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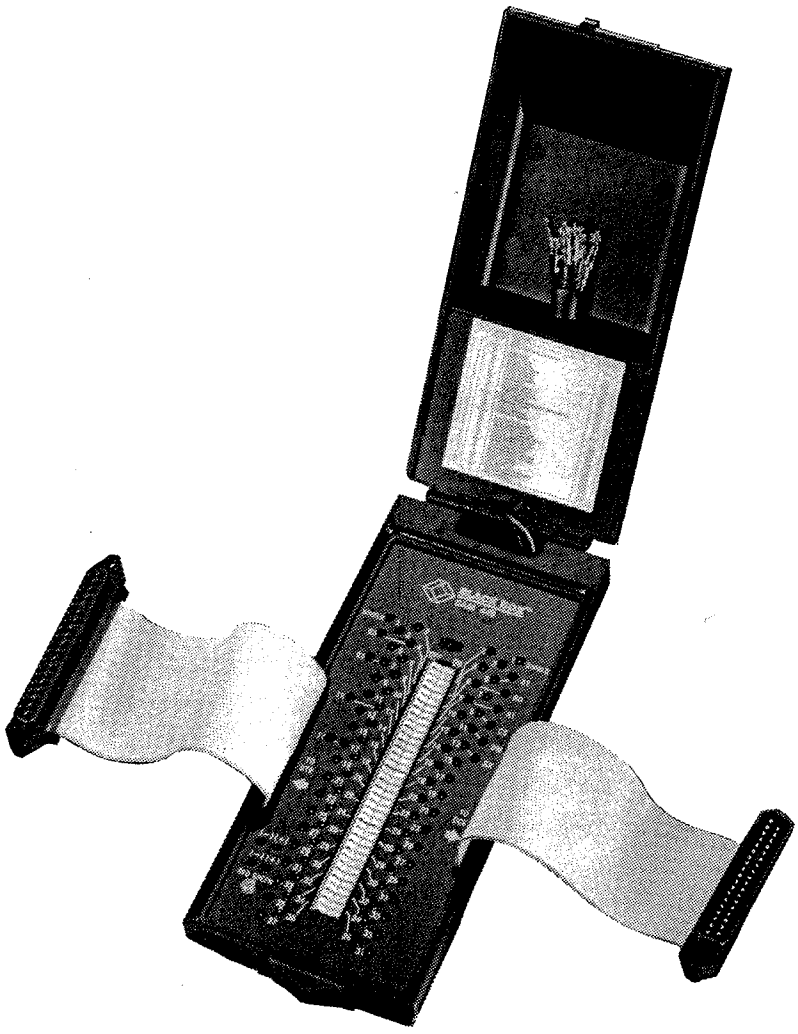
Status Activity Monitor SAM+449



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1.0 SPECIFICATIONS

Indicators:	Eleven LEDs Monitoring the most common pins
Interface:	RS-449
Connectors:	DB37 male and female
Input Signal:	RS-422 +6V nominal, +/- 25V maximum differential RS-423 +/-6V nominal, +/-25V maximum single ended
Power:	9V battery
Size:	5.55"H x 2.9"W x 1.45"D
Weight:	10 oz. (with battery)
Case:	Polypropylene injection-molded case
Front Panel:	Injection-molded clear acrylic plastic

Table 1. Key Parameters of EIA Specifications

Form of Operation	RS-232 Single Ended	RS-423 Single Ended	RS-422 Differential	Units
Maximum cable run	50	2,000	4,000	Feet
Maximum data rate	20K	300K	10M	Baud
Driver output operation circuit	+/-25	+/-6	6V between outputs	V max
Driver output loaded circuit	+/-5 to +/-15	+/-3.6	2V between outputs	V min
Receiver inputs	3K to 7K	≥4K	≥4K	Ohms
Receiver input threshold	-3 to +3	-2 to +2	-2 to +2	V min
Receiver input voltage	-30 to +30	-12 to +12	-12 to +12	V max

2.0 INTRODUCTION

The Status Activity Monitor (SAM+449) is a versatile tool for monitoring data signals--a pocket-sized unit allowing access to all 37 RS-422/RS-423 signal lines. The unit's interface is transparent to data and does not alter the information passing through it. Cabling allowing the connection to both data Terminal Equipment (DTE) and Data Communications Equipment (DCE) is included.

