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Section 1
GENERAL DESCRIPTION

1-1. Outline of the Tracking Scope

The TR 4110/ TR 4110M Tracking Scope Mainframe and the TR 4114/4114T/ 4114H/4114HT RF Section constitute a tracking scope capable of measuring radio frequencies within the range from 50 Hz to 120 MHz with 10 Hz resolution. The input sensitivity is -135 dBm.

The TR 4110/ TR 4110M tracking scope mainframe is composed of an IF section and a CRT display section. The CRT display screen has dynamic range of 80 dB. The LED displays located on the left of the screen anounce the reference level and the setting values of the DISPERSION/DIV. and BAND WIDTH switches on the RF section, to facilitate reading of the measuring conditions.

The TR 4114 series plug-in unit is an RF section to be inserted into the TR 4110/ TR 4110M mainframe. A tracking generator is incorporated in the TR 4114T/ TR 4114HT to permit visual checking of frequency response characteristics. The input impedance of the TR 4114/ TR 4114T is 50 Ω, an that of the TR 4114H/ TR 4114HT is 1 MΩ, 20 pF. The TR 4114 series plug in unit is provided with an automatic band width setting feature that automatically sets the scan time and band width at the optimum values when the DISPERSION/DIV. switch is set at optional position. Thus complex operations are eliminated and prompt measurement is possible. The TR 4114 series plug in unit allows a wide range of purity, spurious and noise measurements since the spectrum purity of the plug in unit itself is excellent.

The TR 4110M is identical to the TR 4110 in basic design, but differs in having a storage tube for the CRT display. The storage tube is of halftone type.

Section 2
SPECIFICATIONS

2-1. TR-4114/4114T/4114H/4114HT Specifications

Frequency response characteristics

Frequency measuring range:
50 Hz to 120 MHz

Scan width:

PER DIVISION	From 50 Hz/div. to 20 MHz/div. in a 1, 2, 5 sequence (DISPERSION/ DIV. switch.)
FULL	0 to 120 MHz
ZERO	The X axis on the CRT screen assumes the time axis.

Selection of PER DIV, FULL, or ZERO mode with the SWEEP MODE switch; continuously variable by more than ±50 kHz or ±500 Hz with the FINE TUNE control.

Frequency accuracy

Center frequency accuracy:
The LED indicates the display center frequency within 1 MHz;
Within 100 kHz with use of the incorporated COMB generator;
Within 10 Hz when a frequency counter is connected to the TR-4114T/ TR-4114HT plug-in units.

Scan width accuracy:
Within ±5%

Resolution

Band width:
10 Hz to 300 kHz in a 1, 3 sequence by the BAND WIDTH switch.

Band width accuracy:
±25% (for 3 dB down point)

Band width selectivity:
60dB/3dB IF band width ratio 1:15 (10 Hz to 300 kHz)
Approx. 60 dB, 50 Hz or more away from carrier signal with 10 Hz band width.

Stability

Frequency stability (one hour after power on):
After stabilization:
3 Hz p-p/0.1 sec, 50 Hz/min
Before stabilization:
1 kHz p-p/0.1 sec, 5 kHz/min

Noise sideband (at ±23°C ±10°C):
Average noise level when the VIDEO FILTER switch is set at 10 Hz. (See Table above.)

Amplitude accuracy

Frequency response:
1.5 dB p-p (50 Hz to 120 MHz)

Switching between band width accuracy:
±1 dB (10 Hz to 300 kHz) (at 23°C ±10°C)

Scale selection:
Switching between logarithmic and linear scales.

LOG. scale:
10 dB/division, 5 dB/division, 2 dB/division, 1 dB/division set on the dB/DIV. switch.

