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GOULD
Electronics

MANUAL PART NO.
MU11-4183-03

GOULD 5900 CARD CAGE
USER'S MANUAL
ALL MODELS

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SAFETY SUMMARY

The general safety information is for both user and service personnel. Specific **WARNINGS** and **CAUTIONS** will be found throughout the manual where they apply.

TERMS IN THIS MANUAL

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property. They will appear in boldfaced capital letters.

WARNING statements identify conditions or practices that could result in personal injury or loss of life. They will appear in boldfaced capital letters.

SYMBOLS IN THIS MANUAL



This symbol indicates where cautionary information is to be found.

TERMS AS MARKED ON EQUIPMENT

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property, including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS AS MARKED ON EQUIPMENT



DANGER - High Voltage.



Protective ground (earth) terminal.



ATTENTION - Refer to manual.

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SAFETY SUMMARY
(Continued)

POWER SOURCE

This instrument is intended to operate from a power source that does not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential.

GROUNDING THE INSTRUMENT

This instrument is grounded through the grounding conductor of the power cord. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your instrument. Use only a power cord that is in good condition. For detailed information on power cords and connections see Section 2, Installation, in the User's Manual.

USE THE PROPER FUSE

Use only a fuse of the correct type, voltage rating and current rating as specified in the parts list for your instrument.

DO NOT OPERATE WITHOUT COVERS AND PANELS INSTALLED

Disconnect power before removing covers, panels or any grounding straps. Reinstall covers, panels and any grounding straps *before* reconnecting power.

WARNINGS FOR AUTHORIZED SERVICE PERSONNEL

Dangerous voltages exist at several points in this instrument. To avoid personal injury, do not touch exposed connections or components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

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SECTION I

GENERAL INFORMATION

1.1 SCOPE OF MANUAL

This manual contains operating and installation instructions for the Gould 5900 Signal Conditioner Frame (P/N CL-810231) and associated accessory kits. Descriptive information and specifications are also included.

For service and repair information contact your local Gould representative at the nearest location listed in the front of this manual.

WARNING: For Patient Care Applications, an isolation transformer must be connected between power source and system. Total Chassis Risk Current must not exceed 100 micro-amps.

1.2 DESCRIPTION

The 5900 Signal Conditioner frame is of modular design to facilitate production of a family of products. This frame is designed for both the Gould 4600 and 5600 line of signal conditioners. The signal conditioners are retained and removed by an ejector from the front panel.

The 5900 frame provides signal conditioner outputs via individual BNC connectors or Bare Wire connectors (Medical Output board). It is also supplied with an additional BNC connector for a sync clock input which will be available in the future. From the Medical Output board, it makes available all the medical and auxiliary analog output signals from each individual signal conditioner.

This frame has been designed to "nest" on top of Gould's 3600, 3800, ES2000 or TA2000 chart recorders or the Gould 5300 waveform recorder. It is offered in a portable or rack mounted version.

The 5900 has a proprietary board, Recorder Interface board, which can be connected to any Gould TA2000 or 3000 series recorder (via the 5900/TA2000 or 5900/3000 cables respectively). The 5900/TA2000 cable (CL-711297) is a 40 in. cable. The 5900/3000 cable comes in 2 lengths: 3 ft. (CL-311222-1) or 6 ft. (CL-311222-2). The Recorder Interface board passes all the signal conditioner's recorder output signals over to the recorder. With the Interpreter Board option and the appropriate signal conditioner(s) (5600 with status board option), signal conditioner status information can to be printed on the Gould 3000 recorder's chart interchannelly (recorder must have interchannel writing heads).

The 5900 has been designed to meet and tested to international safety and EMI/RFI standards. These standards include applicable UL, CSA, IEC, FCC level A, and VDE level A. Specific applicable standards and associated certifications will depend on total system configuration as shipped from the factory. The present instruction manual contains some information and warnings that have to be followed to ensure safe operation and to retain the apparatus in safe condition.

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1.2 DESCRIPTION (cont.)

All operations of the signal conditioners can be done manually via their front panel controls. With the 5600 programmable amplifiers, the versatility of remote control operations from a computer terminal is possible when configured with the Interpreter Board option. This board is available in 3 types of kits:

1. RS-232C kit ..... This kit allows direct communications with the frame via the RS-232C serial interface standard.

2. IEEE-488 kit ..... This kit allows direct communications with the frame via the IEEE-488 parallel interface standard.

3. Interpreter Board kit — This kit (Interpreter Board only) allows indirect communications to the frame via the Gould 3000 recorder through the frame's Recorder Interface board. In this case, the 3000 recorder must have it's RS-232C or IEEE-488 option kit.

NOTE:

There was an early model of the Gould 5900 Signal Conditioner Frame (P/N CL-810232). This model does not have the same cooling power and therefore **DOES NOT** support the 5600 Programmable amplifiers.

1.3 SPECIFICATIONS

POWER REQUIREMENTS	90-132/180-264 RMS VAC, 47-63 Hz
PHYSICAL CHARACTERISTICS (chassis only)	
DIMENSIONS:	
WIDTH	19.0" (482.6 mm)
HEIGHT	7.0" (177.8 mm)
DEPTH	18.0" (457.20 mm)
WEIGHT	19.0 lbs. (8.62 Kg)
FINISH	2 tone corporate gray
MOUNTING	Rack or Portable
VENTILATION:	(1) 25 CFM, minimum, fan for power supply cooling and (4) 20 CFM, minimum, fans for amplifier cooling. One per every two channels.
SIGNAL CONDITIONER RETENTION	Front panel amplifier retention with ejector and locking screw. One per channel.

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1.4 ACCESSORIES

Interpreter Board Kit	11-4221-01
RS-232C Interface Kit	11-4221-03
IEEE-488 Interface Kit	11-4221-04
Recorder Interface Kit	11-4221-06
Digital I/O Board Kit	11-4221-05
medical Output Board Kit	11-4221-02
Rack Mount kit	CL-611346
Portable Case Kit	CL-811254
Line Fuses:	
@ 115 VAC	116198-13
@ 230 VAC	116198-11
Slot Fuses	102625-7
5900/3000 cable:	
3 ft. cable	CL-311222-1
6 ft. cable	CL-311222-2
5900/TA2000 cable	CL-711297
Dust Cover	CL-412345
5900 Cage Service Manual	MS11-4183-03

TABLE 1-1 MODEL NUMBER DESCRIPTIONS

NUMBER	DESCRIPTION
11-4183-3	PORTABLE VERSION
11-4781-1	RACK MOUNT VERSION
CL-810231	BASE CHASSIS VERSION (without case)
18-4183-3	PORTABLE; AGENCY APPROVED
18-4781-1	RACK MOUNT; AGENCY APPROVED
CL-810231-1	BASE CHASSIS; AGENCY APPROVED
CL-810232	BASE CHASSIS, NON-PROGRAMMABLE AMPS. DISCONTINUED

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1.5 SYSTEM CONFIGURATIONS

Model Number CL-810231-01 is the frame assembly of the 5900 cage. This model belongs to the following system configurations:

a. 18-4183-03 - This configuration has the frame assembly housed in a portable unit. It is also configured with the medical output board, 3000 interface board and 3000 to 5900 cable.

   NOTE: Before agency approval, system configuration 18-4183-03 was 11-4183-03.

b. 11-4781-01 - This configuration consists of the frame assemble and a rack mount kit. It is also configured with the medical output board, 3000 interface board and 3000 to 5900 cable.

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SECTION II

INSTALLATION

2.1 INTRODUCTION

This section describes initial inspection checks and installation procedures for the Gould 5900 Signal Conditioner Frame.

2.2 INITIAL INSPECTION

Prior to attempting any electrical connections or operation, visually examine the signal conditioner frame for broken or loose panels, dented or nicked panels and broken or chipped rear input connectors. Make sure you read the Concealed Damage Card (Form No. 222640) which is enclosed in the shipping carton.

2.3 POWER REQUIREMENTS

The 5900 series frame can operate at voltages from 90 to 132 VAC by selecting "115" or 180 to 264 VAC by selecting "230".If the input voltage selector is changed, you must also change the line fuse. For the "115" selector, a 250 VAC 3.0 amp fuse (P/N 116198-13) is used and for the "230" selector, a 250 VAC 1.5 amp fuse (P/N 116198-11) is used.The current selection is displayed in a window just above the line cord.

Power line frequency required is 47 to 63 Hertz. Operation to 440 Hertz is not recommended because power line to chassis ground leakage current may exceed international safety agency certified limits.

