

Operating  
information

# DN320

PRESET EQUALISER  
Dual Channel 16 Band



**Audio engineering  
like no other  
in the world**

## Introduction

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The equaliser is a vital component in any audio system. The entire signal passes through it and so any limitations imposed by the equaliser will compromise the performance of the whole system. For example, an indifferently designed equaliser may introduce severe phase distortion, noise and other anomalies related to centre-frequency accuracy, filter shape and attenuation accuracy which may manifest themselves as an overall deterioration in the perceived sound quality of the system. Clearly this is an unacceptable state of affairs, but fortunately your choice to utilise Klark Teknik equaliser product will eliminate these problems, offering you unprecedented product performance coupled with the highest filter calibration and reliability standards in the industry.

For many years Klark Teknik has been at the forefront of equaliser design, and have carried out detailed research into optimum filter response characteristics, including their sonic performance.

The Series 300 range of equalisers is a direct result of this research. It should be noted that equalisation cannot always overcome all frequency response related problems. There are applications where the ability to cut or boost the response at a particular frequency, or over a certain bandwidth other than the equaliser specified one, is required to overcome exceptionally difficult response anomalies or narrow band feedback problems. When such an instance is encountered, it may be more appropriate to use the greater range of control provided by a parametric type equaliser, where the centre frequency, bandwidth and amplitude are all controllable.

When using an equaliser remember that the need to use large amounts of boost or cut within the equalisation curve indicates that there may be something fundamentally wrong with the sound system or room acoustics, which should be further investigated and corrected before final equalisation is applied.

Both the input and output circuitry is electronically balanced. The input is voltage and current matched and gives exceptional noise, distortion and CMR performance, while the output circuitry is based on the Midas XL3 output stage giving high drive capability.

Operation is normally from the mains supply with the 24VDC supply being utilised upon the failure of the mains. If no 24V is available then the internal relays will bypass the unit in the event of power failure.

## DN320 Equaliser

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The Klark Teknik DN320 is a dual channel, 16 band equaliser offering 12dB of cut or boost in 2/3 octave steps between the frequencies of 20Hz and 20kHz.

### Filter Shape and Combining Action

At the heart of any equaliser is the bank of filters used to shape the signal response, and Klark Teknik utilise a proprietary filter circuit which replaces the conventional inductor based circuit, at the same time, offering several performance advantages. Inductor based circuits are heavy, expensive to produce and suffer from low frequency distortion and induced hum. Klark Teknik's proprietary filters on the contrary suffer none of these problems, yet offer unequalled phase response and control accuracy with the additional benefits of low noise and minimal ripple.

The nature, shape and way in which individual equaliser filters combine, has a profound effect on the control provided by the equaliser and on the resulting quality of sound. The majority of applications within the sound reinforcement, broadcast and recording fields, require a smooth and continuous equalisation response curve in order to correctly contour the overall response characteristics of a sound system, loudspeaker, recording effect or audio channel. To achieve this, the individual filters must be capable of combining smoothly together to result in a continuous response curve, free from shape discontinuities in order to avoid unwanted audible peaks or anomalies in the final sound.

Individual channel level controls, overload indicators and bypass switches with incorporated low cut filters are featured on the control panel.

### Other features

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The bypass switch silently removes the graphic equaliser sections from the signal path. Incorporated in the bypass switch is a subsonic 18dB/octave roll-off filter (-3dB @ 30Hz).

Other features include an overload LED per channel, which warns of impending overload at any point in the equaliser. A detachable security cover is an inherent feature to prevent unauthorised personnel from tampering with the control settings.

This product is built to the same high electrical and mechanical standards as all Klark Teknik equipment and is both robust and stylish. It occupies a standard one unit of rack space and has electronically balanced inputs and outputs.

## Reliability Control

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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 final performance test.

## INSTALLATION

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The DN320 is designed for fixed installations where it is conventionally mounted into a standard 19" equipment rack. The unit occupies only 1U of height and due to the low operating power requirements of this unit, heat generation is kept to a minimum allowing units to be stacked above each other with no ill effects. For continued reliability it is not recommended that the equalisers are located immediately above heat generating units such as power amplifiers or mixer power supplies. If this is unavoidable a vent panel between the units is advisable.

