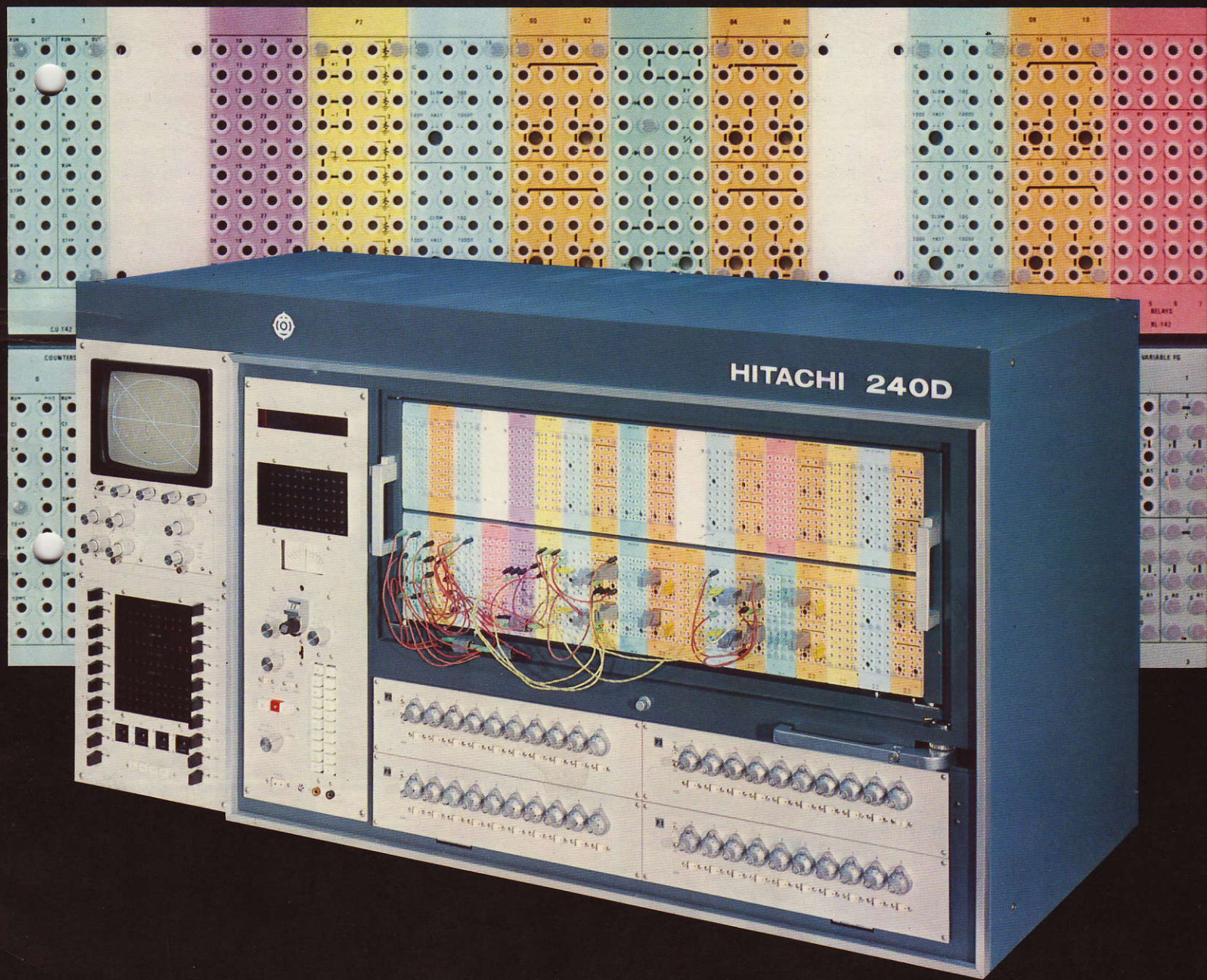


HITACHI 200D SERIES ANALOG/HYBRID COMPUTER



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Key points in design of Hitachi 200D series analog/hybrid computer

In succession to the well-received Hitachi 505 and 200 series desk-top analog/hybrid computers, Hitachi proudly presents its newest desk-top 200D series.