2.1 Features

The following features expand the capabilities of your Status Activity Monitor.

- **Dual Cables** - Female and male connectors on the interface cables eliminate the need to carry freestanding patch cables.
- **Clear Acrylic Faceplate** - Clear faceplate with description on the back eliminates marring or scratching.
- **Velcro Jumper Strap** - Secures loose jumper wires.
- **Battery Switch** - On/off switch allows on-line operation with no battery drain.
- **Light Emitting Diodes (LEDs)** - Eleven LEDs allow the monitoring of DTE and DCE signals. LEDs are located on the appropriate DTE and DCE sides.
- **Color-Coded Jumper Connectors** - Single and daisy-chain jumper connectors are color coded for easy identification and use.
- **Faceplate Pin Identification** - Lines from LEDs and pins to switches simplify operation.
- **Connector Alignment** - Connectors are properly aligned for normal interconnection with DTE and DCE equipment.

2.2 General Operation

The SAM+449 allows full access to all 37 signal lines of the RS-422/RS-423 interface. It provides the ability to either switch or disable 36 of the lines.

The switch for signal ground (line 19) is disabled, allowing the LEDs to function for both the DTE and DCE side when all switches are turned off. As a result, the operator is able to place the device between two pieces of equipment, turn off all the switches, and monitor either piece of equipment independently.

The dual cables have molded stress relief RS-422/RS-423 DB-37 connectors to eliminate the need of carrying an additional jumper cable to the job site.

The LEDs are powered by the battery and draw no voltage from the line when the unit is in operation. When a voltage within the RS-422 specification of +1V to +6V (unloaded output) appears differentially across a signal pair, an integrated circuit in the device switches the voltage from the battery to the LED. When a voltage within the RS-423 specification of -6 to +6 (unloaded output) appears single-ended on a signal lead, an integrated circuit in the device switches the voltage from the battery to the LED.

The on/off switch on the faceplate allows the unit's battery pack to be turned off when left on-line for extended periods of time.

Also contained in the lid of the unit are ten single jumpers easily distinguishable by their white insulation, and two four-way jumpers identifiable by their brown insulation. They are contained with a Velcro strap mounted below the EIA CCITT modem/terminal interface signal list. The pins and jumpers are 0.25 square, an accepted industry standard. The use of this size pin enables easy interfacing with oscilloscope probes and other test equipment.

2.3 Applications

The following items are a summary of the specific applications for the SAM+449. The applications are explained in greater detail in Section 3.0.

- **Monitoring the Terminal/Modem Processor Interface** - The SAM+449 is transparent to the interface while allowing you to monitor and break out all the RS-422/RS-423 signals.

- **EIA Signal Test** - The + and - voltage circuits measure input singals to determine if they meet EIA specifications. The associated bi-color LED glows red when the + input is +1V to +6V volts positive with respect to the - input (RS422). The bi-color LED is green under all other static conditions. The bi-color LED alternates between red and green when the RS-422/RS-423 signals make transitions between the on/mark and the off/space states.

- **EIA Line Attenuation Test** - The SAM+449 attenuation network can be used to test the operation of the modem or terminal EIA driver circuits under a simulated full-load condition. The LED associated with the line under test lights if the driver circuits are operating properly.

- **Modem Loopback Test** - Transmit data is looped into receive data at the digital side of the modem, allowing a loopback test to be performed on modems with no looback capability.

- **Non-Standard Interfaces** - The SAM+449 can be used where a special cable is required to interconnect a terminal to a modem. This is normally an interim application until a special cable can be constructed.

3.0 OPERATION

3.1 Monitoring the Terminal/Modem/Processor Interface

To monitor signals, place the SAM+449 between the two pieces of transmission equipment you want to monitor (see Figure 1). Due to its dual cables, the SAM+449 can be plugged directly into the back of data equipment or inserted directly into the data line, where a male or female connection junction is located. The 10 LEDs monitor all RS-449 category 1 signals.

