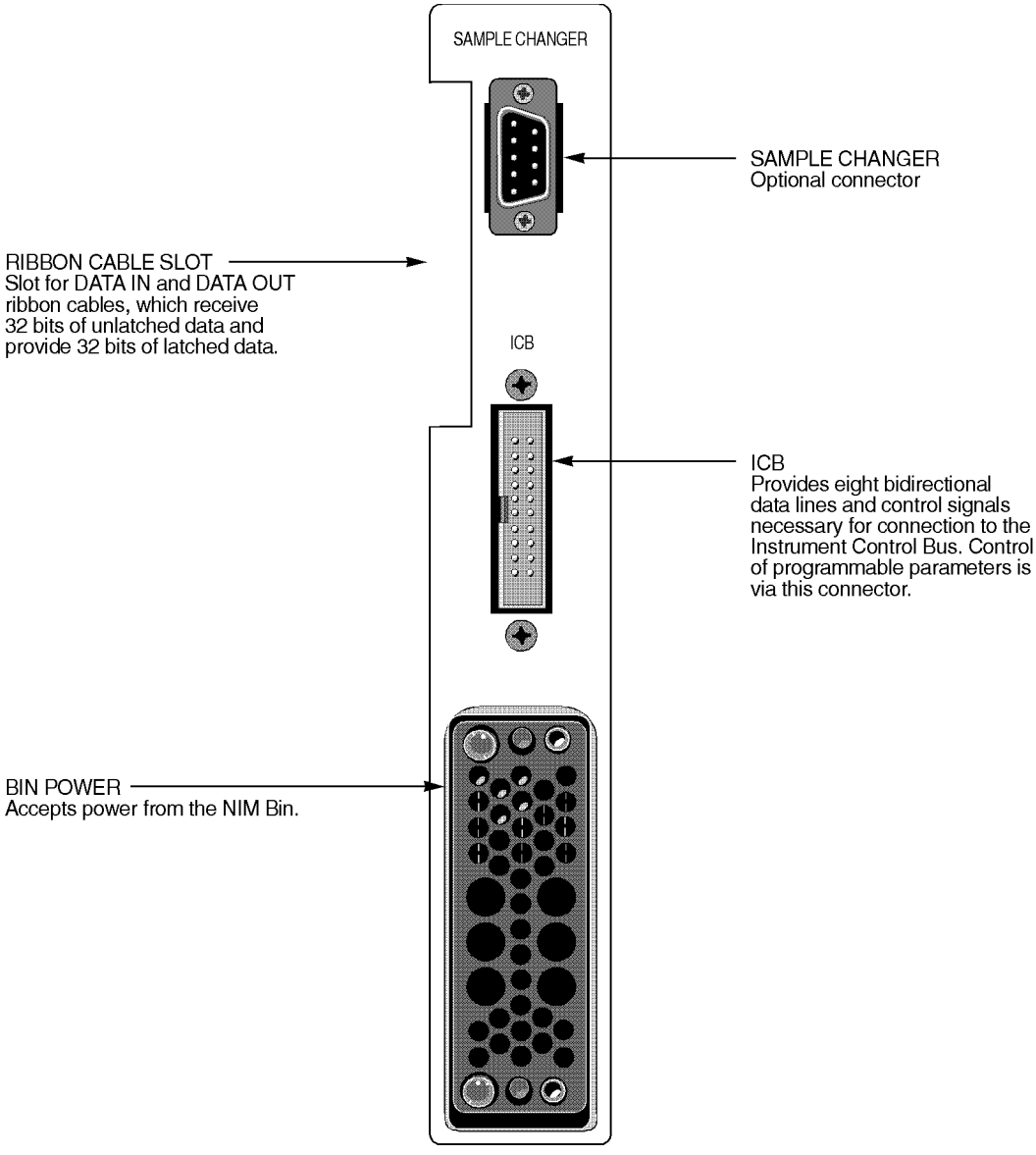


Figure 2.1 Rear Panel Connectors

2.3. Internal Controls

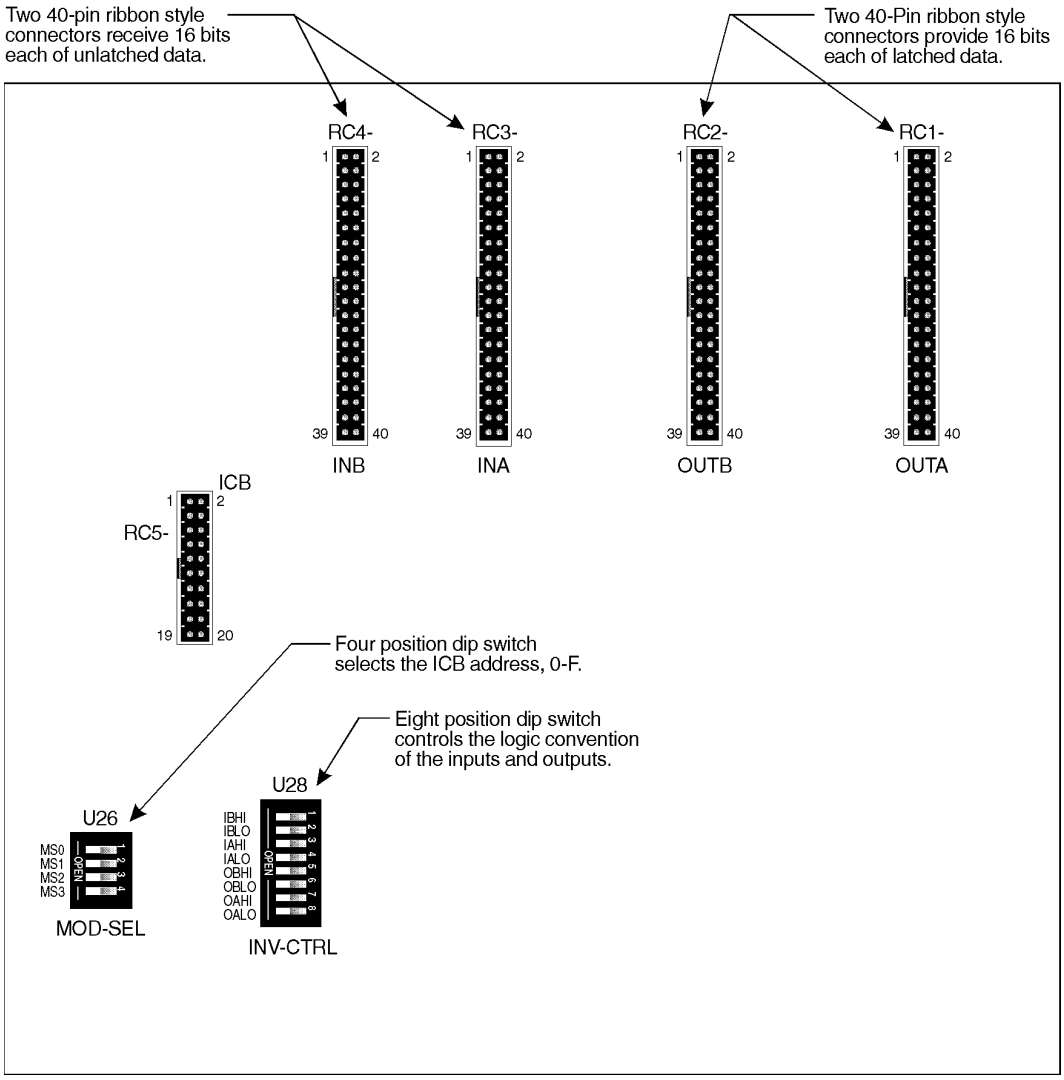


Figure 2.3 Internal Controls

All connectors are located on the component side of the circuit board and can be accessed by removing the module's right side-panel. Figure 2.3 shows the location of the connectors as they appear on the circuit board.

