ADVANTEST®

ADVANTEST CORPORATION

USER'S MANUAL

TR4153A/B

TRACKING GENERATOR

MANUAL NUMBER TR4153A/B ED 711

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Printed in Japan

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1. INTRODUCTION

1.1 GENERAL

Tracking generator TR4153A/B (this unit) is a sweep oscillator connected to the ADVANTEST spectrum analyzer (main unit).

Table 1-1 lists the spectrum analyzer connected to this unit and the measurement frequency range.

Combined use of the tracking generator and the ADVANTEST spectrum analyzer allows direct reading of the frequency characteristic of the DUT within the frequency range depending on that of the main unit. In this case, a dynamic range of 80 dB is obtained on the CRT of the main unit. Moreover, a dynamic range of approximately 110 dB can be obtained by changing the reference level on the CRT display.

Table 1-1 Connectable Spectrum Analyzer and Measurement Frequency Range

Spectrum analyzer	Measurement frequency range
TR4131/E	100 kHz to 2 GHz

The normalization feature of the spectrum analyzer (TR4131) main unit can eliminate the frequency characteristic of the measurement system, which permits direct reading of only the frequency characteristic of DUT.

1.2 PREPARATION

1.2.1 Preparation and Precautions

① Set POWER switches of the spectrum analyzer and this unit to OFF when connecting this unit to the spectrum analyzer or when connecting a power cable.

② Before switching power on
Set the voltage setting card under the fuse properly so that you can read the print of the supply voltage you use. Use only the specified fuse. See (5) for details on card setting.

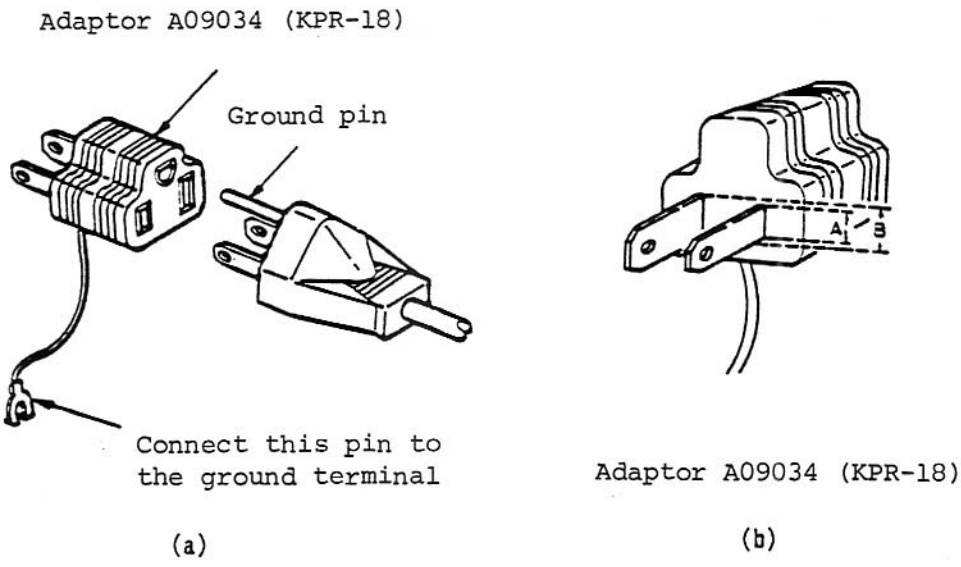


Figure 1-1 Power Cable Plug and Adaptor

③ Switching power on
Set the POWER switch on the front panel of this unit to OFF, then connect the power cable as follows:
Connect the power cable to the AC LINE connector. The power plug has three pins and the middle round pin is for grounding.
When using a 2-pin adaptor, connect either the ground wire of the adaptor or the ground panel on the rear panel of the main unit to the ground. The attached adaptor, A09034 (KPR-18), conforms to the Electric Appliance Regulations. As shown in Figure 1-1, widths A and B of two pins of the A09034 are different, so check which is which when inserting this plug in the receptacle.
When the A09034 cannot be used, use the optionally available adaptor KPR-13.

④ Replacing the fuse
Before replacing the fuse, disconnect the power cable from the AC LINE connector. Move the plastic cover of the fuse box (on the right side of the fuse box) to the left, then pull the FUSE PULL lever to remove the fuse as shown in Figure 1-2. Use only the fuse specified in Table 1-2.

Table 1-2 AC Supply Voltage and Fuse

Supply voltage	Fuse
AC 100 V AC 120 V	MDX 1.25 A
AC 220 V AC 240 V	MDX 0.6 A

⑤ Setting the voltage setting card
Check whether the voltage setting card is properly set. If you cannot see the print (100 V, 120 V, 220 V, or 240 V) of the supply voltage you use, remove the card and insert it again up side down. (See Figure 1-2.)

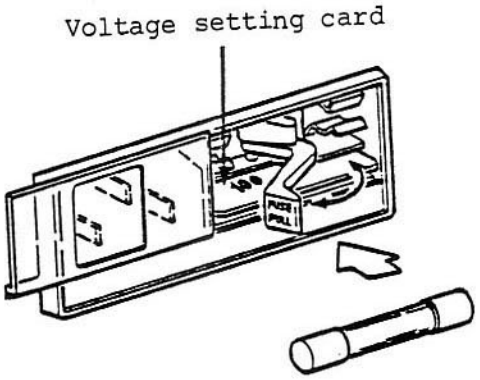


Figure 1-2 Fuse Replacement and Voltage Setting Card

⑥ The ambient temperature is 0 to 40oC.

⑦ The storage temperature is -20 to +70oC. Put this unit in a cardboard or wrap it with a vinyl sheet and store it in a place not exposed to direct sunlight.

1.2.2 Operations before Starting Measurement

This section explains the connections between the rear panel of this unit and the rear panel of the spectrum analyzer and the operations required before starting measurement.

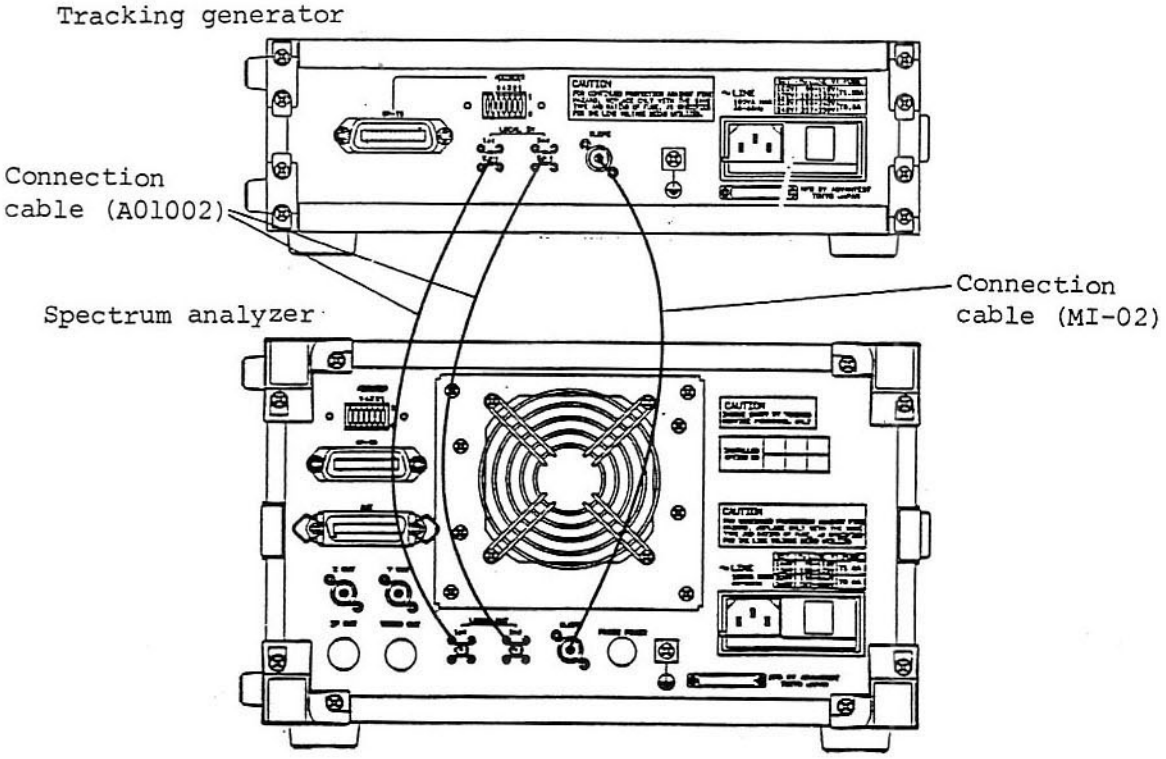


Figure 1-3 Connections between Rear Panels

① Set the POWER switches of this unit and main unit to OFF.

② As shown in Figure 1-3, connect cables between the following connectors:

- SLOPE IN connector of this unit and SLOPE OUT connector of main unit (MI-02 cable)
- 1st LO INPUT connector of this unit and 1st LOCAL connector of main unit (A01002 cable)
- 2nd LO INPUT connector of this unit and 2nd LOCAL connector of main unit (A01002 cable)

③ Set POWER switches of this unit and main unit to ON.

④ For the TR4153A, the output level indication LED goes on. For the TR4153B, the POWER lamp goes on.

⑤ Connect the OUTPUT connector of this unit to the INPUT connector of the spectrum analyzer with the specified cable.

⑥ The CRT screen displays the frequency characteristics of this unit and main unit.
If the LEVEL VARIABLE control of the TR4153B is at the MIN position, the output level cannot be controlled and consequently the frequency characteristic curve may deviate from being flar.

⑦ If maximum input is applied to the spectrum analyzer when the frequency characteristic of the amplifier is observed, the maximum input level must not exceed that of the first mixer or attenuator.

2. OPERATION

2.1 FRONT AND REAR PANELS

2.1.1 TR4153A

See Figure 2-1 for the panels of the TR4153A. See Section 2.1.2 for details on the panels of the TR4153A.

- Front panel -

① POWER switch
To power this unit, set this switch to the ON position. For the 4153A, the output level indication LED goes on. Set this switch to the OFF position to switch the power off.

② OUTPUT connector
This is the output connector for this unit.

③ OUTPUT LEVEL keys
These keys are used to attenuate the signal output from the OUTPUT connector.

④ RMT/LCL key
The RMT lamp goes on and any input by panel keys are ignored when this unit is controlled from the outside via the general-purpose interface bus (GPIB). Press this key to make inputs by panel keys effective.

⑤ Output level indication LEDs
These LEDs indicate the level of the signal output from the OUTPUT connector.

⑥ LEVEL ADJ knob
This knob is used for fine adjustment of the output signal level from 0 to -1.5 dB.

⑦ FREQ ADJ knob
This knob is used for fine adjustment of the frequency to the middle of the bandwidth of the main unit.

- Rear panel -

⑧ SLOPE
This connector is connected to the SLOPE connector on the rear panel of the main unit.

⑨ 1st LO INPUT connector
This connector is connected to the 1st LOCAL connector on the rear panel of the main unit.

⑩ 2nd LO INPUT connector
This connector is connected to the 2nd LOCAL connector on the rear panel of the main unit.

⑪ Ground terminal
When the power cable is used together with a 2-pin adaptor, connect the wire of the adaptor or this terminal to the ground.

⑫ AC LINE connector
The power cable is connected to this connector.

⑬ GPIB connector
An external controller is connected to this connector with a GPIB cable.

⑭ Address switch for GPIB
The GPIB address is set with five bit switches.

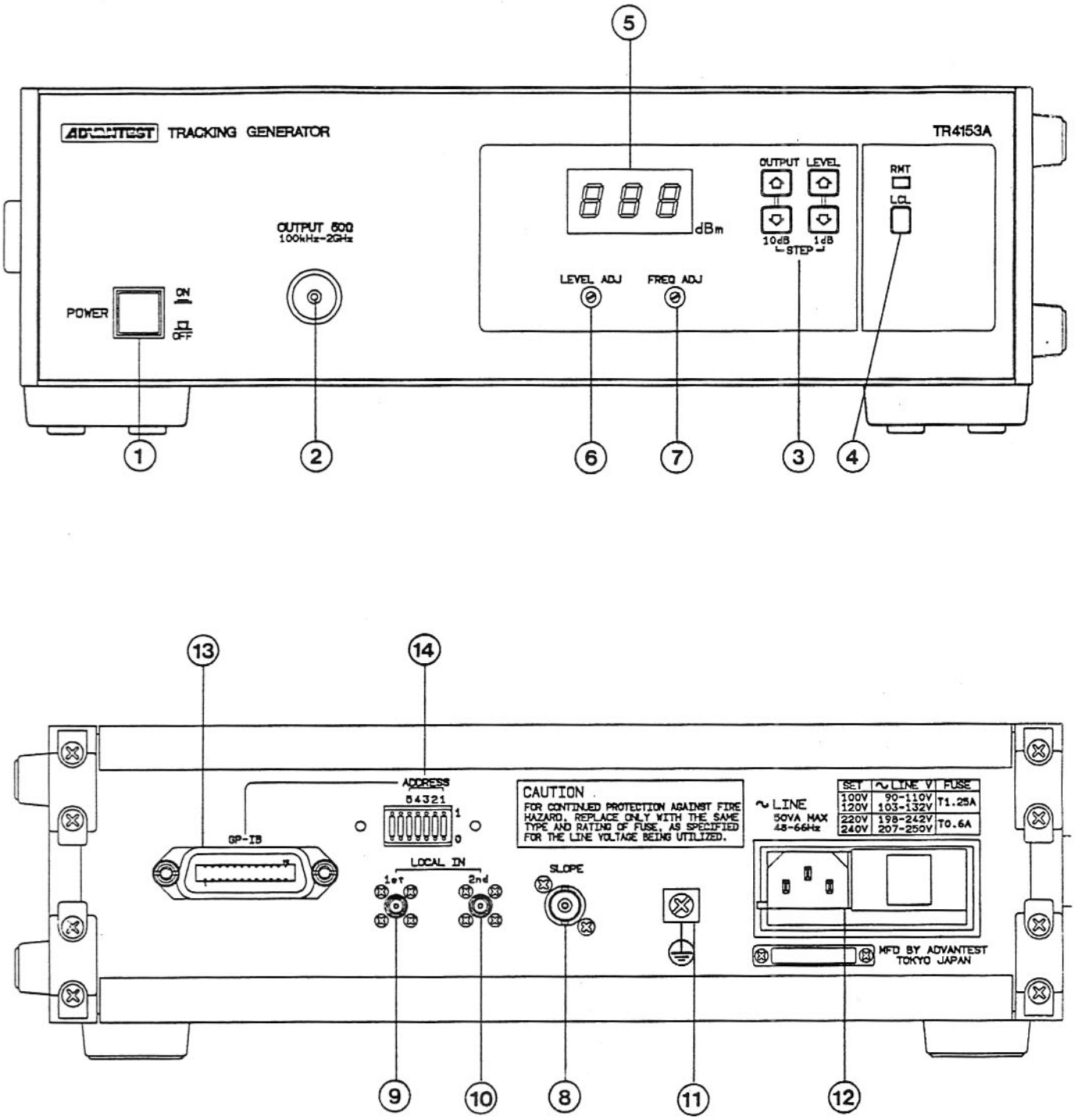


Figure 2-1 TR4153 Panels

2.1.2 TR4153B

See Figure 2-2 for the panels of the TR4153B.

- Front panel -

① Power switch
To power this unit, set this switch to the ON position. For the 4153B, the POWER lamp goes on. Set this switch to the OFF position to switch the power off.

② OUTPUT connector
This is an output connector of this unit.

③ LEVEL VARIABLE knob
This knob is used to control the output signal level 10 dB or more between the MIN and MAX positions.

④ FREQ ADJ knob
This knob is used for fine adjustment of the frequency to the middle of the bandwidth of the main unit.

- Rear panel -

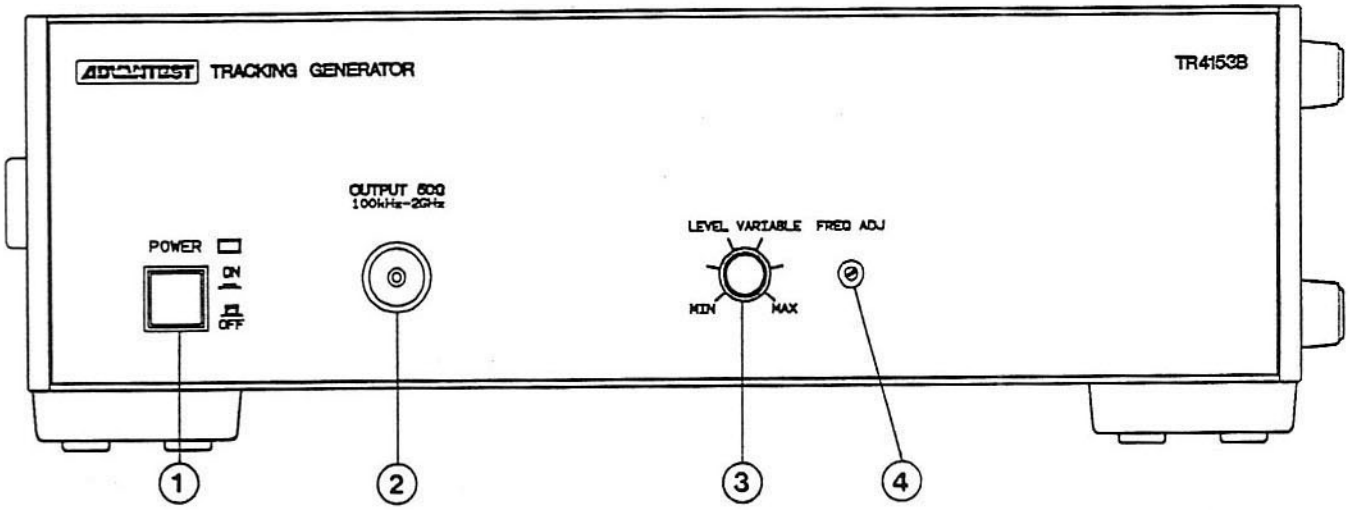
⑤ SLOPE
This connector is connected to the SLOPE connector on the rear panel of the spectrum analyzer.

⑥ 1st LO INPUT connector
This connector is connected to the 1st LOCAL connector on the rear panel of the spectrum main unit.

⑦ 2nd LO INPUT connector
This connector is connected to the 2nd LOCAL connector on the rear panel of the main unit.

⑧ Ground terminal
When the power cable is used together with a 2-pin adaptor, connect the wire of the adaptor or this terminal to the ground.

⑨ AC LINE connector
The power cable is connected to this connector.



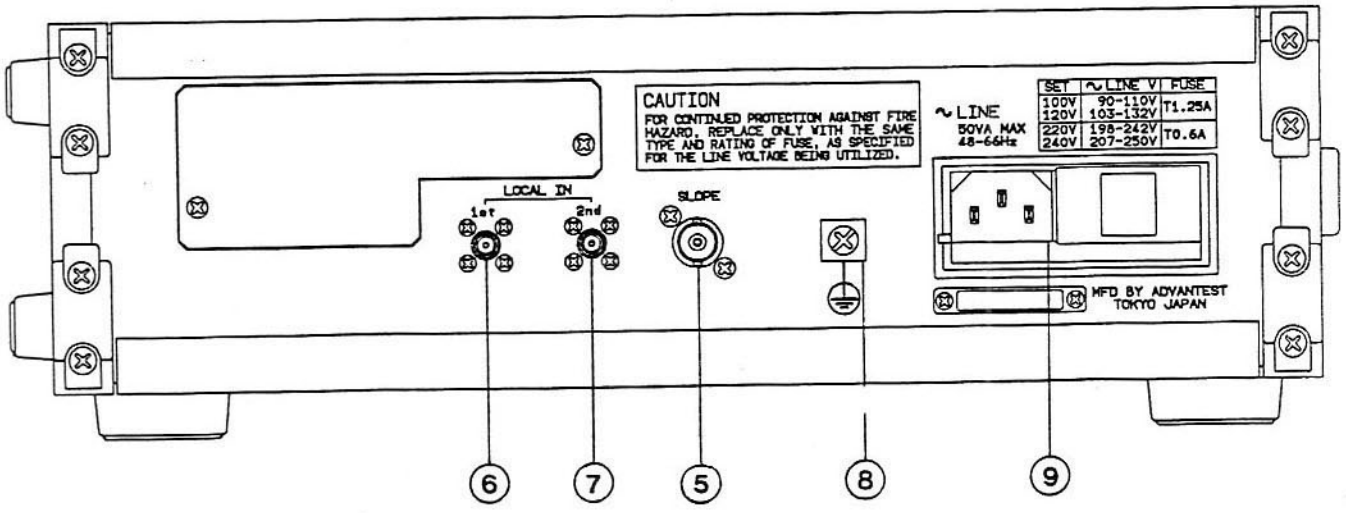


Figure 2-2 TR4153B Panels

2.2 OPERATION METHOD

2.2.1 Reading Frequency Characteristic Directly

This section explains how to read the frequency characteristic directly by using the tracking generator with the spectrum analyzer TR4131/E.

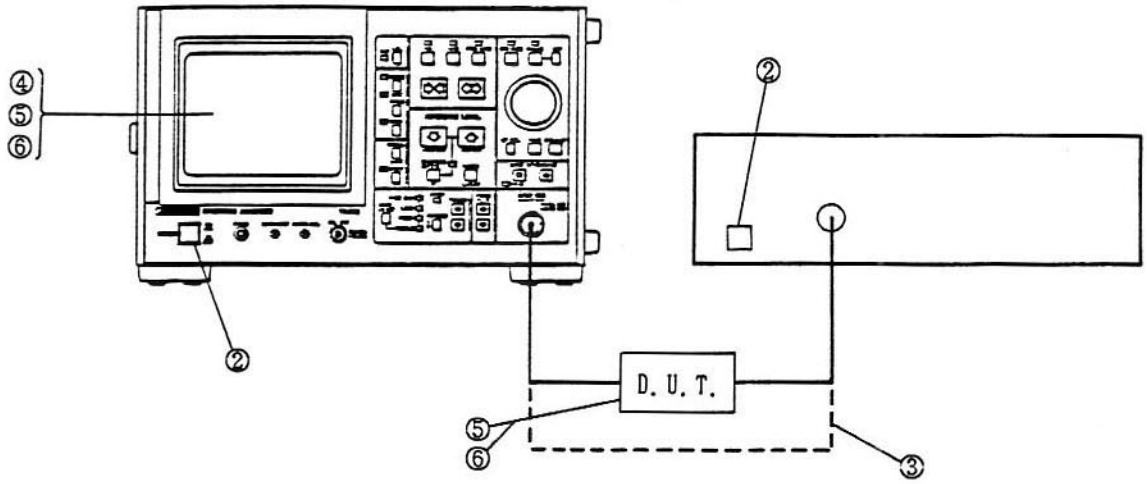


Figure 2-3 Procedure for Reading the Frequency Characteristic Directly

① Connect cables between this unit and main unit by referring to Section 1.2.2.

② Set POWER switches of this unit and main unit to the ON position.

③ Connect the OUTPUT connector of this unit to the INPUT connector of the main unit with the specified cable.

④ The CRT screen then displays horizontal bright lines. The frequency range of this unit is 100 kHz to 2 GHz and the frequency range of the main unit is 10 kHz to 3.5 GHz, then the following waveform is displayed immediately after power-on operation.

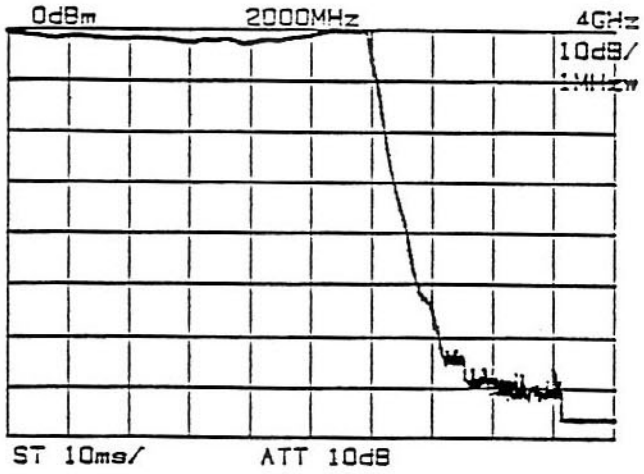


Figure 2-4 Direct Reading of Frequency Characteristic (1)

⑤ Set output levels of the main unit and this unit for the DUT. Figure 2-5 shows the screen displayed when output levels are reset to measure the frequency characteristic of 155 MHz B.P.F.

