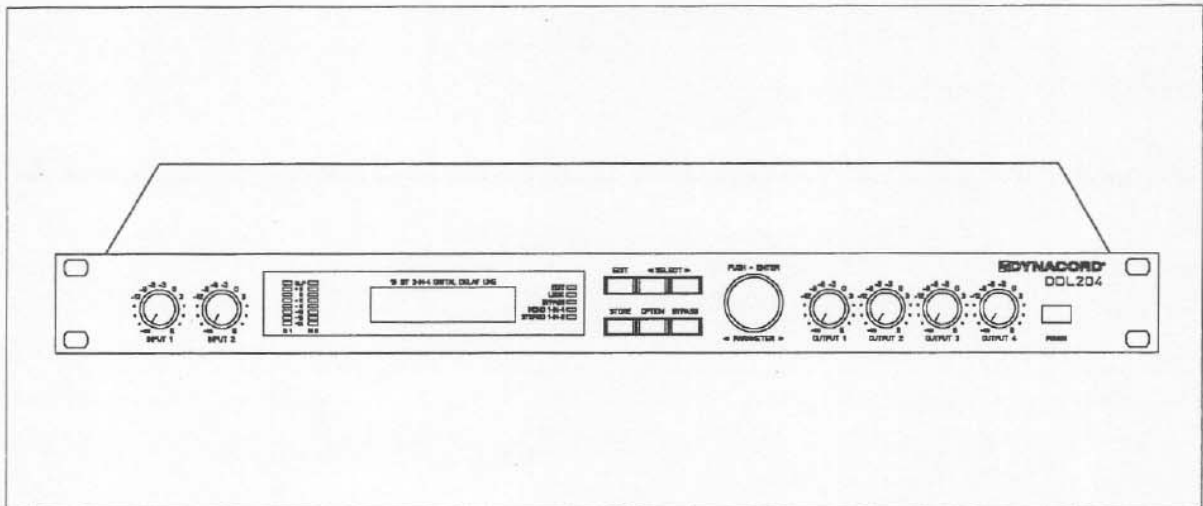


EV[®] DYNACORD[®]

USER MANUAL



DDL 204

18 Bit 2-in-4 Digital Delay Line

1. INTRODUCTION

First of all we should like to thank and congratulate you for choosing the Professional Signal Delay Line DDL 204 from DYNACORD.

The DDL 204 is a delay unit which can be configured as stereo unit with 2 x IN and 2+2 x OUT or as mono unit with 1 x IN and 4 x OUT at will, enabling you an easy set-up of "distributed systems" of different loudspeaker groups, distributed over the room. The different delay times of sound from the loudspeaker groups to the audience can be compensated with the DDL 204, in order to avoid echo effects and increase speech intelligibility.

The 4 outputs of the DDL 204 allow different delays for 4 loudspeaker groups. The maximum delay time of more than 2750 msec. allows a delay compensation of distances up to 950 m. Optionally the delay can be set as distance in m, cm, inch, feet or as time in msec. According to requirements in the "normal" operating modes the phase can be inverted for each output and additionally a High Shelving Filter can be used to reduce the trebles by 15 dB. The various delays can either be edited relatively to one another or separately. 30 different configurations can be stored in 30 user memory places.

All the DDL 204's inputs and outputs are electronically balanced XLR sockets. It is perfectly straightforward to retrofit transformers as an optional feature.

In this Owner's Manual you will find a lot more features of the DDL 204. Please read it through carefully and we guarantee that your new Professional Signal Delay Line DDL 204 from DYNACORD will give you great pleasure.

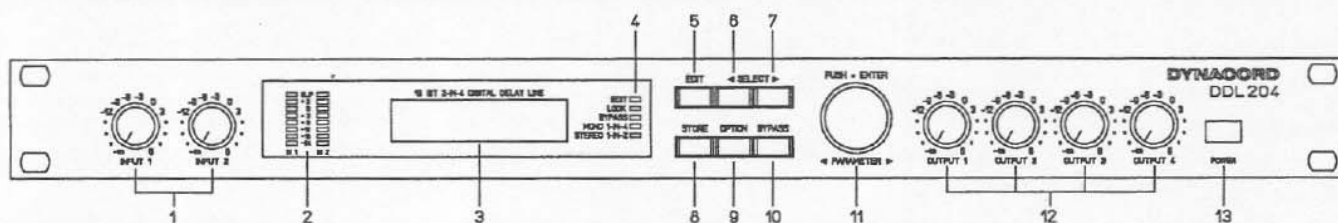
IMPORTANT NOTES

ATTENTION: This unit must be protected from damp because of fire risk and the possibility of electric shocks.

1. Make sure that nothing, especially no metal objects, are inserted into the device. This could result in a severe electric shock or malfunction.
2. If the unit is subjected to extreme fluctuations of temperature, e.g. on being transported from outside to a heated room, condensation can form. The unit should not be used until it has reached room temperature.
3. If water or any other liquid is spilt on to the unit accidentally, the unit should be switched off immediately and taken to a servicing facility to be checked.
4. Make sure that the unit is always well ventilated and never exposed to direct sunlight.
5. Do not use sprays to clean the unit as they have a detrimental effect on the unit and could ignite suddenly.
6. Inside the unit there is a battery to supply the RAM when the unit is switched off. This will ensure that your stored USER programs do not get lost. The service life of the battery is approx. 5 years. If the voltage drops below a minimum value, the following display appears after switching the unit on: "Service Required, Change Internal Battery". In this case contact the DYNACORD service center for changing the battery.

ON NO ACCOUNT SHOULD THE USER ATTEMPT TO DO THIS HIMSELF!

2. PANEL DESCRIPTION AND CONNECTIONS



2.1 FRONT PANEL

1, Controls INPUT 1 / INPUT 2

These adjust the input level of the DDL 204 to adapt the unit to different sound source output voltages. The input signal can be raised by 6 dB (control fully right) or attenuated infinitely.

2, Level indicators INPUT 1 / INPUT 2

These are for modulation monitoring, as the peak value of the input level is indicated. Another feature is the peak hold function which facilitates easy level matching. Adjust the input controls so, that the level indicators remain at 0 dB. The CLIP LED's should never light up, because otherwise the unit is overdriven internally.

3, Multi-functional display

This is a LC display involving 2 lines with 16 characters each. In PLAY mode the program number and delay configurations for the outputs 1 - 4 are indicated. In EDIT mode the parameter name and a graphic and numeric parameter value are indicated. Depending on the current status OPTION menus, status messages, user guide messages etc. appear.

4, Status/Mode LED's

These LED's indicate the DDL 204's current status. If the LED EDIT lights up, the EDIT mode is indicated. The LOCK LED indicates, that the DDL 204 is in the write protected mode and that no key inputs are possible. The BYPASS LED indicates the BYPASS mode of the unit. The LED's MONO 1-IN-4 or STEREO 1-IN-2 light up depending on the actual configuration (see chapter 6 "DELAY CONFIGURATIONS AND PARAMETERS").

5, EDIT Key

This key changes the operation to EDIT mode. After pressing this key, the first parameter of the active program is shown. Further parameters are accessible via the SELECT keys. The value of the parameter shown can be changed via the rotary encoder.

For further information please see "EDITING", chapter 5.2.

6, SELECT Key <

In play mode this key selects the previous memory place (activation via ENTER). In edit mode it is used for selecting parameters (always the previous parameter).

7, SELECT Key >

In play mode this key selects the next memory place (activation via ENTER). In edit mode it is used for selecting parameters (always the next parameter).

8, STORE Key

With this key the edited programs can be saved in any memory place (No. 01 - 30). For further information please see chapter 5.3 "SAVE AND COPY"

9, OPTION Key

This key allows access to the OPTION mode where special settings for the unit can be made or checked. For further information please see "OPTION-FUNCTIONS", chapter 7.

10, BYPASS Key

With this key the DDL 204 is switched to BYPASS mode, i.e. The inputs are then passed through directly to the appropriate outputs according to the current configuration.

See also chapter 5.4 "BYPASS OPERATION".

11, Rotary Encoder with ENTER key

In play mode a program is selected by turning the encoder and activated by pressing the encoder (=ENTER). In the Edit mode the parameter values are altered with the encoder. The parameter alteration is faster if the encoder is turned and pressed simultaneously. Generally speaking the encoder serves for fast one-hand operation of the DDL 204. For further information please see "OPERATION" on page 5-1.

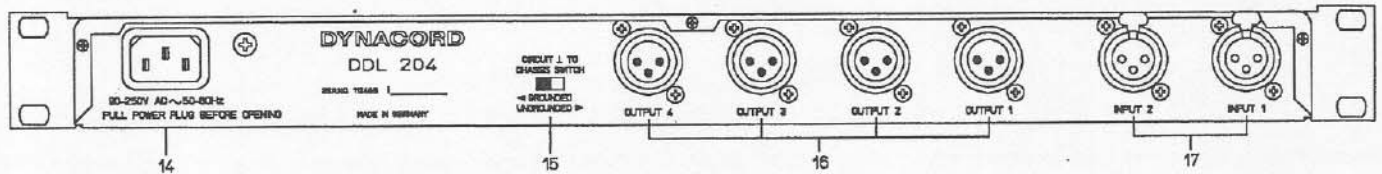
12, Rotary controls OUTPUT 1-4

With this controls the output levels of the channels 1 to 4 can be adjusted and the DDL 204 adapted in this way to the operating levels of subsequent devices. The output signal can be raised by 6 dB (control fully right) or attenuated infinitely.

13, POWER switch

This key is used to switch the DDL 204 on and off.

2.2 REAR PANEL



14, Mains socket

The DDL 204 is started up by connecting the enclosed mains cable to the mains socket. The DDL 204 is designed for mains voltages of 90 V to 250 V AC, meaning that fluctuations in mains voltage present no problem!

15, Groundlift switch

The groundlift switch serves to prevent hum loops. If the DDL 102 is used together with other units in a 19" rack, the switch should be put into position "GROUNDED". If the DDL 204 is used together with units which have different earthing potentials, the switch should be put into position "UNGROUND".

16, Sockets OUTPUT 1 - 4

These are the 4 DDL 204's balanced outputs. In configuration "MONO 1-IN-4" the delayed signal of INPUT 1 is applied to the outputs 1 to 4.

In configuration "STEREO 1-IN-2" the delayed signal of INPUT 1 is fed to OUTPUT 1 and 2 and the delayed signal of INPUT 2 is fed to OUTPUT 3 and 4.

If the unit is switched off INPUT 1 is switched directly to OUTPUT 1 and 2 and INPUT 2 directly to OUTPUT 3 and 4. Both inputs should always be connected in order to ensure that a signal appears at all 4 outputs in the case of unit failure.

The wiring for the inputs and outputs is explained in chapter 3.

17, Sockets INPUT 1 / INPUT 2

These are the DDL 204's two balanced inputs.

In configuration "MONO 1-IN-4" only the signal from INPUT 1 is fed to the outputs.

In configuration "STEREO 1-IN-2" the signal from INPUT 1 is fed to OUTPUT 1 and 2 and INPUT 2 to OUTPUT 3 and 4.

The wiring for the inputs and outputs is explained in chapter 3.

3. SETTING UP THE DDL 204

To achieve the best results with the DDL 204, the unit must be connected properly. To start the unit up, connect the enclosed mains connection cable with the DDL 204's mains socket and your mains outlet.

In order to avoid temperature problems the unit should be ventilated sufficiently and not operated at ambient temperatures above 40°C.

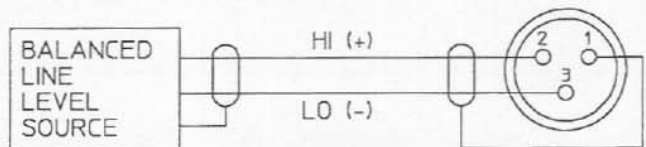
Before you switch on the DDL 204, all connections should be made according to your required configuration and wiring.

IMPORTANT:

- Always use well-screened audio cables.
- To avoid high frequency losses, the feeding lines, especially to the inputs, should not exceed 10 m.
- Do not position the unit directly on or under a power amplifier, TV monitor or the like, as the leakage field of the transformers in such devices could induce hum into the electronic circuits of the DDL 204.

3.1 Balanced input wiring

Connect the non-inverting (+) lead of the cable to pin 2 of the XLR connector and the inverting (-) lead to pin 3 of the XLR connector. The screen is connected to pin 1 (SHIELD) of the XLR connector.



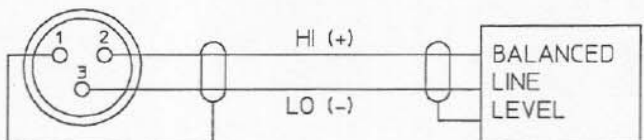
3.2 Unbalanced input wiring

Connect the "hot" lead of the cable to pin 2 of the XLR connector and the screen to pin 1 (SHIELD) of the XLR connector. In order to avoid a level loss of 6 dB, short Pin 1 and 3 of the XLR connector. If any noise occurs as result of this connection, disconnect it again.



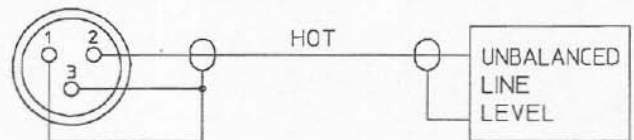
3.3 Balanced output wiring

Connect the non-inverting (+) lead of the cable to pin 2 of the XLR connector and the inverting (-) lead to pin 3 of the XLR connector. The screen is connected to pin 1 (SHIELD) of the XLR connector.



3.4 Unbalanced output wiring

Connect the "hot" lead of the cable to pin 2 of the XLR connector and the screen to pin 1 (SHIELD) of the XLR connector. In order to avoid a level loss of 6 dB, short Pin 1 and 3 of the XLR connector. If any noise occurs as a result of this connection, disconnect it again.



3.5 Position of the Groundlift switch

The groundlift switch serves to avoid hum loops. Depending on the operating mode it should be switched to the following positions:

UNGROUND: If you are using the DDL 204 together with units which have different earthing potentials.

GROUND: If you are using the DDL 204 together with other units in a 19" rack.

CIRCUIT 1 TO CHASSIS SWITCH



← GROUND
UNGROUND →

4. START-UP

4.1 SWITCHING THE UNIT ON

- 1 The DDL 204 is switched ON via the POWER switch (13).