The RPI mechanically configures the 32 bits of input and 32 bits of output as four 40-pin ribbon style connectors (IN-A, IN-B, OUT-A and OUT-B) that are DRV-11 pin compatible, with the exception of the control signals which are not supported by the RPI. The pin-out listing for the I/O connectors is given in Appendix B, *Connector Descriptions*.

The rear panel ICB ribbon connector header is directly connected to the ICB (RC-5) connector on the PC board.

3. Installation and Operation

3.1. Installation

The following procedure describes the installation of an 554 RPI ICB module with an ICB master, such as a Model 556 AIM module and appropriate software: Genie-PC or Genie-VMS. For details on programming the 556's controls, refer to the software manuals.

For Genie-PC systems, look in the *MCA Input Definition Editor* chapter in the Basic Operation binder for a section on MXR (Mixer/Router) or Sample Changer under the "Devices" menu for your specific MCA type.

For Genie-VMS systems, in document 07-0196 VMS Spectroscopy Applications User's Manual (Volume 1), refer to the section on the use of the RPI with multiplexed inputs or the section on use of a Sample Changer.

3.1.1 RPI Preparation

This section describes how to prepare a 554 for ICB operation. Refer to Figures 2.2 and 2.3 for connector and switch placement.

Removing the Side Panel

Remove the right side-panel and verify that the ICB connecting cable is attached to the ICB connector.

Setting the Module's Address

DIP switch MOD-SEL sets the 554's ICB address. Table 3.1 shows the 16 possible address settings (for Modules 0-F). Switch 1 corresponds to the least significant address bit, MS0. Each switch's *off* position corresponds to a logic 1 and the *on* position corresponds to a logic 0.

Table 3.1 MOD-SEL Switch Settings				
Module	Switch			
	MS0 (1)	MS1 (2)	MS2 (3)	MS3 (4)
0	On	On	On	On
1	Off	On	On	On
2	On	Off	On	On
3	Off	Off	On	On
4	On	On	Off	On
5	Off	On	Off	On
6	On	Off	Off	On
7	Off	Off	Off	On
8	On	On	On	Off
9	Off	On	On	Off
A	On	Off	On	Off
B	Off	Off	On	Off
C	On	On	Off	Off
D	Off	On	Off	Off
E	On	Off	Off	Off
F	Off	Off	Off	Off

Setting the Polarity of Input and Output Ports

The DIP switch labeled INV-CTRL controls the logic convention of inputs and outputs. The logic convention is selected on the byte boundary, so each individual INV-CTRL switch corresponds to eight bits of data. A switch set in the *on* position sets the selected byte to the positive logic convention. (A logic 1 at an input will appear as a logic 1 when read.) A switch in the *off* position sets the selected byte to the negative logic convention. (A logic 1 at an input will appear as a logic 0 when read.)

When power is first applied to the module, all outputs are initialized to a TTL low state. For outputs selected for Negative logic convention, this is a logic 1. Software will later load the desired logic states.

Figure 2.3 displays all eight switches in U28 (INV-CTRL) with a four letter combination. These letters, defined in Table 3.2, describe the logic selection for all eight bytes.

Table 3.2 INV/CTRL Letters vs Meanings	
Letter	**Meaning**
I	Specifies Input
O	Specifies Output
A	Specifies Port A
B	Specifies Port B
HI	Specifies High Byte
LO	Specifies Low Byte

For example, OBLO (switch 6) refers the LOw byte (bits 7 through 0) of Output port B. IAHI (switch 3) refers to the HIgh byte (bits 15 through 8) of Input port A.

The RPI is shipped with all eight INV-CTRL switches in the *on*, or positive logic, position. The polarity setting for your RPI depends on the particular application for which the RPI is being used. Refer to the user's manual of the device being polled or controlled by the RPI, as well as the user's manual for the specific software being used to control the RPI.

