PRELIMINARY

OPERATORS MANUAL

MODEL 488 GPIB ANALYZER

RACAL-DANA

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

SPECIFICATIONS

GENERAL DESCRIPTION	
The GPIB Bus Analyzer is a battery powered instrument which can trace, single-step or stop on a trigger word. It contains a 40 x 11 bit memory.	
GENERAL SPECIFICATIONS	
Power Requirements	Four alkaline C Type cells, 7.0 - 4.5 volts, 200 mW maximum
Weight	2 lbs. with batteries
Dimensions	Width: 6" (152.4mm) Length: 9-1/4" (234.9 mm) Height: 3-1/2" (88.9 mm)
Warranty	Standard warranty statement: Exhibit inside front page.
Temperature Range **Operating** **Storage**	 $0^{o}C$ to $+ 55^{o}C$ -55 to $+ 75^{o}C$
Humidity	$0^{o}C$ to $25^{o}C$ 95% RH $25^{o}C$ to $40^{o}C$ 75% RH $40^{o}C$ to $75^{o}C$ 45% RH
ELECTRICAL SPECIFICATIONS	
Low Battery Annunciator	At 4.5 ± 0.25 Volts annunciator turns ON.
Load	Meets IEEE-STD-488-1978 DC load requirements
Driver	In accordance with IEEE-STD-488-1978 Driver Specification for NRFD and NDAC

SPECIFICATIONS Continued

ELECTRICAL Continued	
Handshake Speed	100 K bytes/sec. typical or single step
Trigger Points	3 points: START (00), MIDDLE (19), or END (39)
FUNCTIONAL SPECIFICATIONS	
Trace	Records from GPIB
Passive	Displays the status of the GPIB
S/S	Single steps or stops the GPIB
Memory	Records DIO bits, ATN, SRQ and EOI word – 40 words deep
Trigger	Triggers on bits DIO1 through DIO8, ATN, SRQ and EOI with combinations of 0, 1 or X. (X = Don't care)
DISPLAY SPECIFICATIONS	
Type	LCD (Liquid Crystal Display)
Data	2 Hexadecimal (00 through FF)
Memory Location	2 Decimal digits (0 to 39) or symbol db (data bus)
GPIB Annunciators	ATN NRFD SRQ NDAC EOI REN DAV IFC
Instrument Status	ARM
Battery Condition	LO BAT

SECTION 1
GENERAL DESCRIPTION

1.1 PURPOSE

1.1.1 Racal-Dana Instruments prepared this Instruction Manual for the Model 488 GPIB Analyzer. The manual provides the user with the operating procedures necessary to employ the features designed into the instrument. Also, the manual presents the maintenance procedures required by technical people to obtain the maximum performance specified by Racal-Dana in the published specifications. It is recommended that the users and technicians read this manual before operating the instrument.

1.2 SCOPE

1.2.1 The Instruction Manual presents the information for the Model 488 GPIB Analyzer in a functional sequence, starting with the Operator's sections one through three and continuing with the Maintenance sections four through seven. The sections in the manual include: General Description, Installation, Operation, Maintenance, Drawings, and Parts List.

1.3 PRODUCT SUPPORT

1.3.1 Racal-Dana Instruments maintains a complete Engineering Laboratory, Field Engineers, Service Department and Parts Department to support the product commitment. Further support is provided by a network of Field Representatives and Area Service Centers with service personnel available for consultation. The complete list appears on the last two pages of the manual. The warranty program declaration is presented in the forward section of this manual.

1.4 ELECTRICAL DESCRIPTION

1.4.1 The Model 488 GPIB Analyzer is designed specifically to monitor and service abnormalities in IEEE-Standard-488-1978 General Purpose Interface Bus (GPIB) systems. The analyzer can be easily connected into any GPIB system (stack connector) for transparent analysis of the bus data.

1.4.2 The analyzer features three operating modes:

a. TRACE Mode; data is captured, stored in memory, and later displayed for analysis.

b. PASSIVE Mode; presents the bus transactions in real time on the display.

c. S/S (Single Step) Mode; allows bus transactions to be stopped or single-step.

These modes are enhanced with ARM/STEP and START/END switches which increase flexibility by providing variations of the basic operation.

1.4.3 The user is provided with three categories of data from the LCD (liquid-crystal-display) to visually interpret the bus data:

a. Memory Location displays stored data locations in decimals digits 00 to 39. The display exhibits db (data bus) when directly viewing the bus.

b. Data displays one of the 40 hexadecimal data bytes in memory or can display data from the bus.

c. Bus line status indicators plus two analyzer status indicators, in addition to low battery and arm are also provided.

1.4.4 The user can observe signals with short duration that are expanded with special pulse stretching circuits. The REN line is at logic one (0.8V) when the REN annunciator is displayed. The pulse stretcher turns it OFF for a visible period of time if the REN lines go to logic zero (2V) for 2 μs or longer. The IFC line is at logical one (0.8V), when the IFC annunciator is displayed. The pulse stretcher turns it ON for a visible period of time if the IFC line goes to a logic one (0.8V) for 2 μs or longer.

1.4.5 The 488 Analyzer provides a terminal with 17 Test Points (TP) which parallels the GPIB connector. The 18th TP provides the trigger output for peripheral device. These TP connections expand the diagnostic applications of the analyzer. The test point assignments are listed in Table 3.5.

1.4.6 The 488 operates from a battery pack containing 4 C-type cells.

1.5 MECHANICAL DESCRIPTION

1.5.1 The physical dimensions of the 488 Analyzer are outlined in Figure 1.1. The top view shows the control panel with the control switches for TRIGGER condition, MEMORY and POWER on/off. The LCD Memory Location and Data display with nine status indicators are also located on the control panel.

1.5.2 The rear panel includes the GPIB connector and the parallel test point (TP) terminals. The bottom panel of the analyzer provides the battery pack access door and concise operating instructions.