2.4 ENVIRONMENTAL REQUIREMENTS

Operating Temperature	0 to 50 degrees celsius
Storage Temperature	-40 to +70 degrees celsius
Humidity	10% to 90% relative humidity at 65 degrees Fahrenheit, non-condensing
Shock and Vibration	IEC-348 Section 11.3
Static Insensitivity	IEC Class 2

2.5 AMPLIFIER INSTALLATION

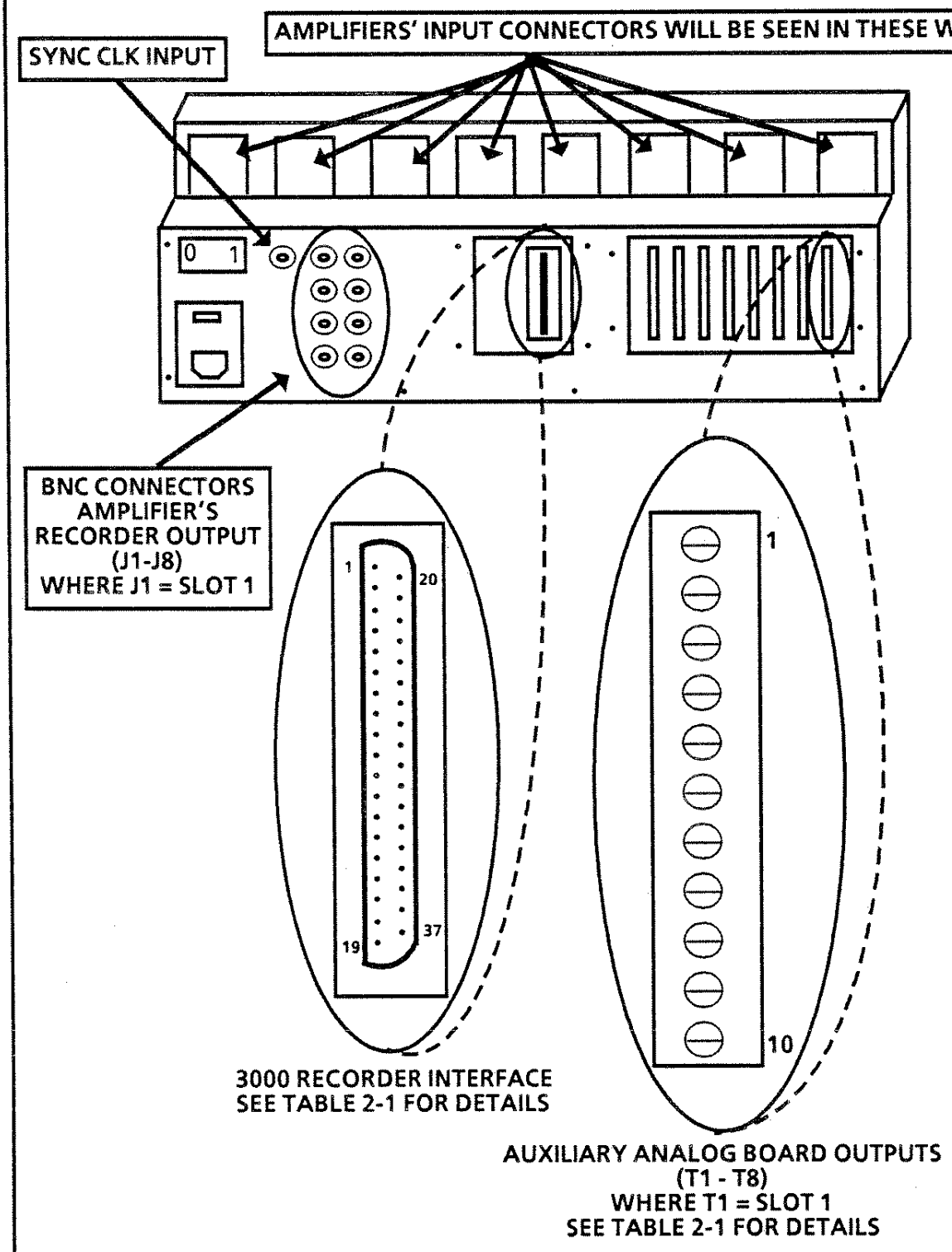
2.5.1 Insertion

To install a signal conditioner into its appropriate slot in this frame perform the following:

a. Turn power OFF to the frame with the power switch (located in the rear). Make certain the extractor located at the bottom of the cage slot is unlocked, i.e. the screw is loose and the extractor pulled completely forward (see Figures 2-1 and 2-2).

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FIGURE 2-1
5900 FRAME - (REAR VIEW)



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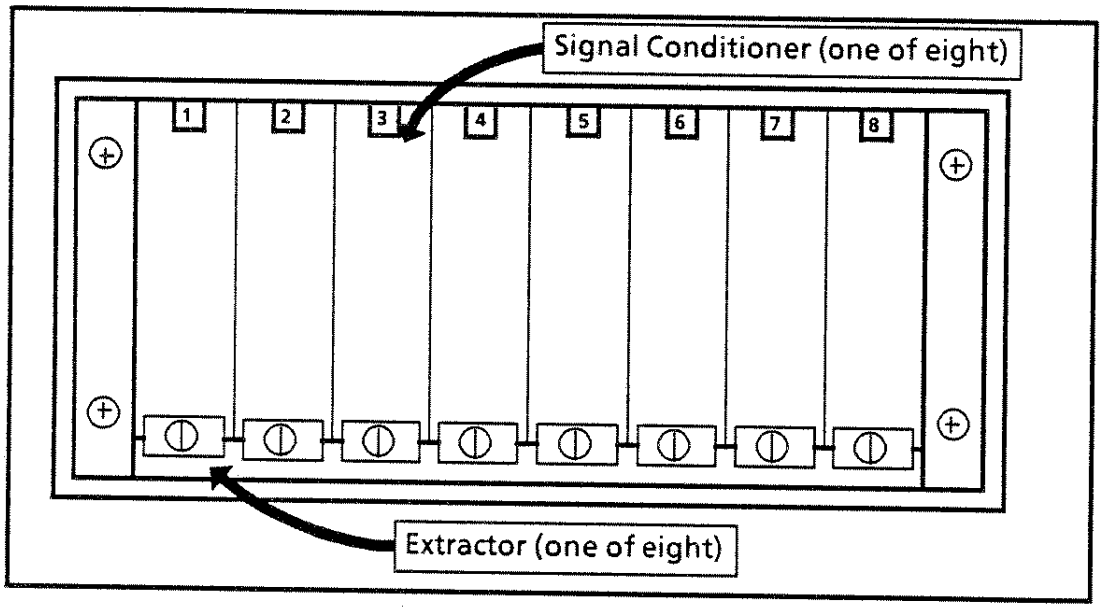
2.5.1 Insertion (cont.)

b. Slide the signal conditioner into the slot until it makes contact with the backplane connector. It will then require a little force to seat the signal conditioner into the backplane connector. The front panel of the signal conditioner should be flush with the front panel of the 5900 front plate.

c. Lock the extractor by pushing it in and tightening the screw

d. Install the input connector plug at the back of the signal conditioner (see signal conditioner's manual for details).

FIGURE 2 - 2
5900 FRAME (FRONT VIEW)



2.5.2 Removal

To remove the signal conditioner from its slot perform the following:

a. Turn power OFF the frame with the power switch (located at the rear of the unit).

b. Disconnect the signal conditioner's input connector plug (see signal conditioner's manual for details).

c. Loosen the extractor (see Figure 2-2) located at the bottom of the slot by turning the screw counterclockwise. Pull on the extractor until the signal conditioner releases.

d. Carefully slide the entire signal conditioner from the cage.

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2.6 SIGNAL CONNECTIONS

2.6.1 Input

NOTE:

In most cases, a special connector is provided with the signal conditioner for signal input connections. See the particular conditioner manual for the proper part number.

Connections to the conditioner are made at the rear of the frame (see Figure 2-1).See the signal conditioner manual for instructions on connections and types of cable to use.

2.6.2 Output

The conditioner's recorder output signals are located in the rear of the 5900 frame. They are the BNC connectors J1 thru J8 (J1 is for slot 1, etc.).Other output pins from the conditioner are available via the Medical Board (see Figure 2-1 and Table 2-1 for details).

TABLE 2-1
MEDICAL BOARD

MEDICAL BOARD (T1-T8) SCREW NUMBER	AMPLIFIER 16-PIN CARD EDGE CONNECTOR
1	2 (RECORDER OUT)
2	A
3	B
4	C
5	D
6	E
7	F
8	H
9	J
10	5 (SIGNAL COMMON)

WARNING: For Patient Care Applications, an isolation transformer must be connected between power source and system. Total Chassis Risk Current must not exceed 100 micro-amps.