Connecting the 40-pin Ribbon Connectors

If the RPI is being used to control 8224 AMXs, refer to the setup diagram in Figure C.1 for instructions on connecting cables between the RPI and the AMX. The INV-CTL switch(es) for the connected 8224's must be set to *on* (for positive output).

For Genie-PC systems, the RPI 8224/589 AMX device driver allows choice of RPI output lines using the following convention ("Start with line" means RPI Outputs):

1	Out A Low	0-7
9	Out A High	8-15
17	Out B Low	0-7
25	Out B Hi	8-15

For Genie-VMS systems, in document 07-0196 VMS Spectroscopy Applications User's Manual (Volume 1), refer to the section on the use of the RPI with multiplexed inputs.

After the I/O cables are connected, verify that pin one of the female connector aligns with pin one of the male connector located on the RPI. Pin one is in the upper left-hand corner of the connector. Carefully route the cables straight out the rear of the module and make sure that they fall into the 5.8 cm (2.3 in.) slot located in the upper half of the 554's rear panel. Verify that cables are not twisted or partially folded as they leave the module. With this done, replace the right side-panel.

3.2. Operation

If the RPI is being used to control sample changers by way of the Model 630416 Sample Changer Option, refer to Appendix D.

On VMS systems only, the RPI can be controlled by user written software. A sample FORTRAN program is provided as part of the Model 48-0272 Miscellaneous Utilities package.

A. Specifications

A.1. Inputs

DATA - 32 lines, unlatched; logic low, 0.0 to 0.8 V at 1 mA; logic high, 2.0 to 5.0 V at 20 μA; open input is not defined.

ICB - Connects 554 to the Instrument Control Bus and provides DATA OUT signals.

A.2. Outputs

DATA - 32 lines, latched; logic low, 0.0 to 0.5 V at 48 mA; logic high, 2.4 to 5.0 V at 15 mA.

ICB - Provides DATA IN signals and status of the 554 to the ICB master.

A.3. Manual Controls

ADDRESS - Four-pole internal DIP switch selects 1 of 16 unique ICB addresses.

DATA POLARITY - Eight-pole internal DIP switch selects polarity of DATA IN and OUT on a byte basis.

A.4. ICB Programmable

DATA IN - 32 logic inputs.

DATA OUT - 32 latched logic outputs.

A.5. Performance

OPERATING TEMPERATURE RANGE - 0 to 50 °C

A.6. Connectors

DATA IN - Two 40-pin PC-mounted ribbon headers; 16 bits on each; accessible through rear panel slot; DRV-11 pinout.

DATA OUT - Two 40-pin PC-mounted ribbon headers; 16 bits on each; accessible through rear panel slot; DRV-11 pinout.

ICB - 20-pin rear panel ribbon header.

SAMPLE CHANGER - Optional 9-pin rear panel D-type connector (Model 630416) for controlling two sample changers with breakout cable: 9-pin connector to four BNC connectors.

A.7. ICB Programming Summary

Module Status
ICB Address
Module Power On Reset

Setup Parameters

	Read	Write
DATA IN	X	
DATA OUT		X

A.8. Power Requirements

+24 V – 3 mA
–24 V – 0 mA
+6 V dc – 430 mA
+12 V dc – 0 mA
–12 V dc – 0 mA

A.9. Physical

SIZE - Standard single-width NIM module 3.43 x 22.12 cm (1.35 x 8.71 in.) per DOE/ER-0457T.

NET WEIGHT - 0.9 kg (1.9 lb).

SHIPPING WEIGHT - 1.8 kg (4 lb).

B. Connector Descriptions

This appendix lists the pin numbers and signals for the Instrument Control Bus (ICB) Connector, the Out-A and Out-B connectors, and the In-A and In-B connectors.

B.1. ICB Interface Connector

This 20-pin ribbon connector provides all the necessary signals for connection to the Instrument Control Bus (ICB). Negative true signals are shown with a trailing asterisk (LWE*); all other signals are positive true.