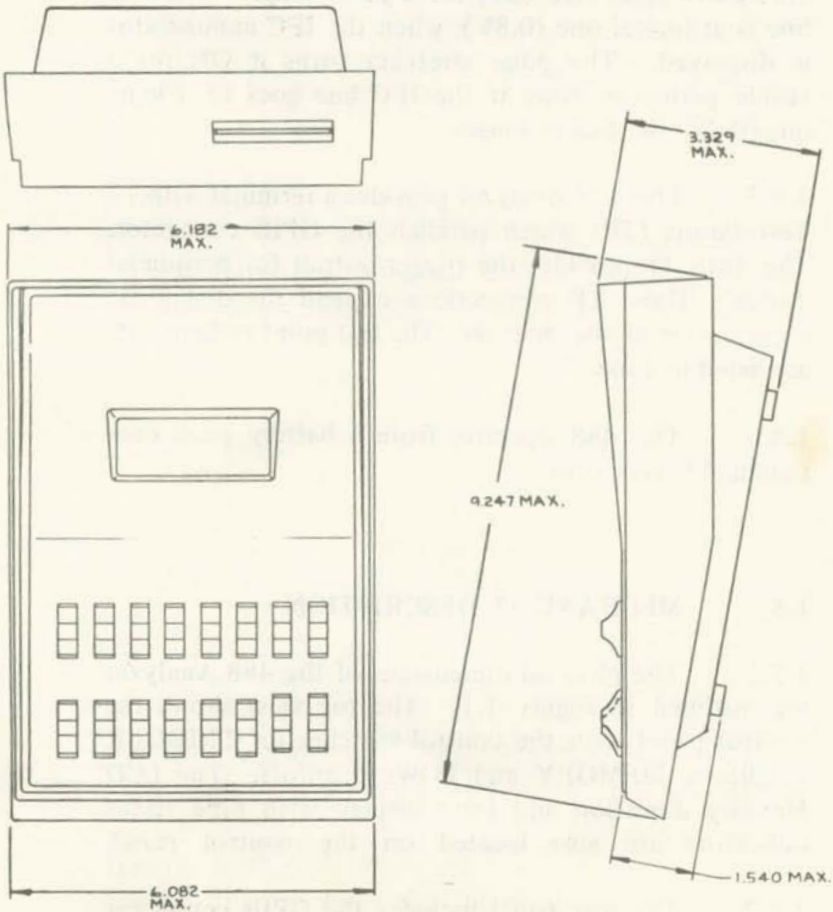


Figure 1.1 - Dimensional Outline

SECTION 2
INSTALLATION

2.1 PURPOSE.

2.1.1 This section describes the suggested procedures upon receiving a new instrument from Racal-Dana. The subjects include unpacking, packing, initial preparation, battery supply, and cables.

2.2 UNPACKING AND INSPECTION.

2.2.1 Prior to unpacking the instrument, examine the exterior of the shipping carton for any signs of damage (all irregularities should be noted on the shipping bill). Carefully remove the instrument from the carton's packaging and inspect the instrument for any signs of damage. Notify the carrier immediately if damage is apparent.

2.2.2 If damage to the unit is apparent or suspected, a qualified person should bench check the unit immediately. If findings are not satisfactory, a report to the carrier must follow immediately.

2.3 SHIPPING CONTAINER REQUIREMENTS.

2.3.1 When shipping the instrument, the original shipping carton with plastic dust cover will provide the necessary protection. This carton should be preserved, if it is possible.

2.3.2 When the original shipping carton is not available, reconstruct the packaging to approach the

protection designed into the original shipping carton as listed next:

a. Wrap the unit in a plastic cover.

b. Spray the bottom of a suitable carton with plastic foam. Permit to expand.

c. Place the unit on the plastic foam in the carton, about center.

d. Surround the unit with plastic foam.

e. Seal the carton.

2.4 INITIAL PREPARATION.

2.4.1 Preparing the analyzer for use requires the GPIB connector cable and the battery power source installed as described next.

2.5 BATTERY INSTALLATION.

2.5.1 The battery pack is accessible through the screw-locked battery cover on the bottom panel.

2.5.2 To install the batteries, turn the battery cover retaining screw counterclockwise (CCW) until the cover is freed from the case (the other end of the cover is secured under the case).

2.5.3 Extend the battery release strap along the bottom of the battery cage.

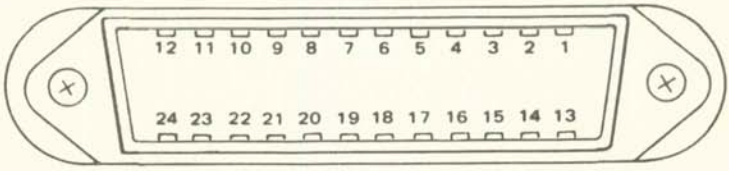
> NOTE
>
> To release the batteries from the cage, pull the release strap tab that extends around the last cell.

2.5.4 Install the cells over the battery release strap so that the polarity markings on the cell match the markings on the battery holder.

2.5.5 Install the battery cover; start with end that slips under the case, then secure the screw-lock by turning the screw clockwise.

2.6 GPIB CABLE ATTACHMENT.

2.6.1 The analyzer is attached to a GPIB system thru a 24-conductor GPIB cable. Care must be taken when making the connection to avoid using two different screw threads. The type of threads used are indicated by the color of the bolt; black for metric, chrome for non-metric. The analyzer uses the standard specified metric thread. Racal-Dana part numbers for GPIB cables are 406845 (1 meter), and 406844 (2 meter) and 406846 (4 meter). Figure 2.1 illustrates the 488 GPIB connector and pin number assignment table.



Pin No.	Assignment
1	DIO 1
2	DIO 2
3	DIO 3
4	DIO 4
5	EOI
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	SHIELD

Pin No.	Assignment
13	DIO 5
14	DIO 6
15	DIO 7
16	DIO 8
17	REN
18	GND, (6)
19	GND, (7)
20	GND, (8)
21	GND, (9)
22	GND, (10)
23	GND, (11)
24	GND, LOGIC

Figure 2.1 - GPIB Connector

SECTION 3
OPERATION

3.1 INTRODUCTION.

3.1.1 This section contains operating instructions for the analyzer. The information contains illustrations of panel controls, indicators and connectors along with a tabular listing of the function and purpose for each. Operating instructions for the analyzer are presented in two ways; a description of each operating feature followed, where necessary, with a step-by-step operating example. Some operating features or functions are simple one or two step operations and thus no examples are included.