LOG display accuracy:
±0.5 dB or less/ 10 dB
±1.5 dB or less/ 70 dB

STABILIZER	Band width	Difference from Center freq.	Noise level
OFF	1 kHz	50 kHz	-95 dB below
OFF	1 kHz	20 kHz	-90 dB below
OFF	300 kHz	10 kHz	-85 dB below
ON	100 kHz	5 kHz	-85 dB below
ON	100 kHz	2 kHz	-84 dB below

Dynamic range
Gain compression:
1 dB or less for -10 dBm input.
Spurious response:
-80 dB below for -40 dBm input (for 15 MHz or higher frequency); -70 dB below for -40 dBm input (for frequency lower than 15 MHz).
Residual response:
-100 dBm (for no input, input attenuation below is 0 dB)

Calibration output
Level:
-20 dBm ±0.5 dB
Frequency:
10 MHz ±1 KHz, 1 MHz COMB signal included.
Connector:
BNC type

Input characteristics
Minimum average noise level:
-135 dBm or less
Maximum input level:

TR 4114/T	TR 4114H/HT
+20 dBm DC ±10 V	5 Vrms. (RF ATT. 0dB) 30 Vrms (RF ATT. 20 dB or more) ±100 V DC

Input impedance:
TR 4114/4114T ... Approx. 50 Ω (VSWR 1.3 or less for RF ATT. setting at 10 dB)
TR 4114H/4114HT ... 1 MΩ, approx. 20 pF
Input attenuator:
TR 4114/4114T ... 0dB to 40 dB in a 10 dB sequence
TR 4114H/4114HT ... 0 dB to 50 dB in a 10 dB sequence
Error within ±0.5 dB in both of above types of attenuator
Connector:
BNC type

Tracking generator section (for TR 4114T/4114HT only)
Frequency characteristics:
30 kHz to 120 MHz
1 dB p-p (with the ALC. set at ON)
50 Hz to 30 kHz
1 dB p-p (with the ALC. set at OFF)
Output level:
Less than -40 dBm to +10 dBm
Output attenuator:
0 dB to -40 dB in a 10 dB sequence and OFF; continuously variable from 0 dB to 10 dB or more.
Output impedance:
Approx. 50 Ω
Stability:
Same as the spectrum analyzer section
ALC (Automatic Level Control):
Response for 30 kHz or higher frequency
TG mode:
TUNED AMP ... Selects and amplifies signals of -70 dB or more and S/N ratio 10 dB or more, then generates the signal.
NOR. (Normal) ... Output of the signal synchronized with the frequency axis on the CRT screen

General specifications
Ambient temperature (for operation):
0°C to +40°C
Power consumption:
Approx. 20W
Weight:
Approx. 7 kg
Dimensions:
Approx. 181.5(W) x 117.5(H) x 469 (D) (mm)

2-2. TR 4110/TR 4110M Specifications

Amplitude characteristics
Reference level indication:
-60 dBm to +40 dBm in a 10 dBm sequence; indication in dB μ is optional
IF gain:
0 dB to 60 dB in a 10 dB sequence;
0 dB to 12 dB in a 1 dB sequence;
continuously variable by more than ±1.5 dB by means of the VARI. control.
Reference level indication accuracy:
±0.5 dB
Display level accuracy:
±0.5 dB/10 dB, ±1.5 dB/70 dB

Level stability:
0.1 dB/°C (for IF band width of 300 kHz)
Warning indication:
LED indicator
Video filter:
Selectable from 10 Hz, 100 Hz, 10 kHz and OFF.

Scan characteristics

Scan mode:
Selectable from the SINGLE, EXT., INT., and MANUAL modes.
Scan trigger:
Selectable from the AUTO, LINE, EXT., and VIDEO modes, only when the SCAN MODE switch is set at INT.

