

AEG



Prozeß-Datenverarbeitung

Analog Computer and Hybrid Systems

**Hybrid
Precision Analog Computer System
RA 770 D**

Part 1:

Operating Manual

Introduction

Computer Design and Equipment

Operating and Control

Programming

ANNEX

Catchword Listing

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INTRODUCTION

This manual RA 770 D is divided into two parts:

Part 1: Operators Manual RA 770 D

Part 2: Technical Manual RA 770 D

The following operators manual refers to the Hybrid Precision Analog Computer RA 770 D. Since there are almost no differences as to the operation of the RA 770 D and its preliminary model RA 770 C, a larger number of instructions could be taken-over into this operator manual. This means that all instructions given for RA 770 C also become valid for RA 770 D, respectively.

The model number RA 770 D thereby designates the further developed Hybrid Precision Analog Computer RA 770, from device number 50 on, whereby important improvements have been made as compared to its preliminary model.

Furthermore used are the following basic features of the RA 770 C:

The mechanical design:

flexible adaptation of equipment complement by using drawers, plug-in units and printed circuit boards, as well as interchangeable, fully screened patch panels.

The 10 V - technology:

large bandwidth by low resistance level, high longtime constancy because of low thermal load of computing elements (no air-conditioning of computer system required).

Precision computing elements with error rate $\leq 10^{-4}$:

wire-wound resistors, capacitors with extremely high longtime stability and small temperature coefficient ($\leq 10^{-5}/^{\circ}\text{C}$).

Broadband operational amplifiers of silicon-Planar-technology. Fast comparators, either with relays or electronic switches.

Integrator control with electronic switches (EMC, = electronic mode control).

Quarter-square multiplier with little product error. Servo-set potentiometer with small resistance and fast setting.

Control unit with digital selection system, digital timers and fixed-wired control programs.

Digital adapter with interchangeable digital elements for changing normal computing programs.

Additional drawers for special computing operations.

The additional drawer non-linear networks NNT 801 meanwhile is succeeded by model NNT 771, but is not part of the delivery program. However, since its use basically is possible with the RA 770 D, its operation will also be explained beside that of the NNT 771 in this operators manual.

The Hybrid Precision Analog Computer RA 770 D provides a larger scale of expansion possibilities. By means of two expansion units RA 775 or two further basic units RA 770 D used as expansion units, the analog computer system RA 770 D can be expanded to its triple size. Furthermore, two RA 770 D computers can be switched in-parallel. To each of the two computers again up to two expansion units can be connected, providing a six-fold computing scope.

For adaption of additional drawers whose computing elements can be assigned to the analog patch panels of the RA 770 D or of the expansion unit RA 775, the expansion unit RA 776 is used.

In combination with the digital computer 90 - 40 or the computer system TR 86, the Precision Analog Computer System RA 770 forms the Hybrid Computing System HRS 900 or HRS 860.

The following operators manual informs the user about equipment, control and programming of the Hybrid Precision Analog Computer RA 770 D.

Further details such as technical design, initial operation, specifications etc. of RA 770 D, RA 775 and RA 776 are given in the Technical Manual.

Section 2

Computer Layout and Equipment

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LIST OF ABBREVIATIONS

APF	Analog Patch Panel
ASF	Connection Panel (rear side)
BDZ	Operating Unit (for addressing and control of a second computer)
BG	Limiter
Bu	Jack
DBG	Digital Control Panel (control panel of master computer)
DPF	Digital Patch Panel
DVM	Digital Voltmeter
DZ 772	Digital Adapter
ERS 702	Drawer Electronic Resolver
NN	Non-Linear Networks
NNE	NN-Drawer
NNR	NN-Computer
NNT 801	Drawer Non-Linear Networks
NNT 701	Drawer Non-Linear Networks
NW	Networks
HPO 771	Drawer Dual-Trace Oscilloscope
PM	Quarter-Square Multiplier
RG	Noise Generator
RS	Resolver
St	Plug
UKF	Universal Breakpoint Function
VAR	Variable Function
VFG 801	Drawer Variable Function Generator

2.1
Mechanical Layout

The computer console above the tabletop comprises a standard unit of the RA 770 C. Fig. 2. 1/1 shows a front view, whereas Fig. 2. 1/2 shows a rear view of the computer. This arrangement can be expanded by means of a bottom part (UBS 770 or UBE 770).

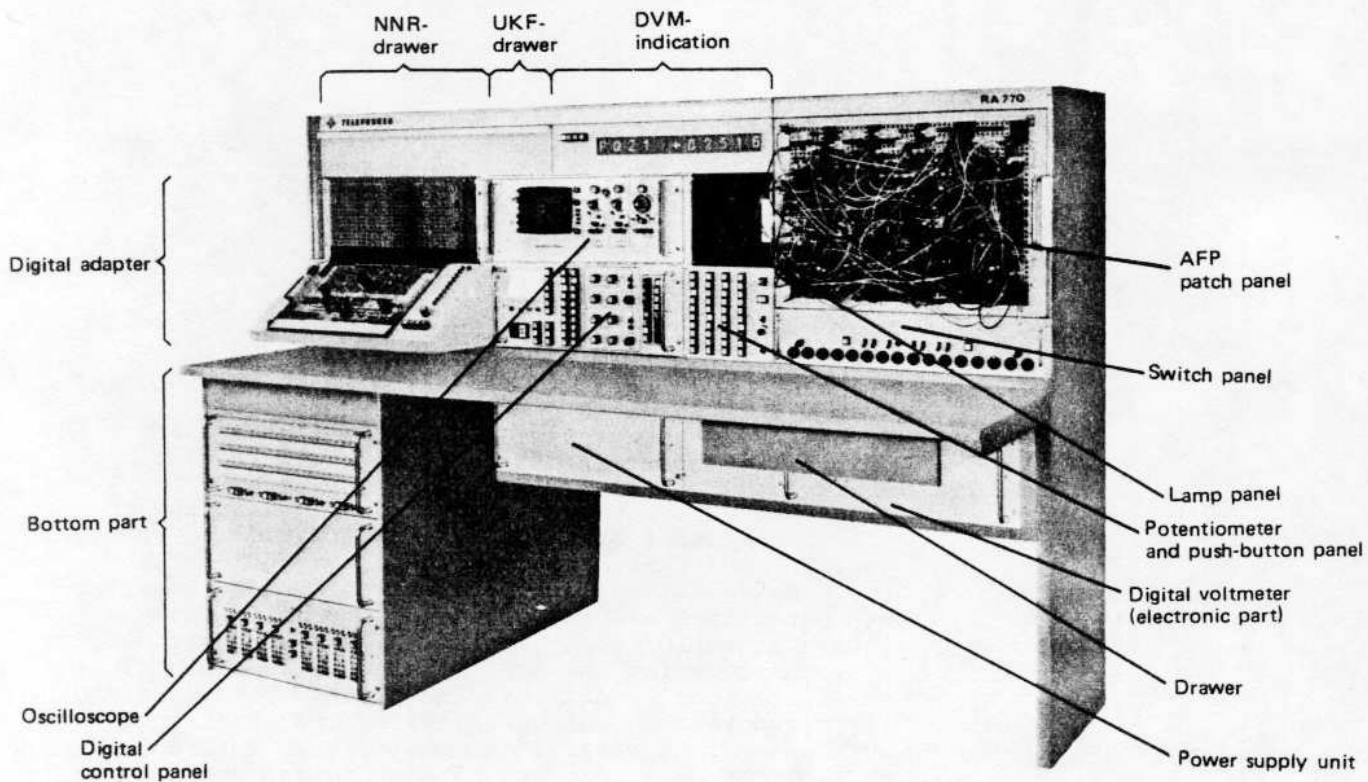


Fig.2. 1/1 RA 770 C, front view with standard equipment

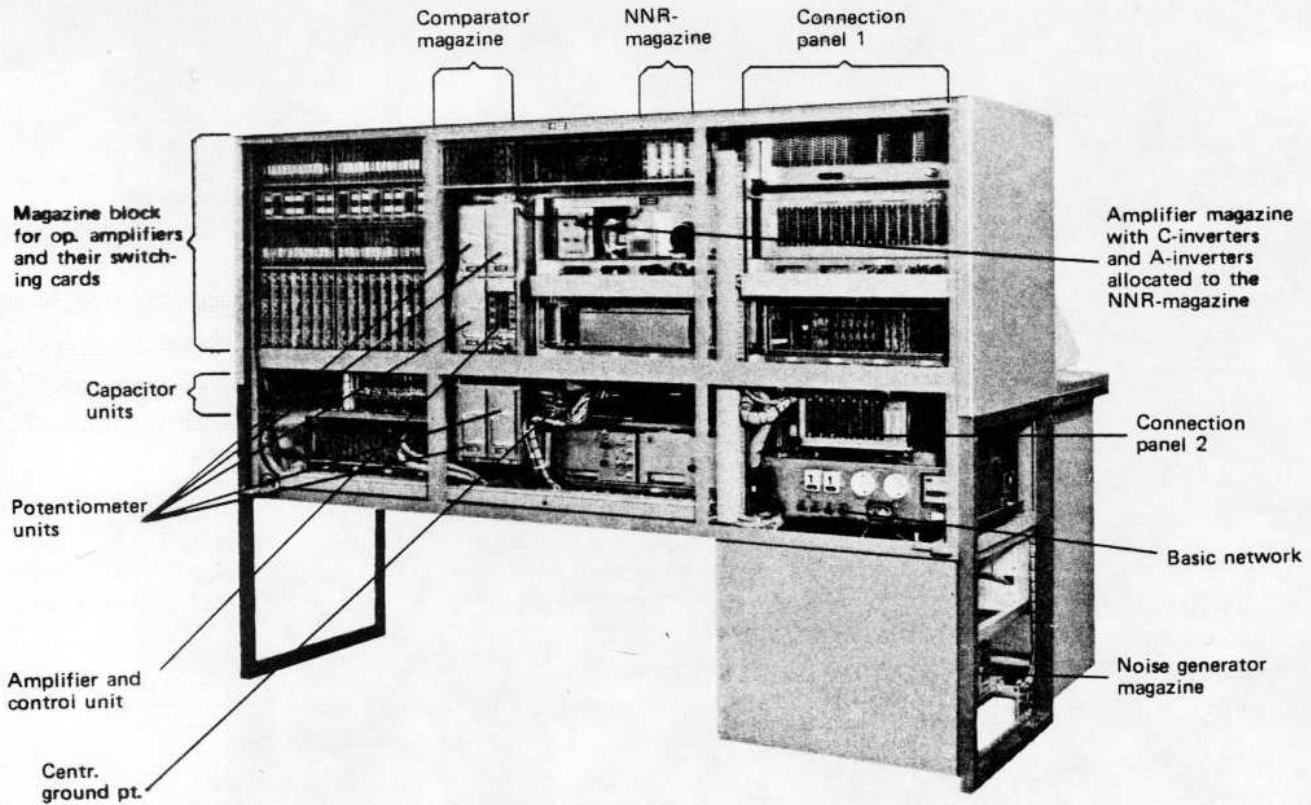


Fig. 2.1/2 Rear view of RA 770 C with standard equipment without connection cable

Beneath the tabletop, the power supply unit and the electronic parts of the digital voltmeter are provided. In the right-hand console part above the tabletop, the manual potentiometer panel with 16 coefficient potentiometers as well as the mounting for the interchangeable patch panels (APF) is arranged. Directly mounted behind the APF, within a drawer block, are the operational amplifiers and printed circuit boards for networks and control relays or the electronic switches of the operational amplifiers. The center part of the console contains the digital control panel, the push-button panel for setting of the servo-potentiometers, the lamp panel with zero potentiometers, the oscilloscope as well as the digital voltmeter indication. On the left-hand side above the tabletop are the digital adapter with desk-type mounting for interchangeable digital patch panels (DPF), as well as a magazine for 24 interchangeable printed circuit boards with digital elements. Mounted below are the front part of the NNR-magazine containing 32 locations for printed circuit boards, as well as the UKF-magazine with 8 board locations. In the center of the table frame, up to 50 servo-potentiometers can be mounted in five units ten potentiometers each from the rear of the potentiometer frame.

