

**Operators & Service
Manual**

DN3600C

Version 3.0C

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INTRODUCTION

Designed to meet and exceed the needs of the recording, broadcast, installation and live sound industries, the Klark Teknik DN3600 Programmable Graphic Equaliser is an extremely high quality, digitally controlled, two-channel, third-octave equaliser that combines state-of-the-art audio performance with unprecedented ease of use. The two channels may either be used independently or linked for stereo use. To further extend the flexibility of the equaliser, the unit also incorporates variable frequency low and high-pass filters, two notch filters with variable frequency and depth and overall gain adjustment.

Featuring a very large backlit LCD display window, the DN3600 may store up to 66 equaliser programs and the inclusion of a Pro MIDI interface enables several other DN3600s or DN3601 slave units (64 maximum) to be controlled from a single DN3600. The slave units are electrically identical to the DN3600 but have limited control and display facilities. A 16-pin connector is provided for use in conjunction with the DN60/DN6000 Real Time Spectrum Analyser enabling room analysis and equalisation to be accomplished automatically.

The proprietary analogue filters are based around the Klark Teknik "MELT" hybrid filter circuits which offer far greater headroom and dynamic range than is possible using standard 20-bit linear, digital systems. Benefiting from revised circuitry, these filters are exceptionally reliable and offer greater stability than discrete designs. They are also relatively immune to electromagnetic interference, unlike coil-based filters. Separate supply rails are used for the digital and analogue circuitry which, in combination with rigorous internal screening, ensures the cleanest possible audio signal path.

In order to provide maximum operational flexibility, the system includes a switchable Q mode. The Low Q setting (Q:360) provides an accurate emulation of the industry-standard DN360 equaliser. In High Q mode (Q:27), the performance emulates the DN27.

To maintain the optimum signal to noise ratio and headroom at all equaliser settings, the gain control acts on the equaliser sections themselves rather than being a simple pre or post-equalisation gain stage. Additionally, an Auto gain mode is included in the system which automatically scales the gain of the individual equaliser bands as cut or boost is applied to reduce the risk of accidental clipping and to maintain a safe working headroom.

Both the input and output circuitry is electronically balanced with a nominal operating level of +4dBu. The output circuitry is based on the Midas XL3 output stage, giving exceptionally high drive capability. A transformer option is available for both inputs and outputs.

In order to make the DN3600 as straightforward to use as a conventional graphic equaliser, the backlit LCD window provides a 'virtual' representation of a conventional graphic equaliser as well as the settings of the shelving high and low-pass filters and the notch filters. The use of multi-function buttons for regularly accessed functions has been avoided to enable the unit to be adjusted quickly and efficiently while the Curve display function provides the user with a frequency response display based on the combined operation of the graphic, shelving filters, notch filters and gain.

Installation

The inputs and outputs are electronically 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 so long as the same protocol is adhered to for both the input and the output connectors.

The DN3600 is designed for use in both fixed and mobile installations where it can be mounted in a conventional 19 inch rack occupying just 2U of height. In mobile situations where rough handling is a possibility, it is advisable to support the rear of the unit to prevent undue stress being placed on the front panel. Ensure that the unit has sufficient ventilation and that it is not placed directly over any device which runs hot such as a power amplifier or console power supply.

Instrument Familiarisation

Front panel functions

DISPLAY SCREEN: This is a large, backlit "Supertwist"-type LCD which shows white/green legend on a blue background. Menu options are listed down the left hand end. Various status information is shown along the top edge. In normal operating mode, the largest part of the screen displays the "Virtual" graphic equaliser faders for one channel. LCD contrast is adjusted via a menu option. See the Adj. LCD section for more details. In addition the LCD backlight features a bright up feature which increases the LCD backlight brightness when the controls are operated. The bright up period can be set under software control via the Adj. LCD menu from 2 seconds to 60 seconds.

FREQUENCY BUTTONS: These 30 dedicated keys, each labelled with a separate ISO centre frequency, are used to select graphic frequency bands and to set low pass, high-pass and notch filter positions. A number of adjacent bands may be selected by pressing two keys either at once or in quick succession. The selected 'fader' or 'faders' in the display window may be adjusted by means of the **LEVEL** control. An alternative method of frequency selection is to use the **FREQ** rotary control.

FREQ: This rotary control may be used to select any of the equaliser bands for adjustment as an alternative to using the Frequency buttons. Also, a number of adjacent faders may be selected by holding a single button until it flashes and then using the **FREQ** rotary control. The **FREQ** rotary control may also be used to set the frequency of Notch filters and of the High pass filter.

LEVEL: This rotary control is used to adjust the level of any selected faders - including the Gain fader. It may also be used to set the attenuation of the Notch filters and the frequency of the Low pass filter.

BUTTONS 1-4: These "soft keys" are used to select and operate the various functions of the equaliser. The functions immediately available depend on the current operating mode of the unit. The current function attached to each key is shown on the LCD display beside it.

CURVE/FADER: This button is used to switch between the virtual fader display and a composite frequency response curve, calculated from the positions and shapes of all Graphic, High pass, Low pass and Notch filters and gain control. The curve changes in real time with any adjustments made.

GAIN: This button selects the Gain fader for adjustment. The Gain fader is highlighted and can be adjusted in 0.5dB steps from +6 to -18dB. One step below the -18dB point mutes the selected channel. To deselect the Gain fader press **GAIN** a second time.

The Gain control on the DN3600 scales the actual frequency bands. This achieves optimization of signal to noise ratio from one simple control and avoids the disadvantages of conventional pre EQ or post EQ gain controls.

NUMERIC WINDOW: Displays the number of the currently operating Memory and, in the appropriate operating modes, the Slave address number or the MIDI channel number. A flashing number indicates access by a remote control device, such as another DN3600.

METERS: Separate 10-segment bargraph level meters monitor the signal level in channels A and B over the range -12dB to +15dB. The Clip warning LED monitors seven different points within the circuitry of the DN3600 and flashes if the level at any point comes within 2dB of clipping.

POWER SWITCH: Switches the unit on and off. When the unit is off, there is a hard relay bypass which connects the input signal directly to the output.

Rear Panel Functions

Balanced Input XLR Sockets

Balanced Output XLR Sockets

Pro MIDI XLR Connectors: These follow the same wiring convention as conventional MIDI DIN sockets. These are used for performing system exclusive data transfer and for linking multiple units in a master/slave configuration. See service section for wiring convention.

16-Pin IDC Interface: Interfaces directly with the DN60/DN6000 Real Time Spectrum Analyser for automatic equalisation and may be used to interface with future products.

IEC Mains Socket with integral fuse.

GETTING STARTED WITH THE DN3600

The operation of the virtual faders is much like that of a conventional graphic equaliser in that a 'fader' is selected and then moved. Faders may be selected directly by pressing any one of the Frequency buttons or the bands may be 'scanned' through using the **FREQ** rotary control. The selected fader is then adjusted by use of the **LEVEL** rotary control.

More than one band may be selected by pressing and holding one of the Frequency keys until it flashes and then either pressing another Frequency key or rotating the **FREQ** control. A bank of faders can also be selected by pressing two keys at the same time or in quick succession. Moving the **LEVEL** control will now adjust all selected bands simultaneously. Exit from bank selection is by pressing a single frequency key.

SELECTING CHANNELS: The user may adjust channels A and B independently or both together. Channels are selected by pressing the **A : B : Link** key. The Link mode may be selected by pressing and holding the **A : B : Link** key. In Link mode, any adjustments made to the fader positions affect both channels. If Link mode is entered from channel A, the screen continues to display channel A. Channel B will follow changes to channel A. If Link mode is entered from channel B, the screen continues to display channel B. Channel A will follow changes to channel B.