3.1.2 The analyzer operates in the IEEE-STD-488-1978 bus environment; therefore, this section will describe the operation procedures of the analyzer and will review the basics of GPIB in sub-sections 3.8.

3.2 PRELIMINARY INSTRUCTIONS.

3.2.1 Before operating the analyzer, it is recommended that the user read this entire section, then verify that the batteries are installed correctly. Next, slide the POWER switch to ON. This will activate the display, indicating that the analyzer is ready for operation.

3.3 CONTROL AND INDICATORS.

3.3.1 There are basically 4 groups of controls. One group establishes the mode of operation, (TRACE, Passive, S/S). A second group includes the ARM/STEP switch. Another group sets the TRIGGER CONDITION (DIO1 through DIO8, ATN, SRQ, EOI).

Finally, one group is used to control memory (UP-DOWN, START-END). The location of each switch is shown in Figure 3.1. Each switch is described in Table 3.1

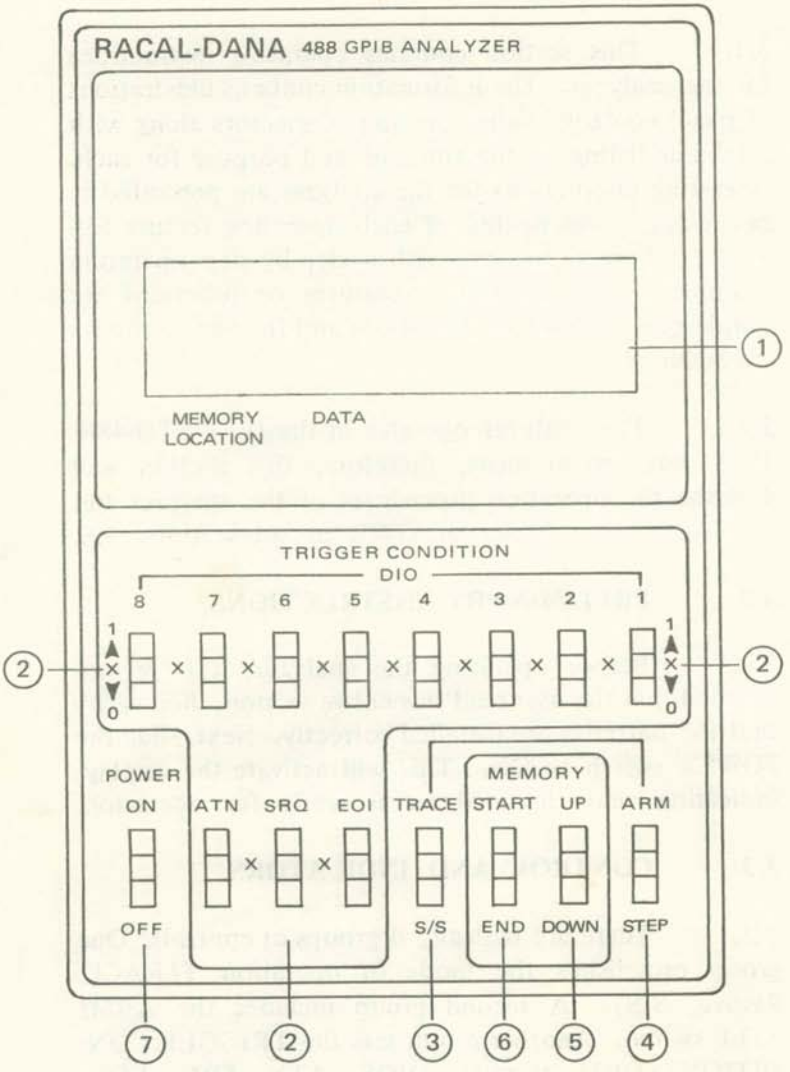


Figure 3.1 - Analyzer Control Location

Table 3.1 - Analyzer Control Description

REFERENCE	ITEM	DESCRIPTION
1	Liquid crystal display	See Figure 3.2 and Table 3.2
2	Trigger condition	The 3 position switches - Data Input/Output (DIO1 through DIO8) ATN, SRQ and EOI select the trigger word. When the signal lines match the switches and DAV is true (low) the trigger condition is met.
	1	This switch position matches when the referenced signal is a 1 (low).
	X	This switch position matches either a 1 or an 0 on the referenced signal.
	0	This switch position matches when the referenced signal is a 0 (high).
3	Mode of operation	A 3 position switch that selects one of 3 modes.
	TRACE	The TRACE mode is used to record data from the GPIB. ARM initiates the recording. STEP aborts it. The memory movement switch (ref. 4) is used to view the recorded data.
	CENTER	The center position places the analyzer in the passive mode of operation. The display shows the status of the GPIB. The analyzer does not handshake in this mode. it is completely passive.
	S/S	The S/S mode is used to single step the GPIB. ARM causes the analyzer to start searching for the TRIGGER CONDITION. STEP will abort a search or allow the bus to proceed one handshake.
4	ARM/STEP	A 3 position momentary switch with center-off.
	ARM	This position causes the analyzer to start searching for the TRIGGER CONDITION. While searching. the ARM indicator is displayed. In TRACE mode data is recorded during the search. In S/S mode the handshake is allowed to proceed at high speed during the search.
	STEP	In S/S mode the GPIB is allowed to proceed one handshake. In TRACE or S/S mode a search is aborted.
5	MEMORY (Movement)	A 3 position momentary switch with center-off. Switch is only active in TRACE mode.
	UP	This position causes the display of the next transaction in memory.
	DOWN	This position causes the display of the previous transaction in memory.
6	MEMORY (Trigger)	A 3 position switch that determines which transactions to record in memory. The switch is only active when ARMing in TRACE mode.
	START	39 transactions are recorded after the trigger condition is recorded.
	Center	20 transactions are recorded before the trigger condition and 19 after.
	END	39 transactions are recorded before the trigger condition is recorded.
7	POWER	The POWER switch applies power to the analyzer when set to the ON position.