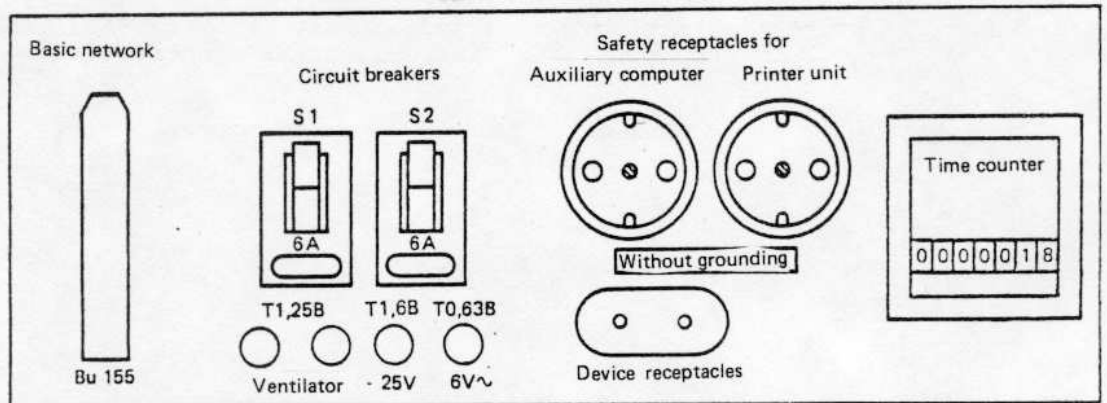
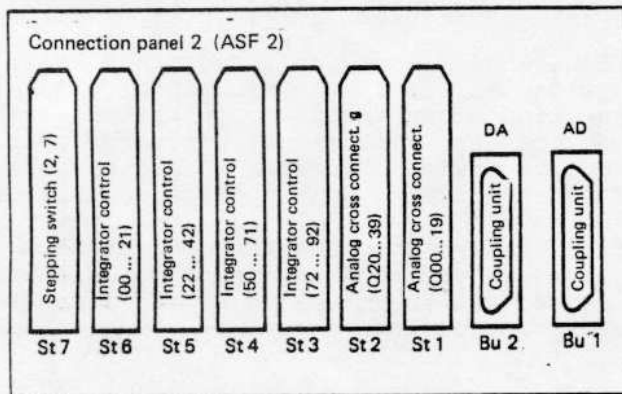
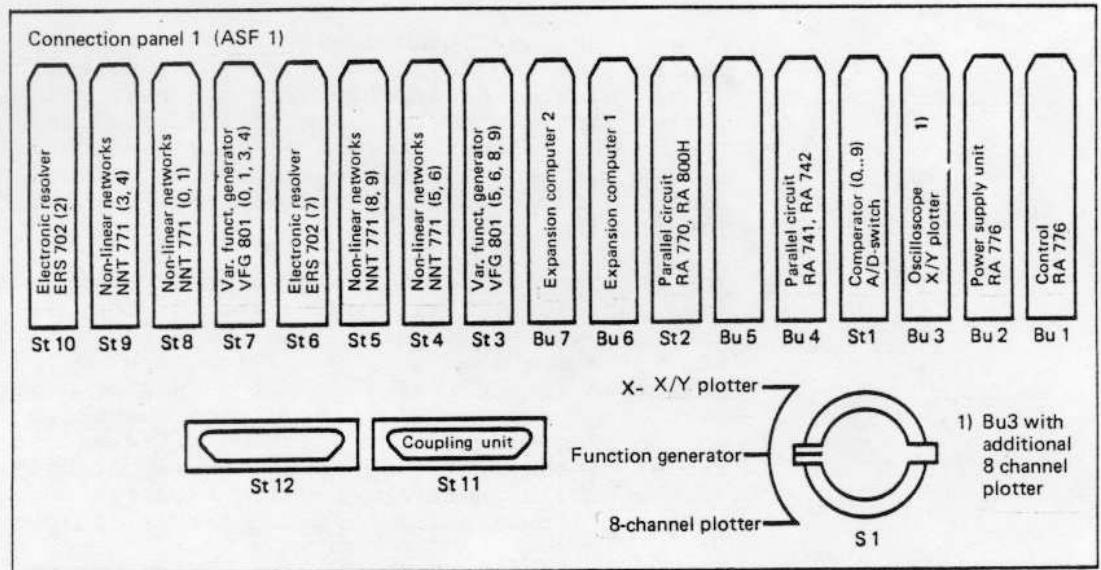


Fig. 2.1/3 Occupation of connection panels and of power supply unit of the RA 770 C

On request, two further units with 9 servo-potentiometers each can be added. Above this potentiometer frame and also accessible from the rear side is a magazine for 10 comparators with 2 digital analog switches each. Below the magazine block, which is also accessible from the rear, are two capacitor units with 15 double integrator capacitors each ($5/0.5 \mu\text{F}$) for the integrators.

The bottom part has locations for expansion units (see table 2.2.1) with up to 6 units containing further computing elements. When inserting a slide-in unit, the required supply voltages are automatically connected at the rear side via connector rails. Connection of the signal lines of the computing elements to the rear side of the patch panel takes place via cables at the rear side of the table. At both ends of the cables, there are contact bars for connection at the slide-in units or patch panels, respectively.

Fig. 2.1/3 shows the connection panels at the rear side of the power supply unit.

Connection panel 1 contains the contact knife bars for the signal lines of the additional slide-in units, for connection of expansion computers and external output devices as well as the switch for operation of the output devices. Further connectors are provided for the coupling unit and the comparator control.

Connection panel 2 provides the contact bars for the signal lines to the coupling unit, to auxiliary computers as well as the stepping switch lines and the integrator control interfaces.

On the rear side of the power supply, there are a socket for connection of the computer, protective receptacles for connection of external devices or auxiliary computers and circuit breakers. Additionally, the operating time counter is mounted.

2.2
Possibilities of Equip-
ment Complement

The following chapter deals with the variable part of the equipment complement depending on the special problems. This means that independent from the patch panel designation, a number of equipment complement versions are possible. On the one hand, this shows the large flexibility of the computer, on the other hand however it requires additional recording of the selected system configuration by the programmer.

2.2.1
Equipment of the Compu-
ter with Slide-in Units

All locations of fig. 2.2.1/1 not showing a special designation are equipped with basic units. As to the equipment of the designated locations, see table 2.2.1.

For use of the digital control unit DBG 771 or of the control unit BDZ 771 at location F, further details described in the Technical Manual, chapter 1.2 must be observed.

A 1	E		
A 2	F		
B			
C			
D			

Fig. 2.2.1/1 Equipment of the RA 770 C with slide-in units

Table 2.2.1

Available slide-in units and their allocation to different locations of the RA 770 C (see Fig. 2.2.1/1)

Slide-in unit	Type	Function/Purpose	Possible Location
Digital control unit	DBG 771	Selection, time-selection, control,	F
Control unit	BDZ 771	For slave-computer operation: decoupling and amplification of control signals of DBG of master computer	F
Digital adapter	DZ 772	Expansion of control possibilities, free-programmable logics	A (A1 + A2)
Drawer, function generator *)	VFG 801	Simulation of non-linear functions, contains 4 variable function generators	A1, B, C, D E**)
Drawer, non-linear networks*)	NNT 771	For non-linear networks, drawer contains 8 card-group locations	A1, A2, B, C, D, E***
Drawer, non-linear networks*)	NNT 801	For non-linear networks. drawer contains 8 card-group locations	A1, A2, B, C, D, E
Drawer, electronic resolver *)	ERS 702	Coordinate transformation or multiplication (2x2 depending products)	A1, B, C, D**)
Dual-trace oscilloscope	HPO 771	Indication and quantity evaluation of computing results	E

*) The following drawer can be assigned to the analog patch panel of the RA 770 C:

2 drawers function generator VFG 801
 1 drawer non-linear networks NNT 771
 or 1 drawer non-linear networks NNT 801
 2 drawers electronic resolver ERS 702

***) smaller wiring change required when used at this location

***) selection not possible at this location.

The location C is free available only in case of bottom part UBE 770.

2.2.2. Equipment of the Magazines for Non- Linear Networks

The RA 770 C contains the following magazines for equipment of NN-slide-in units:

1. the NNR-magazine (with its assigned amplifier magazine)
2. the magazines of the slide-in unit "non-linear networks" (NNT 771 or NNT 801)

2.2.2.1

Equipment of the NNR-Magazine and of the Assigned Amplifier Magazine

The NNR-magazine consists of two parts:

- a) The front part with 8 card-group locations, which can be accessed at the upper left-hand side of the computer. This magazine part is suited for installation and change of problem-depending networks. Furthermore, for VAR-cards which at this location can be easily set to the pre-given function sequence by using an adapter card.
- b) The rear part of the NNR-magazine houses 2 card locations and is accessible from the upper rear side after removing the center rear wall of the computer. The NNR-magazine is followed by an amplifier magazine containing 10 card locations for A-inverters and 8 locations for C-inverters. The 10 A-inverters are assigned to the 10 card locations of the NNR-magazine.

Table 2.2.2. Equipment of card locations with network parts

Function type	Network designation		Functions	Card locations equipped with:			
				A		B	
				+	-	+	-
Location designation at NNR-magazine							
Multiplier	Quarter-square multiplier	SPM 134	X · Y	PM 3A	PM 3B	PM 3A	PM 3B
		SPM 154		A-PM 51		A-PM 52	
Fixed functions	Square function	SQF 112	+X ²		PM 3B		PM 3B
		SQF 132				A-PM 52	
		SQF 122	-X ²	PM 3A		PM 3A	
		SQF 142		A-PM 51			
	Sine function	SSF 112	$\sin \frac{\pi}{2} X$	SIN 1A	SIN 1B		
		SSF 122	$\sin \pi X$	SIN 2A	SIN 2B		
	Cosine function	SCF 112	$\cos \frac{\pi}{2} X$	COS 1A	COS 1B		
		SCF 122	$\cos \pi X$	COS 2A	COS 2B		
	Arc-Sine function	SAF 112	$\frac{2}{\pi} \arcsin X$	ARC 1A	ARC 1B		
	Logarithmic function	ALF 111	$+\frac{1}{2} \lg(-100X)$ $-\frac{1}{2} \lg(100X)$			LOG 1A	
Variable functions	Universal function	VAR 100	f(X)s. Tab.7	VAR 1A	VAR 1B	VAR 1C	VAR 1D
		VAR 200		VAR 2A	VAR 2B	VAR 2C	VAR 2D
Location designation				I	II	III	IV

1) These card types can be arranged on each magazine location.

2) Occupation of this location depending on bridge mounted on LOG 1A-card, see text.

Patched locations must not be occupied unless otherwise stated.

Each card location group contains four card locations, subdivided into 2 A-locations and 2 B-locations. At the NNR-magazine, these locations are designated by +A, -A, +B, -B. As to the equipment possibilities for each card location group refer to table 2.2.2.

As to the use of part LOG1A, the following must be observed:

if only the function

$$+\frac{1}{2}lg(-100X)$$

is used, the card occupies only part B of the part location group, so that two further cards can be inserted on part A. In case also (or only) the function:

$$-\frac{1}{2}lg(100X)$$

is required, a soldering link between terminal b9 and b10 must be inserted according to Fig. 2.2.2/1. In this, the card location group is fully occupied.