Pin Number	Signal	Pin Number	Signal
1	GND	2	LD0
3	LD1	4	GND
5	LD2	6	LD3
7	GND	8	LD4
9	LD5	10	GND
11	LD6	12	LD7
13	GND	14	LWE*
15	GND	16	LDS*
17	GND	18	LAS*
19	GND	20	LSRQ*

Interface Signal Functions

This section describes the function of each interface signal in detail. All input and output signals are TTL compatable. Unless otherwise noted, the input signal levels are:

Low = 0 to 1.0 volts
High = 3.0 to 5.0 volts

And the output signal levels are:

Low = 0 to 0.5 volts
High = 3.0 to 5.0 volts

All input and output signals considered to be a logic 1 for a high voltage level unless the signal name is followed by an asterisk (*), in which case the signal is considered to be a logic 1 for a low voltage level.

SIGNAL	PIN	DESCRIPTION
LD0	2	INPUT/OUTPUT: Address/Data line 0 (LSB).
LD1	3	INPUT/OUTPUT: Address/Data line 1.
LD2	5	INPUT/OUTPUT: Address/Data line 2.
LD3	6	INPUT/OUTPUT: Address/Data line 3.
LD4	8	INPUT/OUTPUT: Address/Data line 4.
LD5	9	INPUT/OUTPUT: Address/Data line 5.
LD6	11	INPUT/OUTPUT: Address/Data line 6.
LD7	12	INPUT/OUTPUT: Address/Data line 7. (MSB)
LWE*	14	INPUT (Write Enable): This signal is active when the ICB master is writing to the ICB.
LDS*	16	INPUT (Data Strobe): Used to latch the data into a slave during a write cycle or gate the data onto the bus during a read cycle.
LAS*	18	INPUT (Address Strobe): Used to latch the address which the ICB master is accessing into the slave unit.
LSRQ*	20	OUTPUT (System Request): This signal is set when the slave requires service from the ICB master.
GND	1, 4, 7, 10, 13, 15, 17, 19	DC common for all interface signals.

B.2. Out-A and Out-B Connectors

The Out-A and Out-B connectors provide 32 lines of latched output data on ports A and B.

Pin Number	Signal	Pin Number	Signal
1	–	2	GND
3	–	4	GND
5	–	6	GND
7	OUT02	8	GND
9	–	10	GND
11	OUT15	12	OUT14
13	OUT13	14	GND
15	–	16	GND
17	OUT12	18	OUT11
19	OUT10	20	GND
21	OUT09	22	OUT08
23	GND	24	OUT03
25	OUT07	26	GND
27	OUT06	28	–
29	OUT05	30	GND
31	OUT04	32	OUT01
33	GND	34	–
35	–	36	–
37	–	38	OUT00
39	–	40	–

B.3. In-A and In-B Connectors

The In-A and In-B connectors receive 32 lines of unlatched input data on ports A and B.

Pin Number	Signal	Pin Number	Signal
1	–	2	GND
3	IN00	4	GND
5	–	6	GND
7	–	8	GND
9	IN01	10	IN04
11	GND	12	IN05
13	–	14	IN06
15	GND	16	IN07
17	IN03	18	GND
19	IN08	20	IN09
21	GND	22	IN10
23	IN11	24	IN12
25	GND	26	–
27	GND	28	IN13
29	IN14	30	IN15
31	GND	32	–
33	GND	34	IN02
35	–	36	IN02
37	–	38	–
39	–	40	–