Scan time characteristics

Scan time;
20 μs/division to 10 sec/division; in a 1, 2, 5 sequence.
Scan time accuracy:
±15%
Scanning indication:
LED indicator

Output characteristics

X axis output:

Output impedance	Approx. 1 kΩ
Output level	±5 V

Y axis output:

Output impedance	Approx. 5 kΩ
Output level	3 V p-p for full scale

Z axis output:

Output level	TTL level blanking at low level

CRT characteristics

Dynamic range:
80 dB
CRT:
TR-4110
Post deflection acceleration type tube.
P7 persistence
400 ms
Screen space
10 cm x 8 cm (10 divisions x 8 divisions)
TR-4110M
Half-tone type storage tube, acceleration voltage 7.5 kV, P31 phosphor; screen space 9.5 cm x 7.6 cm (10 division x 8 divisions)

General specifications

Ambient temperature (for operation):
0°C to 40°C
Power supply:
100 VAC ±10%, 50/60 Hz; approx. 140 VA (TR-4114 series included); selectable from 115, 200 and 230 VAC by tap changing.
Dimensions:
Approx. 425(W) x 175(H) x 472(D) (mm)
Weight:
Approx. 20 kg
In addition to the above features, the TR-4110M is operable in any of the following four display modes:

NORMAL:
Use as a non-storage tube
PERSISTENCE:
Variable range MIN ... 500 ms
MAX ... 15 sec
Hold ..... 120 sec
STORE:
MIN ..... 1 min
MAX ..... 1 hour
ERASE:
Available in the PERSISTENCE mode; approx. 1 sec
Warm-up time;
Approx. 1 min.

2-3. TR 4114 Series Accessories

	TR 4114	TR 4114T	TR 4114H	TR 4114HT
Input cable (MI-02)	1	2	1	2
Slow blow fuse (See note)	2	2	2	2
Hexagonal wrench (3 mm, 4 mm)	1 each	1 each	1 each	1 each
TR 1622 50 Ω terminator	0	0	1	1
Instruction manual (for TR 4110 series tracking scope)	1	1	1	1

Note: Fuse value
AC 100 V, AC 115 V ... 2A slow-blow (EAWK-2A)
AC 200 V, AC 230 V ... 1A slow-blow (EAWK-1A)

Section 3
OPERATING PROCEDURE

3-1. Inspection

The TR-4110/4110M mainframe and TR-4114 series plug-in unit are separately packed. On receiving the mainframe and plug-in unit, unpack and inspect them for damage during shipment and loosening of controls and other fittings.

If damage is found or any plug-in unit or mainframe does not operate in conformity with the specifications, contact an agency or the Takeda Riken Industry.

3-2. Preparations and Precautions before Use

(1) Power voltage
The standard AC power voltage required for the instrument is 200 VAC ±10%. The power voltage is set at the specified voltage before the shipment. The power voltage to be supplied is designated under the power connector on the rear panel. No other power voltage can be used.

(2) Power cable
The power cable connected to the mainframe consists of an MP-20 cable and an adapter (KPR-13 (black)).

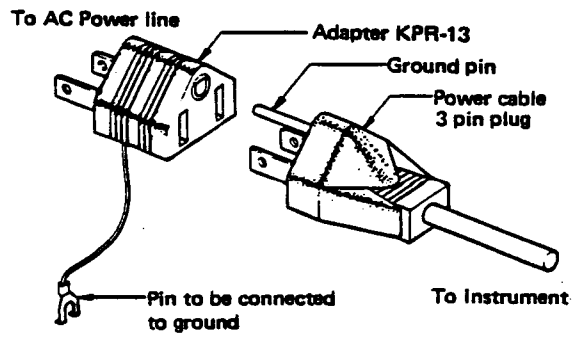

Fig. 3-1 Power cable

The plug attached to the power cable has three pins. The round pin in the upper center is for ground connection.
When using an adapter to connect the cable to the AC outlet, connect the external ground to the ground lead of the adapter or the ground terminal provided on the rear panel of the TR-4110/4110M mainframe.

(3) Confirm that the POWER switch is set to OFF before connecting the power cable.

(4) Protect the instrument against excessive impacts since the TR-4114 series RF section and the TR-4110/4110M mainframe are interconnected via a connector and the TR-4110/ 4110M mainframe houses a CRT.

(5) Locate the instrument so as to facilitate ventilation since the instrument draws in air through the slit on its side and blows it out via the fan provided on the rear panel for cooling.