3.3.2 Indicators include MEMORY LOCATION, DATA, and 10 individual indicators. The display is shown in Figure 3.2 and described in Table 3.2.

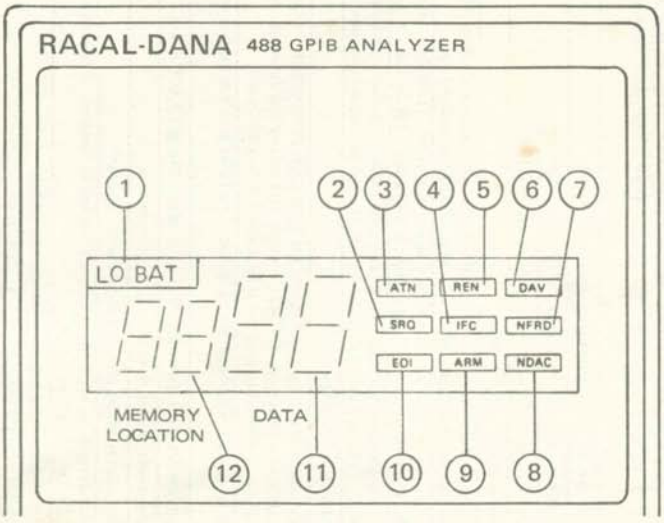


Figure 3.2 - LCD Display Exhibits

Table 3.2 - Panel Controls Description

REFERENCE	DESIGNATOR	DESCRIPTION
1	LO BAT	Low Battery status indicator
2	SRQ	Service Request status indicator
3	ATN	Attention status indicator

Table 3.2 - Panel Controls Description Continued

REFERENCE	DESIGNATOR	DESCRIPTION
4	IFC	Interface Clear status indicator with pulse stretcher
5	REN	Remote Enable Status indicator with pulse stretcher
6	DAV	Data Valid status indicator
7	NRFD	Not Ready For Data status indicator
8	NDAC	Not Data Accepted status indicator
9	ARM	Analyzer status indicator
10	EOI	End or Identify status indicator
11	DATA (00-FF)	Data that is recorded during a bus transaction in HEX code. Real time bus display
12	MEMORY LOCATION	Shows the relative location of a recorded bus transaction or if the bus is displayed directly

3.4 TRIGGERING AND DISPLAY OF DATA.

3.4.1 The user servicing a bus with the analyzer should refer to the list of interface and program messages shown on the label attached underneath the unit (Table 3.3). These bit patterns, normally ASCII encoded, provide the user with specific trigger words that are required when setting the TRIGGER CONDITION switches.

3.4.2 The ASCII seven bit mode is the convention used to transmit and receive data in GPIB instrument control systems. The LSD vertical row from 0 to F (Hex) and the MSD top horizontal row 0 to 7 or 8 to F, together list the letters, numbers, special characters and control modes applicable to the GPIB (see example in para. 3.4.3).

3.4.3 Table 3.3 allows easy transfer from Hex to binary for setting the TRIGGER CONDITION switches and also to transfer from the data displayed to the ASCII character on the GPIB.

Example:

Assume the data display reads 45. The MSD column 4 or C represents the characters @ to O. In addition, the LSD column indicates that row 5 lists the character E as the one being transmitted on the GPIB. In reverse, if we wanted to trigger on the character E, we would locate "E" on the table, then note the MSD column heading (E = 4 or C, binary X100), and the LSD row (E = 5, binary 0101). Putting them together would give us the setting for the 8 DIO switches (i.e., X100 0101).

Table 3.3 - 488 Analyzer ASCII Codes

LSD HEX	LSD BIN	MSD HEX 0 OR 8 X000 ASCII	NOTE 1	1 OR 9 X001 ASCII	NOTE 1	2 OR A X010 ASCII	NOTE 1	3 OR B X011 ASCII	NOTE 1	4 OR C X100 ASCII	NOTE 1	5 OR D X101 ASCII	NOTE 1	6 OR E X110 ASCII	NOTE 1	7 OR F X111 ASCII	NOTE 1
0	0000	NUL		DLE		SP	MLA 0	0	MLA 16	@	MTA 0	P	MTA 16	`		p	
1	0001	SOH	GTL	DC1	LLO	!	MLA 1	1	MLA 17	A	MTA 1	Q	MTA 17	a		q	
2	0010	STX		DC2		"	MLA 2	2	MLA 18	B	MTA 2	R	MTA 18	b		r	
3	0011	ETX		DC3		#	MLA 3	3	MLA 19	C	MTA 3	S	MTA 19	c		s	
4	0100	EOT	SDC	DC4	DCL	$	MLA 4	4	MLA 20	D	MTA 4	T	MTA 20	d		t	
5	0101	ENQ	PPC	NAK	PPU	%	MLA 5	5	MLA 21	E	MTA 5	U	MTA 21	e		u	
6	0110	ACK		SYN		&	MLA 6	6	MLA 22	F	MTA 6	V	MTA 22	f		v	
7	0111	BEL		ETB		'	MLA 7	7	MLA 23	G	MTA 7	W	MTA 23	g		w	
8	1000	BS	GET	CAN	SPE	(	MLA 8	8	MLA 24	H	MTA 8	X	MTA 24	h		x	
9	1001	HT	TCT	EM	SPD	)	MLA 9	9	MLA 25	I	MTA 9	Y	MTA 25	i		y	
A	1010	LF		SUB		*	MLA 10	:	MLA 26	J	MTA 10	Z	MTA 26	j		z	
B	1011	VT		ESC		+	MLA 11	;	MLA 27	K	MTA 11	[	MTA 27	k		{	
C	1100	FF		FS		,	MLA 12	<	MLA 28	L	MTA 12	\	MTA 28	l		|	
D	1101	CR		GS		–	MLA 13	=	MLA 29	M	MTA 13	]	MTA 29	m		}	
E	1110	SO		RS		.	MLA 14	>	MLA 30	N	MTA 14	^	MTA 30	n		~	
F	1111	SI		US		/	MLA 15	?	UNL	O	MTA 15	_	UNT	o		DEL	

NOTE 1: BUS INTERFACE MESSAGES IF ATN IS TRUE.