FILTERS: Access to the high and low pass filters and notch filters is via the **More EQ** key. Filter and notch positions are displayed on a frequency response curve that changes in real time with any adjustments. The user may select the filters of either channel for adjustment by pressing the **A : B** key, and may switch the filters in or out of circuit by use of the **In/Out** key. Pressing the **Filters** key allows the individual filters to be adjusted.

The High-Pass filter covers the range 20Hz to 400Hz in one third octave steps while the Low-Pass filter covers the range 1.6kHz to 30kHz, again in one third octave steps. These filters have a 12dB/octave slope characteristic. When selected by pressing the $\sqrt{+}$ key, the High pass and Low pass filter frequencies are displayed at the top of the screen. They may be adjusted either by use of the **FREQ** and **LEVEL** rotary controls respectively, or by pressing the Frequency keys.

Both Notch filters cover the range 20Hz to 20kHz in one twelfth octave steps and provide up to 12dB of attenuation. When a notch filter is selected, its attenuation and frequency are displayed at the top of the screen. The Notch may be adjusted by use of the **LEVEL** control and either the **FREQ** control or the Frequency keys.

Q SWITCHING

Over the last 15 years, Klark Teknik's graphic equalisers have become "industry standards" with audio professionals around the world - some preferring the smooth, averaging quality of the DN360 - others, the sharper, tighter Q character of the DN27. To satisfy these individual preferences, the DN3600 incorporates two "Q" options - 360 and 27.

The DN3600 utilises 30 "combining" 1/3 octave filters. This combining action allows adjacent filters to act over the area in between their own centre frequencies to create smooth but complex frequency response curves with minimal ripple and phase error.

Q:360

On this setting, at low boost or cut the filters exhibit a relatively wide Q which results in a smooth response with very low ripple and phase error. At high boost or cut, the filter Q sharpens to allow notching/accentuation of particular frequencies with just enough combining to provide cut/boost in between adjacent bands.

Q:27

At full boost or cut, this setting is the same as Q:360. At lower settings of boost or cut, although the filter Q widens, it remains sharper than the Q:360 at an equivalent gain. This gives more precise control of the EQ curves, but means that careful setting of the filters is required to create smooth curves with minimal ripple and phase error.

To change Q, press the soft keys labeled **Utilities**, **Auto/Q** and **Q Type** in turn. Pressing the **Q Type** key toggles between Q:27 and Q:360 and the Q mode is shown at the top of the screen.

MEMORY OPERATION

Equalisation programs may be created from scratch or existing programs may be called up and modified.

To start from scratch, switch **OUT** the More EQ and reset the unit by pressing and holding the **Bypass** key for more than 5 seconds.

RECALLING A MEMORY

Select **Utilities**, **Memory** and **Recall** in turn on the soft keys. Then use the **FREQ** rotary control to select the required memory by number (shown in the **NUMBER** window) or name (shown, together with the fader positions, on the LCD screen). Press the **Recall** key a second time to complete the procedure. The number of the current memory remains in the **NUMBER** window.

SAVING A MEMORY

Select **Utilities**, **Memory** and **Save** in turn on the soft keys. The memory number defaults to that last used, although a new memory location may be entered if desired. Use the **FREQ** or **LEVEL** rotary controls to select the memory location by number, and use the Frequency keys to give the new memory a name, or to overwrite the previous name. The < key has a backspace function. The **SHIFT** key gives access to the numbers 0 to 9. To complete the storage procedure, press the **Save** key a second time. The data from both channels is saved to the new location, regardless of the Link status.

Note: Whenever parameters are adjusted, the revised data is placed in a temporary store so that the original memory data is not overwritten until it is deliberately saved. When the unit is switched off, the temporary store is not lost. On switch on, the unit will return exactly to the state at switch off.

AUTO EQUALISATION - THE DN3600/DN60 CONNECTION

The DN3600 can be interfaced with the Klark Teknik model DN60 Real Time Spectrum Analyser. The combination can then be used to perform an Automatic Equalisation function, to compensate for the sound system frequency response. To do this, proceed as follows:

1. Make certain that both units are switched OFF. Connect the DN60 to the DN3600. The interconnection is made using the pin-to-pin 16-way cable supplied with the DN3600. The cable should be used to connect the DN60 "PLOTTER INTERFACE" to the DN3600 "DN60 INTERFACE". Switch ON the DN60 first, let initialise, then switch ON the DN3600.
2. Feed the signal from the DN60 pink noise source through a level control device, such as a mixing console, into the DN3600 input - whichever channel is to be equalised. Keep the pink noise level down at this point. Make certain that any other equalisation in the pink noise signal path, such as on a mixing console input channel, is set to a flat position.
3. Set the DN60 microphone at the desired listening/measurement position in the venue.
4. Slowly bring up the level of the pink noise through the sound system to an average listening level.
5. Set the DN60 controls to **Avg., Cont., Resp 3., 1 dB resolution, mic input**. Adjust the DN60 **Reference Level** until the full frequency response display is seen.
5. Switch the **More EQ** section **OUT (More EQ, In/Out, Exit if required)**.
6. Enter the DN3600 **Auto/Q** menu (**Utilities, Auto/Q**). Repeatedly press the **Auto EQ** button allowing sufficient time between presses for the DN60 display to settle. Continue until a flat response is obtained on the DN60 display. Six to eight iterations are usually enough. It may be necessary to adjust the DN60 **Reference Level** between iterations.

What happens is this. On each iteration the DN3600 obtains the measured room response from the DN60, calculates the room response correction, limits it to +/-4 dB and adds this to the current Graphic settings. With each iteration the measured response gets closer and closer to flat until finally all the DN3600 is doing is to correct minor random variations.

Note. The DN3600 should not be in bypass mode. If it is the room correction curve will still be added to the DN3600 settings but the measured response will not be affected and the Auto EQ function will not perform as specified.

Equalising to a Preferred Curve

Whilst the Auto EQ function tries to equalise to flat (as measured by the DN60) it is possible to perform an approximate Auto EQ to a preferred house curve by making use of the Bypass setting of the DN3600.

To do this set up the house curve on the DN3600, or Recall the desired curve from memory (the memory itself will not be modified by the Auto EQ function). Connect the DN60 and DN3600 as defined in 1. above. Inject pink noise into the system as defined in 2. above. Measure the room response as described in the DN60 operators manual. **Bypass** the DN3600. Perform the Auto EQ function once and once only. Do not iterate.

Note. The spectrum display may be "frozen" by saving it to a DN60 memory and switching to **mem.** mode.

The room response is corrected subject to the Auto EQ adjustment limit of +/-4 dB. This Auto EQ adjustment limit is the reason for the approximate room correction.

The reason for performing the Auto EQ function only once is because the measured spectrum of the pink noise is not modified by the DN3600. With the equalise to flat connection defined above each iteration brings the overall system response (including the DN3600) closer to flat. With the DN3600 bypassed this cannot happen. Hence the same correction factor would be added each time.

AUTO EQUALISATION - THE DN3600/DN6000 CONNECTION

The DN3600 can be interfaced to the Klark Teknik model DN6000 Audio Analyser or DN60 Real Time Spectrum Analyser. The combination can then be used to perform an Automatic Equalisation function to compensate for the room or system frequency response. To do this with the DN6000 proceed as follows:

1. Connect the DN6000 to the DN3600. The interconnection is made using the pin-to-pin 16 way cable supplied with the DN3600. The cable should be used to connect the DN6000 "DN3600 INTERFACE" to the DN3600 "DN60 INTERFACE". This connection should be made with the DN6000 switched OFF.
2. Set up the DN6000 in Frequency mode.
Set the output utility to unfiltered pink noise.
Switch weighting to Flat.
Switch off Peak Hold.
Set Scale to 60dB.
Set resptime to 1 second or more.
3. Feed the signal from the DN6000 output into the DN3600 input - whichever channel is to be equalised.
4. Set the DN6000 microphone at the desired listening/measurement position.
5. Switch the **More EQ** section **OUT (More EQ, In/Out, Exit if required)**.
6. Make sure that the DN6000 is not muted and is running.
7. Adjust the Level and Level Trim controls of the DN6000 so that the spectrum analysis is displayed as much as possible in the upper half of the LCD.
8. Enter the DN3600 **Auto/Q** menu (press **Utilities, Auto/Q**). Repeatedly press the **Auto EQ** button allowing sufficient time between presses for the DN60 display to settle. Continue until a flat response is obtained on the DN6000 display. Six to eight iterations are usually enough. It may be necessary to adjust the DN6000 Level Trim control between presses.

