# Preliminary operating and service information

# DN728

## Digital Delay Line

## Introduction

The DN728 opens up a complete new world in digital delay lines, with two inputs, six outputs and a maximum delay of 1.3 Seconds (upgradable to 5.2 Seconds) virtually any required delay line configuration can be implemented. These configurations are easily set-up from the front panel controls and are automatically stored with delay settings in one of the 64 memories. Configurations can range from a three output stereo delay to a six output mono delay, including a dual delay where a variable amount of delay memory can be assigned to either channel and each output can be individually assigned to either channel.

Constructed in a one rack-space unit, the DN728 features state-of-the-art 64x-oversampling converters and linear-phase decimating filters. These give a full 18-bit resolution at an effective 200kHz sampling rate, ensuring flat frequency and phase response over a 20Hz-20kHz bandwidth and a typically 108dB dynamic range.

Delay resolution is 5 micro-Seconds allowing very accurate time alignment of drivers in multi-way loudspeaker systems. The delay settings can be displayed in units of time (micro-Seconds), distance (metres or feet) or video fields (PAL or NTSC). Delays can be set either as absolute or relative values, allowing quick and accurate alignment of delayed speaker stacks. When set in distance mode a temperature compensation facility is incorporated.

Each output has an independent digitally controlled output level, adjustable from -14dB to +4dB in 1dB steps, including mute. These are automatically stored with the delay settings in the user memories and can be recalled if required.

Various levels of control lock-out are provided, with the option of a user definable password for function access.

The DN728 also includes various retrofittable remote control interfaces including; Intelix Mind-Net, MIDI, RS422, GPI.

## Reliability Control

Even with the advanced technology incorporated in this product, each instrument is given the full backing of Klark-Teknik's "reliability control" which proves each product against a specification consistent with the highest professional standards. Only top quality components are used and every unit is bench tested and aligned before a burn-in period and a final performance test is carried out after the burn-in period.

## Instrument Familiarisation

### Front panel functions
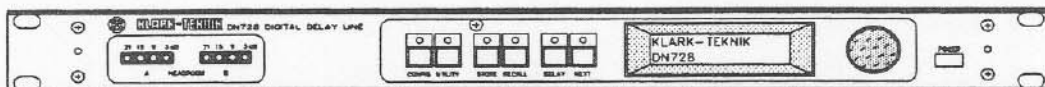


### Headroom indicators
These are peak level indicators and are set up so that the red 3dB LED illuminates 3dB below the digital full scale (digital clipping).

### CONFIG switch
This switch gains access to the configuration menu, which allows the construction of a new delay line, the control of the relevant remote interface if fitted and control of the security lock-out functions.

### UTILITY switch
This switch gains access to the utility menu, which allows control of the individual output gains, conversion of the current operating delay to another mode (ie. milliSeconds to metres) and switching the relative mode on or off.

### STORE switch
This switch is primarily used for storing the current delay to one of the 64 user memories, it has a secondary function in the menu modes for confirming a desired action.

### RECALL switch
This switch is used for recalling one of the 64 user memories.

### DELAY switch
The primary use for the delay switch is to select the display and control of the delay settings. Pressing the DELAY switch while in the delay mode will cause the toggling of the high and low speed settings.

### NEXT switch
The primary use for this switch is in the delay mode to select the next output to be displayed and controlled. In the menu mode it is used for selecting the next option.

### ROTARY controller
This is used for changing the displayed delay settings, menu options, memory numbers during store or recall modes etc. The parameter that is alterable by the rotary controller is always underlined in the display window.

**Rear panel functions**
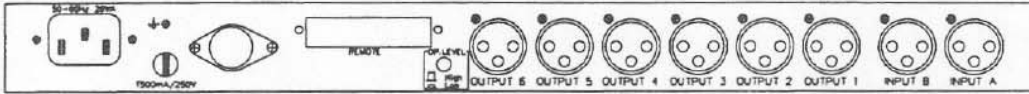


**Mains** Supplied via an IEC standard 3 pin connector. A compatible power cord is supplied with the unit.

**Operating Voltage** This is clearly marked on an adhesive label. See "Installation" for voltage change-over instructions.

**Mains Fuse** Located in a fuse holder fitted to the rear panel. Always replace with the correct type and rating of fuse, as indicated adjacent to the fuse holder.

**Earth-lift link** Located inside the unit. This disconnects the signal ground from the mains and chassis earth. This should be used if hum is attributable to earthloops and will generally solve the problem. It is also safe, unlike the practice of disconnecting the mains earth from the power cord.

**Input and output connections** Made via complementary XLR style connectors. For wiring details see "Audio Connections".

**Serial number** Should be quoted in any correspondence concerning the unit.

**OP. Level** This switch sets the nominal operating level of the unit, with the switch out the 'high' operating level is selected. This allows a maximum signal level of +20dBu before signal clipping, in the 'low' position the maximum level is +10dBu.

**Remote** A cut out for the various retrofittable remote interfaces.

## Using the DN728 Digital Delay Line

In understanding the DN728 it is probably best to consider the unit as a two input six output delay line, with a block of memory and each output having an independent level control. From this the control software is capable of allocating a percentage of the total memory to each input channel and assigning any output to either input channel. The software is also able to gang delay setting of outputs to allow for stereo outputs or even relative delay settings. In a stereo delay line for example, the total memory will be split 50% between each input. Outputs 1,2 and 3 will be assigned to input channel A and outputs 4,5 and 6 will be assigned to input channel B and outputs 1 and 4 will be ganged together as will outputs 2 & 5 and 3 & 6.

The configuration menu allows all these parameters to be set, allowing configurations such as a dual delay with one channel having a 100mS maximum delay with one output and the other channel 1.2 seconds of maximum delay and five outputs. With relative mode settings, one output for each channel is assigned as a base. When the delay setting for this output is changed all other outputs assigned to the same channel will automatically change by the same amount, if any other output apart from the base output is altered it will only effect that output, the display will always show its relative delay to the base output. The base channel is always the lowest numbered output assigned to the channel.

The DN728 is capable of setting an output delay in various forms - time, distance (metres,feet) and video fields. The time and video fields are directly converted into 5 micro-Second steps, the minimum resolution of the unit. The distance modes use the temperature parameter to convert the displayed distance to a time delay. This causes all the output delays to change when the temperature parameter is altered. The displayed delay setting in both time and distance mode is corrected for the inherent delay introduced by the sampling processes, hence the minimum delay settable in the time mode is 0.980 milliseconds.

Each output has a software adjustable gain control, which allows the output gain to be set from +4dB to -14dB in 1dB steps and the capability to mute the channel. Due to the fact the unit has a large dynamic range, the need for an input level control has virtually been avoided. But to allow for various operating levels a two position switch is provided on the rear panel, this allows for nominal operating levels of 0dB and +10dB each with 10dB's of headroom. In changing operating levels the set gain of each output is not affected, with the exception that due to output drive limitations a settable output gain above 0dB is not allowed in the high operating mode.

With the numerous delay configurations possible with the DN728 the sixty-four memories make it very easy to recall user defined delay line set-ups, each memory stores the complete configuration of the delay line, along with the settings of each output delay and output gains. When a memory is recalled the DN728 is reconfigured for the new delay, the output delay settings are updated and optionally the output gains are reset to the stored values. When storing a new or updated delay configuration the memory can be given a 10 character name, making the recall of specific memories fool-proof.

Using the security lock-out functions any number of the user memories can be protected from being accidentally modified. The lock-out functions also allow the unit to be made tamper-proof, at one level all settings can be locked and only memory recalls allowed, at the next level the memory recalls can also be made unavailable. As a final security measure access to the lock-out functions can be password protected, by a user defined 8 character code.