(6) Warm-up time
The instrument starts operation approximately 10 sec. after the POWER switch is turned on. However, it takes approximately one hour of warm-up to ensure stable operation of the complete circuit.

(7) Storage
When you are not going to use the instrument, pack it in a vinyl sack or a corrugated cardboard box and store it in a place of low humidity protected from the direct sunlight. The allowable storage temperature range is from -20 °C to +70 °C.

3-3. Interconnection of the TR-4110/ 4110M and TR-4114 Series Plug-in Units.

After unpacking the TR-4110/4110M mainframe and the TR-4114 series plug-in unit, which are separately packed, insert the TR-4114 series plug-in unit into the TR-4110/4110M mainframe.

Confirm that the POWER switch is set to OFF before inserting the plug- in unit. Refer to Fig. 3-2 when reading the following description of the insertion procedure.

(1) Pull the lock lever on the TR-4110/4110M mainframe until it is perpendicular to the front panel.
(2) Carefully insert the TR 4114 series plug-in unit backwards into the TR 4110/4110M mainframe.
(3) Pushing the front panel of the TR 4114 series plug-in unit, fully insert the plug-in unit. The lock lever is restored to its previous position after the insertion operation.
(4) Push the lock lever under the TR 4114 series plug-in unit and lock it.
To draw out the TR 4114 series plug-in unit, lift and pull the lock lever. The plug-in unit can then be withdrawn.
After completely inserting the plug-in unit, adjust the CRT display in accordance with section 5-2.

3-4. Fittings on Panel

Figure 3-3 shows the front panel of the TR-4110 and TR-4110M mainframes with the TR-4114T plug-in unit inserted in the respective mainframes,