POWER



- 2 The following appears on the display:

DYNACORD DDL 204
SIGNAL DELAY

- 3 Subsequently the DDL 204 is ready for operation and is in Play Mode. The following may appear on the display:

1	200	2	400	01
3	600	4	800	ms

The display means that you are in program 01. The delay time for output 1 is adjusted to 200 msec., for output 2 to 400 msec., for output 3 to 600 msec. and for output 4 to 800 msec. The configuration can be seen on the status LED's MONO 1-IN-4 or STEREO 1-IN-2.

NOTE!

If the display on the right side appears after the unit has been switched on, you should contact the service center to change the internal battery.

Service Required
Chng. Int. Battery

In this case the battery voltage has dropped below a min. value and there is no guarantee as to whether your program data will be maintained in the memory after switching off the unit.

4.2 LEVEL SETTING

- 1 With the INPUT controls (1) you can adjust the DDL 204's input levels for the channels 1 and 2 to the desired value.
- 2 While the level is being adjusted via the INPUT controls (1), keep checking the maximum indication on the level meters (2). The optimum value is 0 dB. The CLIP LED's indicate internal overdriving and should on no account light up.



5. OPERATION

The DDL 204 is operated by a rotary encoder with push function (ENTER) and 6 function keys.

The DDL 204 contains 4 different modes which can be selected by the corresponding mode key directly from any state.

1. PLAY MODE

Mode after switching on
Program selection mode

2. EDIT MODE

Alteration of configurations and parameters
Indication via EDIT LED
Activation via EDIT key
Return to PLAY mode via EDIT key

3. STORE MODE:

Storing and copying programs
Activation via STORE key
Exit via STORE key

4. OPTION MODE:

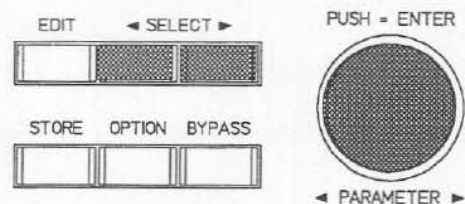
Editing functions pertaining to equipment
Switching the edit protection on and off
Activation via OPTION key
Return to PLAY mode via OPTION key

5.1 PROGRAM SELECTION

Programs can only be called up when the DDL 204 is in Play mode. This is the case after switching on, for example.

The DDL 204 contains 30 program memory places. Each program can be edited freely and can be saved to any user memory place.

- 1 To call up a memory place you search for the program you want with the rotary encoder (11) or with the two SELECT keys (6) and (7).



- 2 The new delay setting appears on the display and the program number on the right in the top line blinks. The new delay configuration can be seen on the status LED's MONO 1-IN-4 or STEREO 1-IN-2.

1	350	2	700	11
3	350	4	700	ms

- 3 Activate the program by pressing the rotary encoder (11) (ENTER). The program number stops blinking.

5.2 EDITING

Delay configurations and parameters are altered in EDIT mode. For a description of all parameters please turn to chapter 6.

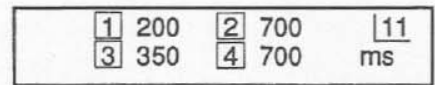
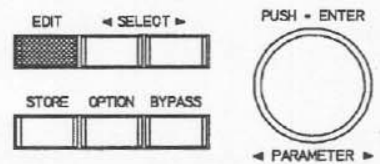
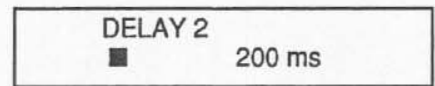
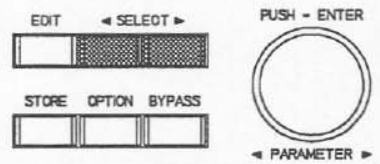
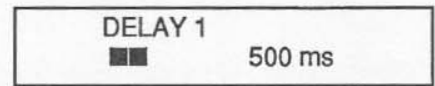
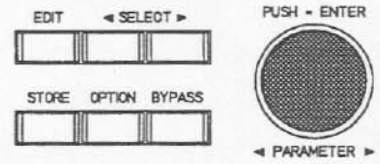
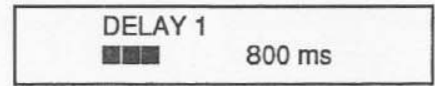
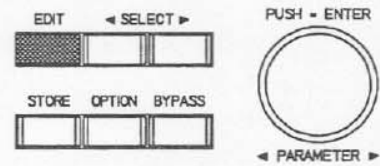
- 1 Press the EDIT key (5).
- 2 You are now in EDIT Mode. The EDIT LED lights up and the name and the value of the first parameter in the active program appear on the display. A graphic indication of the parameter value gives constant information as to one's current position in the parameter range.
- 3 The rotary encoder (11) can now be used to alter the parameter value. If you keep pressed the rotary encoder during rotating, the parameter alteration is accelerated (larger step width).
- 4 The set value appears on the display and the change is immediately audible. The EDIT LED then blinks to show that the program has been changed. If you do not wish to alter further parameters, proceed directly to point 7.
- 5 The SELECT keys (6) and (7) take the user to the next or previous parameter.
- 6 The following may appear on the display:
Points 3 to 6 can be repeated as often as required.
- 7 By pressing the key EDIT (5) again you change back to Play Mode.

CAUTION! Your program alterations have not yet been stored and will be lost at the next program change!

- 8 The program number and the delay setting appear on the display. The EDIT LED continues to blink. There are several different possible ways of continuing:
 - if you should wish to store the edited program in a memory, proceed to chapter 5.3.
 - if you should wish to continue to alter parameters, go back to step 1.
 - if you should require the original program again, press the rotary encoder (11) (=ENTER). The alterations of the parameter values are thus deleted. The EDIT LED goes off.

Note:

You can change directly from the edit mode into the store mode by pressing the key STORE (8)!



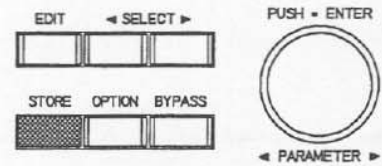
5.3 SAVE AND COPY

No matter whether you are saving an edited program or wish to copy a program from one memory place to another, the procedure is the same in both cases.

The storing procedure is initiated and ended via the STORE key (8). You can leave the STORE mode by pressing STORE (8) once again.

- 1 Press the STORE key (8) to start the storage procedure.

The following may appear on the display:



STORE PROGR. 07
TO PROGR. 07

- 2 Select the desired memory place via the rotary encoder (11).

The following may appear on the display:

STORE PROGR. 07
TO PROGR. 16

- 3 Press the rotary encoder (11) (=ENTER) to confirm the selected program number. The display will show then:

CONFIRM = STORE
PGM 07 TO PGM 16

- 4 Final storage occurs by pressing the key STORE (8) again.

CAUTION! The previous program on this memory place will be deleted (overwritten)! Please make sure that the destination program number corresponds with the number you require. The storage procedure can be cancelled by pressing any other key.

The following may appear on the display after saving:

1	200	2	700	16
3	350	4	700	ms

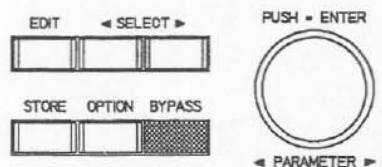
5.4 BYPASS OPERATION

The DDL 204's outputs have built-in relays which connect automatically the input 1 with the outputs 1 and 2 and the input 2 with the outputs 3 and 4 in case of troubles (power loss, circuit failure) (see also BLOCK DIAGRAM, page 8-2).

The unit can however be switched manually to "Bypass" whereby the selected configuration is maintained. The input signals are passed through undelayed and without any filtering to the appropriate outputs.

For switching the DDL 204 to bypass mode, push the BYPASS key (10). This bypasses signal processing in the DDL 204 are then bypassed. This status is indicated by the according LED.

If you push the key BYPASS (10) once more, you switch back to the delay operation. The BYPASS LED goes out and the input signals are fed delayed according to their settings and configurations to the outputs.



6. DELAY CONFIGURATIONS AND PARAMETERS

6.1 BASIC STRUCTURES

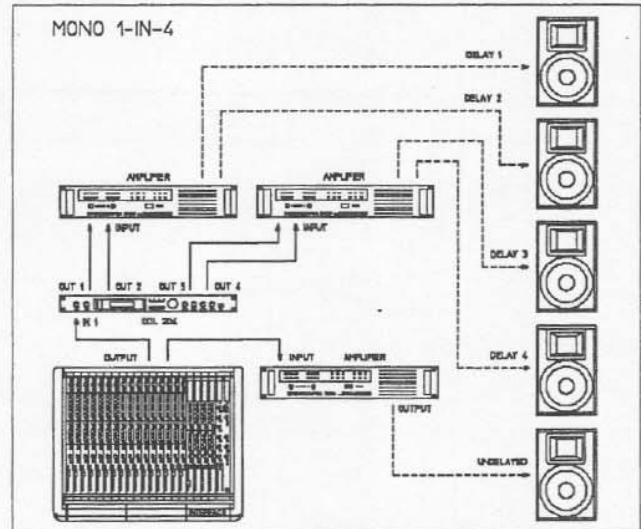
The DDL 204 has 2 different basic structures, indicated at the unit by the according status LED's:

MONO 1-IN-4

STEREO 1-IN-2

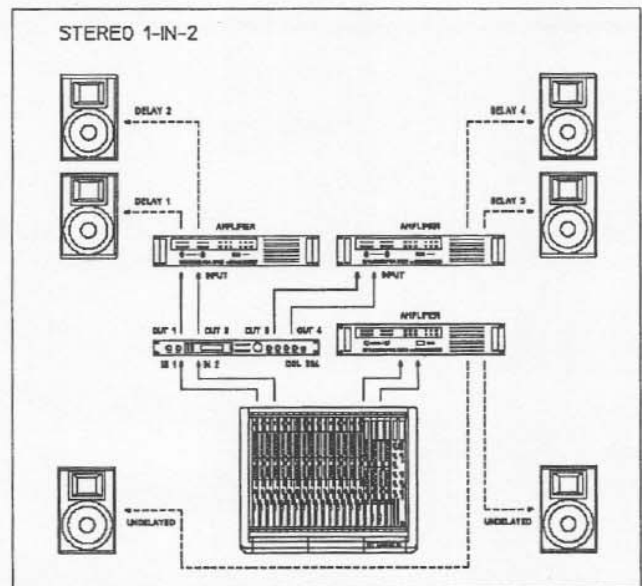
MONO 1-IN-4 is a delay line with one input and 4 outputs. This configuration should be used for situations where more than 2 delayed loudspeaker groups have to be fed. If the sound reinforcement system is in stereo, two DDL 204 must be used.

A typical MONO 1-IN-4 set-up is shown in the fig. on the right.



STEREO 1-IN-2 are two delay lines with one input and two outputs each. This configuration is applicable for situations where in stereo sound systems up to two delayed loudspeaker groups have to be fed.

A typical STEREO 1-IN-2 set-up is shown in the fig. on the right.



6.2 CONFIGURATIONS OF THE DDL 204

Both basic structures are sub-divided into 2 so-called configurations. For the "MONO 1-IN-4 structure" the configurations are named:

- Normal Mono 1in4
- Ganged Mono 1in4

For the "STEREO 1-IN-2 structure" the configurations are named:

- Normal Stereo 1in2
- Ganged Stereo 1in2

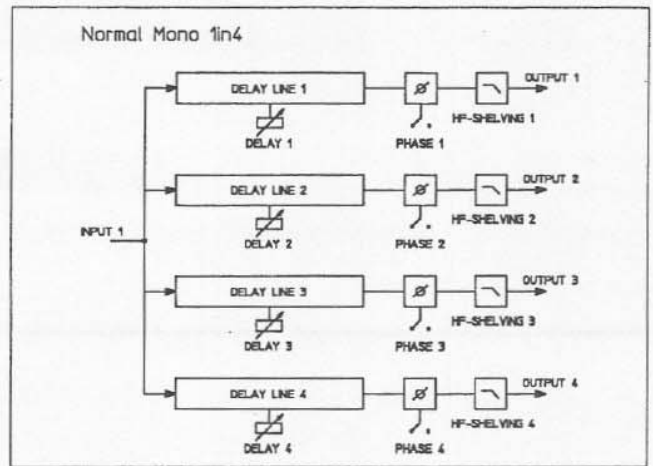
Configuration is set in EDIT mode which is accessible by pressing the EDIT key (5) (see also chapter 5.2, "EDITING".)

Subsequently the "< SELECT " key is pressed until the configuration menu appears as illustrated. The user can then select the desired configuration via the rotary encoder.

CONFIGURATION
Normal Mono 1in4

6.2.1 NORMAL MONO 1-IN-4

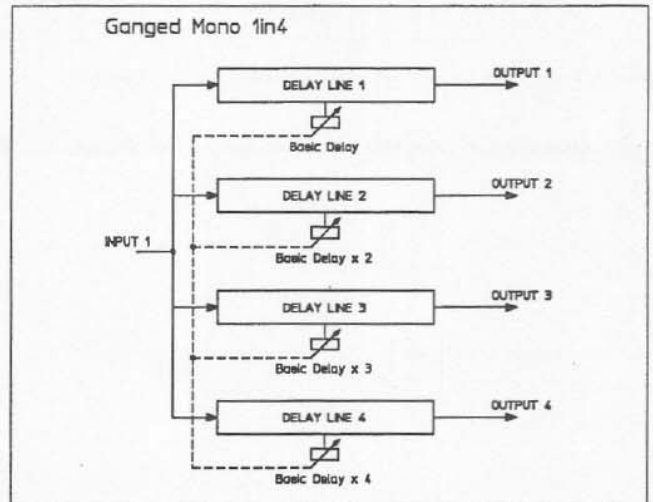
This is a delay line with one input and 4 outputs. The delay time or the signal path and both the phase and the HF shelving can be adjusted and stored individually for all 4 outputs.



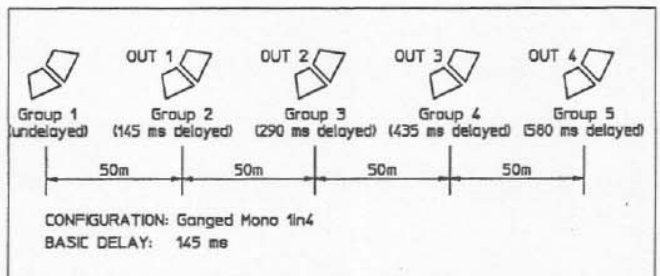
6.2.2 GANGED MONO 1-IN-4

This is also a delay line with one input and 4 outputs. The difference is, that the delay time or the signal source distance is adjusted together for all 4 outputs. This means that for output 1 a "basis delay" is set and the outputs 2, 3 and 4 are then automatically multiples (x2, x3, x4) of this "basis delay".

In this configuration it is not possible to set the phase or HF shelving.