**Power on sequence**

During the power on sequence the unit performs a series of checks and displays certain messages. Any fatal errors found are shown by the switch LED's flashing and possibly an error message in the LCD display. If this happens the unit is unusable and should be switched off immediately. In a normal power on sequence the unit will display its software version number, the total amount of delay memory and what remote interface is connected if any. The unit will then configure itself to the delay mode it was in when it was last switched off and go into its 'idle mode' with the display showing the current configuration of the unit.

**Viewing and changing the delay settings**

Press the [DELAY] switch until its LED illuminates.
The top line of the display will then show the current configuration and output.
The bottom line will show the delay for that output.
e.g. 'Stereo Delay in milliseconds'

| Stereo DELAY 1+4 |
| 40.805 mSec |

--{stereo pair outputs 1 and 4}

e.g. 'Dual Delay in metres'

| Dual DELAY 1.A |
| 38.458 Metres |

--{output 1 assign to input A}

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By turning the rotary control the delay setting for that output can be altered. Note that the underline cursor in the display shows what the rotary control will change. Because the unit is capable of fine resolution and large range (one in a million) the cursor can be toggle across the decimal point by pressing the [DELAY] switch.

If the cursor does not appear then the setting control has been locked out (see Lock-out section).

Pressing the [NEXT] switch will cause the display to rotate through all the output settings.

If the unit has been set in distance mode (feet or metres) the unit will display the temperature that the unit is using to convert the distance to a delay time. Changing the temperature will cause all the outputs to change their delay times. If the delay values are headed by a + or - sign this signifies that the value is relative (see Relative section).

**Storing delay configurations**

Press the [STORE] switch until its LED illuminates.
The display will show:

```
STORE to MEMORY
3:
```

This will be the next available empty memory. If required use the rotary control to select a different memory, memory numbers that appear to be missing will have been protected from being changed (see Protecting Memories section). Pressing the [NEXT] switch will cause the cursor to jump in the name area, use the rotary control and the [NEXT] switch to define a name (maximum of 12 characters). Finally to confirm the store press the [STORE] switch again, the display will confirm that the store has been completed.
Note: Pressing any other switch will abort the store sequence.

**Recalling delay configurations**

Press the [RECALL] switch until its LED illuminates.
The display will show:

```
RECALL a MEMORY
2:Mono (feet)
```

This will be the last recalled memory. If required use the rotary control to select a different memory. Finally to confirm the recall press the [RECALL] switch again, the display will confirm that the recall has been completed. When the unit recalls a memory the outputs are automatically muted and the mutes are not released for a period of the maximum delay found for that memory.
Note: Pressing any other switch will abort the recall sequence.

### Changing operating level

The unit is designed to work at two different operating levels, +10dBu and 0dBu. These are selected by a push button on the rear panel, when the switch is out the high level is selected. Both operating levels have 10dB's of headroom i.e. the high level has a maximum level of +20dBu, when the switch setting is changed the unit maintains an overall unity gain structure (assuming the output levels are at set 0dB).

### Changing output level

Press the [UTILITY] switch until its LED illuminates.
The display will show:

```
UTILITY MENU:
OPT.1=LEVELS
```

If option 1 is not displayed adjust the rotary control.
Press the [NEXT] switch and the display will show:

```
Gain Output 1
>          |      <  0dB
```

Use the rotary control to set the desired gain, the range is from -14dB to +4dB in the low level operating mode and -14dB to 0dB in the high level mode. The output can also be muted by going below -14dB, further pressing of the [NEXT] switch will cause the other five outputs to be displayed. After output 6 the display will show:

```
LEVELS RECALLED
FROM MEMORY=YES
```

This is a status flag which defines whether output levels are modified when a memory is recalled, the current output level is always saved when a delay configuration is stored to memory. Use the rotary control to set the required option.

**Creating a new delay line**

Press the [CONFIG.] switch until its LED illuminates.
The display will show:

```
CONFIG. MENU:
OPT.1=NEW DELAY
```

If option 1 is not displayed adjust the rotary control.
Press the [NEXT] switch and the display will show:

```
NEW DELAY MENU
Mode = STEREO
```

Use the rotary control to select the required mode STEREO, DUAL or MONO.
Press the [NEXT] switch when correct, the display will show:

```
NEW DELAY MENU
Display= TIME
```

Use the rotary control to select the required display mode TIME, METRES, FEET, PAL video fields or NTSC video fields. Press the [NEXT] switch when correct, if the DUAL mode was previously selected the display will show:

```
NEW DELAY MENU
Amax= 217Mt= 50%
```

This is the amount of the available memory assigned to the A channel, the display shows the maximum settable value in the current display mode and the percentage of memory. Use the rotary control to select the required amount of memory assigned to the A channel, the remainder is automatically assigned to the B channel. Press the [NEXT] switch when correct, in the STEREO mode this is automatically set to 50% and in the MONO to 100%.
The display will show:

```
NEW DELAY MENU
Output 1 = A
```

This is the assignment channel for output 1, use the rotary control to select the required channel A or B. Press the [NEXT] switch when correct, and continue through all six outputs. IN the STEREO mode outputs 1, 2 and 3 are automatically assigned to the A channel and 4, 5 and 6 to the B channel, in the MONO mode all outputs are set to channel A.

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When all six outputs have been assigned the display will show:

```
NEW DELAY MENU
Relative Md=OFF
```

This is a status flag to determine if the unit is in relative or absolute mode (see Relative section). Use the rotary control to select relative mode ON or OFF. If the unit is set to display video fields PAL or NTSC the relative mode is forced off. Press the [NEXT] switch when correct, the display will show:

```
NEW DELAY MENU
STORE KEY to USE
```

To set the unit to this new configuration press the [STORE] switch, press the [NEXT] switch to check or change the settings. Pressing any other switch will cause the new delay configuration to be abandoned.

**Converting current delay modes**

If the unit is running a delay line in display modes TIME, METRES or FEET it is possible to convert them into another mode. For example if the current delay was working in METRES and we wished to convert it into TIME:
Press the [UTILITY] switch until its LED illuminates.
The display will show:

```
UTILITY MENU:
OPT.1=LEVELS
```

Adjust the rotary control until the display shows:

```
UTILITY MENU:
OPT.2=CONVERSION
```

Press the [NEXT] switch and the display will show:

```
CONVERSION OPT.
  Metre to Time
```

If the second line is incorrect adjust the rotary control. When correct press the [NEXT] switch, the display will show:

```
CONVERSION OPT.
at TEMP= +20'C
```

Adjust the rotary control to select the temperature at which to convert. When converting between metres and feet there is no temperature setting. When correct, press the [NEXT] switch, the display will show:

```
CONVERSION OPT.
STORE KEY to USE
```

To set the unit to this new display mode press the [STORE] switch, pressing any other switch will cause the conversion to be abandoned.

**Relative modes**

The DN728 is capable of displaying the output delay values in either absolute or relative modes. In the normal absolute mode, the displayed output value is the actual delay value, in the relative mode one output for each channel is a base value - this is displayed in absolute delay. All the other outputs assigned to that channel are displayed as relative to this base value, these displays are differentiated by having a + or - sign. This allows something like a delayed speaker tower to be time aligned, and by adjusting the base output the whole tower can be effectively moved without affecting the time alignment.

