ADVANTEST
ADVANTEST CORPORATION

INSTRUCTION
MANUAL
TR41901A/B
Digital Memory

MANUAL NUMBER 41901 0EA 512

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1. INTRODUCTION

1.1 GENERAL

The TR41901A/B digital memories, combined with the TR4110/4110M (for TR41901A) or TR4132/TR4231N (for TR41901B) spectrum analyzers, can store spectra on the CRT display into memory as digital information and display them on the stable screen through the high speed D/A conversion.

1.2 SPECIFICATION

Memory Capacity
For one screen: X axis 9 bits (512 points)
Y axis 10 bits (1024 points)
(* 100 points/DIV)
The memory capacity for two screens is supported.

Write time
20 ms or more (in terms of sweep time for the main unit)

Display time
Approximately 8.2 ms/1 screen

X.Y sampling error
2.5% or less

Functions

A WRITE   : Writes and displays screenful (page) data.

A VIEW/B WRITE: Disables writing on the A screen and displays the
memory contents.
Writes and displays on the B screen.

A-B   : Subtracts B from A.

NORMALIZE   : Normalizes errors.

MAX HOLD   : Displays the maximum value of X-axis points whenever
repeatedly scanned.

PLOT   : Plots the data on the screen on TR9831 or 7470A (HP).

Operating environment
$0^{\circ}C$ to $+40^{\circ}C$

Power source
AC 100 V ±10% 55 VA or less

Dimensions
TR41901A: Approximately 295(W) x 87(H) x 430(D) mm
TR41901B: Approximately 288(W) x 70.5(H) x 385(D) mm

Weight
TR41901A: 6.3 kg or less
TR41901B: 4.5 kg or less

1.3 ACCESSORIES

TR41901A
    Connection cable: TR41901A-TR4110/M connection cable (A 01220)   1
    Fuse   : Slow-blow fuse 0.5 A   2
    Power cable   : MP-43   1

TR41901B
    Fuse   : Slow-blow fuse 0.5 A   2
    Power cable   : MP-43   1

2. OPERATING GUIDANCE

2.1 PANELS

[Front panel]

① Power switch
Switch for supplying AC power to the entire unit.
Setting the power switch to ON supplies AC power to set the display
mode to A WRITE, and initializes MAG AMP to 10 dB/DIV and VIDEO FILTER
to OFF.

② Memory ON/OFF switch
Switch for setting the digital memory function to ON/OFF.
At power-on, setting this switch to ON activates the digital memory
function.
Setting this to OFF makes the spectrum analyzer display spectra in
normal real time.

③ MAG AMP selection switch
Switch for selecting the Y-axis sensitivity. The selection is made in
the following order:

10 dB/Div → 5 dB/Div → 2 dB/Div → 1 dB/Div

NOTE: The display sensitivity value of the TR41901 is identical to
      that when setting the spectrum analyzer sensitivity to 10 dB/Div.

④ MAG AMP display LED
LED for displaying the sensitivity of the Y-axis selected.

⑤ VIDEO FILTER selection switch
Switch for selecting the frequency band area of a video filter. The
selection is made repeatedly in the following order:

OFF → 10 kHz → 1 kHz → 100 Hz

⑥ VIDEO FILTER band area display
Displays the band area on the video filter selected.

⑦ A WRITE
Rewrites and displays data on the A screen.

⑧ A VIEW
B WRITE
Disables writing data on the A screen and only displays the data of A.
Rewrites and displays data on the B screen. Commands A and B display
2-page data on the CRT. (Useful for a relative measurement)

⑨ A-B
Subtracts B from A and displays the result.

(10) PLOT

Outputs the data on the CRT screen on ADVANTEST digital plotters
TR9831 or HP 7470A.
The type of plotter can be selected by using the GPIB address switch
on the left end of the TR41901 rear panel. (0: TR9831 1: 7470A)

(11) MAX

Compares the data in memory with the input data, and replaces the
larger amount of data with the current data.

