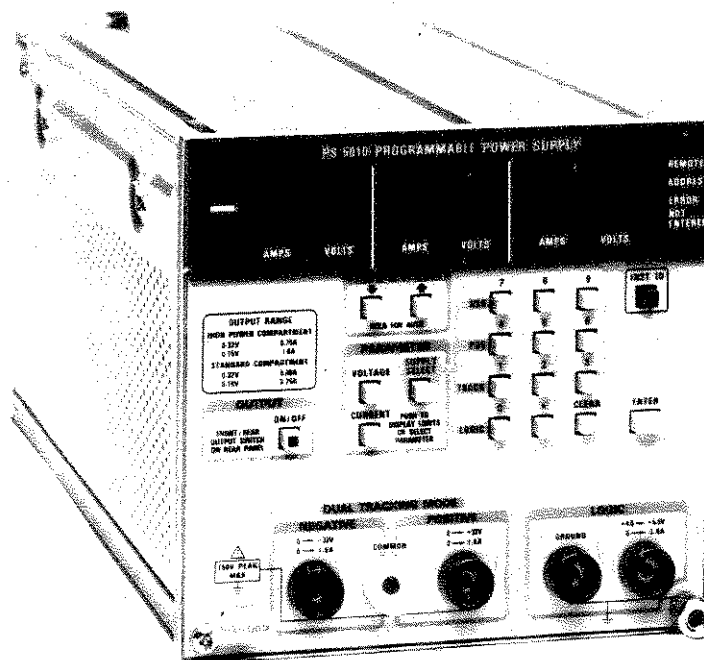


PS 5010 Instrument Interfacing Guide



4610-1

This interfacing guide is designed to help you get started using the PS 5010 Programmable Power Supply with a GPIB controller as quickly and easily as possible. This guide tells you how to set PS 5010 switches for GPIB operation and explains how to communicate with the PS 5010 with a variety of controllers. Sample output programs for these controllers are also included.

This guide does not take the place of the operators manual or other documentation supplied with the PS 5010 and your system controller. More complete information in this other documentation will help you get the full benefit of the PS 5010's programmable capabilities.

Setting Up the PS 5010 for GPIB Operation

Connect the TM 5000 power module to your controller with a GPIB cable. The program examples in

this guide assume that the PS 5010 and controller are the only instruments on the bus.

Checking the GPIB Address and Terminator.

The PS 5010 primary address is displayed when you press the INST ID button. A decimal point in the display indicates the message terminator switch is set for EOI or LF (no decimal point indicates EOI-only).

The PS 5010 is supplied from the factory set to an address of 22 and to EOI-only for the message terminator.

Setting the Address and Terminator Switches.

The switches that select the GPIB address and terminator are located on a circuit board on the left side of the PS 5010. Because the PS 5010 side cover must be removed, allowing hazardous voltages to be exposed, refer address and terminator selection to qualified personnel only. Both a sticker on the inside of the side cover and Fig. 1 identify the switches and illus-

trate their meanings. Other strap-selectable options in the PS 5010 are explained in the operators manual.

WARNING

Hazardous voltages exist inside the PS 5010. The PS 5010 should be removed and disconnected from the TM 5000 power module (after turning power off) before opening the instrument covers. Internal settings should only be made by qualified personnel.

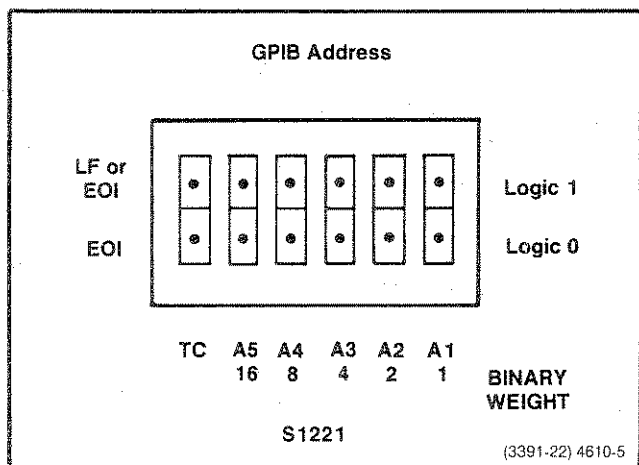


Fig 1. The address and message terminator switches are located on the circuit board on the left side of the PS 5010.