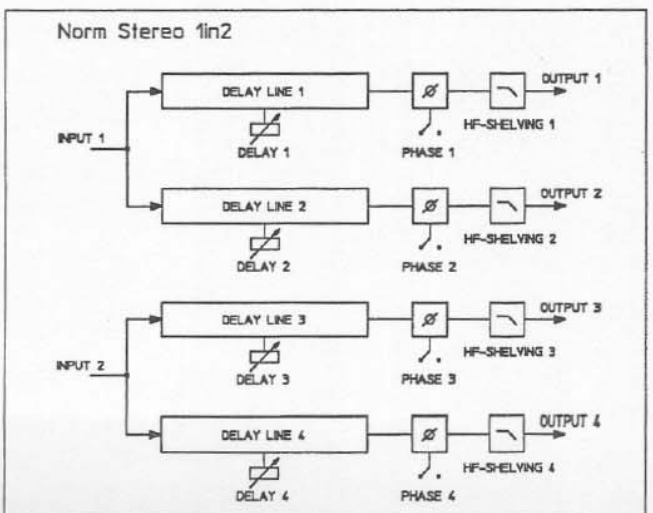


This configuration simplifies the delay setting, if the delayed loudspeaker groups are set-up in equal distances among one another.



6.2.3 NORMAL STEREO 1-IN-2

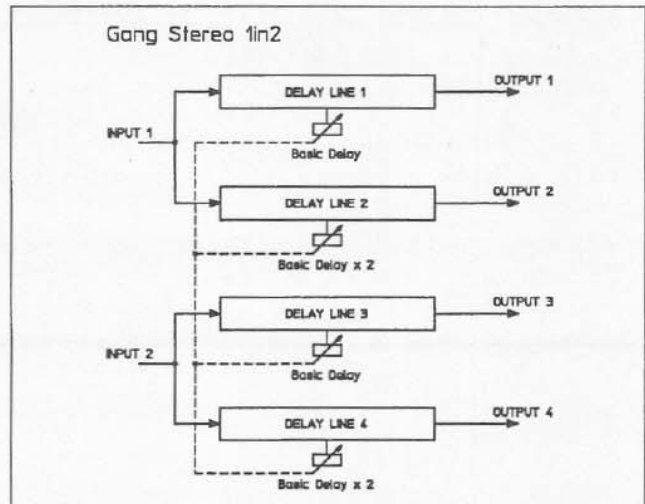
These are two delay lines with one input and 2 outputs each. The delay time or the signal path and both the phase and the HF shelving can be adjusted and stored individually for all 4 outputs.



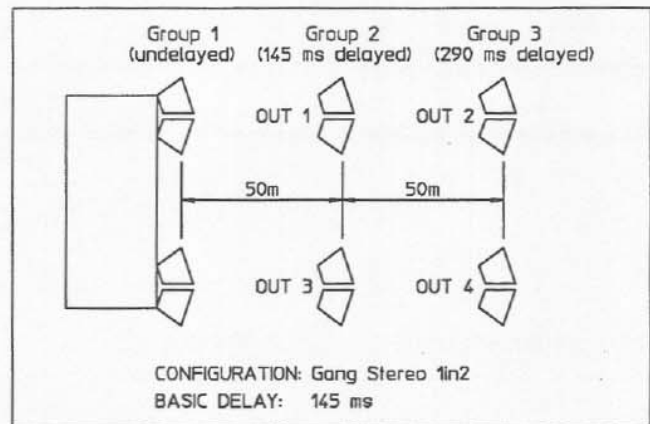
6.2.4 GANGED STEREO 1-IN-2

These are also two delay lines with one input and 2 outputs each. The difference is, that the delay time or the signal source distance are adjusted together for all 4 outputs. This means that a "basis delay" is set which is valid for the outputs 1 and 3. The delays for the outputs 2 and 4 are then automatically set to the double value.

In this configuration it is not possible to set the phase or HF shelving.



This configuration facilitates the delay setting for delayed loudspeaker groups in stereo systems, set-up equidistant to one another and left and right.



6.3 PARAMETERS

The "NORMAL configurations" offer a total of 14 parameters in the following order:

CONFIGURATION

DELAY 1

PHASE 1

HF-SHELVING 1

DELAY 2

PHASE 2

HF-SHELVING 2

DELAY 3

PHASE 3

HF-SHELVING 3

DELAY 4

PHASE 4

HF-SHELVING 4

DELAY UNIT

When entering the EDIT mode the parameter which was edited last appears; if the program has not been edited the first parameter to appear is "DELAY 1".

In the "GANGED configurations" the following 3 parameters are available:

CONFIGURATION
BASIC DELAY
DELAY UNIT

If the program has not been edited the first parameter to appear in this case is "BASIC DELAY".

All parameters with their valuation ranges are described in the following page:

DELAY 1 (2, 3, 4)

This parameter is used to set the delay time or the signal source distance for the outputs 1 - 4. The reading appears in milliseconds, microsec, feet, inches, metres or centimetres.

Valuation range: 2 ms - 2798 ms.
2245 μ s - 2798240 μ s
3 ft. - 3153 ft.
30 in. - 37835 in.
1 m - 961 m
77 cm - 96105 cm

DELAY 1
■ 230 ms

PHASE 1 (2, 3, 4)

This sets the phase relationship of the delayed signals for the outputs 1 - 4.

Settings: normal
inverted

1 PHASE
normal

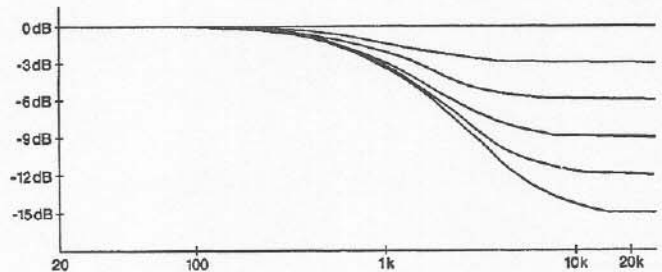
HF-SHELVING 1 (2, 3, 4)

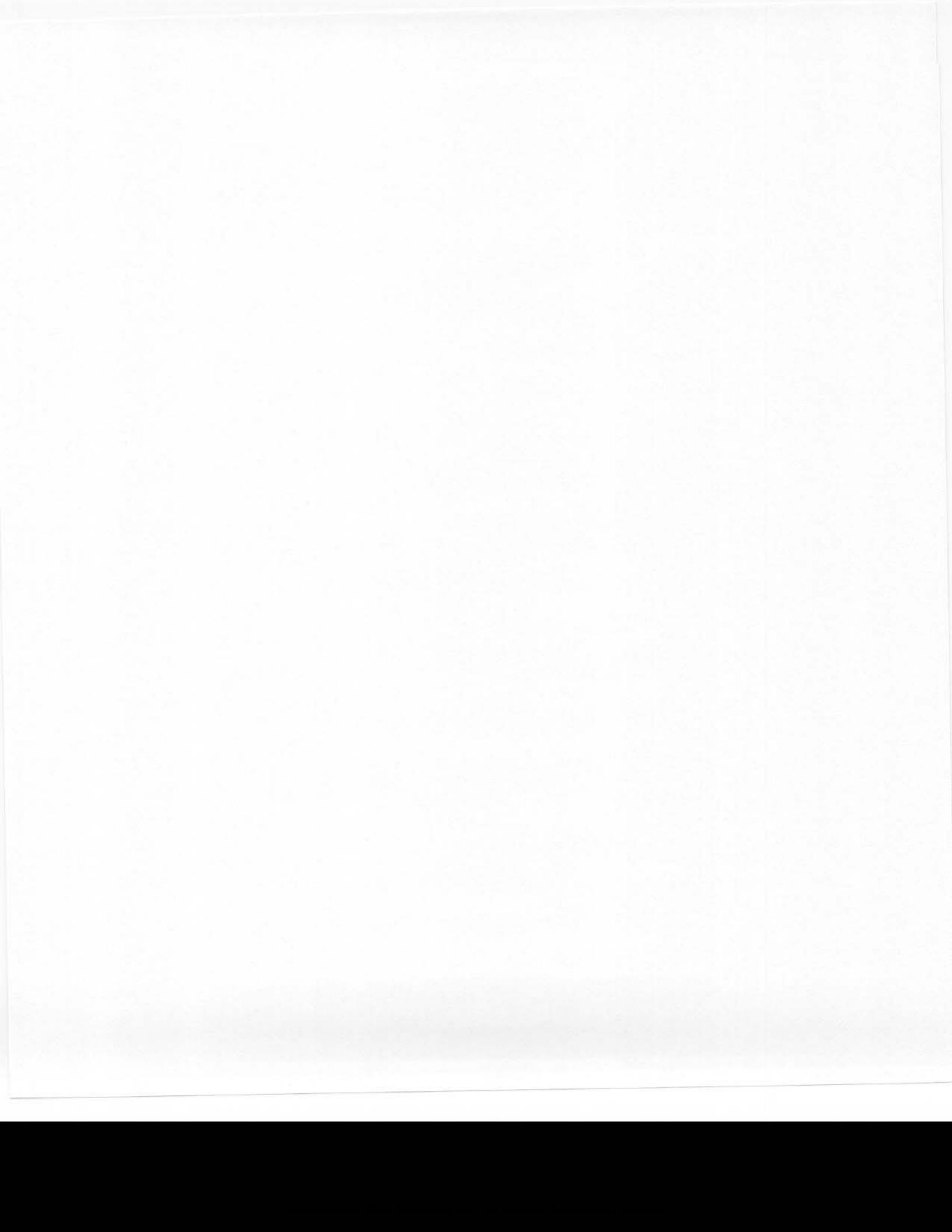
This is a shelving filter which can be used to attenuate the trebles for the outputs 1-4 individually by up to 15 dB.

As higher frequencies are damped generally more it is advisable to adjust the frequency response of the delayed loudspeaker lines accordingly. This permits improved localisation of the signal source in distributed systems.

Value range: 15 kHz, 0dB - -15dB

HF-SHELVING 1
■■■■ -4dB





BASIC DELAY

This sets the "basic time" for the "ganged configurations". The setting is generally valid for the output 1. The other outputs are set automatically to a multiple of this basic time, depending on the configuration:

Output 1 = BASIC DELAY x 1
 Output 2 = BASIC DELAY x 2
 Output 3 = BASIC DELAY x 3
 Output 4 = BASIC DELAY x 4

\ /
 \ /
 \ /

at Ganged
 Mono 1-in-4

Output 1 = BASIC DELAY x 1
 Output 2 = BASIC DELAY x 2
 Output 3 = BASIC DELAY x 1
 Output 4 = BASIC DELAY x 2

\ /
 \ /
 \ /

at Ganged
 Stereo 1-in-2

Valuation range: 2 ms - 699 ms.
 2245 μs - 699557 μs
 3 ft. - 788 ft.
 30 in. - 9458 in.
 1 m - 240 m
 77 cm - 24026 cm

BASIC DELAY ■■ 350 ms

DELAY UNIT

Here the unit for the delay line can be selected. The distance data are automatically calculated into delay times.

Settings: milli-sec.
 μsec.
 feet
 inch
 meter
 centimeter

DELAY UNIT milli - sec.

CONFIGURATION

Here the delay configuration can be selected. The number of parameters and names depend on the configuration in question.

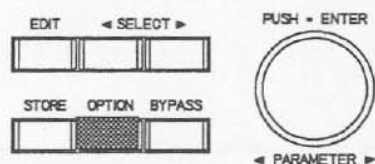
Settings: Normal Mono 1in4
 Ganged Mono 1in4
 Norm Stereo 1in2
 Gang Stereo 1in2

CONFIGURATION Normal Mono 1in4

7. OPTION FUNCTIONS

The Option programs comprise a number of important additional functions and defaults, such as display of the software version, the setting of the LCD contrast, how the VU display should be set, etc.

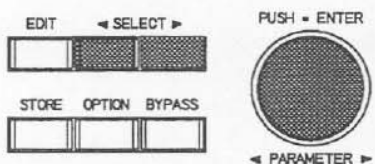
- 1 Press the key OPTION (9) to activate the Option programs.



- 2 The Option program used last appears on the display, e.g.:



- 3 Find the Option required using the two SELECT keys (6, 7).
- 4 The rotary encoder (11) is used to set the Option values.
- 5 An Option program can be cancelled by pressing another MODE key, (e.g. return to Play Mode by pressing OPTION again).



7.1 SETTING THE LCD CONTRAST

The LCD contrast or viewing angle can be adjusted between -10 (view from below) and +10 (view from above).



7.2 DISPLAY MODE OF THE LEVEL METERS

PEAK HOLD:

The Peak-Hold function is switched on. This will help the user to set the level.

NO PEAK:

The Peak-Hold function is switched off. The level meters work normally.

SLOW:

In this setting the level meters work with a long decay time constant, i.e. the indication decay is slower when the signal level decreases.



7.3 SWITCHING THE EDIT PROTECTION ON AND OFF

The DDL 204 also has an additional edit protection feature which can be switched on and off. This means that all the settings cannot be altered without entering a code number.

LOCK = ENTER
CODE NR: 000

Enter a code number with the rotary encoder (11) and confirm by pushing the encoder (11) (=ENTER) and then STORE (8). The following may appear on the display:

CONFIRM = STORE
CODE NR: 008

If you wish to alter any of the unit's settings, the display will show:

SYSTEM
IS LOCKED!

In order to switch off edit protection, press the OPTION key once more and the display shows:

UNLOCK = ENTER
CODE NR: 000

Enter your Code number now and press ENTER.

The following appears briefly on the display:

SYSTEM
IS UNLOCKED!

Now you can alter your settings again.

Note:

- If you have forgotten the Code No. you can switch off edit protection again, if you push the keys STORE (8) and OPTION (9) simultaneously during switching on.