If you want to monitor a signal on a line which does not have an LED, you need to use a jumper strap. Place one end of the jumper strap on the pin for the line to be monitored. Place the other end of the jumper strap in the + test pin at the bottom. The state of a signal present on the line is displayed by the bi-color LED.

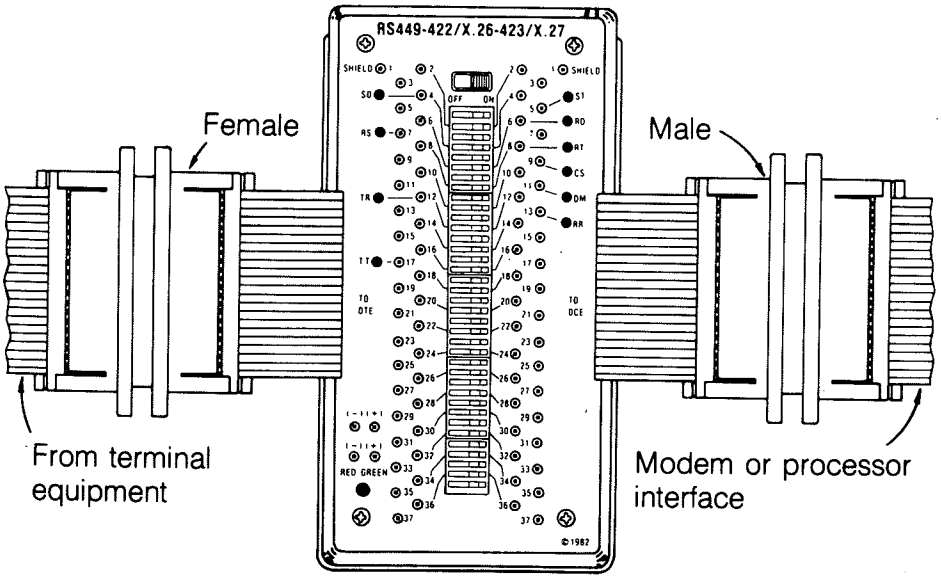

Figure 1. Monitoring Signals For Modems, Processors, And Terminals

3.2 EIA Signal Testing

All RS-449 category 1 signals are monitored by LEDs.

The EIA signal test is used to determine if the signal is within the RS-423 specification range of -6 to +6 volts (unloaded). To perform the test, jumper the pin to either the + or - bi-color LED input pin. A signal within the RS-423 range causes a change in color from green to red when applied to the corresponding terminal. Figure 2 (below) is an example of checking the Signal Quality line (pin 33) of a Bell 2048 Datphone II modem.

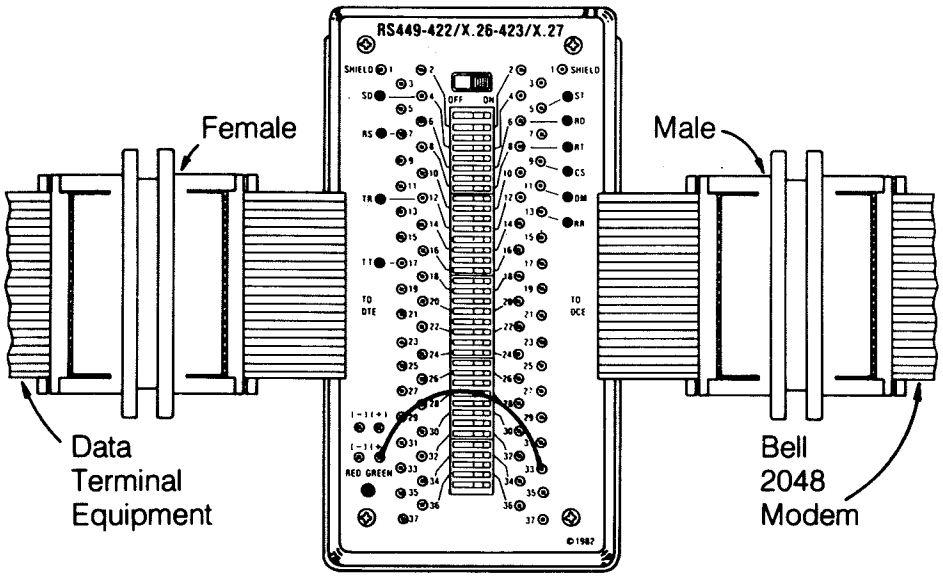

Figure 2. Checking EIA Signals

3.3 Modem Loopback Test

The modem loopback test (see Figure 3) is performed by plugging the tester into the available connector. Switches 4, 22, 6, and 24 are closed. Pin 4 is strapped to pin 6. Pin 22 is strapped to pin 24 on either side of the tester.