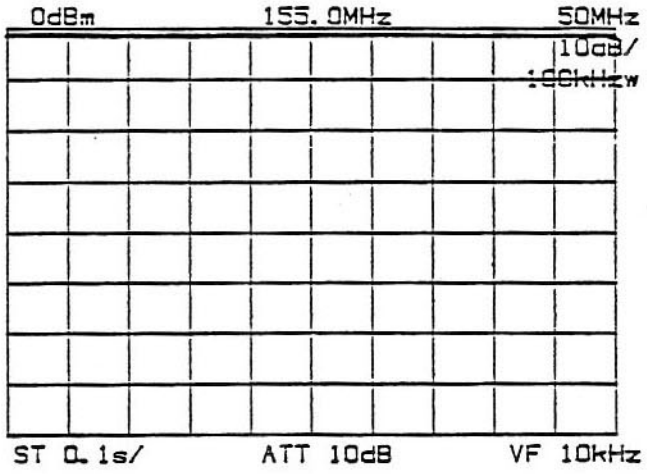


Figure 2-5 Direct Reading of Frequency Characteristic (2)

⑥ If the output signal of this unit is applied to DUT and the device output is applied to this unit the frequency characteristic shown in Figure 2-6 can be read directly.

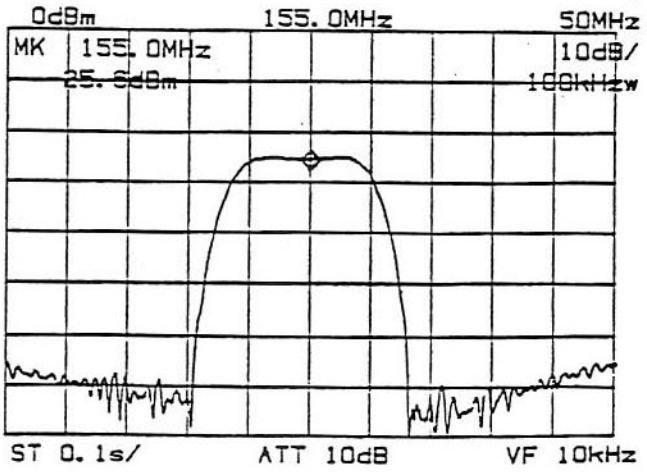


Figure 2-6 Direct Reading of Frequency Characteristic (3)

(1) Dynamic range
The dynamic range of measurement is limited by the maximum output level and white noise level of this unit. To widen the dynamic range, reduce the IF band width of this unit to lower the noise level. Since the tracking signal leaks into the main unit (T.G. leakage), noise may not be reduced to the desired level if the resolution of this unit is increased to the maximum value. T.G. leakage provides a dynamic range of -110 dBm (at an output level of 0 dBm). Therefore, measurement can be done if the stop band of the filter causes attenuation of approximately 110 dB. To prevent T.G. leakage, use well-shielded cable cables and do not bring these cables close to each other.
When the IF band width is reduced, pay attention to the following:

(a) The RBW (resolution band width) of the TR4131/E is set to 30 kHz or less, the tracking error (difference between output frequencies of this unit and main unit) causes a level error. Accordingly, it is necessary to set RBW of the main unit to 1 kHz and to adjust the tracking error by turning the half-fixed volume FREQ ADJ knob before starting measurement so that the level indication on the CRT screen becomes maximum.

(b) The CRT display cannot display dynamic ranges greater than 80 dB therefore, switch reference levels of the CRT display. Pay attention to level suppression caused by excessive input in the primary mixer in the input block of the main unit.

(2) Time response
"UNCAL" is displayed to indicate whether the level displayed on the CRT screen is correct. This indication, however, has no meaning when frequency characteristics are measured using this unit.

"UNCAL" indicates whether the IF filter responds correctly to indicate the level according to the combination of SWEEP TIME/DIV., SPAN, and BANDWIDTH switches of the main unit. For the unit holding a constant level like this unit, the level may displayed normally even if "UNCAL" is displayed.
If the signal which is supplied from the output terminal of DUT to the main unit changes abruptly, the IF filter of the main unit stops responding. Pay attention to the response by DUT itself.
If the SWEEP TIME/DIV. switch is operated, the IF filter and DUT respond normally providing the characteristic on the screen does not change. If the characteristic changes when the SEEP TIME/DIV. switch is operated, delay the sweep time or make the span (frequency sweep width) narrow.

(3) Normalization function
The normalization function is used to compensate for the frequency characteristic of the TR4131/B and to compare waveforms displayed on the CRT screen. The procedure for measuring the high frequency cable insertion loss is explained below as an example.

① Connect the TR4131/E and TR4153A/B in the system, except the cable, to be tested. (See Figure 2-7.)
(The frequency characteristic measured in this system involves the cable insertion loss and frequency characteristic of the TR4131/E; the cable insertion loss concerned is obtained according to this frequency characteristic.)

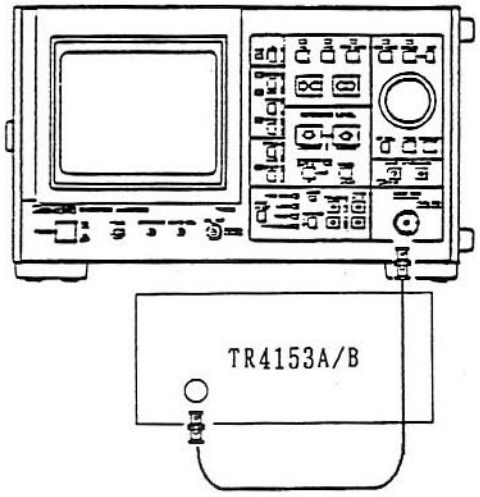


Figure 2-7 Example of Measurement of High Frequency Cable Loss

② Vertical axis : 2 dB/DIV.
Frequency span : 2 GHz
Reference level: Set the reference level so that the waveform is displayed in the middle of the screen. (See Figure 2-8.)

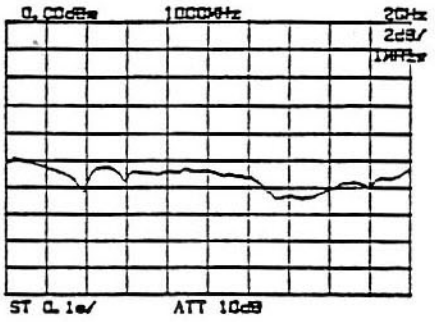


Figure 2-8 Storage of Displayed Waveform

③ For the TR4131, press STORE to store this waveform.
Press SHIFT and RBW (NORM) ; the screen will display "NORM", a reference line in the middle of the screen, and a measured waveform. (See Figure 2-9.)

For the TR4131E, the waveform on only one screen is memorized.
Press SHIFT - and RBW (NORM) ; the reference waveform will be stored after sweeping once. (See Figure 2-8.)
Thus, the reference line and normalized waveform are displayed every time a sweep is completed. (See Figure 2-9.)

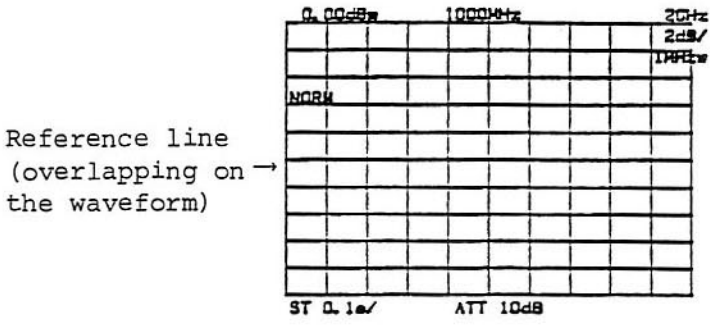


Figure 2-9 Normalization

④ Connect the cable to be measured. (See Figure 2-10.)
The measured waveform is displayed away from the reference line according to the amount of cable loss. (See Figure 2-11.)

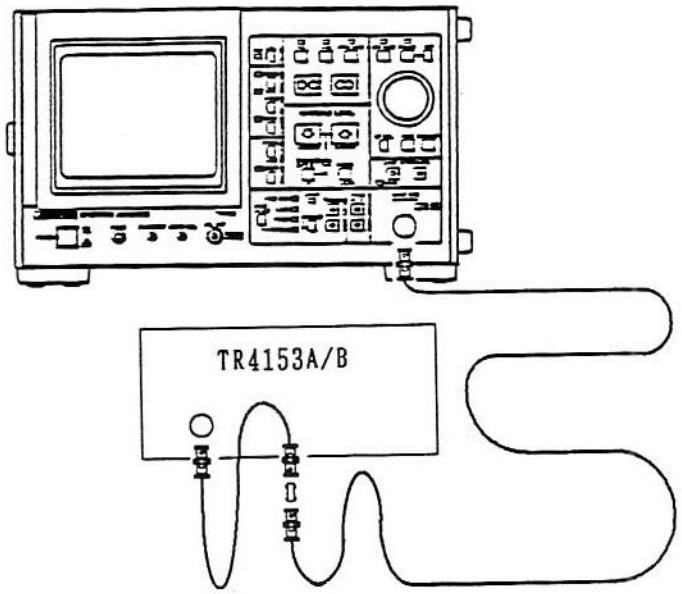


Figure 2-10 Connection of Cable to be Measured

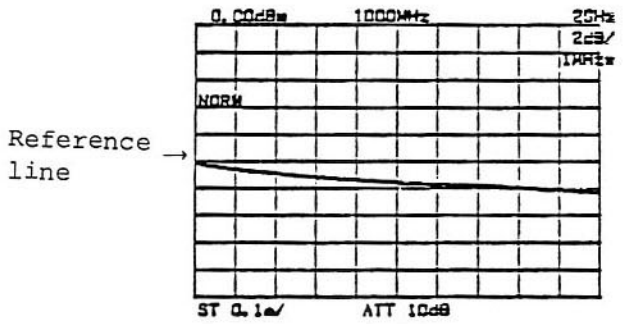


Figure 2-11 Reference Line and Waveform

⑤ Press MARKER ; a marker will be displayed on the measured waveform to indicate the deviation from the reference level. (See Figure 2-12.)

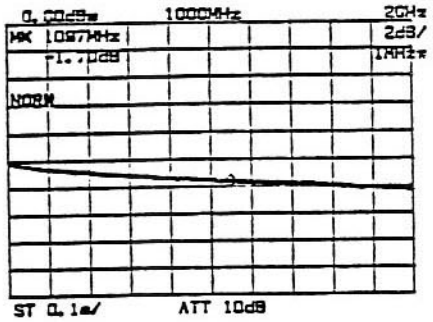


Figure 2-12 Reference Line, Waveform Shift, and Marker

⑥ If a wide dynamic range is required for the measurement of a filer or amplifier, press ⇩ ⇧ ; the reference line and waveform will move by one division. To shift the reference line and waveform by 1/10 division, select FINE by pressing COARSE FINE . Thus, select this option to observe the waveform easily. (See Figure 2-13.)

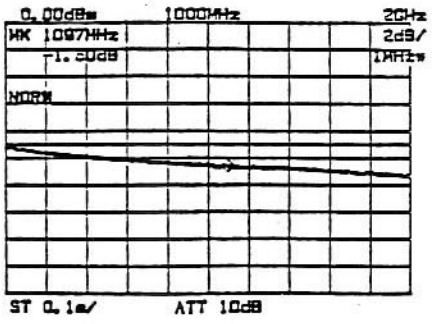


Figure 2-13 Reading Deviation from Reference Line According to Marker

To modify or terminate setting after measurement, press SHIFT and NORM to return to the normal mode.

3. CONNECTING GPIB AND PROGRAMMING

3.1 GENERAL

Tracking generator TR4153A can be connected to the an GPIB conforming to IEEE specifications by using the GPIB interface supplied.

This chapter explains the specifications and functions of the GPIB interface.

- GPIB: General-Purpose Interface Bus
  The GPIB cannot be connected to the TR4153B.

3.2 OUTLINE OF GPIB

The general-purpose interface bus (GPIB) is an interface system that can connect the measurement unit to the controller or peripheral equipment with a simple cable (bus line). It is expandible and easy to use compared to the existing interfaces. It is also compatible with the products of other makers both electrically and functionally. Accordingly, connection of only one bus line allows construction of both simple and complicated automatic measurement systems.

In the GPIB system, addresses of the devices connected to the bus line must be set. Of the three parts (controller, talker, and listener), each device can take one or two parts.

During system operation, only one talker can send data to the bus line and two or more talkers can receive this data. The controller transfers data from a talker to the listener(s) by specifying their addresses. Moreover, the controller (talker in this case) itself sets the measurement condition of the listener. Eight bit/byte parallel serial data lines are used for data transfer between devices. Data can be transferred in both directions asynchronously. This system can contain both high-speed and low-speed devices because it is an asynchronous system.

The data (message) transferred between devices consists of measurement data, measurement conditions (program), and commands expressed by ASCII codes.

In addition to the above eight lines, there are three handshake lines and five control lines.

- Handshake lines send the following signals:
  DAV (Data Valid) : Indicates that the data is valid.
  NRFD (Not Ready For Data): Indicates that data reception is enabled.
  NDAC (Not Data Accepted) : Indicates that reception is completed.

- Control lines send the following signals:
  ATN (Attention) : Indicates whether the signal on the data line is an address, command, or other information.
  IFC (Interface Clear) : Clears the interface.
  EOI (End or Identify) : Indicates the end of information.
  SRQ (Service Request) : Indicates a service request from a device to the controller.
  REN (Remote Enable) : Controls the device that allows remote programming.

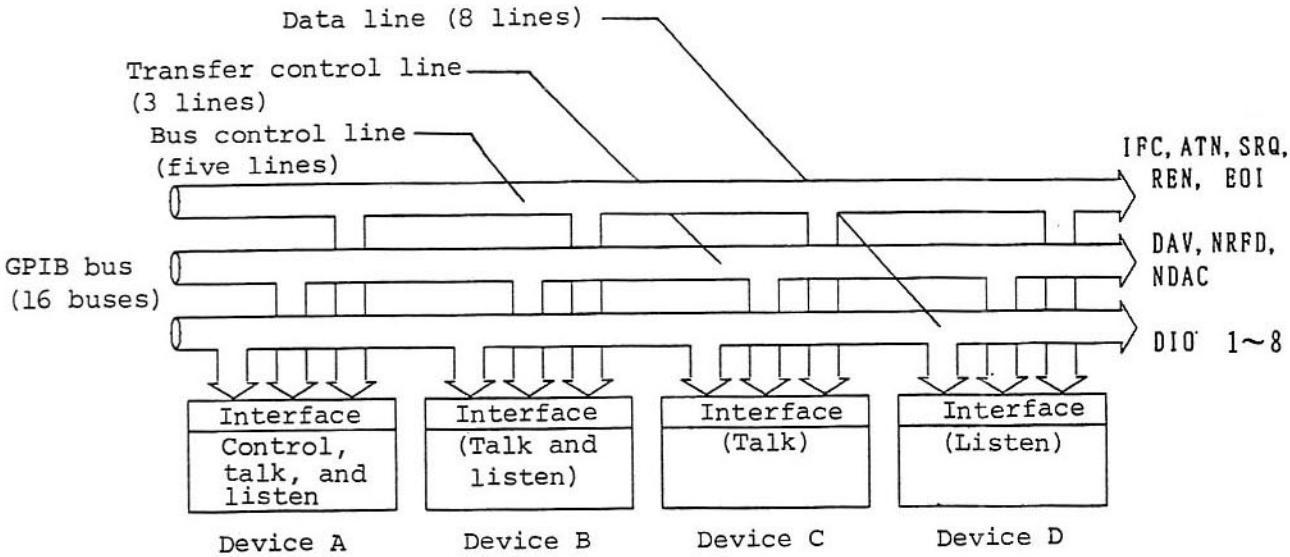


Figure 3-1 Outline of GPIB

3.3 SPECIFICATIONS

3.3.1 GPIB Specifications

Standard : IEEE 488-1978
Code : ASCII (or binary code for packed format)
Logical level : Logical 0 High state (+2.4 V or more)
Logical 1 Low state (+0.4 V or less)
Signal line termination: Sixteen bus lines are terminated as follows:

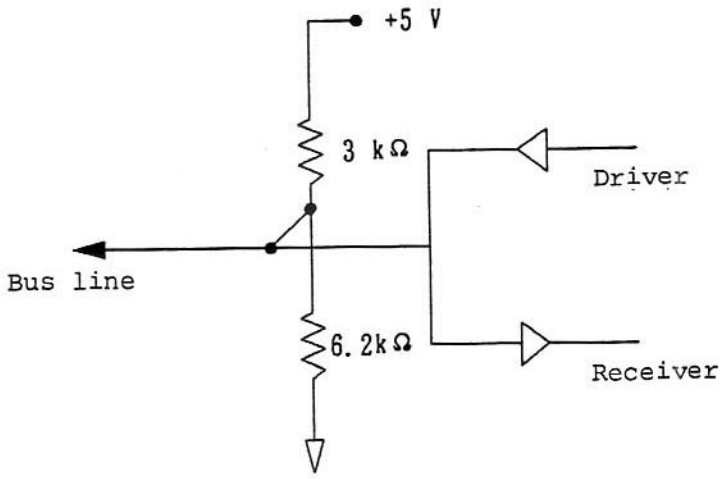
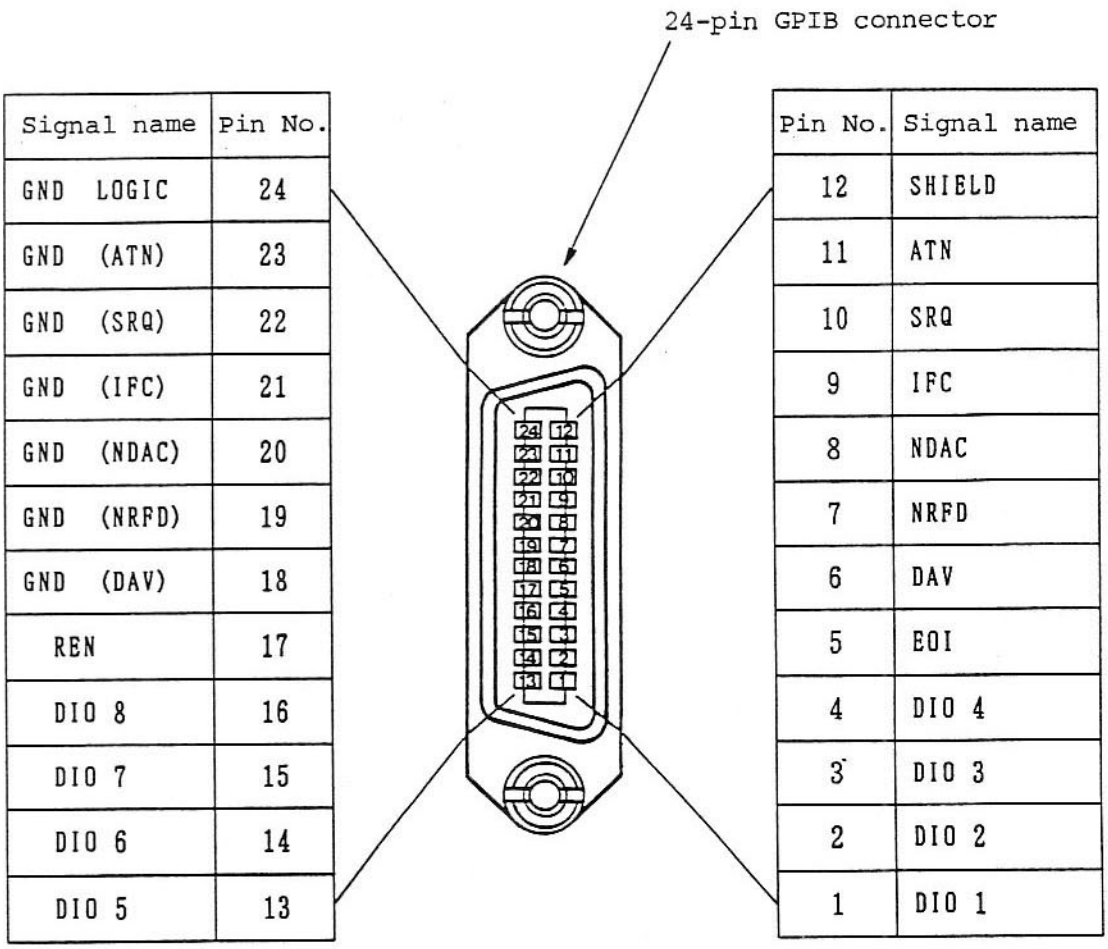


Figure 3-2 Signal Line Termination

Driver : Open collector
Output voltage in "Low" state: +0.4 V or less, 48 mA
Output voltage in "Hight" state: +2.4 V or more, -5.2 mA
Receiver : "Low" state at +0.6 V or less
"High" state at +2.0 V or more
Bus cable length : The length of each cable is 4 m or less and the total cable length (number of devices connected to bus x 2 m) must be shorter than 20 m.
Address assignment: Thirty-one token/listen addresses can be assigned as desired by using the address selection switches on the rear panel.
After setting the address selection switches, set the POWER switch to OFF then set to ON again.
Connector : 24-pin GPIB connector
57-20240-D35A (or equivalent ANFEHOL connector)



Signal name	Pin No.
GND LOGIC	24
GND (ATN)	23
GND (SRQ)	22
GND (IFC)	21
GND (NDAC)	20
GND (NRFD)	19
GND (DAV)	18
REN	17
DIO 8	16
DIO 7	15
DIO 6	14
DIO 5	13

Pin No.	Signal name
12	SHIELD
11	ATN
10	SRQ
9	IFC
8	NDAC
7	NRFD
6	DAV
5	EOI
4	DIO 4
3	DIO 3
2	DIO 2
1	DIO 1

Figure 3-3 GPIB Connector Pin Arrangement

3.3.2 Interface Functions

Table 3-1 Interface Functions

Code	Description
SH1	Source handshake function
AH1	Acceptor handshake function
T8	Basic talker functions without serial poll function Talker release function (specified listener)
L4	Basic listener functions and listener release function (specified talker)
SR0	No service request function
RL1	Remote function
PP0	No parallel function
DC1	Device clear function
DT0	No device trigger function
C0	No controller function
E1	Use of open collector bus driver EOI, DAV: E2 (use of 3-state bus driver)

3.4 HANDLING GPIB

3.4.1 Connecting System Components

The GPIB system consists of two or more devices. Notes on connecting these devices are as follows:

(1) Check the states (preparatory settings) and operations of the system according to the Operating Instructions of the TR4153A, controller, and peripheral devices.

(2) Minimize the lengths of the cable connecting the measurement device and the bus cables connecting the controller and other devices. The total bus cable length (number of devices connected to bus x 2 m) must be less than 20 m.
ADVANTEST is ready to supply the following bus cables:

Table 3-2 Standard Bus Cable (Optional)

Length	Name
0. 5 m	408JE-1P5
1 m	408JE-101
2 m	408JE-102
4 m	408JE-104

(3) The bus cable connector is a piggyback type. One connector has both male and female connectors and these connectors can be connected with each over.
When connecting a bus cable, do not connect three or more connectors together. Fasten connectors securely with connector set screws.

(4) Check power requirements, grounding conditions, and, if required, setting conditions of the system components. Then, supply power to these components.
All the components connected to the bus must be powered; otherwise, the entire system operation is not guaranteed.

3.4.2 Setting Address Switches

A DIP switch is provided on the rear panel of this unit. (See Figure 3-4.) This switch is used to assign GPIB addresses.

GPIB Addresses 0 to 30 can be set by setting bit 1 (rightmost bit) to bit 5 to 0 or 1. Address setting must be done before switching the power on.

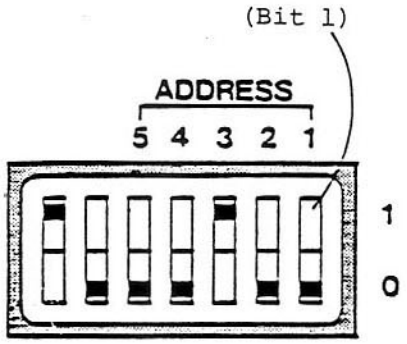


Figure 3-4 ADDRESS Switch

Table 3-3 shows the relationship between ADDRESS switch settings and GPIB addresses.