For example, if outputs 1, 2 and 3 are assigned to channel A and this was used for a delayed speaker tower where output 1 is used for the bass driver, output 2 for the mid range and output 3 for the horns. Outputs 2 and 3 the relative outputs could be time aligned to the bass driver, now by adjusting output 1 the delay for the whole tower could be adjusted without affecting the time alignment. In the relative mode the base delay is always the lowest numbered output assigned to the specific channel.

The relative mode can be defined when setting up a new delay line, it can also be switched on and off by the following method (there is no relative mode in the video fields display option).

Press the [UTILITY] switch until its LED illuminates. The display will show:

```
UTILITY MENU:
OPT.1=LEVELS
```

Adjust the rotary control until the display shows:

```
UTILITY MENU:
OPT.3=RELATIVE
```

Press the [NEXT] switch and the display will show:

```
RELATIVE OPT.
Relative Md=OFF
```

Use the rotary control to select relative mode ON or OFF and press the [NEXT] switch to set.

**Protecting memories**

Memories with stored delay configurations, that should not be modified, can be protected. To protect a range of memories use the following method.
Press the [CONFIG.] switch until its LED illuminates.
The display will show:

```
CONFIG. MENU:
OPT.1=NEW DELAY
```

Adjust the rotary control until the display shows:

```
CONFIG. MENU:
OPT.3=LOCK-OUTS
```

Press the [NEXT] switch and the display will show:

```
LOCK-OUT MENU:
MEMORIES=NO
```

Adjust the rotary control until the display shows:

```
LOCK-OUT MENU:
MEMORIES=YES
```

Press the [NEXT] switch and the display will show:

```
MEMORY LOCK-OUT
OPT.1=LOCK MEM
```

Press the [NEXT] switch and the display will show:

```
LOCK MEMORIES
Range= 1 to 1
```

Use the rotary control and the [NEXT] switch to set a range of memories to be protected from being modified. Please note that unused memories in the range are not protected. When the range is correctly set press the [STORE] switch, the display will confirm the protection, pressing any other key will abort the operation.

To Unprotect a range of memories follow the same method, but use OPT2. (see below)

```
MEMORY LOCK-OUT
OPT.1=LOCK MEM
```

Use the rotary control to select OPT.2=UNLOCK MEM before pressing the [NEXT] switch.

**Lock-out section**

The unit can easily be protected against unauthorised control, by setting two different lock-out functions, the first one 'SETTINGS' will stop any modification to the unit apart from allowing the recall of memories. This can also be defeated by setting the 'M.RECALL' lock-out, and the lock-out section itself can be protected by setting a user definable password. With all locks on and a password set the unit is completely protected from unauthorised tampering.
To set the various lock-out functions use the following method.
Press the [CONFIG.] switch until its LED illuminates.
The display will show:

```
CONFIG. MENU:
OPT.1=NEW DELAY
```

Adjust the rotary control until the display shows:

```
CONFIG. MENU:
OPT.3=LOCK-OUTS
```

Press the [NEXT] switch and the display will show:

```
LOCK-OUT MENU:
MEMORIES=NO
```

(Note: If the password has previously been set the unit will request the correct password first.)

Press the [NEXT] switch and the display will show:

```
LOCK-OUT MENU:
SETTINGS=LO LOCK
```

Use the rotary control to select SETTINGS=NO LOCK or LOCK and press the [NEXT] switch to set, the display will show:

```
LOCK-OUT MENU:
M.RECALL=NO LOCK
```

Use the rotary control to select M.RECALL=NO LOCK or LOCK and press the [NEXT] switch to set, the display will show:

```
LOCK-OUT MENU:
PASSWORD = OFF
```

Use the rotary control to select PASSWORD=OFF OR ON and press the [NEXT] switch to set. If password has been set OFF, the unit will return to its normal display otherwise it will show:

```
Enter Password..
= = =:xxxxxxxx:= = =
```

'xxxxxxxx' equals the current password, use the rotary control and the [NEXT] switch to define a password (maximum of 8 characters). Finally to confirm the password press the [STORE] switch, the display will confirm that the password has been set.

## Options

5.2 Seconds of total memory
Relay fail-safe
Electronic output balancing
Transformer output balancing
Transformer input balancing*
Remote interfaces MIDI, Intelix-Mind Net, GPI
*Not retrofittable

| Option Ordering information | Part number | Quantity |
| --- | --- | --- |
| 5.2 Seconds of total memory | MEM1M9 | 2 off |
| Relay fail-safe | RL728 | 6 off |
| Electronic output balancing | BE728 | 6 off |
| Transformer output balancing | BT728 | 6 off |
| Transformer input balancing* | BI728 | |

## Memory upgrade procedure

a) Remove both 256K * 9 SIMM modules from converter board.
b) Insert two 1M * 9 SIMM modules.
c) Remove 'MEM SIZE' link on main board (near remote connector).

## Relay Fail Safe retrofit procedure

a) Solder in six relays on main board at positions RLA-RLF.
b) Remove solder bridging on reverse of main board under each relay (12 bridges to remove).
c) Use links provided to select the by-pass channel for each output, the connection options are printed on the main board.

## Balanced output retrofit procedure

a) Remove resistors and links from positions LK3-LK14.
b) Solder in six transformers or electronic balancing cards to positions TX3-TX8.
c) Remove link LK2 located between input socket B and output socket 1.
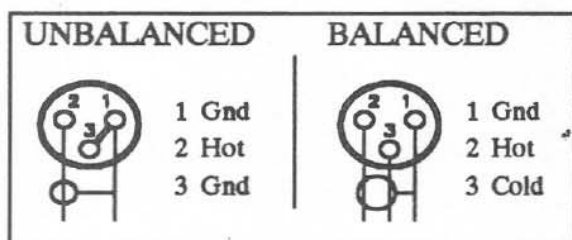
## Audio Connections

### Input

The input circuitry is a transformerless, electronically balanced design which achieves a symmetry of better than -50dB from 20Hz to 10kHz.

If transformer balancing of the input is required, this must be specified at the time of order - it is not retrofittable.

### Output

The standard output is unbalanced, but balancing transformers and electronic balancing are available and may be retrospectively fitted.
The output unbalanced output XLR connections are: Pin 1 circuit ground; Pin 3 circuit ground and Pin 2 signal.



### Balanced Circuits

Transformer or electronically balanced connections have the benefit of "common mode rejection" which eliminates externally induced interference such as mains hum etc.  Balancing is especially useful when long cable runs are used between pieces of equipment.

Transformer balanced circuits have the added advantage of being, "full floating" with the ground (earth) or screen being totally isolated from the signal.  In installations where a difference in earth potential is likely to occur this isolation prevents grounding problems which can, in some cases, damage the equipment.

If used unbalanced, either Pin 2 or Pin 3 can be used for signal providing the unused Pin is connected to Pin 1.

## Installation

### Mounting

The DN728 is designed for standard 19 inch rack mounting and is 44mm (1.75 inch) high and 300mm (11.75 inch) deep, excluding connectors. Observe the following when mounting:-
1) Use a well ventilated rack.
2) Do not mount on top of heat producing equipment.
3) Use fan assisted ventilation if rack exceeds 40'C

### Power Requirements

The factory set nominal operating voltage is clearly indicated on the rear panel. Power connection is made via a standard CEE power cable provided. The chassis to mains earth connection made by this cable must not be removed. Maximum power consumption of the unit is 20VA. For power cables using flying leads, the cable are colour coded as follows:-    BROWN.......................LIVE
BLUE............................NEUTRAL
GREEN/YELLOW....EARTH

### Voltage Change-Over

* NOTE: Noisy supply or insufficient mains voltage will cause the DN728 to operate in an intermittent manner.
The unit can be set to operate on 110, 120, 220 or 240 (nominal) VAC @ 50/60Hz, by changing the position of the two voltage selector switches inside the unit, adjacent to the mains power transformer. The range of supply voltages suitable for each switch position are as follows:-

| Switch Position | Range |
|---|---|
| 240V | 215-250V @ 50Hz |
| 220V | 200-230V @ 50Hz |
| 120V | 105-130V @ 60Hz |
| 110V | 95-115V @ 60Hz |

## Voltage Switch Settings

To change the operating voltage, a qualified service technician or an approved Klark-Teknik dealer must carry out the following procedure:-
1) Remove the mains cable from the socket
2) Remove the four screws retaining the top cover
3) Set the voltage selector switches inside the unit to the appropriate positions as shown
4) Replace top cover, refit and tighten all screws
5) Affix a label on the rear panel with the new voltage details

## Mains fuse

The correct type is T500mA for all operating voltages.