### Precautions

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Do not install this unit in a location subjected to excessive heat, dust or mechanical vibration. Before connecting the unit to the mains supply, ensure that the operating voltage is correct for your local supply. It is important that you observe the following precautions.

### Voltage Selection & Power Connection

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Connection to the mains supply is by means of a standard IEC power socket. The rear panel voltage label indicates the voltage required for satisfactory operation of the unit. To change the mains voltage please refer to the 'Voltage Changeover' section on page 12.

**IMPORTANT** Mains voltage adjustments should only be carried out by a qualified service technician.

The DC supply can be connected either by separate 4mm (Banana) plugs or by use of the dual stacking version. Correct polarity must be observed for operation, though the unit is protected against reverse polarity. Please refer to the section below regarding DC operation.

**NOTE:** As there is no power on/off switch on this unit, as soon as the power (Mains or DC) is connected the unit will be active.

### Safety Warning

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This unit is fitted with a 3-pin power socket. For safety reasons the earth lead **MUST NOT** be disconnected. An internal 'floating' audio ground reference is used to ensure no earth loop problems occur related to the installation of this unit. Should any ground loop problems be encountered they will be caused by the commoning of the grounds of the other equipment connected to the equaliser.

The DN320 can be made the central ground reference as detailed on page 12, this modification should only be carried out by qualified service technician.

To prevent shock or fire hazard, do not expose the unit to rain or moisture, only replace fuses with the correct type and rating.

Do not remove the covers, refer servicing to qualified personnel only.

## Audio Connections

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The inputs and outputs are fully balanced on XLR connectors and are wired conventionally with pin 1 as ground. Because the system is fully floating, either pin 2 or pin 3 can be designated as hot ( phase ) so long as the same protocol is adhered to for both inputs and outputs. To comply with EMC regulations filtering is incorporated into this unit. To maximise the benefits of this it is recommended that the XLR shell is not connected to the audio ground.

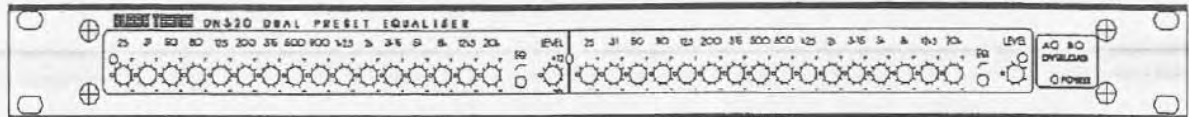
## DC Operation

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This unit is designed primarily for operation from the mains supply. The DC connection is intended for use as a backup power for evacuation and similar uses in conditions of mains failure. Upon failure of the mains supply, as the unit is already operational the DC supply is only required to furnish the current necessary to maintain operation, nominally 200mA at 24V.

If it is required to power the unit only from the DC supply, this is quite acceptable but the power supply **MUST** be capable of providing an initial 1.5A start up current to initiate the switched mode power supply. The duration of this current draw is only for approximately 5 milliseconds after which the current drops to 200mA. This is no problem when running from batteries but could overload a bench power supply. Please refer to the application note later in the manual for a method of starting and running from a supply that only gives 250-300mA.

## Front Panel Functions



Other than the power on and clip indicators no user controls or indicators are available with all set-up controls secured behind the central removable panel.

Remove the three pozidrive screws to gain access to these controls.

The unit has two identical channels A & B, each channel is fitted with:-

1. Input level control allowing system gain of up to +12dB in the fully clockwise position and attenuation of up to -6dB in the fully anticlockwise position. When the 'slot' is horizontal it is in the 0dB, unity gain position.
2. EQ & subsonic filter in/out switch. This switch has three positions and allows the 30Hz subsonic filter to be connected in or out of circuit as well as bypassing of the equaliser. These are selected as follows:
 

|         |  |
|---------|--|
| Down:   | Equaliser only in circuit.   |
| Centre: | Equaliser & subsonic filter are both out of circuit, the gain control is still active. |
| Up:     | Both the equaliser & the subsonic filter are in circuit.                               |
3. Sixteen high quality, sealed rotary preset filter level controls each providing between +12dB boost and -12dB cut at the 2/3 Octave ISO standard frequencies. When the 'slot' is horizontal the filter is flat.
4. Channel overload led. The signal level is monitored at several separate points within the circuitry of the unit. If any one of these signals exceeds a threshold set 3dB below clipping the led will light. It must be remembered that excessive boost at some frequencies combined with a high average input signal can occasionally cause the clip sensing threshold to be exceeded. In this event the gain control should be turned down to correct the problem. However, if the input signal itself exceeded 20 dB the input stage will be overloaded. If this problem arises then the signal level from the equipment feeding the equaliser must be reduced.