3.5 OPERATION DESCRIPTIONS.

3.5.1 There are 3 basic modes of operation, TRACE, S/S and PASSIVE. These are described below:

3.5.2 Trace Mode:

Records bus transactions at high speed and allows viewing the recorded transactions. When operated in conjunction with MEMORY, ARM and STEP functions, the analyzer will perform as follows:

a. TRACE-ARM: The analyzer will search for the TRIGGER CONDITION that is set on the panel switches. When the search is completed and data recorded, ARM is turned OFF.

b. TRACE-UP/DOWN: A data byte captured in memory is displayed in HEX digits along with the recorded values of ATN, SRQ and EOI. MEMORY LOCATION shows the relative location of the recorded data. The data sequence can be stepped up or down as required.

c. TRACE-STEP: When STEP is activated during the search period, the search stops and the balance of memory locations are filled with zeros. (Note: the bus handshake is stopped while STEP is held down).

3.5.3 PASSIVE:
Middle position on the TRACE-S/S Switch.

a. Display exhibits the bus on a sampled basis (approximately 20 times/sec.). MEMORY LOCATION shows db to indicate the data bus is being displayed rather than memory.

3.5.4 S/S (Single Step):

The display shows the bus on a sampled basis. MEMORY LOCATION shows the data bus (db) being displayed. When operated in conjunction with ARM and STEP functions, the analyzer will perform as follows:

a. S/S-ARM: The analyzer handshakes bus transaction at high speed until the TRIGGER WORD is recognized. While the search is in progress the ARM indicator is displayed. ARMing allows the user to "fast forward" when in single step.

b. S/S-STEP: The bus is allowed to advance one handshake each time STEP is activated and released. If a search is in progress, STEP will abort it.

NOTE

1. ANRS: The Acceptor Not Ready State is activated when STEP switch is engaged.

2. ACDS: The Accept Data State is entered when the ARM-STEP switch is in the center position.

3.5.5 Abridged operation instructions presented in Table 3.4 are placed on the bottom of the analyzer for easy reference. This table shows the main operating modes, which can be used as a guide after becoming familiar with material in this manual.

Table 3.4 - Abridged Operation Instructions

MODE	TRACE-S/S SWITCH SETTING	OPERATING INSTRUCTIONS
Trace (Storage of events in memory)	Set switch to TRACE	1. Set trigger condition. 2. Select memory trigger position (START-mid-END). 3. Use ARM position to arm analyzer. 4. Wait for trace to complete (ARM indicator off). 5. Recall stored data using UP-DOWN switch.
Passive	Set switch to mid position	1. All other switches are inactive. 2. Observe bus traffic on display.
Single Step	Set switch to S/S	1. Use STEP position to advance bus traffic.
Stop on Trigger	Set switch to S/S	1. Set trigger condition. 2. Use ARM position to arm analyzer. 3. Wait for trigger (ARM indicator off). 4. Use STEP position to advance bus traffic.

3.6 CONNECTIONS.

3.6.1 Indication of the various test points contained on the rear connector is shown in Table 3.5. The pin designation of this standard GPIB connector is shown in Figure 2.1.

Table 3.5 - Test Point Assignment

TEST POINTS	ASSIGNMENT	GPIB - PIN NUMBERS
TP1	Common	12, 18-24
TP2	DIO5	13
TP3	DIO6	14
TP4	DIO7	15
TP5	DIO8	16
TP6	DIO1	1
TP7	DIO2	2
TP8	DIO3	3
TP9	DIO4	4
TP10	EOI	5
TP11	DAV	6
TP12	NRFD	7
TP13	NDAC	8
TP14	SRQ	10
TP15	ATN	11
TP16	IFC	9
TP17	REN	17
TP18	$\overline{\text{TRIG}}$	N/A

3.7 APPLICATION EXAMPLES.

NOTE

The instructions provided assume that power switch is ON and that the analyzer operation is normal.

3.7.1 MLA7 (My Listen Address 7) Trace Mode

EXAMPLE 1:

This is an example of how to record and view what was sent to listen address 7.

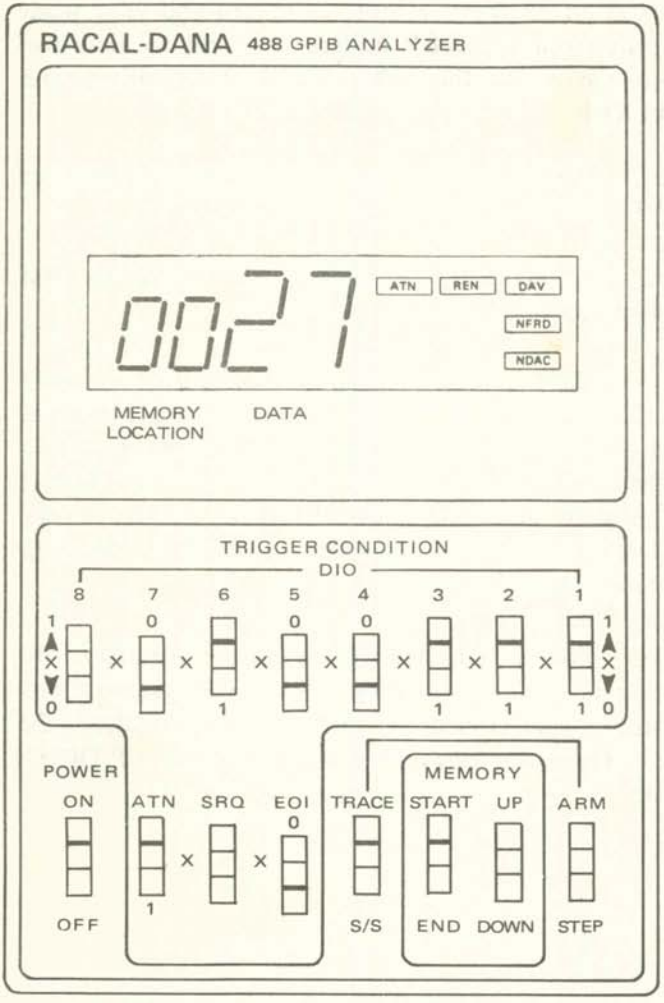
1. The mode of operation is set to TRACE. TRACE is used to record and view recorded data.