Table 3-3 ADDRESS Switch Setting

ADDRESS switch	GPIB address	ADDRESS switch	GPIB address
00000	0	10000	16
00001	1	10001	17
00010	2	10010	18
00011	3	10011	19
00100	4	10100	20
00101	5	10101	21
00110	6	10110	22
00111	7	10111	23
01000	8	11000	24
01001	9	11001	25
01010	10	11010	26
01011	11	11011	27
01100	12	11100	28
01101	13	11101	29
01110	14	11110	30
01111	15		

3.5 BLOCK DELIMITER

This unit is provided with four types of block delimiters listed in Table 3-4.

Table 3-4 Block Delimiter

Code	Block delimiter
DL1	Outputs an LF code (1 byte).
DL2	Outputs an EOI signal together with the last data byte.
DL3	Outputs CR and LF codes (2 bytes).
DL0	Outputs CR and LF codes (2 bytes), and outputs an EOI signal together with the LF code.

This unit accepts the command or data sent from the GPIB controller and so forth if the command or data matches one of above block delimiters. If the block delimiter of the GPIB controller does not match any one of above delimiters, the GPIB connected to this unit does not function normally.

When data is received from this unit, the block delimiter of this unit must be changed to one of the block delimiters handled by the receiver (GPIB controller and so forth). In this case, select one of four block delimiters listed above.

The block delimiter of this unit can be changed by sending a command listed above from the GPIB controller.

When this unit is powered, block delimiter DL3 is selected.

3.6 PROGRAMMING EXAMPLE

The output level of the TR4153A can be remotely controlled by the GPIB controller.

This section explains programming of settings with reference to the program generated using the Hewlett Packard desk-top computer 9816.

Codes used are as follows:

Table 3-5 Program Codes

TL	(TG LEVEL) Sets an output level with an absolute value.
DM	(dBm) Sets an output level with an absolute value.
CU	(COARSE UP) Raises the output level by 10 dB over the current value.
CD	(COARSE DOWN) Lowers the output level by 10 dB under the current value.
FU	(FINE UP) Raises the output level by 1 dB over the current value.
FD	(FINE DOWN) Lowers the output level by 1 dB under the current value.
IP	Instrument Preset Performs initialization (the output level is set to 0 dBm).

(1) Setting the output level directly

```
10   OUTPUT   701 ; "TL-200M"
20   END
```

When this program is started in the initial state (output level = 0 dBm), its operation is displayed as shown in Figure 3-5.

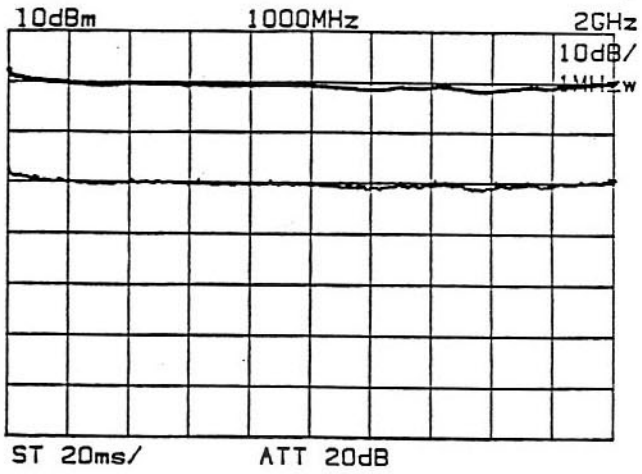


Figure 3-5 Example of Programmed Operation

(2) Setting output levels with the commands corresponding to front panel keys

```
10   OUTPUT 701 ; "IP"
20   ENTER 701 ; A
30   IF A=  -20 THEN 60
40   OUTPUT 701 ; "CD"
50   GOTO 20
60   IF A=-20 THEN 90
70   OUTPUT 701 ; "CU"
80   GOTO 20
90   END
```

Line number	Meaning
10	Initializes the TR4153A.
20	Reads data from the TR4153A.
30	Branches to line 60 when the read data is equal to or less than -20.
40	Lowers the TR4153A output level by 10 dB.
50	Returns to line 20.
60	Branches to line 90 when the read data is equal to -20.
70	Raises the output level of the TR4153A by 10 dB.
80	Returns to line 20.
90	End

Like the program in (1) above, this program is executed as shown in Figure 3-5.

(3) Reading the set output level

```
10   ENTER 701 ; A
20   PRINT A
30   END
```

Line number	Meaning
10	Data is read from the TR4153A and set in variable A.
20	Displays the value of variable A. (-20 is displayed when the output level is -20 dBm.)
30	End

4. PERFORMANCE SPECIFICATIONS

4.1 ELECTRICAL PERFORMANCE

The following performance is attained when spectrum analyzer TR4131 is connected to this unit:

Frequency range	: 100 kHz to 2 GHz
Output impedance	: Approximately 50 Ω
Output V.S.W.R	: 1.5 or less (at 10 dB or more of output attenuation) (TR4153A)
Output level flatness	: 4153A: ±1 dB or less (with 0 dB output at 100 kHz to 2.0 GHz)
	: 4153B: ±0.5 dB or less (with 0 dB output at 100 kHz to 2.0 GHz)
Output level range	: 4153A: 0 to -59 dBm, variable at 1 dB step
	: 4153B: 10 dB or more, continuous variation possible
Output spurious	: At output of 0 dBm Spurious high frequency is 20 dB or less. Spurious non-high frequency is 30 dB or less.
T.G. leakage*	: -110 dBm or less

* T.G. leakage: Signal leakage from this unit to the main unit, which affects the main unit operation

4.2 GENERAL SPECIFICATIONS

Output connector : N-type
Operating temperature range: 0 to 40oC
Storage temperature : -20 to +70oC
Power requirements :

Option No.	Standard	32	42	44
Supply voltage (V)	100	120	220	240
Supply voltage fluctuation (%)	±10	±10	±10	+4, -10

Outside dimensions : Approximately 300 (W) x 90 (H) x 440 (D) mm
Weight : Approximately 10 kg

4.3 ACCESSORIES

(1)	Power cable (MP-43A)	1
(2)	Output cable (MI-04)	1
(3)	Connection cable (A01002)	2
(4)	Connection cable (MI-02)	1
(5)	Fuse (1.25 A)	2
(6)	Operation Manual	1

5. OPERATION

This unit is a sweep oscillator that supplies a synchronization signal at a given level in response to sweeping by the spectrum analyzer main unit.

The main unit uses four local oscillators to generate a 3.58 MHz input signal and inputs this signal to the IF filter which determines resolution.

This unit uses a highly stable oscillator for outputting a 226.42 MHz frequency that matches the middle frequency of the 3rd IF of the main unit. The output signal is mixed with the signals from two local oscillators, thus generating the same frequency as the synchronization frequency input to the INPUT terminal of this unit.

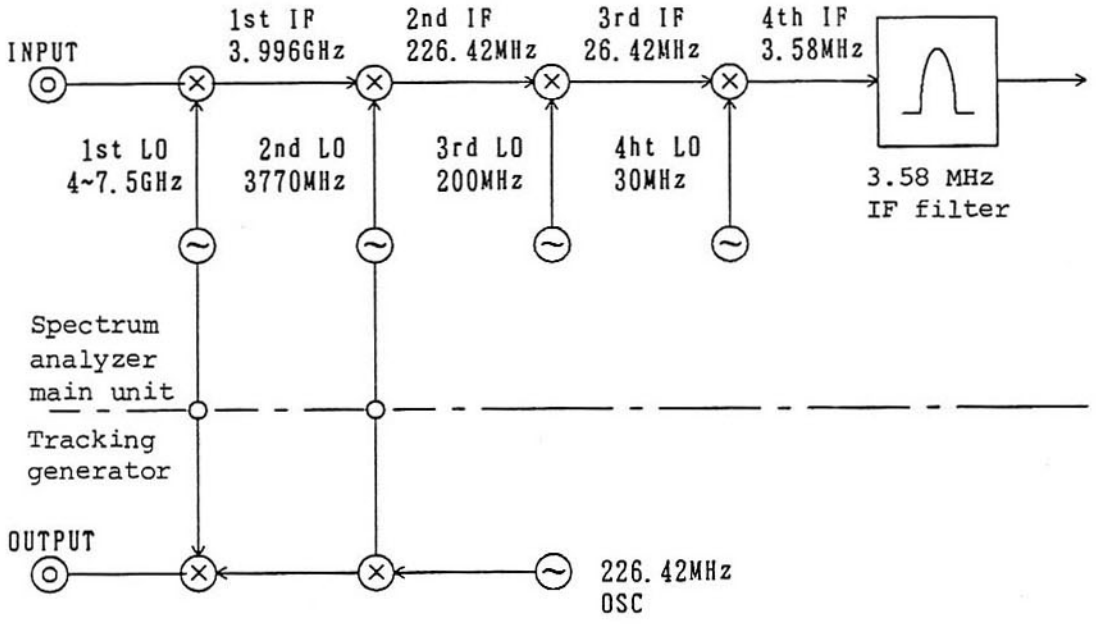


Figure 5-1 Operation Principle Block Diagram

The circuit of this unit mainly consists of a mixer and filters. The filters are used to eliminate spurious elements generated when signals are mixed. Amplifiers between mixers compensate return loss of each mixer. The final-stage amplifier lowers the mixing level of the final-stage mixer and lowers the spurious level within the frequency range.

The IF and output frequencies of this unit are the same as those of the spectrum analyzer main unit, local oscillators must be linked and then isolated sufficiently. If the IF and output signals leak into the main unit via the linked local oscillators, the main unit operates as if it has received a valid signal. This symptom is called T.G. leakage. T.G. leakage deteriorates sensitivity of this unit and lowers its the dynamic range.

Accordingly, each local oscillator is connected to the mixer via the isolation amplifier.

6. PERFORMANCE TEST

6.1 PREPARATION

The equipment and tools required for the performance testing are listed in Tables 6-1 and 6-2.

Table 6-1 Equipment Required for Performance Test

Equipment	Specifications	Recommended model
Spectrum Analyzer	(It is necessary to operate TR4153.)	TR4131
Spectrum Analyzer	Frequency range: 100 kHz to 2 GHz	TR4131
Power Meter	Frequency range: 100 kHz to 2 GHz	

Table 6-2 Tools Required for Performance Test

Tools	Mfr stock No's	ADVANTEST stock No's	Remarks
Cable	A01002		SMA-SMA cable (2 pcs)
Cable	M1-02	DCB-FF0386-1	BNC-BNC cable
Cable	M1-04	DCB-FF0388-1	N-N cable

6.2 FREQUENCY RANGE

① Connect TR4153 with TR4131 as shown in Figure 6-1(a).

② Connect the OUTPUT connector of this unit to the INPUT connector of TR4131. (See Figure 6-1(b).)

③ Press MKR on TR4131. Rotate an encoder to position a marker at the end of the waveform as shown in Figure 6-2.

④ Confirm that the marker value reads more than 2 GHz.

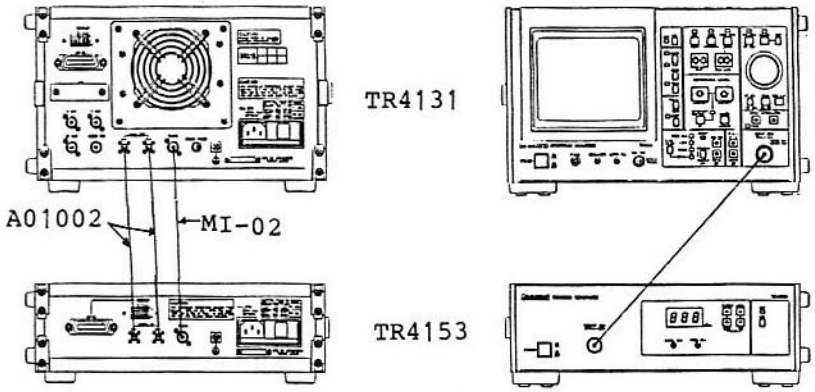


Figure 6-1 How to Connect Cables

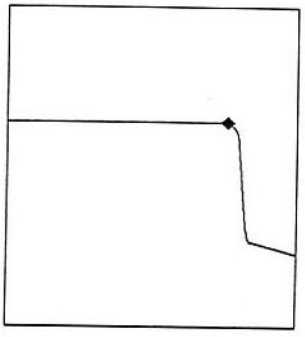


Figure 6-2 Marker Position

6.3 OUTPUT LEVEL FLATNESS

① Connect TR4153 with TR4131 as shown in Figure 6-1. Connect OUTPUT connector of TR4153 with POWER METER.

② Set the Freq SPAN of TR4131 to ZERO SPAN. Then, gradually slide up the CENTER FREQ from 100 kHz to 2 GHz with a rotary encoder, and read the display value of POWER METER.

TR4153A: ±1 dB (Based on CENTER FREQ 200 MHz)
TR4153B: ±0.5 dB (Based on CENTER FREQ 200 MHz)

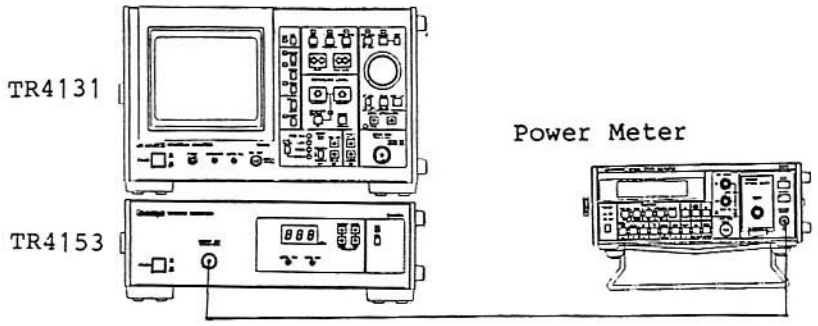


Figure 6-3 Output Level Flatness

6.4 T.G. LEAKAGE

① Connect TR4153 with TR4131 as shown in Figure 6-1(a), (b). Then, set the TR4131 as follows.

(TR4131)
- CENTER FREQ: 1000 MHz
- FREQ SPAN : 2 GHz
- RBW : 1 kHz

② Set the waveform to peak by turning the FREQ ADJ VR of TR4153.

③ Disconnect the cable between OUTPUT connector of TR4153 and INPUT connector of TR4131.

④ Set the TR4131 as follows.

(TR4131)
- INPUT ATT : 0 dB
- REF LEVEL : -60 dBm
- VIDEO FLTR: 10 Hz
- SWEEP TIME: 2 sec/DIV

⑤ Press MKR and read the peak value of the waveform.

SPEC: -110 dBm or less

6.5 OUTPUT SPURIOUS

1 Set up TR4131's as shown in Figure 6-4. Then, set TR4131(a) and (b) as follows.

(TR4131(a))
- CENTER FREQ: 0.5 MHz
- FREQ SPAN : 1 MHz
- Set the local feedthrough at the left end of screen.
- SWEEP TIME : 2 sec/DIV

(TR4131(b))
- CENTER FREQ: 1 MHz
- FREQ SPAN : 2 MHz
- Set the local feedthrough at the left end of screen.

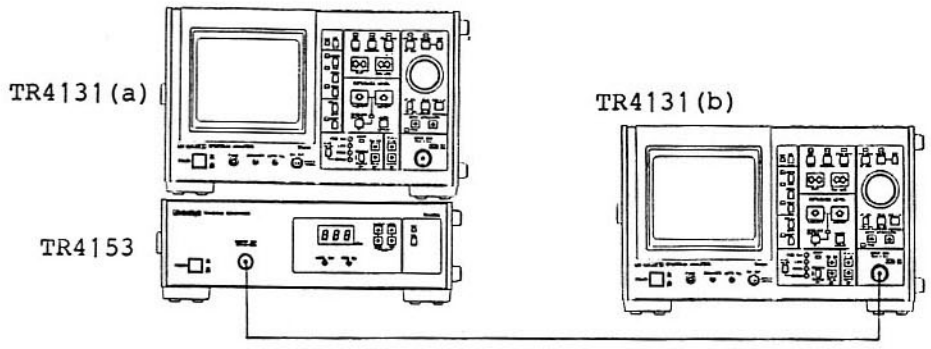


Figure 6-4 Output Spurious

2 Confirm that the spurious level is 20 dBc or more against T.G. fundamental waveform level.

SPEC: 20 dBc or more (Spurious)

3 Set the TR4131(a) and (b) as follows.

(TR4131(a))
- CENTER FREQ: 1000 MHz
- FREQ SPAN : 2 GHz
- SWEEP TIME : 2 sec/DIV

(TRTR4131(b))
- CENTER FREQ: 1000 MHz
- FREQ SPAN : 2 GHz

4 Confirm that the non-spurious level is 30 dBc or more against T.G. fundamental waveform.

SPEC: 30 dBc or more (Non-spurious)

6.6 TABLE OF SPECIFICATIONS

Table 6-3 Specifications

	Test items	Specifications
1	FREQUENCY RANGE	100 kHz to 2 GHz
2	OUTPUT LEVEL FATNESS	TR4153A: ±1.0 dB or less (with 0 dBm output at 100 kHz to 2.0 GHz) TR4153B: ±0.5 dB or less (with 0 dBm output at 100 kHz to 2.0 GHz)
3	T.G. leakage	-110 dBm or less
4	OUTPUT SPURIOUS	At output of 0 dBm Spurious high frequency is 20 dB or more. Spurious non-high frequency is 30 dB or more.

7. ADJUSTMENT & CALIBRATION

7.1 PREPARATION

Table 7-1 lists equipment and tools required for calibration and adjustment. Equivalent or superior substitutes may by used.

Table 7-1(a) Equipment and Tools Required for Calibration and Adjustment.

Equipment	Specifications	Recommended model
Spectrum Analyzer	(It is necessary to operate TR4153.)	TR4131
Spectrum Analyzer	Frequency range: 100 kHz to 4 GHz	TR4133
Spectrum Analyzer	Frequency range: 100 kHz to 120 MHz	TR4171
DC Power Supply	Output Voltage: ±10 V Accuracy : ±0.03%	TR6142
Sweep Adapter		TR13211
Signal Generator	Frequency Range: 100 kHz to 1.8 GHz	TR4511
	OUTPUT LEVEL: +10 dBm or more	
	Frequency Accuracy: 2 x 10-8/day	
Power Meter	Frequency: 100 kHz to 1.8 GHz	
	Sensitivity: -30 dBm to +20 dBm	
	Accuracy: ±0.5 dB	

Table 7-1 (b)

Tools	Mfr stock No's	ADVANTEST stock No's	Remarks
Cable	A01002		SMA-SMA cable (2 pcs.)
Cable	M1-02	DCB-FF0386-1	BNC-BNC cable (2 pcs.)

7.2 ADJUSTMENT OF 3.77 GHz BPF AND ISO CAVITY

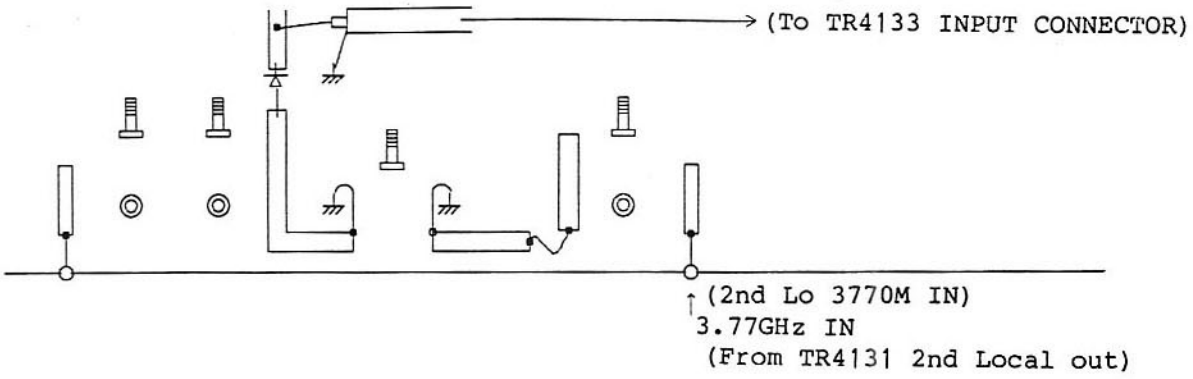


Figure 7-1 Adjustment of 3.77 GHz BPF and ISO Cavity

Maximize the 3.77 GHz leakage signl level from 2nd Mix by adjustment knobs ① and ②.

7.3 ADJUSTMENT OF 4.0 GHz BPF

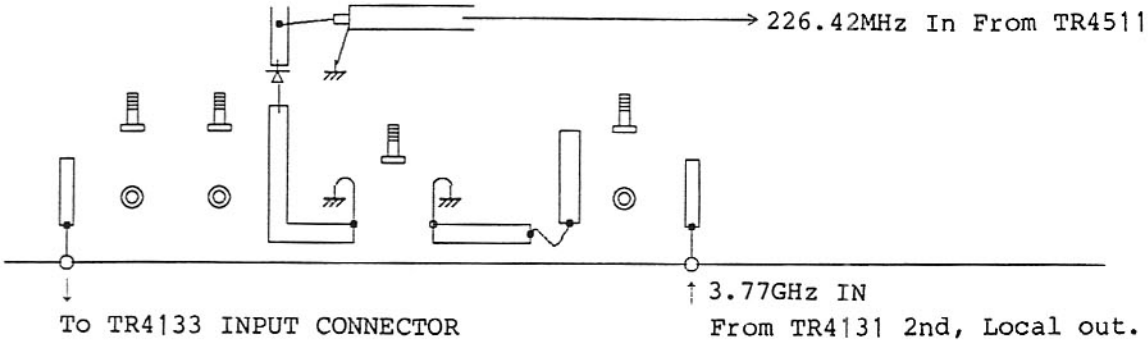


Figure 7-2 Adjustment of 4.0 GHz BPF

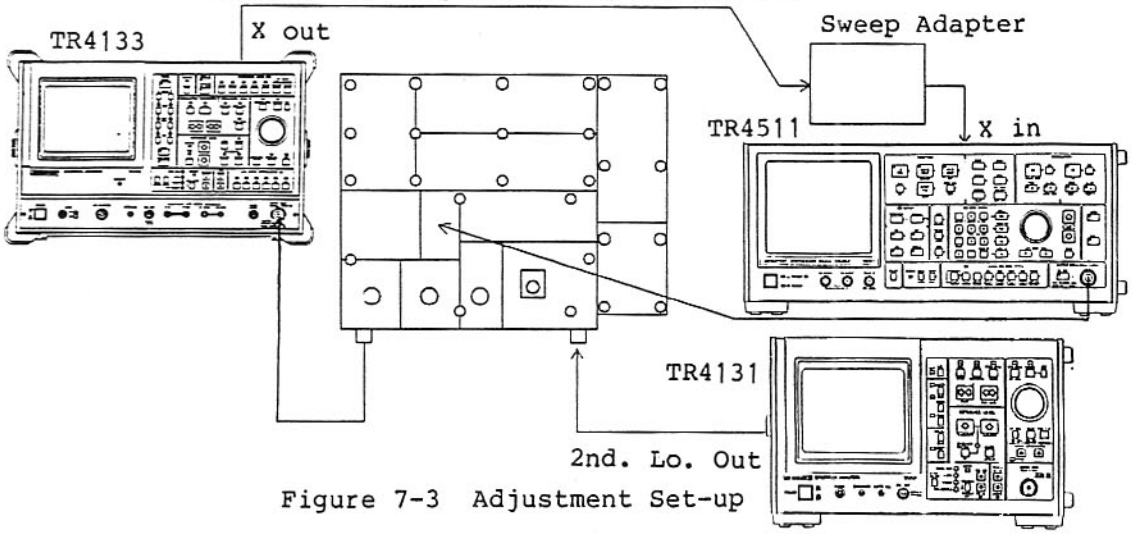


Figure 7-3 Adjustment Set-up

Set up as shown in Figures 7-2 and 7-3. Then, set TR4133 and TR4511 as follows.

(TR4133)

CENTER FREQ:		4000 MHz
FREQ SPAN	:	5 MHz/DIV
REF LEVEL	:	-20 dBm
SWEEP TIME	:	0.5 s/DIV

(TR4511)

CENTER FREQ:		226.42 MHz
FREQ SPAN	:	100 MHz
LEVEL	:	-20 dBm

With checking for 4 GHz BPF frequency characteristic, adjust the value by adjustment knobs 3 and 4 . Note that adjustment knobs 1 and 2 are not used at this time.

