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**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

7912AD
CHECKOUT SOFTWARE

CP56003 (TEK SPS BASIC V01)
CP56008 (TEK SPS BASIC V02)

INSTRUCTION MANUAL

Serial Number _____

Scans
By
Artek Media

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Table of Contents

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7912AD CHECKOUT SOFTWARE

CP56003 - CP56008

Introduction

The 7912AD Checkout Software package is a collection of TEK SPS
BASIC programs designed to verify proper operation of the 7912AD.
Checkout packages are available for either Version 01 or Version 02 of
TEK SPS BASIC. Both versions of the checkout software operate in the same
way, but differences exist in loading procedures and in the format of
questions asked on the terminal screen. V01 checkout software must be run
using V01 TEK SPS BASIC, and V02 checkout requires V02 TEK SPS BASIC.
Before attempting to use the software, determine which version you have;
then refer to the instructions for your version.

This software provides go/no-go testing of the command set used
during normal operation of the 7912AD. It is not intended to diagnose
problems down to the chip level. When a fault is detected, an identifying
error message is printed to provide service personnel the maximum amount
of information concerning the fault. In some cases TEK SPS BASIC error
codes (e.g., P-18) may be issued. Refer to the TEK SPS BASIC Software
System manual for information on these errors.

Every attempt has been made to minimize operator interaction. Once a
test or test sequence has been chosen by the operator, no additional knob
settings or terminal pagings are required.

For a complete checkout, the checkout software requires the use of
programmable plug-ins in the 7912AD. Using the programmable plug-ins, it
is possible to send and query all the possible settings within three to
four minutes, depending upon controller type and system storage device
(hard or floppy disk).

Loading Version 1 Checkout Software

Version 1 checkout software requires TEK SPS BASIC version 01.
Refer to the TEK SPS BASIC Software System manual for loading procedures.
TEK SPS BASIC must be initialized with the string functions and
graphics. The user must also ask to set system parameters. All the
parameters should be left at their default values except the last
question, as shown below:

HOW MANY NON-RESIDENT COMMANDS DO YOU WANT RESIDENT AT ONCE?
(DEFAULT TO 6) **15**

When the system has finished loading, the software prints READY on
the terminal screen.

The 7912AD Checkout Software package must be copied to your system
disk. Refer to the TEK SPS BASIC Software System manual for instructions
on copying files to the system disk. Copy the following files:

- *.ROM (copies all files with .ROM Extension)
- INSTAD.SPS

NOTE

If you have a floppy-disk system, space limitations on
the system diskette may prevent you from copying these
files. If so, a simple solution is to copy all files
with a .SPS extension from your system diskette to the
checkout software diskette. Then boot TEK SPS BASIC from
your system diskette, answer all the questions, and swap
diskettes. That is, put the checkout software diskette in
drive 0. The system will operate normally, and the
checkout software can be run.

When you have copied the files to the system disk (or created a
working disk as noted above), the checkout software is ready to load and
run. To load the software, type:

OLD "AD7912.ROM"

When the terminal prints READY, the software is ready to run. Then type:

RUN

NOTE

Other devices connected to the IEEE 488 bus while
the 7912AD Checkout Software is running may disguise
or create apparent faults in the 7912AD. Even though
the universal commands "UNT" and "UNL" are sent,
other devices may listen to messages sent with "ATN"
and slow down or hang up the handshake between the
controller and the 7912AD. These could appear to be
7912AD faults. If the checkout software reports a
fault while other devices are connected, it should
be rerun with all other devices disconnected from
the bus.

Typical terminal output for the loading and starting procedure is
shown below (user responses are typed in bold face):

READY
*OLD "AD7912.ROM"

READY
*RUN

*** 7912AD DIAGNOSTICS *******
VERSION-XXX

ARE YOUR INSTRUMENTS ON INTERFACE (Ø)? **YES** (or **NO**)
DO YOU WISH TO MINIMIZE THE PRINT-OUTS ASSOCIATED WITH THESE TESTS?
ONLY EXPERIENCED USERS SHOULD ANSWER YES.
PLEASE TYPE YES OR NO AND PRESS RETURN.