## Rear Panel Functions

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5. Mains is supplied via an IEC standard 3 pin connector. A compatible power cord is supplied with the unit.
6. The mains fuse is located in the draw that is part of the mains input connector. A spare fuse is also stored here. Disconnect the unit from the mains supply before replacing the fuse. Always replace the fuse with the correct type and rating.
7. Two sockets are provided for the connection of the 24V DC supply. These are standard 4mm 'banana' type. The sockets are on a standard 19mm pitch to allow the use of twin stackable connectors. The polarity of the DC supply must be maintained for operation though incorrect connection will not damage the unit.
8. Input and output connections are via complementary XLR style connectors. For wiring details see the page entitled Audio Connections.

**NOTE:** The security cover is normally fixed with M3 pozidrive screws. For installations where the utmost security is required these can be replaced with tamperproof type of M3 x 6mm.

## Audio Connections

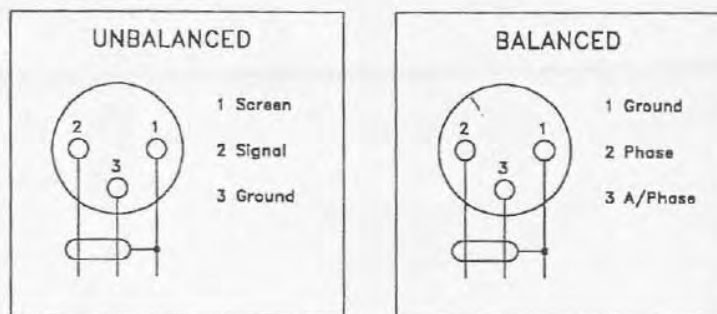
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### Inputs

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

It is always preferable to drive the equaliser from a balanced source. If only an unbalanced source is available it is recommended that it is connected as shown below. Connect the screen only at the equaliser end.



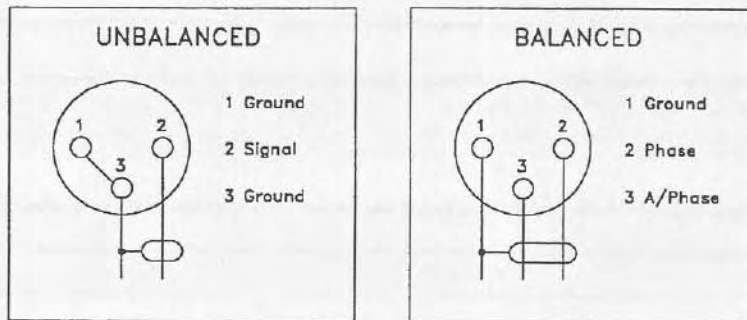


## Outputs

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The standard outputs are electronically balanced and is capable of driving +19dBu into 600 ohms and +20dBu into 2K.

It is recommended that the equaliser feeds into a balanced input, however to feed an unbalanced input it is necessary to connect the antiphase output to ground. This is best carried out on the XLR output connector of the equaliser.