7.4 ADJUSTMENT OF 226.42 MHz VCO

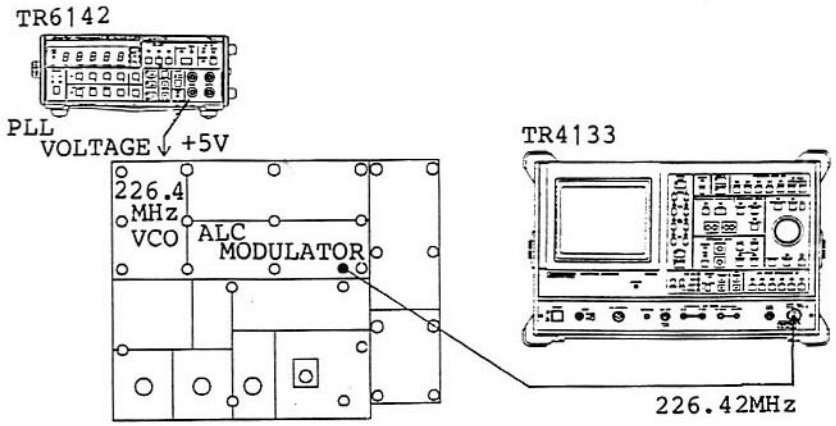


Figure 7-4 Adjustment of 226.42 MHz VCO

Apply +5.0 V to PLL terminal of 226.42 MHz VCO block by using TR6142. Then, connect ALC MODULATOR Board OUTPUT to TR4133 INPUT, and adjust frequency to 226.42 MHz ±0.1 MHz with 226.42 MHz VCO Block L6.

7.5 ADJUSTMENT OF 22.6 MHz VCXO

① Connect Q1 collector of DIGITAL PLL BOARD with TR4171, and adjust 22.6 MHz level to maximum by C5 and L3 of 22.6 MHz VCXO Block.

② Rotate the FREQ ADJ VR on TR4153 front panel clockwise to adjust frequency of DIGITAL PLL BOARD Q1 collector to 22.642 MHz + 4.0 kHz by 22.6 MHz VCO Block L2.

③ Similarly, rotate the FREQ ADJ VR counterclockwise, and confirm the frequency is set to 22.642 MHz -4kHz.

7.6 ADJUSTMENT OF ALC CONTROL BOARD

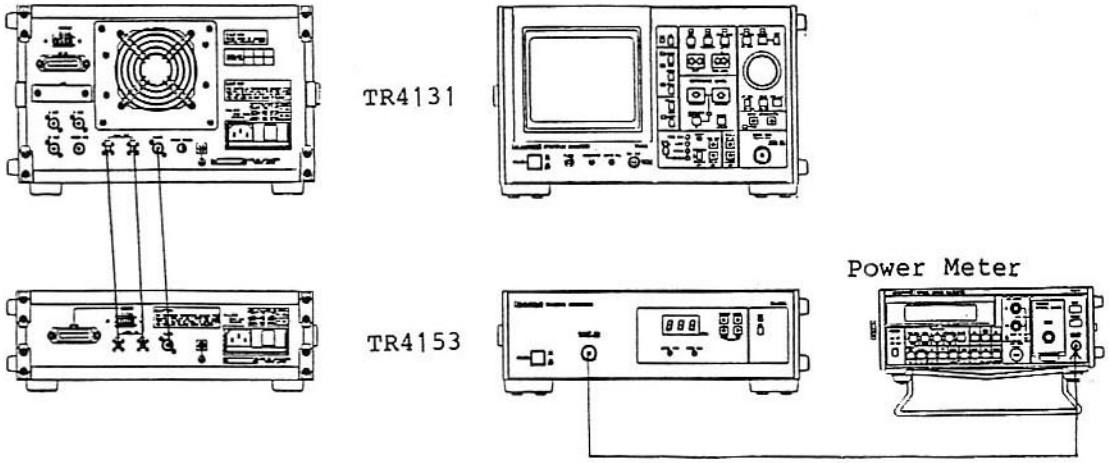


Figure 7-5 How to Connect TR4153 and TR4131

① Connect POWER METER with OUTPUT connector of TR4153.

② Set the TR4131 as follows. And adjust POWER METER display to 0 dBm with ALC CONTROL BOARD R5.

(TR4131)
CENTER FREQ: 2000 MHz
FREQ SPAN : Zero
CF CAL

③ Re-set the FREQ SPAN to 4 GHz. Then, set the TR4131 as follows, and adjust POWER METER display to 0 dBm by ALC CONTROL BOARD R2.

(TR4131)
CENTER FREQ: 200 MHz
FREQ SPAN : Zero
CF CAL

④ Connect TR4131 INPUT connector with TR4153 OUTPUT connector. After setting TR4131 to CENTER FREQ: 200 Mhz, FREQ SPAN: zero and CF CAL , connect TR4153 OUTPUT connector with POWER METER. (See Figure 7-5.)
Lower the output level of TR4153 in 1 dB step with DOWN key, and adjust them by each VR as shown in Table 7-2.

Table 7-2 Adjustment of ALC CONTROL

OUTPUT LEVEL	VR	Measured OUTPUT LEVEL	Specification
0 [dBm]	R2	0.00 [dBm]	±0.2dB
-1	R13	-1.00	
-2	R16	-2.00	
-3	-	-3.00	
-4	R19	-4.00	
-5	-	-5.00	
-6	R22	-6.00	
-7	-	-7.00	
-8	-	-8.00	
-9	-	-9.00	

8. MAINTENANCE INFORMATION

8.1 LOCATION

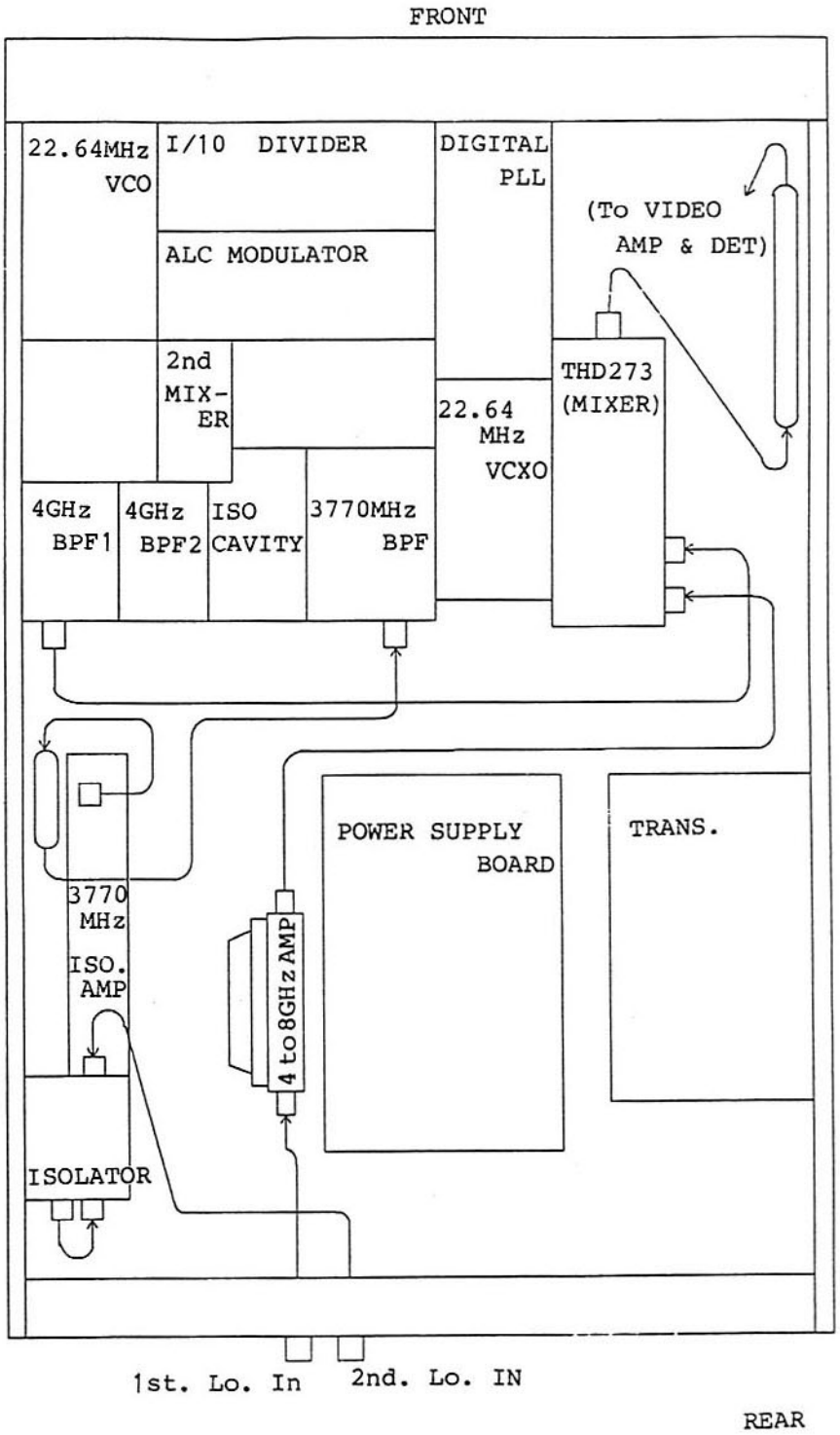


Figure 8-1 Top View

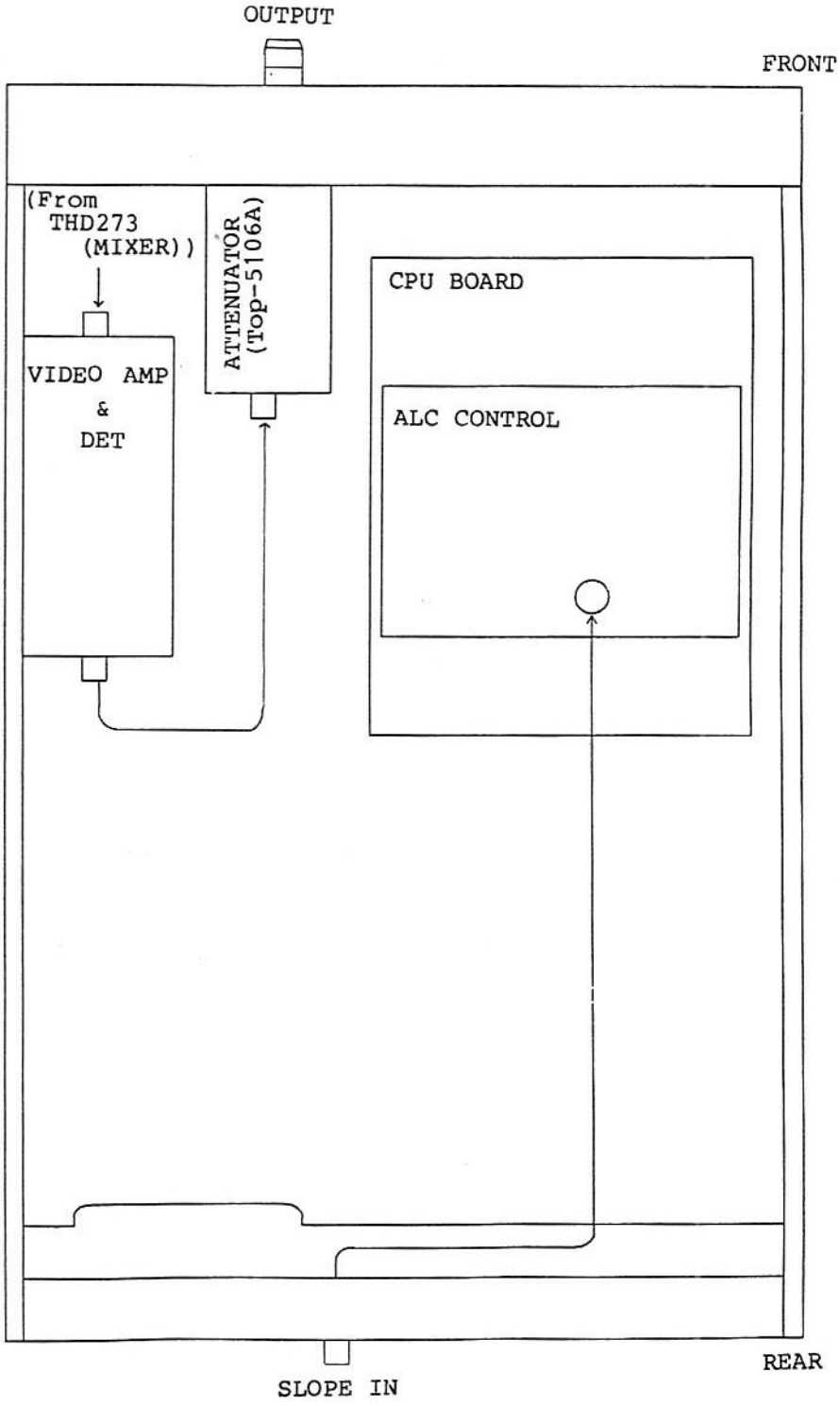


Figure 8-2 Bottom View

8.3 LEVEL DIAGRAM

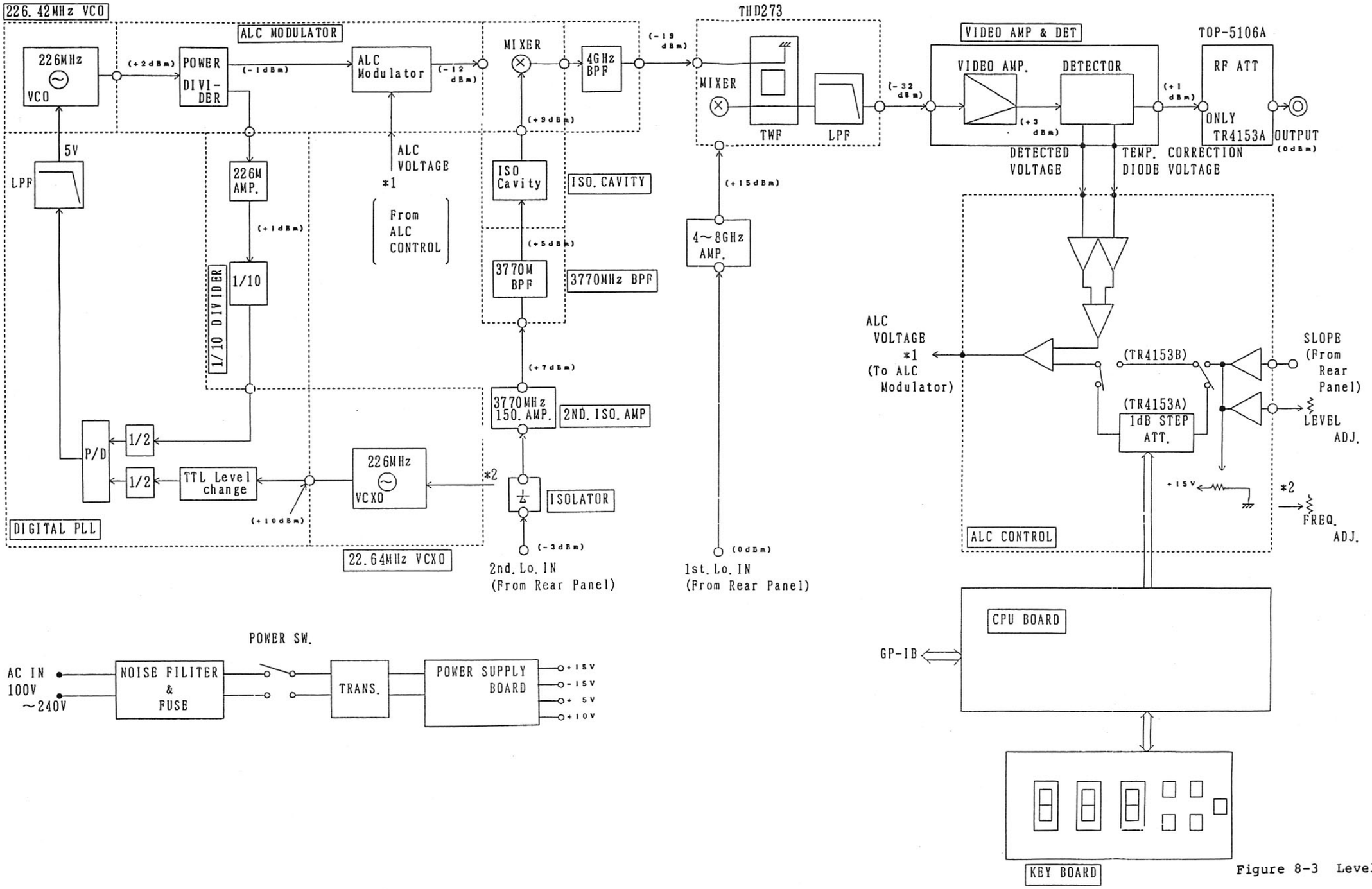
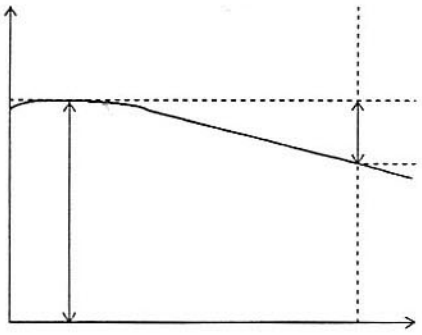


Figure 8-3 Level Diagram

CHARACTERISTIC OF VIDEO AMP & DET BLOCK.



Gain : 35dB

Frequency
Flatness : 5dB

CHARACTERISTIC OF ALC MODULATOR BOARD

ALC VOLTAGE	OUTPUT LEVEL
+12V	big
↓	↓
+0V	small

LIST OF FIGURES

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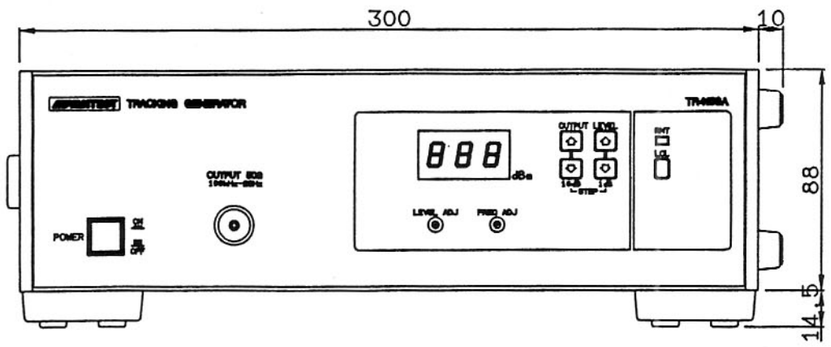
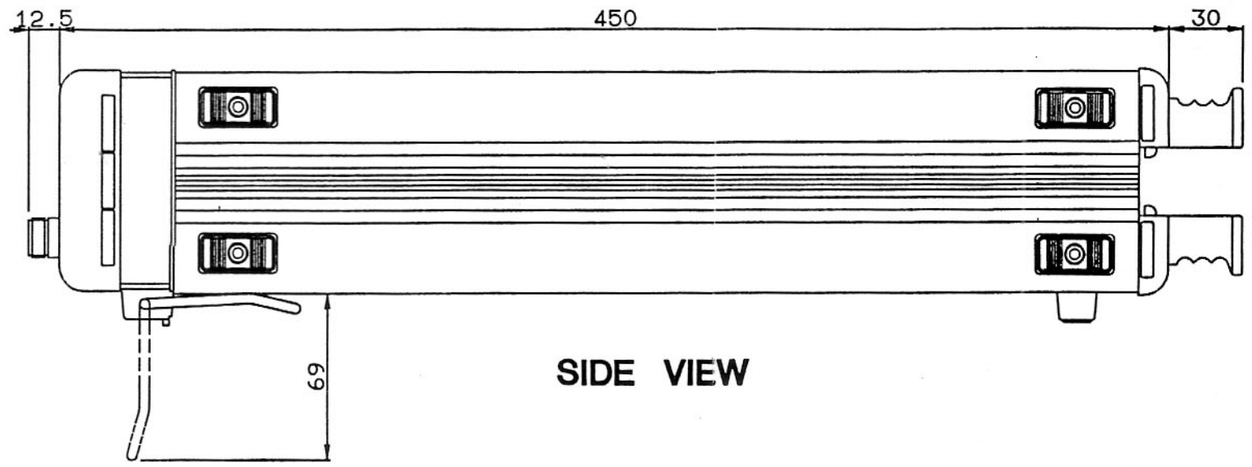
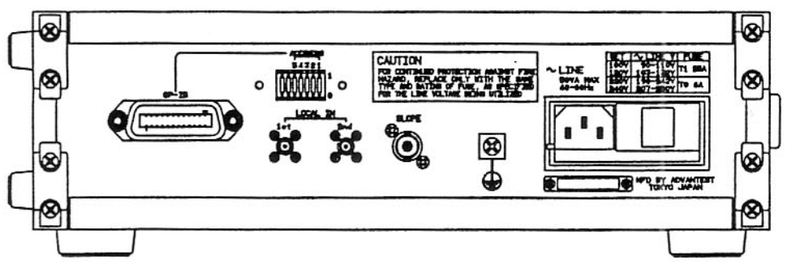