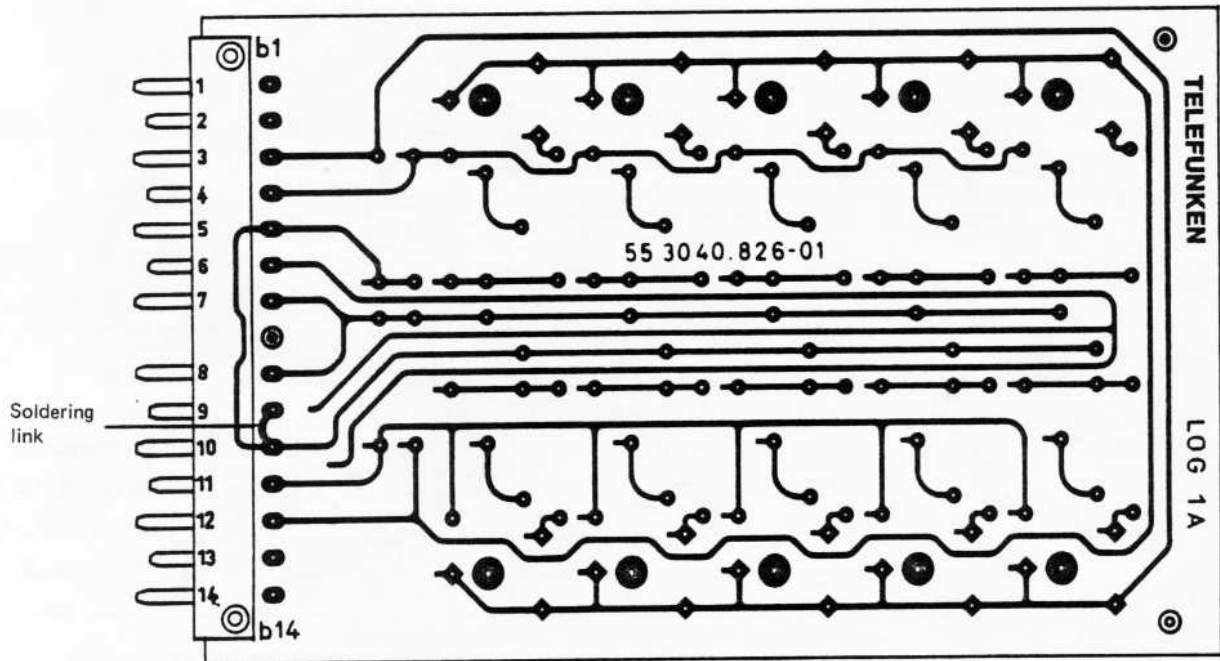


Fig. 2.2.2/1 Card LOG 1A with soldering link

The use of VAR-cards is limited to 8 card locations in the front NNR-magazine part and 8 card locations max. in the rear part. This limitation must be observed irregarding the number of functions to be simulated.

2.2.2.2.
Equipment of the
NN-Drawers

The drawers NNT 801 and NNT 771 provide 8 card location groups for cards with non-linear networks as well as additional amplifiers. Because of the different equipment range and operating features, the drawers are described separately.

2.2.2.2.1
Drawer NNT 771

The drawer NNT 771 contains its own power supply unit as well as locations for non-linear networks (8 card location groups, i.e. 32 card locations) and for 3 amplifiers per card location group (i.e. 24 card locations). Of these optional amplifiers, 2 each can be used as input inverter whereas one can be used as directly selectable output amplifier. Additionally, two of the amplifiers can be used as free inverters. Further details see chapter 4.4.2.1 and 4.24.3. A common network card (NW) belongs to 6 amplifiers each.

The card location groups and the respective amplifier locations can be seen from Fig. 2.2.2/2. As to the locations of the NN-drawers, see table 2.2.2 and the described details.

8 of the 32 card locations can be simultaneously occupied with VAR-cards, depending of the number of functions to be simulated.

The use of universal-breakpoint function A-BG1 requires a wiring change within the drawer by reducing the number of amplifiers being available.

2.2.2.2.2.
Drawer NNT 801¹⁾

This drawer is equipped with two identical units, each containing its own power supply unit and locations for non-linear networks (4 card location groups, i.e. 16 card locations per unit), as well as for one operational amplifier per card location group. Further details concerning this additional amplifier see section 4.4.2.2. Each unit contains one network card equipped with feedback resistors. The locations and assigned amplifier locations are shown in Fig. 2.2.2/3. As to the use of the NN-units, see table 2.2.2 and the following explanations.

8 of the 32 card locations of the drawer can be equipped with VAR-cards, depending of the number of functions to be simulated.

The use of the universal breakpoint function A-BG1 requires a wiring change within the drawer.

1) no more available for delivery

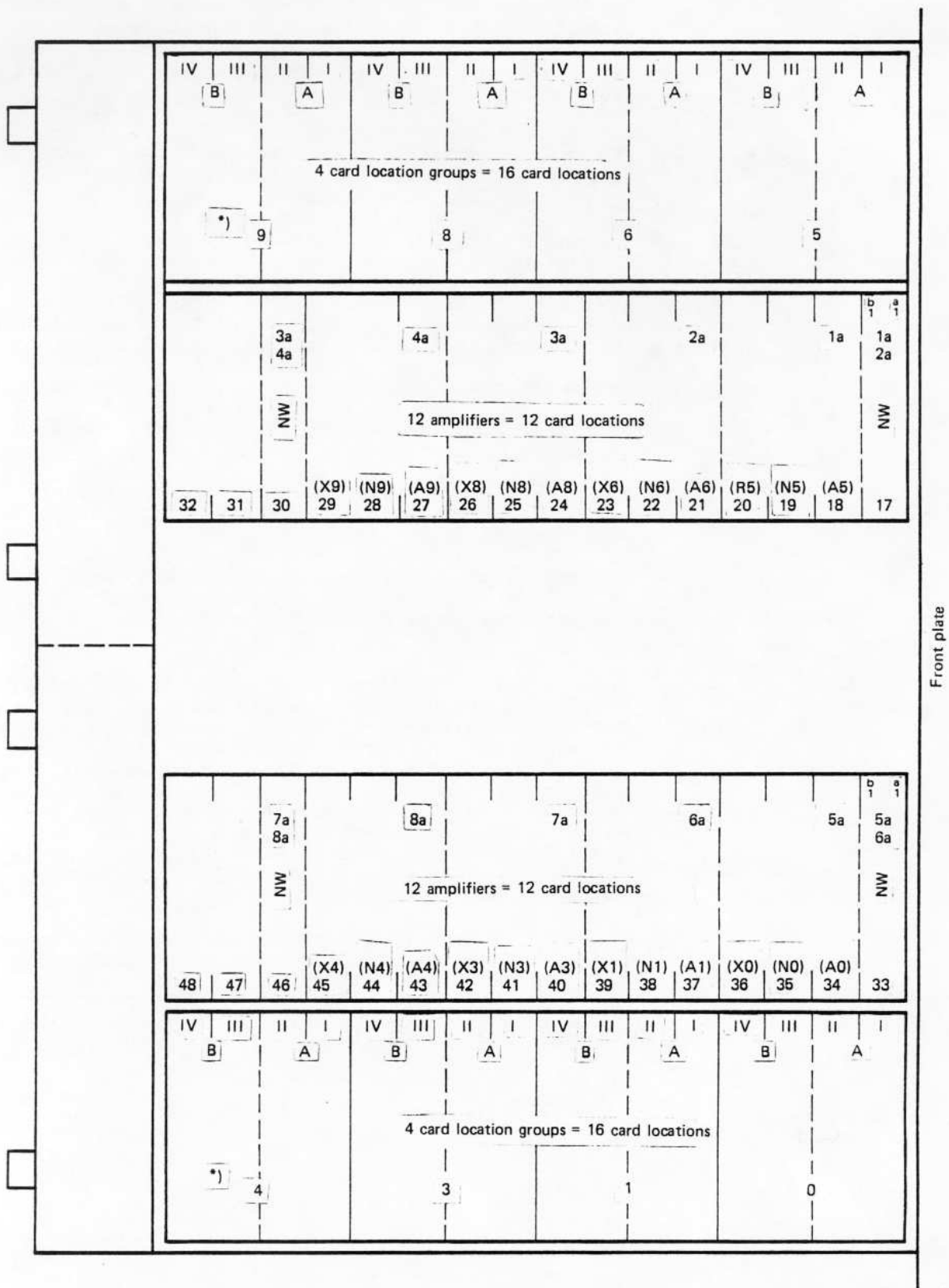


Fig. 2.2.2/2

*) Equipment possibilities of drawer NNT 771
 The digits indicate the respective address field on the analog patch panel allocated to the respective card location

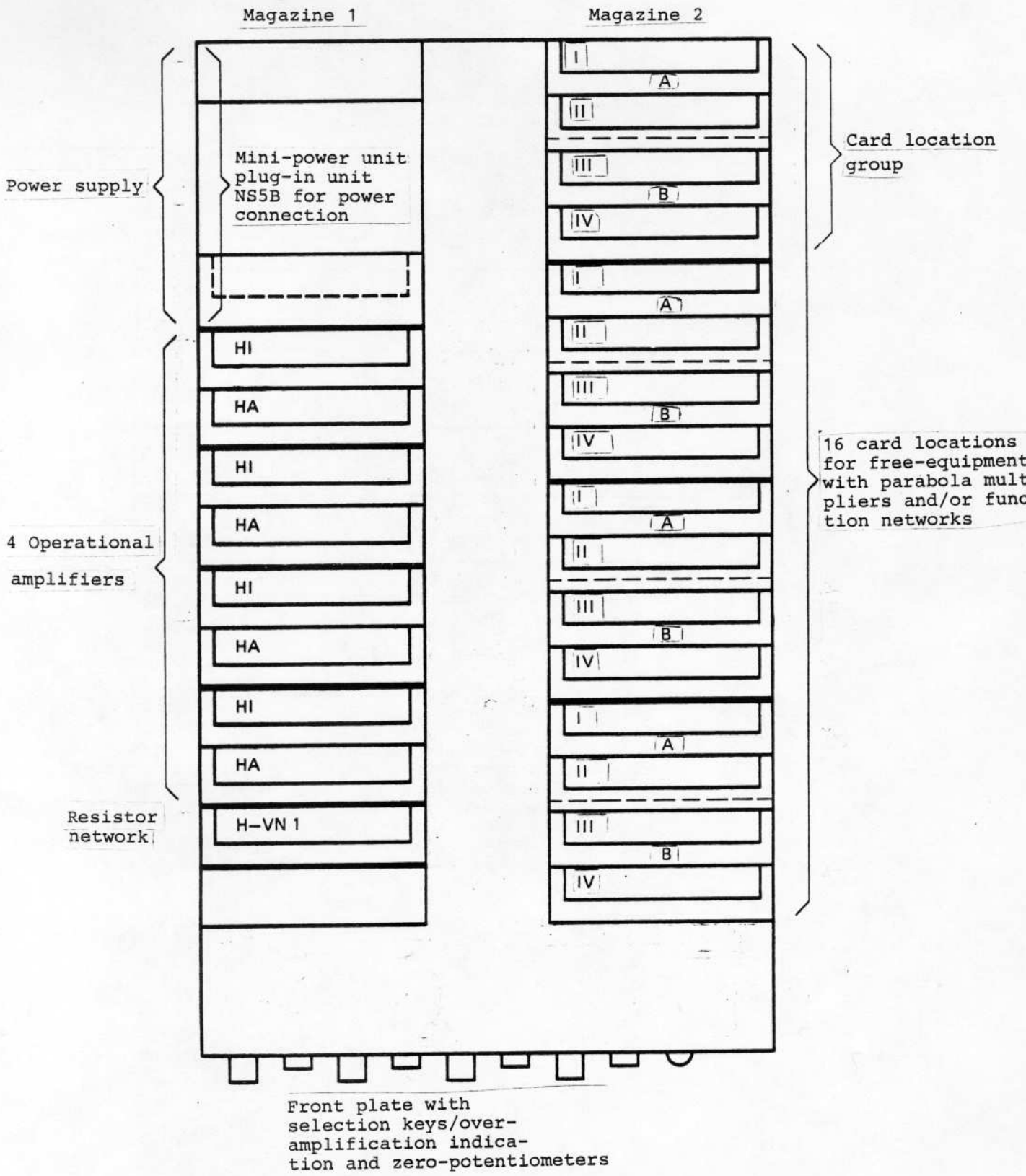


Fig. 2.2.2/3 Equipment layout of a mounting unit within NNT 801

2.2.3
Equipment of the
UKF-Magazine

The UKF-magazine is accessible from the front below a cover provided on the other left-hand side of the magazine. It consists of 8 card locations, designated with BG0-9 except the digits 2 and 7. This designation thereby correlates to the arrangement of the UKF-jacks on the analog patch panel. This means, that the digits 0,1,3,4,5,6,8,9 are the numbers of the address fields in which the assigned jack field is located. Further details see section 4.6.1.