(12) SHIFT

SHIFT expands the functions of the switches described in 7 and 10 .
Press the DISP LINE switch following the SHIFT switch.
This displays lines (DISP LINE) on the CRT.
Pressing the DISP LINE switch changes display lines by one division in
the scale (div).
If the switch is not pressed, the display lines move by ten scales.
TR4110/M displays data from the second scale to the ninth on the
screen.
TR4132/N displays data from the first scale to the eighth on the
screen.
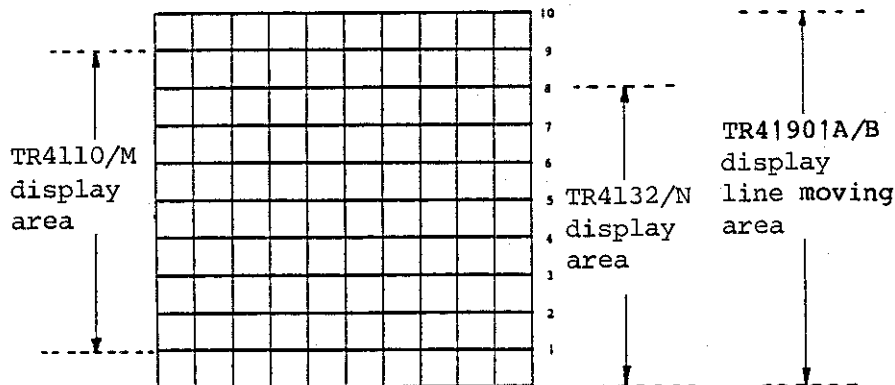
Select the A WRITE mode when using SHIFT.
Press the NORMALIZE switch subsequent to the SHIFT switch. This
normalizes the frequency characteristic with respect to the reference
value (display line). Press the NORMALIZE switch following the SHIFT
and DISP LINE switches. This normalizes the frequency characteristic
with respect to the current display line.

NOTE: ● When no display line is displayed, if the NORMALIZE operation
is executed without specifying a display line, then the
frequency characteristic is normalized with respect to the
seventh line (for TR41901A) or the eighth line (TR41901B).
● When shifting from the NORMALIZE operation to the another one,
press the SHIFT switch, then press the next switch.
● When plotting the normalized data, press the PLOT switch
following the SHIFT one.

⑬ LOCAL
LOCAL terminates the external control operation to enable the
operation through the switches on the panel.

[Rear panel]

⑭ Fuse holder
Contains two 0.5 A slow-blow fuses.
To replace the fuse, turn its cap in the direction of the arrow and
remove.
⑮ Power cable connector
Connector for the accessory power cable connection.
⑯ GND terminal
Terminal for grounding. To use a power cable with a 2-pin adaptor,
ground the line of the adaptor or the GND terminal.
⑰ Address switch
Switch for selecting the TR41901 address on GP-IB instrumentation and
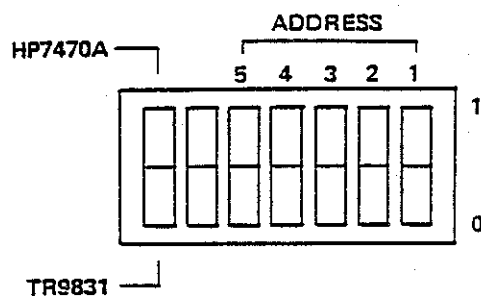the plotter type, and for switching the header.

Figure 2-1 Address Switch

⑱ GP-IB connector
Connect a bus cable to the GP-IB connector on GP-IB instrumentation.
⑲ TR4110/M connector (Only for TR41901A)
Connector for connecting spectrum analyzer TR4110/M to TR41901 using
accessory connection cable A01220.

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㉓ Counter connector (Only for TR41901A)
Connector for connecting an external counter using optional connection
cable A01221 (available for 14 to 50 pins). The counter connector is
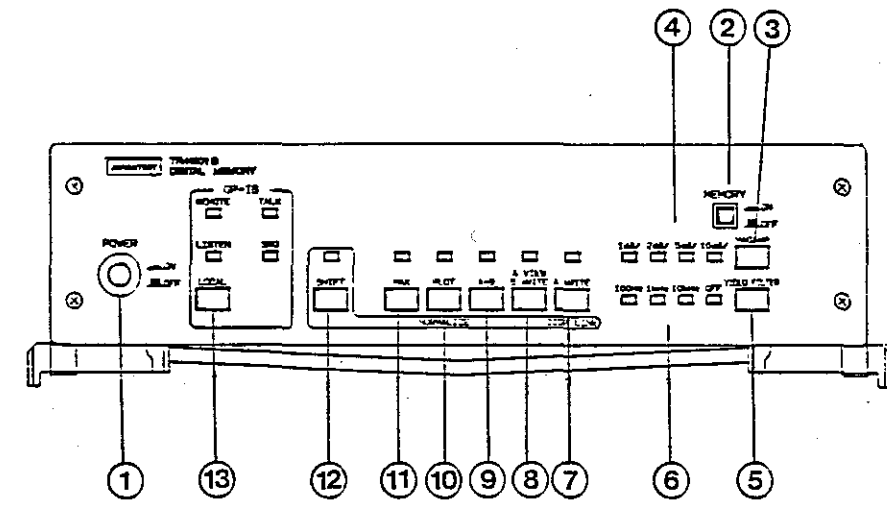used to measure the central frequency, marker frequency, etc. of the
displayed spectra.