FRONT VIEW

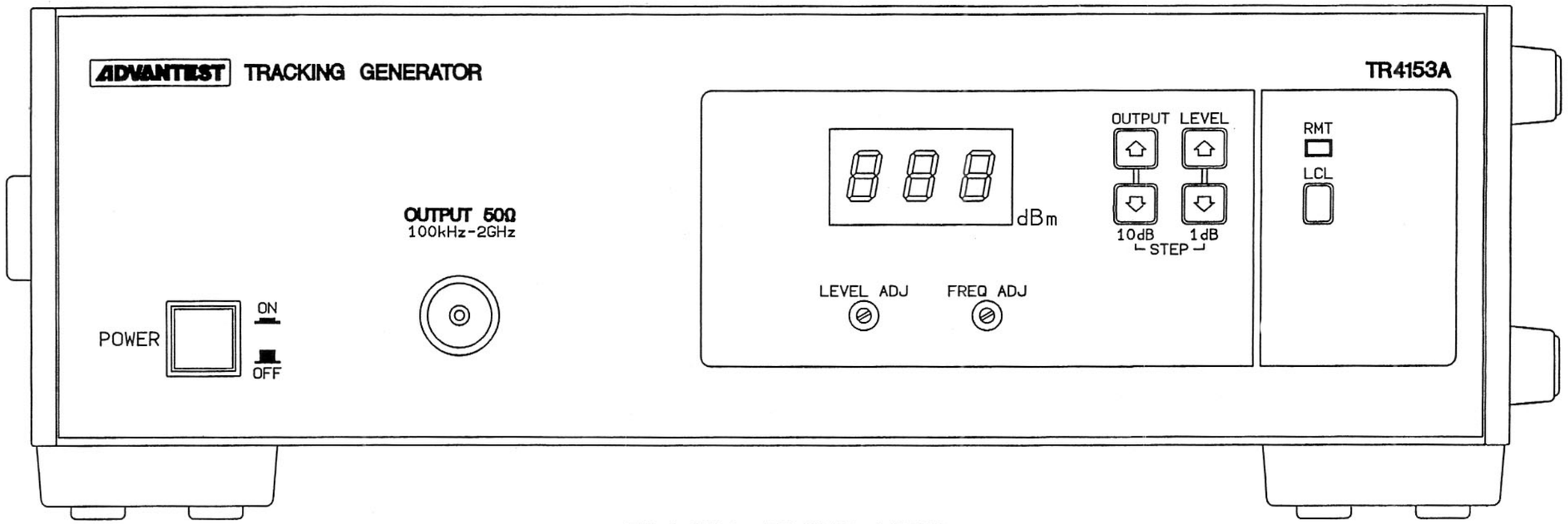


SIDE VIEW



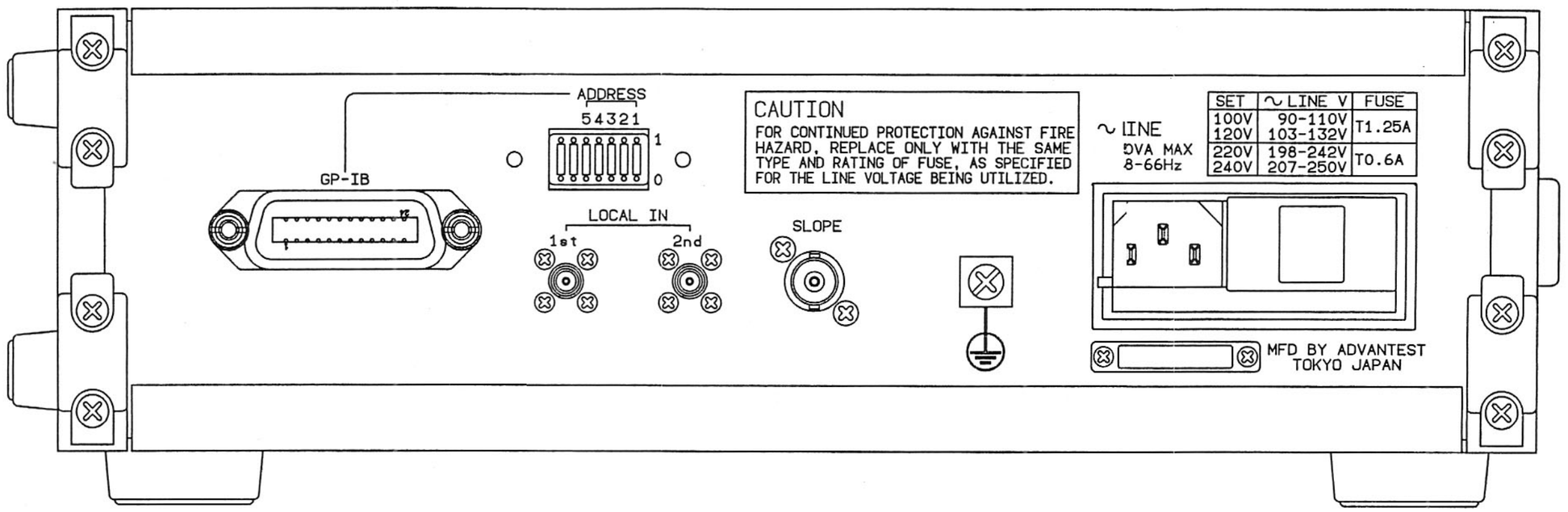
REAR VIEW

TR4153A
EXTERNAL VIEW



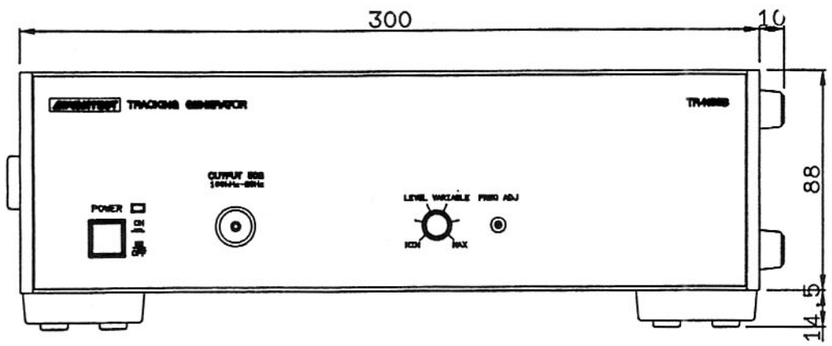
TR4153A FRONT VIEW

4153A EXT2-512-A

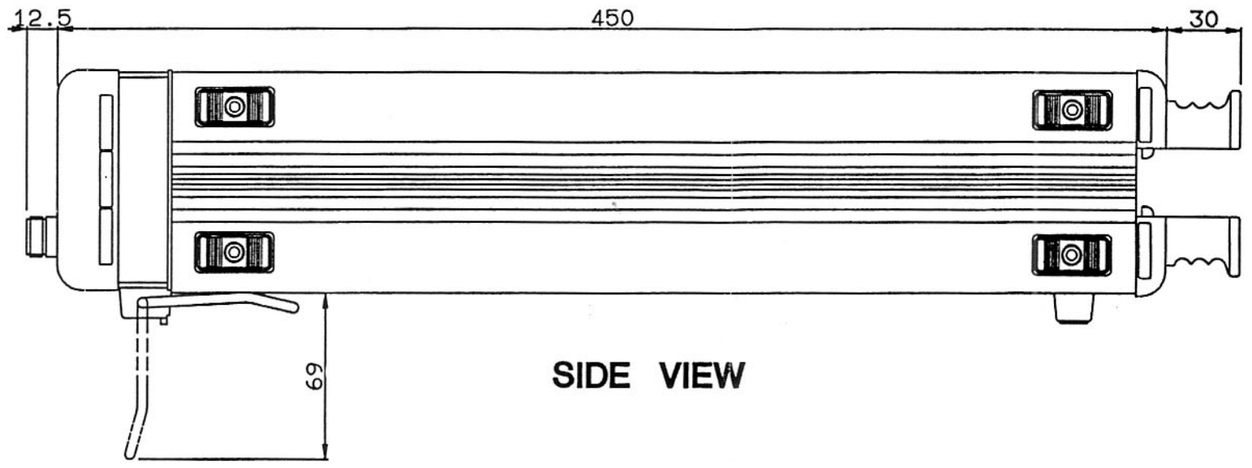


TR4153A REAR VIEW

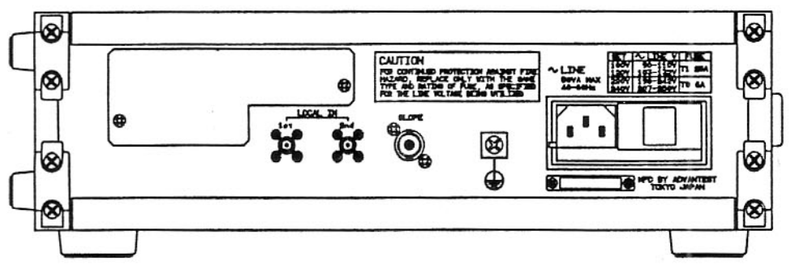
4153A EXT3-512-A



FRONT VIEW



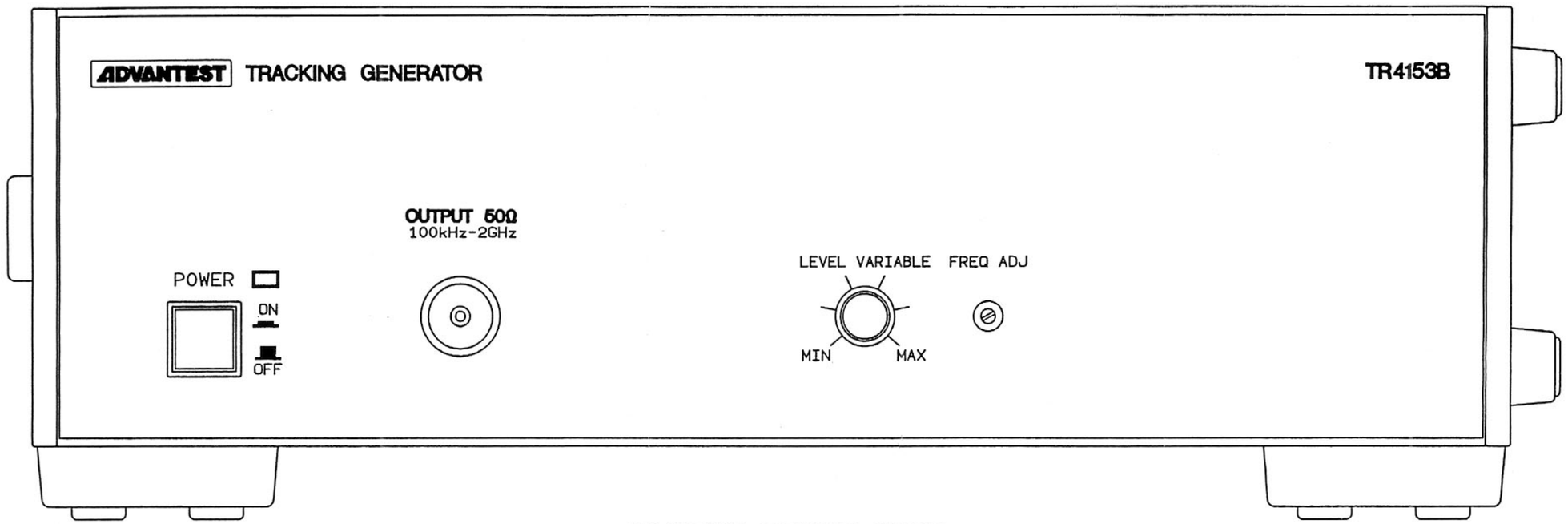
SIDE VIEW



REAR VIEW

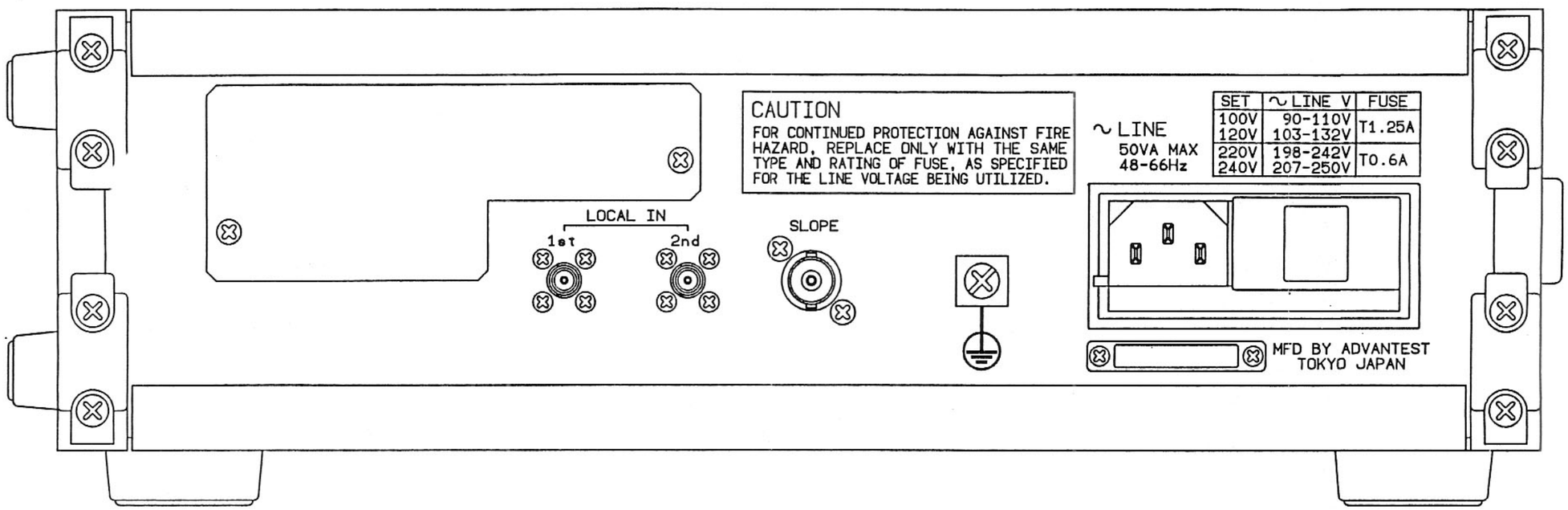
4153B EXT1-512-A

TR4153B
EXTERNAL VIEW



TR4153B FRONT VIEW

4153B EXT2-512-A



TR4153B REAR VIEW

4153B EXT3-512-A

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
CB1	DCB-FF2023X08		
CB2	DCB-FF2023X18		
CB3	DCB-FF0934X26		
CB6	DCB-FF0934X17		
CB8	DCB-FF1167X11-1		
CB10 -11	DCB-QS1271X02		
CB12	DCB-QS1271X01		
CB15	DCB-RR1210X02		
CB18	DCB-FF0934X09-1		
F1	DFT-AG1R25A		
FL1	DEE-001172-1		
FL2	SHB-001020-1		
FL3	DEE-001166		
J1	JCD-AA003PX01-1		
J2	YEE-000738		
J3	YEE-000737		
J4	JCF-AA001PX09-2		
J5	JCF-AF001JX02-1		
J6	JCF-AB001JX03-1		
P1	JTE-AG001EX01-1		
R1	RVR-BA2K-1		
R2	RVR-AD5K-2		
S1	KSP-000035-1		
T1	LTP-000697B		
U1	SIA-CGB408000-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
CB1	DCB-FF2023X08		
CB2	DCB-FF2023X18		
CB3	DCB-FF0934X26		
CB8	DCB-FF1167X11-1		
CB10 -11	DCB-QS1271X02		
CB12	DCB-QS1271X01		
CB16	DCB-FF0934X24		
CB17	DCB-QS1271X02		
CB18	DCB-FF0934X09-1		
D1	NLD-000001-1		
F1	DFT-AG1R25A		
FL1	DEE-001172-1		
FL2	SHB-001020-1		
FL3	DEE-001166		
J1	JCD-AA003PX01-1		
J2	YEE-000738		
J3	YEE-000737		
J5	JCF-AF001JX02-1		
J6	JCF-AB001JX03-1		
P1	JTE-AG001EX01-1		
R2	RVR-AD5K-2		
R3	RVR-BL10K-1		
S1	KSP-000035-1		
T1	LTP-000697B		
U1	SIA-CGB408000-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CSM-ACR1U50V		
C2	CCK-BN4700U16V		
C3	CSM-ACR1U50V		
C4	CCK-AR47U10V-1		
C5	CSM-ACR1U50V-1		
C6	CCK-BN4700U50V-1		
C7	CSM-ACR1U50V		
C8	CCK-AR33U25V-1		
C9	CSM-ACR1U50V		
C10	CCK-BN4700U50V-1		
C11	CSM-ACR1U50V		
C12	CCK-AR33U25V-1		
C13	CSM-ACR1U50V		
C14	CCK-BN4700U50V-1		
C15	CSM-ACR1U50V		
C16	CCK-AR10U25V-1		
C17	CSM-ACR1U50V		
C18	CCK-AR22U10V		
C19	CSM-ACR1U50V		
C20	CCK-AR22U25V		
D1	SDP-S10SC4M-1		
D2	SDS-RB402		
D3	SDS-RB402		
D4	SDS-RB402		
J1	JCS-BL006PX01		
J2	JCS-BL004PX01		
J3	JCS-AD022PX03-1		
J4 -5	JCP-BH003PX01-1		
R1 -4	RCB-AH10K		
U1	SIA-S3052-2		
U2 -3	SIA-S3152		
U4	SIA-7810M		

TR4153A/B

BLC-013182X01

Parts No.	ADVANTEST Stock No.
C1	CSM-AGR1U50V
C2 -3	CCK-AA10U25V
C4	CSM-AGR1U50V
C5	CCK-AA22U10V
C6	CSM-AGR1U50V
C7	CFM-ASR047U50V
C8 -25	CSM-AGR1U50V
D1	SDS-1S953
D2	SDZ-W120-5
J1	JCS-AD022PX01-1
J2	JCS-AD010PX02-1
J3	DCB-RR1575X01
J4	JCP-BH005PX02-1
J5 -6	JCP-BH003PX02-1
J7	JCF-AC001JX01
L1 -3	LCL-C00010
R1	RCB-AG10K
R2	RVR-CB5K
R3	RCB-AG4R7K
R4	RMF-AC47KFJ
R5	RVR-CB200K
R6	RCB-AG15K
R7	RMF-AC27KFJ
R8	RCB-AG2R2K
R9	RCB-AG4R7K
R10	RMF-AC27KFJ
R11	RMF-AC10KFJ
R12	RMF-AC39KFJ
R13	RVR-CB50K
R14	RMF-AC10KFJ
R15	RMF-AC18KFJ
R16	RVR-CB20K
R17	RMF-AC10KFJ
R18	RMF-AC5R1KFJ
R19	RVR-CB10K
R20	RMF-AC10KFJ
R21	RMF-AC12KFJ
R22	RVR-CB10K
R23	RMF-AC10KFJ
R24	RCB-AG4R7K
R25	RMF-AC1KFJ
R26	RMF-AC1KFJ
R28	RCB-AG220
R29	RMF-AC1KFJ
R30 -31	RMF-AC6R8KFJ
R32 -35	RMF-AC2R2KFJ
R37	RMF-AC39KFJ
R38	RMF-AC5R1KFJ
R39	RVR-CB500
R40	RMF-AC680QFJ
R41	RAY-AL10K4
R42 -43	RMF-AC47KFJ
R44	RCB-AG47K
R45	RCB-AG12K
R46	RCB-AG10K
R47	RCB-AG47K
R48	RVR-CB2K
R49	RMF-AC18KFJ
U1 -4	SIA-TL072-1
U5 -9	SIA-OP07P-2
U10	SIT-74LS07
U11	SIA-4066-1

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CSM-AGR1U50V		
C2 -3	CCK-AA10U25V		
C4	CSM-AGR1U50V		
C5	CCK-AA22U10V		
C6	CSM-AGR1U50V		
C7	CFM-ASR047U50V		
C8 -15	CSM-AGR1U50V		
C18 -21	CSM-AGR1U50V		
C22 -23	CSM-AGR1U50V		
D2	SDZ-W120-5		
J1	JCS-AD022PX01-1		
J2	JCS-AD010PX02-1		
J4	JCP-BH005PX02-1		
J5 -6	JCP-BH003PX02-1		
J7	JCF-AC001JX01		
J9	JCP-BH003PX02		
L1 -3	LCL-C00010		
R1	RCB-AG10K		
R2	RVR-CB5K		
R3	RCB-AG4R7K		
R4	RMF-AC47KFJ		
R5	RVR-CB200K		
R6	RCB-AG15K		
R7	RMF-AC27KFJ		
R8	RCB-AG2R2K		
R9	RCB-AG4R7K		
R10	RMF-AC27KFJ		
R11	RMF-AC4R7KFJ		
R12	RCB-AG100		
R13	RVR-CB1K		
R23	RMF-AC10KFJ		
R24	RCB-AG4R7K		
R25	RMF-AC1KFJ		
R26	RMF-AC1KFJ		
R28	RCB-AG220		
R29	RMF-AC1KFJ		
R30 -31	RMF-AC6R8KFJ		
R32 -35	RMF-AC2R2KFJ		
R38	RMF-AC5R1KFJ		
R39	RVR-CB500		
R40	RMF-AC680QFJ		
R44	RCB-AG47K		
R45	RCB-AG12K		
R50	RCB-AG2R7K		
U1 -2	SIA-TL072-1		
U3	SIA-TL072-1		
U5 -9	SIA-OP07P-2		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CCK-AR10U16V		
C2 -3	CMC-AB150PR3K-4		
C4	CSM-AGR1U50V		
C5	CSM-AC22P50V		
C6	CCK-AR22U25V		
C7 -28	CSM-AGR1U50V		
C29	CCK-AR100U16V		
C30	CSM-AGR1U50V		
C31	CCK-AR10U25V		
D1 -7	SDS-1S953		
J1	JCR-AV034PX01-1		
J2	DCB-RR1594X01		
J3	JCR-BM010PX02-1		
J4	JCP-AA012PX05-1		
L1	LCL-T00084A-1		
L2	LCL-C00010		
Q1 -7	STP-2SA1015		
R1	RCB-AG10K		
R2	RCB-AG2R2K		
R3	RCB-AG4R7K		
R4	RCB-AG1K		
R5	RCB-AG220		
R6	RCB-AG22		
R7	RCB-AG10K		
R8 -13	RCB-AG5R6K		
R14 -19	RCB-AH100		
R20	RAY-AL680Q6		
R21	RAY-AL10K6		
R22 -23	RCB-AG10K		
U1	SIM-74HC02		
U2	SIM-74HC374		
U3	SIM-74HC138		
U4	SIM-74HC374		
U5	SIM-74HC244		
U6	SIM-74HC30		
U7	SIT-74LS148		
U8	SIM-Z80		
U9 -10	SIM-74HC244		
U11	SIM-9914		
U12	SIT-75161		
U13	SMM-8464B		
U14	SIT-75160		
U15	SIM-74HC04		
U16	SIM-74HC32		
U17	SMM-27128A		
U18	SIT-7416		
U19	SIM-74HC393		
U20	SIT-74LS04-1		
U21	SIM-74HC04		
X1	DXE-001082-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1 -2	CSM-ACR01U50V		
D1 -3	NLD-000096-1		
D4	NLD-000003-1		
J1	JCR-AV020PX01-1		
J2 -4	JCI-AN016JX04-1		
Q1	STN-2SC1815-55		
R1	RCB-AG820		
R2	RCB-AG10K		
R3 -17	RCB-AG680		
R18	RAY-AL10K6		
SW1 -5	KSP-000250-2		
U1	SIT-74LS47		
U2	SIT-74LS47		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
CB1	DCB-FF0934X25		
FL1 -11	DNF-001052-1		
J1	JCF-AA001JX01		
J2	JCF-AA001JX05		
J3	JCS-AD010PX05-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
R1	RCP-AB100		
Y1	DXD-000792-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
Y1	DXD-000792-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CCP-AC5P50V		
C2	CTM-BP25P-1		
C3	CCP-AC22P50V		
D1	SDS-6789-1		
L1	LCL-A00514		
L2	LCL-B00052		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
L1	MYM-28385A		
L2	MYM-28386A		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
Y1	DXD-001266-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CSM-AC2200P50V		
C2	CCP-ACR01U50V		
C3	CCP-AC33P50V		
C4	CCP-AC15P50V		
C5	CCK-AR33U25V-1		
C6	CSM-ACR01U50V		
C7	CCK-AR10U25V-1		
D1 -2	SDS-1SV50		
L1 -3	LCL-B00323		
L4	LCL-A00068		
L5	LCL-C00010		
Q1	STN-2SC2369-2		
Q2	STP-2SA1015		
R1	RCB-AG150		
R2 -3	RCB-AG150		
R4	RCB-AG10K		
R5	RCB-AG5R6K		
R6	RCB-AG390		
R7	RCB-AG4R7K		
R8	RCB-AG180		
R9	RCB-AG33		
R10	RCB-AG180		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CSM-AC18P50V		
C2 -5	CSM-AC1000P50V		
C6	CTM-BM6P		
C7	CMC-AB15PR5K-6		
C8	CSM-AC1000P50V		
C9	CCK-AR10U25V		
C10	CSM-ACR01U50V		
L1	LCL-C00521		
L2	LCL-E00388		
L3	LCL-A00063		
L4	LCL-B00343		
L5	LCL-C00010		
Q1	SFM-3SK74-1		
R1	RCB-AG100		
R2	RCB-AG39		
R3	RCB-AG150		
R4	RCB-AG47		
R5	RCB-AG27K		
R6	RCB-AG15K		
R7	RCB-AG4R7K		
R8	RCB-AG390		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1 -3	CSM-AC1000P50V		
C4 -5	CSM-AGR1U50V		
L1 -2	LCL-C00010		
R1	RCB-AG150		
R2	RCB-AG33		
R3 -4	RCB-AG150		
R5	RCB-AG33		
R6	RCB-AG150		
R7	RCB-AG2R2K		
U1	SIA-1655-1		
U2	SIC-11C90		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CSM-ACR01U50V		
C2	CMC-AB100PR3K-4		
C3	CSM-AGR1U50V		
C4 -6	CSM-ACR01U50V		
C7	CCK-AR10U16V		
C8 -9	CCK-AR10U25V		
L1 -3	LCL-C00010		
Q1	STN-2SC2901		
R1	RCB-AG1K		
R2	RCB-AG27K		
R3	RCB-AG470		
R4	RCB-AG330		
R5	RCB-AG68		
U1	SIT-74S74		
U2	SHB-001510-1		