## Specifications

| | |
|---|---|
| **Inputs** | **Two via 3-pin XLR** |
| Type | Electronically balanced |
| Impedance (ohm) | |
|    Balanced | 20k |
|    Unbalanced | 10k |
| Max Level | +20dBu |
| | |
| **Outputs** | **Six via 3-pin XLR** |
| Type | unbalanced (pin 2 hot) |
| Min. Load Impedance | 600 ohms |
| Source Impedance | <60 ohms |
| Max Level | +20dB |
| | |
| **Performance** | |
| Frequency response | +/- 0.5dB (20Hz-20kHz) |
| Total harmonic distortion | <0.05% (20Hz-20kHz @ +8dBu) |
| Dynamic Range | Typically 108dB |
| Max Delay | 1.3 seconds (optional 5.2 seconds) |
| Minimum increment | 5 uS (2mm in distance mode) |
| Digital conversion | 18 bit PCM |
| Effective sample rate | 200kHz |
| | |
| **Power Requirements** | |
| Voltage | 110/120/220/240V @ 50/60Hz AC |
| Consumption | <20VA |
| | |
| **Weight** | |
| Nett | 2.5kg |
| Shipping | 4.2kg |
| | |
| **Dimensions** | |
| Width | 482mm (19 inch) |
| Depth | 300mm (11.75 inch) |
| Height | 44mm (1.75 inch) |
| | |
| **Terminations** | |
| Inputs | 3 Pin XLR |
| Outputs | 3 Pin XLR |
| Power | 3 Pin CEE |

## Warranty

This product is manufactured by Klark-Teknik and is warranted to be free from defects in components and factory workmanship under normal use and service for a period of one year from the date of purchase.

During the warranty period, Klark-Teknik will undertake to repair or at its option, replace this product at no charge to its owner when failing to perform as specified, provided the unit is returned shipping pre-paid, to the factory or authorised service facility.*
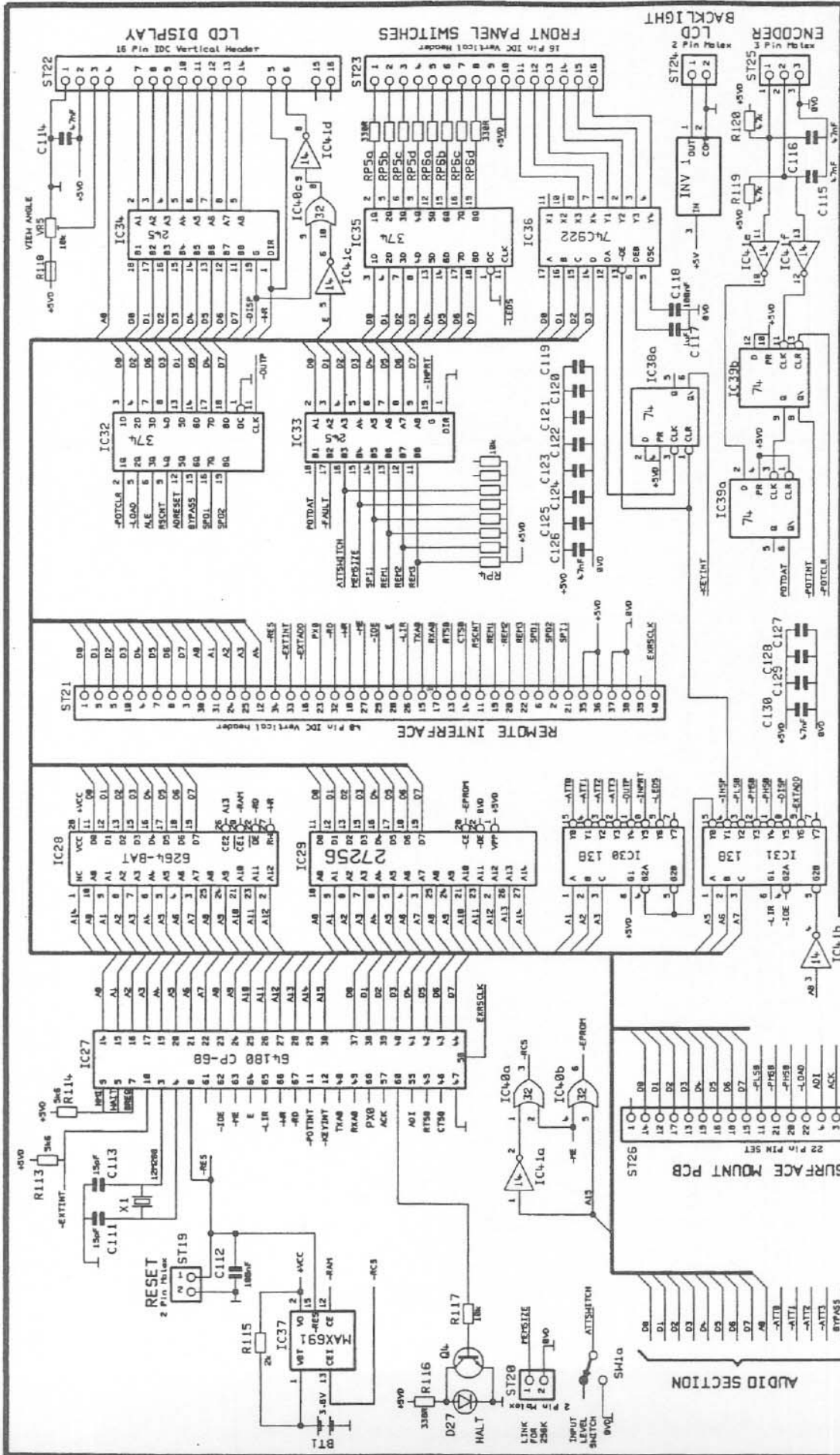
No other warranty is expressed or implied.

This warranty shall not be applicable and be void when this product is subjected to:

a) Repair work or alteration be persons other than those authorised by Klark-Teknik in such a manner as to injure, in the sole judgement of Klark-Teknik, the performance, stability, reliability or safety of this product.

b) Misuse, negligence, accident, act of God, war or civil insurrection.

c) Connection, installation, adjustment or use otherwise than in accordance with the instructions provided by Klark-Teknik.

* See enclosed service request form.