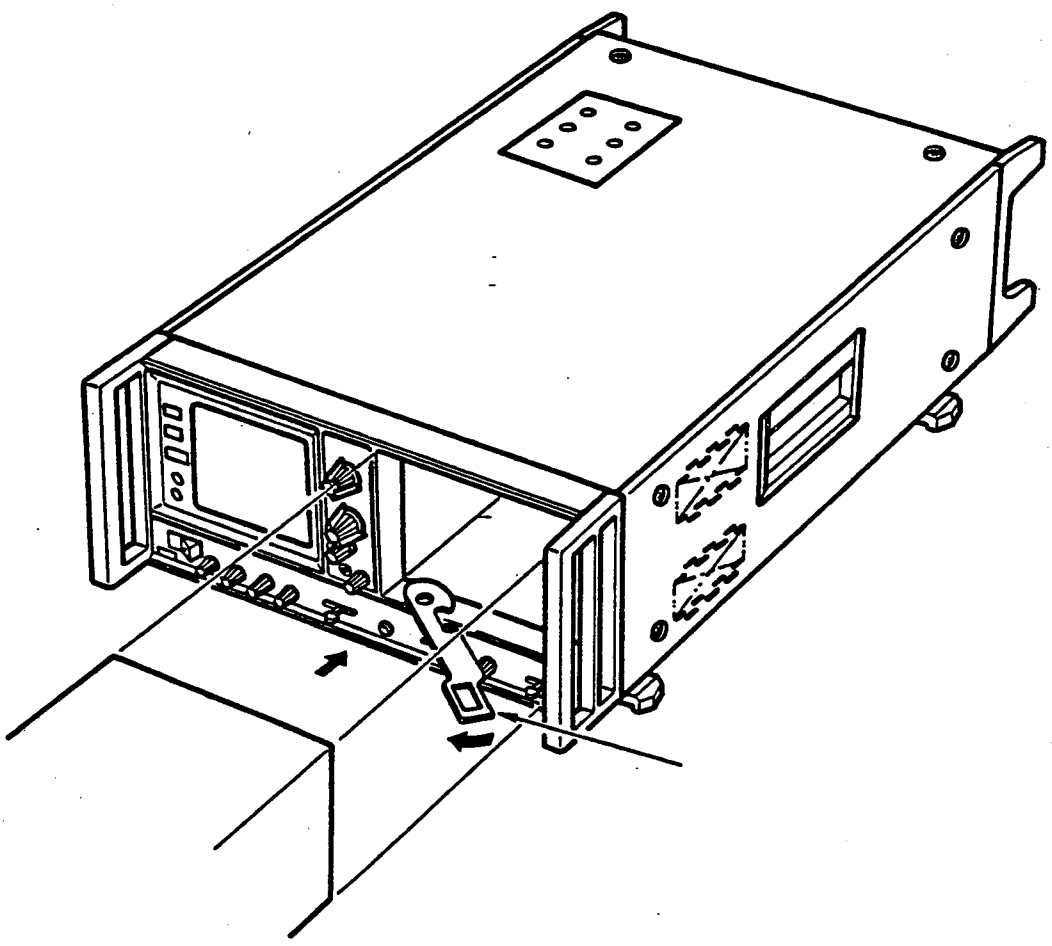

Fig. 3-2 Interconnection of the TR 4110/4110M and TR 4114 series modules

and the rear panel of the TR 4110/4110M module. This figure is valid also for the combination of the TR 4114/4114H/4114HT plug-in unit and the TR-4110 mainframe, or the combination of the TR 4114/4114H/4114HT and the TR-4110M.

-- Front Panel --

(1) POWER switch
Setting the POWER switch at ON supplies power to the instrument, and puts the instrument into operation after approximately 10 sec. Setting this switch at OFF immediately turns the power off.

(2) FOCUS control
Focuses the bright line on the CRT screen.
Operating the INTENSITY control may defocus the bright line. Consequently, refocus by means of the FOCUS control.

(3) INTENSITY control
Adjust the intensity of the spectrum on the CRT screen. Turning the control clockwise intensifies the spectrum. It may defocus the spectrum.

CAUTION
Excessive intensity may burn the fluorescent screen of the CRT.

(4) GRASS CLIPPER control
Erases the noise (grass) at the bottom of the CRT screen up to the desired height, to improve the spectrum readability.
This control is used to balance the intensity in case of taking a photograph (using the TR-1651).

(5) SCALE ILLUM. control (for TR-4110 only)
Illuminates the scale on the CRT screen and adjusts the intensity of illumination.

(6) SCAN TRIGGER switch
Sets the scanning trigger mode when the SCAN MODE switch is set at INT.
When the VIDEO mode is selected, scanning is triggered by a signal within the range from 100 Hz to 100 kHz on the CRT screen, as in the case of an oscilloscope. (The signal amplitude must reach at least the second mark on the scale.)
When the EXT. mode is selected, scanning is triggered by a TTL level signal applied to pin 5 of the OUTPUT connector on the rear panel.
When the LINE mode is selected, scanning is triggered by the AC power frequency. This mode permits recognition of induced noise from the AC power supply, etc.
When the AUTO mode is selected, scanning is automatically repeated with the timing set in the instrument

(7) SCAN MODE switch
Selects the scan mode.
When the SINGLE mode is selected, pressing the pushbutton switch on the left of the SCAN MODE switch initiates a scanning cycle. The scan time is determined by the scan time set in the instrument.
When the EXT mode is selected, applying a signal of -5 V to +5 V to the SCAN INPUT/OUTPUT connector on the rear panel initiates scanning.
When the MANUAL mode is selected, the MARKER POSITION/MANUAL SWEEP control on the right of the SCAN MODE switch can be used for manual sweep.
When the INT. mode is selected, scanning is performed by the scan generator incorporated in the instrument. The SCAN TRIGGER switch is effective only when the SCAN MODE switch is set at INT.

(8) MARKER POSITION/MANUAL SWEEP control
When an external frequency counter is connected to this instrument, a marker spot appears in spectrum on the CRT screen as though caused by intensity modulation. Turning this control moves the marker spot. The frequency of the marker spot is

indicated on the frequency counter.
When the SCAN MODE switch is set at MANUAL, turning this control permits manual sweep.