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2.7 RECORDER INTERFACE BOARD CONNECTION

The 37 pin D-shell connector on the Recorder Interface board allows the 5900 to pass the signal conditioner's recorder output signals to either the TA2000 or 3000 series recorder (see Figure 2-1). The remaining pins (pins 9-19 and 28-37) on this connector allow direct communications with Gould 3000 series recorders. See Section I for information on available cables.

TABLE 2-2
RECORDER INTERFACE BOARD

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COMMON CH 1	20	SIGNAL CH 1
2	COMMON CH 2	21	SIGNAL CH 2
3	COMMON CH 3	22	SIGNAL CH 3
4	COMMON CH 4	23	SIGNAL CH 4
5	COMMON CH 5	24	SIGNAL CH 5
6	COMMON CH 6	25	SIGNAL CH 6
7	COMMON CH 7	26	SIGNAL CH 7
8	COMMON CH 8	27	SIGNAL CH 8
9	n/c	28	DCOMM
10	n/c	29	DCOMM
11	n/c	30	SCSR
12	PB0	31	SCACK
13	PB1	32	RECSR
14	PB2	33	RECACK
15	PB3	34	DCOM
16	PB4	35	DCOM
17	PB5	36	DCOM
18	PB6	37	DCOM
19	PB7		

2.8 INSTALLATION OF OPTIONAL KITS

The installation of each kit is described in its separate appendix. To install a kit the top-rear cover on the 5900 frame must first be removed. If the 5900 frame is in a portable case, you must first remove the top cover of the case. This cover pops right off.

2.9 RACK MOUNTING

Refer to Figure 2-3 for rack mounting the 5900 Signal Conditioner Frame via the Rack Mount kit.

2.10 OUTLINE DIMENSIONS - RACK MOUNTED AND PORTABLE

Refer to Figure 2-3 for outline dimensions of the rack mount assembly and Figure 2-4 for the portable case.

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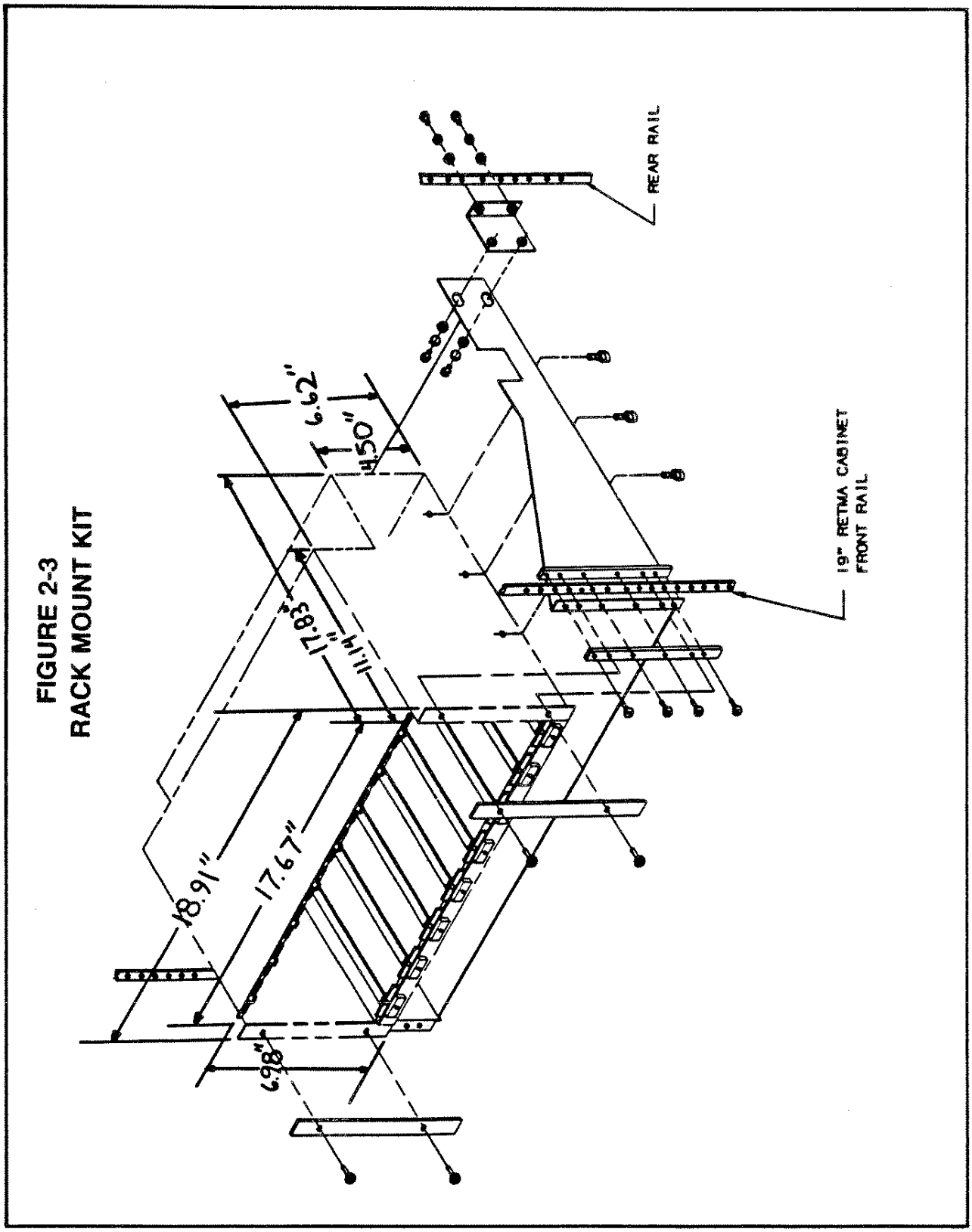


FIGURE 2-3
RACK MOUNT KIT

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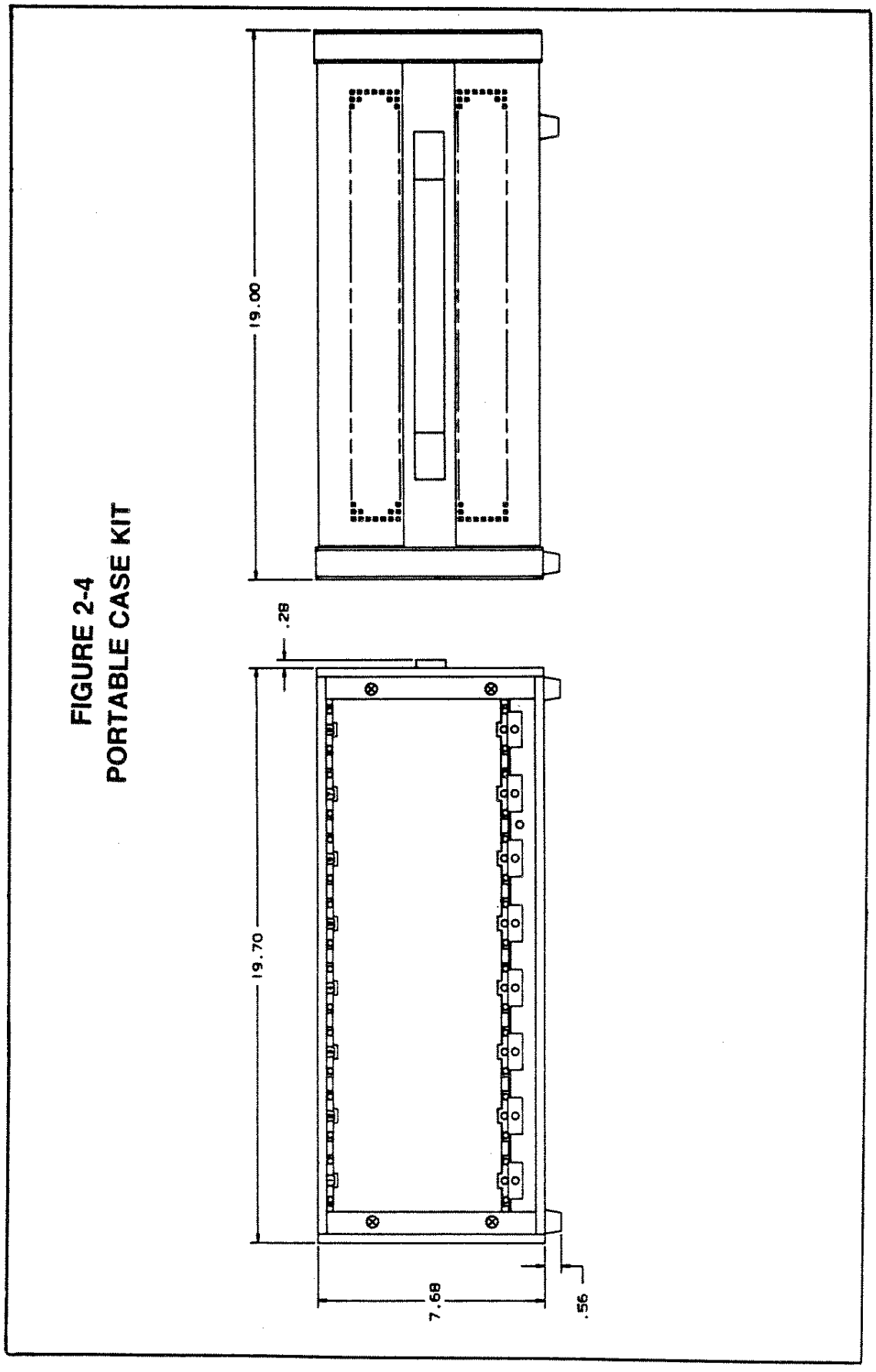


FIGURE 2-4
PORTABLE CASE KIT

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SECTION III

OPERATION

There are no operator controls for the Gould 5900 frame. For remote control operations (using the Interpreter Board), refer to Appendix A for software commands. Depending on the interface used (RS-232 or IEEE-488), also refer to Appendix B or C respectively for protocal and set-up information. For operating instructions on signal conditioners used, refer to the conditioner's manual. The power switch is located in the rear. When the frame is on, the pilot light (green LED), which is located in the front of the frame, will be lit.