Klark-Teknik reserves the right to alter specifications without notice. This warranty does not affect the statutory rights of the UK customer.
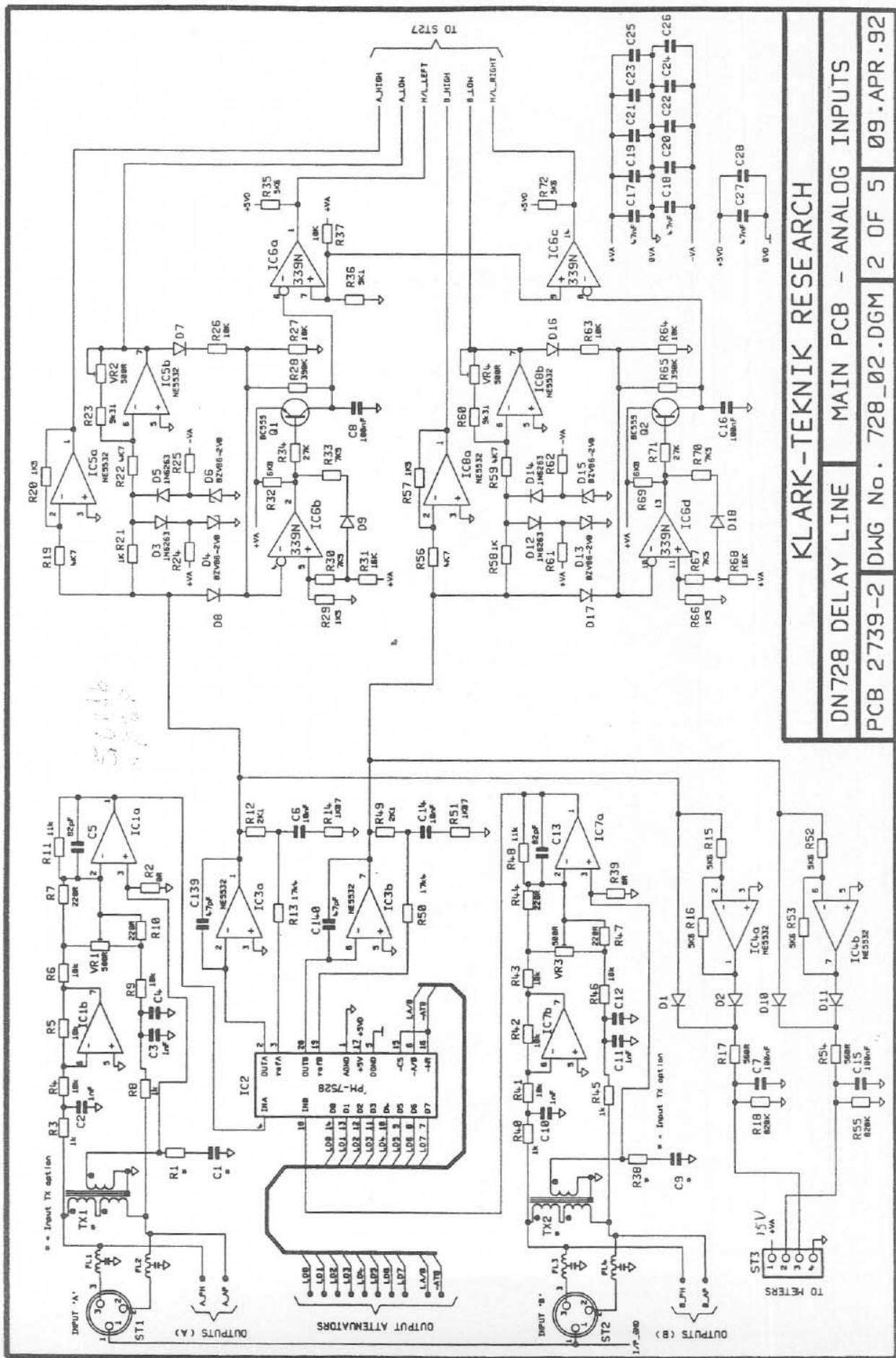
LCD DISPLAY
16 Pin IDC Vertical Header
ST22

VIEW ANGLE
VR5

IC34
245

IC40c IC40e
IC41c

IC35
374

FRONT PANEL SWITCHES
16 Pin IDC Vertical Header
ST23

RP5a RP5b RP5c RP5d RP6a RP6b RP6c RP6d

IC36
74C922

LCD BACKLIGHT
ST24
2 Pin Molex
INV

ENCODER
ST25
3 Pin Molex
R120 R119

IC41e IC41f
IC39b
74

IC32
374

IC33
245

IC38a
74

IC39a
74

REMOTE INTERFACE
48 Pin IDC Vertical Header
ST21

IC28
6264-BAT

IC29
27256

IC30
138

IC31
138

IC4b

IC27
64180 CP-68

IC40a IC40b
IC41a

SURFACE MOUNT PCB
ST26
22 Pin Pin Set

RESET
2 Pin Molex
ST19

X1

IC37
MAX691

R117
Q4
D27
HALT
ST20
2 Pin Molex
LINK FOR 256K

INPUT LEVEL SWITCH
SW1a

AUDIO SECTION

KLARK-TEKNIK RESEARCH

| DN728 DELAY LINE | MAIN PCB - ANALOG INPUTS | | |
|---|---|---|---|
| PCB 2739-2 | DWG No. 728_02.DGM | 2 OF 5 | 09.APR.92 |
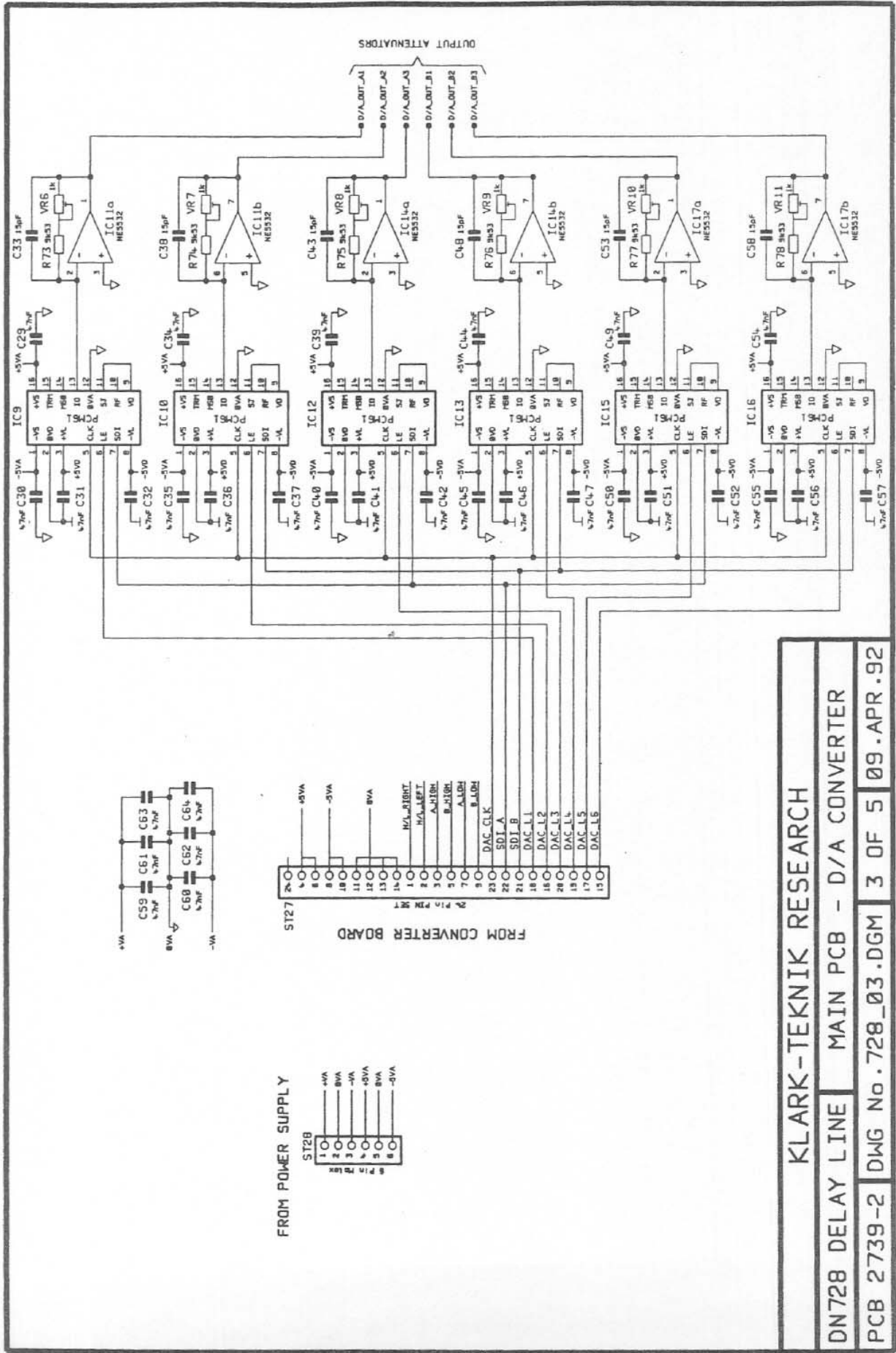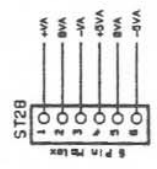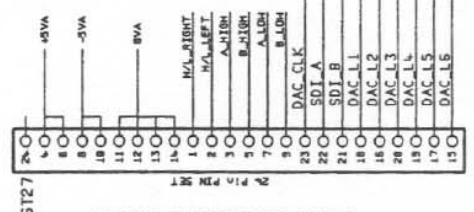
KLARK-TEKNIK RESEARCH