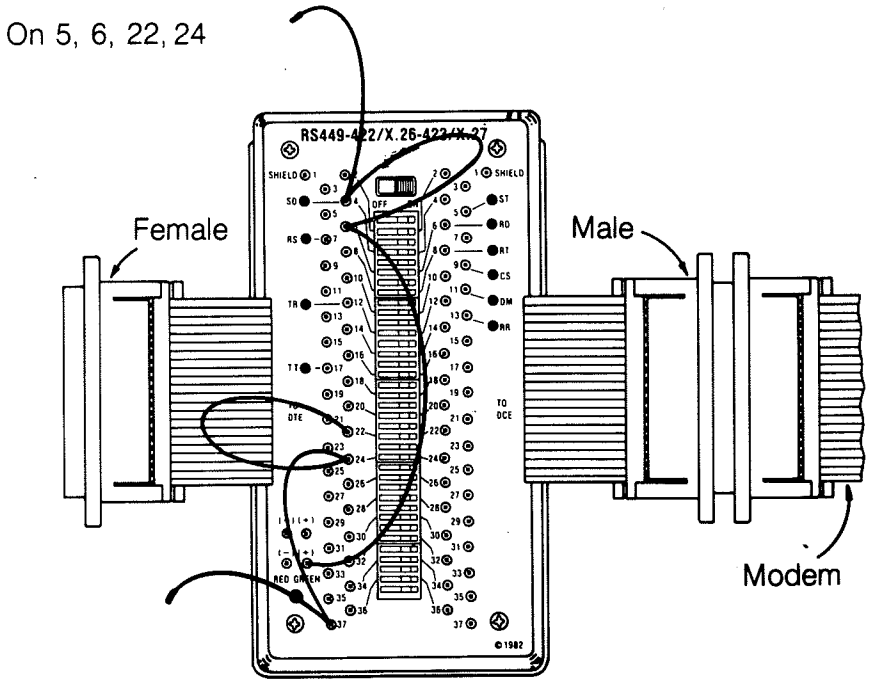

Figure 3. Modem Loopback Test

3.4 Non-Standard Interfaces

Non-standard interfaces are resolved by switching or strapping individual lines. Each rocker DIP switch, with the exception of line 19 (signal ground), allows you to break the line between the two devices. Each jumper pin on either side of the switches can be a terminal pin to attach a jumper to connect a line to another pin position on the other side of the device. Figure 4 shows an example of a null modem cable interface (see Figure 4). For a null modem cable interface, pins 4:22 and 6:24 are reversed. Switches 4, 6, 22, and 24 are turned off. Jumpers are placed from pin 4 on the DCE side to pin 6 on the DTE side, from pin 6 on the DCE side to pin 24 on the DTE side, from pin 22 on the DCE side to pin 24 on the DTE side, and from pin 24 on the DCE side to pin 22 on the DTE side.