7.4 DISPLAY OF THE SOFTWARE VERSION NUMBER

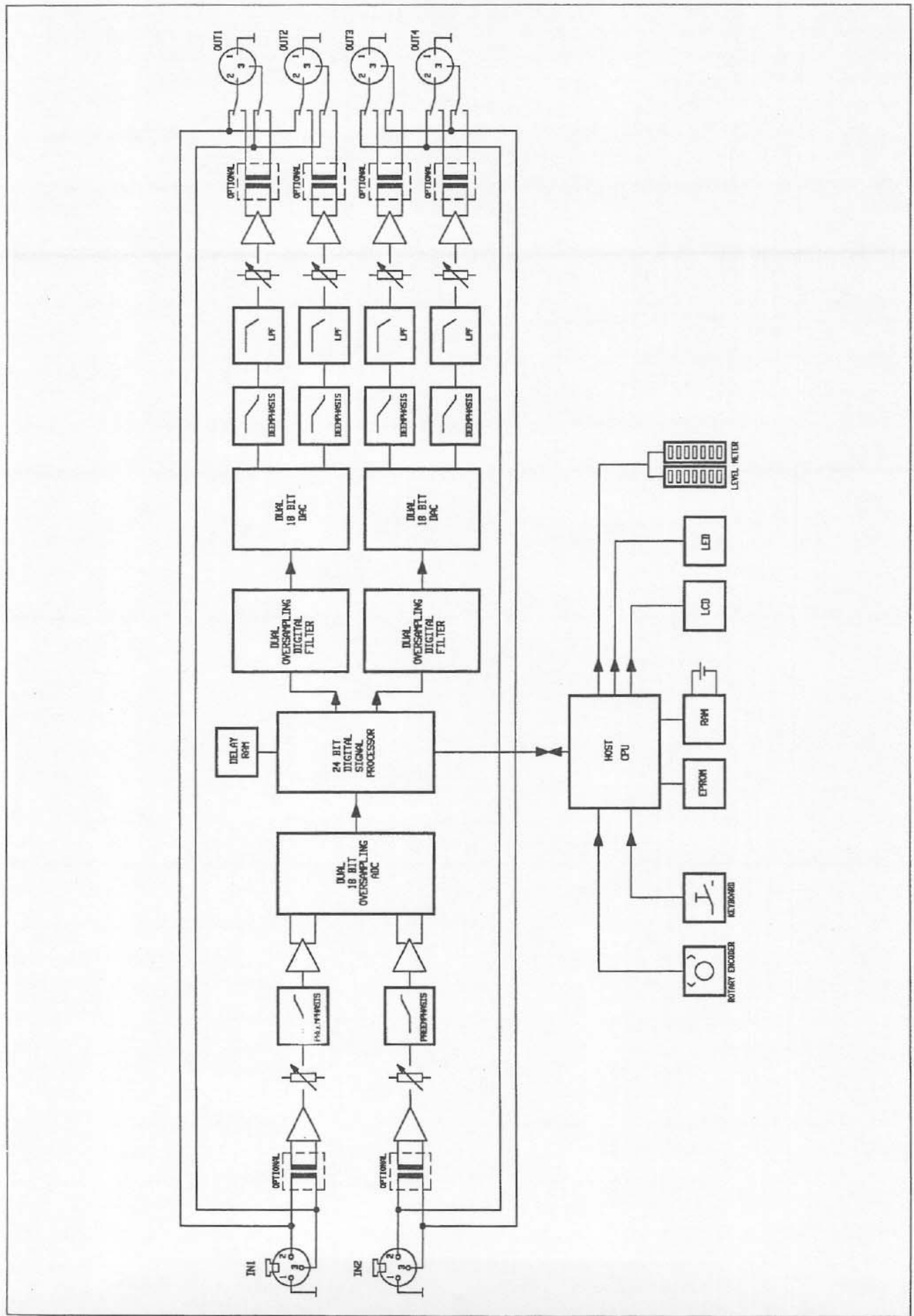
The display shows the software version of the DDL 204's host processor, e.g. version 1.0.

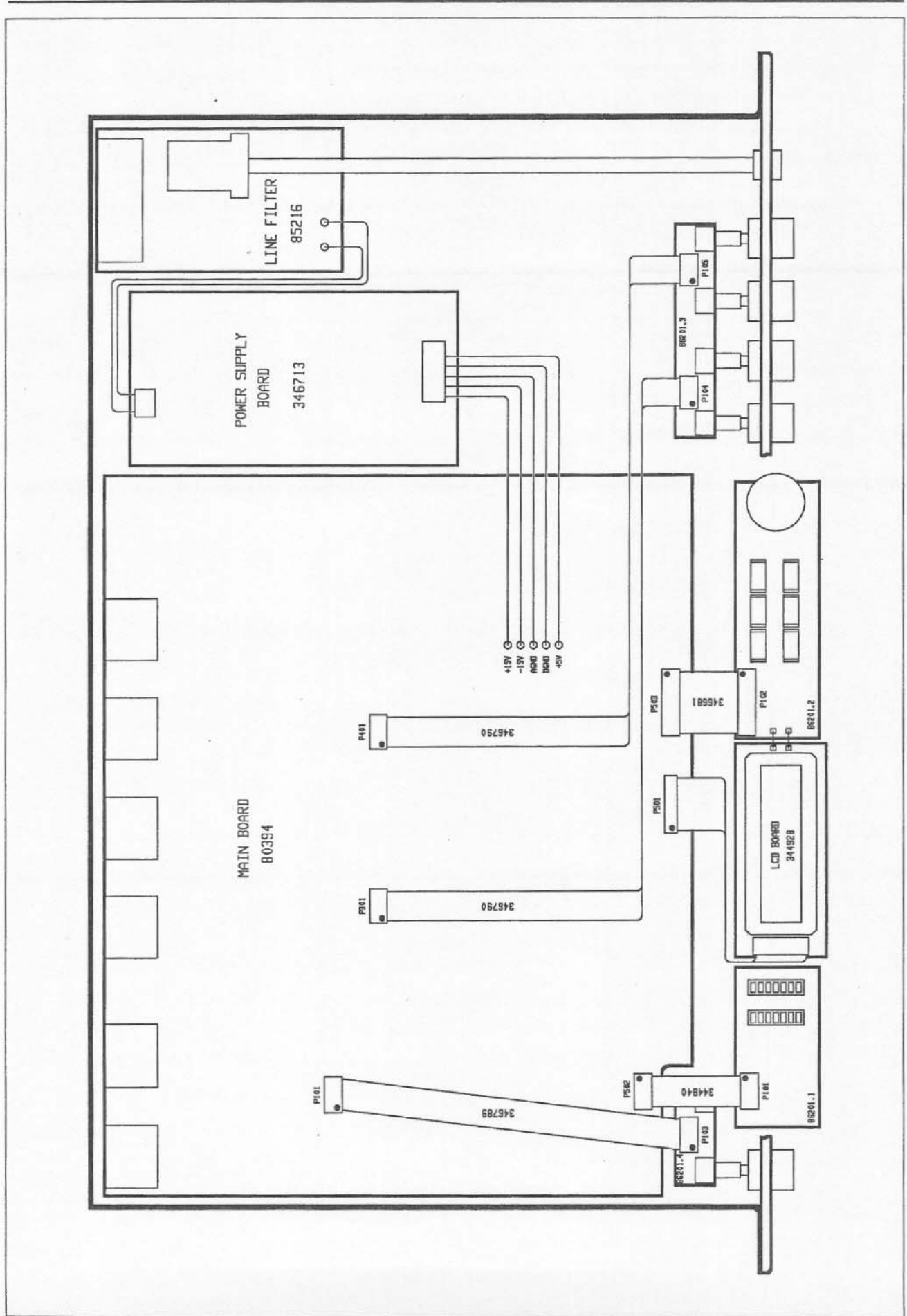
DYNACORD DDL 204
Software V 1.0

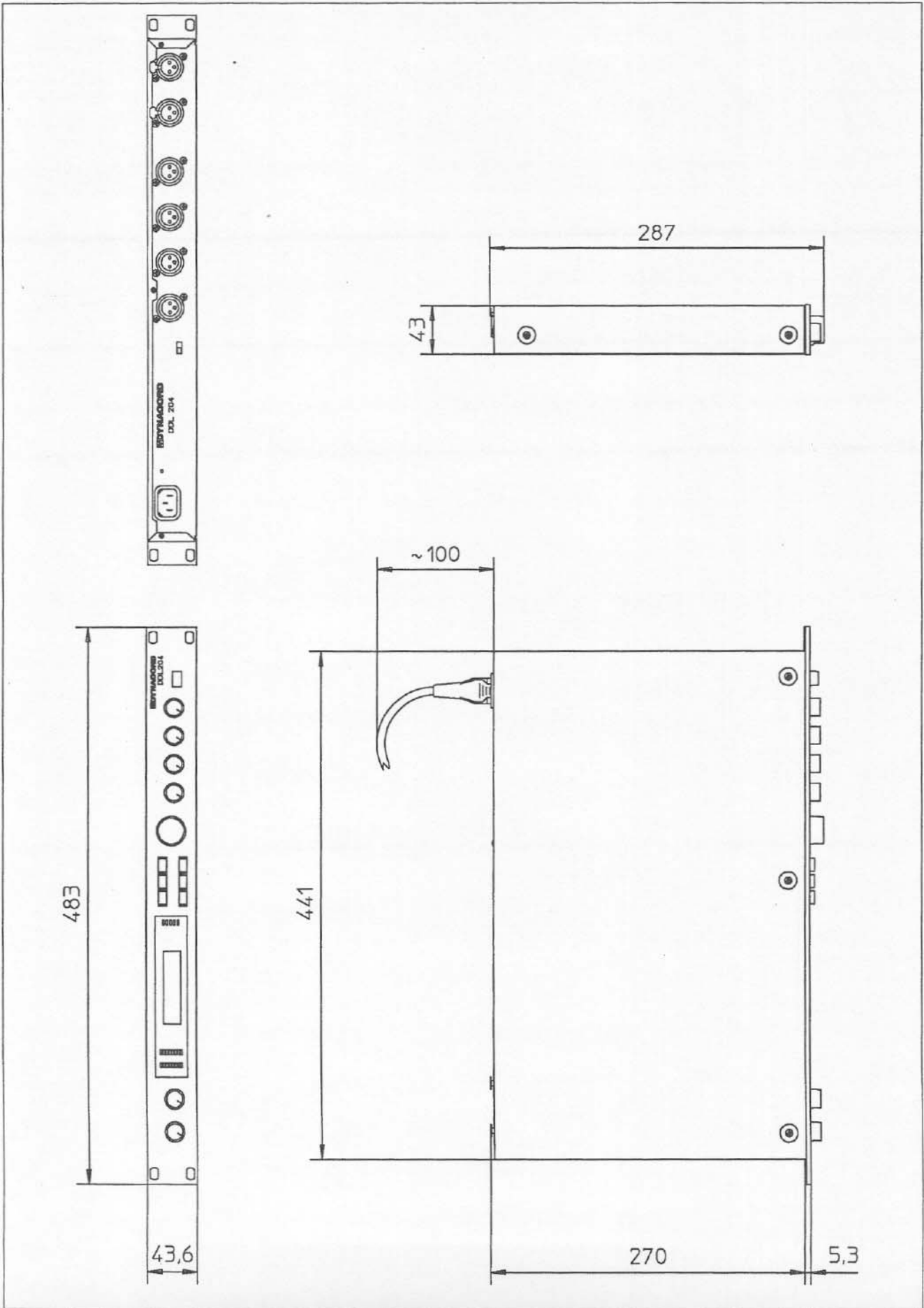
8.1 SPECIFICATIONS

Mains voltage	90 - 250 VAC / 50 - 60 Hz (without switching)
Power consumption	21 W
Safety class	I
Inputs	2 x XLR, electronically balanced, transformer as option
Input voltage	1.55 V / +6 dBu
Max. input voltage	9 V / +21 dBu
Input impedance	20 kohm
CMRR	> 70 dB (1kHz)
Insertion loss of input transformer	< 1.5 dB
A/D converter	18 bit linear, sigma-delta, 64times oversampling, linear phase
Outputs	4 x XLR, electronically balanced, transformer as option
Output voltage	1.55 V / +6 dBu
Max. output voltage	3.1 V / +12 dBu
Output impedance	< 100 ohm
Min. load impedance	600 ohm
D/A converter	18 bit linear, 8times oversampling, linear phase
Frequency response	20 Hz - 20 kHz \pm 0.3 dB
S/N ratio	> 100 dB
THD without transformer	< 0.01% (1 kHz)
THD with transformer	< 0.1% (1 kHz)
Max. Delay time	2798 msec
Delay increment	5 μ sec
HF-Shelving Filter	15 kHz, 0... -15 dB
Data format	18 bit linear, internally 24 bit
Sampling rate	46,875 kHz
Display	2 x 16 digit alpha-numerical LCD with LED back lit
Ground Lift	Disconnects ground from housing
Dimensions (W X H X D)	483 x 43.6 x 287 mm; 19" with 1 HU
Weight	4 kg / 8.8 lbs
Bypass relays	Bypass at power loss oder circuit failure
Lock function	Protection against wrong operation by locking out of operation
Retrfitting kits	NRS 90 185 (1 x input transformer) NRS 90 186 (1 x output transformer)

The specifications for this product are subject to change without prior notice.