The UKF-magazine can be equipped with the following cards:

Table 2.2.3 Equipment of card locations of UKF-magazine

Designation of network	Card location BG							
	0	1	3	4	5	6	8	9
Universal breakpoint function	A-BG1	A-BG1	A-BG1	A-BG1	A-BG1	A-BG1	A-BG1	A-BG1
Logarithmic function	LOG 1A	LOG 1A	LOG 1A	LOG 1A	LOG 1A	LOG 1A	LOG 1A	LOG 1A
Noise generator	RGF 104				RGF 104			

The hatched locations must not be occupied. When using the card LOG1A, the functions

$$+\frac{1}{2} \lg (-100x) \text{ and } -\frac{1}{2} \lg (100x)$$

can be realized on each card location.

2.2.4
Equipment of the
RGV-Magazine

The RGV-magazine (order number ZUB 770) is located in the bottom part UBE 770 or UBS 770 of the computer and can be accessed from the front after removing the lower left-side wall. It permits use of 2 noise generators RGF 104 max. and 6 drift-compensated operating amplifiers A-SV1A (or A-SV1B) max. as inverter. As to the equipment, see the following table.

Table 2.2.4. Equipment of card locations of RGV-magazine

Jack No.	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Noise generator							RGF 104				RGF 104			
Amplifier	A-SV 1A(B)	A-SV 1A(B)	A-SV 1A(B)	A-SV 1A(B)	A-SV 1A(B)	A-SV 1A(B)								
Assignment	Df	De	Dd	Dc	Db	Da	RG 2				RG 1			

Hatched locations must not be occupied (however, both RGF 104 and A-SV1A(B) can be used on the remaining locations).

2.3
Assignment of the Computing Elements to the Analog Patch Panel

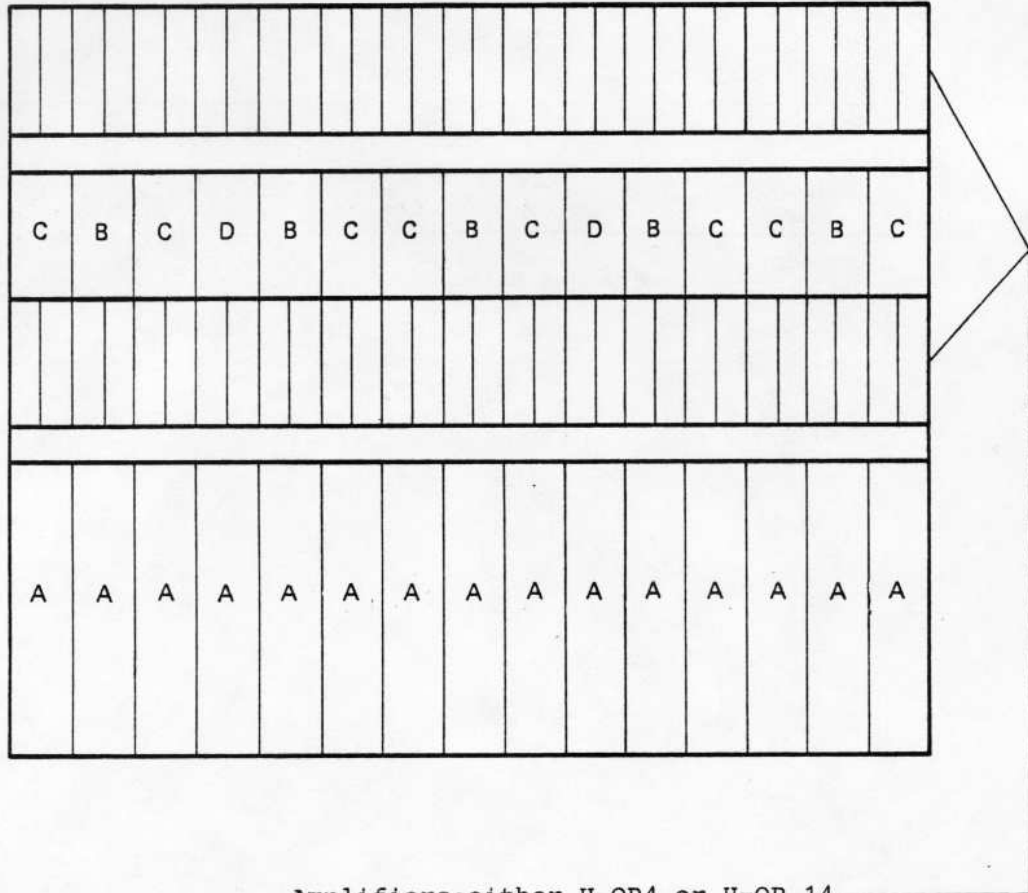
2.3.1
Magazine Block for
Open Amplifiers/
Summers/Integrators

The magazine block contains 60 free-programmable operational amplifiers arranged in two magazines, as well as the respective switching cards also being arranged in two magazines. As to arrangement and equipment, see Fig. 2.3.1/1 and table 2.3.1/1.

Open Amplifiers/
Summers

In general, the allocation of these elements to each other and to the analog patch panel results in shortest possible line lengths. Two designation labels contain the address indication of the respective amplifier as well as the allocation of a switching card to two amplifiers. In principle, a switching card contains control elements and networks of two amplifiers arranged opposite on the APF but with equal end address number, e.g. for amplifier 3 of address field 0 (upper APF half) and address field 5 (lower APF half), so that amplifier 03 and 53 have a common switching card.

Open Amplifiers/
Inverters



Amplifiers: either H-OP4 or H-OP 14

Fig. 2.3.1/1 Magazine block for integrators, summers and inverters (equipment side, seen from the rear).

Table 2.3.1/1

Switching cards for control of operational amplifiers (cards also contain networks)

Type A	Integrators/Summers	H-SK31* H-SK41 each possible H-SK24
Type B	Summers	H-SK12 H-SK22 each possible
Type C	Inverters	H-SK13 each possible
Type D	Inverters	H-SK15 each possible

* Wiring must be changed

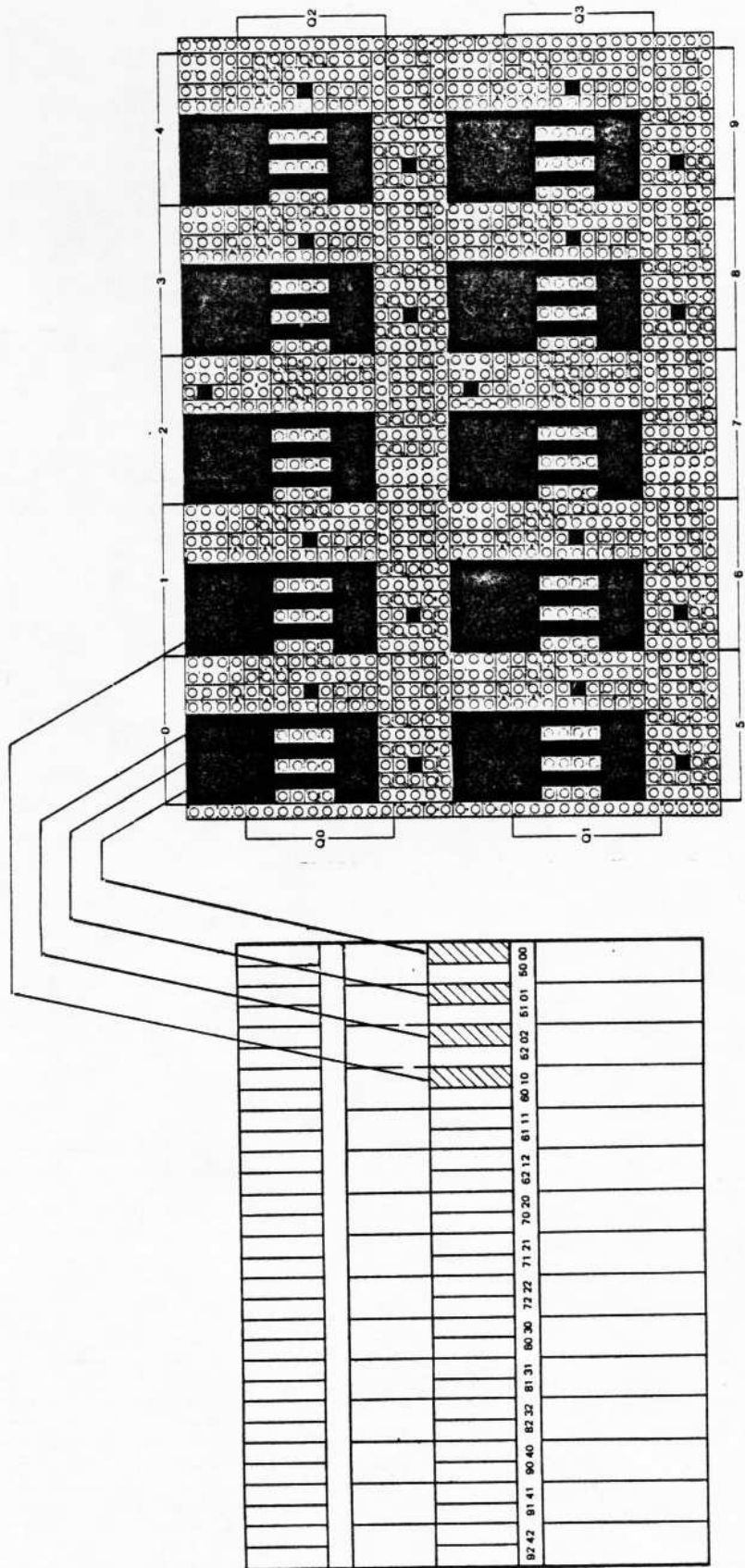


Fig. 2.3.1/2 Allocation of the open amplifiers/summers/integrators to the APF. E.g. amplifiers 00,01,02,10. To each amplifier, the switching card below is allocated.

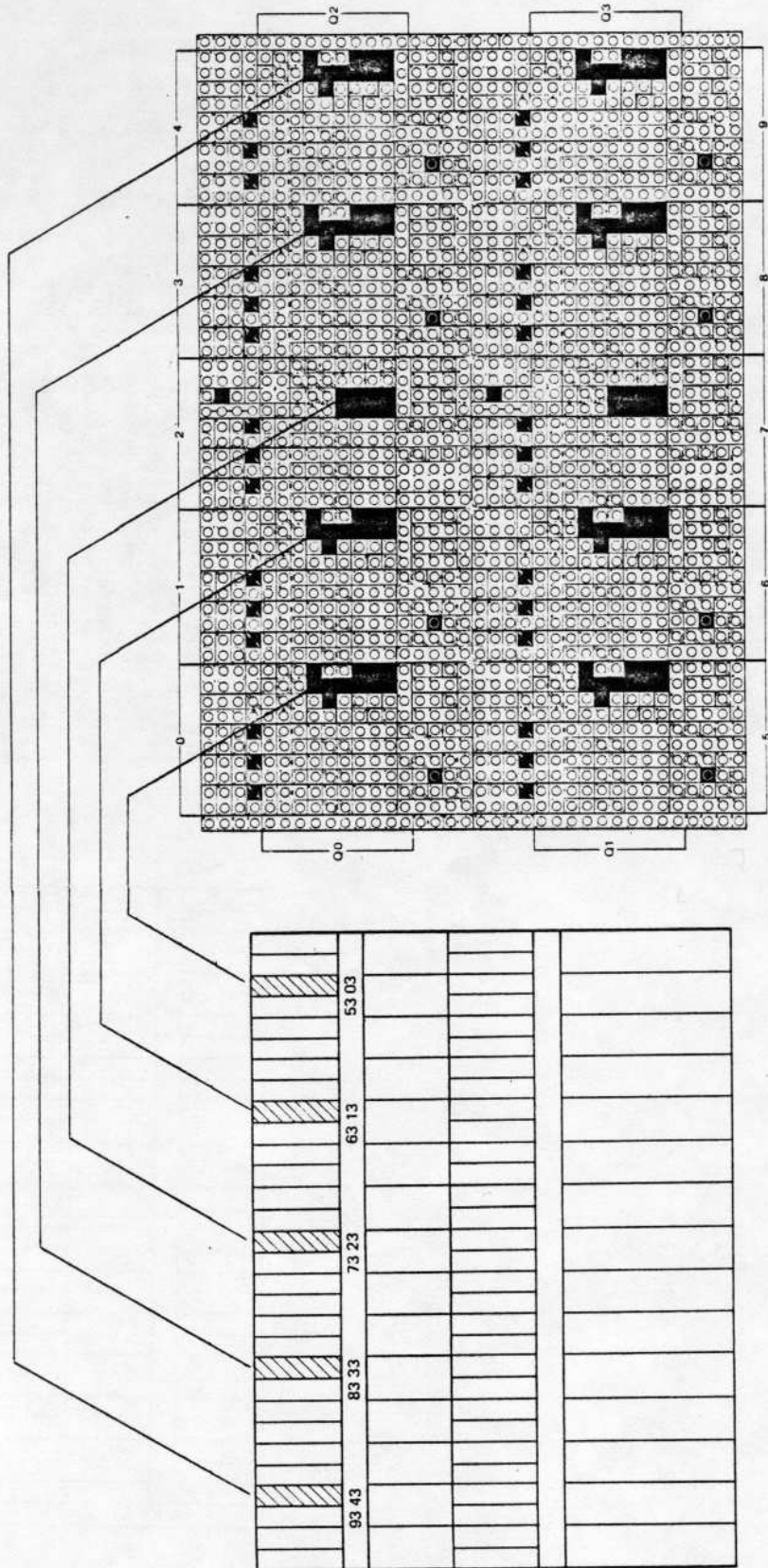


Fig. 2.3.1/3 Allocation of the open amplifiers/summers/ integrators to the APF. E.g. amplifiers 03,13,23,33,43. To each amplifier, the switching card below is allocated.