Valid primary addresses include the range of 0 to 30. (31 effectively disables the PS 5010 from communicating on the GPIB.) If your controller reserves an address for itself, do not set the PS 5010 to that address. This is true of Tektronix 4050-Series controllers, which reserve address 0 for themselves. The Tektronix 4041 defaults to address 30 on power-on, but may be programmed to use any primary address. The PS 5010 ignores secondary addresses.

EOI-only is recommended as the message terminator for use with Tektronix controllers. EOI-or-LF is recommended for use with Hewlett-Packard controllers.

(In the latter position, the PS 5010 still recognizes EOI as a terminator and transmits EOI concurrently with the LF character to terminate a message.)

Programming The PS 5010

PS 5010 Power-On

The PS 5010 performs a self-test and goes to its default settings at power-on.

Self-Test. During the self-test, all front-panel indicators are lighted. If an internal error is detected, the PS 5010 continuously displays a three-digit error code and turns on the ERROR indicator. See the operators manual for the meaning of any code displayed.

Power-On Settings. Following a successful self-test, the PS 5010 goes to local state with the default settings shown in Table 1 (and defined in Table 2). These settings are restored any time the INIT command is executed.

Power-On SRQ. The PS 5010 asserts SRQ to report power-on status after completing the self-test. This can be handled with a serial poll, although the PS 5010 communicates normally on the GPIB and executes the commands it receives whether or not the SRQ is serviced. Some controllers, such as the 4051 and 4052 when used without the 405XR14 GPIB rompack, require that the program contain an SRQ handler and begin by enabling the handler; otherwise the power-on SRQ will cause the program to halt with the error 'NO SRQ ON UNIT'.

PS 5010 Messages

Commands are provided to control PS 5010 settings, cause PS 5010 actions, or request status. These commands are listed in Table 2. PS 5010 commands begin with a header—a word or abbreviation that describes the function implemented. The command may include one or more arguments, which are delimited from the header by a space; multiple arguments are delimited by a comma. PS 5010 commands can be combined in a message by separating the commands with the message unit delimiter (semicolon). Either upper or lower-case ASCII characters are accepted.

Table 1
PS 5010 Power-On Settings

The instrument goes to the following settings at power on and when the INIT command is executed. Characters in parenthesis are not entered as part of the argument.

Header	Argument
VPOSitive	0.0 (V)
IPOSitive	0.4 (A)
VNEGative	0.0 (V)
INEGative	0.4 (A)
VLOGic	5.0 (V)
ILOGic	1.0 (A)
FSOUTput	OFF
LSOUTput	OFF
PRI	OFF
NRI	OFF
LRI	OFF
RQS	ON
USEReq	OFF
DT	OFF

Table 2
PS 5010 Programming Commands

Header	Argument	Description
DT	SET	Instrument waits for GET to update settings.
DT	OFF	Instrument updates without GET message.
DT?		Returns DT SET; or DT OFF;
ERR?		Returns error code for most recent event reported by serial poll when RQS is ON. With RQS OFF, it returns the highest priority status.
FSOUT	ON	Connects floating supplies to output terminals.
FSOUT	OFF	
FSOUT?		Returns FSOUT ON; or FSOUT OFF;
ID?		Returns ID TEK/PS5010, V79.1 FXX with XX the firmware version.
ILOG	<number>	Sets the logic supply current limit.

Table 2 (cont)

Header	Argument	Description
ILOG?		Returns ILOG <number>;
INEG	<number>	Sets the negative floating supply current limit.
INEG?		Returns INEG <number>;
INIT		Resets instrument settings to the power on state (see Table 1).
IPOS	<number>	Sets the positive floating supply current limit
IPOS?		Returns IPOS <number>;
ITRA	<number>	Sets both the positive and negative floating supplies current limits.
LRI	ON	Enables the logic supply regulation interrupt.
LRI	OFF	
LRI?		Returns LRI ON; or LRI OFF;
LSOUT	ON	Connects the logic supply to the output terminals.
LSOUT	OFF	
LSOUT?		Returns LSOUT ON; or LSOUT OFF;.
NRI	ON	Enables the negative floating supply regulation interrupt.
NRI	OFF	
NRI?		Returns NRI ON; or NRI OFF;.
OUT	ON	Connects all supplies to their output terminals.
OUT	OFF	
OUT?		Returns FSOUT ON; or FSOUT OFF; and LSOUT ON; or LSOUT OFF;.
PRI	ON	Enables the positive floating supply regulation interrupt.
PRI	OFF	
PRI?		Returns PRI ON; or PRI OFF;.