?NO

*** THIS IS THE MENU ***

ALL	POWER ON
MENU	SETTINGS
HELP	7A16P
INSTRUMENT LIST	7B90P
DONE	DEFECTS
CONTINUE ON FAULT	GRATICULE
	DIGITIZE
	SCALE FACTORS

TO SELECT AN ITEM FROM THE MENU, TYPE THE FIRST TWO LETTERS OF THE FIRST NAME AND PRESS RETURN. IF ALL ELSE FAILS, TRY 'HELP' or 'MENU'.

The first question asks which of two possible IEEE-488 interfaces you wish to use for testing your instruments. The checkout software assumes interface #1 if your response to the question is NO.

Loading Version 2 Checkout Software

Floppy-Disk Systems. Before the checkout software can be run on a floppy-disk system, several files must be transferred (copied) from the checkout software diskette to your system diskette. If you have archived your system software according to instructions given in the TEK SPS BASIC VØ2 system manual, there should be enough space available on the system diskette. If not, read the archiving instructions before proceeding.

When you have at least fifteen free blocks on the system diskette, copy all files with a .SPS extension from the checkout software diskette to your system diskette (use the "wildcard" copy option, e.g., "*.SPS").

When all .SPS files have been transferred to the system diskette, and with the checkout software diskette loaded in drive 1, type:

OLD DX1: "AD7912.ROM"

When the asterisk reappears, type:

RUN

Hard-Disk Systems. Before the checkout software can be run on a hard-disk system, all files must reside on the system disk (usually DKØ or DLØ). Copy both the program files and all files with a .SPS extension from your distribution disk (or diskette) to your system disk. A wild-card copy (e.g., "*.*") is the most convenient way to perform the transfer.

When all files have been copied, type:

      OLD "AD7912.ROM"

When the asterisk reappears, type:

      RUN

Terminal Output

Typical terminal output for starting VØ2 Checkout Software is shown below. User responses to terminal output are shown in bold face.

```
READY
*OLD "AD7912.ROM"

READY
*RUN

IF YOUR 7912AD CHECKOUT SOFTWARE FILES ARE ON
DKØ:  ENTER Ø
DX1:  ENTER 1?1

**** 7912AD DIAGNOSTICS ****
       VØ2-XX DATE
```

- - - - - - - -

   OR

```
ENTER WHICH DISK YOUR 7912AD CHECKOUT SOFTWARE IS ON
FOR EXAMPLE -- DX1, DKØ, ETC.
?DLØ

**** 7912AD DIAGNOSTICS ****
VØ2-Ø5          2-OCT-80
```

- - - - - - - -

ENTER THE INTERFACE NUMBER (Ø-3)? **Ø**
DO YOU WISH TO MINIMIZE THE PRINT-OUTS ASSOCIATED
WITH THESE TESTS?
ONLY EXPERIENCED USERS SHOULD ANSWER YES.
PLEASE TYPE YES OR NO AND PRESS RETURN

?**NO**

*** THIS IS THE MENU ***

ALL	POWER ON
MENU	SETTINGS
HELP	7A16P
INSTRUMENT LIST	7B90P
DONE	DEFECTS
CONTINUE ON FAULT	GRATICULE
	DIGITIZE
	SCALE FACTORS

TO SELECT AN ITEM FROM THE MENU, TYPE THE FIRST TWO LETTERS OF THE
FIRST NAME AND PRESS RETURN. IF ALL ELSE FAILS, TRY 'HELP' OR 'MENU'.

Discussion

The first question asks which disk your checkout software is on. If
your system is a floppy disk (RXØ1) system, the system software must be
in DXØ, and the checkout software diskette must be in DX1. For any other
type of system, the checkout software files must be on the system disk.
In any case, all files with a .SPS extension on the checkout media must
have been copied to the system media. The checkout software wil not run
properly unless these conditions are met.

The second question asks which of four possible IEEE 488 interfaces
you wish to use for the tests. Only one interface to the IEEE 488 bus can
be used at a time. If you have only one interface, it is probably strapped
as interface number Ø (the standard setting). For more information about
the CP1100/ or CP4100/IEEE 488 Interface, refer to the appropriate instruction
manual.

Command Descriptions

ALL. The ALL command causes all test routines to be executed for each 7912AD in the instrument list. The routine prints the number of instruments currently recognized and the number of repetitions requested. It then asks if the numbers were satisfactory. If not, (enter NO or N) it returns to the menu to allow modifications (with INSTRUMENT LIST). To run all tests a specified number of times, enter **ALL,n** where n is the number of repeats desired. If the number of repeats requested is unreasonable or non-numeric, one (1) is assumed.