SERVICE

Measuring data DDL 204 - complete device

Test Conditions:

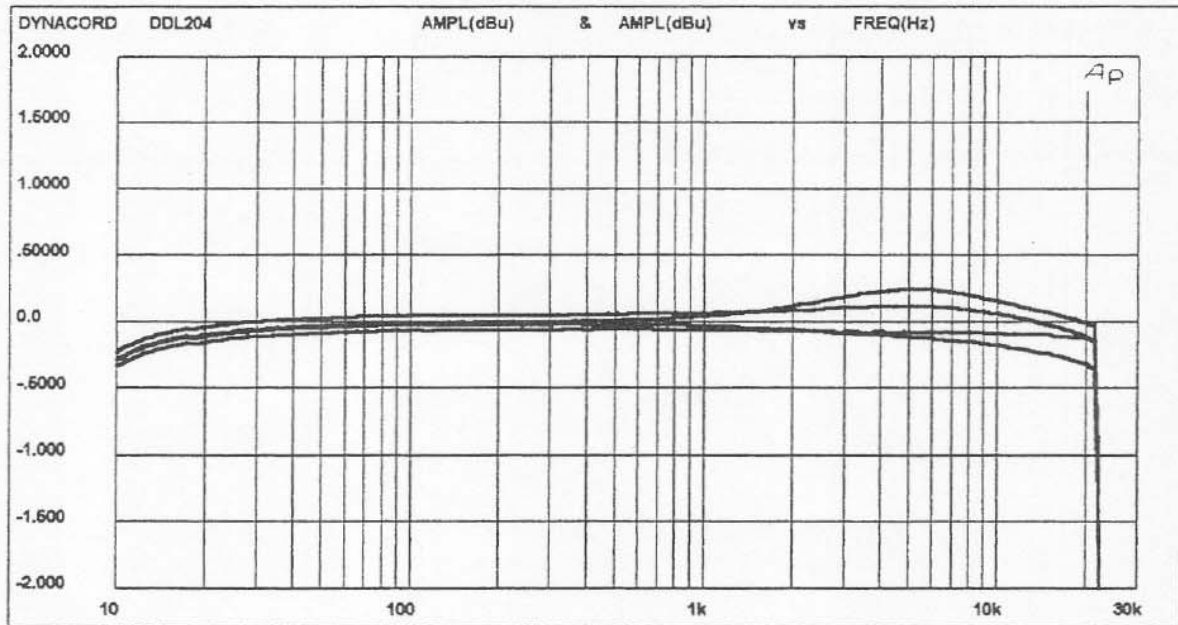
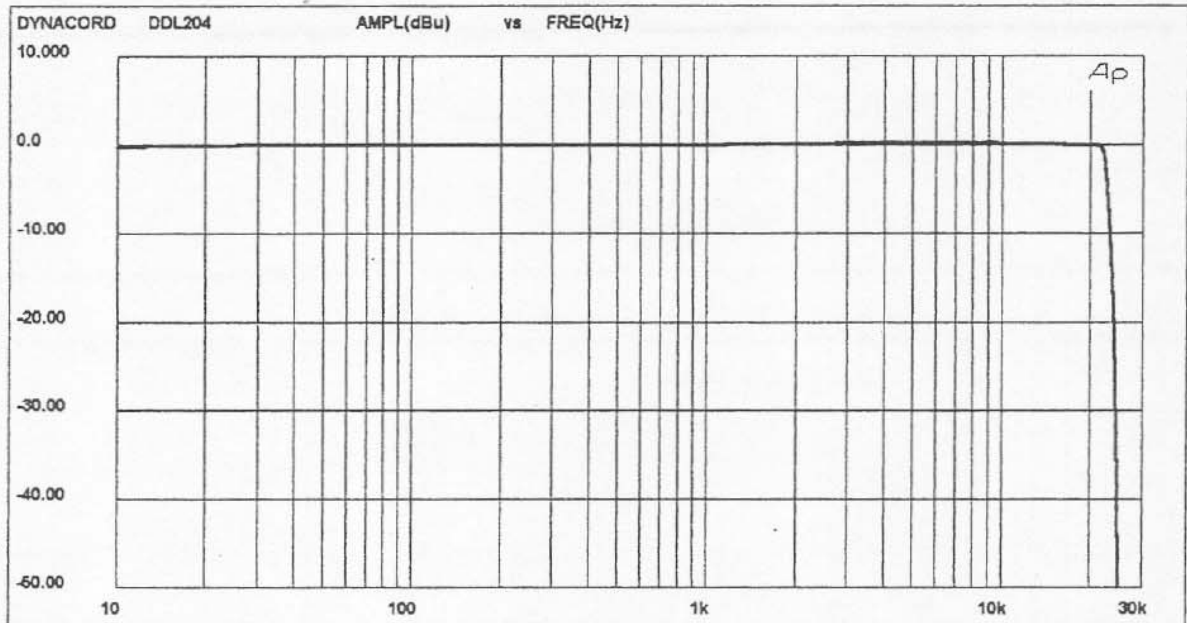
- All Level, Frequency Response and Distortion Measurements are performed with "AUDIO PRECISION SYSTEM ONE".
- Generator impedance 25 ohms, Analyzer impedance 100 kohms.
- Levels measured with $f = 250$ Hz.
- The noise levels measured at the outputs refer to the nominal output level of +12dBu.
- Tolerances of the level values: +/- 1 dB.
- All Distortion measurements are performed with a measurement bandwidth of 10 Hz - 22 kHz, without filter, measured is THD+Noise.
- All measurements with balanced loading of inputs and outputs (1 ground, 2 +, 3 -)
- Operating voltage and current are measured with "PHILIPS MULTIMETER PM 2517X".
- Power consumption is measured with "ZÄRES Wattmeter".
- 0 dBu = 775 mV rms

1. Operating voltage:	90 - 250 VAC	$f = 50 - 60$ Hz
2. Operating current:	at 110 VAC	270 mA
	at 230 VAC	150 mA
3. Power consumption:	at 110 VAC	17 watts
	at 230 VAC	21 watts
4. Inputs:		
4.1. Input impedance	Z_i	20 kohms
4.2. Input voltage:	Input control : 0	1.55 V = +6 dBu
	Input control : 6	775 mV = 0 dBu
	E_{lmax}	9 V = +21 dBu
4.3 Input symmetry:	CMRR (1 kHz)	> 70 dB
5. Outputs:		
5.1. Output impedance	Z_o	< 100 ohms
5.2. Min. load impedance:	Z_{Lmin}	600 ohms
5.3. Output voltage	Output control : 0	1.55 V = +6 dBu
	Output control : 6	3.1 V = +12 dBu
	E_{Omax}	3.1 V = +12 dBu

6. Frequency responses:

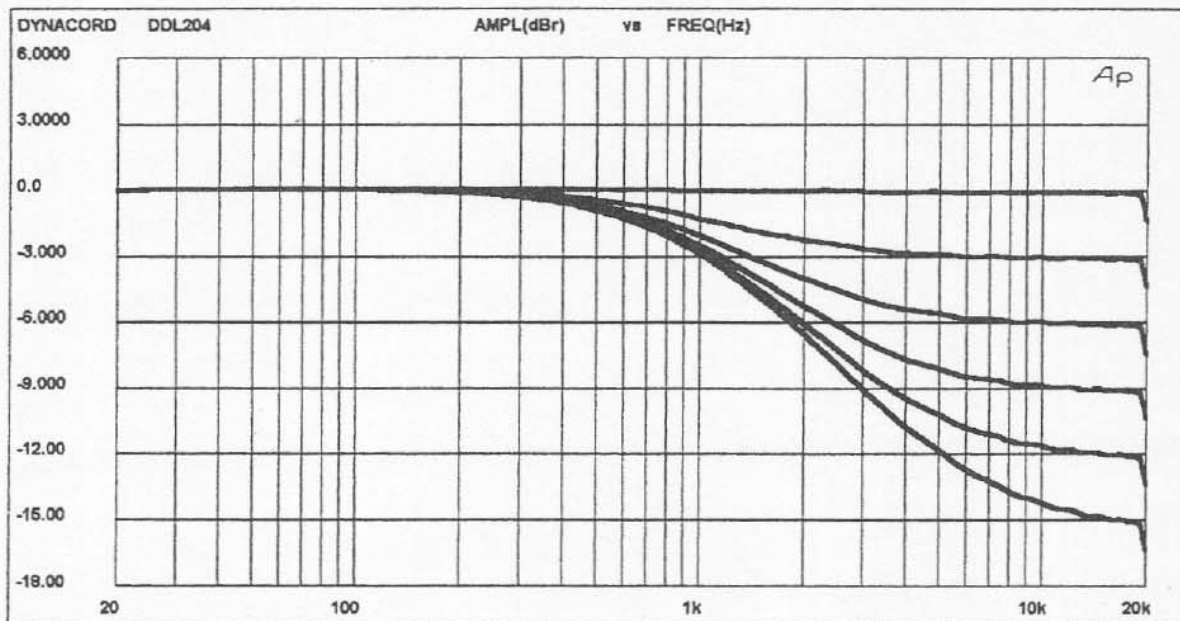
6.1. Frequency response complete unit:

- * measured with service program "ORIGINAL THRU", Level = 0 dB
- * In 1 to Out 1 and 2, IN 2 to OUT 3 and 4
- * Input level -12 dBu
- * All controls to 6 (fully right)



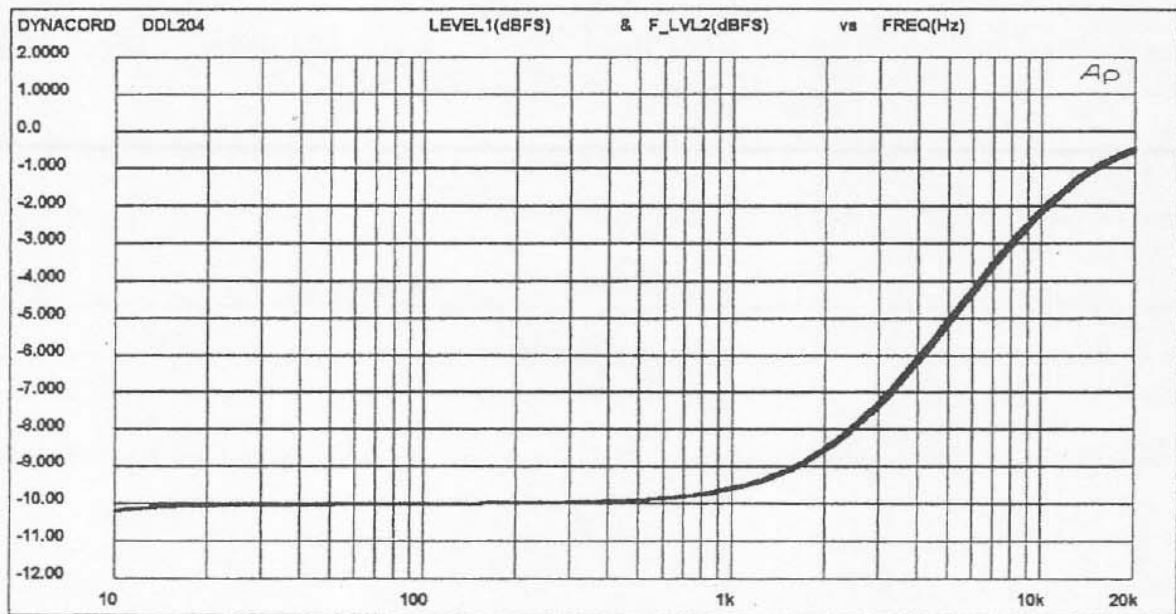
6.2. Frequency response HF shelving filter:

* measured in delay program with configuration "Normal Mono 1 in 4" or "Normal Stereo 2 in 2".



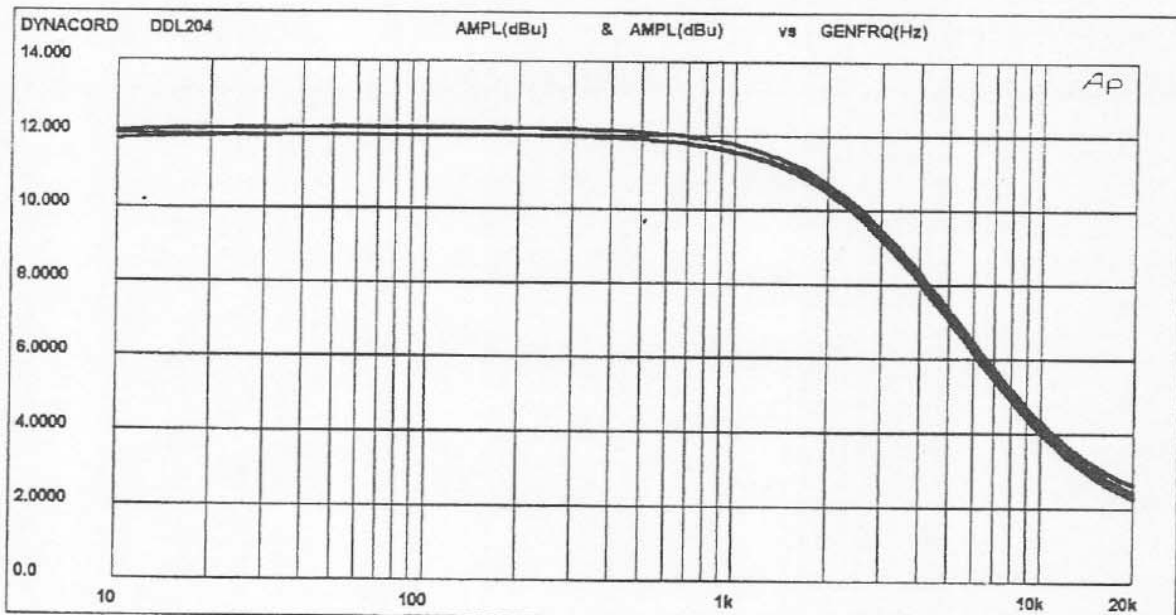
6.3. Frequency response input stage and A/D converter:

- * measured with external AES/EBU interface at connector P 150
- * input level -10 dBu
- * Input control to 6 (fully right)



6.4. Frequency response D/A converter and output stage:

- * measured with external AES/EBU interface at connector P 150
- * input level 0 dBFS
- * Output control to 6 (fully right)



7. Noise voltages

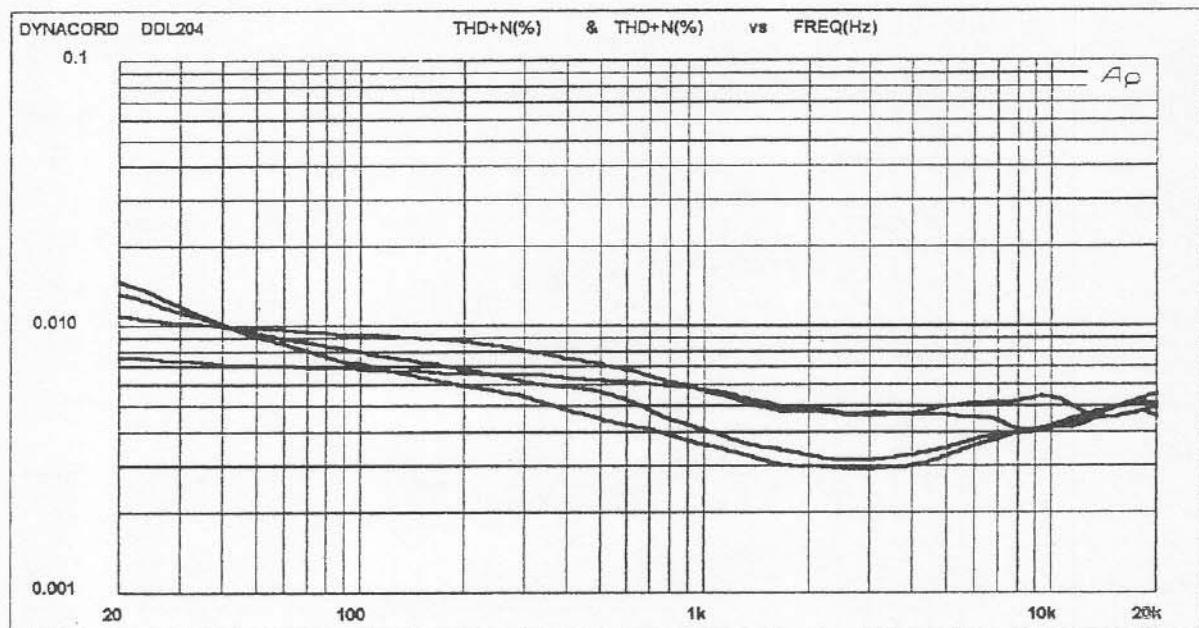
- * measured with service program "ORIGINAL THRU", Level = 0 dB
- * In 1 to Out 1 and 2, IN 2 to OUT 3 and 4
- * All controls to 6 (fully right)