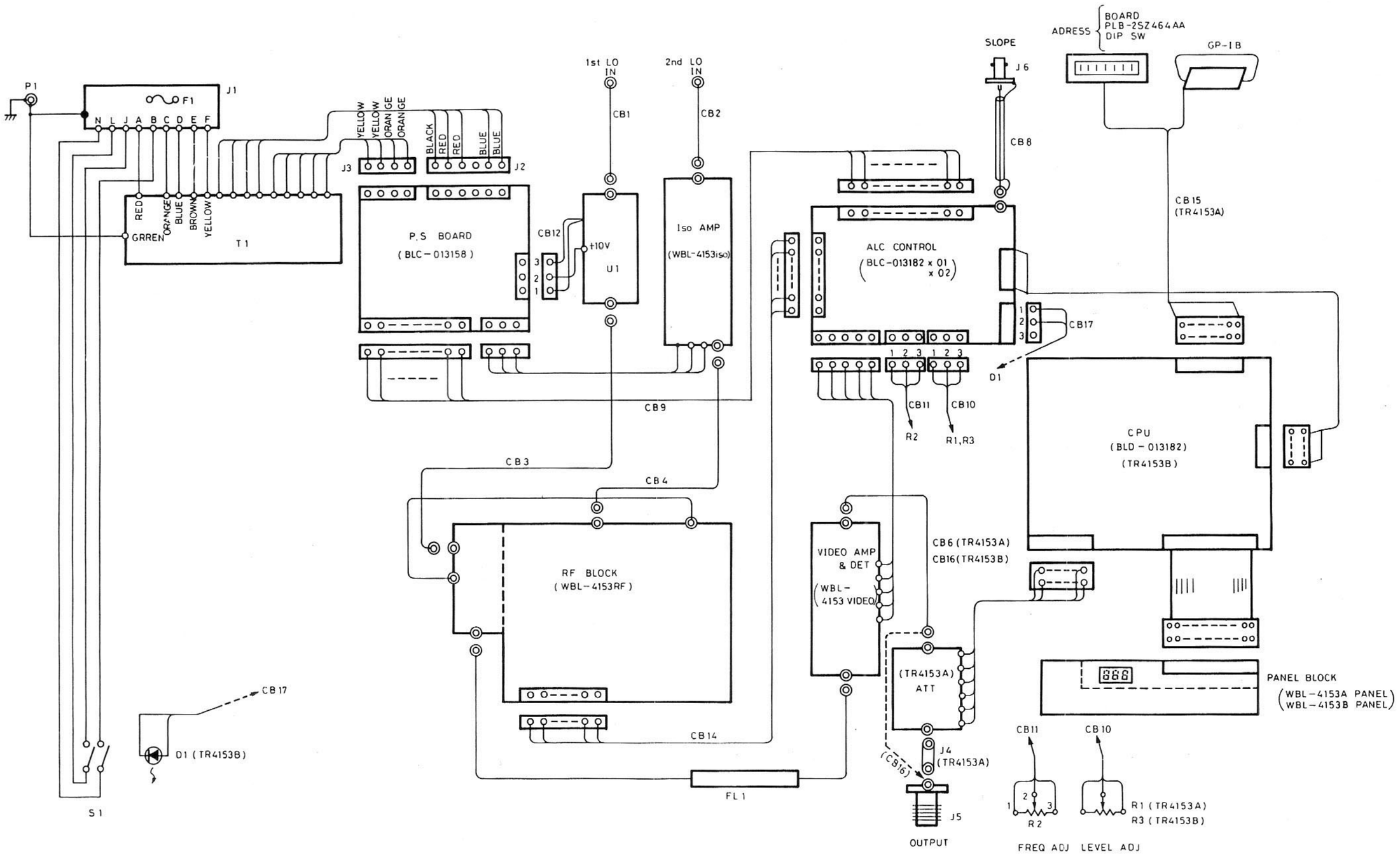
Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CSM-ACR01U50V		
C2	CMC-AB68PR3K-4		
C3	CMC-AB150PR3K-4		
C4	CMC-AB68PR3K-4		
C5	CTM-BM30P		
C6	CMC-AB150PR3K-4		
C7	CSM-ACR01U50V		
C8	CCK-AR10U25V-1		
D1	SDS-1SV50-1		
L1	LCL-B00158-1		
L2	LCL-C00309-1		
L3	LCL-C00329-1		
L4	LCL-C00010		
Q1	STN-2SC2026		
R1	RCB-AG330		
R2 -3	RCB-AG10K		
R4	RCB-AG1R2K		
X1	DXD-001194-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
CB1	DCB-QS1272X02		
FL1 -5	DNF-001052-1		
J1 -2	JCF-AA001JX01		

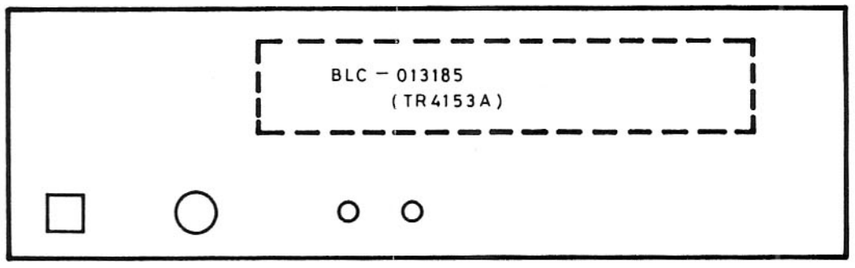
Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1 -7	CCP-AE1U50V-1		
C8 -9	CCP-ADR1U50V		
C10 -11	CCP-AE1U50V-1		
L1	LCL-B00052		
L2	LCL-A00516		
L3	LCL-B00052		
L4	LCL-A00516		
L5	LCL-B00052		
R1	RCB-AK270		
R2 -4	RCB-AK330		
R5	RCB-AK220		
R6	RMF-AR33KFK-1		
R7 -8	RMF-AR470KFK-1		
R9	RMF-AR27KFK-1		
R10	RVR-AK10K		
R11	RCP-AG470		
R12	RCP-AG10		
R13	RCP-AG470		
U1 -5	SIA-0435-1		
U6	SHB-000865-1		

Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
CB1	DCB-QS1271X02		
CB2	DCB-FF0934X07		
E1	DEE-001242-1		
FL1 -3	DNF-001052-1		
J1	JCF-AA001JX01		
J2	JCF-AA001JX06-1		

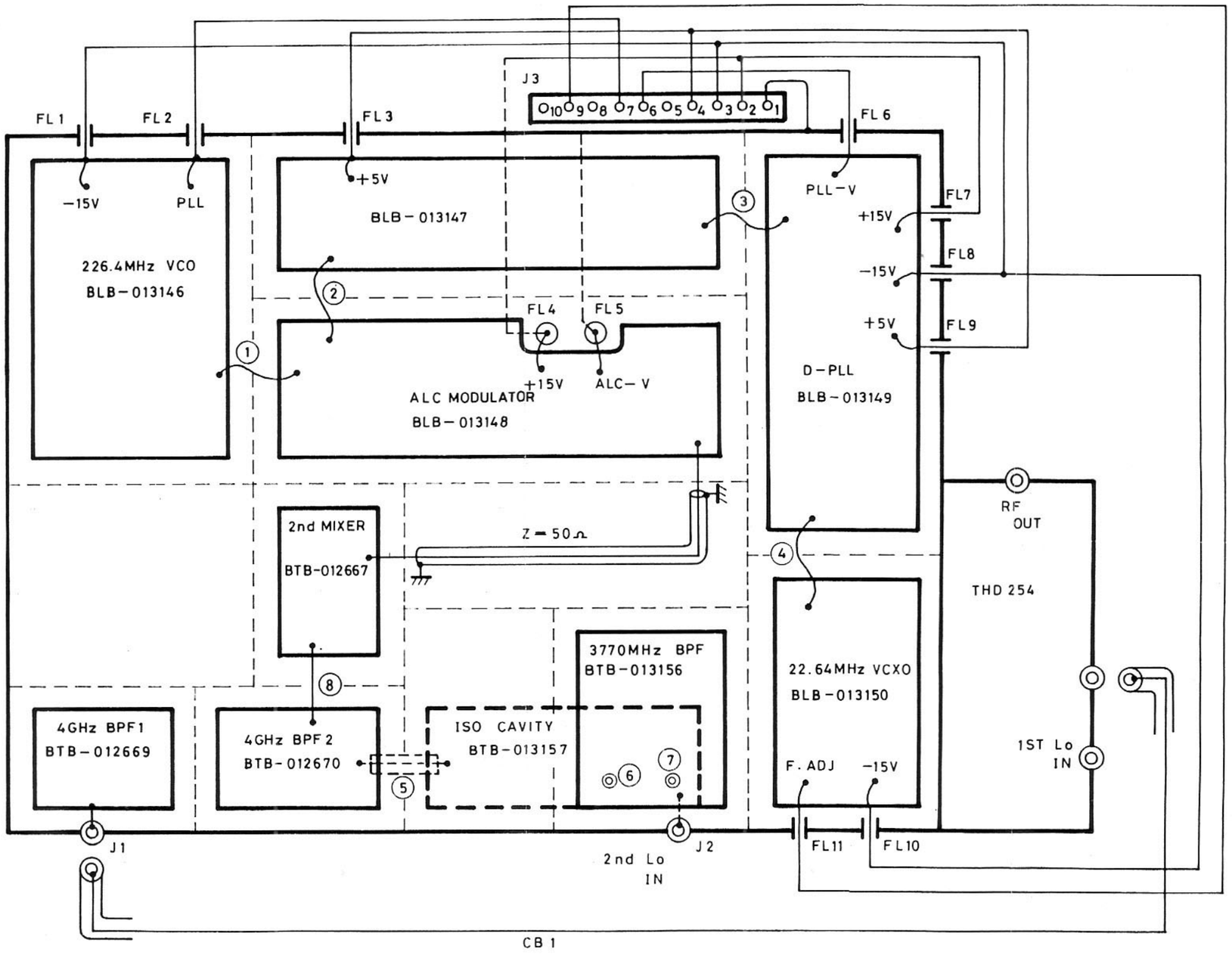
Parts No.	ADVANTEST Stock No.	Parts No.	ADVANTEST Stock No.
C1	CCP-AT36PR1K		
C2 -4	CCP-AV68PR1K		
C5	CCP-AT36PR1K		
C6	CCP-AV68PR1K		
C7	CCK-AR10U25V		
C8 -9	CCP-AT36PR1K		
C10 -11	CCP-BCR01U50V		
C12 -13	CSM-ACR01U50V		
C14 -15	CCP-BCR01U50V		
C16	CSM-ACR01U50V		
D1	SDZ-W050-5		
L1	LCL-A00671		
Q1	SFN-2SK571-1		
Q2	STN-2SC1730		
Q3	SFN-2SK571-1		
Q4	STP-2SA1015		
R1	RCB-AG27K		
R2	RCB-AG10K		
R3	RCB-AG22K		
R4	RCB-AG10K		
R5	RCB-AG680		
R6	RCP-AG220		
R7	RCP-AG22		
R8	RCP-AG220		
R9	RCB-AG1R5K		
R10	RCB-AG10		
R11	RCB-AG6R8K		
R12	RCB-AK330		
R13	RCB-AG2R7K		
R14	RCB-AG12K		



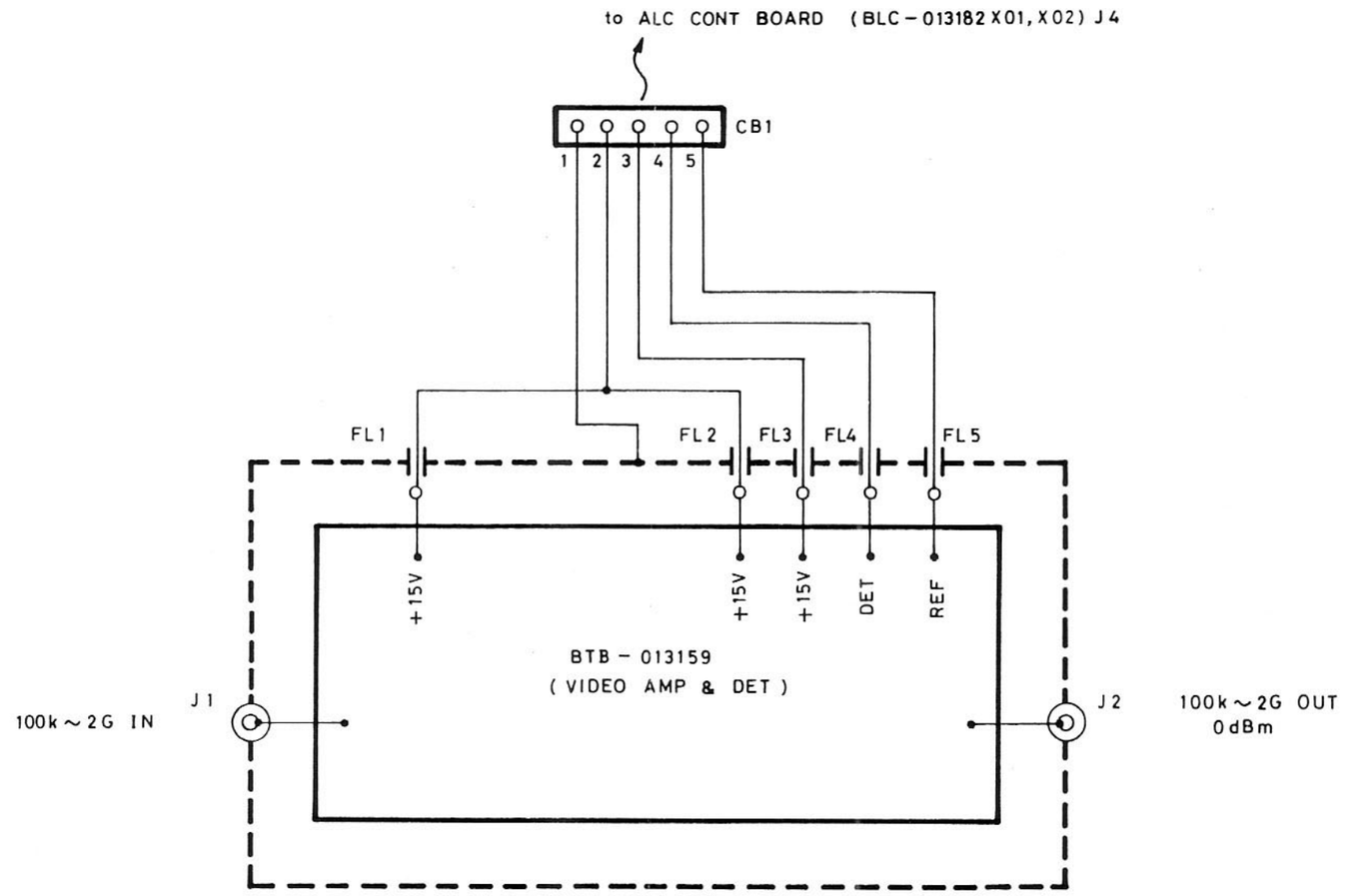
TR4153A/4153B
SCHEMATIC SECTION
WFU-4153AE/BE

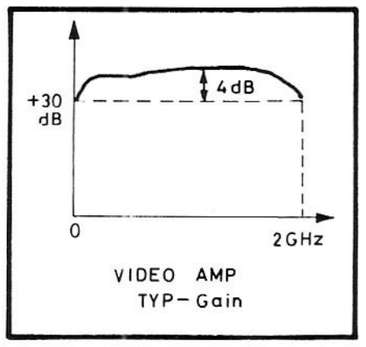


TR4153A/4153B
PANEL BLOCK
WBL – 4153APANEL/BPANEL



TR4153A/4153B
RF BLOCK
WBL − 4153RF





4153807-004-A

TR4153A/4153B
VIDEO BLOCK
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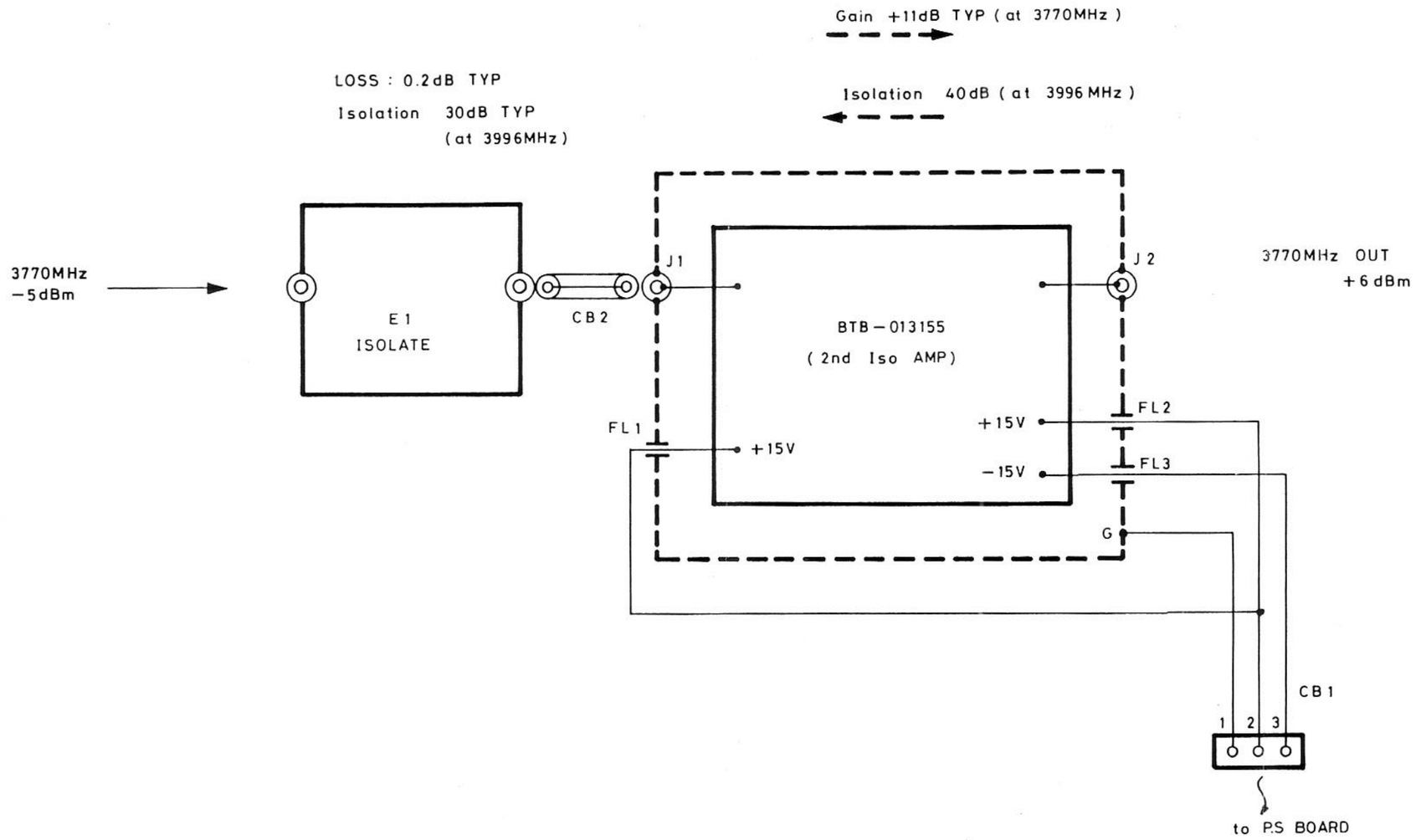
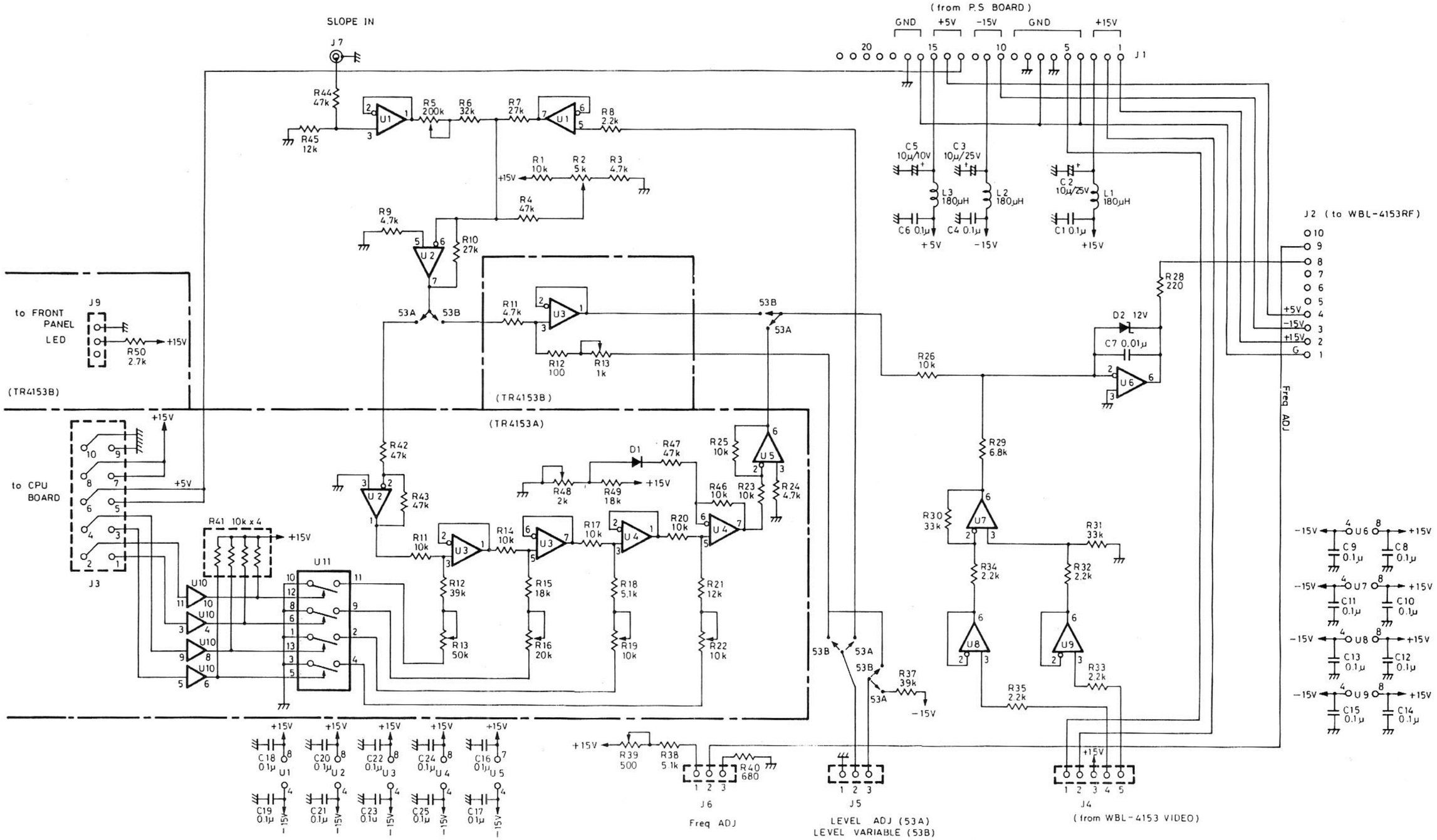
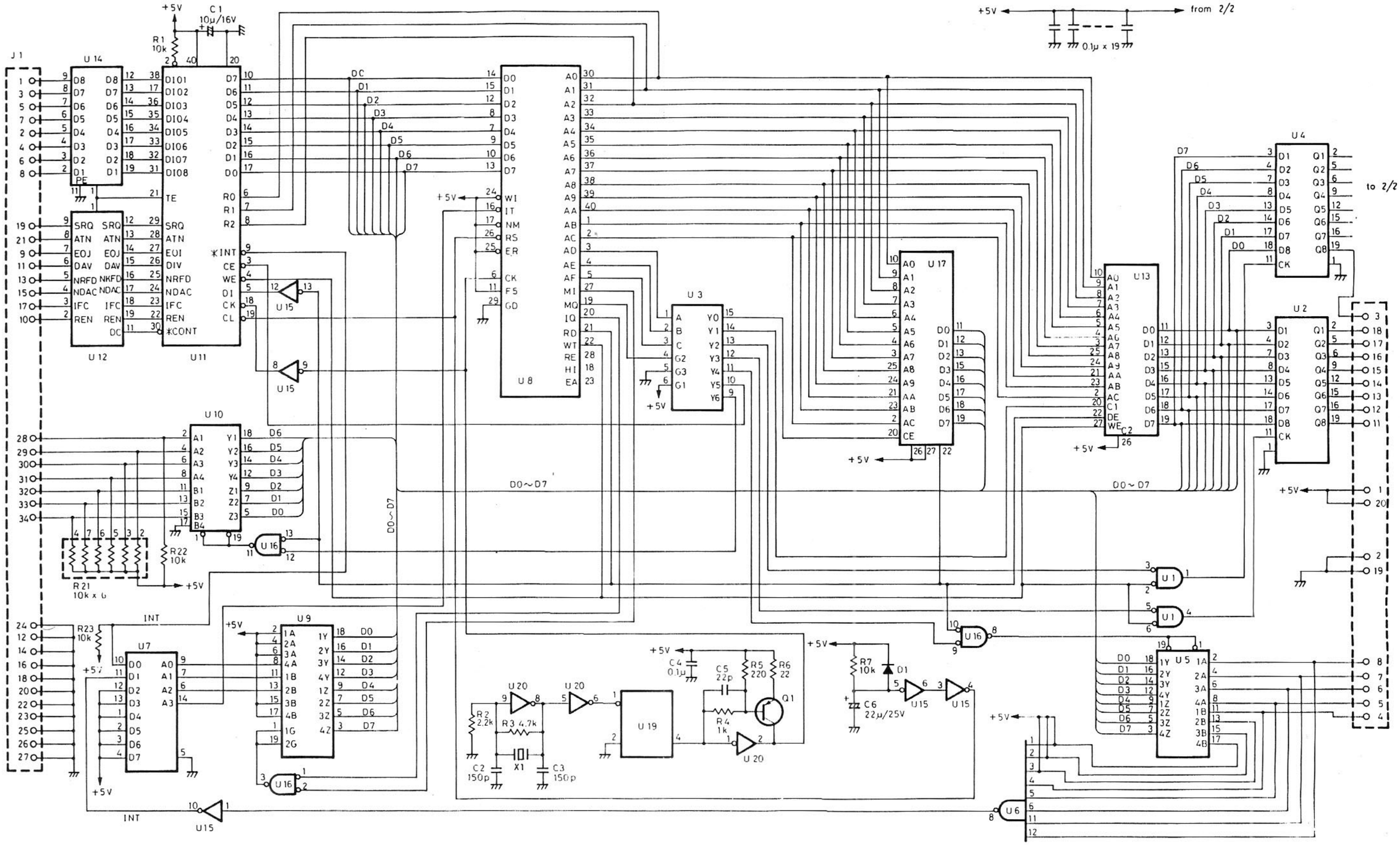