MENU. MENU simply prints the command and test list, and prompts for a selection from it. Selections are made by entering at least the first two characters of the first name of the command or test desired. The entire name may be entered, but only the first two characters are recognized. MENU also allows tests to be automatically repeated a specified number of times. Just enter the command name, a comma, and a number indicating the number of repeats desired.

HELP. The HELP command is designed to help the user understand and use the commands listed in the left column of the menu. It does not provide help for the tests listed in the right column. HELP allows the user to select a command from the menu for further explanation. The explanatory text requested is printed on the terminal screen.

INSTRUMENT LIST. This command allows the user to inform the checkout software of the quantity and location (address) of 7912AD's to be tested. It also allows selection of a particular instrument from the list for individual testing. Note that specific tests (as opposed to ALL) are run on only one instrument at a time, as selected during this routine. Instructions are provided in the commentary for adding or deleting instruments from the list. The list is initialized whenever the checkout software program is run, reducing it to one 7912AD located at a default address of Ø,Ø (GPIB primary address Ø, secondary address Ø).

DONE. DONE causes the checkout software to halt and return control to TEK SPS BASIC. It deletes some text and variables from the program. If the software is restarted (by entering RUN) an initialization routine is automatically executed, initializing variables and resetting the instrument list (see INSTRUMENT LIST).

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CONTINUE ON FAULT. This command causes the checkout software to report any non-fatal faults detected, but directs it to continue testing. Fatal faults are those that preclude further testing, e.g. no response at a selected bus address. Non-fatal faults are those that are specific to a portion of the instrument under test. In most cases when CONTINUE ON FAULT is selected, a non-fatal fault causes FAULT to be printed on the terminal screen, the remainder of a specific test to be bypassed and the next test to be started. If a series of instruments are being tested (ALL), the test is bypassed only for the failing instrument; other instruments are fully tested. Fatal faults always abort testing and cause a return to the menu. Note that if CONTINUE ON FAULT is selected the error messages normally describing the fault are suppressed. The only indication provided is the word FAULT printed on the terminal.

Test Descriptions

Power ON. The Power On test sends out a Device Clear (DCL) and polls all connected devices to clear any pending Service Requests (SRQ's). The 7912AD is then sent the "ID?" query to verify its identity.

Next, the internal firmware power on sequence in the 7912AD is executed to simulate a user powering up the instrument. The 7912AD performs certain memory, checksum and ID tests on itself before asserting SRQ to report its power up status.

Finally, the command "TEST" is sent, which causes the 7912AD to test its RAM and constant PROMS.

Settings. The instrument is sent the "ID?" query and the response verified. The test then verifies that the 7912AD can be set to all valid operating modes. No waveforms or data are acquired, but queries are made to verify that the instrument has made the appropriate transitions.

The following command sequence is sent for each of these headers:

Headers: DT, GRAT, XYZ, TV, REM, OPC

Commands	Description
Header OFF	; Set to off
Header?	; Query status (should be off)
	;
Header ON	; Set to on
Header?	; Query status (should be on)
	;
Header OFF	; Set to off
Header?	; Query status (should be off)
	;

Next, "mode" is tested by setting Mode Dig, Mode TV, Mode Dig and querying each setting change.

The "XYZ" setting is set to DEF, SA, RAW, ATC, EDGE and OFF. Again, a query is made after each setting to verify that the 7912AD made the correct transition.

Next the Main Intensity and the Graticule Intensity are given nominal values of ten, then set to zero. The intensities are queried after each setting to verify the correct values.

The Focus is stepped from 0 to 63 in steps of 7 and returned to 0. At each step, the Focus value is queried.

Finally, the maximum rate of increase (RT) and maximum trace width (TW) parameters for the Edge command are set to 55, then to 1. Each setting is queried to verify correctness.