$E_{O(RMS)}$	22 μV = -103 dB
$E_{NOISE(RMS)}$	50 μV = -100 dB
$E_{NOISE(Q-PEAK)}$	55 μV = -95 dB
$E_{CCIR(Q-PEAK)}$	98 μV = -90 dB

8. Distortion (THD+N):

- * measured with service program "ORIGINAL THRU", Level = 0 dB
- * In 1 to Out 1 and 2, IN 2 to OUT 3 and 4
- * Input level ref. to full modulation
- * All controls to 6 (fully right)

THD+N	< 0.02 %
THD+N (1 kHz)	< 0.01 %

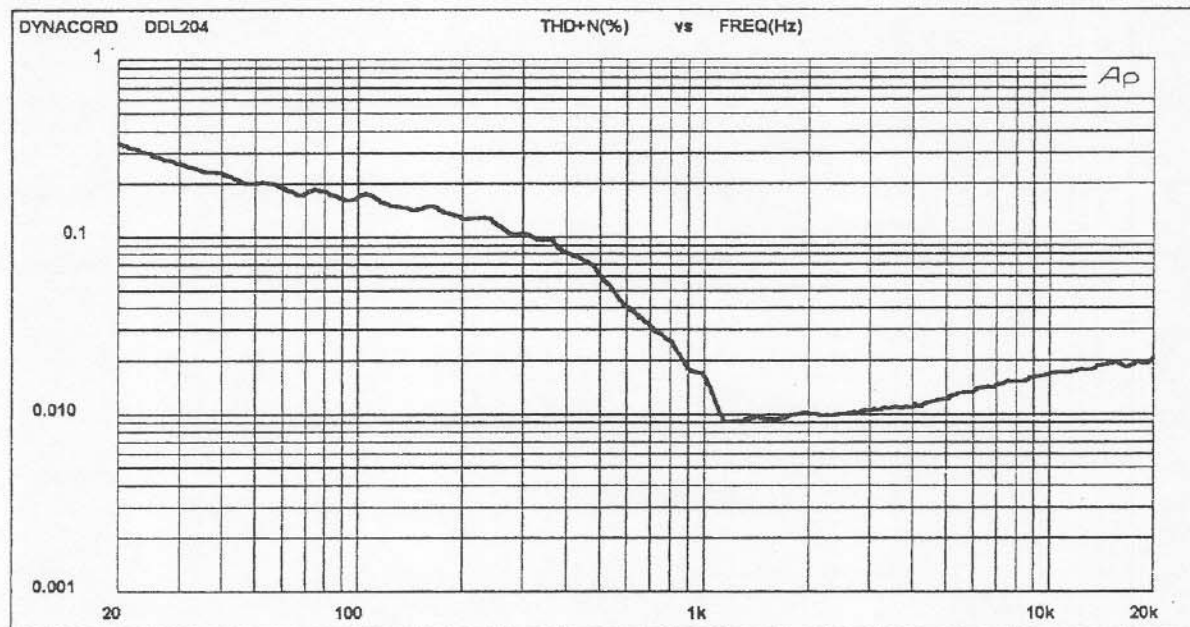


9. Retrofitting with transformers

Operation with NRS 90185 (input transformer) and NRS 90186 (output transformer) will alterate the specifications as follows:

- * Level The insertion loss of the input transformers is approx. 1.5 dB, i.e. the input levels must be raised by this amount.
 If the outputs are loaded with 600 ohms, the output levels are reduced by max. 1.5 dB.

- * Distortion THD+N (20 - 500 Hz) < 0.5 %
 THD+N (500 - 20 kHz) < 0.1 %



* The alteration of the frequency response and the noise levels are not worth mentioning.

10. Specifications

Mains voltage	90 - 250 VAC / 50 - 60 Hz
Power consumption	21 W
Safety class	I
Inputs	2 x XLR, electronically balanced, transformer retrofittable
Input voltage	1.55 V / +6 dBu
Max. input voltage	9 V / +21 dBu
Input impedance	20 kohms
CMRR	> 70 dB (1 kHz)
Insertion loss of the input transformer	< 1.5 dB
A/D converter	18 bit linear, sigma delta, 64times oversampling, linear phase
Outputs	4 x XLR, electronically balanced, transformer retrofittable
Output voltage	1.55 V / +6 dBu
Max. output voltage	3.1 V / +12 dBu
Output impedance	< 100 ohms
Min. load impedance	600 ohms
D/A converter	18 bit linear, 8times oversampling, linear phase
Frequency response	20 Hz - 20 kHz (+/-0.5 dB)
S/N ratio	> 100 dB
Distortion (THD) (without transformer)	< 0.01 % (1 kHz) < 0.02 % (20 Hz - 20 kHz)
(with transformer)	< 0.1 % (500 Hz - 20 kHz) < 0.5 % (20 Hz - 500 Hz)
Max. delay time	2798 ms
Min. resolution	5 s
HF shelving filter	15 kHz, 0 ... -15 dB
Data format	18 bit linear, internally 24 bit
Sampling rate	46.875 kHz
Display	2 x 16 digit alphanumerical LCD with LED back lit
Ground lift	separates circuit ground from chassis
Dimensions (WxHxD)	483 x 43.6 x 287 mm, 19", 1HU
Weight	4 kg
Bypass relay	Bypass if unit is switched-off
Lock function	Protects against maloperation
Retrofitting kits	NRS 90185 - 1 x input transformer NRS 90186 - 1 x output transformer

DDL 204 - Test Programs

The DDL 204 integrates various test programs to check internal function blocks.

Pressing the keys "EDIT" and "OPTION" simultaneously gives access to the test mode. The following message appears briefly in the display:

TEST MODE FOR SERVICE ONLY

The test programs can be selected by means of the "SELECT" keys or rotary encoder and called up by "ENTER".

The "ENTER" key also serves to abort a test.

The test mode is exited by the program call.

QUIT START=ENTER

Available test programs:

- μ P-ROM TEST
- μ P-RAM TEST
- μ P-DSP COM TEST
- DSP RAM TEST
- BATTERY TEST
- LED TEST
- DISPLAY TEST
- KEY TEST
- ENCODER TEST
- A/D ADJUST
- ORIGINAL THRU
- SINE WAVE OUT
- QUIT

μP-ROM TEST
START = ENTER

When "ENTER" is pressed the display changes to:

Testing μP-ROM

....

and the EPROMs of the host processor are checked. A check sum is calculated from the entire content of the EPROM. The test cannot be interrupted! If no error is found, the following appears in the display:

μP-ROM TEST OK!

<< >>

If an error is detected the following appears:

μP-ROM TEST FAIL

<<Checks: XXh >>

μP-RAM TEST
START = ENTER

This program serves to check the static RAMs in the DDL 204's processor system. To do so, various bit patterns are written to all RAM addresses and re-read.

NOTE! All data in the RAM will be lost during this test!

When "ENTER" is pressed the following message appears in the display:

Warning: Data in
RAM will be lost

By pressing "ENTER" again the test program is started and the following message appears in the display:

Testing μP-RAM

.....

The test cannot be interrupted! If no error is found, the following message appears in the display:

μP-RAM TEST OK!

<< >>

If an error is detected in the data bus, the faulty line is displayed:

μP-RAM TEST FAIL

<< at D XX >>

If an address error occurs, the display shows the first RAM address where a write/read error occurred:

μP-RAM TEST FAIL

<< at XXXh >>

μP-DSP COM TEST

START = ENTER

After pressing the "ENTER" key the communication between host processor and DSP is tested.

Testing P-DSP

If no error is found, the test is finished with the message:

mP-DSP TEST OK

<< >>

If an error is detected the following appears:

--- Error: ---

DSP comn0

The test is finished with the message:

μP-DSP TEST FAIL

<< >>

DSP-RAM TEST
START = ENTER

This program serves to check the delay memory in the DDL 204. After pressing the "ENTER" key the data and address busses from DSP to RAM are checked. The display shows shortly:

Testing DSP-RAM

If no error is found, the test is finished with the message:

DSP-RAMTEST OK!

<< >>

If an error is detected in the data bus, the faulty data or address line is displayed:

DSP-RAMTEST FAIL

at D XX

Now the test can be continued by pressing any key except "SELECT" and "ENTER". The test is aborted by pressing the keys "SELECT" or "ENTER".

BATTERY TEST
START=ENTER

The DDL 204 incorporates a lithium battery to supply the static RAM with the necessary power when the unit is switched off. The battery voltage is constantly monitored by the unit and can be indicated on the display in this test. After the program has been called up via "ENTER", the following message appears in the display:

Testing BATTERY
U: 3.0V

The test can also be aborted via "ENTER" and then the following appears on the display:

BATT.TEST OK

<< >>

If the battery voltage drops to below 2.5 volts the following error message is displayed:

BATT.TEST FAILED

<< >>

The battery should then be changed as soon as possible.

LED TEST
START=ENTER

This program serves to check all LEDs on the front panel. After pressing "ENTER" the following appears in the display:

Testing LEDs

The test starts with individual triggering of the status LEDs. Then all LED segments are switched off. The program ends automatically and the display shows:

LED TEST done

<< >>

DISPLAY TEST
START=ENTER

This program serves to check the LC display and the contrast setting. After the program has started, the LCD shows a graphic pattern. This is so the user can check whether all the pixels are being activated and are working properly. The following appears in the display:

LCD CONTRAST:

::: 0 :::

With the rotary encoder the display contrast can be adjusted in a range between -10 to +10. The test is exited via "ENTER" and the following appears in the display:

DISP.TEST done

<< >>

The contrast value set is maintained even the unit is switched off.

KEY TEST
START=ENTER

This program serves to check the keyboard of the DDL 204. When "ENTER" is pressed, the following appears in the display:

Press all Keys

If a key is pressed then, the key designation appears in the second line accordingly. After all the keys have been activated successfully the display shows:

KEY TEST OK!

<< >>

The key test can be aborted at any time via "ENTER".

ENCODER TEST
START=ENTER

This program serves to check the rotary encoder. When "ENTER" is pressed, the following appears in the display:

Turn Encoder

If the encoder is rotated, the direction of rotation and the counter pulses are shown in the second line. One full rotation complies with 30 pulses. Pressing "ENTER" will terminate the program and the following appears in the display:

ENC. TEST done
<< >>

A/D ADJUST
START=ENTER

This test serves to adjust the A/D converter in the DDL 204. When "ENTER" is pressed, the display shows a 6-digit positive or negative value for each input channel.

CH1 AD-TEST CH2
+000000 -000000

Both channels must be adjusted to 0 with the trimmers R119 / R219. After pressing "ENTER" the display shows the following, if the adjustment is ok:

ADJUSTION OK
<< >>

If one of the values is outside the tolerance range of +/-20, the following message appears:

ADJUSTION FAILED
<< >>

NOTE: For a correct adjustment it is necessary that the unit is switched on for some time in order to bring the internal components to operating temperature!

**ORIGINAL THRU
START=ENTER**

With this program the input data of the DSP are passed thru directly to the outputs. No additional signal processing is performed and the output is in the configuration 2 in 2, i.e. the input 1 is fed to the outputs 1 and 2 or, input 2 to the outputs 3 and 4.

**Original thru
Level: 0 dB**

With the rotary encoder a level between 0 and -99 dB can be set. The test is terminated by "ENTER" and the display shows:

**THRU TEST done
<< >>**

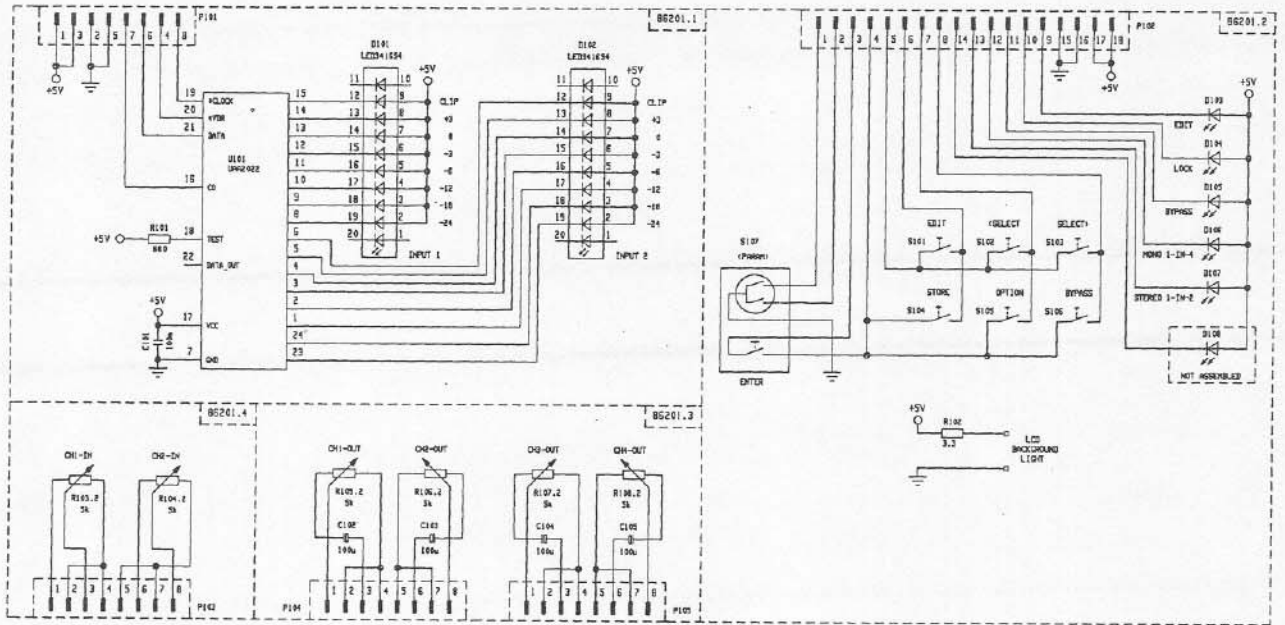
**SINE WAVE OUT
START=ENTER**

This test serves to check the complete signal path post DSP (digital filters, D/A converter, output channels). After pressing the "ENTER" key the DSP generates a sine wave and feeds it to all 4 channels.