(9) VIDEO FILTER switch
Selects the cut-off frequency for the CRT driver in the instrument.
When high level noise affects the spectrum, setting this switch will integrate the noise and improve the spectrum readability.

(10) SWEEP MODE switch
Selects the sweep mode for the X axis (also known as the horizontal axis or frequency axis) on the CRT screen.
When the FULL mode is selected, a scanning cycle sweeps from 0 to 200 MHz. The frequency indicated by the FREQUENCY indicator is displayed in the form of a V-shaped marker on the base line.
When the PER DIV. mode is selected, the frequency scale on the CRT screen is determined according to the setting of the DISPERSION/DIV. switch, and the FREQUENCY indicator shows the center frequency on the CRT screen.
When the ZERO mode is selected, frequency scanning is not performed, and the frequency is fixed at the value set with the TUNING control. The X axis represents the time axis set with the SCAN TIME/DIV. switch. Thus the instrument operates just like an ordinary selective levelmeter.

(11) LOG./LIN. switch
Selects the scale for the Y axis on the CRT screen.
When this switch is set at LOG., the Y axis represents the logarithmic scale, and when it is set at LIN., the Y axis represents the linear scale. The gain per scale division can be increased with the dB/DIV. switch.

(12) dB/DIV. switch
Sets the gain per scale division of the Y axis on the CRT screen.
When the LOG./LIN. switch is set at LOG., setting this switch at 1, 2, 5 or 10 selects 1 dB/division, 2 dB/division, 5 dB/division or 10 dB/division respectively. When the LOG./LIN. switch is set at LIN., setting this switch at 1, 2, 5 or 10 multiplies the linear gain value per division by ten, five, two and one respectively.

(13) STABILIZER switch
When the SWEEP MODE switch is set at PER DIV. or ZERO and the DISPERSION/DIV. switch is set at a value lower than 20 kHz, setting this switch at ON automatically stabilizes operation. For stabilization, the first local oscillator is phase-locked by a 1 MHz crystal oscillator.
Accordingly, when the DISPERSION/DIV. switch is set at a value lower than 20 kHz, the FINE TUNE control must be used to move the spectrum.
When the STABILIZER switch is set at OFF, the first local oscillator is not phase-locked.
Therefore, the TUNING control is effective for the DISPERSION/DIV. switch setting up to 10 kHz, and the sideband noise is low.

(14) INPUT connector
Input connector of RF signal. The input impedance is approximately 50 Ω and the maximum input level is +20 dBm, ±10 V DC for the TR 4114/4114T, while the input impedance is 1 MΩ with approximately 20 pF, and the maximum input level is 30 Vrms, ±100V DC for the TR 4114H/ 4114HT.

(15) CAL. OUT. connector
Gives the output of the referrence oscillator in the module. This signal is used for calibration of the level and frequency.
The output frequency is 10 MHz and the output level is -20 dBm.
A 1 MHz COMB signal generator is incorporated to facilitate calibration of the X axis.

(16) RF ATT. switch
Attenuates the input signal level. This switch is used when the input signal level is too high. The maximum input level of the

TR 4114/4114T is +20 dBm, ±10 VDC regardless of the setting of the RF ATT. switch.
The maximum input level of the TR 4114H/4114HT is 5 Vrms (with the RF ATT. set at 0 dB) or 30 Vrms (with the RF ATT. set at over 20 dB), ±100 VDC.

(17) ZERO ADJ. control
Adjusts the FREQUENCY indicator to "000". This control is used when the zero frequency spectrum is set at the center of the CRT screen by means of the TUNING control.

(18) FINE TUNE controls
The two FINE TUNE controls permit fine adjustment of the frequency. The ±50 kHz control varies the frequency within the range of ±50 kHz (100 kHz), and is used with the DISPERSION/DIV. switch set at 20 kHz or less. The ±500 Hz control varies the frequency within the range of +500 Hz (1 kHz), and is used with the DISPERSION/DIV. switch set at 200 Hz or less.