7A16P. The test first queries the left plug-in to verify that it is a 7A16P. Then each setting shown below is sent and then queried for correctness:

VAR	ON
VAR	OFF
POL	INV
POL	NOR
BW	FUL
BW	LIM
RIN	LOW

```
RIN      HI
INP      B
INP      A
CPL      DC
CPL      AC
CPL      GND
```

Next, the vertical scale factor (volts/division, V/D) is set to each valid setting and queried after each one.

```
V/D      .01
V/D      .02
V/D      .05
 .        .
 .        .
 .        .
V/D       5
```

Last, Position (POS) is sent to the plug-in, with the argument ranging from -10 to +10 in steps of two. The position is queried after each change to verify the correct setting.

7B90P. The right plug-in slot is sent the "ID?" query, to verify that it is a 7B90P.

The following settings are sent to the plug-in and queried for correctness.

```
MOD      PPA
MOD      NOR
MOD      SSW

CPL      AC
CPL      DC
CPL      LFR
CPL      HFR

SRC      INT
SRC      LIN
SRC      EXT
SRC      EIO

SLO      POS
SLO      NEG
```

The trigger level (LEV) is set from -6 to +6 in steps of one and then returned to zero. The level is queried after each change. The sweep rate (Time per Division, T/D) is set and queried for all valid settings from 5E-1 to 5E-10 sec/div.

The sweep magnifier (MAG) is set and queried both on and off. The Position (POS) is swept through its settings from -6 to +6 by steps of one, then returned to zero. Each change of setting is queried.

Trigger Hold-off (HOL) is set and queried from 1 to 61 in steps of five.

Finally, End of Sweep SRQ (EOS) is set and queried both on and off.

Defects. The test sends out a device clear (DCL) and then the "ID?" query. An array is generated to simulate defects and sent to the 7912AD with a "Load" command. The 7912AD is then set to Read Defects (READ DEF). The defects array returned is compared with the one sent. They should match.

The 7912AD is then placed in digital mode. Defects are digitized 100 times and read. The number of defects is then checked to verify that the target is within specification.

Graticule. The test sends out a device clear (DCL) and then the "ID?" query to the mainframe and to both plug-ins. The 7A16P is set to "CPL GND" and "POS Ø.Ø". The 7B90P is set to:

```
POS Ø.Ø
MOD PPA
CPL AC
SRC LIN
T/D 1.E-9
```

The mainframe is sent:

```
FOC 32
MODE DIG
GRAT ON
```

The Graticule Intensity "GRI" is then adjusted to provide approximately 300 vertical points when the graticule is digitized. This is not a full

graticule, but is a sufficient number of points to be sensitive to focus adjustments. The focus is then coarse-adjusted from 1 to 63 in steps of four. The "FOC" value of the best focus is saved and a fine focus is done, sweeping from best focus -4 to best focus +4 in steps of one.

With the graticule in focus, the Graticule Intensity is increased to provide approximately 600 points when the graticule is digitized.

The digitized graticule is then sent to the 7912AD using the install command. This command automatically checks the graticule for correct geometry. Finally, the graticule is turned off.

Digitize. The mainframe and both plug-ins are sent the "ID?" query. The left plug-in is sent:

CPL GND; POS 0.0.

This command sequence provides a ground trace at center screen. The right plug-in is sent:

POS 0.0; MOD PPA; CPL AC; SRC LIN; T/D 1.E-5

This centers the trace, selects AC coupling, Peak-to-Peak Auto trigger mode, and a trigger source derived from the power line.

The mainframe is sent:

MOD DIG; GRI 0; GRAT OFF; DT OFF; FOC 31; DEF OFF

This places the 7912AD in digital mode, turns off the graticule, resets the defect flags and assumes an average focus. The mainframe is then queried to determine the main intensity limit.

Using one-half the main intensity limit as a starting point, the main intensity is changed in binary increments to achieve approximately 700 vertical points from a "DIG DATA; READ VER" command.

With a good trace established, the average to center (ATC) command is sent to the 7912AD and the ATC data read back.

The trace position is then raised with a "POS 1.0" command to the left (vertical) plug-in. A second average to center (ATC) command is given and the ATC data read back. The two averaged arrays are compared to verify that the positioning command moved the waveform the appropriate amount. The single-sweep mode is then verified by sending the right plug-in:

MOD SSW; SRC INT

and sending the mainframe:

SSW ARM

The mainframe is then queried to verify that the sweep is armed. The left (vertical) plug-in is then set to "SRC LIN" (thereby triggering the sweep) and the mainframe queried to verify that the single sweep is disarmed.