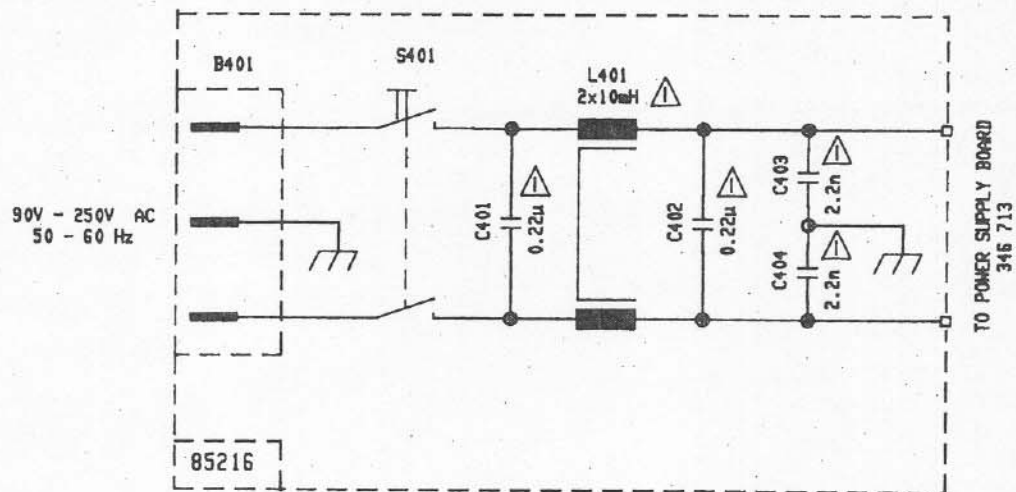
**Sine Wave 250 Hz
Level: -24 dB**

With the rotary encoder a level between 0 and -99 dB can be set. The test is terminated by "ENTER" and the display shows:

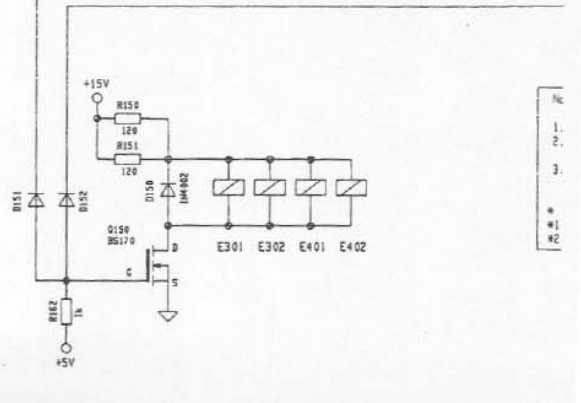
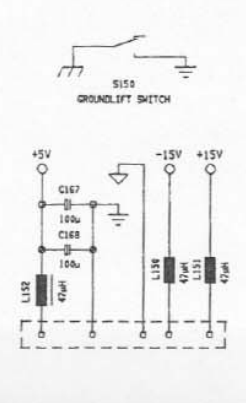
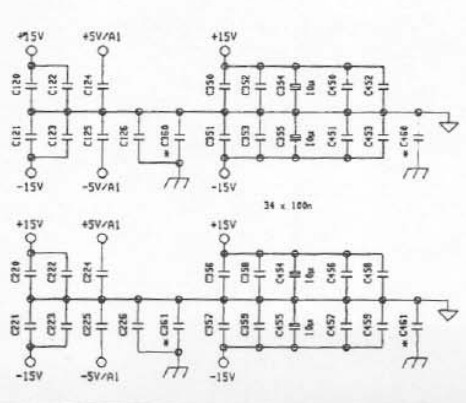
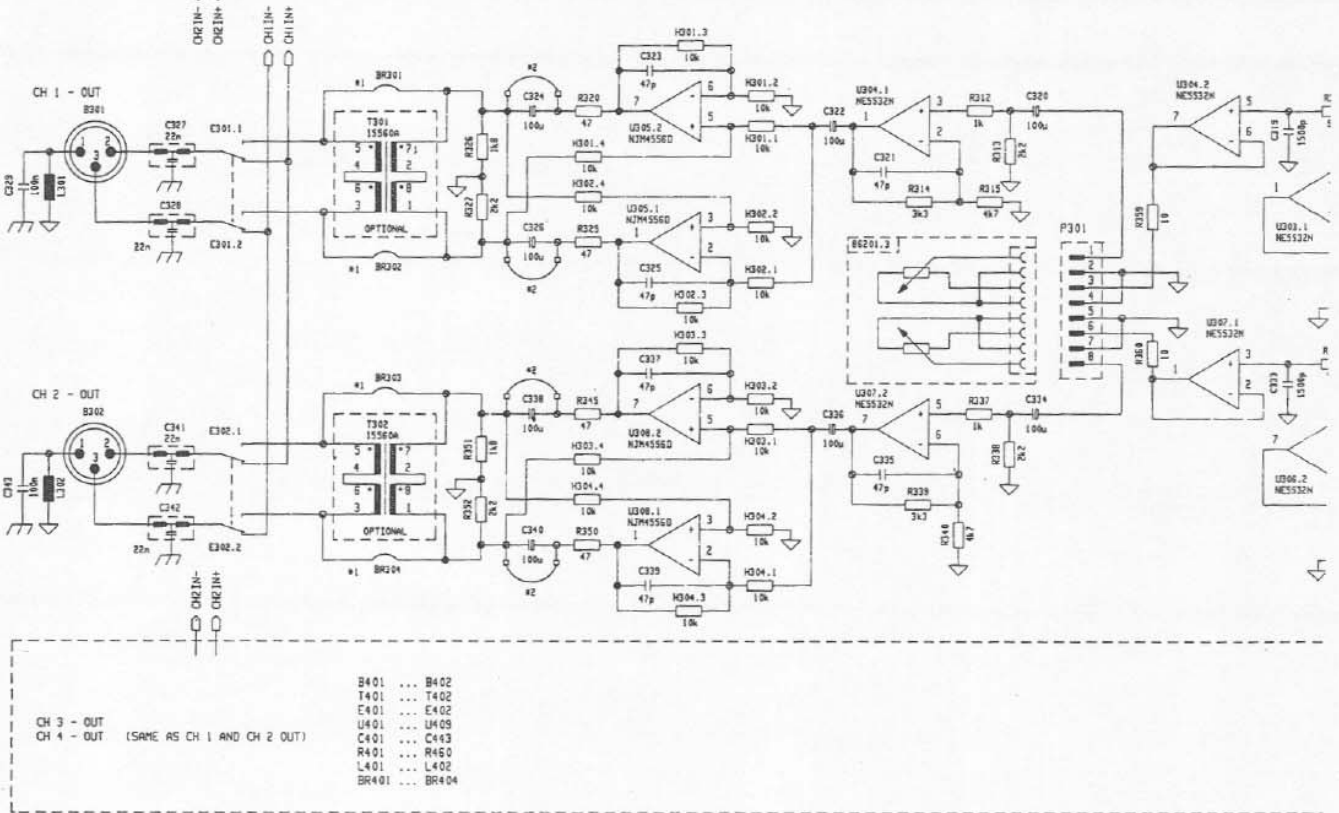
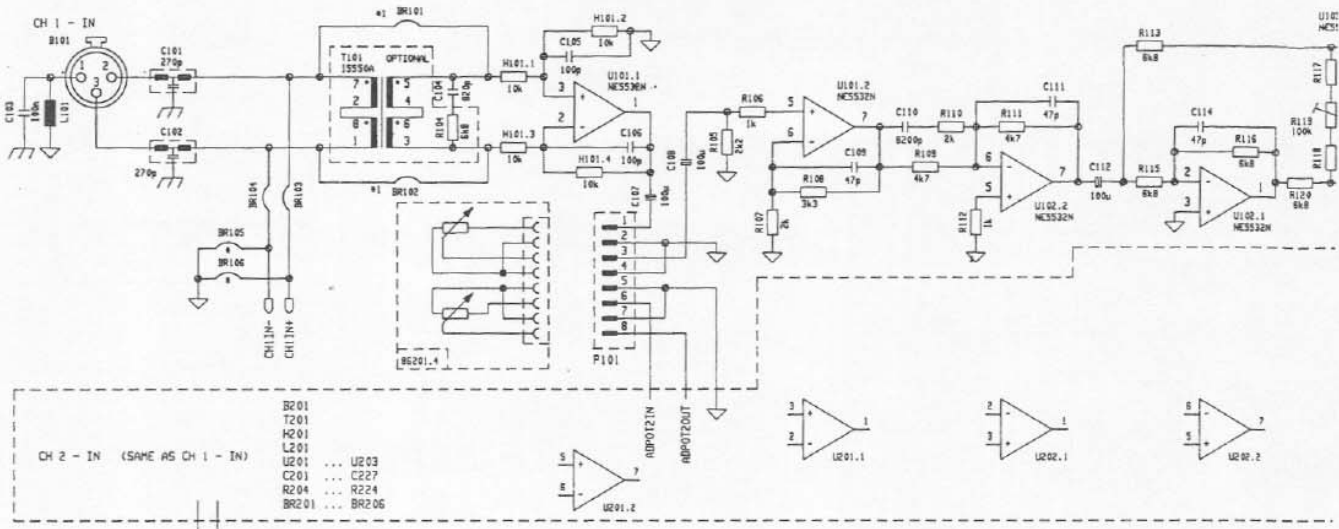
**SINE TEST done
<< >>**



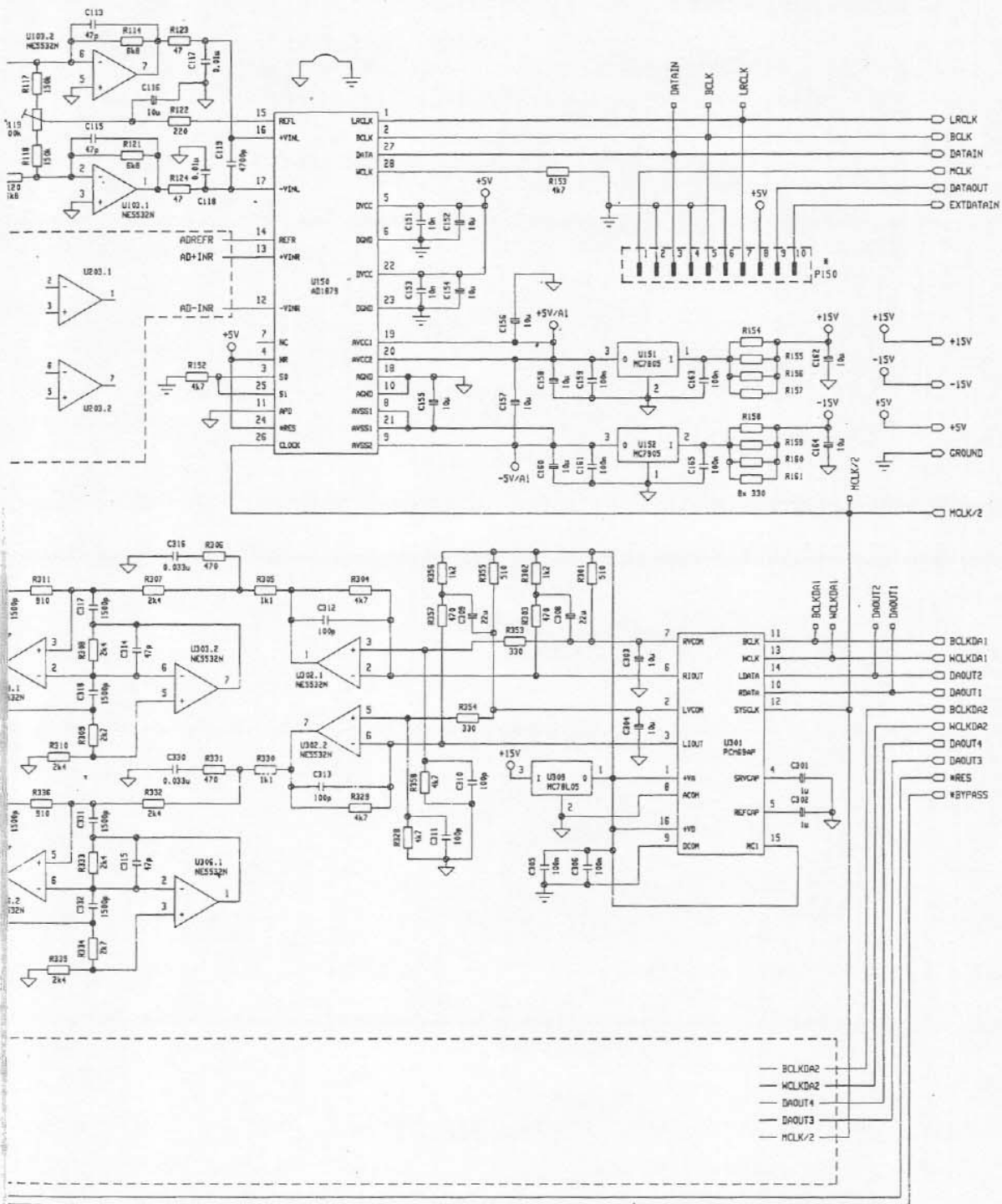
FRONT BOARD	66201
CIRCUIT DIAGRAM	
346 766	
DDL 204	



⚠ SAFETY COMPONENT
(MUST BE REPLACED BY ORIGINAL PART)