This 200D series is an improved and further-developed version of the conventional 200 series, and its key design points are as follows;

1 Completion of total family system

In consideration of easy operation, three different models, from a small machine for teaching with 10 – 20 amplifiers to a medium-sized machine for research with 40 – 60 amplifiers, are available according to a composition scale as follows;

Hitachi 220D	4–24 amplifiers
Hitachi 240D	4–40 amplifiers
Hitachi 260D	4–60 amplifiers

With the same type elements used, these models are interchangeable and can be interlocked with one another.

2 Perfect analog/hybrid performance

Thanks to employment of many parallel logic elements and control units arranged from the viewpoint of human engineering, iterative computing can be performed easily at a high speed.

Since operation solutions are clearly indicated on the easy-to-see indication panel with a black face and each logic element unit is connected to the same patch panel as the analog elements, programming is very easy.

Due to these functions, automatic operation and finding the most suitable solution are facilitated.

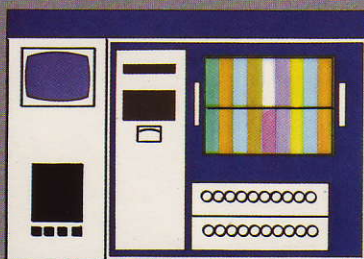
3 Extension to hybrid

To facilitate composing a large-scale hybrid system in combination with a digital computer, this series is designed in full consideration of extendability and flexibility. For example, an electronic mode control system used operates at a high speed by external signals and a servo-set potentiometer unit whose parameters can be freely changed is employed.

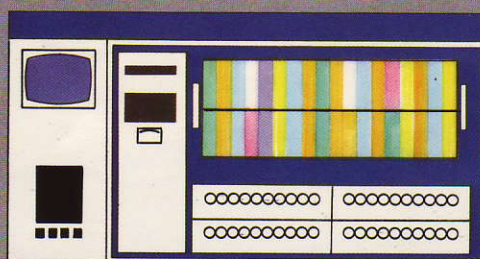
Naturally, the amplifiers and several trunk lines can be optionally called by a signal from the hybrid linkage side.

4 Easy operation

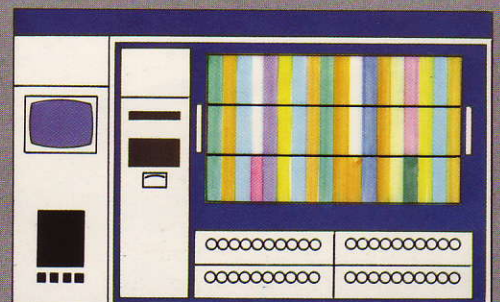
One of this series' main design features is easy operation; for example, the patch panels are color coded in order to facilitate discriminating elements, and the switches and knobs are arranged from the viewpoint of controllability. Especially, to reduce the mental burden of an operator, for the colors of parts and panels, neutral tints are uniformly employed instead of loud primary colors, considering overall balance.