B.4. Sample Changer Connector

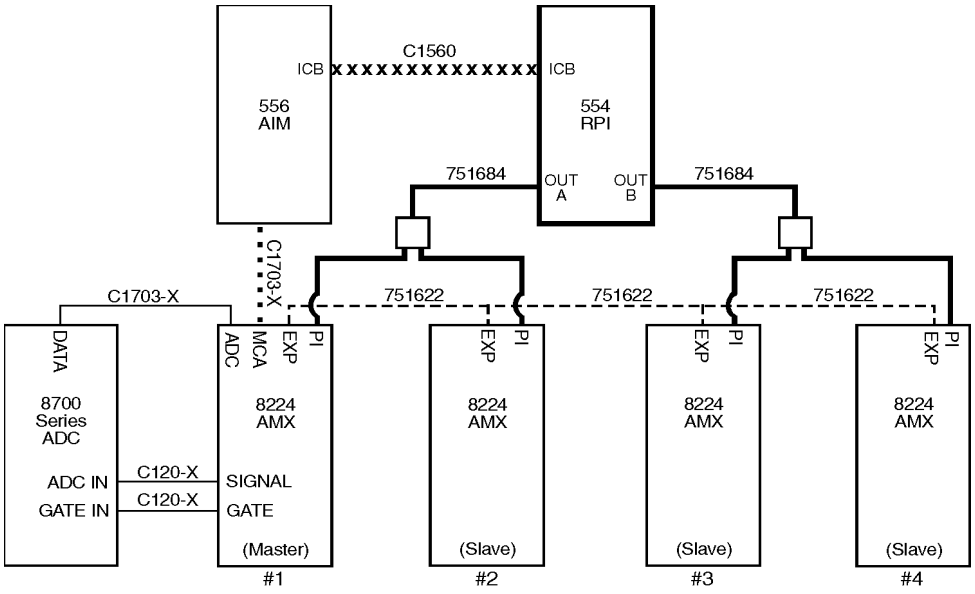
This 9-pin male D-type connector is installed with the optional Model 640416.

Pin Number	Signal	Location	Label
2	GND	Out A-22	–
3	GND	–	–
4	GND	–	–
5	GND	–	–
6	Out A0	Out A-38	SCC0
7	In A0	In A-3	SCR0
8	Out A1	Out A-32	SCC1
9	In A1	In A-9	SCR1

C. Setup Diagrams

This diagram, which shows a common application, is provided to help you set up a system using the 554 RPI.

C.1. 554 RPI with a 556 AIM and an 8224 AMX



Independent Start/Stop for the 8224 AMXs
Each 751684 Cable Assembly supports two 8224s and each RPI supports 2 such cable assemblies.

ADC-AMX Connections
Each 8224 AMX is supplied with one C1703-2 Interface Cable.

The C120-X Coax Cables for the Signal and Gate connections must be purchased separately.

xxxxx **ICB Connection**
An ICB controllable ADC (9633 or 9635) can be substituted for the 8700 series ADC with the added connection to the C1560 cable.

▪ ▪ ▪ ▪ ▪ **AIM-AMX Connection**
Each AIM is supplied with two C1703-2 Interface Cables.

– – – – – **AMX Master-Slave Connection**
Each slave requires a 751622 Expansion Cable, which must be purchased separately.

Note: The number of 8224's supported is limited by the software platform being used. Please refer to the appropriate manual for information.