What happens is this. On each iteration the DN3600 obtains the measured room response from the DN6000, calculates the room response correction, limits it to +/- 4dB and adds this to the current Graphic settings. With each iteration the measured response gets closer and closer to flat until finally all the DN3600 is doing is to correct minor random variations.

Note: The DN3600 should not be in bypass mode. If it is the room correction curve will still be added to the DN3600 settings but the measured response will not be affected and the Auto EQ function will not perform as specified.

Equalising to a Preferred Curve

Whilst the Auto EQ function tries to equalise to a flat response (as measured by the DN6000), it is possible to perform an approximate Auto EQ to a preferred house curve by making use of the Bypass setting of the DN3600.

To do this set up the house curve on the DN3600 faders, or **Recall** the desired curve from memory (the memory itself will not be modified by the Auto EQ function). Connect and set up the DN6000 and DN3600 as defined above. **NOTE:** The spectrum display may be "frozen" by switching off Run on the DN6000. Press **Bypass** on the DN3600. Perform the Auto EQ function once and once only. Do not iterate.

The room response is corrected subject to the Auto EQ adjustment limit of +/- 4dB. This Auto EQ adjustment limit is the reason for the approximate room correction.

The reason for performing the Auto EQ function only once is that the measured spectrum of the pink noise is not modified by the DN3600. With the equalise to flat connection defined above each iteration brings the overall system response (including the DN3600) closer to flat. With the DN3600 bypassed this cannot happen. Hence the same correction factor would be added each time.

AUTO GAIN

The Auto Gain function, when activated, assists in making the best use of the dynamic range and headroom of the DN3600. When frequency bands are boosted, the average signal level rises and it is advisable to reduce the gain of the equaliser to prevent overload. When frequency bands are cut, the average signal level falls and it is advisable to increase the gain of the equaliser to maintain the optimum signal to noise ratio. When some bands are boosted and some bands are cut, the situation becomes more complicated, especially as the energy spectrum of a typical musical or vocal signal is far from flat across all the frequency bands.

The Auto Gain function is activated by pressing **Utilities, Auto/Q, Auto Gain**, and deactivated in the same way. When activated, the DN3600 compares any new filter adjustments to a model of the energy response of a typical musical signal, and adjusts the Gain control to compensate - thus helping to make optimum use of the headroom. The Gain fader will flash as it moves to show its operation. Auto gain status is indicated by text at the top of the Gain fader.

MASTER/SLAVE OPERATION

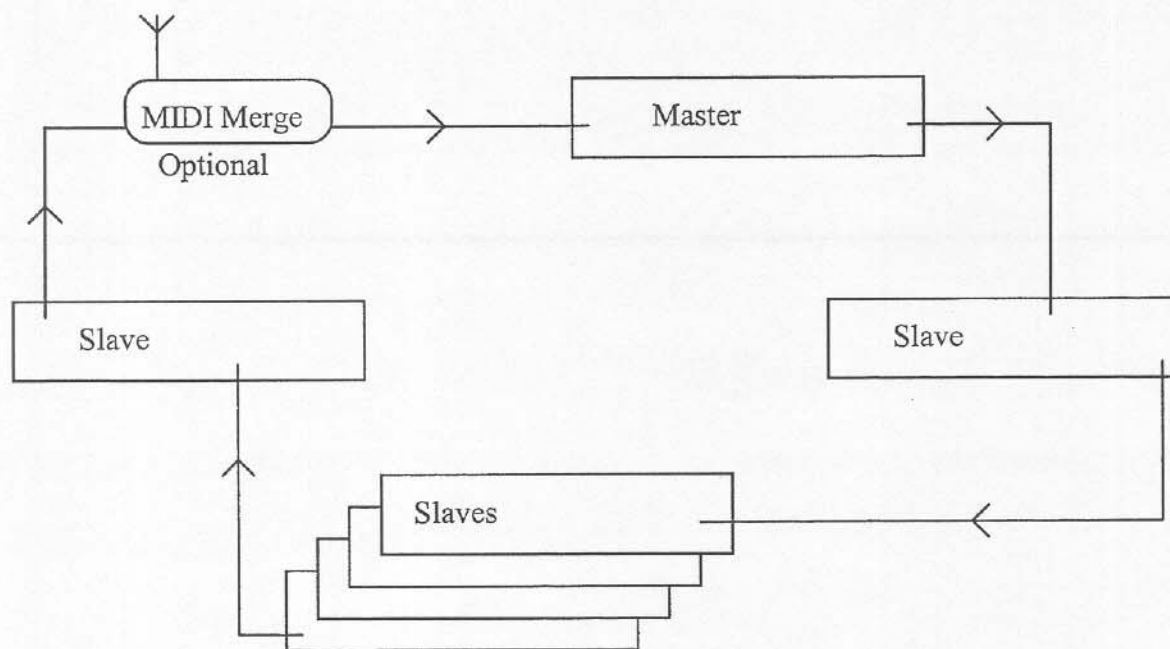
The Klark Teknik Pro MIDI Master/Slave system allows up to 65 DN3600 and DN3601 units to be operated, either individually or together, from the front panel of one DN3600. The system is simple to connect, simple to operate and protects itself from the dangers of unreliable power supply and damaged connections.

Once programmed, the equaliser program memories resident in the slaves may be selected via ordinary MIDI program change commands without the need for a DN3600 master unit. This provides an economical way of managing a large installation as the slave system is both cost effective and secure from inadvertent tampering.

Master/Slave configuration is automatic when two or more DN3600 and/or DN3601 units are linked in a closed loop via their Pro MIDI interfaces - MIDI OUT to MIDI IN.

Note: The loop must be closed. Each MIDI OUT must be connected to the next MIDI IN. If MIDI program change messages from some other device are to be injected onto the Klark Teknik loop, this must be done via a MIDI MERGE unit.

MIDI Signal Flow:



Any DN3600 in the loop can be designated as the Master by entering the Slaves sub menu (press **Utilities, More..., Slaves**). The other DN3600 and DN3601 units in the loop will automatically configure themselves as slaves, with the first being number 1, the second being number 2 and so on. A maximum of 64 slaves may be connected in this way (65 units including the Master).

To address an individual slave unit, enter the Slaves sub-menu of the Master. The slave address number can now be changed using the **FREQ** rotary control. Press the Slaves soft key a second time to initiate control of the selected device.

All the controls and display modes now affect only the selected slave unit. The number of the selected Slave is displayed as highlighted text at the top of the LCD screen. Only the Slaves, Lock and Adj. LCD sub menus relate to the Master unit. To address another slave, enter the Slaves sub menu and select a new slave number.

To address all the units in the loop, enter the Slaves sub menu and select **SELECT ALL**. All functions and controls now affect all units including the Master. For example, performing an Auto EQ function now will adjust all the units in the loop to equalise the spectrum of the DN60/ DN6000 connected to the master.

To return to normal operation, ie adjustment of the Master itself, the Slaves selection must be returned to "STAND ALONE". The slave units will retain their current settings until changed. All controls and display modes now affect only the Master unit.