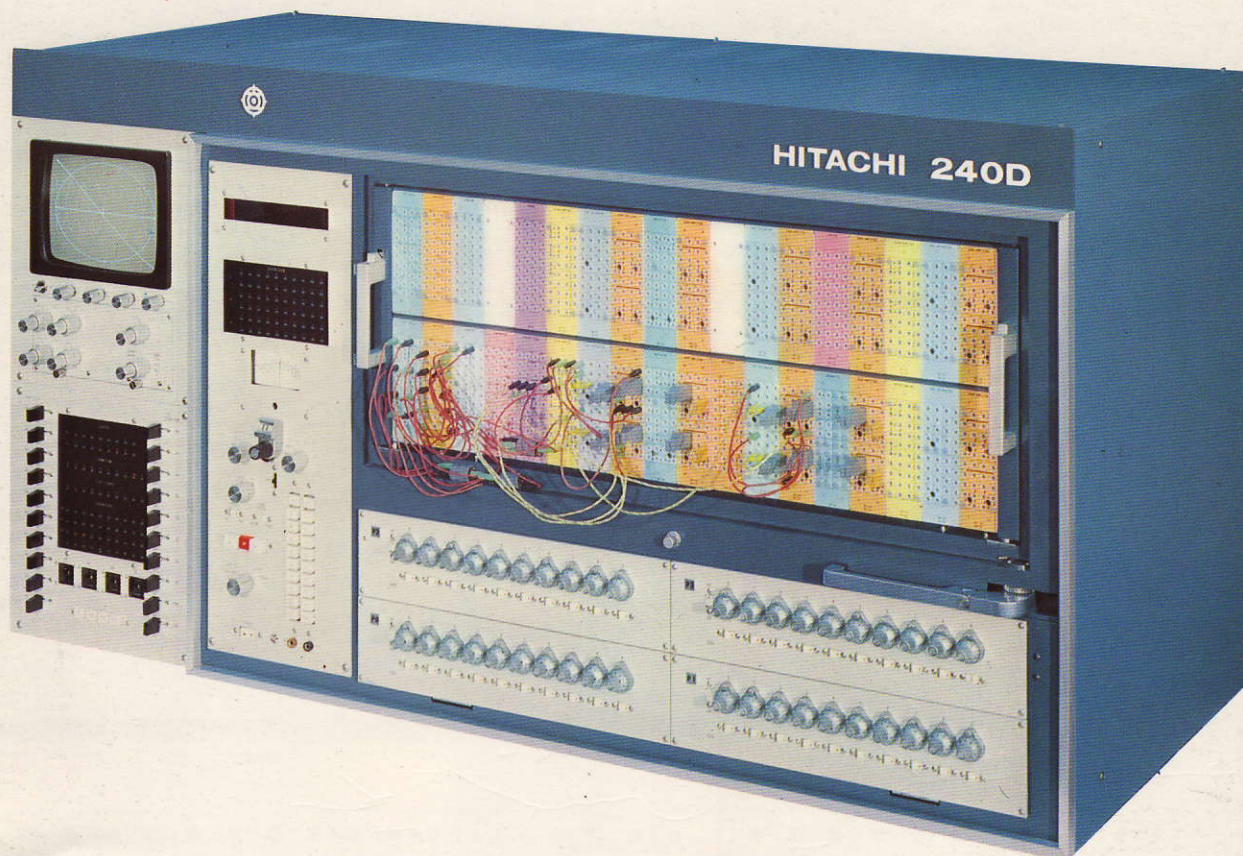
220D



240D



260D



HIGHLIGHTS OF 200D SERIES

High performance logic elements

Use of high speed and multipurpose parallel logic elements makes the analog computer more hybrid. The elements for the flip-flop, electronic comparator and counter can also be set by manual switches.

Solution display

On an easy-to-see rectangular CRT, the solutions obtained at a high speed are optionally indicated. Since this display device indicates signals in four channels simultaneously together with electronic markers, highly accurate readout is possible.