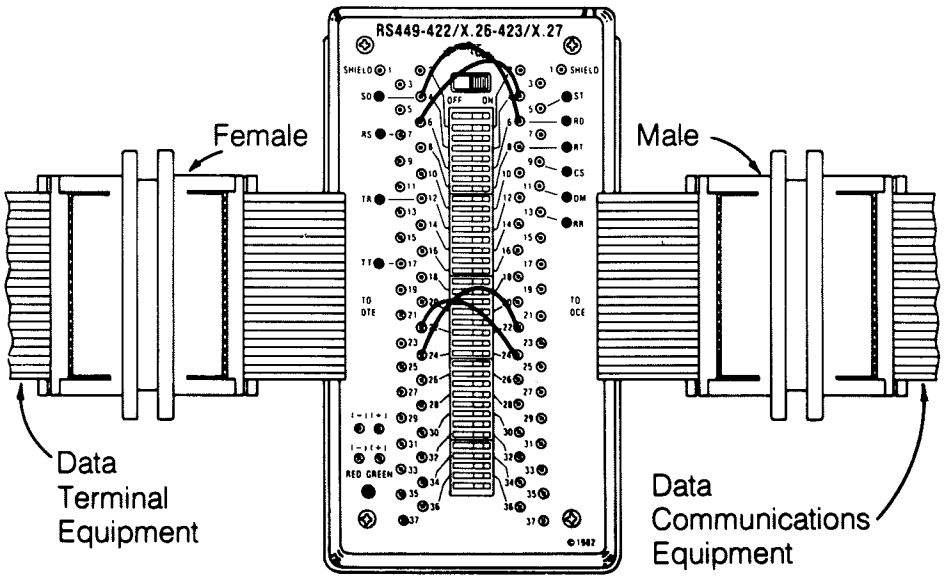

Figure 4. Null Modem Cable Interface

Table 2. R-S449 Signal Assignment

Contact Number	Circuit	Direction To DCE	Direction From DCE	Function
1	SHIELD			Shield
2	SI		X	Signaling Rate Indicator
3	SPARE			
4	SD+	X		Send Data
5	ST+		X	Send Timing
6	RD+		X	Receive Data
7	RS+	X		Request to Send
8	RT+		X	Receive Timing
9	CS		X	Clear to Send
10	LL	X		Local Loopback
11	DM+		X	Data Mode
12	TR+	X		Terminal Ready
13	RR+		X	Receiver Ready
14	RL	X		Remote Loopback
15	IC		X	Incoming Call
16	SF/SR	X		Select Frequency Signaling Rate Indicator
17	TT+	X		Terminal Timing
18	TM		X	Test Mode
19	SG	X		Signal Ground
20	RC		X	Receive Common
21	SPARE			
22	SD-	X		Send Data Return
23	ST-		X	Send Timing Return
24	RD		X	Receive Data Return
25	RS-	X		Request to Send Return
26	RT-		X	Receive Timing
27	CS-		X	Clear to Send Return
28	IS	X		Terminal In Service
29	DM-		X	Data Mode Return
30	TR-	X		Terminal Ready Return
31	RR-		X	Receiver Ready Return
32	SS	X		Select Standby
33	SQ		X	Signal Quality
34	NS	X		New Signal
35	TT-	X		Terminal Timing Common
36	SB		X	Standby Indicator
37	SC	X		Send Common

Table 3. 37-Position Connector Assignments

First Segment Assignment		Second Segment Assignment		Direction	
Contact Number	Circuit	Contact Number	Circuit	To DCE	From DCE
1	SHIELD				
2	SI	20	RC		X
3	SPARE	21	SPARE		
4	SD	22	SD	X	
5	ST	23	ST		X
6	RD	24	RD		X
7	RS	25	RS	X	
8	RT	26	RT		X
9	CS	27	CS		X
10	LL	28	IS	X	
11	DM	29	DM		X
12	TR	30	TR	X	
13	RR	31	RR		X
14	RL	32	SS	X	
15	IC	33	SO		X
16	SF/SR+	34	NS	X	
17	TT	35	TT	X	
18	TM	36	SB		X
19	SG	37	SC	X	

Table 4. Interfaces For Communication System Configurations

	Interchange Circuit	Configuration				Notes
		Type SR	Type SO	Type RO	Type DT	
SG	Signal Ground	M	M	M	M	
SC	Send Common	M	M	M		
RC	Receive Common	M	M	M		
IS	Terminal In Service	O	O	O		
IC	Incoming Call	A	A	A		
TR	Terminal Ready	S	S	S		
DM	Data Mode	M	M	M		
SD	Send Data	M	M		M	
RD	Receive Data	M		M	M	
TT	Terminal Timing	O	O		O	
ST	Send Timing	T	T		T	
RT	Receive Timng	T		T	T	
RS	Request To Send	M	M			
CS	Clear To Send	M	M			
RR	Receiver Ready	M		M		
SQ	Signal Quality	O		O		
NS	New Signal	O		O		
SF	Select Frequency	O	O	O		
SR	Signaling Rate Selector	O	O	O		
SI	Signaling Rate Indicator	O	O	O		
SSD	Secondary Send Data	O	O	O		a,d
SRD	Secondary Receive Data	O	O	O		b,d
SRS	Secondary Request to Send	O	O	O		a,c
SCS	Secondary Clear To Send	O	O	O		a, d
SRR	Secondary Receiver Ready	O	O	O		b