Note: A MIDI loop can only have one Master. Initiation of another master by entering its Slaves menu will cancel the original master and renumber the loop.

OPERATION FROM THE FRONT PANEL WHEN UNDER REMOTE CONTROL

There are two responses to front panel input when under remote control:

If the unit is individually selected - the front panel controls are disabled.

If all the units are selected i.e. **SELECT ALL** - the front panel controls are enabled but the first action is used to override the remote control.

VISUAL INDICATION OF REMOTE CONTROL

A unit when selected will respond by changing its operating mode and displaying the following:

DN3600 V3.0 software and DN3600C V3.0C software - Dynamic screen operation i.e. the fader knobs etc. will move in response to remote control messages. The **NUMBER** window displays the slave number during the selection operation. At all other times it displays the current memory number and flashes when unit is individually selected.

DETAILS OF OPERATION

Initial, Default Display

Soft key options: **More EQ**

A : B : Link

Utilities

Bypass

Fader adjustment

The 'Virtual' Graphic Equaliser faders are selected either by pressing the appropriate frequency key or by rotation of the **FREQ** rotary control.

There are several ways to select a range of adjacent faders.

1. Hold a single Frequency key until it starts to flash. This sets one end of the range. Define the other end of the range by pressing a second Frequency key, or by use of the **FREQ** rotary control. The selected fader or faders becomes highlighted.
2. Press two Frequency keys at the same time.
3. Press two Frequency keys in quick succession.

The frequency or frequency range of the selected fader or faders is shown in text at the top of the screen.

The selected fader or faders are adjusted by use of the **LEVEL** rotary control. The adjustment range is +/-12dB in half dB steps. The fader level or, in the case of a range of faders, the average fader level, is shown as text at the top of the screen.

Also shown at the top of the screen are current Memory name, Q-mode and Channel being addressed.

Gain Adjustment

Pressing the **GAIN** key at any time toggles between gain adjustment and fader adjustment. When gain adjustment is selected, the gain fader is highlighted. Gain may be adjusted by use of the **LEVEL** rotary control.

The range of adjustment is +6 to -18dB in half dB steps. Below -18dB the unit is muted. While in Gain Adjust mode, the gain setting is shown in text at the top of the screen. Mute status is shown by a **Muted** icon at the top of the screen.

CURVE/FADER

The **CURVE/FADER** key toggles the screen between Curve and Fader displays. While the Fader display shows the positions of the 30 Graphic faders for the addressed channel, Curve display calculates the actual frequency response of the unit, taking into account fader positions, filter Q and interaction, low and high pass filters, notches and gain. Graphic faders can be selected and adjusted while viewing the Curve display, which changes to show the adjustments in real time.

More EQ

Soft key 1 is accompanied by the text **More EQ**. Pressing this key selects the More EQ menu and the Filter Adjust display. See below. The More EQ menu text will be highlighted if the More EQ filters for the selected channel are in circuit.

A : B : Link

Soft key 2 is accompanied by the text **A : B : Link**. Pressing this key toggles between addressing channels A and B. If the key is held for more than 1 second, the Link mode is selected. In Link mode, all fader adjustments affect both channels. If Link mode is entered from channel A, channel A is displayed and channel B follows it. If Link mode is entered from channel B, channel B is displayed, and channel A follows. The A : B : Link status is shown at the top of the screen as =A=, =B=, A+B or B+A.

Utilities

Soft key 3 is accompanied by the text **Utilities**. Pressing this key selects the Utilities menu. See below.

Bypass and Reset

Soft key 4 is accompanied by the text **Bypass**. Pressing this key engages a bypass of the graphic equaliser section. The Gain control and More EQ filters and Notches remain in circuit. If the **Bypass** key is held pressed for more than 5 seconds, all the graphic faders of the addressed channel are reset to the 0dB position.

More EQ Menu and Display.

Accessed by pressing the **More EQ** key from the Start-up menu.

Soft key options: **Filters**

A : B : Link

In/Out

Exit

More EQ Display

In More EQ mode, the display shows the frequency response curve calculated from the Notch filter and High Pass and Low Pass filter settings.

CURVE/FADER

When the **CURVE/FADER** key is pressed, the display incorporates the Graphic fader positions into the calculated frequency response curve.

Filters

Soft key 1 is accompanied by the text **Filters**. Pressing this key selects Filter Adjust mode. See below.

A : B : Link

Soft key 2 is accompanied by the text **A : B : Link**. Pressing this key toggles between addressing channels A and B. If the key is held for more than 1 second, the Link mode is selected. In Link mode, all fader adjustments affect both channels. If Link mode is entered from channel A, channel A is displayed and channel B follows it. If Link mode is entered from channel B, channel B is displayed and channel A follows. The A : B : Link status is shown at the top of the screen as **=A=**, **=B=**, **A+B**, or **B+A**.

Selection of Link only links the operation of the two channels, it does not copy details between the channels except when changes are made to certain settings. Full details are provided below in the section headed **Filter Adjust Menu and Display**.

In/Out

Soft key 3 is accompanied by the text **In/Out**. When pressed, the High and Low pass filters and two Notch filters are switched in or out of circuit. When the channels are linked the currently displayed channel acts as the master with new settings copied to the alternate channel. The In/Out status is highlighted on the menu. When the filters are out of circuit, the **Filters** key is disabled and the display shows a flat frequency response.

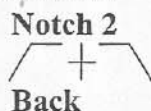
Exit

Soft key 4 is accompanied by the text **Exit**. When pressed, the key returns the unit to the start up display and menu.

Filter Adjust Menu and Display.

Access by pressing the **More EQ** key followed by the **Filters** key.

Soft key options: **Notch 1**



Display

In Filter adjust mode, the display shows the frequency response curve calculated from the Notch filter and High Pass and Low Pass filter settings.

CURVE/FADER

When the **CURVE/FADER** key is pressed, the display incorporates the graphic fader positions into the calculated frequency response curve.

Notch 1

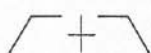
Soft key 1 is accompanied by the text **Notch 1**. When pressed and highlighted, the key selects Notch 1 for adjustment. The Notch filter frequency is set by use of the Frequency keys (1/3 octave ISO frequencies) or by the **FREQ** rotary control (1/12 octave steps). When linked the new frequency setting of the displayed channel is copied to the alternate channel. Notch frequency is shown as text at the top of the screen.

Notch filter depth is adjusted by the **LEVEL** rotary control over a range of 0 to -12dB in 1dB steps. When linked, the settings of the two channels are incrementally linked i.e. the settings of both channels are increased or decreased by 1dB per click of the rotary control. Notch depth is shown as text at the top of the screen.

Notch 2

Soft key 2 is accompanied by the text **Notch 2**. When pressed and highlighted, the key selects Notch 2 for adjustment. The Notch filter frequency is set by use of the Frequency keys (1/3 octave ISO frequencies) or by the **FREQ** rotary control (1/12 octave steps). When linked, the new frequency setting of the displayed channel is copied to the alternate channel. Notch frequency is shown as text at the top of the screen.

Notch filter depth is adjusted by the **LEVEL** rotary control over a range of 0 to -12dB in 1dB steps. When linked the, the settings of the two channels are incrementally linked i.e. the settings of both channels are increased or decreased by 1dB per click of the rotary control. Notch depth is shown as text at the top of the screen.



Soft key 3 is accompanied by the text **+ +**. When pressed and highlighted this key selects the High and Low pass filters for adjustment. The High pass filter frequency is set by the frequency keys or by the **FREQ** rotary control. The Low pass filter frequency is set by the frequency keys or by the **LEVEL** rotary control. When linked, the setting of the currently

displayed channel is copied to the alternate channel during adjustment. High and Low pass filter frequencies are shown as text at the top of the screen.