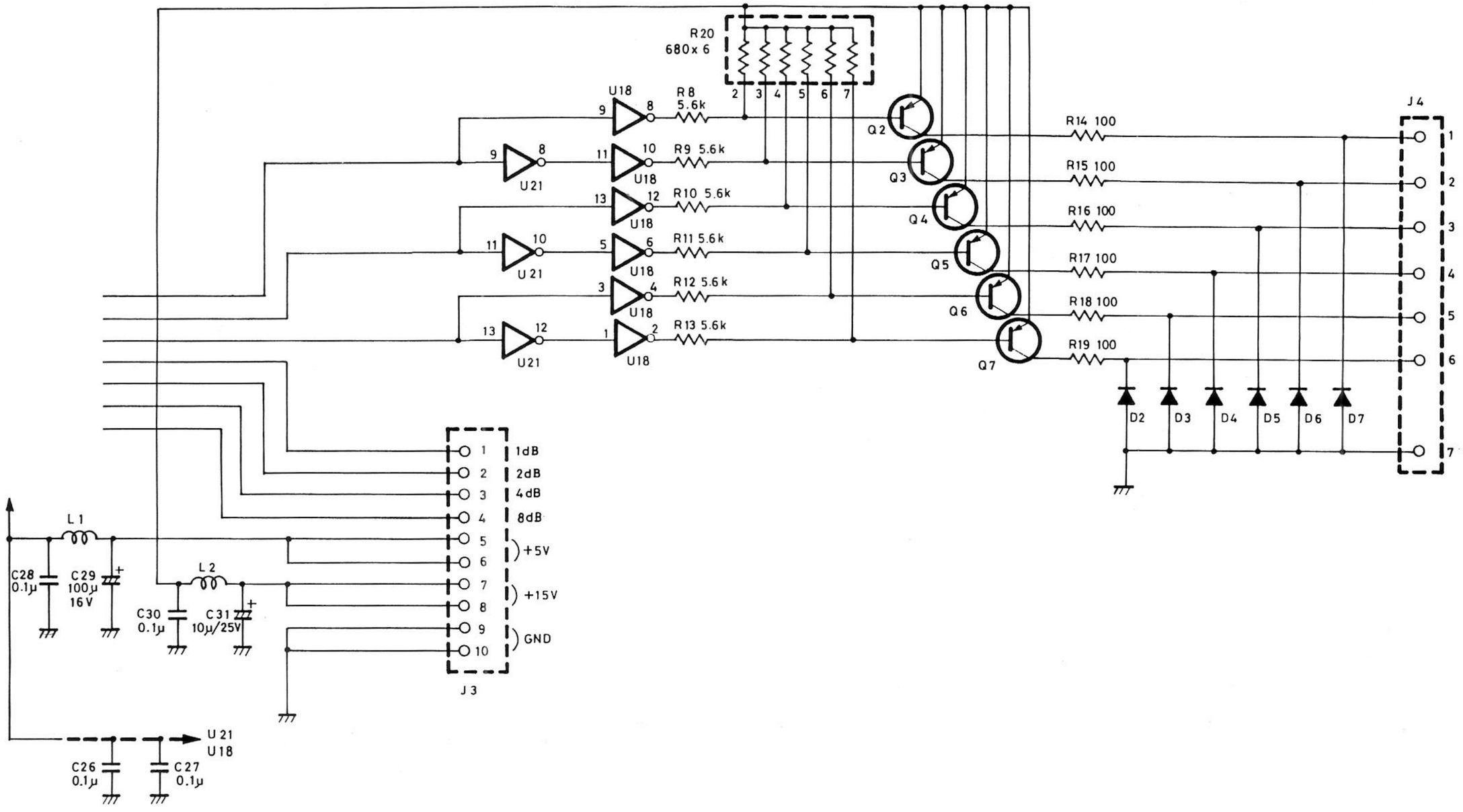
TR4153A/4153B
ISO BLOCK
WBL − 4153ISO



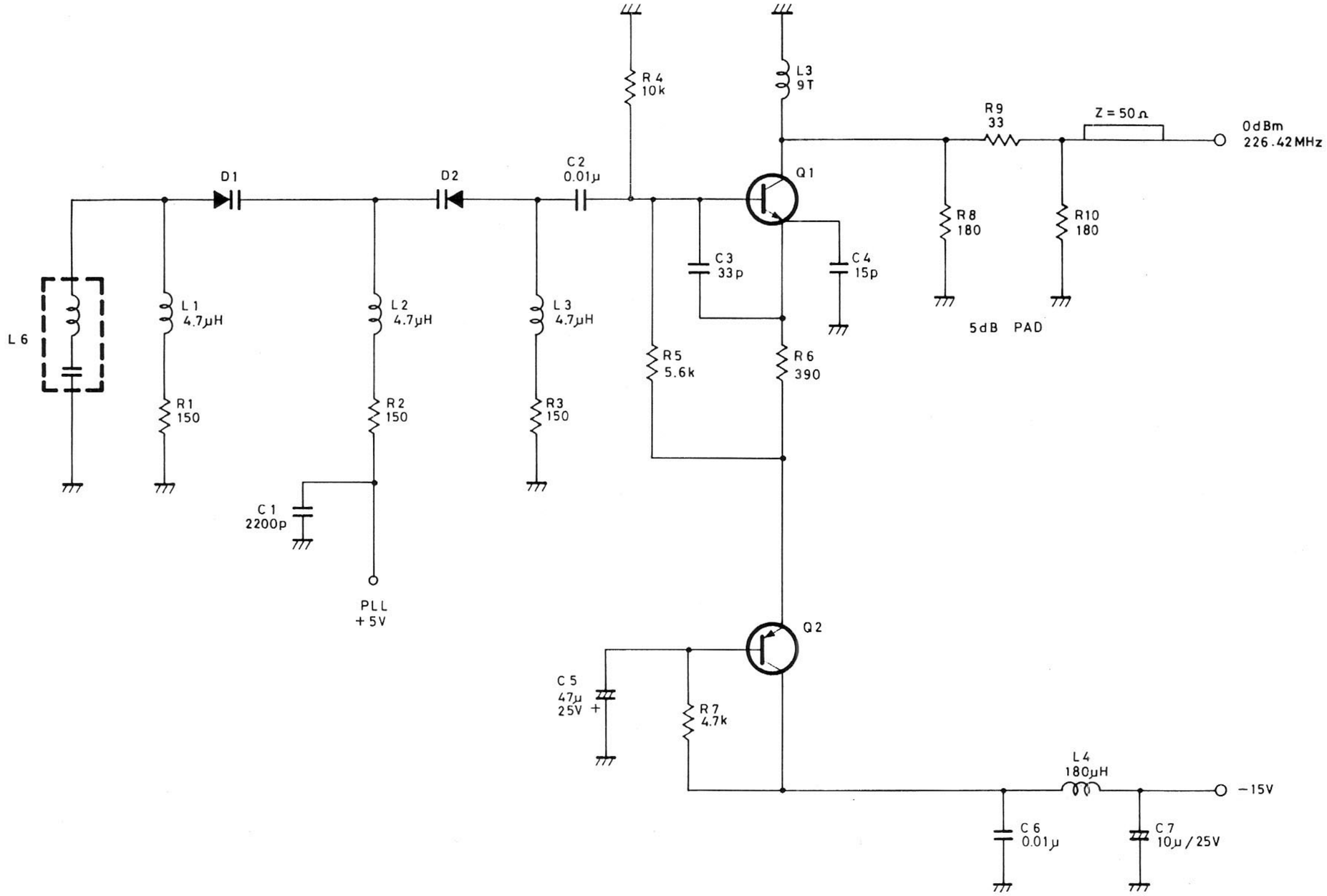
TR4153A/4153B
ALC CONTROL
BLC – 013182X01/X02



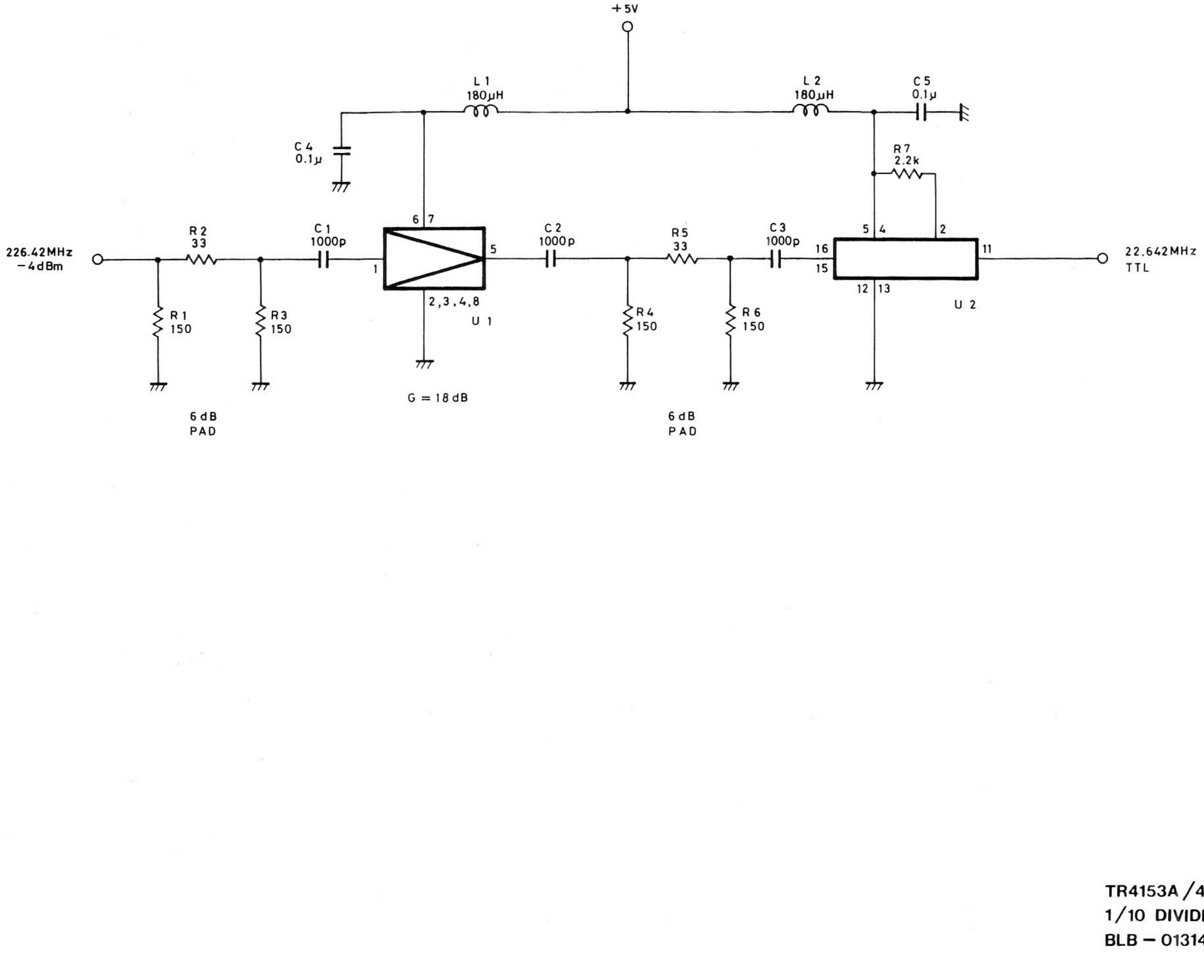
TR4153A
CPU
BLD – 013183 1/2



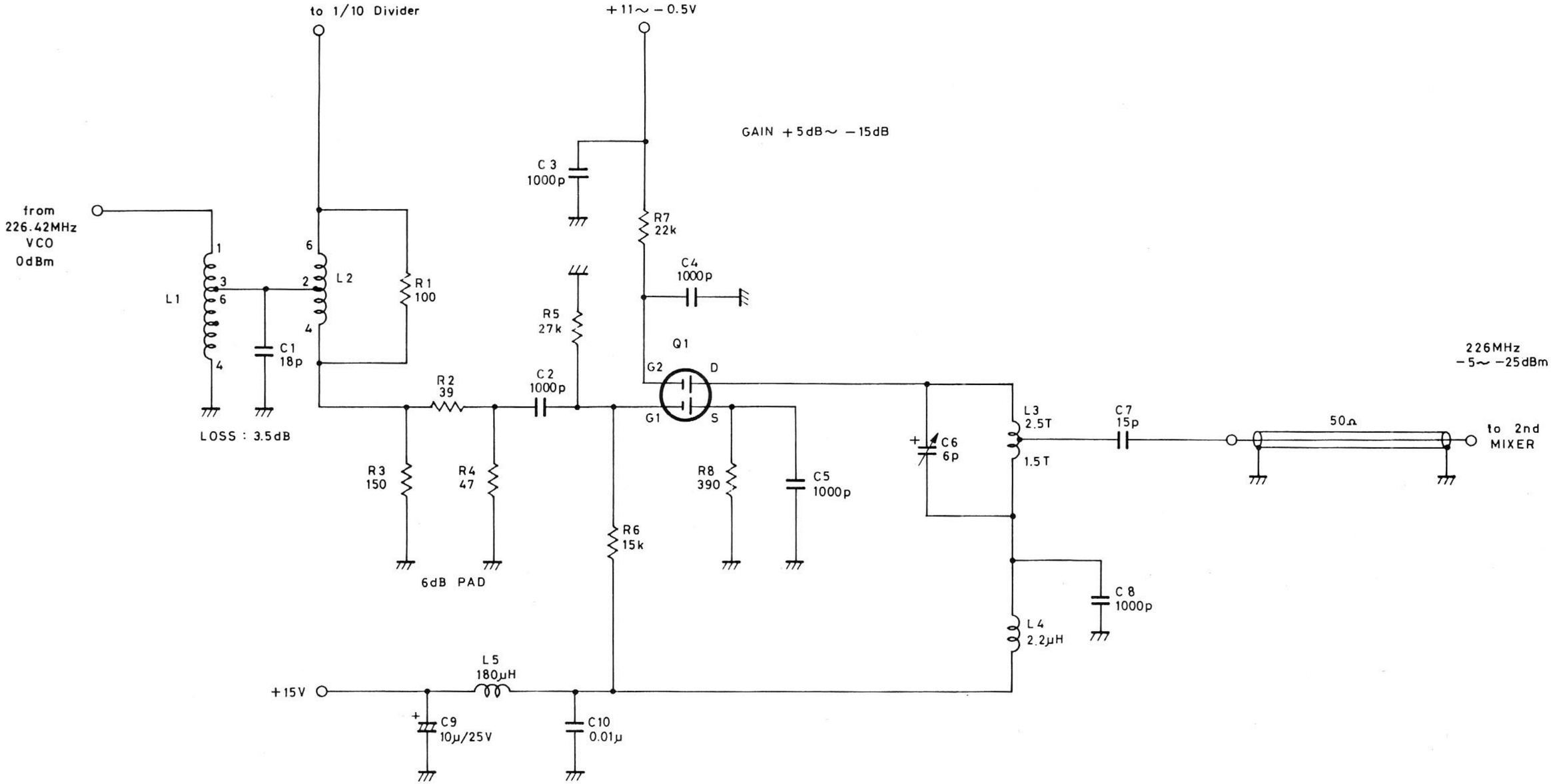
TR4153A
CPU
BLD – 013183 2/2



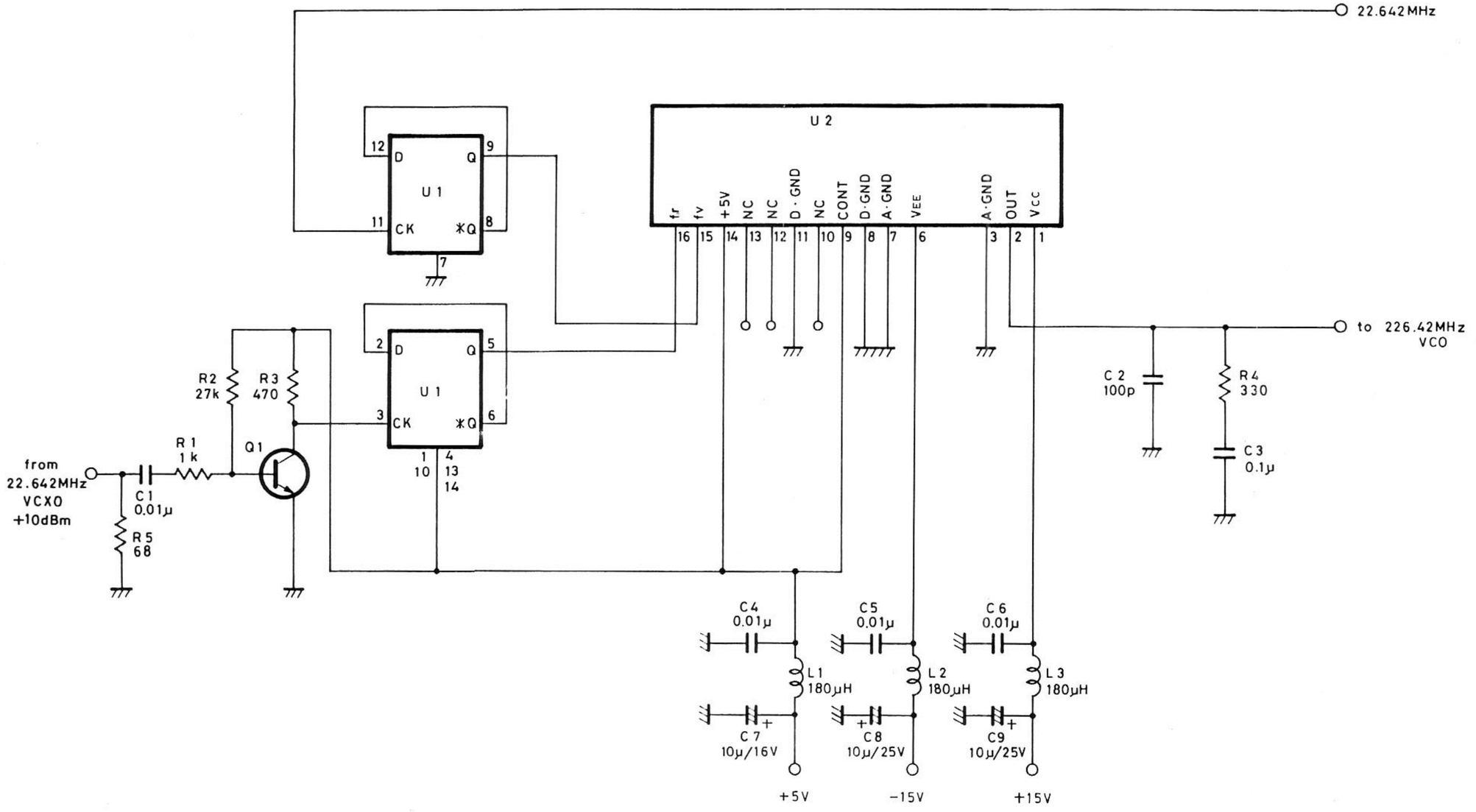
TR4153A/4153B
226.42MHz VCO
BLB – 013146



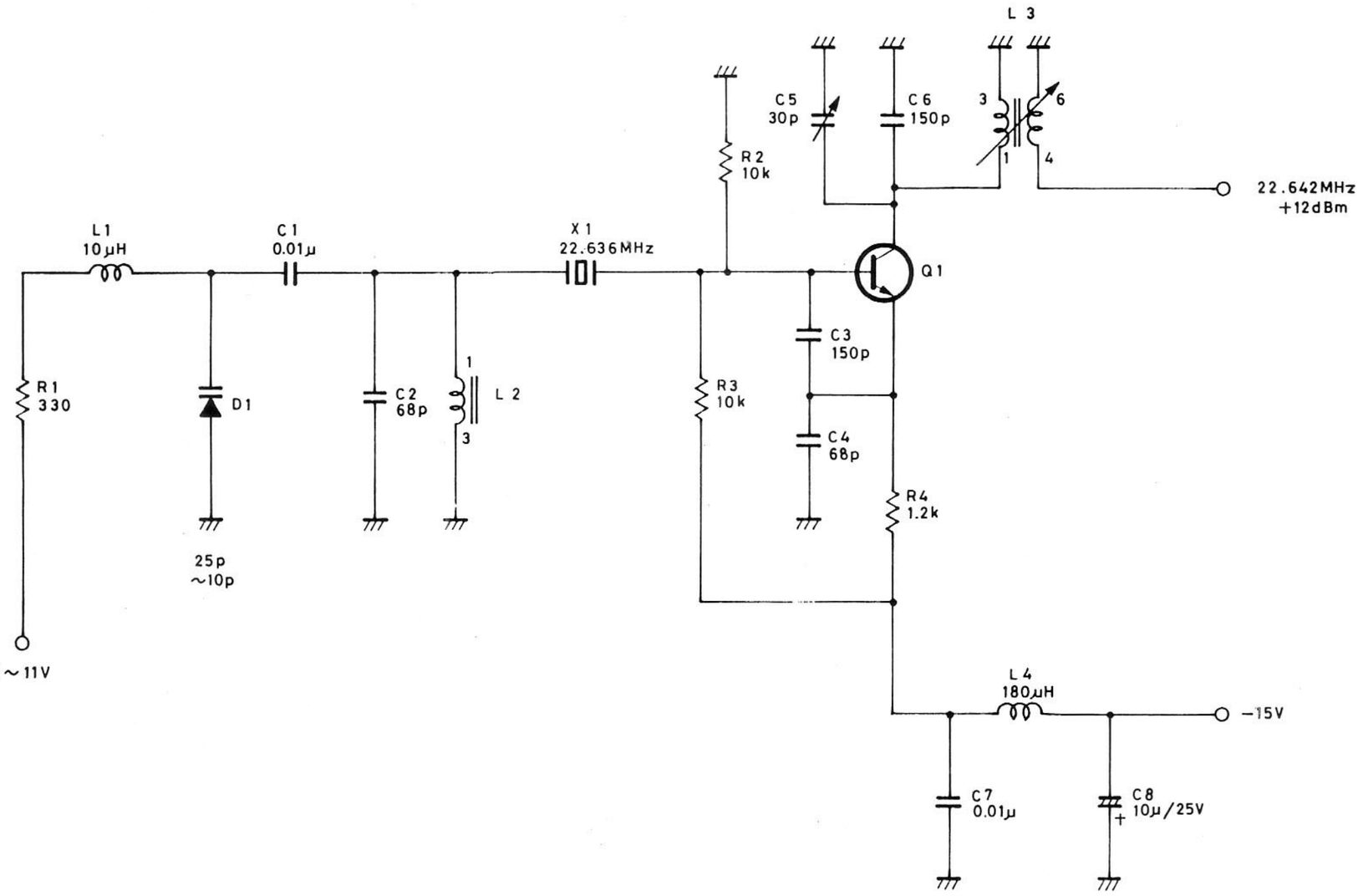
TR4153A /4153B
1/10 DIVIDER
BLB – 013147