Highly stable operation elements

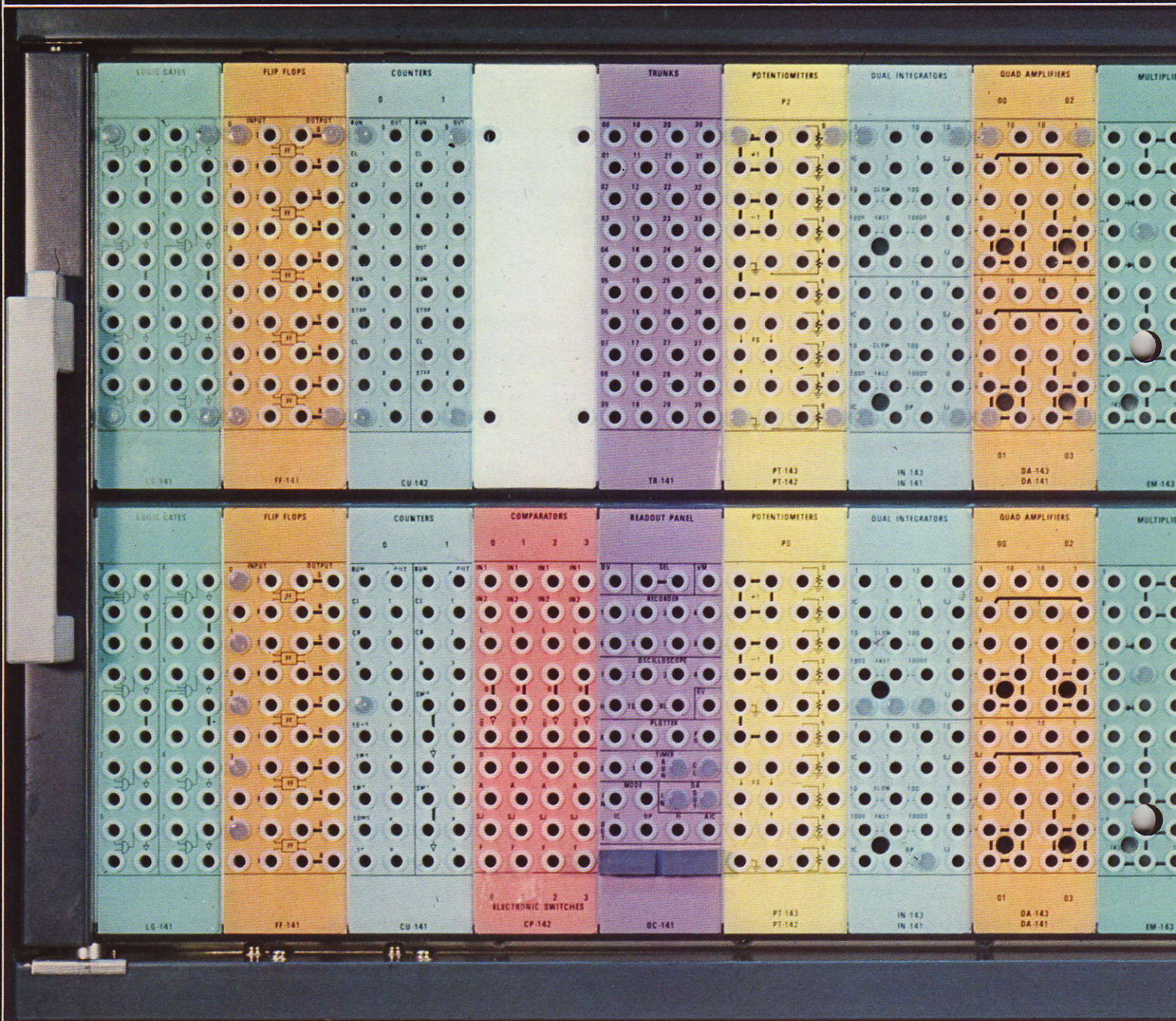
A group of stable operation elements, which earned a good reputation in the Hitachi 200 series, are also employed for this series, whether linear or non-linear elements. The high performance of this series results from Hitachi's excellent circuit engineering technique, fully and freely utilizing semiconductors such as FETs. Integrator capacitor has a patented by Hitachi.

Use of servo-set potentiometer

This is the first attempt at using the servo-set potentiometer for desk-top analog computers. Since the set value of this servo-set potentiometer can be adjusted by external signals, this element is considered very useful for the hybrid system. Naturally, this value can also be easily set at a high speed by manual input signal from the setting panel.