Back

Soft key 4 is accompanied by the text **Back**. When pressed, this key returns the unit to the More EQ menu.

Utilities menu.

Accessed by pressing the **Utilities** key from the Start-up menu.

Soft key options: **Auto/Q**

Memory

More...

Exit

Curve/Fader

The **Curve/Fader** key toggles the screen between Curve and Fader displays. While the Fader shows the positions of the 30 Graphic faders for the addressed channel, Curve display calculates the actual frequency response of the unit, taking into account fader positions, filter Q and interaction, low pass and high pass filters, notches and gain.

Auto/Q

Soft key 1 is accompanied by the text **Auto/Q**. When pressed, this key selects the **Auto/Q** menu. See below.

Memory

Soft key 2 is accompanied by the text **Memory**. When pressed, this key selects the Memory/Lock menu. See below.

More...

Soft key 3 is accompanied by the text **More...**, meaning "More Utilities". When pressed, this key selects the MIDI channel, Slave selection and LCD invert facilities. See below.

Exit

Soft key 4 is accompanied by the text **Exit**. When pressed, this key returns the unit to the Start up menu.

Auto/Q menu.

Accessed by pressing the **Utilities** key followed by the **Auto/Q** key.

Soft key options: **Auto Gain**

Auto EQ

'Q' type

Exit

Curve/Fader

The **Curve/Fader** key toggles the screen between Curve and Fader displays. While the Fader display shows the positions of the 30 Graphic faders for the addressed channel, Curve display calculates the actual frequency response of the unit, taking into account fader positions, filter Q and interaction, low pass and high pass filters, notches and gain.

Auto Gain

Soft key 1 is accompanied by the text **Auto Gain**. When pressed, this key toggles the Auto Gain function on or off and returns the unit to the start up screen.

When Auto Gain is on, the Gain fader will move automatically to compensate for any further adjustments made to the graphic faders in order to maintain unity gain for an average audio signal.

Auto EQ

Soft key 2 is accompanied by the text **Auto EQ**. This function is used when the DN3600 is connected to a Klark Teknik model DN60/DN6000 Real Time Spectrum Analyser via their respective "DN60 Interface" and "Plotter/Data" ports.

When the key is pressed, the DN3600 reads the frequency spectrum as displayed at that moment by the DN60/DN6000 analyser. Fader adjustments are then applied to the selected channel (A, B or - in LINK mode - both) to compensate for the analysed room or system response.

The unit remains in Auto/Q menu, allowing repeated triggering of the Auto EQ function.

Q Type

Soft key 3 is accompanied by the text **Q Type**. When the key is pressed, the addressed channel toggles between the Q modes: 360 and 27. The Q mode is shown as text at the top of the screen. The Q mode determines the shape, and hence the sound and interaction, of the graphic filters. **Q:360** emulates the wide and hence smoothly combining and easy to use filters of the industry standard Klark Teknik DN360 Graphic Equaliser. **Q:27** emulates the narrower and hence less interactive LCR filters of the older Klark Teknik model DN27 Graphic Equaliser.

Exit

Soft key 4 is accompanied by the text **Exit**. When this key is pressed, the unit returns to the start up menu.

Memory/Lockout menu

Accessed by pressing the **Utilities** key followed by the **Memory** key.

Soft key options: **Recall**

Save

Lock

Exit

Curve/Fader

The **Curve/Fader** key toggles the screen between Curve and Fader displays. While the Fader display shows the positions of the 30 Graphic faders for the addressed channel, Curve display calculates the actual frequency response of the unit, taking into account fader positions, filter Q and interaction, low pass and high pass filters, notches and gain.

Recall

Soft key 1 is accompanied by the text **Recall**. This key allows any of the 66 named memories to be recalled. To recall a memory:

1. Press the **Recall** key once.
2. The **NUMBER** window shows the selected memory number while the LCD shows the memory name and fader positions. Select the required memory by name and/or number by use of the **FREQ** or **LEVEL** rotary control.
3. The procedure may be aborted at any time by pressing the **Exit** or **Save** keys.
4. Press the **Recall** key once more. At this point all the fader, filter, Gain, Q and channel settings are updated. The unit returns to the start up screen.

The current memory name is shown as text at the top of the screen. The current memory number is shown in the **NUMBER** window unless any manual changes are made.

Save

Soft key 2 is accompanied by the text **Save**. This key allows the current equaliser settings to be stored in any of the 66 memory locations. Each memory may be given an 8 character name. To Save a memory:

1. Press the **Save** key once.
2. Select the memory number by use of the **FREQ** or **LEVEL** rotary control. Memory number is shown in the **NUMBER** window. Memory name - if any - is shown on the LCD.
3. If desired, enter a new memory name or edit the old memory name using the Frequency keys. These correspond to the letters A to Z. By pressing the **SHIFT** key, the numbers 0 to 9 may also be accessed. The < key is a backspace or delete function.
4. The procedure may be aborted at any time by pressing the **Exit** or **Recall** keys.
5. Press the **Save** key a second time.

All fader, filter, Gain, Q and channel settings together with the name are stored at the selected memory location. The unit returns to the start up screen.

Lock

Soft key 3 is accompanied by the text **Lock**. This key allows access to the two lock modes. When the key is pressed, the menu options change to:

Full

Partial

Exit

Full

Full lock prevents access to all controls. After Full Lock has been set, the only action possible is to press the **Unlock** key and type in a password. If the correct password is typed in, the Full Lock is defeated.

To set Full Lock:

1. Type in the desired password of up to 8 letters, using the frequency keys.
2. The procedure can be aborted by pressing the **Exit** key.
3. Press the **Full** key.

Partial

Partial lock prevents access to all controls except for Memory Recall. After Partial Lock has been set, the only action possible is to Recall a memory (press the **Recall** key) or unlock the unit by pressing the **Unlock** key and typing in the correct password. If the correct password is typed in, the Partial Lock is defeated.

To set Partial Lock:

1. Type in the desired password of up to 8 letters, using the frequency keys.
2. The procedure can be aborted by pressing the **Exit** key.
3. Press the **Partial** key.

Exit

Soft key 4 is accompanied by the text **Exit**. Pressing this key returns the unit to the start-up menu.

More. . . Utilities menu

Accessed by pressing the **Utilities** key followed by the **More. . .** key.

Soft key options: **Slaves**

MIDI Chan

Adj. LCD

Exit

Curve/Fader

The **Curve/Fader** key toggles the screen between Curve and Fader displays. While the Fader display shows the positions of the 30 Graphic faders for the addressed channel, Curve display calculates the actual frequency response of the unit, taking into account fader positions, filter Q and interaction, low pass and high pass filters, notches and gain.

Slaves

Soft key 1 is accompanied by the text **Slaves**. Pressing this key enables the selection of Slave devices to be addressed. Pressing this key also causes the DN3600 to assume the roll of Master over any connected DN3600/DN3601 units. Use the **FREQ** or **LEVEL** rotary control to cycle through the various options:

STAND ALONE

The normal mode of operation. All controls and adjustments affect only the one, local DN3600 unit. The DN3600 must always be returned to **STAND ALONE** mode in order to control itself.

ALL

All controls and adjustments affect all the compatible slave devices connected into the network, including the local, Master DN3600 unit.

Slaves 1 to 64

The Master/Slave mode of operation. Select a single slave device to address. When a slave is selected, all controls and adjustments affect that slave only. There are no changes to the local, master DN3600 unit. The DN3600 must be returned to **STAND ALONE** mode in order to control itself.

The procedure may be aborted at any time by pressing the **Exit** key.

Press the **Slaves** key a second time to complete the selection. The unit then returns to the start up screen and provides control over the selected unit(s).