Fig. 2 - 2 Front Panel
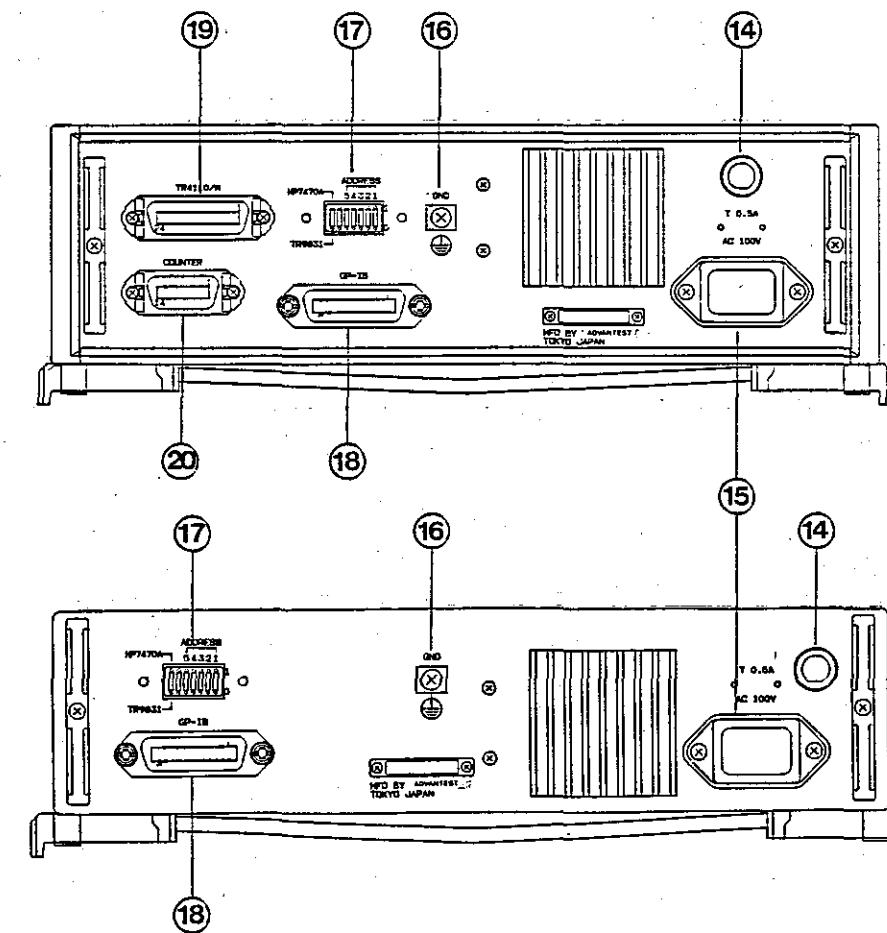
TR41901A

TR41901B

Fig. 2 - 3 Rear Panel

2.2 CONNECTING TR41901A TO SPECTRUM ANALYZER

Figure 2-4 shows the connection of TR41901A to the TR4110/M using the A01220.