Table 4 (continued). Interfaces For Communication System Configurations

	Interchange Circuit	Configuration				Notes
		Type SR	Type SO	Type RO	Type DT	
LL	Local Loopback	O				
RL	Remote Loopback	O				
TM	Test Mode	M	M	M		
SS	Select Standby	O	O	O		
SB	Standby Indicator	O	O	O		

M = Mandatory interchange circuits for a given configuration
S = Addtional interchange circuit required for switched service.
A = Additional interchange circuit required for switched service with answering signaled across the interface.
T = Additional interchange circuits required for synchronous primary channel.
O = Optional interchange circuits.

Notes

a = Unnecessary if secondary channel is receive only.
b = Unnecessary if secondary channel is transmit only.
c = Unnecessary if secondary channel is backward channel
d = Unnecessary if secondary channel is usable only for circuit assurance or to interrupt the flow of data in the primary channel.

Table 5. Equivalency Table

RS-449		RS-232C		CCITT Recommendation V.24	
SG	Signal Ground	AB	Signal Ground	102	Signal Ground
SC	Send Common			102a	DTE Common
RC	Receive Common			102b	DCE Common
IS	Terminal In Service				
IC	Incoming Call	CE	Ring Indicator	125	Calling Indicator
TR	Terminal Ready	CD	Data Terminal Ready	108/2	Data Terminal Ready
DM	Data Mode	CC	Data Set Ready	107	Data Set Ready
SD	Send Data	BA	Transmitted Data	103	Transmitted Data
RD	Receive Data	BB	Received Data	104	Received Data
TT	Terminal Timing	DA	Transmiiter Signal Element Timing (DTE source)	113	Transmitter Signal Element Timing (DTE source)
ST	Send Timing	DB	Transmitter Signal Element Timing (DCE Source)	114	Transmitter Signal Element Timing (DCE Source)
RT	Receive Timing	DD	Receiver Signal Element Timing	115	Receiver Signal Element Timing (DCE Source)
RS	Request To Send	CA	Request To Send	105	Request To Send
CS	Clear To Send	CB	Clear To Send	106	Ready For Sending
RR	Receiver Ready	CF	Received Line Signal Detector	109	Data Channel Received Line Signal Detector
SQ	Signal Quality	CG	Signal Quality Detector	110	Data Signal Quality Detector
NS	New Signal				
SF	Select Frequency			126	Select Transmit Frequency
SR	Signaling Rate Selector	CH	Data Signal Rate Selector (DTE Source)	111	Data Signaling Rate Selector (DTE Source)

Table 5 (continued). Equivalency Table

RS-449		RS-232C		CCITT Recommendation V.24	
SI	Signaling Rate Indicator	CI	Data Signal Rate Selector (DCE Source)	112	Data Signaling Rate Selector (DCE Source)
SSD	Secondary Send Data	SBA	Secondary Transmitted Data	118	Transmitted Backward Channel Data
SRD	Secondary Receive Data	SBB	Secondary Received Data	119	Received Backward Channel Data
SRS	Secondary Request To Send	SCA	Secondary Request To Send	120	Transmit Backward Channel Line Signal
SCS	Secondary Clear To Send	SCB	Secondary Clear To Send	121	Backward Channel Ready
SRR	Secondary Receiver Ready	SCF	Secondary Received Line Signal Detector	122	Backward Channel Received Line Signal Detector
LL	Local Loopback			141	Local Loopback
RL	Remote Loopback			140	Remote Loopback
TM	Test Mode			142	Test Indicator
SS	Select Standby			116	Select Standby
SB	Standby Indicator			117	Standby Indicator

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