Figure C.1 Setting Up the 554 RPI with an AIM and an AMX

C.2. 554 RPI with a Sample Changer

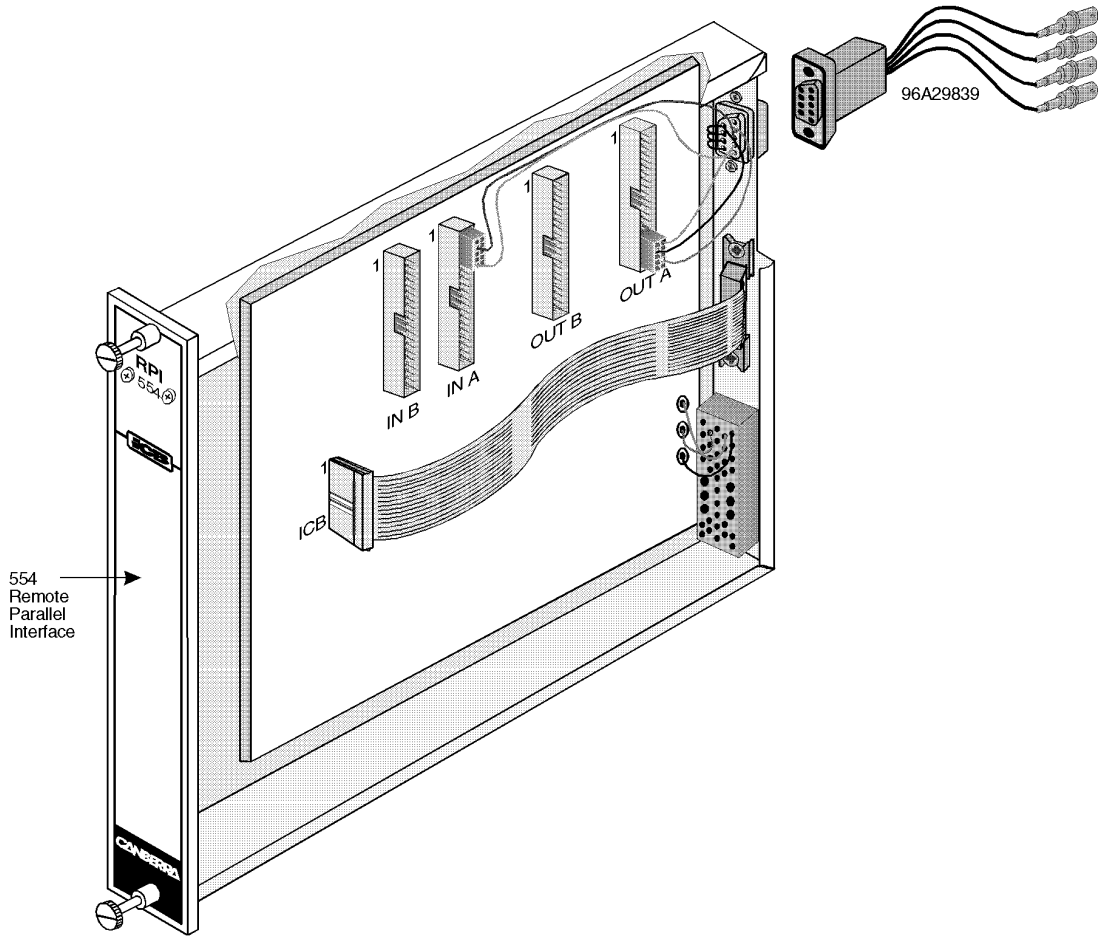
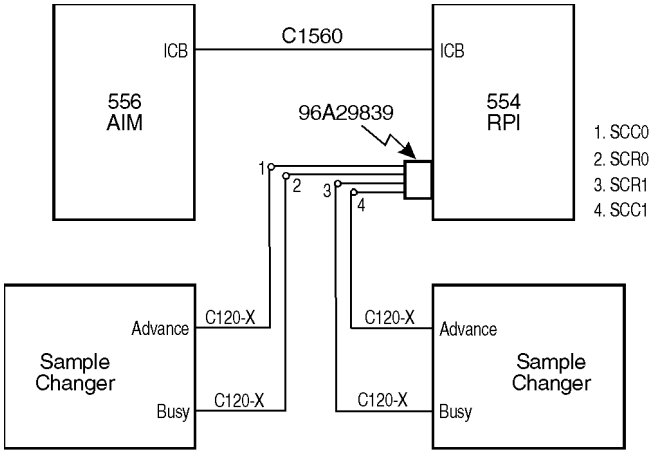


Figure C.2 Connecting a Sample Changer to the 554 RPI

D. Installing the Sample Changer Option

To field install the Sample Changer option, you'll have to open the RPI and connect the sample changer cables (see Figure D.1).