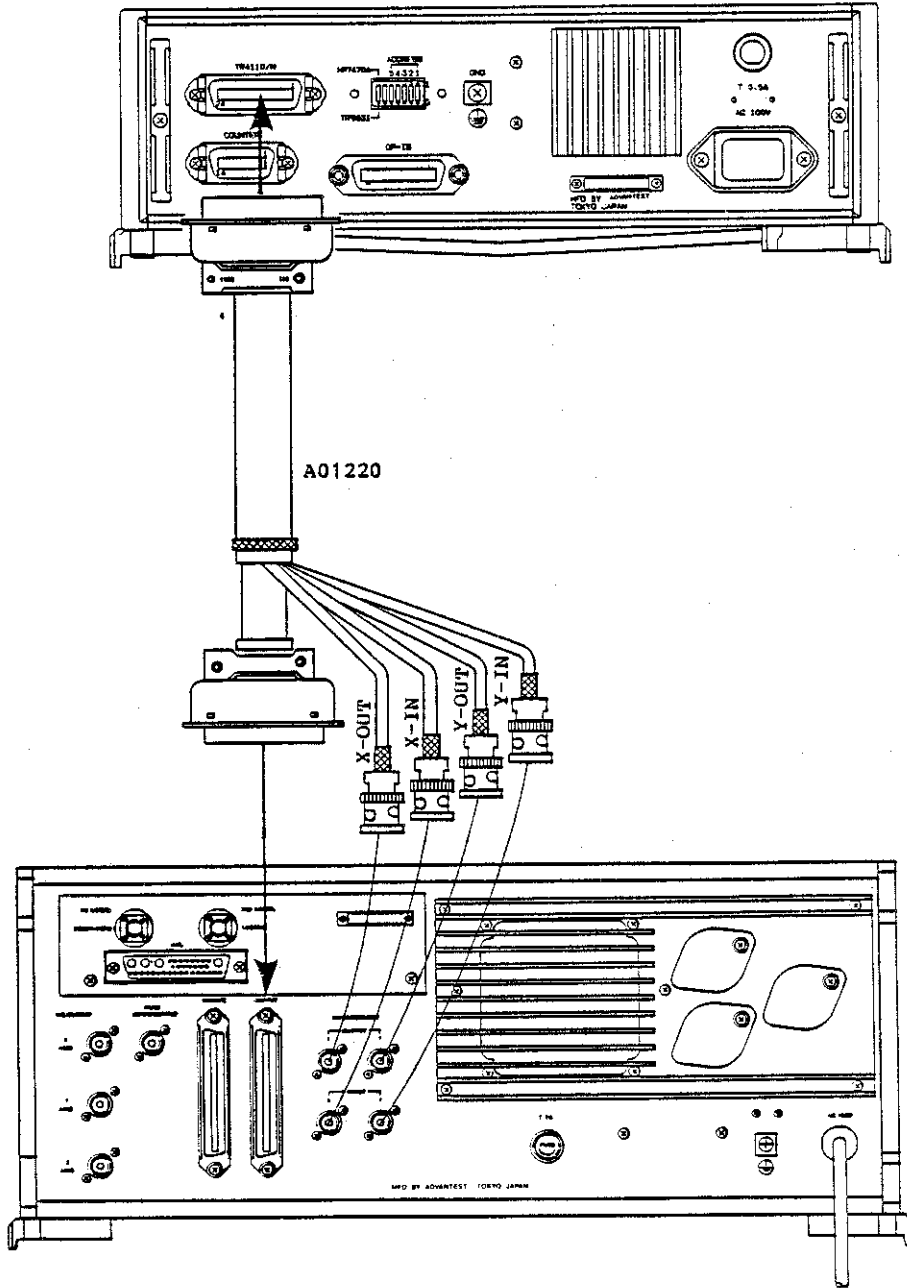Figure 2-4 Connecting TR41901A to TR4110/M
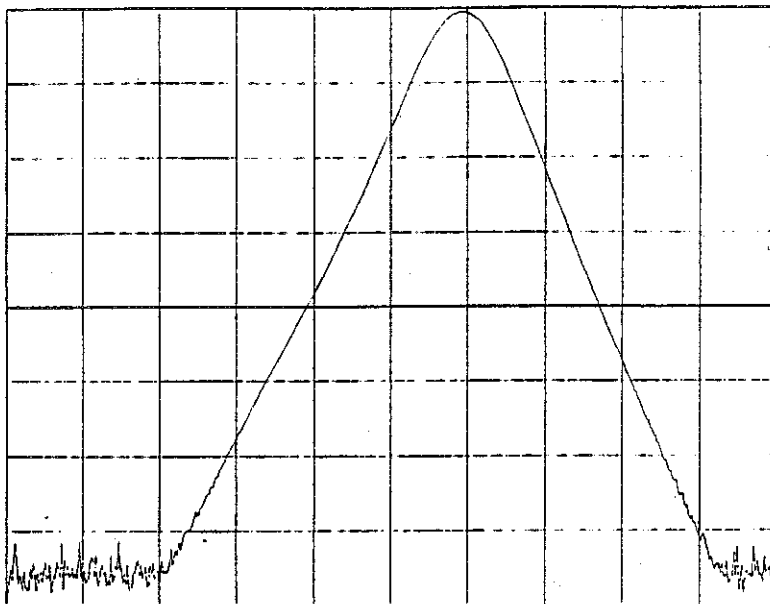
Figure 2-5 A WRITE Mode Plot Example
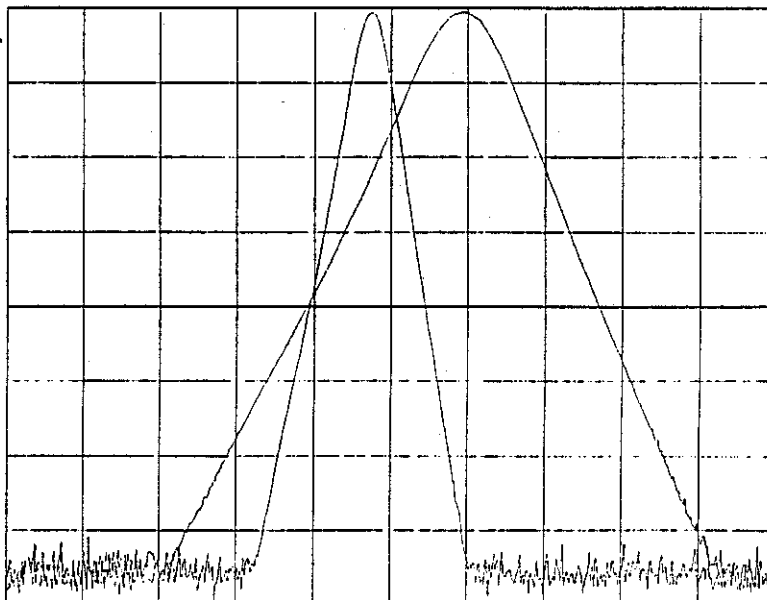
Figure 2-6 A VIEW, B WRITE Mode Plot Example