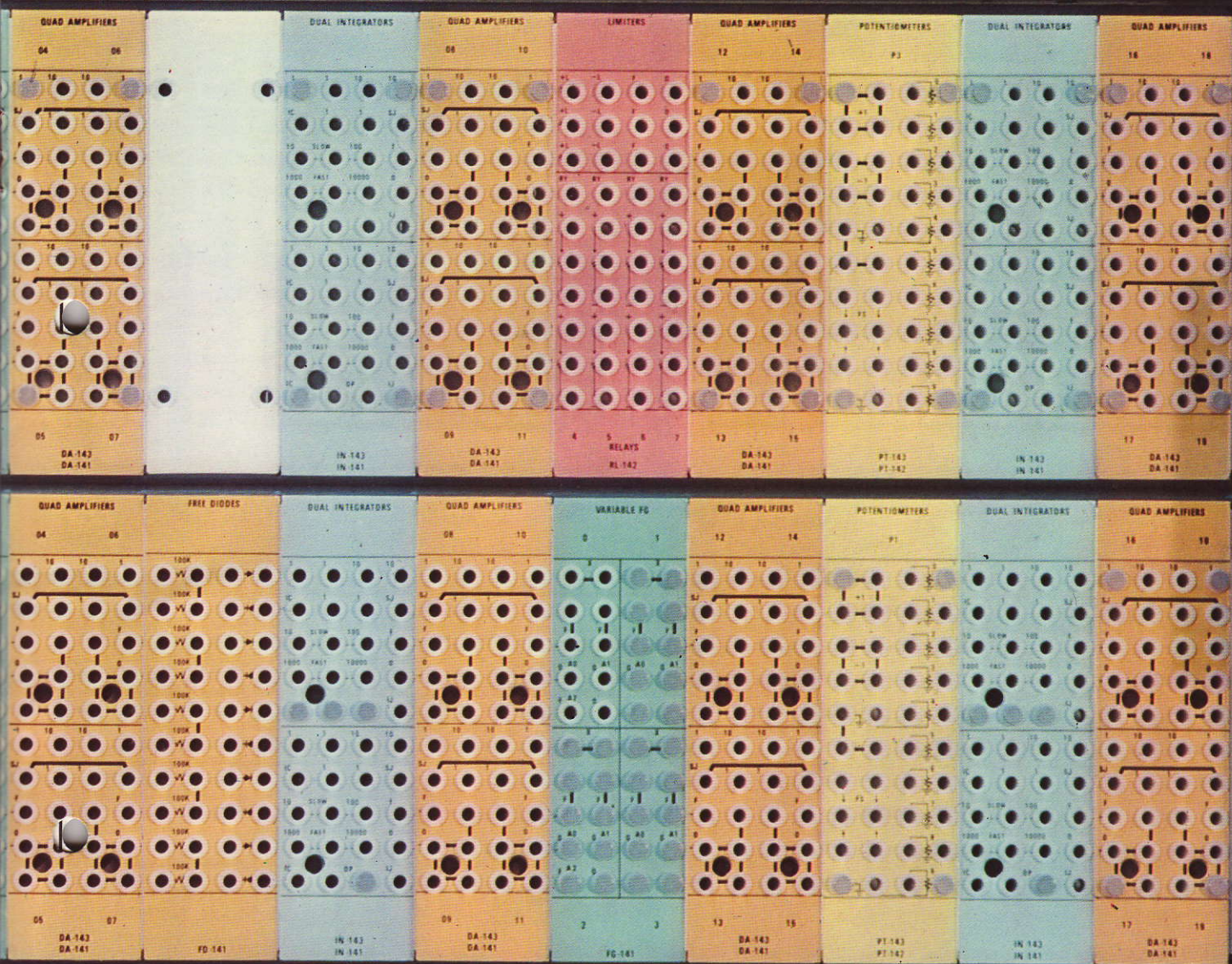
Optional selection of composition scale

Thanks to use of the thorough unit system, the user can obtain the desired quantity of elements without lack or surplus, and increase or decrease the number of operation elements optionally according to the purpose of use. From a simple composition for teaching to a large-scale hybrid composition, content selection rich in variety is one of the features of this series.



PATCH PANEL LAYOUT

LG-141 Eight logic gates
 FF-141 Five flip-flops
 CU-141 Two counters
 CU-142 Two counters
 CP-142 Quad comparator and electronic switches



TR-141
 OC-141
 PT-143/142
 IN-141/143
 DA-141/143
 FD-141

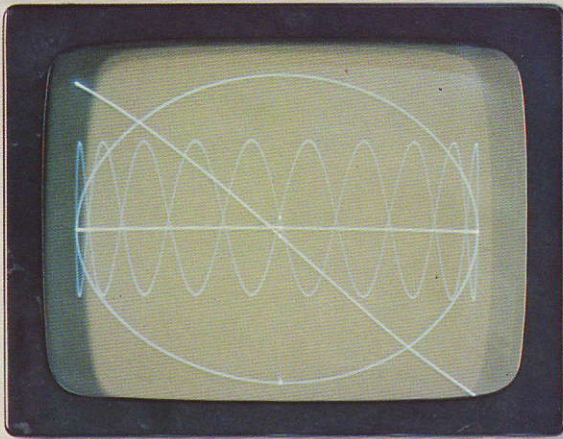
Trunks
 Readout panel
 Potentiometer
 Dual integrator
 Quad DC amplifier
 Free diodes

RL-141/142
 FG-141
 EM-141
 EM-143
 ZO-141/142
 FG-143A

Quad relay
 V.D.F.G.
 Dual multiplier
 High accuracy E.M.
 Free impedance
 Dual sine-cosine
 D.F.G.

FG-144A
 FG-145A
 TD-141
 AS-141
 SP-141

Quad X^2 D.F.G.
 Quad log X D.F.G.
 Time delay unit
 Quad electronic
 switch
 Servo-set potentiometer



OFF ON

SIG INT SCALE INT Y SCALE INT FREQ

2 1 5
OFF 2
1

2 1 5
OFF 2
1

2 1 5
OFF 2
1

200MS 100MS
500MS 50MS
15 20MS
25 10MS

FLIP FLOPS

COMP SW

B0 B1 B2 B3 B4 A0 A1 A2 A3

GATES

COMP/SW

FLIP FLOPS

COUNTERS

A0 A1 B0 B1

0 0 0 0

CL RUN STOP STEP

SW0 SW1

OVERLOAD

C	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
B	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
A	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15