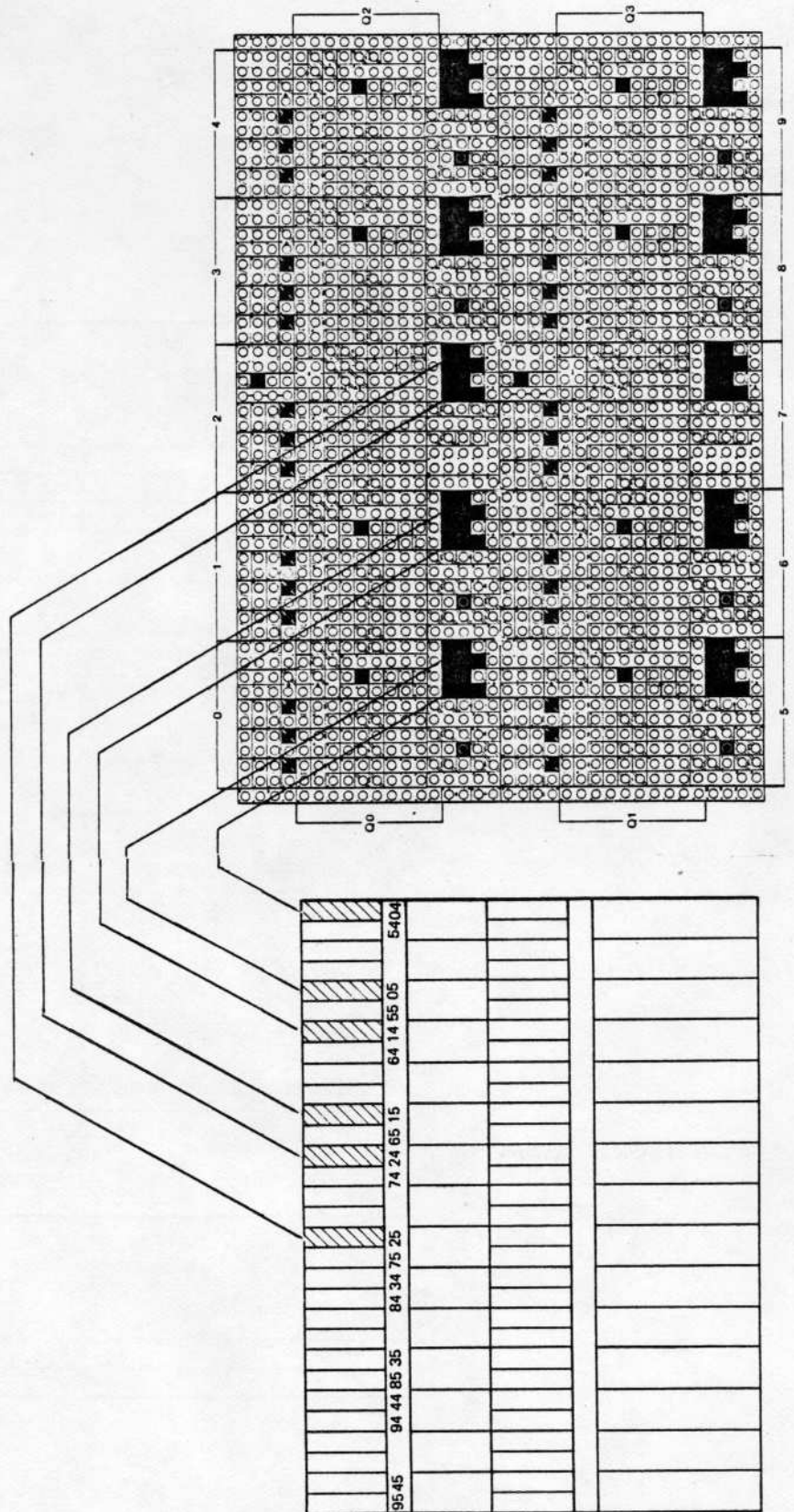


Fig. 2.3.1/4 Allocation of the open amplifiers/summers/integrators to the APF. E.g. amplifiers 04,05,14,15,24,25. To each amplifier, the switching card below is allocated.

2.3.2
 NNR-Magazine with Allocated
 Amplifier Magazine,
 UKF-Magazine and C-Amplifier
 Magazine

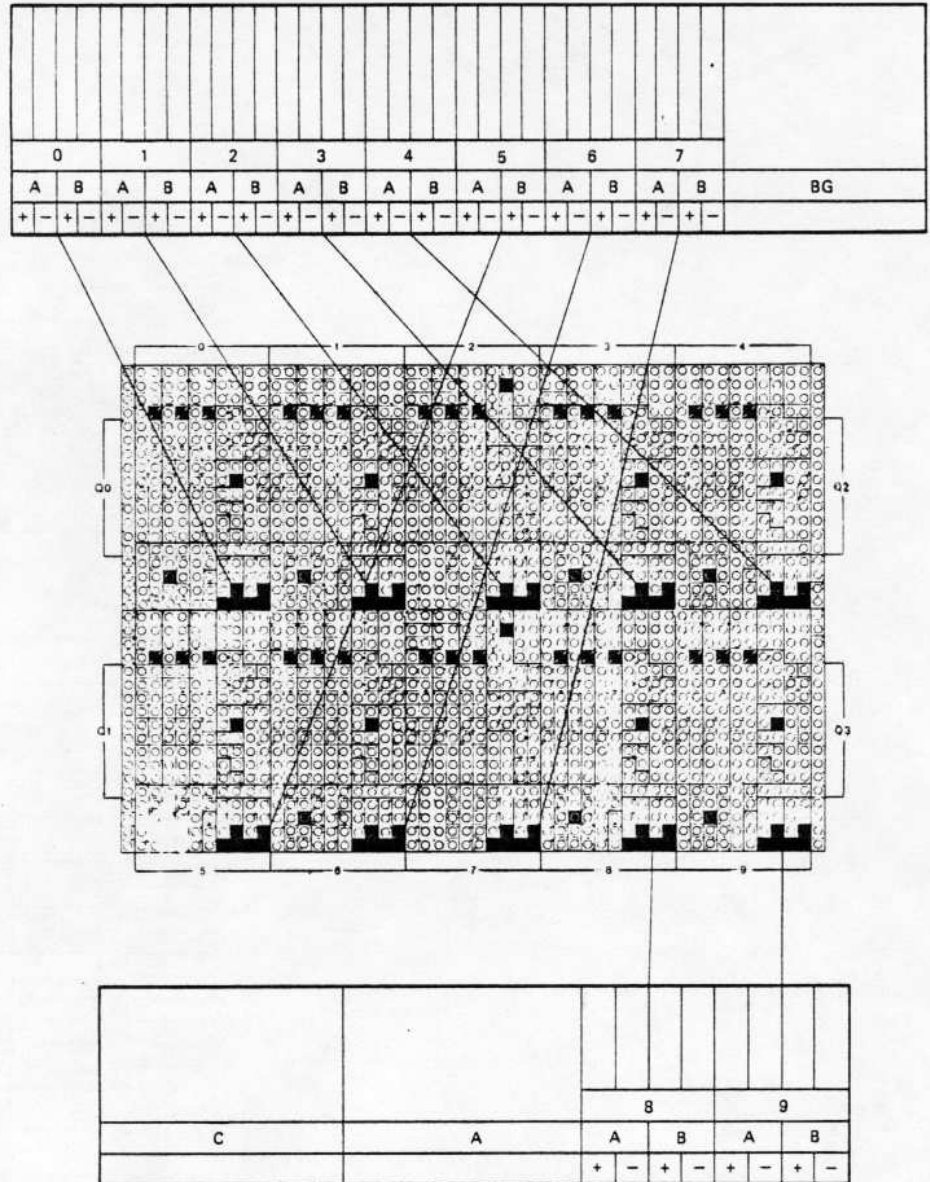


Fig. 2.3.2/1

Allocation of the card locations of the NN-computer
 magazine to the APF top:front accessible NNR-magazine
 part
 bottom: rear accessible NNR-magazine part

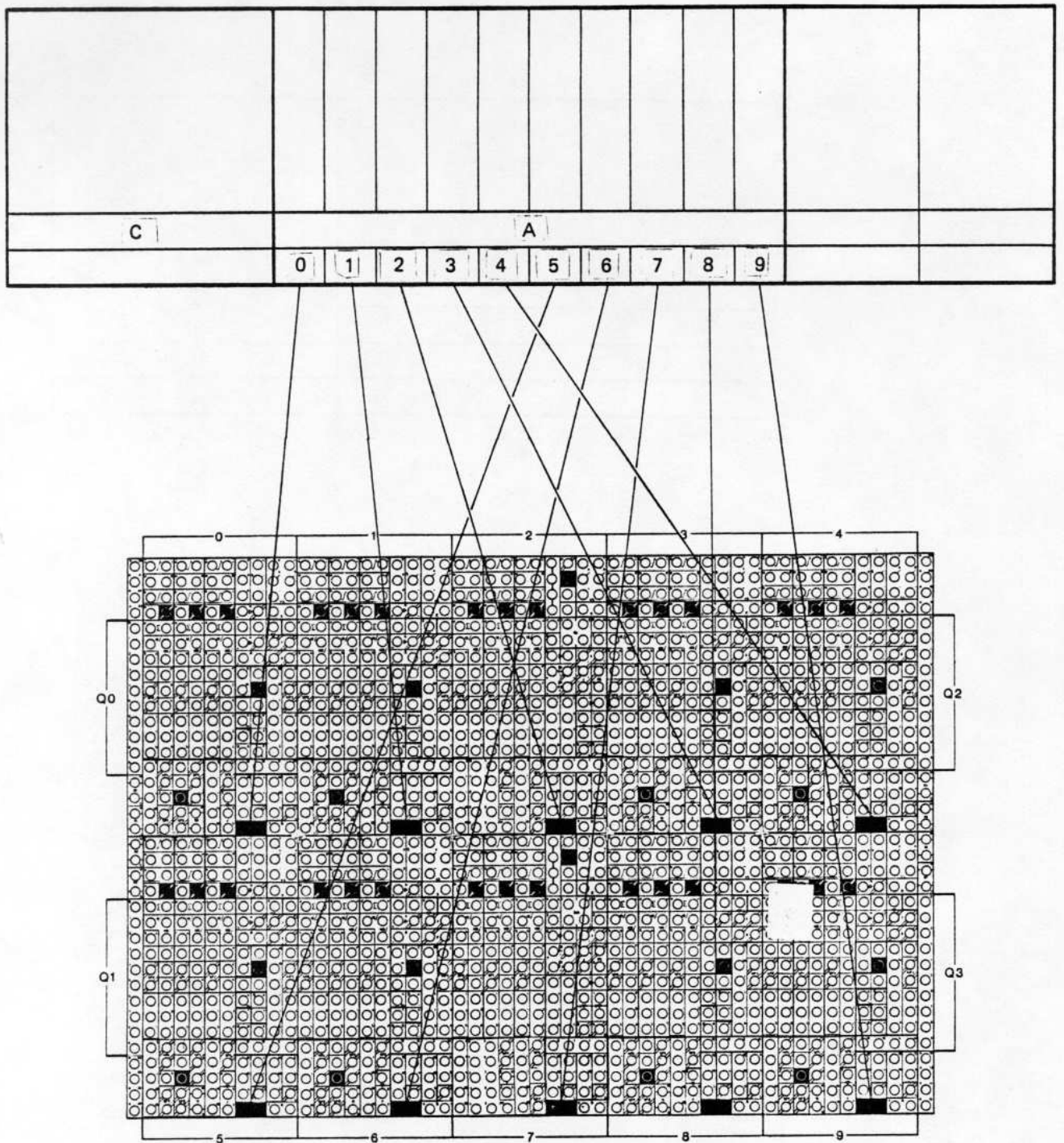


Fig.2.3.2/2 Card locations of A-inverters

The inverters can be used as input amplifiers of the NNR-magazine or as free-programmable amplifiers. The amplifier magazine follows the rear accessible NNR-magazine part.