3. CALIBRATION

3.1 CALIBRATING PROCEDURE

After checking if the TR41901 is connected to the spectrum analyzer, operate using the following procedure:

(1) Set the video filter to OFF; and dB/DIV to 10 dB/DIV on the spectrum analyzer

(2) Set the digital memory ON/OFF switch to ON.

(3) Press the SHIFT and MAX switches.
This displays the pattern on the CRT as shown in Figure 3-1. Adjust each control on the right panel of TR41901 (see Figure 3-2) so that exterior lines of the pattern are matched with the exterior scales of the CRT inside screen.
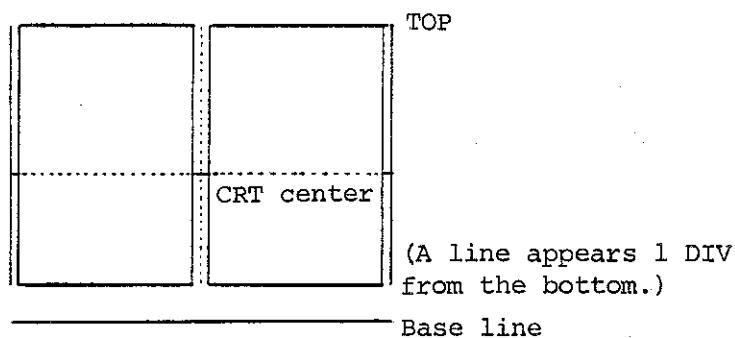
Figure 3-1 Calibration Screen
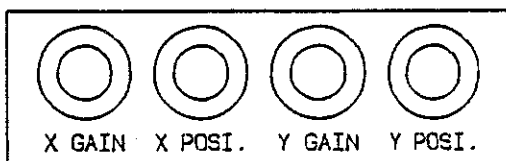
X GAIN: Adjusts horizontal pattern frame width.
Y GAIN: Adjusts vertical pattern frame width.
X POSI: Adjusts length from the CRT left end to the frame left end.
Y POSI: Adjusts length from the CRT top to the frame top.

Figure 3-2 Adjustment Control Location

(4) Cancelling calibration mode
    When cancelling the calibration mode, press the MAX switch. This changes
    the calibration mode to the SHIFT mode.

(5) Cancelling SHIFT mode
    When cancelling the SHIFT mode, press the SHIFT switch.

4. GP-IB INTERFACE

4.1 GP-IB INDICATOR
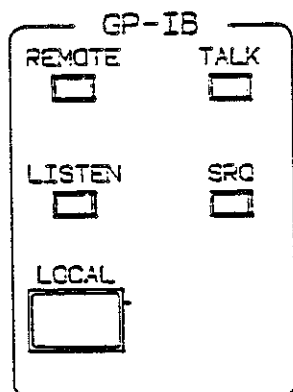
REMOTE: Lights when the TR41901 is in the remote control mode.

LISTEN: Lights when the TR41901 is in the listener mode.

TALK : Lights when the TR41901 is in the talker mode.

SRQ   : Lights when the TR41901 is in the SO mode, or when the
         information to be transmit from the TR41901 to a controller is
         issued. SRQ goes off when a controller issues a serial polling
         command to the TR41901.