Scale Factors. The mainframe and both plug-ins are sent the "ID?" query, and the following pairs of scale factors are sent to the plug-ins:

T/D	V/D
1E-3	.01
5E-4	5
2E-4	2
1E-4	1
5E-5	.5
2E-5	.2
1E-5	.1
5E-6	.05
2E-6	.02
1E-6	.01
5E-7	5
2E-7	2
1E-7	1
5E-8	.5
2E-8	.2
1E-8	.1
5E-9	.05
2E-9	.02
1E-9	.01
5E-10	5

For each pair of values sent to the plug-ins, the mainframe is queried as follows: The queries VS2?, HS2?, VU2?, HU2? are each sent and the response is verified to be "NONE", since they have not been programmed yet. The queries VU1? and HU1? are sent, and their responses verified. Lastly, the queries "HS1" and VS1" are sent and the response (scale factor) is compared with that sent out.

Using the Checkout Software

1. After loading the program and typing RUN, the checkout software allows you to choose the long or short discussion for each test. The discussion is useful, and the question should be answered **NO** to select the long dialog until you are very familiar with the program.

2. The menu comes up next. The first thing to do is fill out the instrument list using INSTRUMENT LIST. Select it from the menu by entering "IN". Enter the bus addresses as requested, and don't forget to delete the default instrument assumed to be at address 0,0 if you don't actually have one there.

3. Then select one of the instruments in the list to be tested. You won't be allowed to return to the menu until you've selected one, even if you intend to select ALL from the menu (ALL tests every instrument in the list regardless of which is selected for test). When you're happy with the list, answer the appropriate question to return to the menu.

4. This is the time to select CONTINUE ON FAULT if you want it. Normally, this option is not used unless troubleshooting is being done.

5. Select your test. ALL is commonly selected, but any specific test may be chosen. Remember that ALL checks all instruments; specific tests check only the instrument selected for test with INSTRUMENT LIST.

If you would like to use ALL to check only one instrument (more convenient than entering each test name in sequence), just make that instrument the only one in the INSTRUMENT LIST. Instruments not listed there are completely ignored. To automatically repeat a test (or ALL tests), enter the test name, a comma, and the number of repeats desired (e.g. ALL,5).

6. If you have trouble with a command, select HELP from the Menu. HELP gives you complete instructions about any command you select. HELP only works on commands, it doesn't help on tests.

7. When you finish, select DONE from the menu. Congratulations.

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DESCRIPTION

TEXT CORRECTIONS

Page 4   (bottom of the page)

ADD: After OLD DX1: "AD7912.ROM"

           OR OLD DY1: "AD7912.ROM"

Page 5

ADD: After DX1:   ENTER 1?1

           Does your CONTROLLER HAVE CACHE MEMORY? (YorN)

Page 6   Discussion paragraph

CHANGE: Line 3 to read:

           in drive Ø, and the checkout software diskette must be in drive 1.

           For any other . . .

DESCRIPTION

TEXT CORRECTIONS

Page 4   (bottom of the page)

ADD: After OLD DX1: "AD7912.ROM"

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Page 6   Discussion paragraph

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            in drive Ø, and the checkout software diskette must be in drive 1.

            For any other . . .

CHANGE	DESCRIPTION

MANUAL CHANGE INFORMATION

REV B, OCT 1980

page 5 --   second line, first paragraph

    Change "(usually DKØ)" to read: "(usually DKØ or DLØ)"

page 5 --   following "VØ2-XX DATE" and before
       "ENTER THE INTERFACE NUMBER (Ø-3)? **Ø**
       Add the following:

- - - - - - - -

   OR

    ENTER WHICH DISK YOUR 7912AD CHECKOUT SOFTWARE IS ON
    FOR EXAMPLE -- DX1, DKØ, ETC.
    ?DLØ

    **** 7912AD DIAGNOSTICS ********
    VØ2-Ø5   2-OCT-80

- - - - - - - -

page 6 --   Replace first paragraph under **Discussion**
       with the following:

    The first question asks which disk your checkout software is on. If
your system is a floppy disk (RXØ1) system, the system software must be
in DXØ, and the checkout software diskette must be in DX1. For any other
type of system, the checkout software files must be on the system disk.
In any case, all files with a .SPS extension on the checkout media must
have been copied to the system media. The checkout software wil not run
properly unless these conditions are met.

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