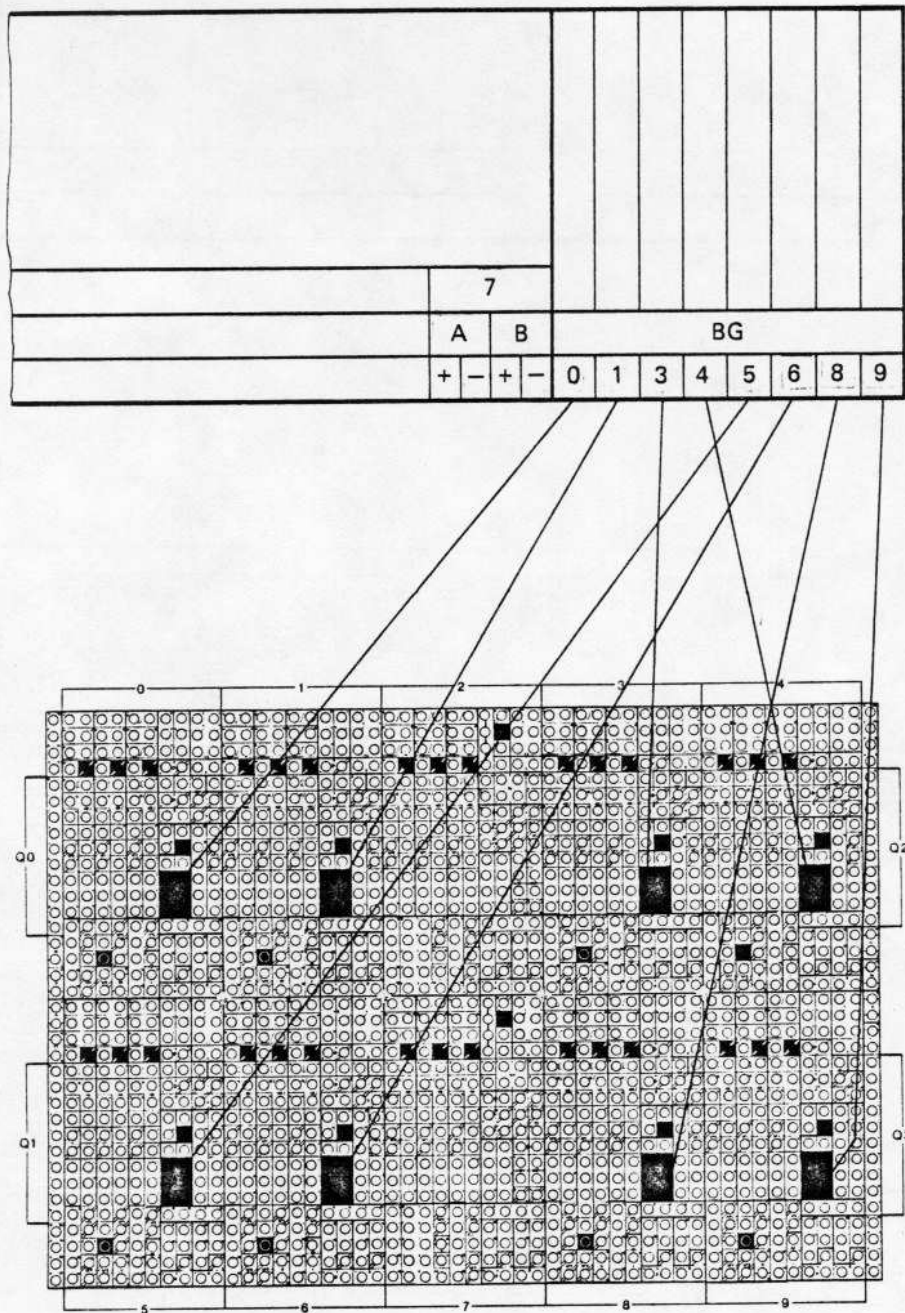


Fig. 2.3.2/3 Allocation of card locations of UKF-magazine to APF

The card locations are beside the NNR-magazine, accessible behind the front cover.

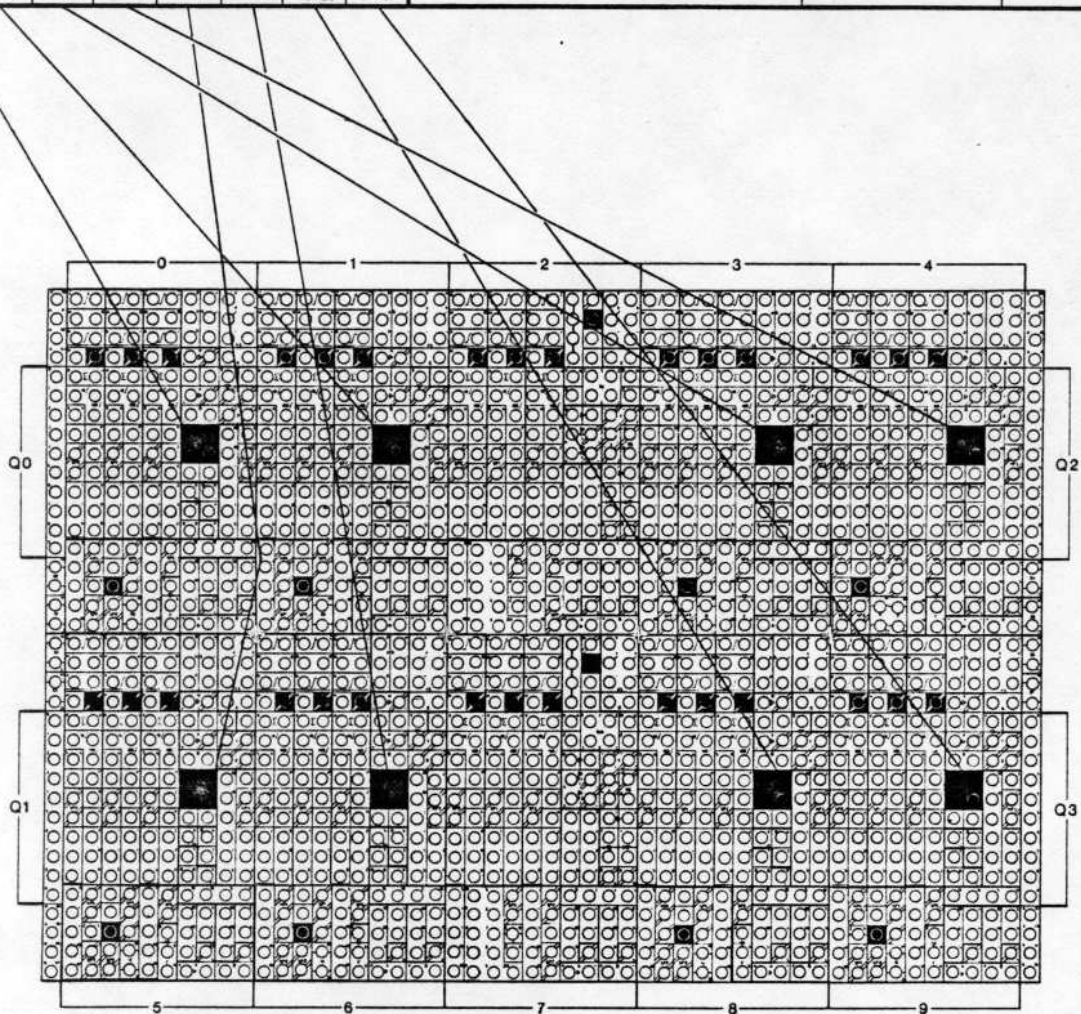
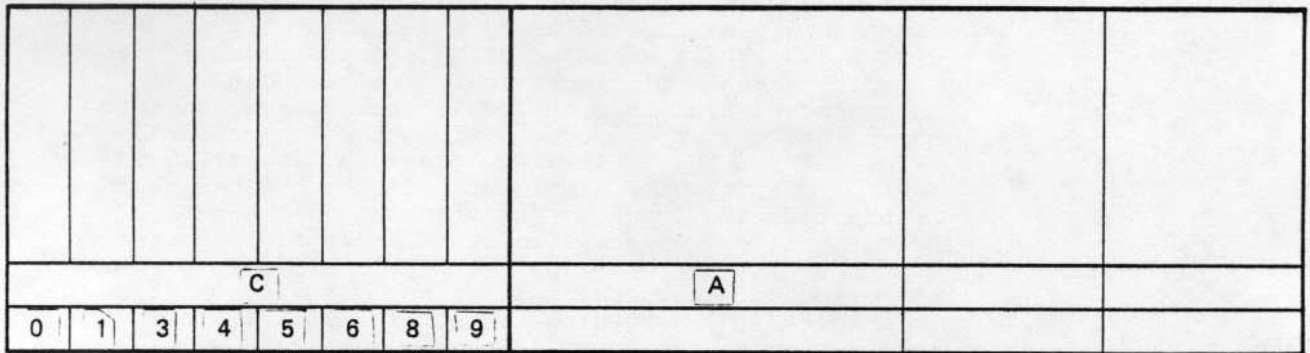


Fig. 2.3.2/4 Allocation of card locations of C-inverters to the APF

These card locations are accessible from the rear side of the computer

2.3.3.
Noise Generator Amp-
lifier Magazine

In the noise generator amplifier magazine (RGV-magazine), amplifiers can be equipped, which are designated as D-inverters (Da...Df) and which do not have own jack fields. According to the table 2.3.3 and Fig. 2.3.3/1, the resolver or NNE-jack fields can be used for these amplifiers. Therefore, a cable must be connected from St.2 or St.3 of the RGV-magazine to one of the stated connectors of connection panel 1 (Fig. 2.1/3). The table shows the type of jack field (NNE or RS) on which the input and output jacks of the D-inverters are located. The position on the analog patch panel can be seen from the address field number.

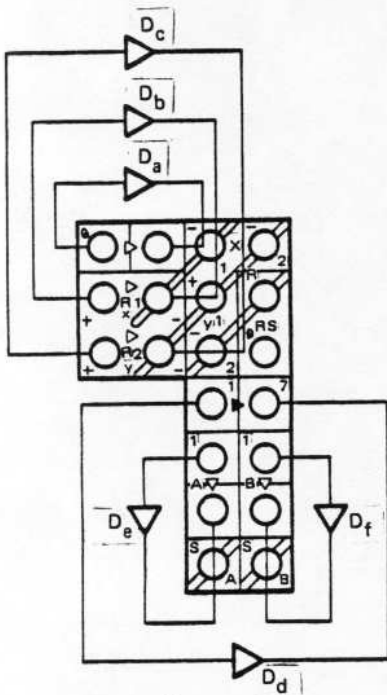
As to the noise generators, further details are given in chapter 4.8. According to the Fig. 2.3.3/2, RG1 is assigned to the upper APF-half, whereas RG2 to the lower half, respectively.