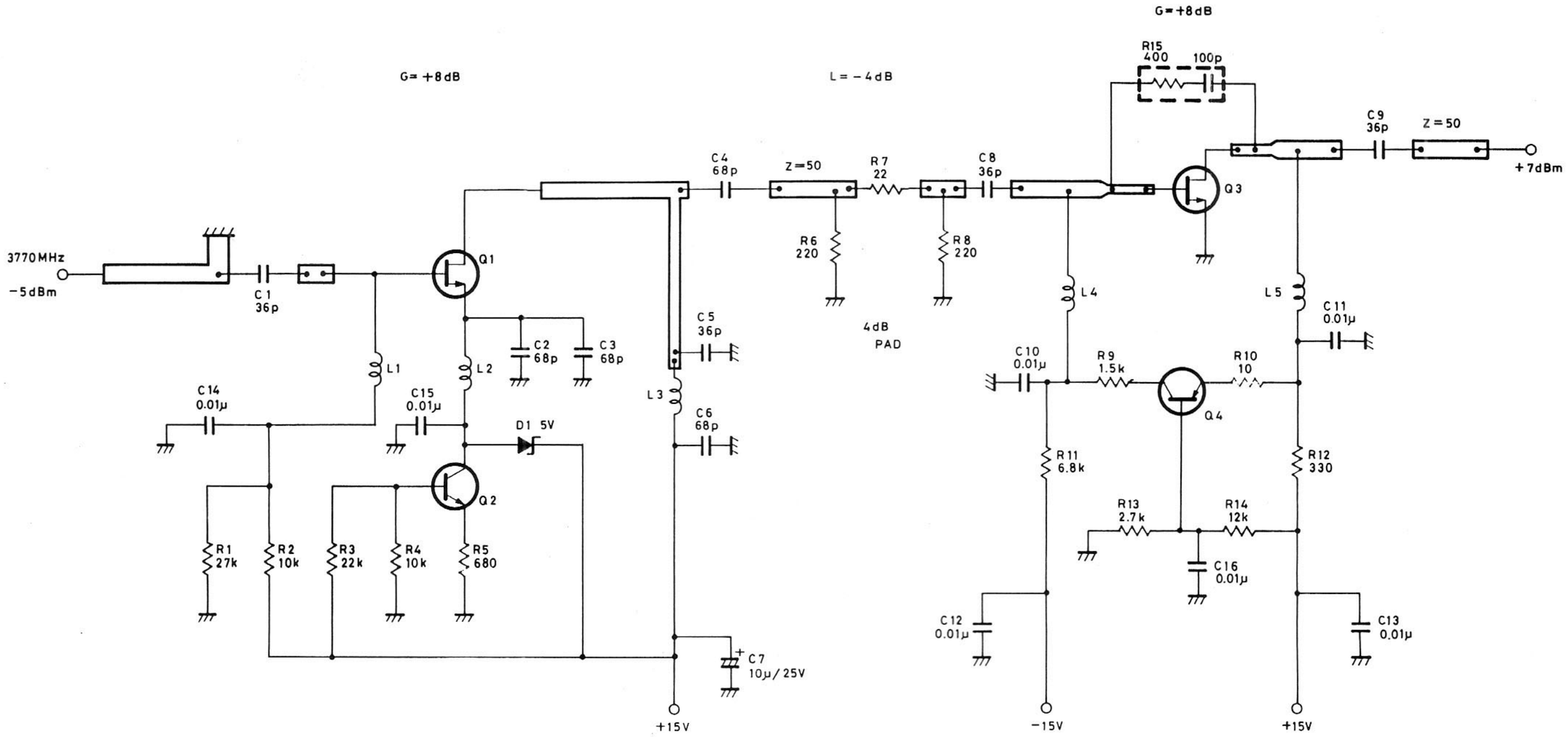
TR4153A /4153B
ALC MODULATOR
BLB − 013148



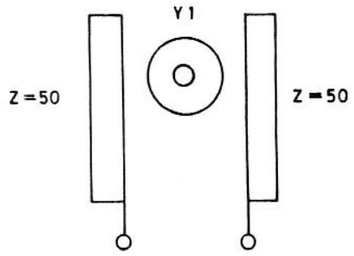
TR4153A/4153B
DIGITAL PLL
BLB – 013149



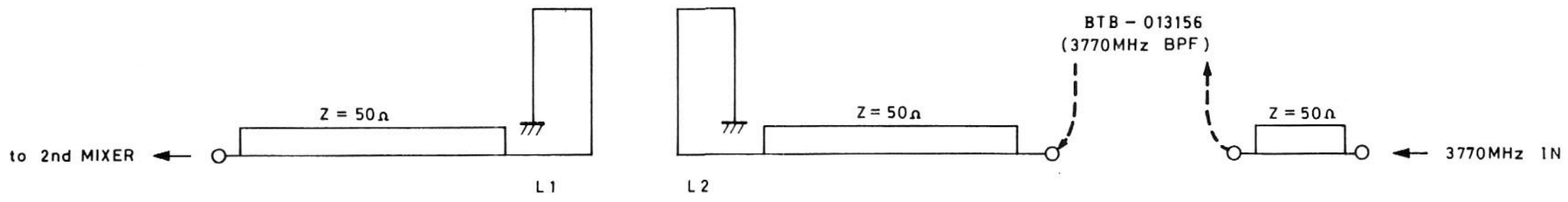
TR4153A/4153B
22.642MHz VCXO
BLB – 013150



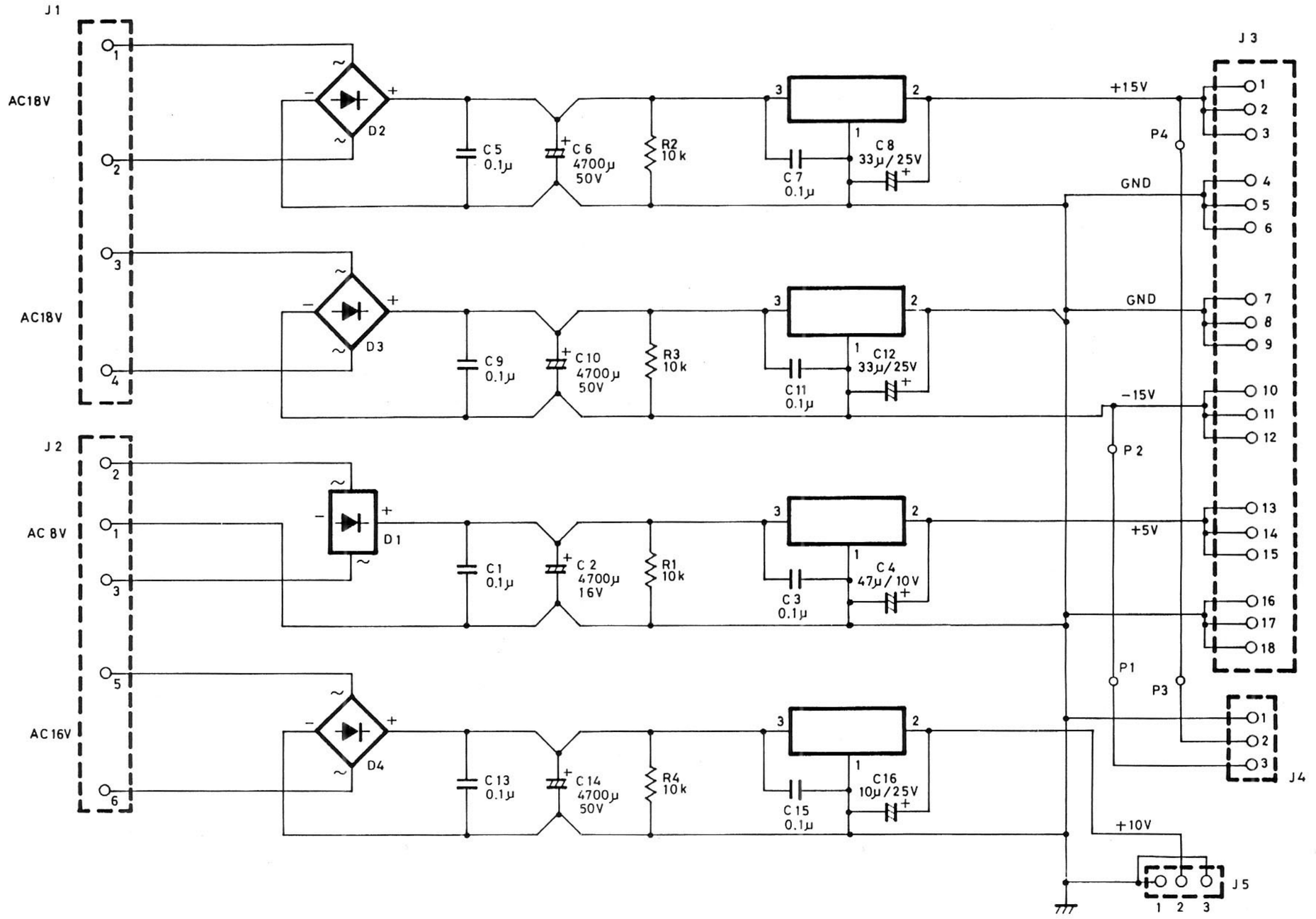
TR4153A/4153B
2nd ISO AMP
BTB − 013155



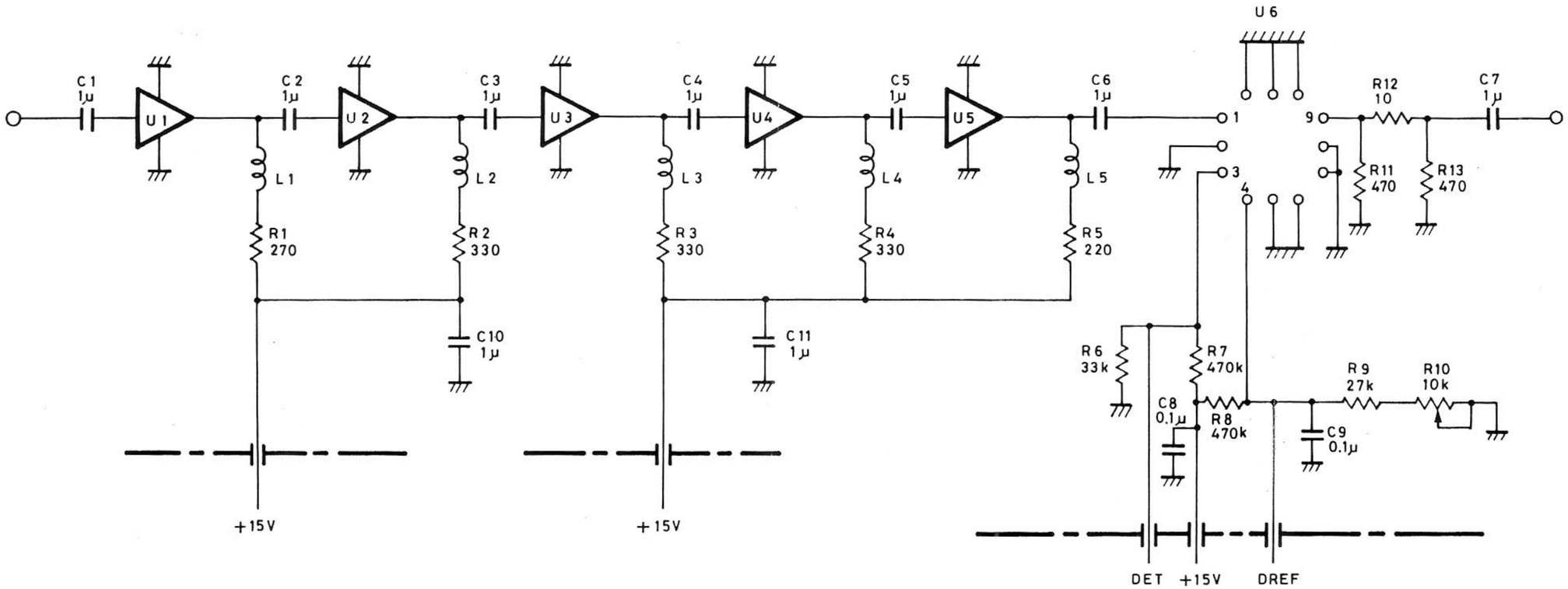
TR4153A/4153B
3770MHz BPF
BTB – 013156



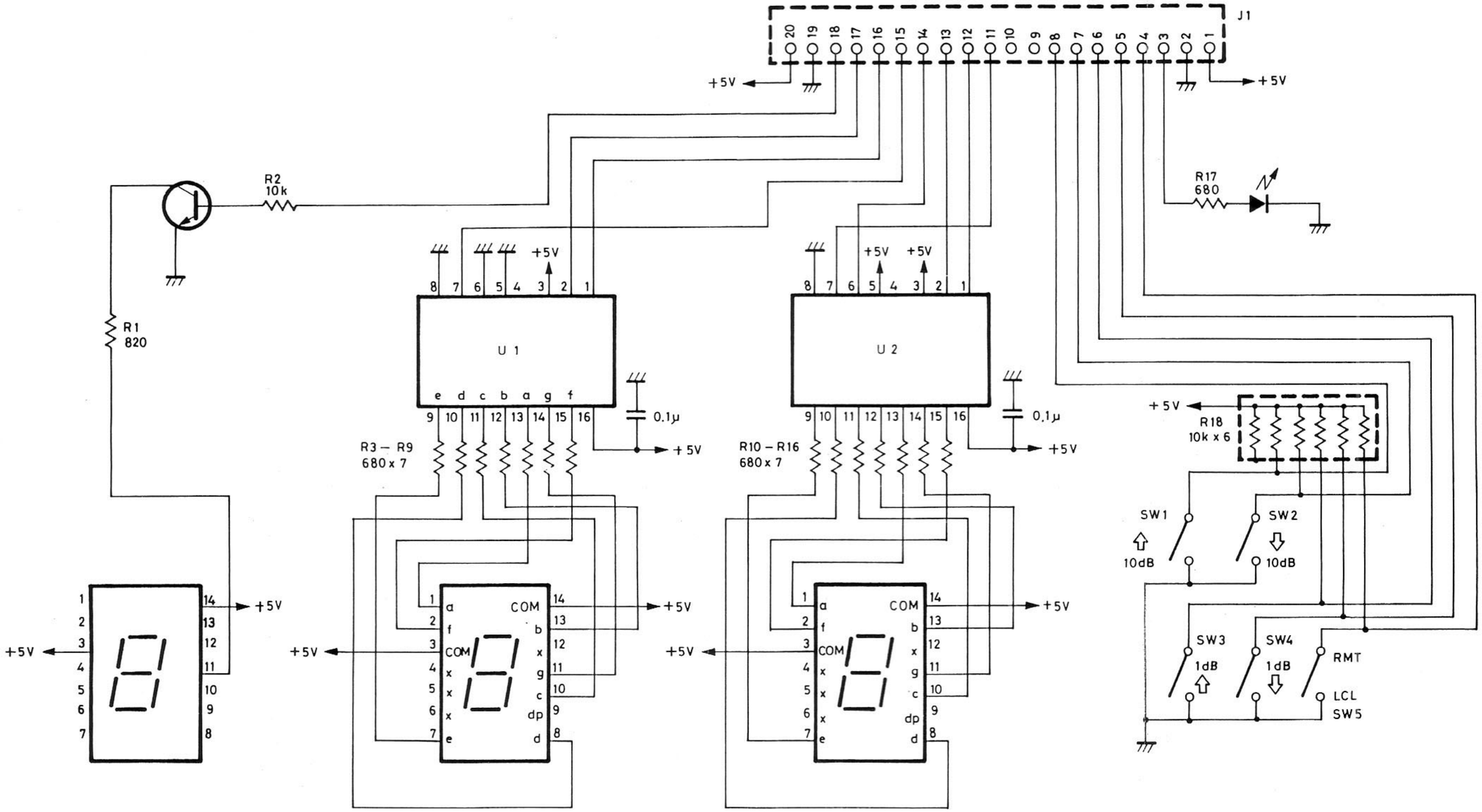
TR4153A/4153B
ISO CAVITY
BTB – 013157



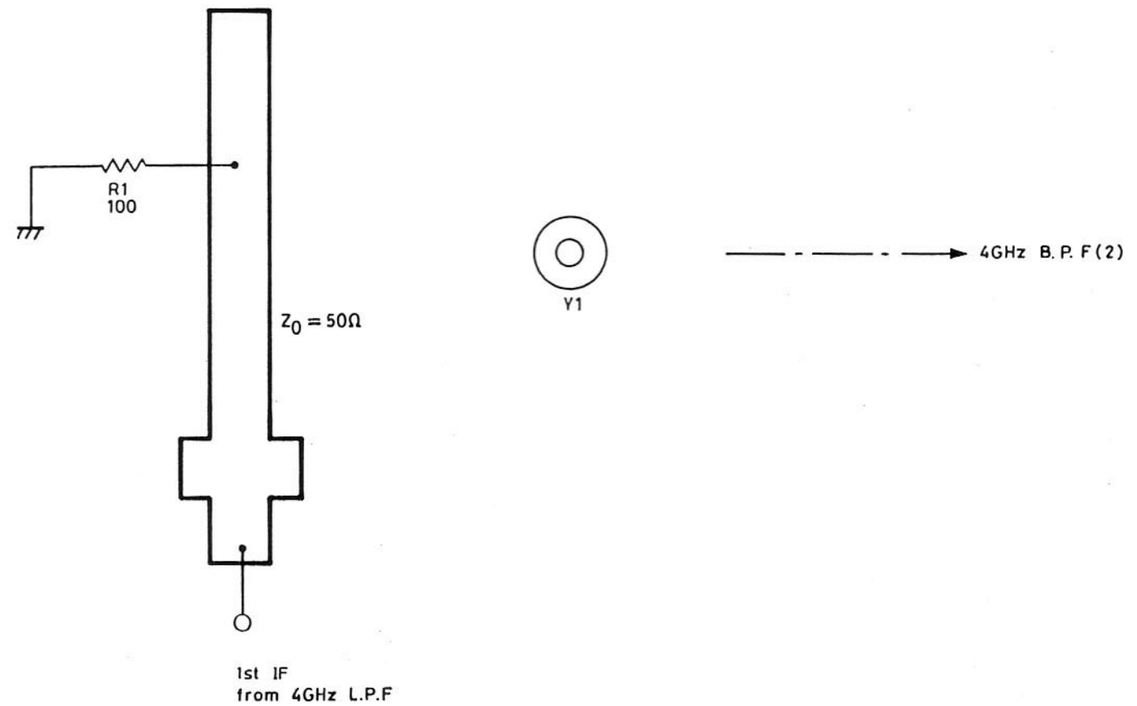
TR4153A/4153B
POWER SUPPLY BOARD
BLC – 013158



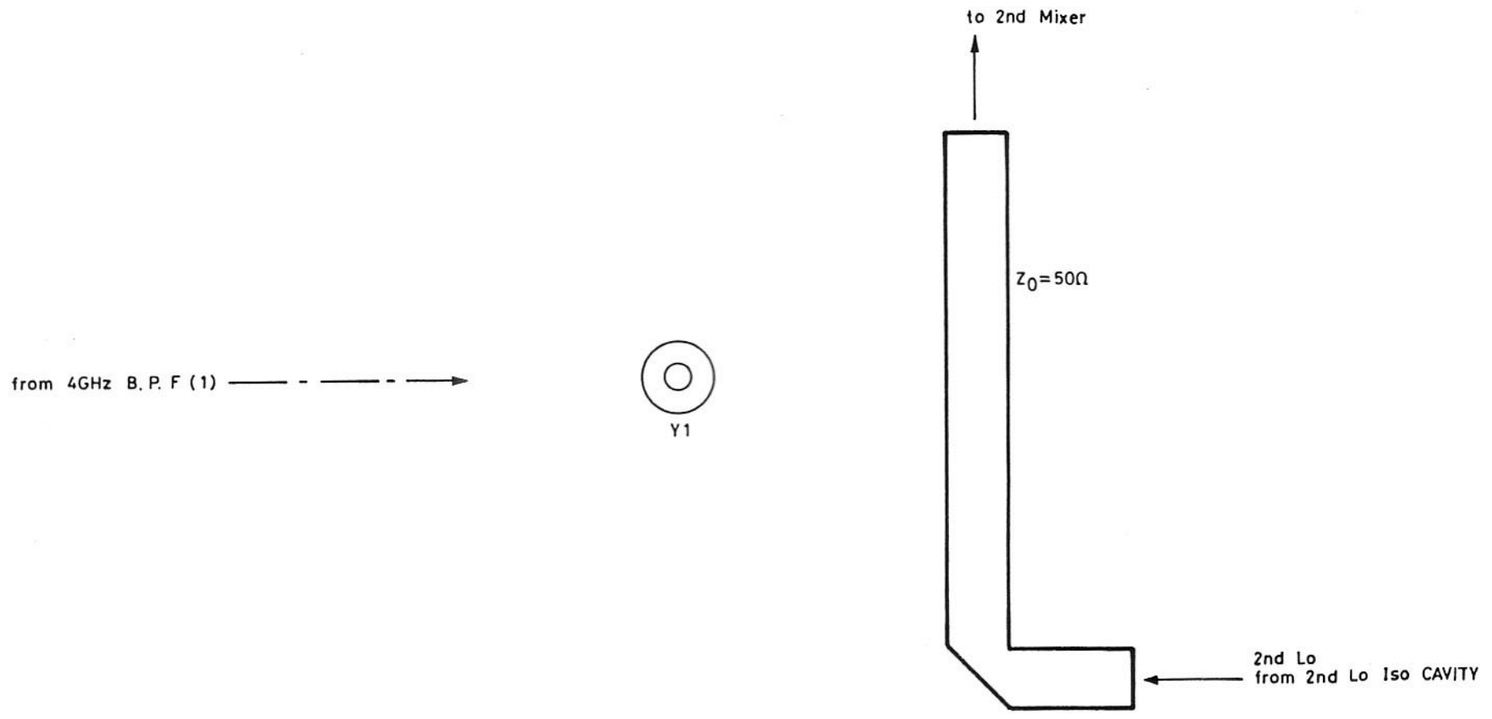
TR4153A/4153B
VIDEO AMP & DET
BTB – 013159



TR4153A
KEY BOARD
BLC – 013185

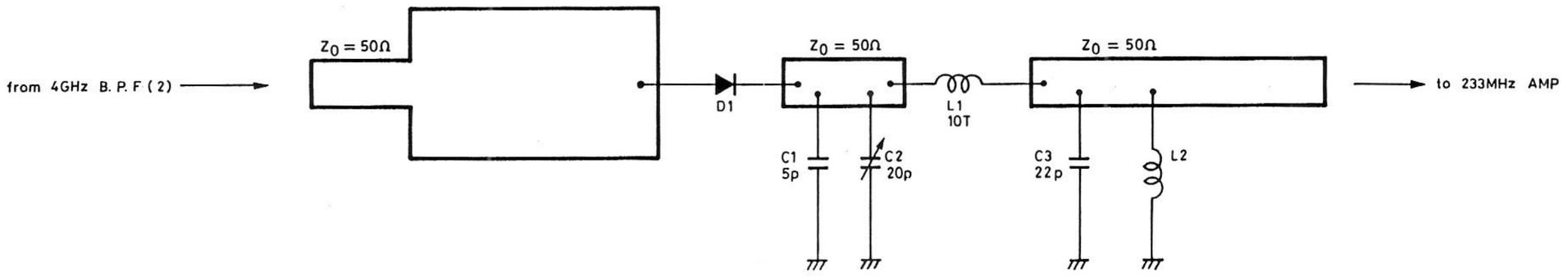


TR4131/4135/4153A/4153B
4GHz B. P. F (1)
BTB-012669



TR4131/4135/4153A/4153B
4GHz B. P. F (2)
BTB-012670

Loss : −5dB



TR4131/4135/4153A/4153B
2nd MIXER
BTB−012667

WARRANTY

ADVANTEST product is warranted against defects in material and workmanship for a period of one year from the date of delivery to original buyer.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by buyer, unauthorized modification or misuse, accident or abnormal conditions of operations.

No other warranty is expressed or implied. ADVANTEST specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

ADVANTEST shall not be liable for any special incidental or consequential damages, whether in contract, tort or otherwise.

Any and all warranties are revoked if the product is removed from the country in which it was originally purchased.

THE SERVICE PERIOD FOR PRODUCT

The service period for product repair is 10 years from the date of sale.

After the service period has expired, ADVANTEST will only reply to the buyer's (customer's) request for repair and maintenance as long as the parts are available.

SERVICE

During the warranty period, ADVANTEST will, at its option, either repair or replace products which prove to be defective.

When trouble occurs, buyer should contact his local supplier or ADVANTEST giving full details of the problem and the model name and serial number.

For the products returned to ADVANTEST for warranty service, buyer shall prepay shipping and transportation charges to ADVANTEST and ADVANTEST shall pay shipping and transportation charges to return the product to buyer. However, buyer shall pay all charges, duties, and taxes incurred in his country for products returned from ADVANTEST.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL BUYER

The product should be throughly inspected immediately upon original derivery to buyer.

All material in the container should be checked against the enclosed packing list or the instruction manual alternatively. ADVANTEST will not be responsible for shortage unless notified immediately.

If the product is damaged in any way, a claim should be filed by the buyer with carrier immediately. (To obtain a quotation to repair shipment damage, contact ADVANTEST or the local supplier.) Final claim and negotiations with the carrier must be completed by buyer.

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