Table 2 (cont)

Header	Argument	Description
REG?		Returns REG <number>, <number>, <number>. Sequence is neg, pos, logic. Numbers are 1=voltage, 2=current, 3=unregulated.
RQS	ON	Enables instrument to generate service requests.
RQS	OFF	Disables all service requests.
RQS?		Returns RQS ON; or RQS OFF;.
SET?		Returns all instrument settings that can be queried.
TEST		Returns 0 or error code corresponding to ROM with a checksum error.
USER	ON	Enables SRQ when INST ID button is pressed.
USER	OFF	
USER?		Returns USER ON; or USER OFF;.
VLOG	<number>	Sets logic supply voltage limit.
VLOG?		Returns VLOG <number>;.
VNEG	<number>	Sets negative floating supply voltage limit.
VNEG?		Returns VNEG <number>;.
VPOS	<number>	Sets positive floating supply voltage limit.
VPOS?		Returns VPOS <number>;.
VTRA	<number>	Sets positive and negative floating supplies to the same voltage limit.

Sending Messages to the PS 5010

Most GPIB controllers provide a high-level statement that allows you to transfer device-dependent messages to the PS 5010. In the 4050-Series and the 4041, it's the PRINT statement.

4050-Series:

```
170 PRINT @22:"VPOS 18;IPOS .15;OUT ON"
```

4041:

```
170 Print #22:"VPOS 18;IPOS .15;OUT ON"
```

A useful variation assigns the PS 5010 address to a variable and inserts that variable in the PRINT statement in place of the number for the address. This works with either the 4050-Series or 4041 and allows you to change the program to work with the PS 5010 set to other addresses by changing only the statement that assigns the variable.

4050:

```
200 P=22
210 PRINT @P:"VPOS 18;IPOS .15;OUT ON"
```

4041:

```
200 P=22
210 Print #P:"VPOS 18;IPOS .15;OUT ON"
```

Notice that the PS 5010 message (what's inside the quote marks) is the same in all of the above examples. The rest of each example varies to match the PRINT statement syntax designed into each controller as illustrated in Fig. 2. This suggests that once you understand your controller's output and input statements, it's just a matter of plugging in the PS 5010 commands you need.

```

4050-Series BASIC PRINT @5:"RQS ON"
4041 BASIC PRINT #5:"RQS ON"
HP-85 BASIC OUTPUT 705 ; "RQS ON"
FLUKE 1720A BASIC PRINT @5%,"RQS ON"
HP 9826 BASIC OUTPUT 705;"RQS ON"
    
```

4603-5

Fig. 2. A message to a GPIB device is contained within the controller's GPIB output statement. The statement is composed of three parts: the keyword, the address or logical unit number, and the device-dependent message. All the statements shown send the same standard Tektronix Codes & Formats message (RQS ON) that enables SRQ interrupts. All send the message to an instrument with primary address 5. The difference lies in the syntax of the statement required for a particular controller.

Getting PS 5010 Settings

PS 5010 queries or output commands (such as VPOS?, IPOS? or REG?) prepare the instrument for output, but do not start such output. The PS 5010 waits until it sees its talk address to begin sending the requested data. This is accomplished by the INPUT statement.

4050-Series:

```

280 PRINT @22:"REG?"
290 INPUT @22:R#
    
```

4041:

```

280 !
290 Input #22 Prompt "REG?":result#
    
```

If no output was specified by a query command, the PS 5010 transmits a byte with all bits set to one (FF hex) and asserts EOI concurrently. This feature prevents the PS 5010 from hanging up the bus handshake lines when it is addressed with nothing to say. This does not change the value stored in the INPUT target variable. If the variable was undefined, it remains undefined. This causes an error if the variable is numeric and it is subsequently used in an output statement or a calculation.

All instrument settings can be obtained in one message. Just dimension a string large enough (200 characters is plenty) and input the settings string.

4050-Series:

```

330 DIM S$(200)
340 PRINT @22:"SET?"
350 INPUT @22:S#
    
```

4041:

```

330 Dim settings$ to 200
340 Input #22 Prompt "SET?":settings#
    
```

You can restore the settings you input from the PS 5010 by sending back the settings string.