+10 10
PP SEL

+15 15
OFF NULL

+24 01

X 01 X1

TIMER TIME SCALE

1S 10S SLOW FAST

IC OP H

ALL IC POT SET SLAVE

PP TIMER

POWER

SEL GND

A0 0
A1 1
B0 2
B1 3
C0 4
C1 5
T0 6
T1 7
POT BUS 8
EXT 9

100V SA

LOGIC GATES

LS-14

P2 UP DN ADD

P0 UP DN ADD

CONTROL AND DISPLAY UNITS

Control and display units

With easy-to-operation pushbutton switches used basically, the 200D series' control panel and various display units have high performance.

The 200D series' left side parts are a CRT display, and control and display units for logic elements. Since these parts can be separated from the main body, it is possible to install just the main body first, and then perform additional installation as required.

CRT display

The rectangular 9" CRT display is easy-to-see and allows four channels of waveforms to be measured simultaneously. In the X-Y display mode, this unit can also display a Lissajous' figure.

Since an electronic marker generator is incorporated, readout is very easy.

Logic control and indication

With a large indicator at the center and key switches on the right and left sides, the logic control panel is easy to operate.

Logic elements

On the left hand side, the set switch of the flip-flop is arranged. Throwing this key switch leftward sets the flip-flop, and throwing rightward resets it.

The indications of A and B mean a position on the pre-patch panel. A and B show the lower and upper steps respectively.

The key switch on the right side is a manual set switch for the comparator. It has a unique function in that the level of the comparator can be manually switched on/off. Throwing leftward switches it on, and throwing rightward puts it off. The lower two switches are manual on/off switches for the digital function device inside the counter. The display unit indicates the operational state of GATE (logic gate), COMP/SW (comparator and manual switch), FLIP-FLOP and COUNTER, etc. These indicators light up in the SET or ON positions.

Four thumbwheel switches under the display unit are used for selecting one of the counter outputs within 0 to 9. These switches are used to perform debugging, changing the operation time of the timer.

Four pushbutton switches CL, RUN, STOP and STEP located at the lowest row are the control buttons for overall logic elements.

CL(clear)	The reset output of the flip-flop is "1".
RUN	The clock on the counter panel is operative.
STOP	The clock on the counter panel stops.
STEP	Push the switch, and one clock appears on the STEP terminal of the counter.

The control panel for the analog system is located at the left edge of the main body.

The main parts are arranged in the following order from the top;

D.V.M. indicator, overload indicators, voltmeter, voltmeter function selector, null potentiometer, address selector, timer and integrator time scale, mode control and power switch, etc.

D. V. M.

A digital panel meter of 3 or 4 digits can be mounted on it.

Overload indicator

This overload indicator is provided for monitoring overload or overvoltage of each amplifier.

DA-143 type amplifier is provided with a special circuit for detecting an overload, and recovers within only 50 μ S under any severe overvoltage condition.

This is especially effective during high-speed repetitive operation.

Voltmeter

Needle type voltmeter which is used to monitor the power supplied and all system elements.

Voltmeter function selector

Rotary selector switch which provides monitor selection and voltmeter ranging.

Null potentiometer

This potentiometer is utilized when the voltmeter is used as a null meter.

Address selector

Pushbutton switch which provides address for amplifier outputs A0, A1, B0, B1, C0, C1, trunk lines, T0 T1, potentiometer bus, POT BUS and external input EXT.

Timer and integrator time scale

Timer: This standard timer for repetitive operation can be adjusted as follows;

X0.1	1 ms - 100 ms
X 1	100 ms - 10 sec

Integrator time scale: The time scales of the integrator and time delay unit can be changed over by this switch simultaneously.

Mode control

IC. OP. H : This switch controls all integrators in low speed operation. IC, OP and H show the reset, operation and hold states respectively.

SLAVE : In combination operation of two or more computers, the slave computers are interlocked with the main one by pushing this button.

POT SET : In this mode, the potentiometer can be set, or its value can be read out.

ALL IC : All integrators assume the reset condition regardless of patching.

P. P. : IC, OP and H modes can be changed over from one to another on the patch panel.

TIMER: The timer controls IC and OP.

Power switch: AC power switch for all power supplies 100/110/120/200/220/240 V, 50/60 Hz

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