2. With trigger position set to START, the trigger condition appears at the start of memory. The rest of memory is filled with data that follows.

3. The TRIGGER CONDITION switches are set to correspond to listen address 7 (called MLA7 for My Listen Address 7). Look for MLA7 in Table 3.3. The table shows the DIO switches should be set to X0100111. MLA7 appears in a column that says NOTE 1. Note 1 indicates ATN should be set true. This means the ATN trigger condition switch should be set to 1. The remaining TRIGGER CONDITION switches and SRQ are set to don't care (X) and EOI is set to zero. The purpose of setting EOI to zero is to avoid triggering on the GPIB Identify state. This occurs when both ATN and EOI are set to one. The switches should appear as shown.

4. The analyzer is ARMed by activating and releasing the ARM switch. The ARM indicator will come on while the analyzer is searching for the TRIGGER CONDITION and recording the data. This may be a very brief time if there is much activity on MLA7. After the data is recorded, the display will appear as shown.

Trace: Example 1



3.7.2 MTA17 (My Talk Address 17) Trace Mode.

EXAMPLE 2:

This is an example of how to record and view what is sent from TALKER address 17, and to view the sequence which the controller used to address the TALKER.

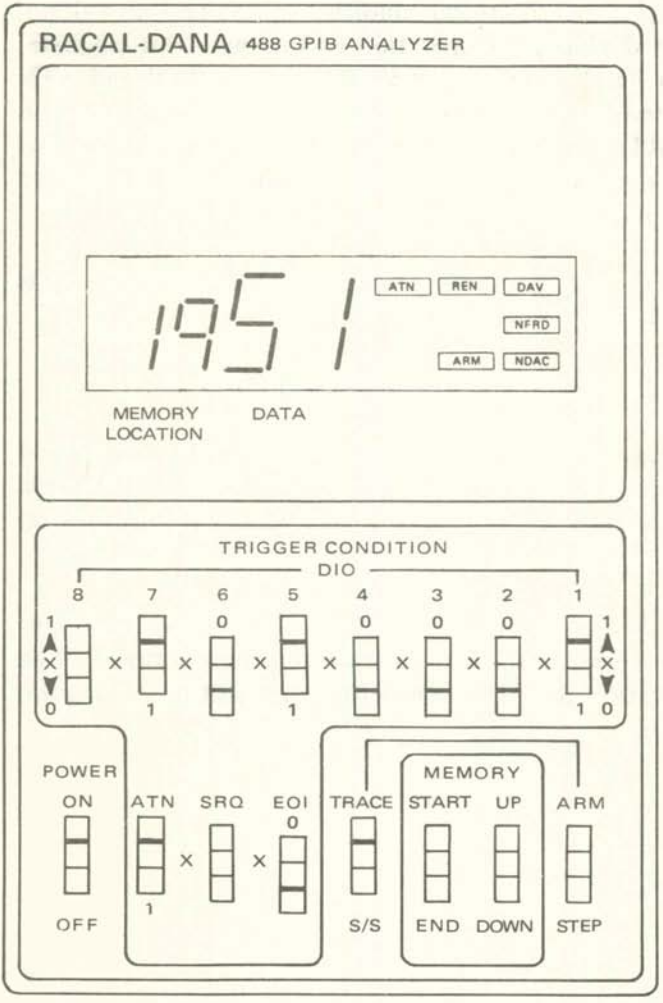
3.7.2.1 With switches set up as shown, the trigger condition corresponds to MTA 17.

3.7.2.2 Momentarily engage the ARM switch. ARM indicator comes ON.

3.7.2.3 Data is recorded in the first half of memory until the trigger condition is met. The trigger word is stored at location 19 and the next 20 transactions are recorded in the last half of memory. After this is accomplished the ARM goes OFF. The display shows MEMORY LOCATION 19 and DATA 51. This data corresponds to MTA 17.

3.7.2.4 Transactions before the trigger condition are recorded in memory locations 00 to 18. Transactions after the trigger condition are recorded in locations 20 to 39. These are viewed by the use of the UP/DOWN switch.

Trace: Example 2



3.7.3 Bus Hang-up, Trace Mode.

EXAMPLE 3:

3.7.3.1 Set-up trigger condition to a value that will not occur during your operation of the bus. For example, if no parallel poll exists in the system (EOI and ATN asserted), set the switches as shown. Note that the START/END switch is set to END. This is done so that the largest number of transactions will be saved in memory (39).

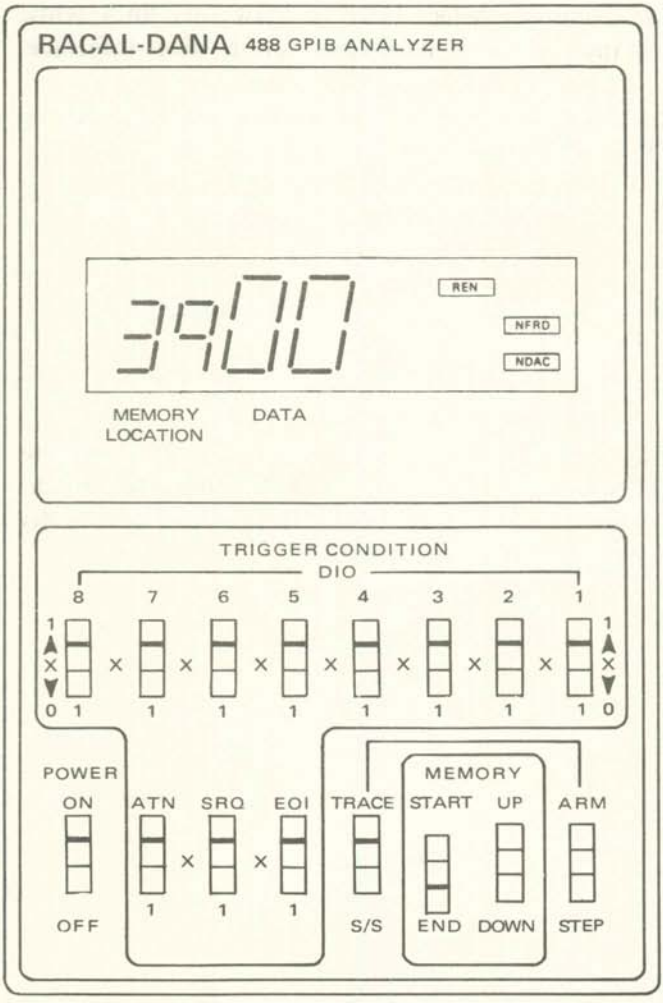
3.7.3.2 Momentarily engage the ARM switch. ARM indicator comes ON.