No
1.
2.
3.
*
#1
#2

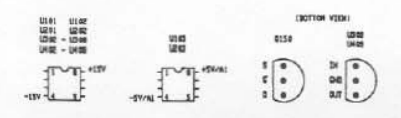


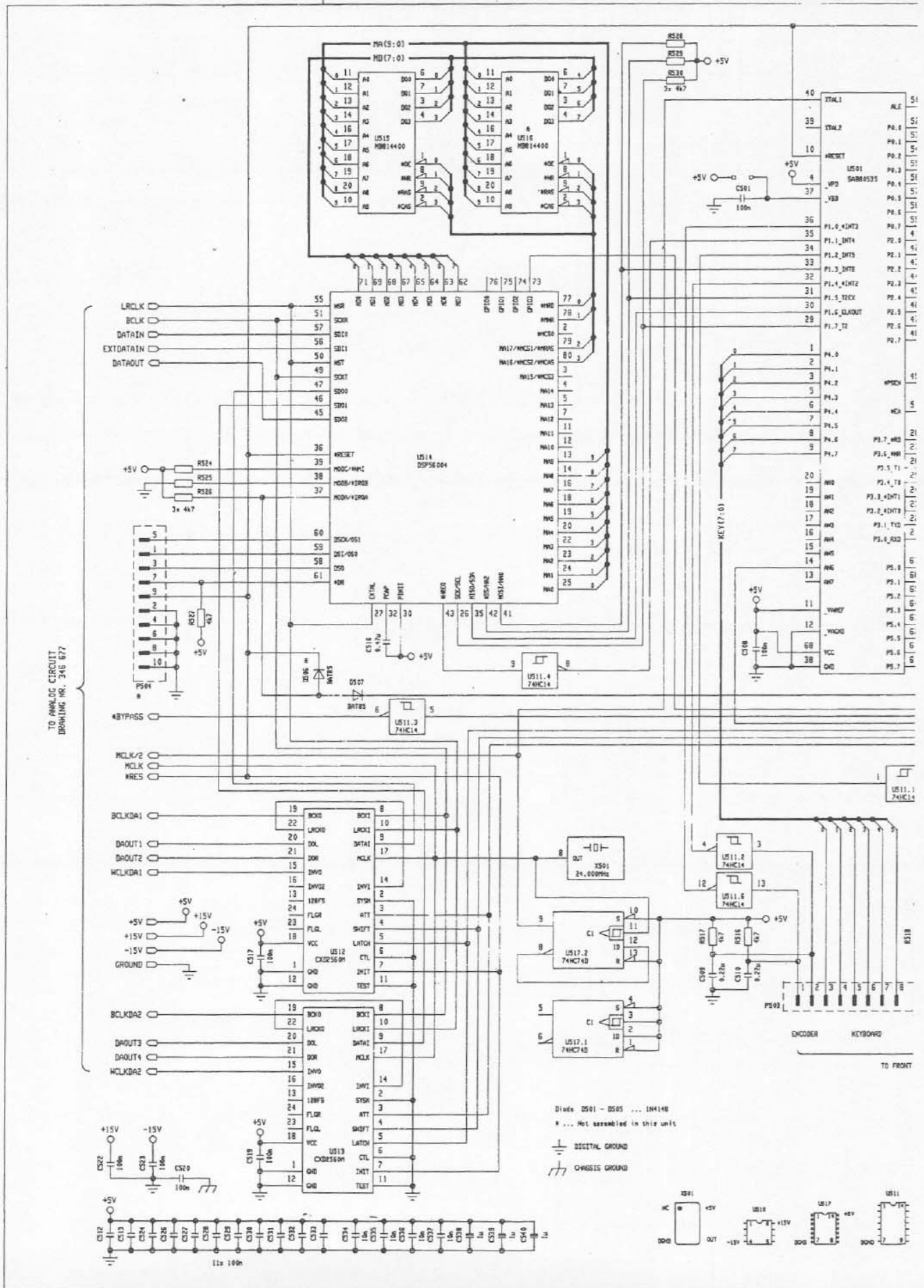
TO DIGITAL CIRCUIT
DRAWING NR. 346 678

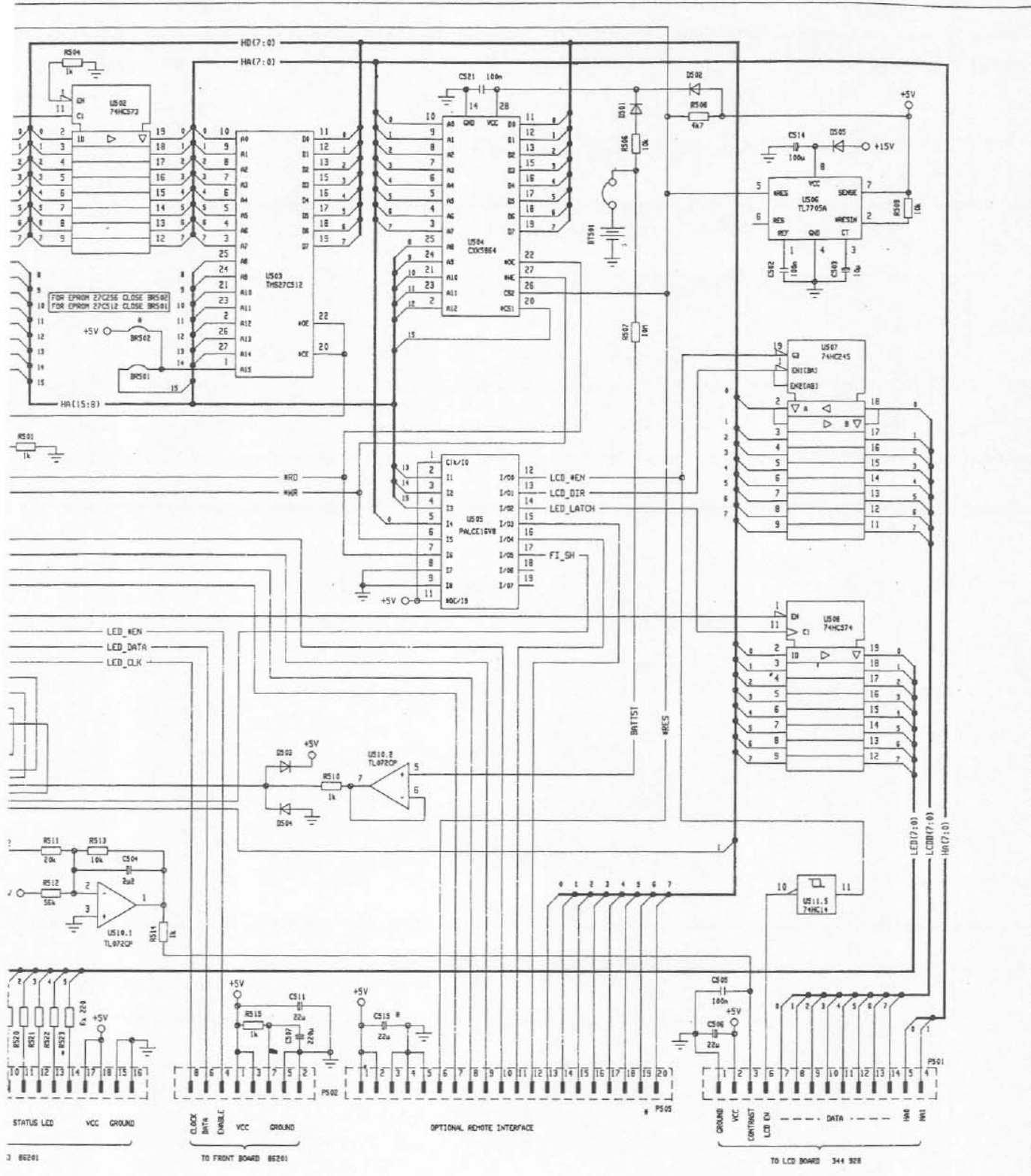
- Notes:
1. EMI Filter C101, C102, C201, C202 ... HTB271
 2. EMI Filter C327, C328, C341, C342 C427, C428, C441, C442 ... HTY223
 3. Diode D151, D152 ... 1N4148
- * : Not assembled in this unit
 #1: Remove using an optional input or output transformer
 #2: Only linked using an optional output transformer

CIRCUIT DIAGRAM CONSISTS OF 2 DRAWINGS : 346 677 2-
 346 678 2-

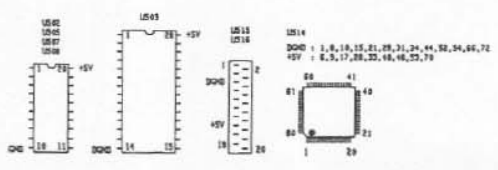
PCB 80394 ANALOG CIRCUIT	
CIRCUIT DIAGRAM	SHEET 1/2
346 677	2-
DDL 204	







CIRCUIT DIAGRAM CONSISTS OF 2 DRAWINGS : 346 677 2-
346 678 2-



PCB 80394 DIGITAL CIRCUIT	
CIRCUIT DIAGRAM	SHEET 2/2
346 678	2-
DDL 204	

Pos. in diagram	description	Part-No.	Pos. in diagram	description	Part-No.
00010	plexiglas panel DDL 204	347876	C 402	KO-EL 1 MF 50V	340520
00040	push button black 12,5x7	337059	C 427	safety component	343489
00050	push button black 6,4x 13,4	342496	C 428	safety component	343489
00060	rotary knob black 16	342120	C 441	safety component	343489
00070	rotary knob black 24	348055	C 442	safety component	343489
00080	power supply	346713	C 507	KO-EL 220 MF 25V	343533
00090	display	344928	C 538	KO-EL 1 MF 50V	340520
			C 539	KO-EL 1 MF 50V	340520
00010	PCB DRP10/DRP 15	852168	C 540	KO-EL 1 MF 50V	340520
B 401	connector	338835	D 150	diode 1N 4002	304360
C 401	safety component 0,22MF	344934	D 151	diode 1N 4148	301254
C 402	safety component 0,22MF	344934	D 152	diode 1N 4148	301254
C 403	safety component 2.2NF	334682	D 501	diode 1N 4148	301254
C 404	safety component 2.2NF	334682	D 502	diode 1N 4148	301254
L 401	coil 2x 10 MH	332961	D 503	diode 1N 4148	301254
S 401	mains switch	331175	D 504	diode 1N 4148	301254
			D 505	diode 1N 4148	301254
00020	PCB DDL 204	862018	D 507	diode BAT 85	301297
D 101	LED 7xgn+3xrt	344868	E 301	relay AZ 845	346760
D 102	LED 7xgn+3xrt	344868	E 302	relay AZ 845	346760
D 103	LED red	345450	E 401	relay AZ 845	346760
D 104	LED red	345450	E 402	relay AZ 845	346760
D 105	LED red	345450	H 101	res.network RKL 8A 103J	343457
D 106	LED red	345450	H 201	res.network RKL 8A 103J	343457
D 107	LED red	345450	H 301	res.network RKL 8A 103J	343457
R 103	potentiometer 2x5kohm log	345484	H 302	res.network RKL 8A 103J	343457
R 104	potentiometer 2x5kohm log	345484	H 303	res.network RKL 8A 103J	343457
R 105	potentiometer 2x5kohm log	345484	H 304	res.network RKL 8A 103J	343457
R 106	potentiometer 2x5kohm log	345484	H 401	res.network RKL 8A 103J	343457
R 107	potentiometer 2x5kohm log	345484	H 402	res.network RKL 8A 103J	343457
R 108	potentiometer 2x5kohm log	345484	H 403	res.network RKL 8A 103J	343457
S 101	switch	339674	H 404	res.network RKL 8A 103J	343457
S 102	switch	339674	L 101	coil	339139
S 103	switch	339674	L 150	coil 47 UH	335966
S 104	switch	339674	L 151	coil 47 UH	335966
S 105	switch	339674	L 152	coil 47 UH/5,5A	333717
S 106	switch	339674	L 201	coil	339139
S 107	rotary encoder	346797	L 301	coil	339139
U 101	IC UAA 2022 P	333487	L 302	coil	339139
			L 401	coil	339139
00030	PCB DDL 204	803948	L 402	coil	339139
BT501	battery	341655	S 150	sliding switch	338886
C 101	safety component	346765	U 101	IC NE 5532 N	327197
C 102	safety component	346765	U 102	IC NE 5532 N	327197
C 201	safety component	346765	U 103	IC NE 5532 N	327197
C 202	safety component	346765	U 150	IC AD 1879	346763
C 301	KO-EL 1 MF 50V	340520	U 151	IC MC 7805 C	309719
C 302	KO-EL 1 MF 50V	340520	U 152	IC MC 7905 CP	338834
C 327	safety component	343489	U 201	IC NE 5532 N	327197
C 328	safety component	343489	U 202	IC NE 5532 N	327197
C 341	safety component	343489	U 203	IC NE 5532 N	327197
C 342	safety component	343489	U 301	IC PCM 69	346849
C 401	KO-EL 1 MF 50V	340520	U 302	IC NE 5532 N	327197

Pos. in diagram description	Part-No.	Pos. in diagram description	Part-No.
U 303 IC NE 5532 N	327197		
U 304 IC NE 5532 N	327197		
U 305 IC NJM 4556 D	344864		
U 306 IC NE 5532 N	327197		
U 307 IC NE 5532 N	327197		
U 308 IC NJM 4556 D	344864		
U 309 IC MC 78 L 05 ACP	346343		
U 401 IC PCM 69	346849		
U 402 IC NE 5532 N	327197		
U 403 IC NE 5532 N	327197		
U 404 IC NE 5532 N	327197		
U 405 IC NJM 4556 D	344864		
U 406 IC NE 5532 N	327197		
U 407 IC NE 5532 N	327197		
U 408 IC NJM 4556 D	344864		
U 409 IC MC 78 L 05 ACP	346343		
U 501 IC SAB 80535 N	341631		
U 502 IC SN 74 HC573 N	341636		
U 503 IC P-IC DDL204	346951		
U 504 IC HM 6264 P20	334590		
U 505 IC P-IC DDL 204	346952		
U 506 IC TL 7705	335857		
U 507 IC SN 74 HC245 N	338389		
U 508 IC SN 74 HC574 N	341637		
U 510 IC TL 072 CP	331340		
U 511 IC MC 74 HC 14	333458		
U 515 IC MB 814400A	346762		
X 501 quarz 24.0000MHZ	346851		

WARRANTY (Limited)

Electro-Voice products are guaranteed against malfunction due to defects in materials or workmanship for a specified period, as noted in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual, beginning with the date of original purchase. If such malfunction occurs during the specified period, the product will be repaired or replaced (at our option) without charge. The product will be returned to the customer prepaid. **Exclusions and Limitations:** The Limited Warranty does not apply to: (a) exterior finish or appearance; (b) certain specific items described in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual; (c) malfunction resulting from use or operation of the product other than as specified in the product data sheet or owner's manual; (d) malfunction resulting from misuse or abuse of the product; or (e) malfunction occurring at any time after repairs have been made to the product by anyone other than Electro-Voice or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Electro-Voice or any of its authorized service representatives together with proof of purchase of the product in the form of a bill of sale or receipted invoice. A list of authorized service representatives is available from Electro-Voice at 600 Cecil Street, Buchanan, MI 49107 (616/695-6831) and/or Electro-Voice West, at 8294 Doe Avenue, Visalia, CA 93291 (209/651-7777). **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are the only remedies provided to the customer. Electro-Voice shall not be liable for any incidental or consequential damages including, without limitation, injury to persons or property or loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **Other Rights:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Electro-Voice Electronics are guaranteed against malfunction due to defects in materials or workmanship for a period of three (3) years from the date of original purchase. Additional details are included in the Uniform Limited Warranty statement.

Service and repair address for this product: Electro-Voice, Inc. 600 Cecil Street, Buchanan, Michigan 49107.

Specifications subject to change without notice.



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