MIDI Chan

Soft key 2 is accompanied by the text **MIDI Chan**. Pressing this switch enables the selection of MIDI send and receive channels. By use of the **FREQ** or **LEVEL** rotary control, select either OMNI ON mode (receive all channels, send on channel 1) or OMNI OFF mode and one of MIDI channels 1 to 16.

The procedure may be aborted at any time by pressing the **Exit** key.

To complete the selection, press the **MIDI Chan** key a second time. The unit updates its MIDI channel number and returns to the start up screen.

The DN3600 recognises MIDI program change messages 1 to 66 on its assigned channel, and maps them to recall memories 1 to 66.

Also, the DN3600 sends MIDI program change messages 1 to 66, mapped to memory recall commands entered via the front panel.

Adj. LCD

Soft key 3 is accompanied by the text **Adj. LCD**. This key allows access to the LCD adjustment screen. When this key is pressed, the menu options change to:

- Inv LCD
- Exit

Inv LCD

When pressed, this switch toggles the LCD screen between Normal display (white or green characters and graphics on a blue screen) and Inverted display (blue characters and graphics on a white or green screen). After toggling the display the unit remains in the Adj. LCD screen.

Frequency Encoder

The frequency encoder may be used to adjust the display brightup time out. The time can be adjusted between 2 and 60 seconds. The setting is retained in power down.

Level Encoder

The level encoder is used to adjust contrast of the LCD. The setting is retained on power down.

Exit

Soft key 4 is accompanied by the text **Exit**. When this switch is pressed, the unit returns to the start up menu.

TECHNICAL SPECIFICATION

INPUTS

Type	TWO
Impedence (ohm)	Balanced (electronically)
Balanced	20k
Unbalanced	10k
Max. level	+22dBu

OUTPUTS

Type	TWO
Min. load impedance	Balanced (electronically)
Source impedance	600ohm
Max. level	50ohm
	+22dB into >2kohms

PERFORMANCE

Frequency response /EQ flat	+/-0.5dB (20Hz to 20kHz)
Distortion @ +4dBm	<0.02% @ 1kHz
Equivalent input noise (20Hz to 20kHz unweighted)	< -94dBu
Overload indicator	+19dBu
Gain	-18 to +6dB

FILTERS

Type	Revised MELT hybrid
Graphic ISO Centre Frequencies	30, 25Hz - 20kHz 1/3 Octave
Tolerance	+/-5%
Maximum Boost/Cut	12dB
Step size	1/2dB
High pass filter slope	12dB/Octave 20Hz - 400Hz
Step size	1/3 Octave
Low pass filter slope	12dB/Octave 30kHz - 1.6kHz
Step size	1/3 Octave
Notch filters	Two per channel, varying Q
Maximum cut	12dB
Step size	1/12 Octave and 1dB

POWER REQUIREMENTS

Voltage	100 - 250 Vac @ 50 - 60 Hz
Consumption	<53 VA

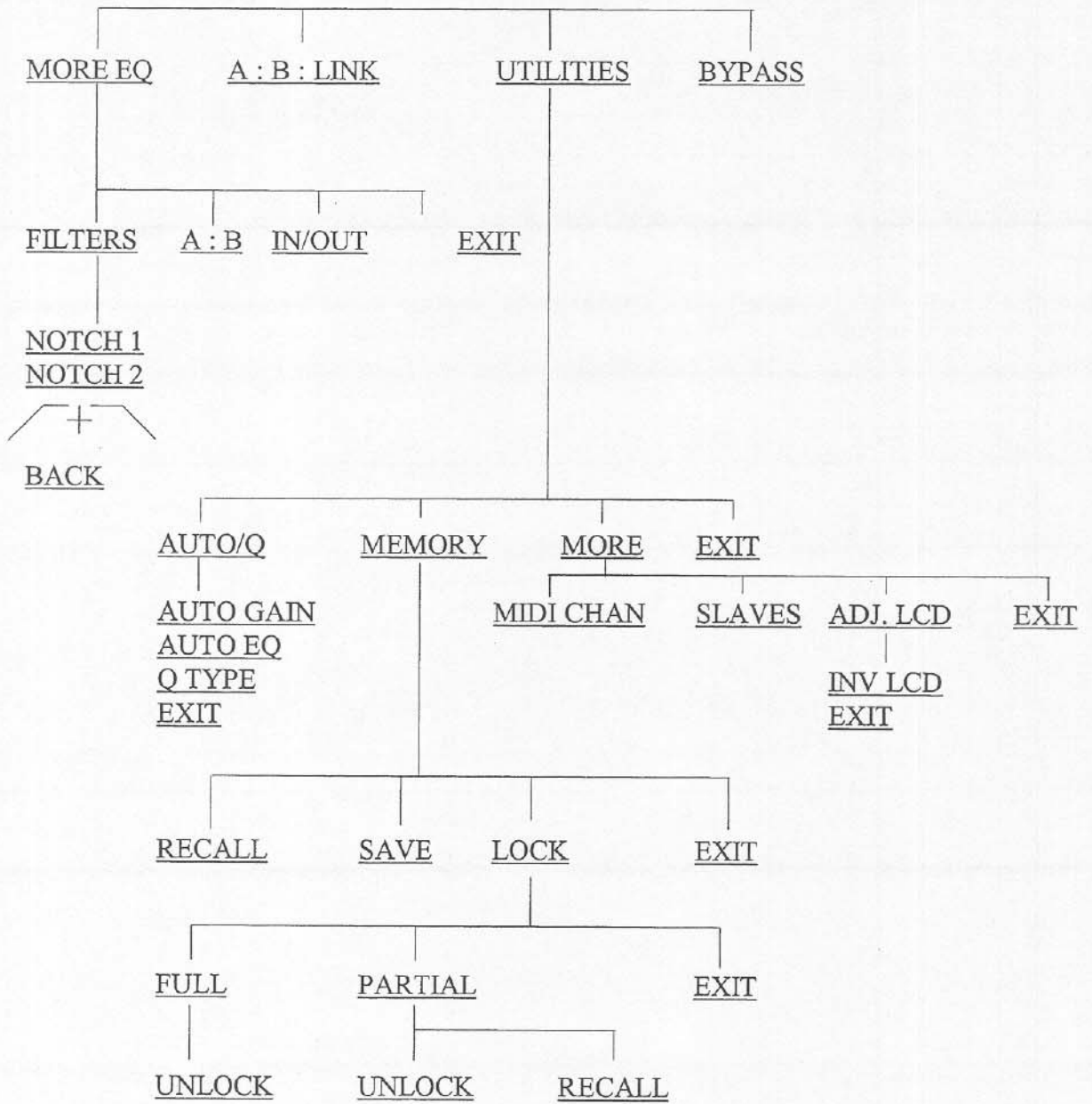
DIMENSIONS

Width	482mm (19 inch)
Height	88mm (3.5 inch)
Depth	306mm (12.25 inch)

WEIGHT

Net	5 kg
Shipping	7 kg

DN3600C SOFTWARE V3.0C MENU STRUCTURE



SERVICE INFORMATION

Caution: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel. Klark Teknik PLC accepts no liability for damage or injury arising from incorrect servicing.

Fuse ratings:

Rear panel fuse holder: 500mAT

Battery Replacement

Caution!:

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Advarsel!:

Lithiumbatteri. Eksplosionsfare ved fejlagtig håndtering af samme fabrikat og type. Lever det brugte batteri tilbage till leverandoren.