3.7.3.3 Allow the system to hang up.

3.7.3.4 Stop recording by engaging STEP switch and releasing it. The display should show MEMORY LOCATION 39 and DATA 00. Memory locations 00 to 38 hold the 39 steps that lead up to the bus hang up.

3.7.3.5 View the recorded transactions with the UP/DOWN switches. The last recorded transaction will be in location 38. The one before that will be in location 37, etc.

Trace: Example 3



3.7.4 Hardware/Interface Bus Checkout, Passive

EXAMPLE 4:

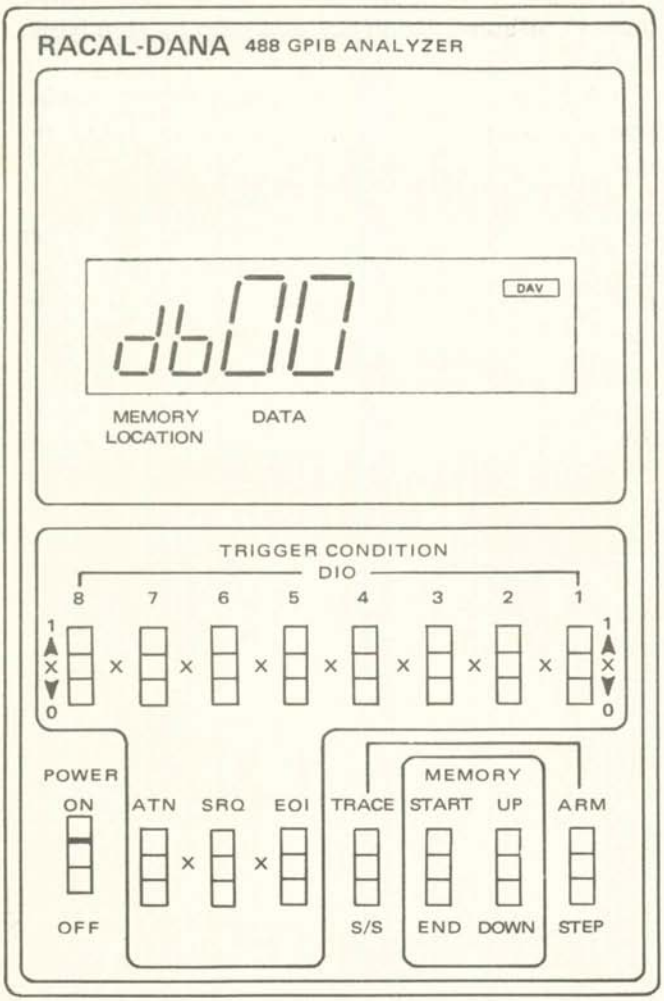
This example shows how to view bus lines while checking out the hardware for a new interface.

3.7.4.1 Place the analyzer in Passive mode by moving the TRACE-S/S switch to the middle position.

> NOTE
>
> None of the other switches have any effect in PASSIVE mode.

3.7.4.2 When the hardware checking out the interface is told to assert DAV, the DAV indicator on the display should come ON. All GPIB lines can be directly viewed when in the Passive mode.

Passive Example 4



3.7.5 Instrument Character Review, S/S.

EXAMPLE 5:

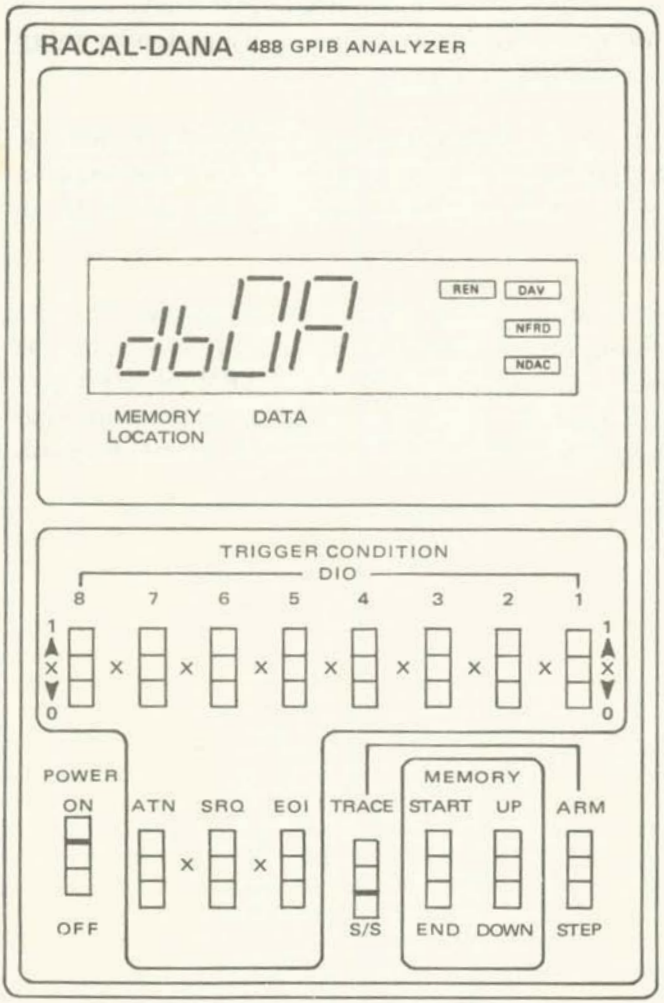
This example shows how to view an instrument's reaction to different characters on a step by step basis.