Table 2.3.3

Allocation of D-amplifiers of RGV-magazine to the jacks on the APF

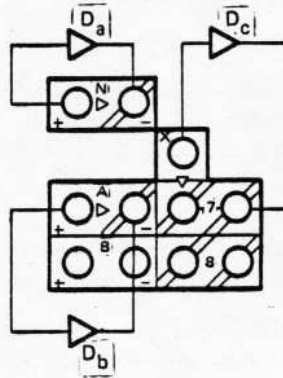
Amplifier	Cable from St.2 to		Cable from St.3 to			
	St.10 (ERS2)	St.6 (ERS7)	St.8 (NNT0,1)	St.9 (NNT3,4)	St.4 (NNT5,6)	St.5 (NNT8,9)
	at connection panel 1		at connection panel 1			
Da	RS-field		NNE-field	NNE-field	NNE-field	NNE-field
Db	in address-field 2	in address-field 7	in address-field 0	in address-field 3	in address-field 5	in address-field 8
Dc						
Dd			NNE-field	NNE-field	NNE-field	NNE-field
De			in address-field 1	in address-field 4	in address-field 6	in address-field 9
Df						
see Fig.2.3.3/1a			see Fig. 2.3.3/1b			

a)



b)

Address field 0, 3, 5, 8



Address field 1, 4, 6, 9

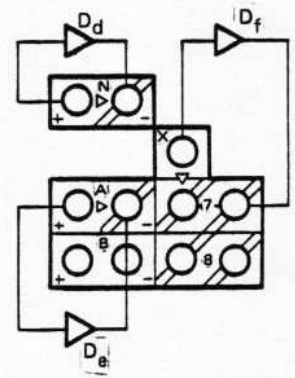


Fig. 2.3.3/1

Allocation of D-amplifiers of RGV-magazine to the jacks of the APF. The allocation depends on the cable connection between RGV-magazine and connection panel 1, see table 2.3.3.

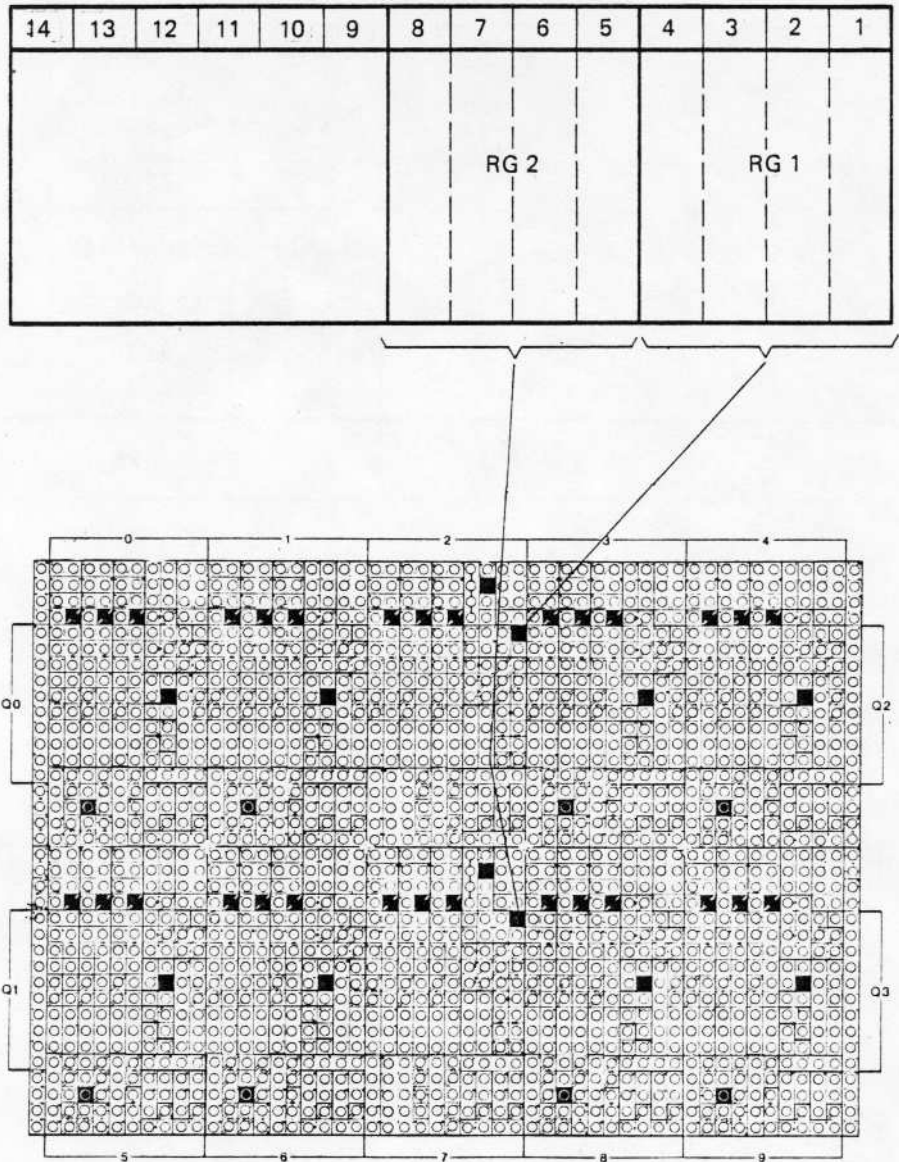


Fig. 2.3.3/2 Allocation of noise generator locations of RGV-magazine to the APF

2.3.4
Comparator Magazine

see chapter 4.6

2.3.5
Drawer, Non-Linear Net-
works NNT 771

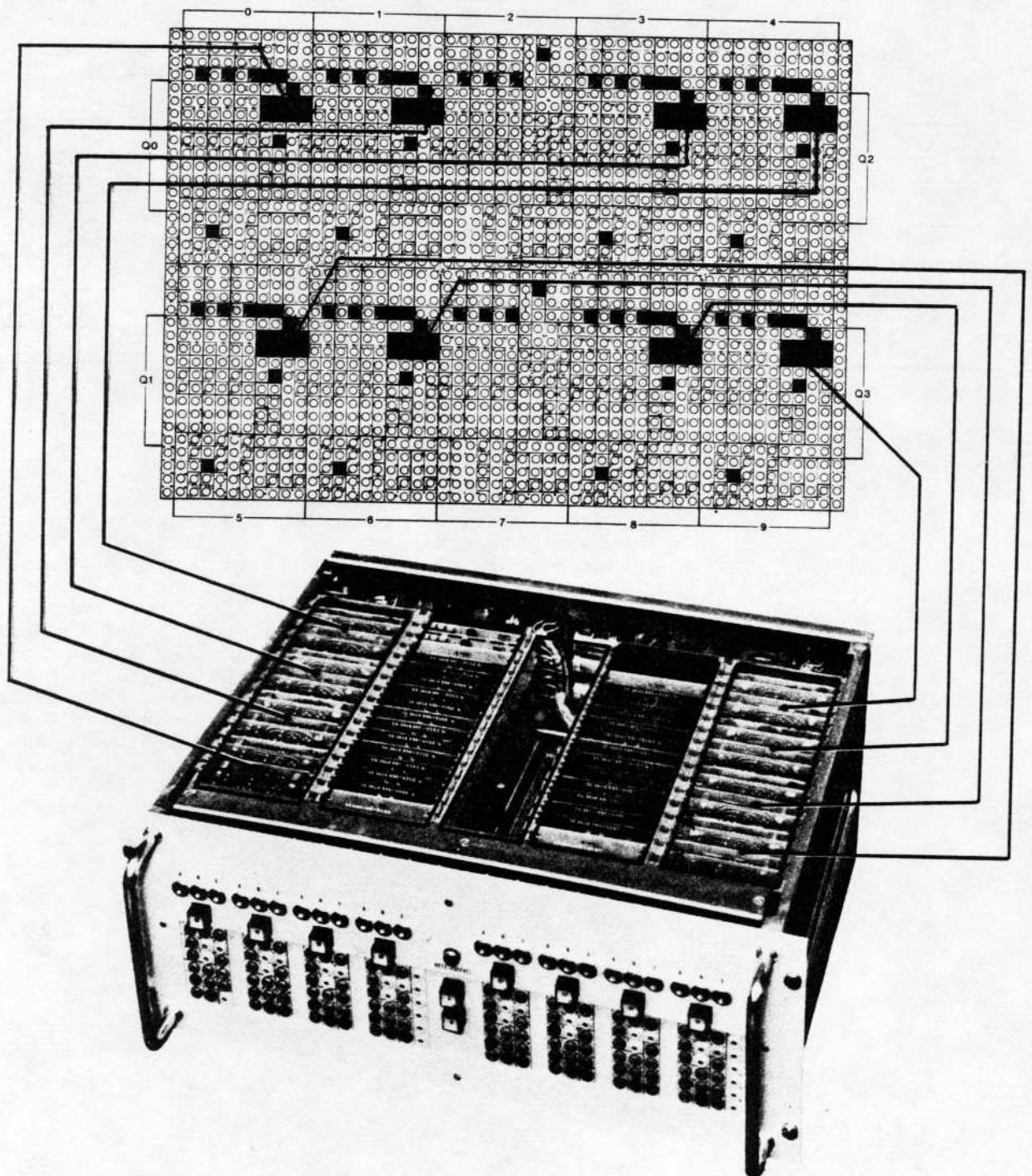


Fig. 2.3.5/1

Allocation of card location groups of drawer NNT 771
to the APF

Fig. 2.3.5/1 shows the allocation of the card location groups of drawer NNT 771 to the APF. Basically, the left-hand drawer half is connected via two cables to the upper APF half, whereas the right-hand drawer half is also connected via two cables to the lower APF half. Seen from the rear, first the B-locations and then further to the front the A-locations are arranged within each card location group.

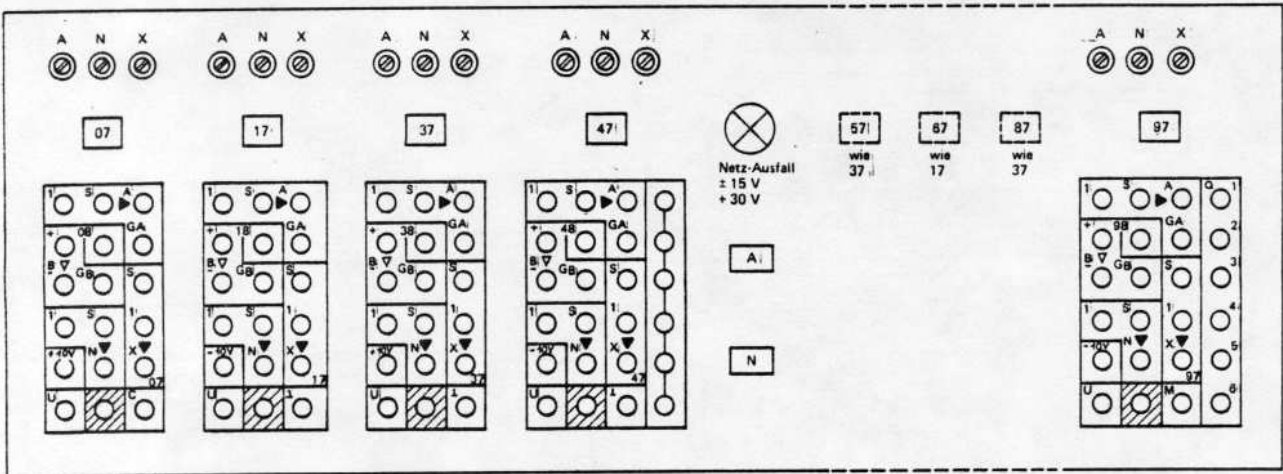


Fig. 2.3.5/2 Front plate of drawer NNT 771 (simplified)

The front plate of drawer NNT 771 shows in its top row the zero potentiometers of the amplifiers, i.e. 3 zero-potentiometers (A, N, X) per card location group. The allocation thereby can be seen from the designation of the below mounted push-button. (With table computers, this button serves for control. Control of the A, N, X-inverters of the RA 770 C is described in section 3.6.3.2). The designation is identical to that of the selection address of the directly selectable X-inverter, whereby the tens digit corresponds to the address field number of the APF. The selection push-button furthermore serves for over-amplification indication of the respective X-inverter.