(19) TUNING control
Sets the center frequency (the frequency at the CENTER mark of the X axis) on the CRT screen.
The FREQUENCY indicator indicates the center frequency displayed on the CRT screen.
When the STABILIZER switch is set at OFF, this control is effective for DISPERSION/DIV. switch settings up to 10 kHz.

(20) DISPERSION/DIV. switch
Sets the frequency scan width per scale division of the X axis on the CRT screen. The scan width can be set within the range from 0.05 kHz to 20 MHz. The switch provides selection of a value in a 1, 2, 5 sequence.

(21) BAND WIDTH switch
Varies the IF band width which determines the resolution of this module. Narrowing the IF band width lowers the noise level and improves the frequency resolution, but causes response lag. If the response lag causes an error in the level, the WARNING lamp lights up. In this case set the SCAN TIME/DIV. or DISPERSION/ DIV. switch so as to extinguish the WARNING lamp.
When this switch is set at AUTO, setting the DISPERSION/DIV. and VIDEO FILTER switches automatically sets the scan time/division and band width.

(22) TG. LEVEL switch (for TR 4114T/ 4114HT only)
Attenuates the tracking generator output.

(23) LEVEL VARI. control (for TR 4114T /4114HT only)
Continuousely changes the output level of the tracking generator (T.G.) with combination to the T.G. LEVEL switch described above. When this control is turned clockwise up to the maximum (CAL.), the output level equals the value set by the TG. LEVEL switch. As the switch is turned counterclockwise from the CAL. positon, the T.G. output level decreases. When set to fully counterclockwise, the T.G. output level decreases approximately 10 dB.
When turned fully counterclockwise with a little bit stronger force, the control is switched and set to the OFF. When set to OFF, the T.G. output level is cut off completely. When the tracking generater is not used, it is advisable to set this control to OFF so that more sensitive measurement is possible.

(24) TG. FREQ. control (for TR 4114T/ 4114HT only)
Permits fine adjustment of the frequency output from the tracking generator.
When the BAND WIDTH switch is rotated clockwise to make the IF band width narrow and the tracking generator output frequency is not exactly equal to the frequency of the spectrum analyzer, the signal level on the CRT screen declines. Thus this control must be used to prevent the level from declining.

Fine adjustment with this control is unnecessary when the BAND WIDTH switch is set at over 300 Hz, but is necessary when this switch is set within the range from 10 Hz to 100 Hz.

(25) TG OUT. connector (for TR4114T/4114HT only)
Tracking generator output connector. No DC voltage must be output since the DC voltage would not be cut at this connector.

(26) ALC. switch (for TR4114T/4114HT only)
Stabilizes the tracking generator level. This switch should be set at OFF for frequencies lower than 30 kHz since the ALC. cannot respond to such frequencies.

(27) TG MODE switch (for TR4114T/4114HT only)
When this switch is set at NOR., the tracking generator functions and emits the signal in synchronism with the frequency displayed on the CRT screen from the TG OUT. connector.
When this switch is set at TUNED AMP., the signal connected to the INPUT connector is selected, amplified and emitted from the TG OUT. connector.
When this switch is set at TUNED AMP., the tracking generator operates as a selective amplifier.

(28) PROBE POWER connector (for TR4114/4114T only)
Supplies power when the active probe is used. The ±15V power voltage and ground are supplied.

(29) SCAN TIME/DIV. switch
Sets the scan time per scale division of the X axis on the CRT screen. The scan time can be set within the range from 20 [s to 10 sec, being selected from among values in a 1, 2, 5 sequence.
Manual switching is prevented when the BAND WIDTH switch on the RF section is set at AUTO.

(30) IF GAIN 10 dB step switch
Selects IF stage gain between 0 dB to 60 dB in 10-dB increment.
Operating this switch varies the reference level and the REFERENCE LEVEL indicator changes by 10 dB steps.

(31) IF GAIN 1 dB step switch
Selects IF stage gain between 0 dB to 12 dB in 1-dB increment.
REFERENCE LEVEL indication LEDs do not change by this switch.