4050-Series:

```

380 PRINT @22:S#
    
```

4041:

```

380 Print #22:settings#
    
```

Using PS 5010 Interrupts

Programmable interrupts are provided in the PS 5010 to inform the controller of asynchronous events, such as command errors, execution errors, and regulation changes. If the PS 5010 is set to report an event, it asserts SRQ when it detects that event and sets its status byte and error code appropriately. The status byte returned in response to a serial poll and the error code returned in response to an error query (ERR?) correspond to the events shown in Table 3. The error query obtains more detail in the case of abnormal events and some normal events. For instance, in the case of a command error, was it a problem with a header, argument, or delimiter? You can find out from the error code.

Here are typical SRQ handlers that alert you to a reporting instrument's address, status, and error code with a message on your console. The error code is helpful during debugging because it identifies the specific command or execution problem should one occur. To use an SRQ handler, you must link it and enable it as shown in the statements at lines 120 and 130.

The sample Regulation Reporting program does not use the error query because the information that is needed (regulation status) is available from the status byte. Status information is printed on the 4041 printer if an SRQ is detected during run-time.

**Table 3
Error Codes and Status Bytes**

Abnormal Conditions		
Event	Bus response to ERR?	Response to serial poll^a
Command Errors		
Command header error	101	97 or 113
Header delimiter error	102	97 or 113
Command argument error	103	97 or 113
Argument delimiter error	104	97 or 113
Missing argument	106	97 or 113
Invalid message unit delimiter	107	97 or 113
Binary block checksum error	108	97 or 113
binary block byte counter error	109	97 or 113
Execution Errors		
Command not executable in local mode	201	98 or 114
Returned to local, new settings pending lost	202	98 or 114
I/O buffers full, output dumped	203	98 or 114
Settings conflicts	204	98 or 114
Argument out of range	205	98 or 114
Group execute trigger ignored	206	98 or 114
Internal Errors		
System error	302	99 or 115
Math pack error	303	99 or 115
Normal Conditions		
System Events		
Power on	401	65 or 81
User request	403	67 or 83
Device Dependent Events		
Negative supply goes to constant voltage mode	721	197 or 213
Negative supply goes to constant current mode	722	198 or 214
Negative supply goes to unregulated mode	723	199 or 215
Positive supply goes to constant voltage mode	724	201 or 217
Positive supply goes to constant current mode	725	202 or 218
Positive supply goes to unregulated mode	726	203 or 219
Logic supply goes to constant voltage mode	727	205 or 221
Logic supply goes to constant current mode	728	206 or 222
Logic supply goes to unregulated mode	729	207 or 223

^aIf the message processor is busy, the instrument returns the higher decimal number.

4050-Series with 405XR14 rompack:

```

120 ON SRQ THEN 465
130 CALL "srqon"
140 REM
150 REM
160 REM
420 REM
430 REM
440 REM
450 REM
460 STOP
465 REM SERIAL POLL OF ADDRESS 22 ONLY
470 POLL A,S;22
475 PRINT @22:"ERR?"
480 INPUT @22:E
490 PRINT "STATUS=";S,"ERROR=";E
500 RETURN

```

4041:

```

120      On srq then gosub dopoll
130      Enable srq
140      !
150      !
160      !
420      !
430      !
440      !
450      !
460      Stop "End of 4041 example program statements."
470 Dopoll:      poll stabyt,addr;22
480      Input #addr prompt "ERR?":errnum
490      Print "STATUS=";stabyt,"ERROR=";errnum
500      Resume

```

PS 5010 Response to Interface Messages

The following program sequences show various interface messages transmitted to the PS 5010.

The PS 5010 responds to DCL (and SDC if listen addressed) by clearing its Input and Output Buffers and any unexecuted setting commands in its Pending Settings Buffer, along with any errors or events waiting to be reported (except power-on).

GET causes execution of settings previously received and decoded following the DT SET command.

LLO locks out the operator from restoring local (front-panel) control when the instrument is under remote control.

GTL unlocks the front panel from the Lock-out state caused by LLO.

See the PS 5010 Operators Manual for a full discussion of how the instrument responds to interface messages.