3.7.5.1 Some instruments react directly to commands, others might require a terminator such as carriage return or line feed.

3.7.5.2 To see this condition displayed, set the analyzer in S/S. Program the controller to send commands to the instrument. Single step the bus using the STEP switch on the analyzer.

3.7.5.3 The instrument's reaction to the different characters can be observed on a step by step basis.

S/S: Example 5


RACAL-DANA 488 GPIB ANALYZER
REN
DAV
NFRD
NDAC
MEMORY LOCATION
DATA
TRIGGER CONDITION
DIO
8 7 6 5 4 3 2 1
1 X 0
POWER
ON
OFF
ATN
SRQ
EOI
TRACE
S/S
MEMORY
START
END
UP
DOWN
ARM
STEP

3.7.6 High Speed to Single Data Viewing, S/S.

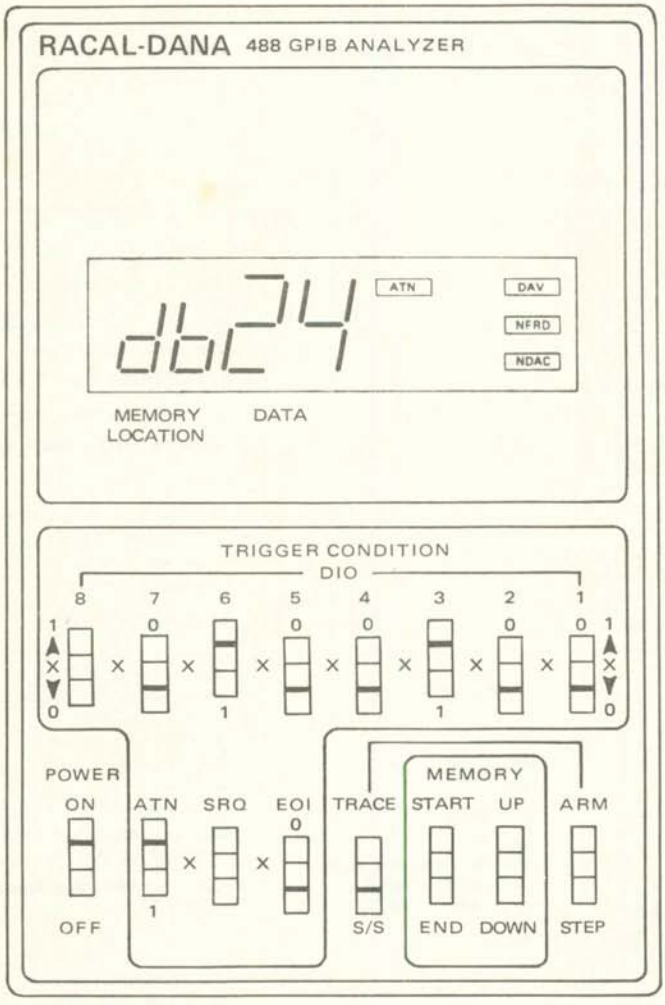
EXAMPLE 6:

This example shows how to move past a large body of information quickly and then view a particular group of data by single stepping.

3.7.6.1 Place the analyzer in S/S. Set the TRIGGER CONDITION to the data where the single stepping is to continue. This might be LISTEN address MLA4 as shown.

3.7.6.2 Momentarily engage the ARM switch. The ARM indicator will come on while analyzer is searching for the trigger condition. When the ARM indicator goes off, the analyzer will have found the trigger word and be ready to single step from that point forward.

S/S: Example 6


RACAL-DANA 488 GPIB ANALYZER
ATN
DAV
NFRD
NDAC
MEMORY LOCATION
DATA
TRIGGER CONDITION
DIO
8 7 6 5 4 3 2 1
POWER
ON
OFF
ATN
SRQ
EOI
TRACE
S/S
MEMORY
START
END
UP
DOWN
ARM
STEP

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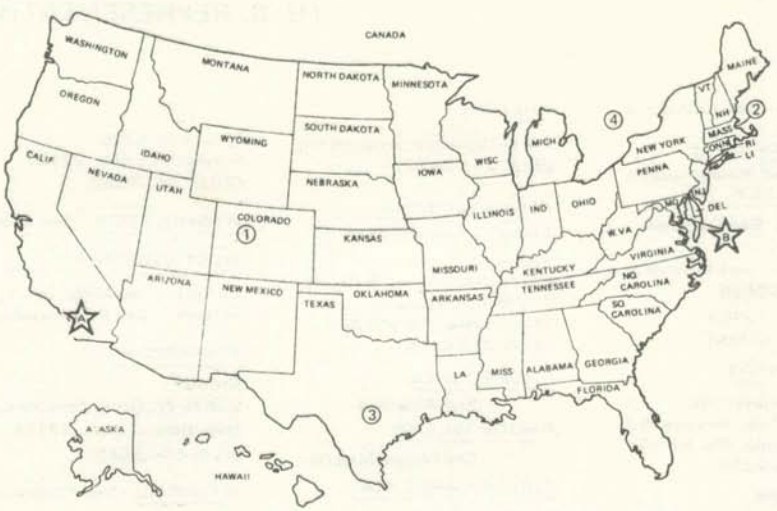

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7-81

REPAIR REQUEST FORM

To allow us to better understand your repair requests, we suggest you use the following outline and include a copy with your instrument to be sent to your local Racal-Dana repair facility.

Model Number _____ Options _____ Date _____

Serial Number _____ P. O.# _____

Company Name _____

Address _____

City _____ State _____ Zip Code _____

Contact _____ Phone Number _____

1. Describe, in detail, the problem and symptoms you are having.

_____

_____

2. If you are using your unit on the bus, please list the program strings used and the controller type, if possible.

_____

_____

3. List all input levels, and frequencies this failure occurs.

_____

_____

4. Indicate any repair work previously performed.

_____

_____

5. Please give any additional information you feel would be beneficial in facilitating a faster repair time. (I. E., modifications, etc.)

_____

_____