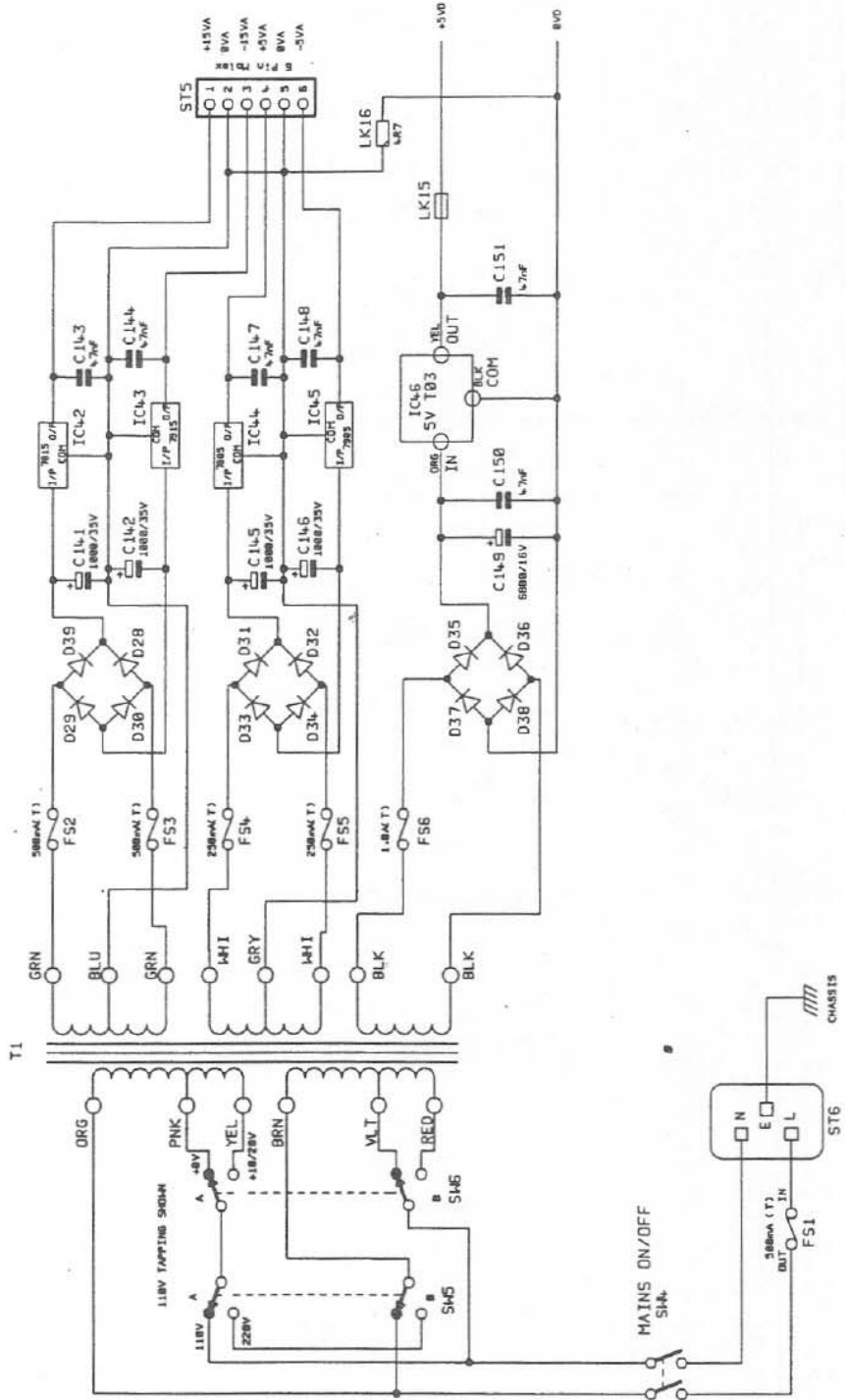| DN728 DELAY LINE | MAIN PCB - D/A CONVERTER | | 09.APR.92 |
|---|---|---|---|
| PCB 2739-2 | DWG No.728_03.DGM | 3 OF 5 | |
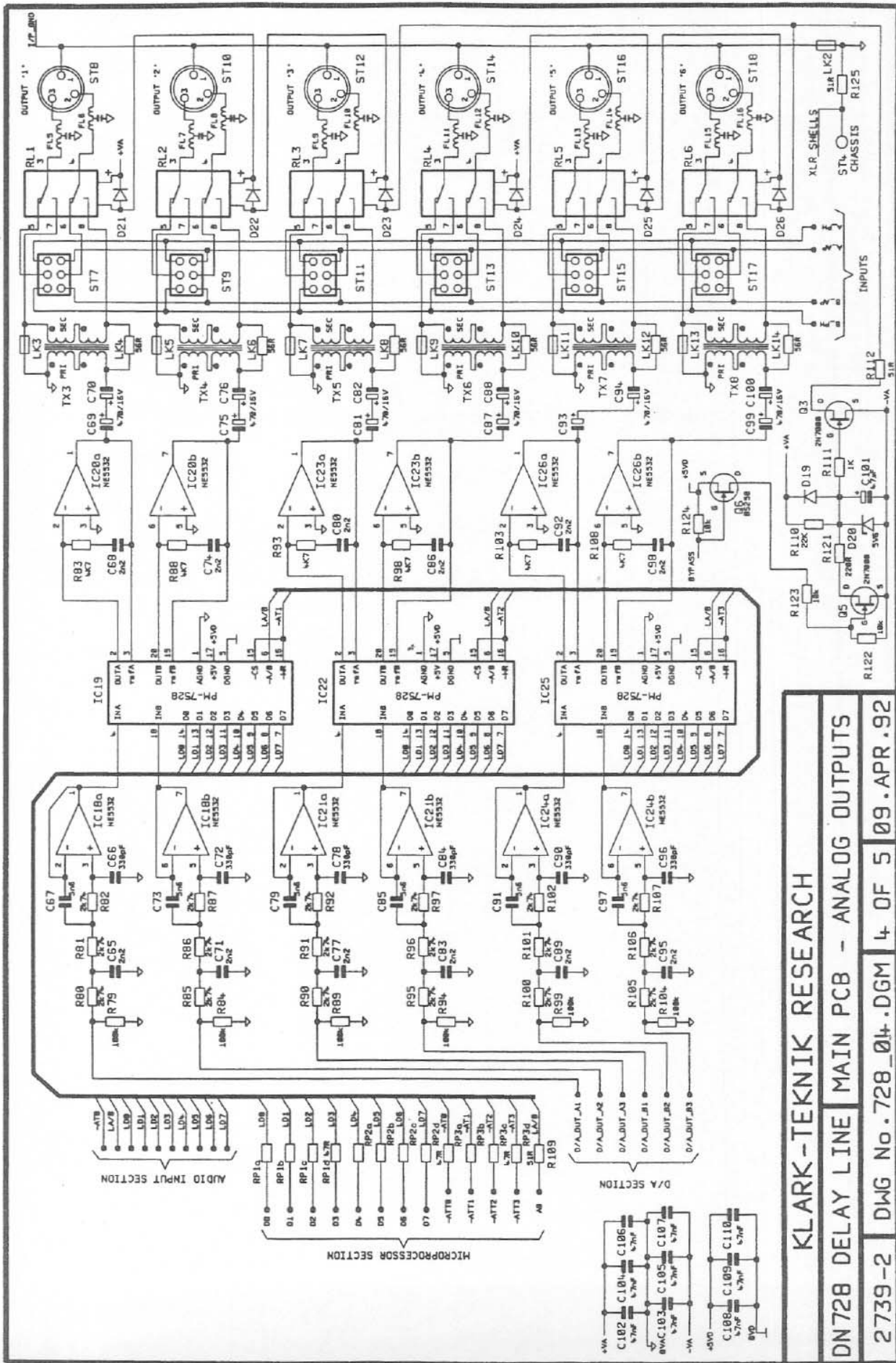
KLARK-TEKNIK RESEARCH