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4050-Series with 405XR14 rompack:

```
530 REM Send Interface Messages from 405x with R14 rompack to PS 5010
540 REM
550 REM PS 5010 primary address (factory set to 22) is variable A.
560 REM
570 A=22
580 REM Send LISTEN ADDRESS
590 CALL "LISTEN";A
600 REM UNLISTEN
610 CALL "UNL"
620 REM Send TALK ADDRESS
630 CALL "TALK";A
640 REM UNTALK
650 CALL "UNT"
660 REM Send DEVICE CLEAR
670 CALL "DCL"
680 REM Send LISTEN ADDRESS, SELECTED DEVICE CLEAR, UNLISTEN
690 CALL "SDC";A
700 REM
710 REM -- REMOTE WITH LOCKOUT STATE (RWLS) from LOCS or REMS --
720 REM Send Listen Address, Local Lockout, Unlisten
730 CALL "LISTEN";A
740 CALL "LLO"
750 CALL "UNL"
760 REM
770 REM Send LISTEN ADDRESS, GO-TO-LOCAL, UNLISTEN
780 CALL "GTL";A
790 REM Send LISTEN ADDRESS, GROUP EXECUTE TRIGGER, UNLISTEN
800 CALL "GET";A
```

4041:

```
130 Pri_addr=22 ! PS 5010 primary address set at factory
140 !
150 !
160 Listen: wbyte atn(pri_addr+32) ! Send Listen Address (MLA)
170 !
180 Unlisten: wbyte atn(unl) ! Send Unlisten (UNL)
190 !
200 Talk: wbyte atn(pri_addr+64) ! Send Talk Address
210 !
220 Untalk: wbyte atn(unt) ! Send Untalk
230 !
240 Devclear: wbyte dcl ! Send Device Clear
250 !
260 Selctclr: wbyte sdc(pri_addr),atn(unl) ! Send MLA, Selected Device
270 ! Clear, UNL
280 Lockout: wbyte llo ! Send Local Lockout
290 !
300 Gtlocal: wbyte stl(pri_addr),atn(unl) ! Send MLA, Go to Local, UNL
310 !
320 Trisser: wbyte set(pri_addr),atn(unl) ! Send MLA, Group Execute
330 ! Trisser, UNL
340 Locistat: wbyte ren(0),ren(1) ! Pulse unassert REN line.
350 !
360 End
```


Regulation Status Monitoring Program

The following program sets up each of the PS 5010's three supplies and enables each supply's Regulation Interrupt capability. After each of the supplies is set, all of the supplies are queried for their Regulation Status. The resulting information is printed in a formatted manner to the appropriate output device as are all SRQ's which are reported.

4050-Series with 405XR14 rompack:

```

100 REM +::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::+
110 REM  :::::::::::::: PS 5010/4050 REPORTS REGULATION STATUS ::::::::::
120 REM  ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
130 REM
140 REM BY Barbara Malin, GPI Marketing, 11/3/82
150 REM
160 REM Copyright (c) 1982, Tektronix, Inc. All rights reserved. This
170 REM software is provided on an "as is" basis without warranty of any
180 REM kind. It is not supported.
190 REM
200 REM This software may be reproduced without prior permission, in
210 REM whole or in part. Copies must include the above copyright
220 REM and warranty notice.
230 REM
240 REM REQUIRED EQUIPMENT:
250 REM - PS 5010 in TM 5000 mainframe.
260 REM - Program assumes no other instruments on the bus.
270 REM - 4050-Series controller with R14 GPIB Enhancement rompack.
280 REM
290 REM PURPOSE:
300 REM - Report Regulation Status as each of the PS 5010's three
310 REM   supplies are set up.
320 REM
330 REM OPERATING PROCEDURE:
340 REM - Connect 4050 Controller to TM 5000 mainframe with GPIB cable.
350 REM - PS 5010 must be set for primary address of 22 or change
360 REM   the line which assigns P=22.
370 REM - Enter and run program (no other program segment required).
380 REM
390 REM PROGRAM FUNCTIONS:
400 REM - Sets up each of the PS 5010's three supplies in order of the
410 REM   front panel display (NEG, POS, LOG).
420 REM - Queries all of the supplies for their Regulation Status after
430 REM   each of the supplies has been programmed.
440 REM - Handles Regulation Change Interrupts via the POLL statement.
450 REM - Prints the resulting information as each of the supplies are
460 REM   programmed.
470 REM
480 REM PROGRAM VARIABLES:
490 REM   A = number of device in POLL list reporting SRQ
500 REM   P = PS 5010 factory set address
510 REM   S = Status byte reported by POLL statement
520 REM   I$ = ID? response
530 REM   R$ = REG? response
540 REM   S$ = Supply which was just set up
550 REM -::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::-
560 INIT
570 PAGE
580 PRINT "PS 5010 REGULATION STATUS"
590 REM   Assign PS 5010 factory-set address of 22