2.3.6.
Drawer, Non-Linear
Networks NNT 801*)

Fig. 2.3.6 shows the allocation of the card location groups of drawer NNT 801 to the APF. Basically, the left-hand drawer half is connected via two cables to the upper APF half, whereas the right-hand drawer half is also connected via two cables to the lower APF half. Allocation of the card location group to the NNE-field of the APF is shown by the black lines in the upper part of the figure, whereas the dotted lines in the lower part show the allocation of card location groups to selection keys (= over-amplification indication lamps) and to the zero-potentiometer. The allocation refers to both left-hand and right-hand mounting unit. See from the rear, first the B-locations and then further to the front the A-locations are arranged within each card location group.

2.3.7
Drawer Function
Generator VFG 801

The black lines on figure 2.3.7 show the allocation of the card locations of function generator 09...49 of drawer VFG 801 to the analog patch panel (APF). Allocation of the drawer is made by the description of the cover plates. The dotted lines show the allocation of the potentiometer for setting the ordinate values, of the switch-over key for use as inverter amplifier, of the over-amplification indication with the number of the function generator, of the zero-potentiometer of both amplifiers and of the switch for the slopes 1, 7 and 5, to the magazine part of the function generator 09. Since the address of the function generator is used for designation, the allocation of the control elements is also possible in other cases. Further details see chapter 4.5.1.

*)Not available for delivery

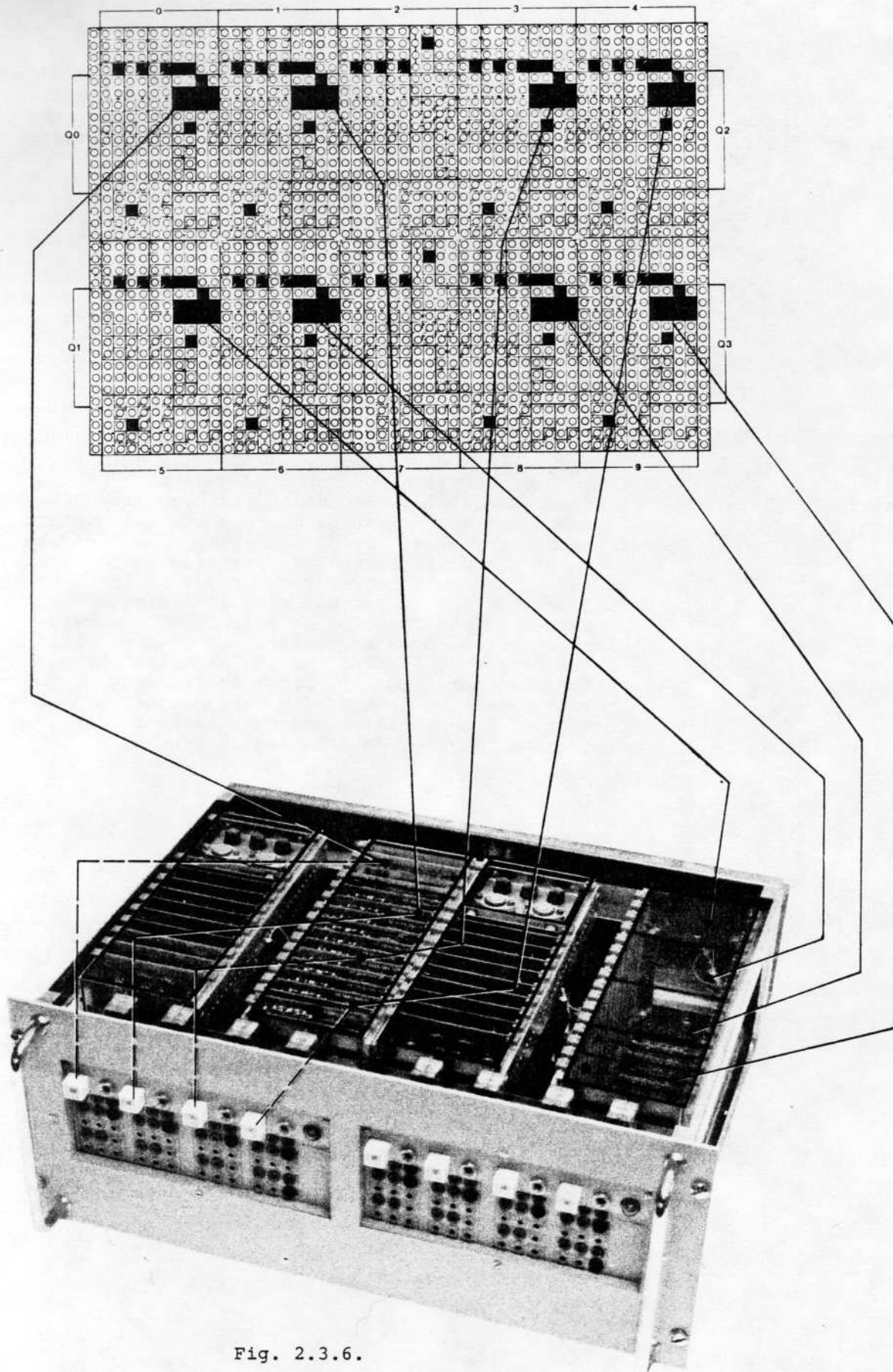


Fig. 2.3.6.

Allocation of the card location groups of drawer NNT 801 to the APF

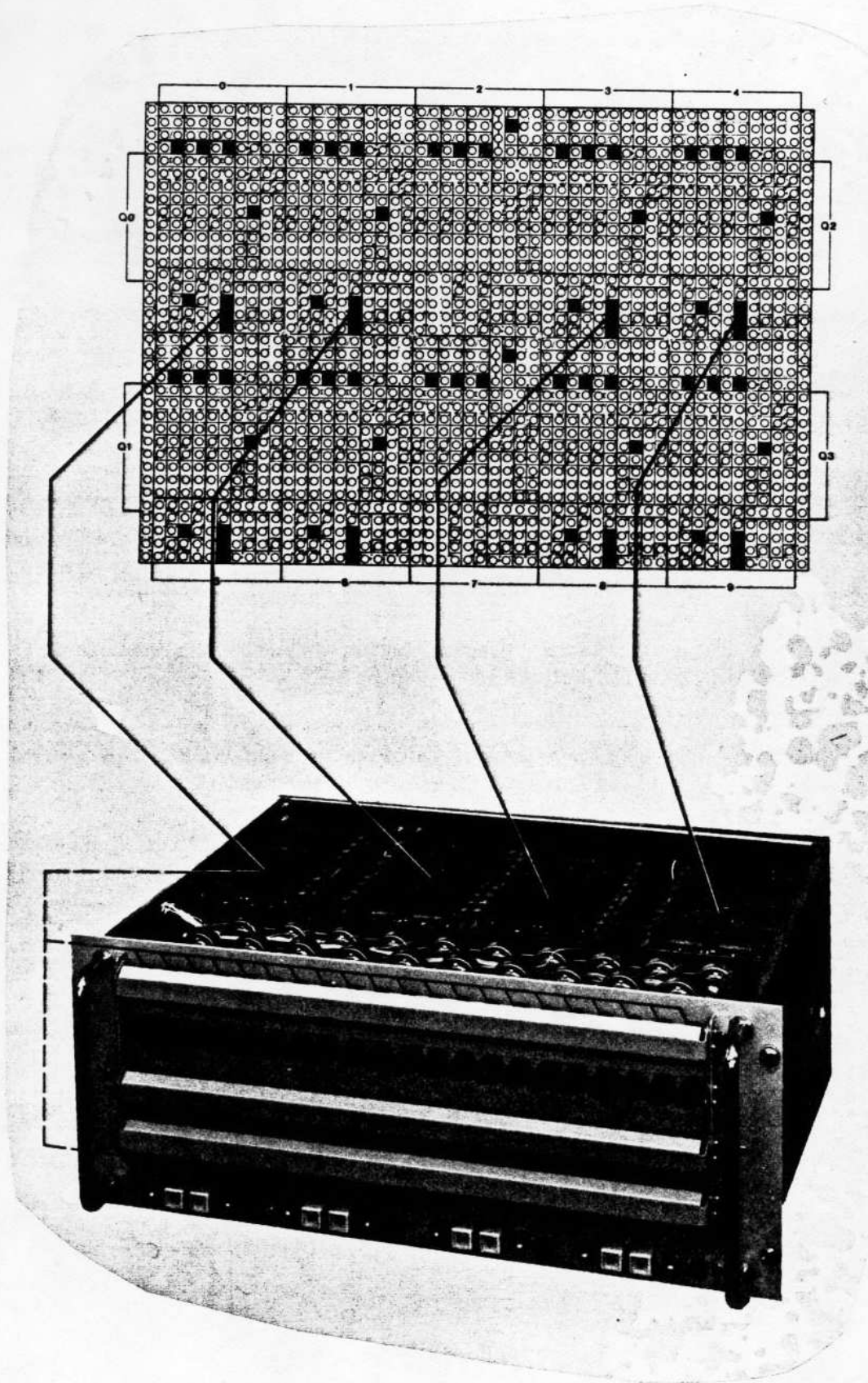


Fig. 2.3.7 Allocation of function generators of drawer VFG 801 to the APF

2.3.8
Drawer Electronic
Resolver ERS. 702

The allocation of the drawer electronic resolver to the APF is achieved by the respective connection of the connection cable at connector St.6 or St.10 of the connection panel. When mounting the drawer on top of the table plate, connector St.10 and thus the upper ERS-jack field should be occupied on the APF. Further details concerning the electronic resolver, see chap. 4.7.

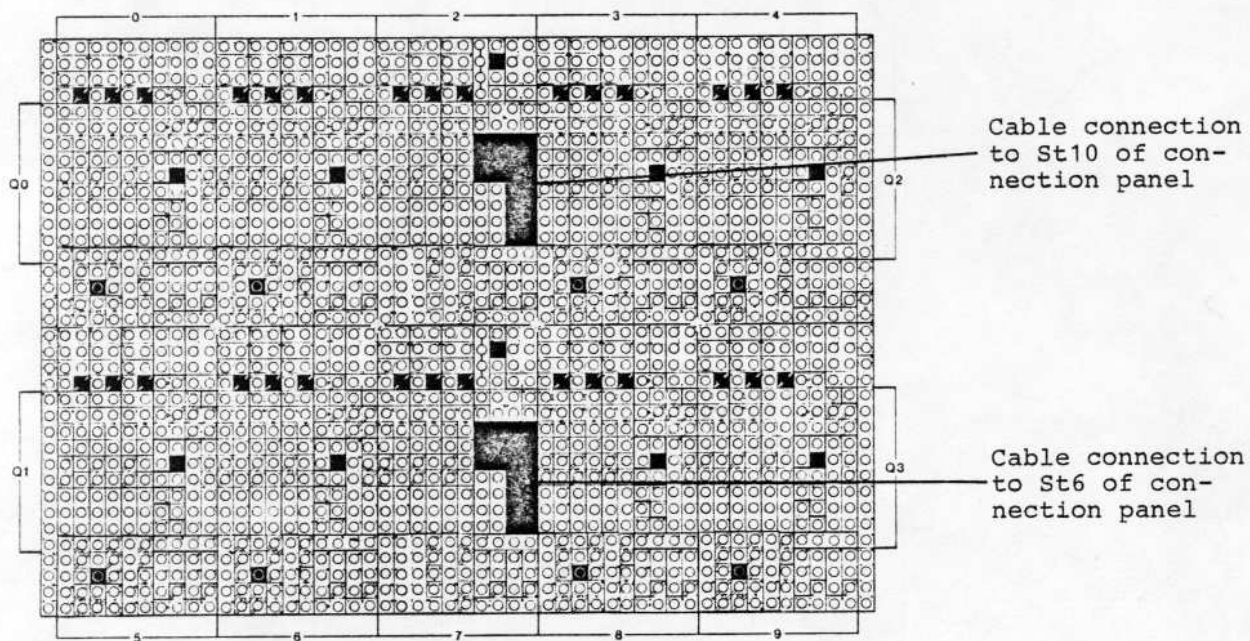


Fig. 2.3.8 Allocation of Drawer Resolver ERS 702 locations to the APF

2.3.9
 Servo-Potentiometer
 Sets PFE 770 and
 PFE 775