(32) VARI. control
Continuously varies the gain in the IF stage by ±1.5 dB. When this control is turned counterclockwise to the CAL. position, the control is turned off.

(33) CAL. control
If level calibration using the CAL. OUT. signal cannot be done by setting the VARIABLE control at CAL., this control is used.

(34) CRT display
The TR4110 has a CRT display with screen area of 10 cm x 8 cm. The CRT has P7 phosphor for persistence of approximately 400 ms.
The TR4110M has a CRT display with a variable persistence storage type CRT (P31 phosphor) which gives a clear, stable trace even for repeated scanning at a low speed.

(35) DISPERSION/DIV. indicator
LED indicator to indicate the value set with the DISPERSION/DIV. switch.

(36) BAND WIDTH indicator
LED indicator to indicate the value set with the BAND WIDTH switch.

(37) REFERENCE LEVEL indicator
LED indicator to indicate the reference level of the CRT screen in terms of the absolute level. The indication is according to the setting of the RF ATT. and IF GAIN 10 dB step switches.
The indication ranges from -60 dBm to +40 dBm for the TR4114/4114T, and from -60 dBm to +50 dBm for the TR4114H/4114HT.

(38) WARNING lamp
Lights up to give warning when there is a level error in the spectrum displayed on the CRT screen.
When this lamp is lit, set any one of the SCAN TIME/DIV., VIDEO

FILTER, DISPERSION/DIV. and BAND WIDTH switches again to extinguish it.

(39) SCANNING lamp
Lights to indicate scanning.

(40) Display Mode switches (for TR-4110M only)

-- Rear Panel --

(41) X AXIS connector
Gives the X axis signal as output on the CRT screen. The output level is approximately ±5 V and the output impedance is approximately 1 kΩ.

(42) Y AXIS connector
Gives the Y axis signal as output on the CRT screen. The output level is 3 V p-p for full scale, and the output impedance is approximately 10 kΩ.

(43) Z AXIS connector
Emits the blanking signal. The output level is the TTL level which is low during blanking. The output impedance is approximately 5 kΩ.

(44) SCAN INPUT/OUTPUT connector
When the SCAN MODE switch on the front panel is set at EXT., an external voltage of -5 V to +5 V applied to this connector causes scanning. When the SCAN MODE switch is set at a position other than EXT., the internal scanning signal is emitted from this connector. Consequently, this connector can be used for monitoring. The output impedance is approximately 1 kΩ. The load connected to this output affects the CRT display since this output is directly connected to the CRT driver circuit. Therefore, the input impedance of the load connected to this output should be as high as possible.

(45) Y INPUT and OUTPUT connectors The OUTPUT connector gives the 0 V to +4.5 V output signal from the LOG. amplifier within the module.
The INPUT connector is connected to the input of the CRT driver circuit. Usually the INPUT and OUTPUT connectors must be interconneted with a cable.

(46) X INPUT and OUTPUT connectors
The OUTPUT connectors gives the X axis signal. Usually the INPUT and OUTPUT connectors must be interconnected with a cable.

(47) Ground terminal
Terminal to connect the ground. When attaching a two-pin adapter to the power cable, connect the ground to the ground lead of the adapter or this terminal.

(48) FUSE
Fuse for power line. The 2 A slow-blow fuses are used for the 100 V AC and 115 VAC power voltages, and the 1A slow-blow fuses are used for the 200 VAC and 230 VAC power voltages.

(49) REMOTE connector (option)
Connector to connect the remote control signal.

(50) OUTPUT connector
If the instrument is to be used in synchronism with a frequency counter manufactured by the Takeda Riken Industry, this connector must be connected to the DATA OUT. or TRACKING SCOPE COUNT. connector on the frequency counter by a cable provided exclusively for this purpose.

(51) AUX. OUT. connector (for TR-4114T/4114HT only)
When the TR-4114T/4114HT is incorporated, the AUX. OUT. connector gives the same signal as output from the TG. OUT. connector on the front panel. This connector is used for connection to a frequency counter or other device.