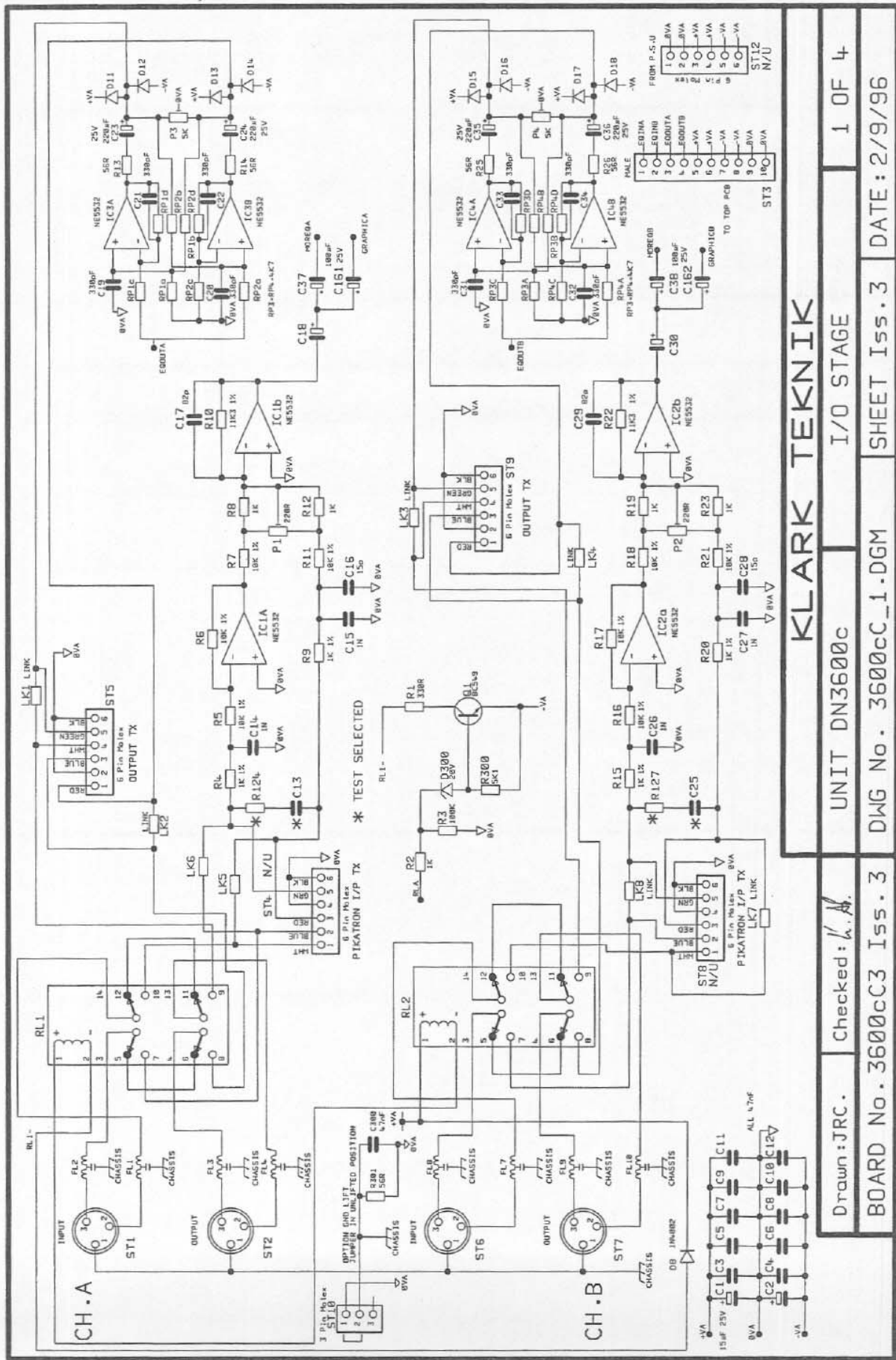
MIDI Connections

DN3600 Pro MIDI XLRs correspond to standard MIDI 5-pin DIN connectors thus:

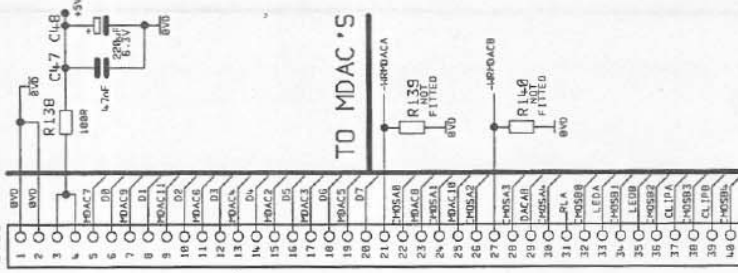
DIN			XLR
Pin 5	-	data	- Pin 3
Pin 4	-	+5V	- Pin 2
Pin 2	-	GND	- Pin 1

Voltage Change-Over

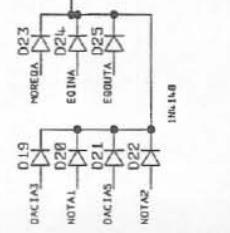
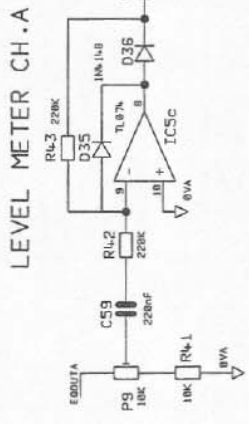
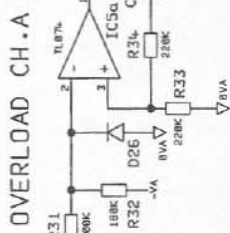
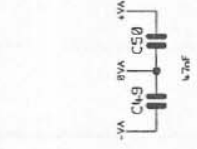
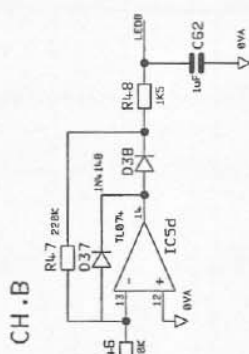
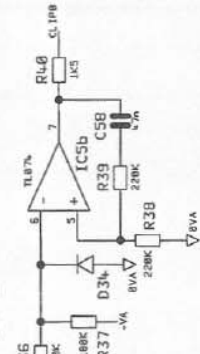
The unit automatically adjusts to any input voltage in the range 100 to 240 Vac @ 50 to 60 Hz.