Before switching on 5900, make sure that it is set to the voltage of the power source (see Section 2.3 for details).

Before connecting the Signal Conditioners installed within the 5900 to live measuring or control circuits, (circuits which the user wishes to make measurements upon), establish the Protective Earth connection by plugging in the 5900. Disconnect the Signal Conditioner measuring points prior to unplugging the 5900.

CAUTION: To retain conformance with FCC and VDE radiated emission standards, as well as to retain full performance of this and surrounding instruments, all customer provided signal cables must be of the SHIELDED type. SHIELDS must be tied to the outer shell or otherwise designated SHIELD connection point of the appropriate mating end or ends.

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WARRANTY

HARDWARE WARRANTY

All products manufactured and sold by Gould Test and Measurement in the United States are warranted to the original purchaser from date of shipment for the applicable periods set forth in the table below. Gould's products are warranted to conform to the applicable published specifications in effect at the time of the shipment, and to be free from any defects in material or manufacture when used with recommended Gould associated equipment and/or supplies. All products are to be returned transportation prepaid by the buyer to Gould's designated service center. Upon buyer's request, on-site warrranty service will be provided at additional charge. Gould reserves the right to determine the cause and existence of a defect under this warranty and this warranty shall not apply to any products which have been subjected to misuse, improper installation, repair, alteration, neglect, accident, inundation, fire, or operation outside their published maximum ratings.

Product Category	Warranty Period
3000 Series Oscillographic Recorders	25 MONTHS from date of shipment*
Other Oscillographic Recorders	1 YEAR from date of shipment**
Strip Chart Recorders	1 YEAR from date of shipment
WindoGraf Recorder	1 YEAR from date of shipment
Signal Conditioners	1 YEAR from date of shipment
TA4000 Array Recorders	25 MONTHS from date of shipment
Other Array Recorders	1 YEAR from date of shipment
5300 Series Waveform Recorders	25 MONTHS from date of shipment***
Other Waveform Recording Products	1 YEAR from date of shipment
DASA Data Acquisition	1 YEAR from date of shipment
DASA Data Acquisition (Accessories)	1 YEAR from date of shipment
Analog & Digital Oscilloscopes	2 YEARS from date of shipment
Monitor Scopes & Digital Displays	1 YEAR from date of shipment
Chart Paper	1 YEAR from date of shipment

* Effective April 1, 1989 for Series 35-Vxxxx-xx recorders only.
** Original penmotors in Oscillographic Recorders manufactured after July 1, 1986 are warranted for 5 years from date of shipment.
*** Effective April 1, 1989.

GOULD'S LIABILITY UNDER SUCH WARRANTY IS LIMITED TO SERVICING OR REPLACING DEFECTIVE PARTS EXCEPT PENS, STYLI, FUSES, BATTERIES AND CATHODE RAY TUBES, AND DOES NOT INCLUDE CALIBRATION AND MINOR MAINTENANCE AS OUTLINED IN GOULD OPERATING MANUALS. IN NO EVENT SHALL GOULD BE LIABLE FOR ANY LOSS OF PROFITS OR OTHER CONTINGENT, CONSEQUENTIAL OR SPECIAL DAMAGES.

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WARRANTY

Gould offers an Extended Warranty Agreement for all its products, along with calibration traceable to NIST. Please contact the Service Center listed on the following pages for details before your warranty expires.

REPLACEMENT PARTS

Warranty is same as above except ninety (90) days from date of shipment. **Gould** instruments are individually tested and calibrated before shipment to assure dependability and verify their accuracy. To this procedure must be added an unseen ingredient of prime importance to you: the Gould concept of continuing service. Gould responsibility for each instrument sold covers far more than its delivery. Of equal concern is the equipment's suitability for its intended purpose, its correct installation, instruction of operating personnel -- plus future servicing and maintenance. The Gould Field Service Department offers customers any or all of these services:

Field Service

Installation
Field maintenance
NIST Certification

Training

Instruction of operators
On-site training seminars
Formal Training courses

Service Contracts

Fixed Fee
Time and Material
Extended Warranty

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Gould Inc., Recording Systems Division and its predecessor organizations tracing back to Charles F. Brush, have been preeminent in instrumentation development since the 1920s. Among Gould's many achievements is a series of the world's best performing, most versatile, and reliable direct writing recording systems.

Today, Gould recorders and signal conditioners are the overwhelming choice for recording analog signals in the most critical industrial, scientific, and biophysical measurement applications. Whether recording the faintest life signals of a patient in a hospital operating room or the most critical variables in the laboratory or on the production line, you can depend on the accuracy, faithfulness, clarity, and permanence of the traces made by any of the Gould Recording Systems. Innovative design, coupled with highest quality, are hallmarks of all Gould products.

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APPENDIX A

5900 INTERPRETER BOARD KIT

A.1 GENERAL INFORMATION

This section contains operating and installation instructions for the Gould 5900 Interpreter Board kit (P/N 11-4221-01). Depending on the interface used (RS-232-C or IEEE-488), also refer to Appendix B or C respectively for protocol and interface set-up information.

The Interpreter Board kit for the 5900 Signal Conditioner Frame is an optional plug in card that allows digital interfacing to the 5600 (with status board option) style signal conditioners. Digital interfacing allows you to do the following:

1. Record, interchannely on a 3000 series recorder, the set-up information for the 5600 style signal conditioners. The recorder must be configured with optional interchannel writing heads.

2. Communicate with the 5600 style signal conditioners. This allows you to remotely control the conditioners, thus letting you automate your system. For communications to be possible, you must have 1 of the following configurations.

    1. 5900 Signal Conditioner Frame with RS-232C Interface kit (P/N 11-4221-03).

    2. 5900 Signal Conditioner Frame with IEEE-488 Interface kit (P/N 11-4221-04).

    3. 5900 Signal Conditioner Frame with Interpreter Board kit, 5900/3000 cable and a 3000 series recorder that has either the RS-232 or IEEE-488 option.

A.2 INSTALLATION

This section describes the installation procedures for the 5900 Interpreter Board kit.

WARNING: To avoid personal injury and equipment damage, the user should disconnect power prior to removing covers, panels, or any grounding straps. Reinstall covers, panels, and any grounding straps prior to reconnecting power.

This kit may be installed at the factory or in the field by either one of our Gould Service Representatives or by you. The following is the procedure for installation :

a. Set SW1 on the interpreter board as follows:

	1	2	3	
3600 MODE	0	0	0	where 1 = ON
3800 MODE	0	1	0	
Print Test Message	1	1	0	3000 Recorder must have interchannel writing heads

Setting SW1 for 3600 mode configures the 5900 frame for only 6 signal conditioners, occupying channels 1-6 and for the 3800 mode, configures the 5900 for all 8 signal conditioners. This switch is read when the WHO command **WH** is received. The position of the switches determines the proper device name sent, **3600** or **3800**. If the switches are set for 3600 mode and a 5600 style amplifier, with reporting capabilities, resides in channels 7 or 8, the interface will send **3XXX** as the device name, prompting the user to properly set SW1 to the 3800 mode.

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b. Remove the top-rear cover on the 5900 frame. If the frame is in a portable case, you must first remove the top cover of the case. The portable top cover pops right off.

c. Connect ribbon cable to interpreter board.

d. Mount interpreter board on top of the power supply.

e. Connect other end of ribbon cable to distribution board.

A.3 OPERATION

A.3.1 Command Format

The following is the format in which these commands are described:

1. All commands must be sent in uppercase characters.

2. The letter "n" in specific commands is a place holder for the slot number.There also must be a space between the command and the slot number.