## Technical Specifications

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|                            |                          |
|----------------------------|--------------------------|
| <b>Inputs</b>              | <b>Two</b>               |
| Type                       | Electronically balanced  |
| Impedance                  |                          |
| Balanced                   | 20Kohms                  |
| Unbalanced                 | 10Kohms                  |
| Max input level            | 20dBm                    |
| <b>Outputs</b>             | <b>Two</b>               |
| Type                       | Electronically balanced  |
| Source impedance           | 50 ohms                  |
| Min. load impedance        | 600 ohms                 |
| Max. level                 | 20dBu with 2Kohm load    |
| <b>Performance</b>         |                          |
| Frequency response         |                          |
| 20Hz to 20kHz, EQ flat     | +/-0.5dB                 |
| THD+N @ +4dB               | <0.01% @ 1kHz            |
| Equivalent input noise     |                          |
| (20Hz to 20kHz unweighted) | <-88dBu                  |
| Gain                       | -6 to +12dB              |
| <b>Filters</b>             |                          |
| Type                       | Proprietary "combining"  |
| ISO centre frequencies     | 16, 20Hz to 20kHz        |
| Frequency tolerance        | 5%                       |
| Maximum boost/cut          | +/-12dB                  |
| Subsonic filter            | 18dB/octave, -3dB @ 30Hz |
| <b>Power requirements</b>  |                          |
| AC Voltage                 | 115/230 +/-12%, 50/60Hz  |
| Consumption                | <15VA                    |
| DC Voltage                 | 24V +/-12%               |
| DC Consumption             | <250mA                   |
| <b>Weight</b>              |                          |
| Nett                       |                          |
| Shipping                   |                          |
| <b>Dimensions</b>          |                          |
| Width                      | 482mm (19 inches)        |
| Height                     | 45mm (1 3/4 inches)      |
| Depth                      | 210mm (8 1/4 inches)     |
| <b>Terminations</b>        |                          |
| Inputs                     | 3 pin XLR                |
| Outputs                    | 3 pin XLR                |
| AC power                   | 3 pin IEC                |
| DC power                   | 2x4mm "Banana" type      |

**THE FOLLOWING INFORMATION IS FOR THE USE OF QUALIFIED SERVICE PERSONNEL ONLY**

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Do not attempt any of the following adjustments yourself

The following adjustments require the removal of the cover. Proceed as follows:-

1. Disconnect the unit from the mains and DC supply.
2. Remove the eight pozidrive cover screws, 3 on the top, 2 on each side and 1 on the rear. Keep these safe for reuse later. Lift off the cover.

**Voltage Changeover**

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The unit is normally shipped preset to the mains supply voltage required for the country. This is indicated on the rear panel.

To select the alternative voltage it is only necessary to slide the voltage selector switch, located to the right of the mains transformer, to the other position.

Please ensure that the rear panel voltage label is removed and replaced with one stating the new voltage setting.

**Making the DN320 the system ground reference**

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Under certain unusual operating environments it may be necessary to use the equaliser as the main ground reference and tie other signal grounds to it. This is easily accomplished as follows:-

1. Remove the M3 pozidrive screw located in the centre of the board labelled 'ST3.' & 'Ground Link'.
2. Fit a solder tag onto the screw and refit ensuring the tag is located over the bare pcb section to the left of the screw.
3. Solder the tag to the circuit board.
4. Replace the cover after adjustment.

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## **A Method of Starting & Powering the DN320 & DN330 from a 24V Bench Supply.**