```

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```

600 P=22
610 S=0
620 ON SRQ THEN 1100
630 CALL "srqon"
640 REM Initialize and query for instrument ID
650 PRINT @P:"INIT;ID?"
660 INPUT @P:I$
670 PRINT I$
680 REM Turn PS 5010 Floating Supply Output ON
690 REM Lockout PS 5010 front panel during setup
700 CALL "LLO"
710 PRINT @P:"FSOUT ON"
720 REM Setup Negative Floating Supply
730 REM
740 PRINT @P:"VNEG 10;INEG .1;NRI ON"
750 S$="- SUPPLY"
760 GOSUB 920
770 REM Setup Positive Floating Supply
780 REM
790 PRINT @P:"VPOS 12.5;IPOS .15;PRI ON"
800 S$="+ SUPPLY"
810 GOSUB 920
820 REM Setup Logic Supply
830 REM
840 PRINT @P:"VLOG 4.57;ILOG .2;LRI ON;LSOUT ON"
850 S$="LOGIC SUPPLY"
860 GOSUB 920
870 REM Make clean exit for PS 5010 and 4050
880 REM END statement returns PS 5010 to Local State
890 CALL "SRQOFF"
900 PRINT @P:"NRI OFF;PRI OFF;LRI OFF;OUT OFF"
910 END
920 REM Report regulation status via REG?
930 CALL "WAIT",0.4
940 PRINT @P:"REG?"
950 INPUT @P:R$
960 REM R$=REG (<neg status>,<pos status>,<log status>)
970 REM Values of R$: 1=voltage regulated
980 REM 2=current regulated
990 REM 3=unregulated
1000 REM Print Regulation results to CRT
1010 PRINT
1020 PRINT S$
1030 IF NOT(S=>197 AND S<=207) THEN 1050
1040 PRINT "STATUS BYTE REPORTED: ";S
1050 PRINT "REGULATION STATUS: ";R$
1060 REM Reset status value to 0
1070 S=0
1080 RETURN
1090 REM General SRQ handler
1100 POLL A,S;P
1110 IF S=>197 AND S<=207 THEN 1130
1120 PRINT "Status byte reported: ";S
1130 RETURN

```

```

PS 5010 REGULATION STATUS
Status byte reported: 65
ID TEK/PS5010,V79.1,F02;

- SUPPLY
REGULATION STATUS: REG 1,1,1;

+ SUPPLY
STATUS BYTE REPORTED: 202
REGULATION STATUS: REG 1,2,1;

LOGIC SUPPLY
REGULATION STATUS: REG 1,2,1;
    
```

4610-3

Fig. 3. Screen output from 4050-Series sample regulation program.

4041:

```

100 !+::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::+
110 ! :::::::::::::: PS 5010/4041 REPORTS REGULATION STATUS ::::::::::::::
120 ! ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
130 !
140 ! By Barbara Malin, GPI Marketing, 11/1/82, revised 12/8/82
150 !
160 ! Copyright (c) 1982, Tektronix, Inc. All rights reserved. This
170 ! software is provided on an "as is" basis without warranty of any
180 ! kind. It is not supported.
190 !
200 ! This software may be reproduced without prior permission, in
210 ! whole or in part. Copies must include the above copyright
220 ! and warranty notice.
P 230 !
240 ! REQUIRED EQUIPMENT:
250 ! - PS 5010 in TM 5000 mainframe.
260 ! - Program assumes no other instruments on the bus.
270 ! - 4041 (V1.1) -- console may be either front panel or terminal (comm:).
280 !
290 ! PURPOSE:
300 ! - Report Regulation Status as each of the PS 5010's three
310 ! supplies are set up.
320 !
330 ! OPERATING PROCEDURE:
340 ! - Connect 4041 Controller and TM 5000 mainframe with GPIB cable.
350 ! - PS 5010 must be set for primary address of 22 or change
360 ! the line which assigns PS=22.
370 ! - Enter and run program (no other program sesment required).
380 !
390 ! PROGRAM FUNCTIONS:
400 ! - Sets up each of the PS 5010's three supplies in order of the front
410 ! panel display (NEG, POS, LOG).
420 ! - Queries all of the supplies for their Regulation Status after each
430 ! of the supplies has been programmed.
440 ! - Handles Regulation change interrupts via the POLL statement.
450 ! - Prints the resulting information as each of the supplies are
460 ! programmed.
470 !
    