3. A command or command string may begin with the actual command mnemonic or the STX or ESC characters (**S**tart of **TeX**t; ASCII 2 and **ESC**ape; ASCII 27 respectively). It must be terminated with a carriage return (ASCII 13) or an ETX (**E**nd of TeXt; ASCII 3). When sending multiple commands, each command must be separated by a semicolon (;).

4. When sending commands via the Gould 3000 recorder interface, each command or command string must be preceded by the command **PC;**.

5. Sending either the BS or DEL characters(**B**ack **S**pace; ASCII 8 and **DEL**ete; ASCII 127) allows you to delete the last character sending.

A.3.2 Command Set

The following is a list and description of the available commands for the Gould 5900 Interpreter board.

TABLE A-1
SOFTWARE COMMANDS

Name	Command
Pass Command	**PC**
Prompt Enable	**PE**
Prompt Disable	**PD**
Send Slot Mask	**SM**
Send Configuration	**SC**
Send Who Configuration	**WH**
Clear Notify Status Register	**CN**
Send Notify Status Register	**SN**
Send Status	**SS** n
Receive Status	**RS** n[< Bit-Stream >]
Send PMD Header	**SH** n
Send PMD Length	**SL** n
Send PMD	**SP** n
Send Tag	**ST** n
Send Mnemonic	**SA** n[< Mnemonic >]
Zero Offset Adjust	**ZA** n

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TABLE A-2
DESCRIPTION OF SOFTWARE COMMANDS

Name	Command	Description
Pass Command	**PC**	Passes a command or a string of commands received by the 3000 Recorder to the 5900 frame. When used in a string, all commands following it will be sent to the signal conditioner and all commands preceding it are for the recorder. In a stand alone 5900 frame where this command is received via the 5900's own interface, it is recognized and ignored. Send: **PC;** <command(s)>
Prompt Enable	**PE**	Enables the 5900 (or 3000 Recorder) prompt for discrete terminal use (full duplex mode with prompt) using RS-232-C transmission. The initial "power on" default is Prompt Disabled. In this state, command characters received are characters which will NOT be echoed back. The initial execution of this command will display an "interface Set-Up Okay" along with the prompt character ">". In this mode, all command characters will be echoed back to the screen. Send: **PE**
Prompt Disable	**PD**	Disables the prompt and returns the 5900 (or 3000 Recorder) to its default communication mode. Send: **PD**
Send Slot Mask	**SM**	Queries the 5900 frame to indicate which slots are occuppied. You will receive a byte for every 4 slots (i.e., a 2 or 4 channel cage will respond with 1 status byte and the 5900 cage will respond with 2 status bytes. The data is displayed in a hexadecimal format and left justified, where a hexadecimal 8 in the first byte means slot one is occupied and a hexadecimal 8 in the second byte means slot 5 is occupied (convert hexadecimal bytes into binary format to find slot occupancy). Example: If you have 5900 frame and slots 1-6 are occupied, you will receive 2 status bytes. **FC** would be received when the command was sent. Send: **SM** Receive: <byte1> <byte2>

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Name	Command	Description
Send Configuration	**SC**	Queries the 5900 frame to send the available options which are configured into the frame. The response will be in an ASCII text format. This command is only available in the PE mode only. Send: **SC** Receive: <ASCII string>
Send Who Configuration	**WH**	Queries the 5900 frame to send information on the type of signal conditioners are installed. The 5900 frame will respond with the device number, the slot mask, followed by each installed amplifier's device number (in left justified order). The device codes for the current signal conditioners available are: 100 = 56-1340 (and 1440) 200 = 56-1300 201 = 56-1302 202 = 56-1301 203 = 56-1300 Example: If the 5900 frame is loaded with 3 signal conditioners; a Gould 5600IS in slot 1, a Gould 5600 DC in slot 3 and a Gould 5600 bridge in slot 7, the response will be **5900;A2;100;200;202;** Send: **WH**
Clear Notify Status Register	**CN**	Clears the internal notify status register. This command should be executed following the **SN** command which allows the Notify Status Register to be received. Send: **CN**

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Name	Command	Description
Send Notify Status Register	**SN**	Queries the 5900 frame to let you know if someone has changed the last known setup from the signal conditioner's front panel controls. It will NOT tell you what has been changed but it will tell you which signal conditioner (in what slot) the change(s) occurred. The data response is similar to the Slot Mask command only here a binary **1** indicates a change. Example: If the signal conditioner's setup has been changed from the front controls on slots on 1,2,5 and 8, the response will be **C9**. Send: **SN** Receive: <byte1> <byte2> **NOTE:** **This feature does NOT tell you how many times a certain signal conditioner has been changed. Once its bit has been set to 1, it will remain set until you clear the register by sending the CN command.**
Send Status	**SS** n	Queries the signal conditioner in slot n for its status. The response will be an ASCII string representing the current front panel status. To decode the string see the signal conditioner manual under bit stream information. Send: **SS** n Receive: <Bit-Stream>

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Name	Command	Description
Receive Status	**RS** n[< Bit-Stream >]	Allows you to "program" or set up a signal conditioner with a new status by sending a bit stream of ASCII characters. To create a valid bit stream refer to the appropriate amplifier's manual under bit stream information. The "n" can be any number from 1 to 8, coresponding to the slot or channel in which the desired signal conditioner occupies or "n" can be an "A" in which all signal conditioners will be programmed. After sending this command, you will receive information in RS-232 mode only. If the prompt is disabled, the response will be either an ASCII 6 (ACK - valid bit stream) or an ASCII 21 (NAK - invalid bit stream). If the prompt is enabled, the response will vary in error message or a "Command Data Received" message will be set. It will take approximately 2 seconds each for each signal conditioner to return a reply (see A.3.3). Send: **RS** n[< Bit-Stream >] Receive: < Valid or not valid message > RS-232 only
Send PMD Header	**SH** n	Queries signal conditioner "n" for its PMD (Personality Module Definition) The response will be the signal conditioner's PMD header in an ASCII text format. The "n" can be any number from 1 to 8, corresponding to the slot or channel which the desired signal conditioner occupies. Send: **SH** n Receive: < signal conditioner's PMD header >
Send PMD Length	**SL** n	Queries signal conditioner "n" for its PMD length. The response will be the length (number of ASCII characters) of the PMD in an ASCII text format. The "n" can be any number from 1 to 8, corresponding to the slot or channel which the desired signal conditioner occupies. Send: **SL** n Receive: < PMD length >

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Name	Command	Description
Send PMD	**SP** n	Queries signal conditioner "n" for its resident PMD. The response is the PMD data in an ASCII text fomat. The "n" can be any number from 1 to 8, corresponding to the slot or channel which the desired signal conditioner occupies. Send: **SP** n Receive: <PMD data>
Send Tag	**ST** n	Queries the signal conditioner in slot "n" for its status. The response will be the signal conditioner's status in a text format (ASCII string). See A.3.4. Send: **ST** n Receive: <signal conditioner's status in a text format>
Send Amp (Mnemonic)	**SA** n[<Mnemonic>]	Enables programming of signal conditioners by signal conditioner mnemonics, either individually or globally. Allows you to change a specific status parameter for the signal conditioner in slot "n" or "n" can be an "A" in which all signal conditioners will be programmed. See specific signal conditioner's manual for mnemonic available under Mnemonic List. When sending this command, you will receive information back in RS-232 mode only (see Section A.3.3). If the prompt is disabled, the response will be either an ASCII 6 (ACK - valid mnemonic) or an ASCII 21 (NAK- invalid mnemonic). If the prompt is enabled, the response will vary in error message or a "Command Data Received" message will be sent. It will take approximatly 2 seconds each for each signal conditioner to return a reply (see A.3.3). Send: **SA** n[<Mnemonic>] Receive: <Valid or not valid message> RS-232 only
Zero Offset Adjust	**ZA** n	Recalibrates the specified signal conditioner's zero offset. The "n" can be any number from 1 to 8, corresponding to the slot or channel in which the desired signal conditioner occupies. Send: **ZA** n

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A.3.3 IEEE-488 via 3000 Series Recorder

When communicating to the 5900 card cage via the 3000 series recorder's IEEE-488 port only, the SA, RA and SC commands will give the RS232 mode response.