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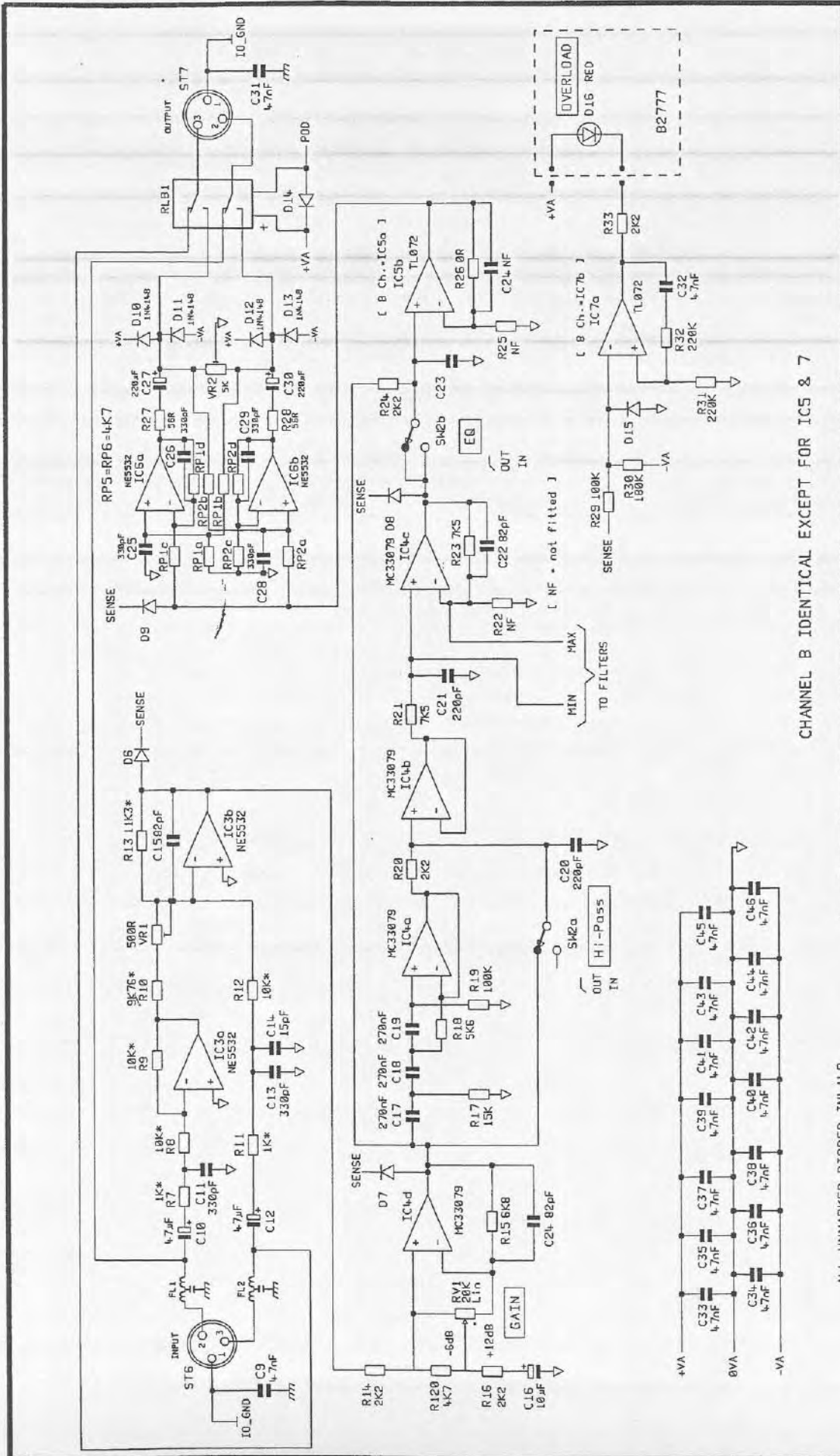
**CAUTION.** The following is given as guidance only and should only be carried out by suitably qualified and experienced personnel.  
The information is given in good faith and is not intended as a definitive method of achieving the desired results.

**Problem:** "I only have a 250-300mA 24V power supply. How can I run the DN320 from it?"

**Answer:**

1. With the supply OFF, connect a capacitor of approximately 10000 mfd and a working voltage of at least 25V across the output terminals.
2. Connect the power supply to the DN320 via a suitable switch, leave in the open position.
3. Turn on the power supply and allow a couple of seconds for the capacitor to charge.
4. Close the switch and the DN320 will power up.

It does this because the capacitor provides sufficient energy to provide the switch mode supply's start up current. Once the supply is running only the nominal 200mA operating current is required.