DN728 DELAY LINE | MAIN PCB - ANALOG OUTPUTS

DWG No. 728_04.DGM | 4 OF 5 | 09.APR.92

2739-2

KLARK-TEKNIK RESEARCH
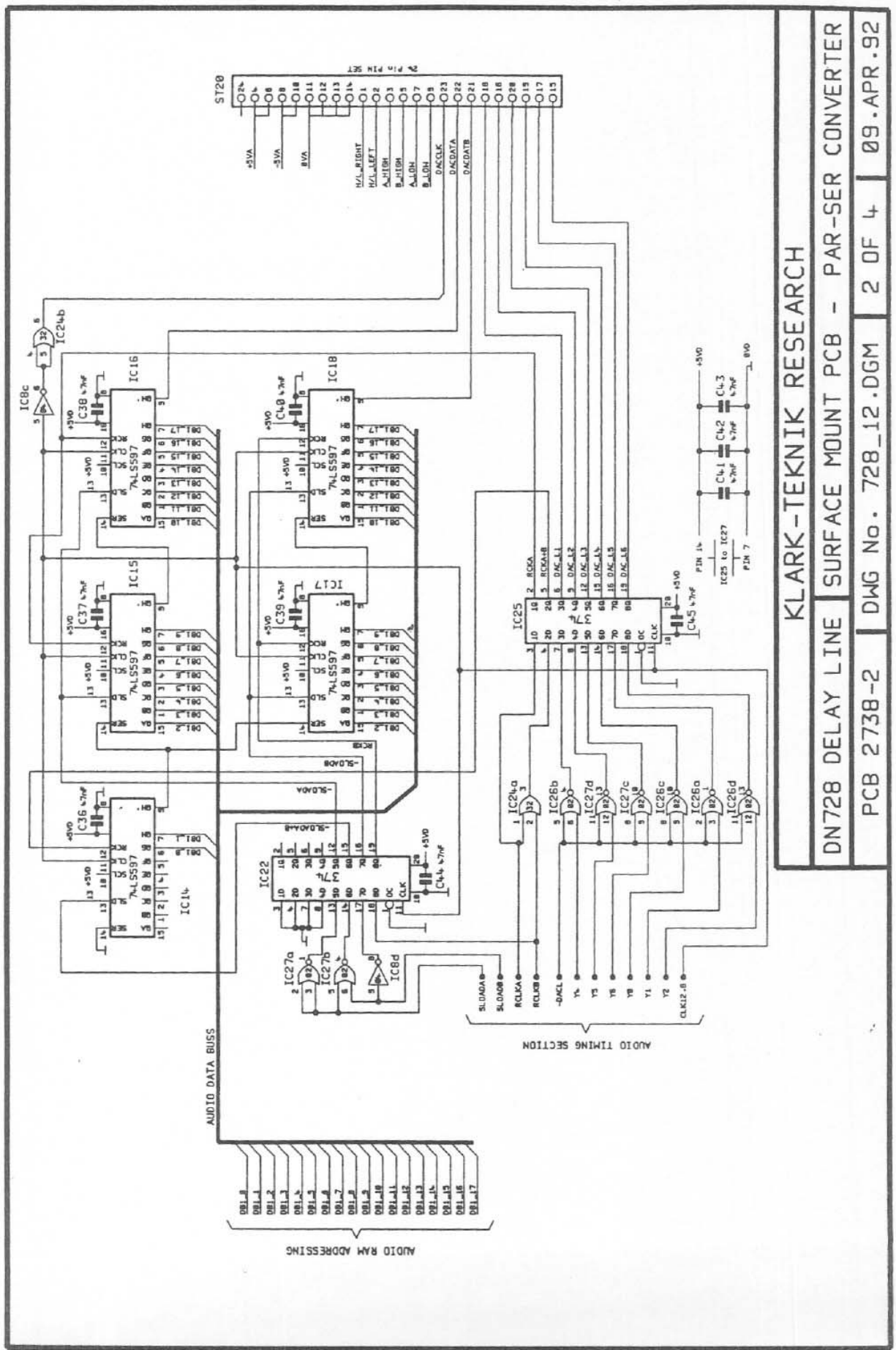
DN728 DELAY LINE | MAIN PCB - POWER SUPPLY

BOARD No.2739-2 | DWG No. 728_05.DGM | 5 OF 5 | 09.APR.92
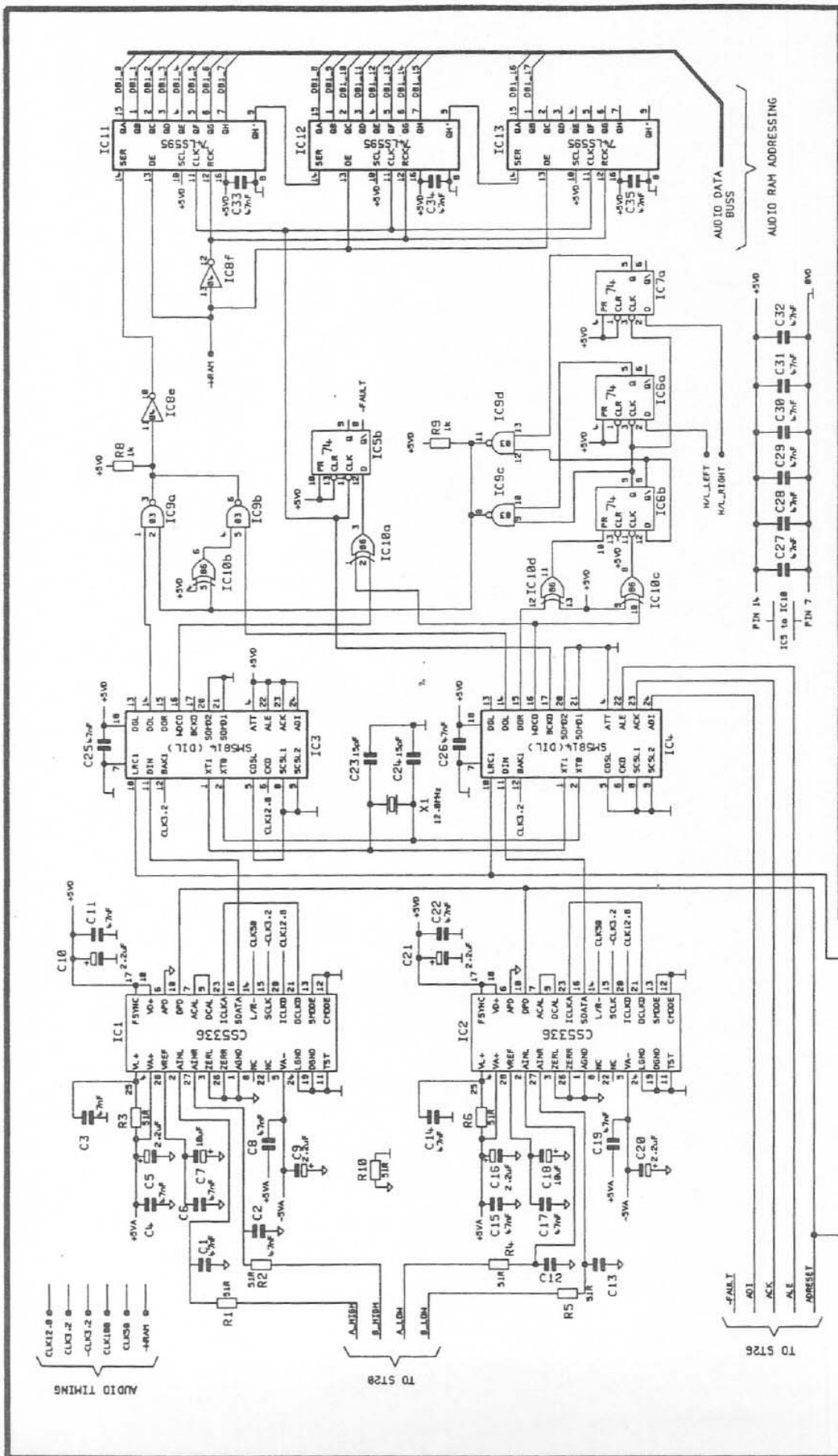
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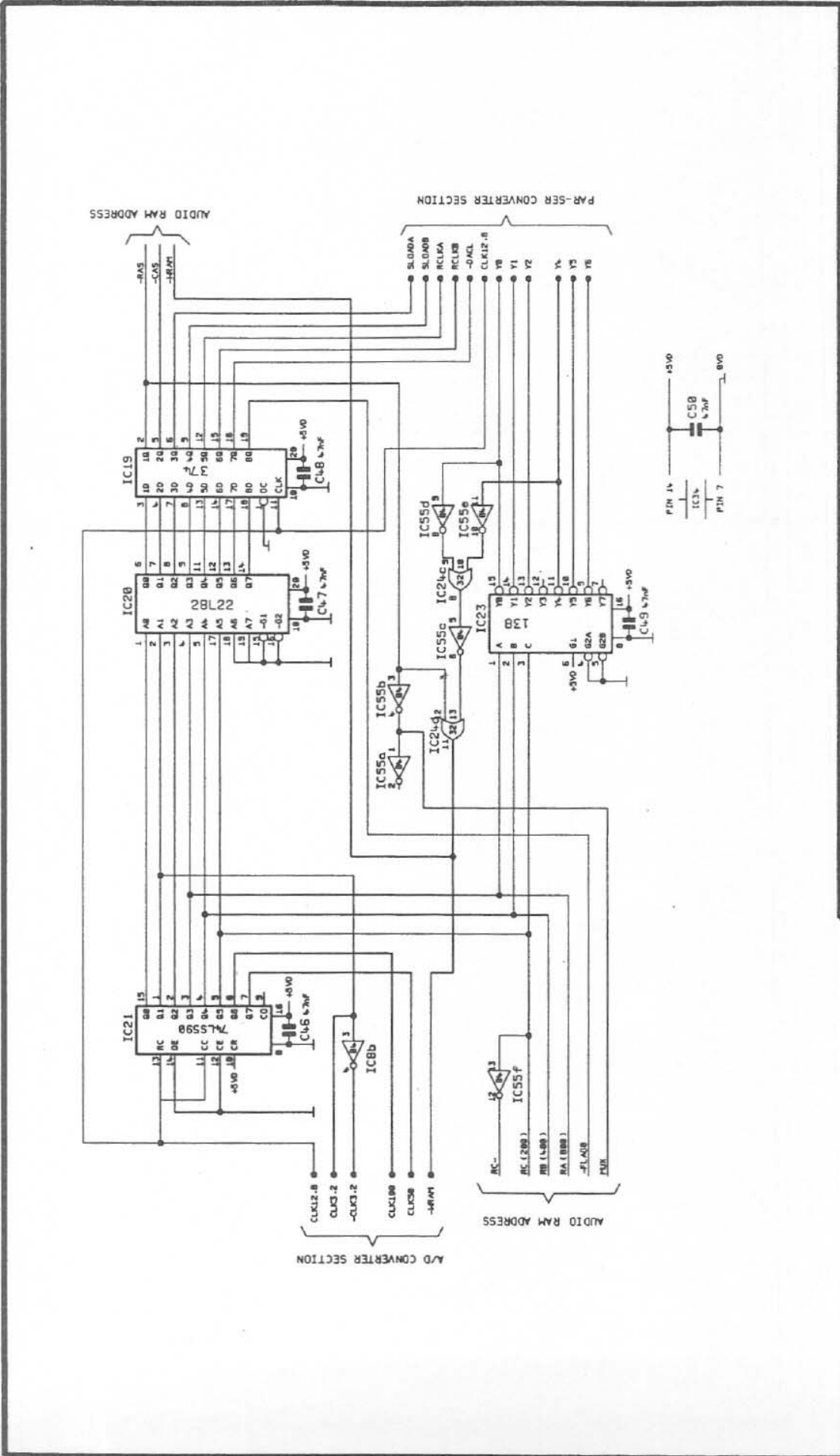
SURFACE MOUNT PCB - A/D CONVERTOR

DN728 DELAY LINE

DWG No. 728_11.DGM  1 OF 4  09.APR.92

PCB 2738-2

KLARK-TEKNIK RESEARCH

| DN728 DELAY LINE | SURFACE MOUNT PCB – PAR-SER CONVERTER | | |
|---|---|---|---|
| PCB 2738-2 | DWG No. 728_12.DGM | 2 OF 4 | 09.APR.92 |

KLARK-TEKNIK RESEARCH

DN728 DELAY LINE | SURFACE MOUNT PCB - AUDIO TIMING | 3 OF 4 | 15.June.92

PCB 2738-2 | DWG No. 728_13.DGM

AUDIO RAM ADDRESS

PAR-SER CONVERTER SECTION

A/D CONVERTER SECTION

AUDIO RAM ADDRESS