A.3.4 Send Tag and 3000 Series Recorder

When the command Sent Tag is sent via a remote terminal (or AMP PRINT key is pushed on the 3000 Recorder), the current status of the signal conditioner will be printed out listing the parameters and values that have been entered for the selected mode. The selected mode and sensitivity value (SENS) is printed first. Any error messages are printed at the end of the line. Up to 4 errors could be listed with the numbers separated by colons (e.g., ERR:3;4;6). Any parameters not entered or functions not selected will not be listed in the status message. The following is a typical example of the status message printed from a Gould DC/Bridge/Transducer programmable signal conditioner:

BRIDGE = 2.00GF ELEM = 4 ZS = 3.0000E + 2US EXP = 100US EXC = 5.0V FIL = 30HZ

The above example describes the signal conditioner status in the Bridge mode with a gage factor of 2; with 4 elements selected (Full Bridge configuration); a Full Scale value of 1000 microstrain; Zero Suppression is ON with a value of 300 microstrain; Expansion set at 100 microstrain; Excitation voltage of 5 volts; and a 30 hertz filter selected. Note that because the Isolation module was not installed in the signal conditioner the function INPUT-FLTG was not listed; the signal conditoner's input was connected so GND was not listed; and Shunt Cal was off so SH-CAL was not listed.

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APPENDIX B

5900 RS-232 INTERFACE KIT

B.1 GENERAL INFORMATION

This section contains operating protocols, error messages and installation instructions for the Gould 5900 RS-232 Interface kit (P/N 11-4221-03). For specific software commands, see Appendix A.

This kit includes two boards and they are as follows:

1. RS-232 Interface board — This board contains 2 communication I/O ports (RS-232 and 3000 Recorder) which allow you to transfer command to the interpreter board (see Figure B-1). The RS-232 port allows direct asynchronous serial communications using the RS-232C standard. The 3000 recorder port allows indirect communication via the Gould 3000 series recorder.

2. Interpreter board — This board is the "brains" of the 5900 frame. It interprets the commands it receives from the Interface board and takes the appropriate actions (see Table A-2).

B.2 INSTALLATION

This section describes the installation procedures for the RS-232 Interface board only. See Appendix A for installation procedures on the Interpreter board.

WARNING: To avoid personal injury and equipment damage, the user should disconnect power prior to removing covers, panels, or any grounding straps. Reinstall covers, panels, and any grounding straps prior to reconnecting power.

The RS-232 Interface kit may be installed at the factory or in the field, either by one of our Gould Service Representatives or by you. The following is the procedure for installation.

a. Set SW1 on the interpreter board (see Appendix A - Section A.2).

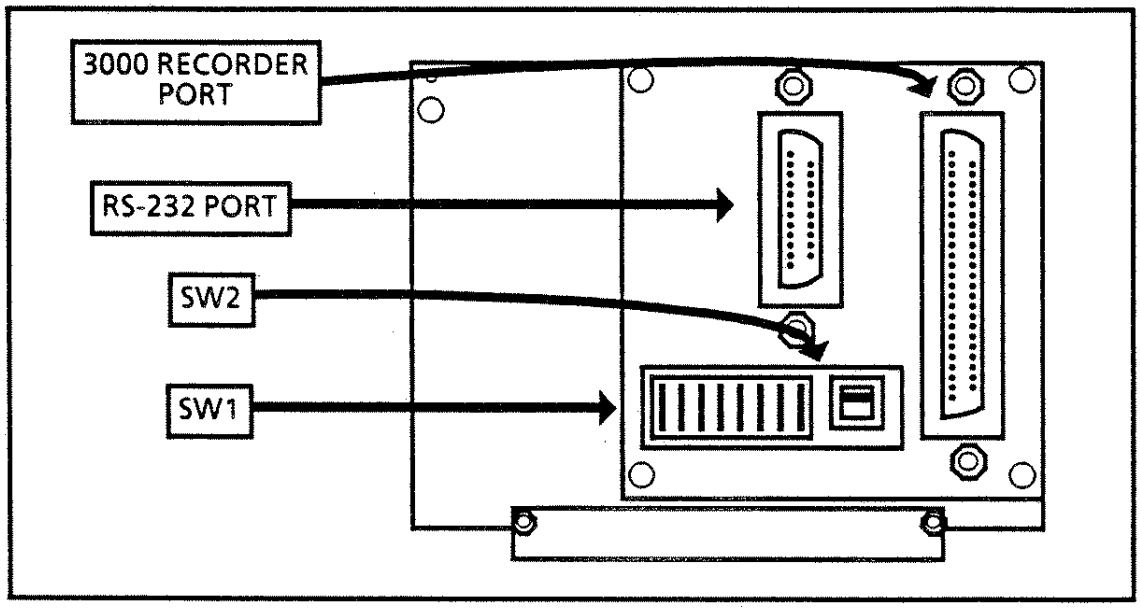
b. Remove the top-rear cover on the 5900 frame. If the frame is in a portable case, you must first remove the top cover of the case. The portable top cover pops right off.

c. Mount the Interpreter board (see Appendix A - Section A.2).

d. Mount the RS-232 Interface board in connector J51 on the Distribution board.

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FIGURE B-1
RS-232 INTERFACE BOARD



The pin out assignments for the 3000 recorder I/O port are discussed in Section II. The RS-232 I/O port (25 pin D-Shell) pin outs are shown in Table B-1.

TABLE B-1
RS-232 PIN ASSIGNMENTS

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	Chassis Gnd.	13	N/C
2*	TxD or RxD	14	N/C
3*	TxD or RxD	15	N/C
4	Request To Send	16	N/C
5	Clear To Send	17	N/C
6	Data Set Ready	18	N/C
7	Signal Gnd.	19	N/C
8	N/C	20	Data Terminal Ready
9	N/C	21	N/C
10	N/C	22	N/C
11	N/C	23	N/C
12	N/C	24	N/C
		25	N/C

* See Note below

NOTE:

If Switch SW2 of the RS-232 board is in the **UP** position, pin 2 is TxD and pin 3 is RxD (True DTE configuration); otherwise, the assignments are reversed.

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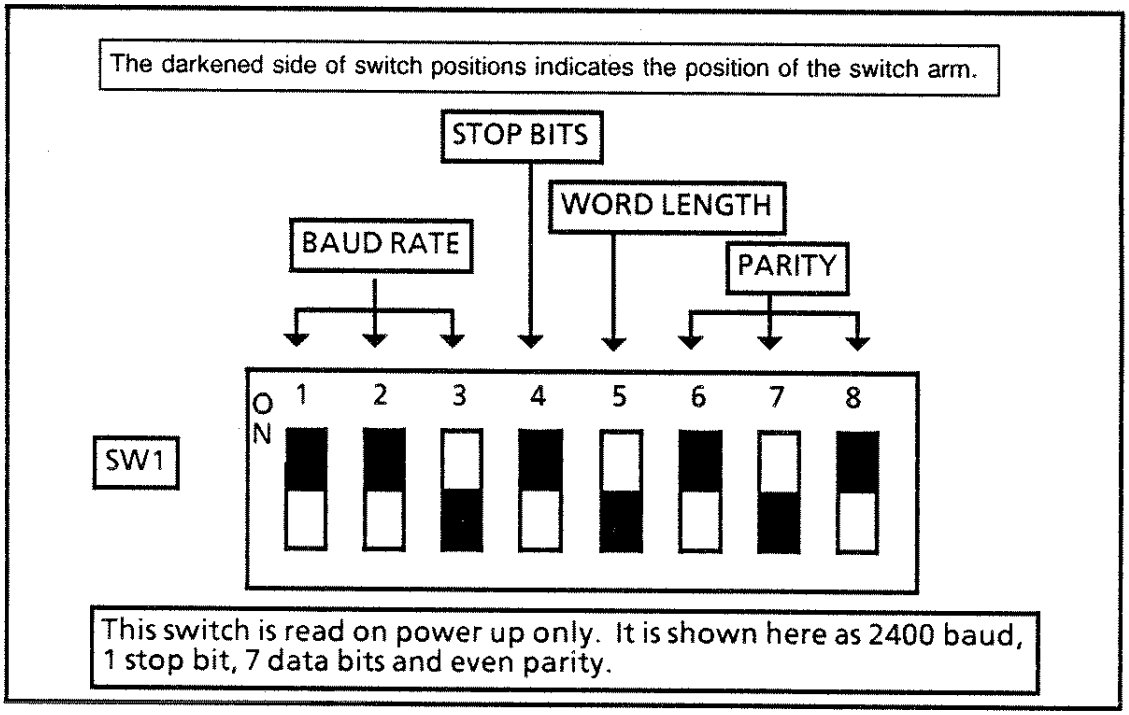
B.2 INSTALLATION (cont.)

Switch SW1 on the RS-232 interface board is used to set the RS-232 data transfer characteristics (see Figure B-2 for an example). There are 4 major parameters for the transfer characteristics and they are as follows:

1. Baud Rate
2. Stop Bits
3. Word Length
4. Parity

These parameters must match the RS-232 data transfer characteristics of the host computer for a successful transmission. Table B-2 lists all the possible configurations.