```

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```

480 ! PROGRAM VARIABLES:
490 !     address = Address of device asserting SRQ
500 !     ps      = PS 5010 factory set address
510 !     status  = Status byte reported by POLL statement
520 !     id#     = ID? response
530 !     res#    = REG? response
540 !     supply# = Supply currently being setup
550 !
560 ! PROGRAM LABELS:
570 !     initset: Initialize PS 5010 settings
580 !     nes_set: Set up Negative Supply
590 !     pos_set: Set up Positive Supply
600 !     los_set: Set up Logic Supply
610 !     res_sta: Subroutine to report Regulation Status
620 !     res_chs: Report status byte for change in Regulation
630 !     poltps: Subroutine to handle SRQ's
640 !     end_prog: End of MAIN program segment
650 ! -----
660 ! Init var all
670 ! Open #101:"prin:" !           Open Logical Unit for 4041 printer
680 ! Print #101:" REGULATION STATUS"
690 ! Print "Regulation Status"
700 ! Integer ps,status
710 ! Ps=22 !                       Assign PS 5010 factory-set address of 22
720 ! Status=0
730 ! On sra then gosub poltps
740 ! Enable sra
750 !
760 ! Initialize PS 5010 and query for its ID
770 ! Initset:   input #ps prompt "INIT;ID?":id#
780 ! Print #101:id#
790 ! Wbyte llo !                   Lockout PS 5010 front panel during setup
800 ! Print #ps:"FSOUT ON"
810 !
820 ! Nes_set:   print #ps:"VNEG 10;INEG .1;NRI ON"
830 ! Supply#="- SUPPLY"
840 ! Gosub res_sta
850 !
860 ! Pos_set:   print #ps:"VPOS 12.5;IPOS .15;PRI ON"
870 ! Supply#="+ SUPPLY"
880 ! Gosub res_sta
890 !
900 ! Los_set:   print #ps:"VLOG 4.57;ILOG .2;LRI ON;LSOUT ON"
910 ! Supply#="LOGIC SUPPLY"
920 ! Gosub res_sta
930 !
940 ! Wbyte ren(0),ren(1) !         Pulse REN line to unlock front panel
950 ! Disable sra
960 ! Print #ps:"NRI OFF;PRI OFF;LRI OFF;OUT OFF"
970 ! Goto end_prog
980 !
990 ! Res_sta:   wait 0.4 !         Report Regulation Status via REG?
1000 ! Input #ps prompt "REG?":res#
1010 !
1020 !           Res#=REG (nes status),(pos status),(los status)
1030 !           Values of Res#: 1=voltage regulated
1040 !                           2=current regulated
1050 !                           3=unregulated
1060 ! Print #101: !                 Print results to 4041 printer
1070 ! Print #101:supply#
1080 ! If not(status)=197 and status(<=207) then goto res_chs
1090 ! Print #101:" STATUS BYTE: ";status
1100 !
1110 ! Res_chs:   print #101:" REGULATION STATUS: ";res#
1120 ! Status=0
1130 ! Return
1140 !
1150 ! poltps:   poll status,address

```

```
1150   If status>=197 and status<=207 then resume
1160   - Print #101:" Status reported:";status
1170   Resume
1180 End_prog:   end
```

```
REGULATION STATUS
Status reported:65
ID TEK/P55010,079.1,
F02:
- SUPPLY
REGULATION STATUS:
REG 1.3.1:
+ SUPPLY
STATUS BYTE: 202
REGULATION STATUS:
REG 1.2.1:
LOGIC SUPPLY
REGULATION STATUS:
REG 1.2.1:
4610-4
```

Fig. 4. Printer output from 4041 sample measurement program.

TEKTRONIX INSTRUMENTATION SOFTWARE LIBRARY

Utility Software for TM 5000 Instruments

Utility Software is available from Tektronix, Inc. for TM 5000 Instruments. This software consists of a set of subroutines and subprograms that perform common instrument functions over the GPIB such as data acquisition, front-panel set-up, etc. These routines are designed to be easily integrated into your application programs. And since they are small and well documented, the routines are easy to modify to suit your particular applications. Refer to the current Tektronix Instrumentation Software Library Catalog for instrument options, ROM packs, and other required equipment.

The following Utility Software was available when this Instrument Interfacing Guide was printed. Other software may be available; contact your local Tektronix Field Office for further information.