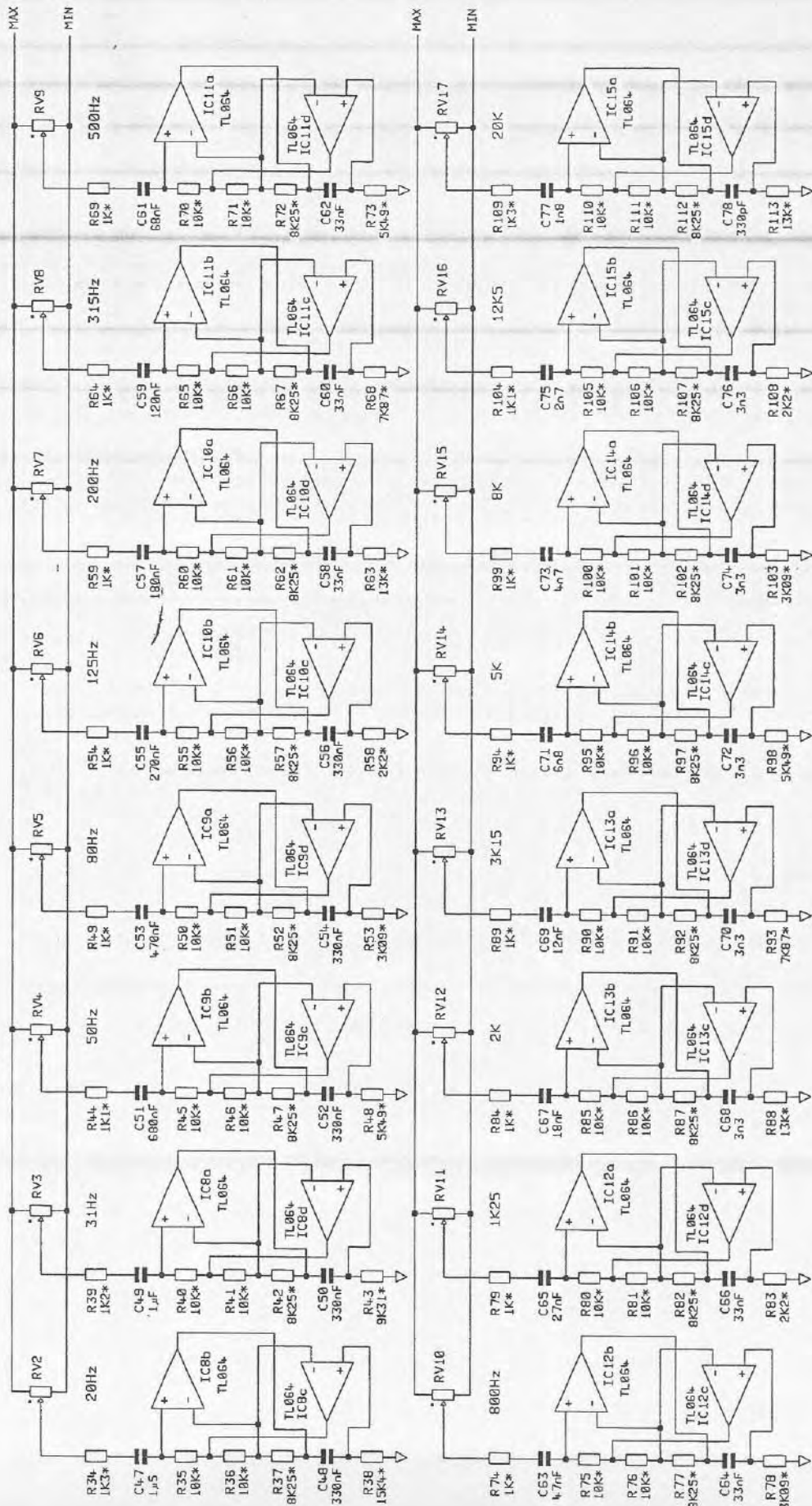
ALL UNMARKED DIODED IN4-148  
\* = 1%

CHANNEL B IDENTICAL EXCEPT FOR IC5 & 7

# KLARK TEKNIK

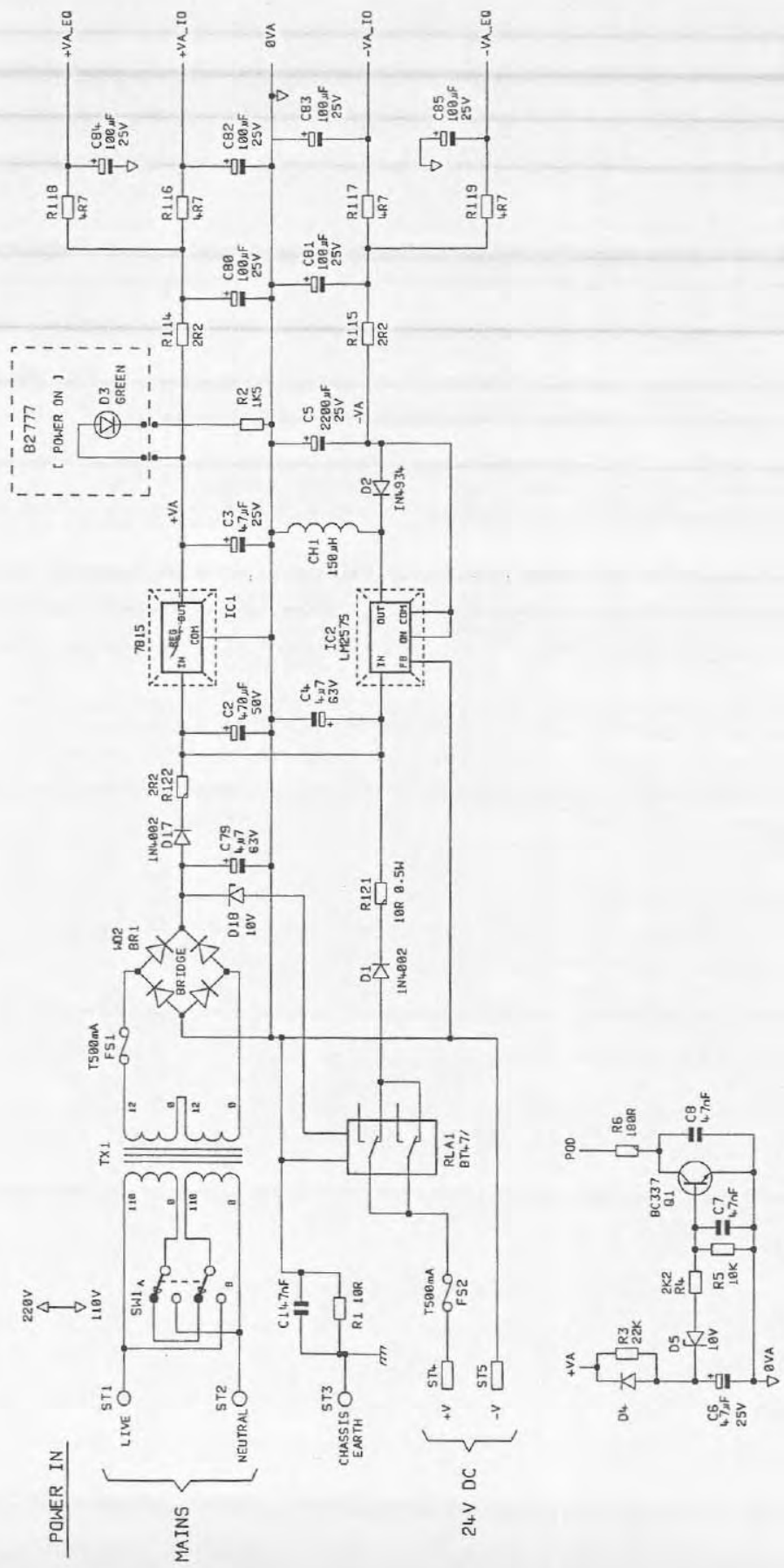
|                         |                     |          |                              |        |
|-------------------------|---------------------|----------|------------------------------|--------|
| Drawn: DGT              | Checked:            | DN320    | CHANNEL A - MAIN SIGNAL PATH | 1 OF 3 |
| BOARD No. B2775 & B2777 | DWG No. DN320_1.DGM | ISSUE: 2 | DATE: 20.Mar.94              |        |

RV2 to RV18 = 20K Lin ( 2038 )  
 \* = 1%



# KLARK TEKNIK

|                 |          |                     |          |                 |
|-----------------|----------|---------------------|----------|-----------------|
| Drawn: DGT      | Checked: | DN320               | FILTERS  | 2 OF 3          |
| BOARD No. B2775 |          | DWG No. DN320_2.DGM | ISSUE: 2 | DATE: 20.Mar.94 |



ALL UNMARKED DIODES IN4148

# KLARK TEKNIK

|                         |          |                     |              |                 |
|-------------------------|----------|---------------------|--------------|-----------------|
| Drawn: DGT              | Checked: | DN320               | POWER SUPPLY | 3 OF 3          |
| BOARD No. B2775 & B2777 |          | DWG No. DN320_3.DGM | ISSUE: 2     | DATE: 14.Mar.94 |