FIGURE B-2
RS-232 SETUP EXAMPLE



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TABLE B-2
RS-232 Data Transfer Characteristics

SETTINGS SW1	1	2	3	4	5	6	7	8
BAUD RATE								
110 BPS	1	1	1					
300 BPS	0	1	1					
600 BPS	1	0	1					
1200 BPS	0	0	1					
2400 BPS	1	1	0					
4800 BPS	0	1	0					
9600 BPS	1	0	0					
19200 BPS	0	0	0					
STOP BITS								
1 STOP BIT				1				
2 STOP BITS				0				
WORD LENGTH								
7 BIT WORD					0			
8 BIT WORD					1			
PARITY								
NONE						0	X	X
ODD						1	1	1
EVEN						1	0	1
MARK						1	1	0
SPACE						1	0	0

Where: ON = 1 OFF = 0

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B.3 COMMUNICATIONS PROTOCOL

The protocol for using the RS-232 I/O port is as follows:

1. Switch SW1 (RS-232 Data Transfer Characteristics) is read on power up only. During power up, you must pause for approximately 10 seconds before sending commands. This is to allow the 5600 signal conditioners to initialize.

2. Commands can be entered separately or together in command strings. Commands must be separated by a semicolon in command strings. A command or command string may begin with an actual command or they may begin with an ASCII 2 or 27 (STX or ESC). A command or command string must be terminated with a carriage return (ASCII 13) or an ASCII 3 (ETX).

3. This interface will accept and buffer up to 512 bytes of data, excluding an ASCII 2,8,127 and 27 (STX, BS, DEL and ESC respectively). Upon receipt of the terminator, ASCII 13 or 3 (carriage return or ETX), or the 512th byte of data, the interface will send an ASCII 19 (XOFF). The interface will then respond, with or without data, and then send an ASCII 17 (XON).

4. This interface supports both hardware and software handshaking protocols. Pins 4 and 5 (RTS and CTS) are your hardware handshaking pins and pin 20 (DTR) is set high when the frame is turned on. This interface will suspend transmission of data upon the receipt of an ASCII 19 (XOFF) or the lower of pin 5 (CTS) on the 25 pin D-Shell connector. It will resume transmission on the receipt of an ASCII 17 (XON) or the raising of pin 5.

B.4 INTERFACE MESSAGES (Displayed in PE mode only)

B.4.1 ERROR MESSAGES

1. INVALID COMMAND SYNTAX - This error message is displayed when the command's syntax is incorrect, whether it is an improper command, a misspelled command or the appropriate space or bracket has been omitted.

2. INVALID COMMAND PARAMETER - This message is displayed when the arguments specified are out of range or invalid.

3. REPORTING DEVICE UNAVAILABLE - This message is displayed when the channel specified by the argument is unoccupied, is occupied by a signal conditioner not having the status board option, or is occupied by a signal conditioner that is not operational.

4. REPORTING DEVICE TIMEOUT - This message is displayed when the channel, specified by the argument, is occupied by a signal conditioner that is not operational or has been removed.

B.4.2 OTHER MESSAGES

1. COMMAND ENTRY ABORT - This message is displayed when an ASCII 27 (ESC) character is received.

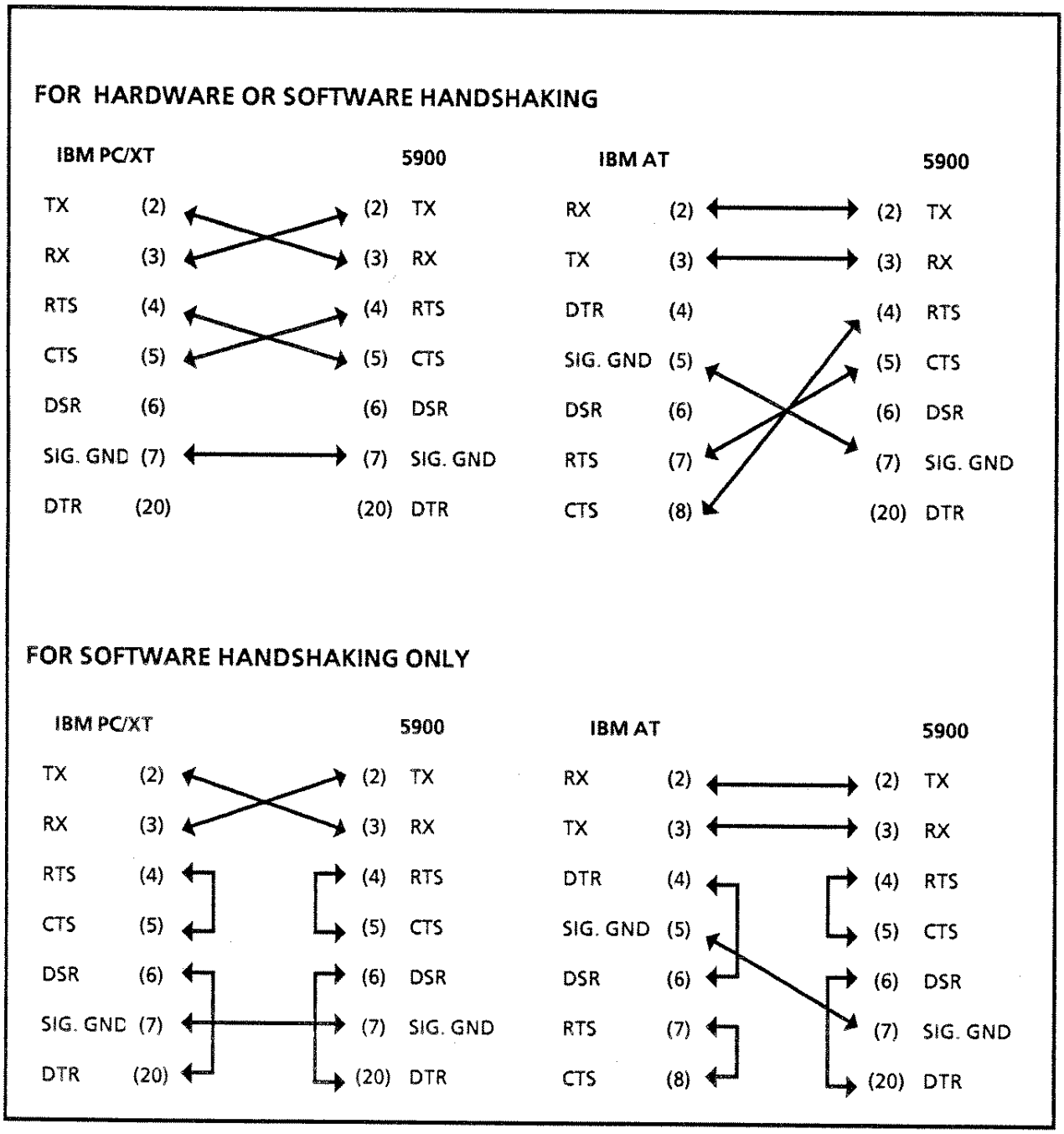
2. COMMAND DATA RECEIVED - This message is displayed when a command is received that only invokes an action and no data response, RS and SA commands. It is displayed once for every successful execution.

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B.5 CABLE CONFIGURATION

Figure B-3 contains some recommended cable configurations.

FIGURE B-3
RS-232 CABLE CONFIGURATION



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APPENDIX C

5900 IEEE-488 INTERFACE KIT

C.1 GENERAL INFORMATION

This section contains operating protocols, error messages and installation instructions for the Gould 5900 IEEE-488 Interface kit (P/N 11-4221-04). For specific software commands, see Appendix A.

This kit includes two boards and they are as follows:

1. IEEE-488 Interface board	This board contains 2 communication I/O ports (IEEE-488 or 3000 Recorder) which allow you to transfer commands to the interpreter board (see Figure C-1). The IEEE-488 port allows direct parallel communications using the IEEE-488 standard. The 3000 recorder port allows indirect communication via the Gould 3000 series recorder.
2. Interpreter board	This board is the "brains" of the 5900 frame. It interprets the commands it receives from the Interface board and takes the appropriate actions (see Table A-2).

C.2 INSTALLATION

This section describes the installation procedures for the IEEE-488 Interface board only. See Appendix A for installation procedures on the Interpreter board.

WARNING: To avoid personal injury and equipment damage, the user should disconnect power prior to removing covers, panels, or any grounding straps. Reinstall covers, panels, and any grounding straps prior to reconnecting power.

The IEEE-488 Interface kit may be installed at the factory or in the field, either by one of our Gould Service Representatives or by you. The following is the procedure for installation (see Figure A-1).

a. Set SW1 on the interpreter board (see Appendix A - Section A.2).