4.2 GP-IB COMMANDS

Command	Operation

AWR: Set the TR41901 to the A WRITE mode.

BWR: Set the TR41901 to the A VIEW/B WRITE mode.

AMB: Sets the TR41901 to the A-B mode.

NRM: Normalizes a frequency band characteristic with respect to the
display line. The display line is specified by using the
subsequent four digits in the following format:
NRM □□□□(□□□□ must be numbers from 0 to 1000.)
NRM is valid when the TR41901 is in the A WRITE mode.

Spectrum analyzer TR4132 TR4110
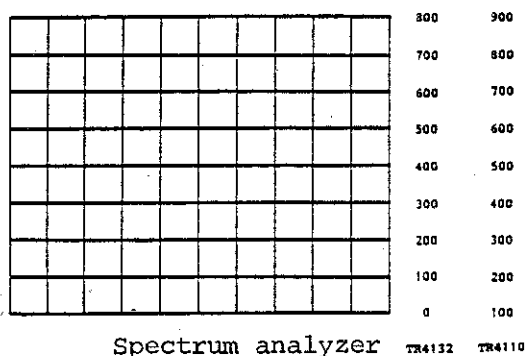
NOTE: The spectrum analyzer converts the data on the CRT to that
shown in the above figure. To change a display line, reset
the current mode to the A WRITE mode.

MAX: Executes the MAX HOLD operation in the A WRITE or A VIEW/B WRITE
mode.

WRT: Displays a marker at the point (X axis). The point is specified by
using the subsequent three digits in the following format:
WRT □□□ (□□□ represents a point on the horizontal line, and
must be numbers from 0 to 511.)

ERA: Deletes markers.

MAG: MAG ☐ specifies the MAG AMP sensitivity.
       MAG 0 10 dB/DIV
       MAG 1   5 dB/DIV
       MAG 2   3 dB/DIV
       MAG 3   1 dB/DIV
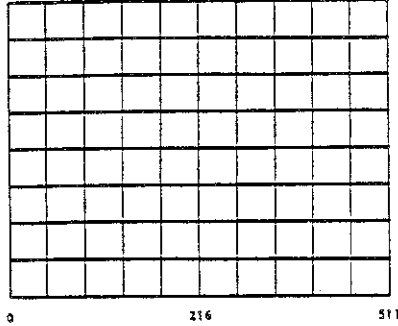
FLT: FLT ☐ specifies the VIDEO FILTER sensitivity.
       FLT 0 OFF
       FLT 1 10 kHz
       FLT 2   1 kHz
       FLT 3 100 Hz