1. Remove the RPI's right side-cover.
2. Attach the D-connector to the rear panel.
3. Install the longer (two-wire) harness so that connector pin 1 (labeled "1") is aligned with pin 1 of the IN-A header. Figure D.1 shows the location of the four headers, IN-A, IN-B, OUT-A and OUT-B.
4. Install the shorter (three-wire) harness so that connector pin 1 (labeled "40") is aligned with pin 40 (lower right corner) of the OUT-A header.
5. Select the desired polarity of the Advance/Busy signals with INV/CTRL DIP switches 4 (IALO) and 8 (OALO). Note that when power is first applied to the module, all outputs are reset to TTL low, regardless of the switch position.
6. Replace the module's right side-cover.



RPI - SAMPLE CHANGER CONNECTIONS
Each RPI is supplied with one 96A29839 cable assembly with purchace of the Model 630416 Sample Changer option.

The C120-X Coax Cables for the RPI to Sample Changer connections must be purchased separately.

Figure D.1 Setting Up the 554 RPI with a Sample Changer

E. Troubleshooting

This chapter is designed to help troubleshoot an ICB configuration containing a Model 556 AIM acting as the ICB controller and at least one Model 554 RPI. No special knowledge is required to run the diagnostics.

E.1. The 554 Is Not Seen By the System.

The module's status is either "Required hardware unavailable" (Genie-PC) or "Module unavailable" (Genie-VMS). To solve this problem, try the suggestions listed below.

E.1.1 Possible Solutions

1. Referring to "Setting the Module's Address" on page 5, verify that the module's address is set correctly on the 554's internal MOD-SEL switch.

2. Check the cabling on the ICB configuration. Start at the ICB controller and follow the ICB bus, verifying that pin 1 on the connector and cable is properly aligned and all ICB modules are connected.

3. Two modules may have the same starting address. Determine the address of each module by examining each 554's internal MOD-SEL switch. If two modules appear to have the same address, refer to "Setting the Module's Address" on page 5.

4. Verify that the NIM Bin containing the 554 is supplying +6 volts.

5. Check that the pins located on the 554's power connector are engaging the NIM Bin's power connector. Check the voltages being supplied by the NIM Bin containing the 554.

6. If the module still exhibits a problem, contact Canberra Customer Service for further assistance.

E.2. 554 Ramp Test

This diagnostic (available only on VMS systems) will verify that the ports on the 554 are working properly. Two 40-pin ribbon cables are required for this diagnostic and the ICB controller must be a Model 556 AIM.

1. Unscrew the 554's right-side panel and detach all cables connected to RC1, RC2, RC3 and RC4. (Refer to Figure 2.3 for location.) Connect one of the 40-pin cables to RC1. Connect that same cable to RC3 placing pin 1 of the cable at pin 40 of connector RC3. If pin 1 is in the upper left-hand corner, then pin 40 is in the lower right-hand corner. This will cause output bits of port A to correspond to input bits of port A.

2. Connect the other 40-pin cable to RC2. Connect that same cable to RC4 placing pin 1 of the cable at pin 40 of connector RC4. This will cause output bits of port B to correspond to input bits of port B.

3. Place all INV-CTRL switches to the *on* position.

4. At the host system type: MCA RESERVE NI*xx*, where *xx* is the AIM's Ethernet address.

5. At the host, type:

```
RUN ND_SYSEXE:ICB_RPI_DIAG
```

6. Then enter the 556 AIM's Ethernet address when prompted.

7. You will then be prompted for the 554 RPI's module number. This is the number set on the MOD-SEL switch.

8. Let the diagnostic run for two minutes. If no errors appear, stop the diagnostic by typing a Control C. Position all INV-CTRL switches to the *off* position and re-run the diagnostic. If errors are reported, refer to step 10.

9. If after two minutes no errors are reported, the 554's ports can be presumed to be working properly. Therefore, the problem can be isolated to either the cabling or the unit under control. If problems continue, contact Canberra Customer Service.

10. If errors are reported, check that the above steps were performed correctly and that the cable connecting RC1 to RC3 and RC2 to RC4 has the appropriate "twist". If difficulties continue, the problem can most likely be isolated to the 554. Contact Canberra Customer Service.

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