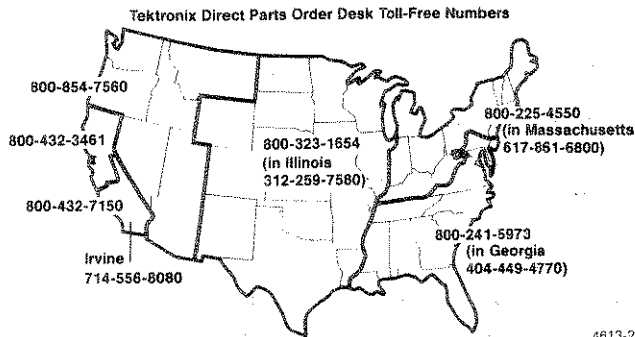
Description	Tektronix Part No.
TM 5000/4041 Utility Software (DC-100 tape)	062-6958-01
TM 5000/4052A Utility Software (DC-300 tape)	062-6957-01

Ordering Utility Software (U.S. Only)

Your local Tektronix Field Office has the current prices for software available from the Tektronix Instrumentation Software Library.

Order Tektronix Instrumentation Software Library programs from Tektronix Central Parts Ordering by using the toll-free number serving your area. The following map identifies the geographical regions in the U.S. and the toll-free number serving each region.

Call the toll-free number serving your area and give the Customer Service Representative the Tektronix nine-digit part number and name of the software package you want to order. If you have any questions about the software, call your local Tektronix Field Office.



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Ordering Utility Software (Outside the U.S.)

Outside of the U.S., order Tektronix Instrumentation Software Library programs through your local Tektronix sales office or from the Tektronix Instrumentation Software Library order point serving your area. Refer to the following list for the applicable library order point.

Africa, Europe, Middle East

Contact local Tektronix sales office.

Australia

Tektronix Instrumentation Software Library
Tektronix Australia Pty. Limited
Sydney
80 Waterloo Road
North Ryde, N.S.W. 2113

Canada

Tektronix Instrumentation Software Library
Tektronix Canada Ltd.
P.O. Box 6500
Barrie, Ontario
Canada L4M 4V3

Caribbean, Latin America, and Far East (except Japan)

Tektronix Instrumentation Software Library
Export Marketing
Tektronix, Inc.
P.O. Box 500
Beaverton, OR 97077
U.S.A.

Japan

Tektronix Instrumentation Software Library
Sony/Tektronix Corporation
9-31 Kitashinagawa-5
Tokyo 141 Japan

Tektronix Instrumentation Software Library
Tektronix, Inc.
Group 157, 54-016
P.O. Box 500
Beaverton, OR 97077

Program Library

The Tektronix Instrumentation Software Library includes over 200 software programs for a variety of Tektronix programmable instruments and controllers. The Library Catalog provides abstracts of the available software. Programs are available as ready-to-load media or as listings (see Catalog). For a copy of the latest catalog, contact your local Tektronix Field Office or representative and ask for Tektronix Instrumentation Software Library Catalog #99W-5293.

Program Contributions

If you have a program which you would like to submit to the Tektronix Instrumentation Software Library, we will send you, in exchange, one software package of your choice from the Customer/User Software portion of the Program Library (see current library catalog). Submitted programs must use Tektronix programmable instruments and must meet certain coding and documentation standards.

To contribute a program, submit a copy of the program on media along with a listing and a Tektronix Instrument Software Library release form (see current library catalog). If the program was created as part of your employment, the release must be signed by an authorized representative of your employer. Acceptance of the program is subject to review of the Tektronix Instrumentation Software Library staff.

For further information on submitting a program or for information about coding and documentation standards, contact:

Software Warranty

Tektronix warrants that the media (tapes, disks, ROMs, etc.) on which Software Products are furnished and the encoding of the programs on the media will be free from defects in materials and workmanship for a period of three (3) months from the date of shipment. If any such medium or encoding proves defective during the warranty period, Tektronix will provide a replacement in exchange for the defective medium. Except as to the media on which Software Products are furnished, Software Products are provided "as is" without warranty of any kind, either expressed or implied. Tektronix does not warrant that the functions contained in the programs will meet Customer's requirements or that the operations of the programs will be uninterrupted or error-free.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period. If Tektronix is unable to provide a replacement that is free from defects in materials and workmanship within a reasonable time thereafter, Customer may terminate the license for the Software Product and return the Software Product with the associated materials for credit or refund.

Tektronix disclaims any implied warranties of merchantability or fitness for a particular purpose. Tektronix' responsibility to replace defective media or refund customer's payment is the sole and exclusive remedy provided to the customer for breach of this warranty. Tektronix will not be liable for any indirect, special, incidental, or consequential damages irrespective of whether Tektronix has advance notice of the possibility of such damages.