D :   D☐ reads the data on the display.
          D0 reads the data accompanied with a comment (read statement)
          The following shows D0 operation example.

```
10    DIM A$(3000)
20    OUTPUT 702:"D0"
30    ENTER 702:A$
40    PRINT A$
50    END
```

```
A-WRITE DATA: 0145.0139.0107.0127.0137.0103.0108.0125.0139.0097.0093.0128.0103.0
091.0129.0122.0131.0105.0087.0086.0109.0126.0097.0089.0097.0124.0106.0138.0094.0
109.0119.0103.0145.0109.0104.0142.0136.0090.0100.0124.0100.0115.0124.0131.0117.0
119.0137.009       112.0123.0100.0105.0120.0089.0121.0095.0
115.00              01.0114.0099.0110.0143.0085.0
0                   05.0091.0110.0103.0
    116.0088.0092.0125.0130.0110.0
137.0089.0095.0109.0086.0105.0155.0096.0098.0
095.0089.0107.0109.0123.0105.0126.0103.0126.0114.0105.0093.0
083.0100.0116.0103.0119.0122.0111.0102.0100.0109.0094.0100.0105.0118.0
115.0104.0123.0097.0096.0129.0124.0126.0112.0097.0104.0106.0115.0101.0132.0119.0
123.0100.0124.0088.0092.0117.0123.0110.0143.0090.0135.0086.0092.0094.0135.0099.0
089.0099.0101.0148.0093.0135.0106.0111.0091.0106.0122.0110.0109.0092.0096.0119.0
085.0096.0097.0123.0114.0119.0107.0103.0135.0115.0085.0145.0113.0110.0106.0097.0
091.0108.0131.0116.0095.0091.0108.0120.0097.0092.0108.0097.0089.0090.0102.0114.0
108.0099.0091.0127.0112.0126.0118.0081.0092.0095.0091.0112.0098.0079.0102.0079.0
096.0114.0087.0106.0101.0127.0085.0099.0140.0106.0115.0124.0108.0106.0129.0107.0
110.0111.0123.:DATA END :
```
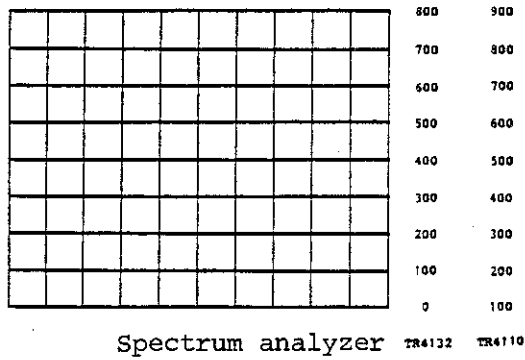
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D1 reads only data.
The following shows D1 operation example.

```
10    DIM A$(3000)
20    OUTPUT 702:"D1"
30    ENTER 702:A$
40    PRINT A$
50    END
```

```
0108,0117,0098,0091,0114,0114,0096,0119,0109,0115,0139,0112,0108,0091,0103,0105,
0111,0092,0106,0103,0121,0093,0039,0103,0113,0105,0117,0114,0120,0136,0106,0101,
0110,0107,0109,0137,0103,0129,0112,0115,0119,0117,0096,0147,0122,0132,0100,0126,
0149,0127,0098,0123,0111,0129,0118,0092,0097,0105,0095,0117,0109,0088,0094,0138,
0109,0113,0115,0164,0122,0145,0089,0127,0110,0118,0111,0145,0108,0118,0113,0097,
0100,0088,0113,0122,0102,0105,0109,0113,0106,0119,0084,0091,0123,0102,0108,0093,
0117,0104,0135,0100,0131,0095,0129,0114,0112,0122,0099,0110,0103,0150,0144,0104,
0105,0103,0089,0100,0111,0110,0114,0096,0123,0121,0130,0099,0119,0106,0099,0113,
0119,0108,0092,0103,0121,0110,0125,0127,0126,0135,0164,0154,0164,0172,0185,0196,
0202,0214,0227,0235,0244,0255,0267,0278,0289,0301,0307,0318,0329,0337,0348,0357,
0367,0377,0387,0398,0406,0416,0426,0435,0442,0454,0463,0474,0492,0494,0505,0513,
0522,0533,0541,0553,0567,0575,0587,0599,0610,0622,0631,0641,0655,0662,0676,0686,
0698,0714,0722,0735,0746,0757,0771,0781,0795,0806,0817,0827,0836,0844,0851,0859,
0865,0870,0873,0876 ....      0875,0873,0866,0861,0854,0847,0837,0826,0815,
0805,0788 ....                      0686,0672,0657,0646,0632,0619,0606,
0592 ....                                  0451,0442,0427,0417,0404,
03..                                        0241,0227,0233,
```

The following figure shows the correspondence between data and display.

Spectrum analyzer TR4132 TR4110

R :   R☐ reads the data at a marker point.
        R0 reads data accompanied with a comment.
        The following shows an R0 operation example.

        10   DIM AS[50]
        20   OUTPUT 702;"R0"
        30   ENTER 702;AS
        40   PRINT AS
        50   END

MARKER ADDRESS:0256,MARKER DATA:0870.:DATA END :

        R1 reads only data.

        10   DIM AS[50]
        20   OUTPUT 702:"R1"
        30   ENTER 702:AS
        40   PRINT AS
        50   END

        0827,

        The following illustration shows a sample program to read data
        using the markers at addresses from 240 to 260 on the X axis:

[R1 mode]

```
10     DIM AS[50]
20     FOR N=240 TO 260
30     OUTPUT 702 USING "6A.DDDD":"WRT ".N
40     OUTPUT 702:"R1"
50     ENTER 702:AS
60     PRINT AS
70     NEXT N
80     END
```

```
0873.
0872.
0871.
0869.
0864.
0858.
0850.
0844.
0835.
0824.
0815.
0803.
0787.
0774.
0762.
0748.
0739.
0728.
0713.
0703.
0688.
```