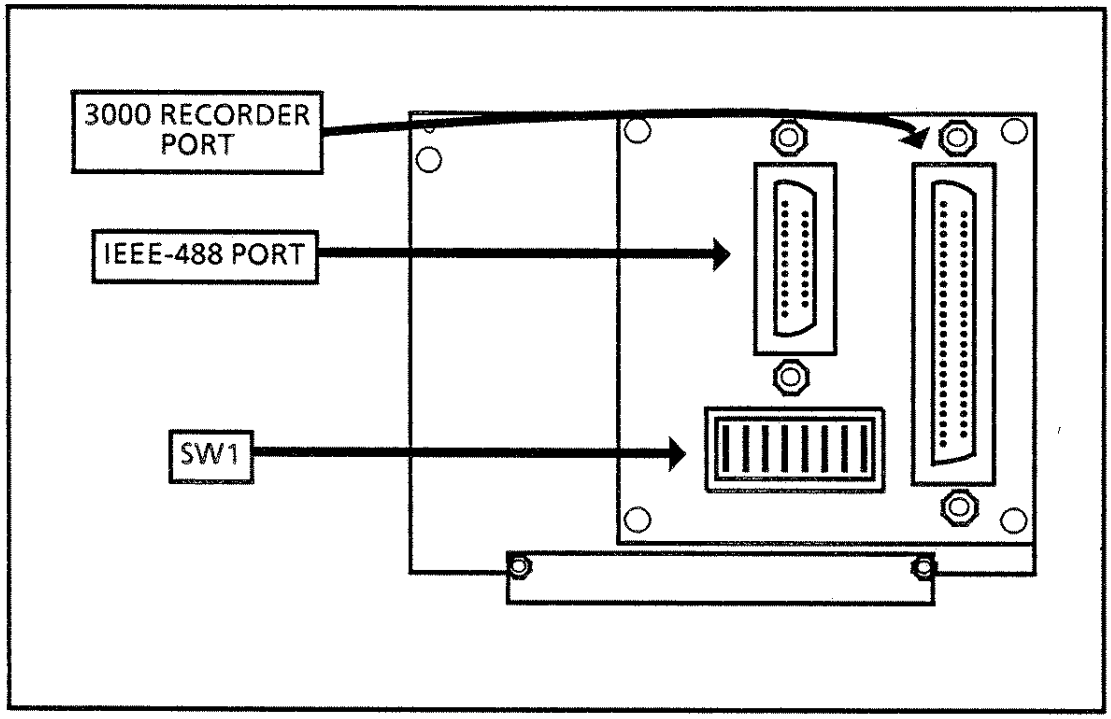
b. Remove the top-rear cover on the 5900 frame. If the frame is in a porable case, you must first remove the top cover of the case. The portable top cover pops right off.

c. Mount the Interpreter board (see Appendix A - Section A.2).

d. Mount the IEEE-488 Interface board in connector J51 on the Distribution board.

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FIGURE C-1
IEEE-488 INTERFACE BOARD



The pin out assignments for the 3000 recorder I/O port are discussed in Section II. The IEEE-488 I/O port follows the IEEE-488 standard (see Table C-1).

TABLE C-1
IEEE-488 PIN ASSIGNMENTS

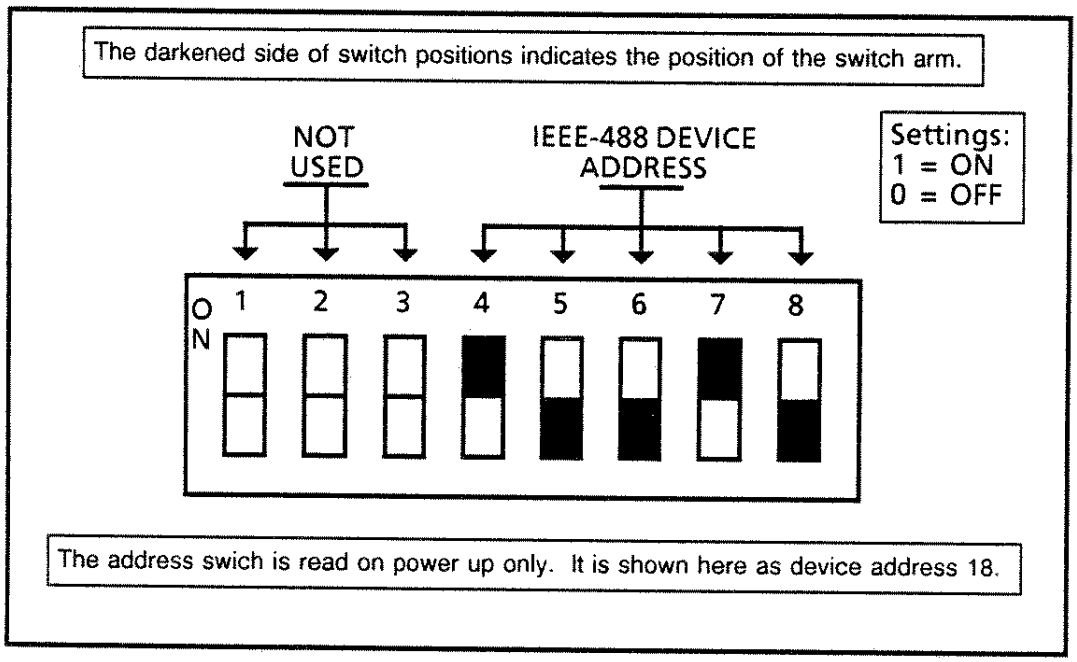
Pin	Assignment	Pin	Assignment
1	DIO 1	13	DIO 5
2	DIO2	14	DIO 6
3	DIO 3	15	DIO 7
4	DIO 4	16	DIO 8
5	EOI	17	REN
6	DAV	18	DCOMM
7	NRFD	19	DCOMM
8	NDAC	20	DCOMM
9	IFC	21	DCOMM
10	SRQ	22	DCOMM
11	ATN	23	DCOMM
12	Chassis GND	24	DCOMM

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C.2 INSTALLATION (cont.)

Switch SW1 on the IEEE-488 Interface board allows you to set the communications address (see Figure C-2 for an example). See Table C-2 for complete device address selection.

FIGURE C-2
IEEE-488 SETUP EXAMPLE



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TABLE C-2
IEEE-488 DEVICE ADDRESS SWITCH SETTING

DEVICE ADDRESS	DIP SWITCH POSITION 4	5	6	7	8
1	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	ON	ON
4	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	ON	OFF	ON
6	OFF	OFF	ON	ON	OFF
7	OFF	OFF	ON	ON	ON
8	OFF	ON	OFF	OFF	OFF
9	OFF	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON	OFF
11	OFF	ON	OFF	ON	ON
12	OFF	ON	ON	OFF	OFF
13	OFF	ON	ON	OFF	ON
14	OFF	ON	ON	ON	OFF
15	OFF	ON	ON	ON	ON
16	ON	OFF	OFF	OFF	OFF
17	ON	OFF	OFF	OFF	ON
18	ON	OFF	OFF	ON	OFF
19	ON	OFF	OFF	ON	ON
20	ON	OFF	ON	OFF	OFF
21	ON	OFF	ON	OFF	ON
22	ON	OFF	ON	ON	OFF
23	ON	OFF	ON	ON	ON
24	ON	ON	OFF	OFF	OFF
25	ON	ON	OFF	OFF	ON
26	ON	ON	OFF	ON	OFF
27	ON	ON	OFF	ON	ON
28	ON	ON	ON	OFF	OFF
29	ON	ON	ON	OFF	ON
30	ON	ON	ON	ON	OFF

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C.3 COMMUNICATIONS PROTOCOL

The protocol for using the IEEE-488 Interface is as follows:

1. This interface will operate as a talker/listener and NOT as a controller.

2. This interface will handle full handshaking protocols and addressing schemes as defined by IEEE Standard 488-1978 "Digital Interface for Programmable Instrumentation".

3. During power-up, the 5900 Interpreter board performs a hardware reset on the IEEE-488 Interface board. It then reads the switch settings on SW1 and initializes the GPIB device. It then pauses, approximately 10 seconds, while the 5600 signal conditioners initialize. After this period, the IEEE-488 interface is ready to receive commands.

4. Commands may be entered separately or together in command strings. Commands must be separated by a semicolon in command strings. A command or command string must be terminated with a carriage return (ASCII 13).

5. All command characters received must be in uppercase. Line feeds (ASCII 10) are ignored.

C.4 ERROR MESSAGES

The serial poll register is used to confirm command acknowledgment. After the execution of a command, this register can be read. If it contains a 00 hex, the command has been interpreted and executed. If it contains a FF hex, an error has occurred. The following are types of errors that will place an FF hex in the serial poll register:

1. Invalid Command Syntax

2. Invalid Command Parameter

3. Reporting Device Unavailable

4. Reporting Device Timeout

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