[R0 mode]

```
10     DIM AS[50]
20     FOR N=240 TO 260
30     OUTPUT 702 USING "6A.DDDD":"WRT ".N
40     OUTPUT 702:"R0"
50     ENTER 702:AS
60     PRINT AS
70     NEXT N
80     END
```

```
MARKER ADDRESS:0240.MARKER DATA:0873.:DATA END :
MARKER ADDRESS:0241.MARKER DATA:0872.:DATA END :
MARKER ADDRESS:0242.MARKER DATA:0871.:DATA END :
MARKER ADDRESS:0243.MARKER DATA:0869.:DATA END :
MARKER ADDRESS:0244.MARKER DATA:0864.:DATA END :
MARKER ADDRESS:0245.MARKER DATA:0858.:DATA END :
MARKER ADDRESS:0246.MARKER DATA:0850.:DATA END :
MARKER ADDRESS:0247.MARKER DATA:0844.:DATA END :
MARKER ADDRESS:0248.MARKER DATA:0835.:DATA END :
MARKER ADDRESS:0249.MARKER DATA:0824.:DATA END :
MARKER ADDRESS:0250.MARKER DATA:0815.:DATA END :
MARKER ADDRESS:0251.MARKER DATA:0803.:DATA END :
MARKER ADDRESS:0252.MARKER DATA:0787.:DATA END :
MARKER ADDRESS:0253.MARKER DATA:0774.:DATA END :
MARKER ADDRESS:0254.MARKER DATA:0762.:DATA END :
MARKER ADDRESS:0255.MARKER DATA:0748.:DATA END :
MARKER ADDRESS:0256.MARKER DATA:0739.:DATA END :
MARKER ADDRESS:0257.MARKER DATA:0728.:DATA END :
MARKER ADDRESS:0258.MARKER DATA:0713.:DATA END :
MARKER ADDRESS:0259.MARKER DATA:0703.:DATA END :
MARKER ADDRESS:0260.MARKER DATA:0688.:DATA END :
```

Enter measurement conditions (center frequency, frequency span and
reference level) through the GP-IB. This plots the measurement
conditions, and also the marker frequency level, if any.

Measurement condition commands

CF : Inputs the center frequency to the TR41901.
      For 123, 456, 789, 123 Hz, enter as follows:

        CF123G456M789K123H

      To enter 1026 MHz, K and H can be omitted:

        CF1G26M

      To enter 10, 000, 234 Hz, M can be omitted:

        CF10M234H

SP : Inputs a frequency span to the TR41091. Entering the data is the
      same as for CF. Enter the value of DISP/DIV as it is. This
      displays the frequency span value from the left end to the right end.

RL : Inputs a reference level to the TR41901.
      The value of a reference level must be up to ±999.9 dBm.

A WRITE

CF   50000000.0Hz
SP   2000000.0Hz
MF   51718750.0Hz.
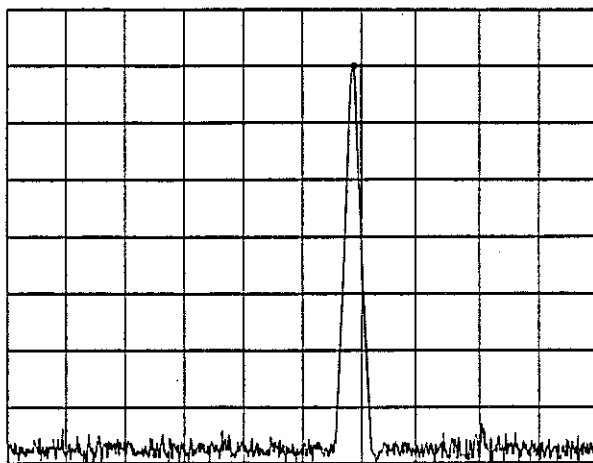
MAG 10dB/div
RL   -10.0dB
ML   -19.9dBm.

LRD: Outputs a marker level to a controller. The output format is as
     follows:

   ML␣␣-10.0 dB<CR><LF+EOI>

   For a marker level of 0 or one without a negative sign, LRD outputs
   spaces until 0 or the most significant digit preceding the decimal
   point as follows:

   ML␣␣␣0.0 dBm (for 0)

FRD: Outputs a frequency at a marker point to a controller.
     The output format is as follows:

   MF␣␣␣1000000000. Hz <DR><LF+EOI>

LIST OF FIGURES

LIST OF TABLES

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LIST OF EXAMPLES

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(No example numbers are assigned in this manual.)

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    (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;

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5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**

6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**

7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

8. **OTHER THAN THE REMEDY FOR THE BREACH OF WARRANTY SET FORTH HEREIN, ADVANTEST SHALL NOT BE LIABLE FOR, AND HEREBY DISCLAIMS TO THE FULLEST EXTENT PERMITTED BY LAW ANY LIABILITY FOR, DAMAGES FOR PRODUCT FAILURE OR DEFECT, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLEGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

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ADVANTEST.