ST1.1

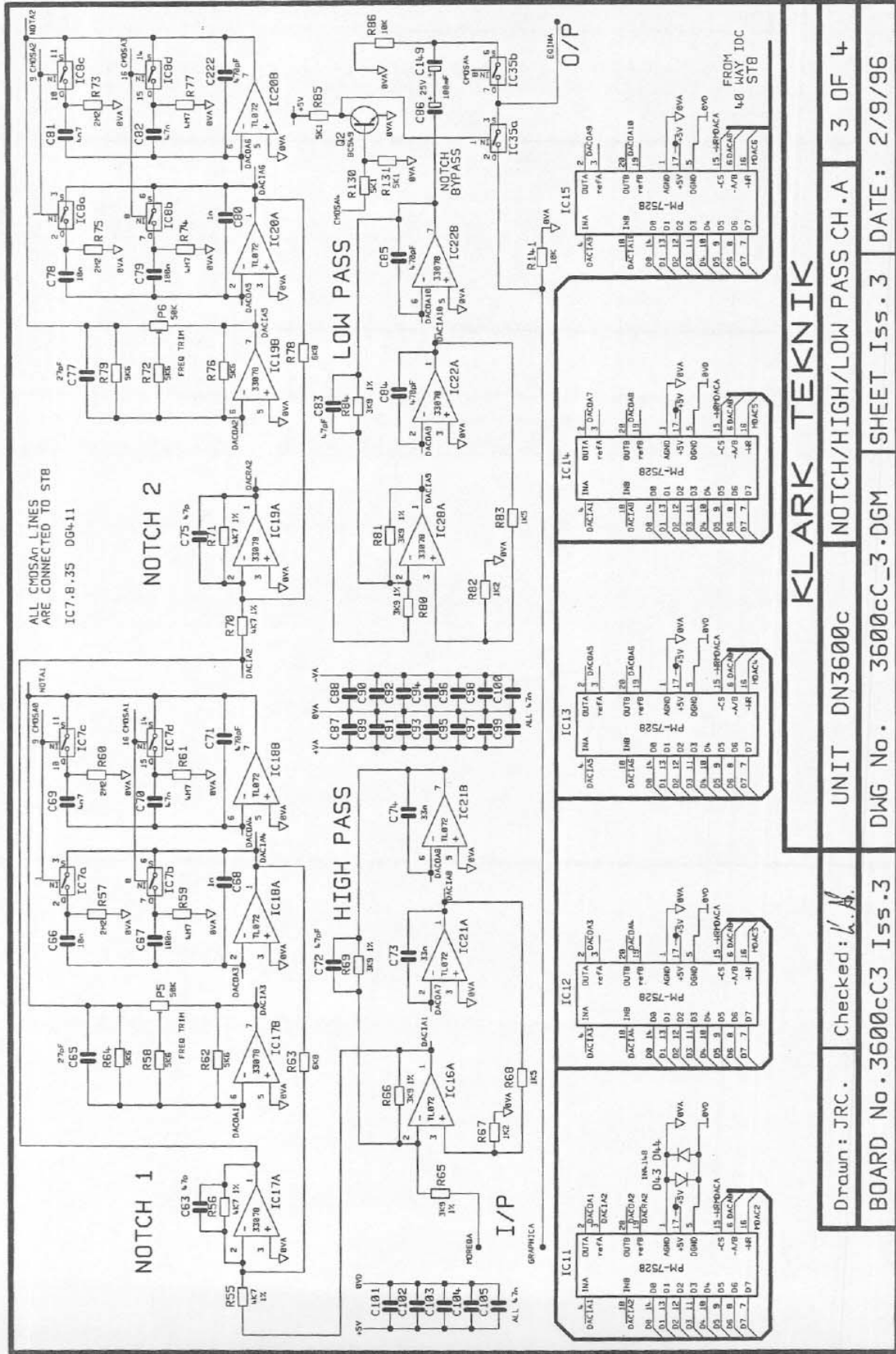


48 Pin JBC Vertical Header
FROM MICRO PCB



KLARK TEKNIK

Drawn : JRC.	Checked : <i>[Signature]</i>	UNIT DN3600c	LED DRIVERS	2 OF 4
BOARD No. 3600cC3 Iss.3		DWG No. 3600cC_2.DGM		DATE : 2/9/96



ALL CMOSAN LINES
ARE CONNECTED TO STB
IC7.B.35 DG4.11

NOTCH 1

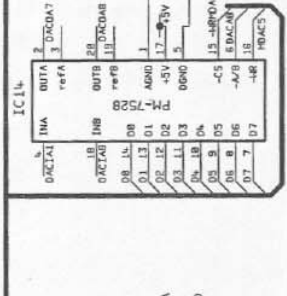
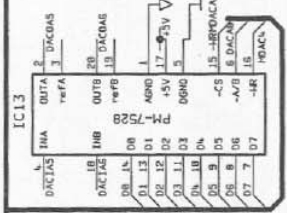
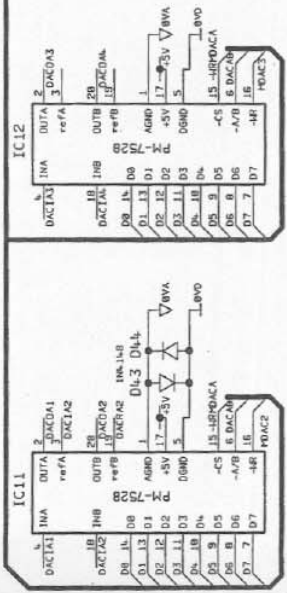
NOTCH 2

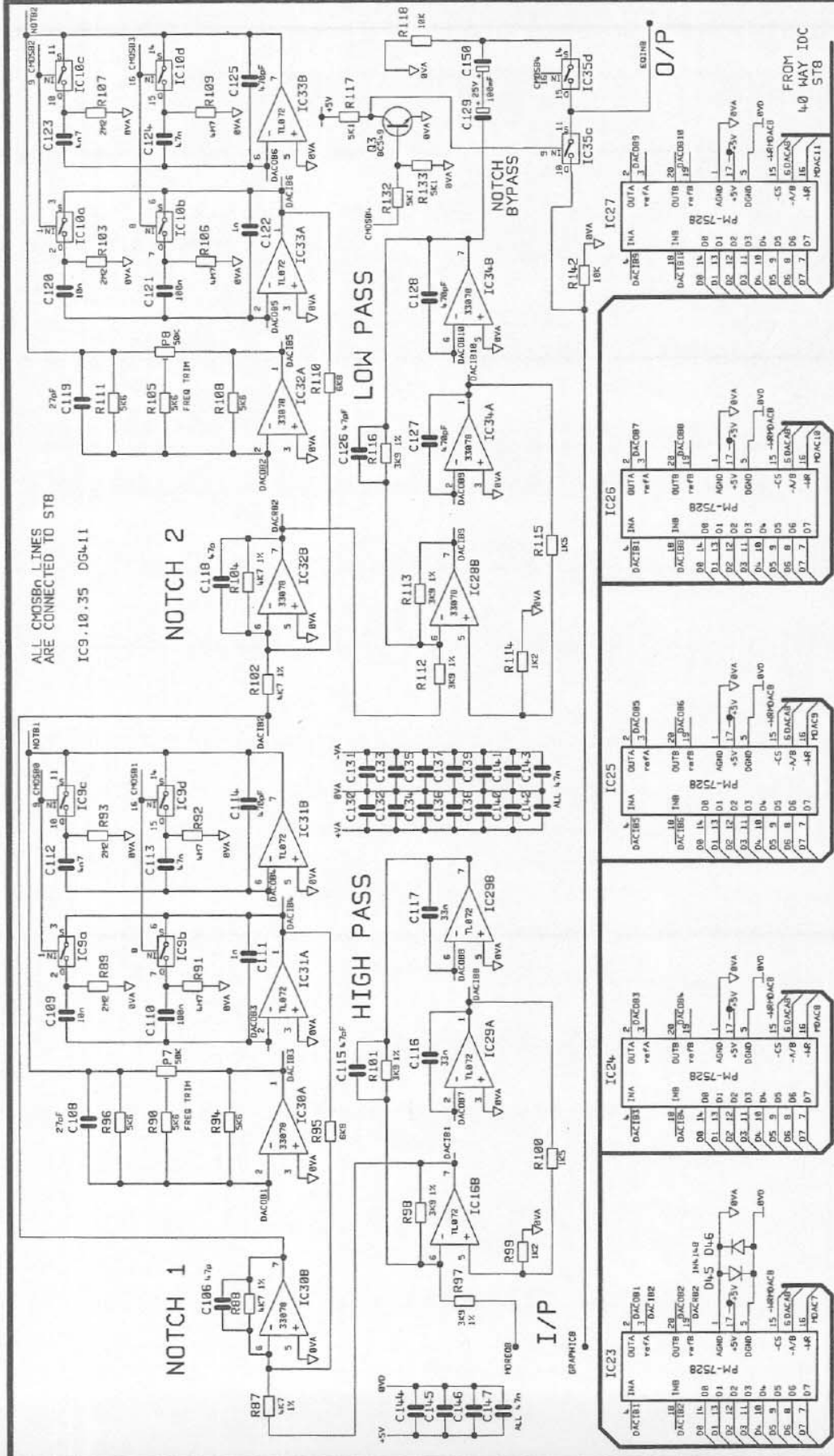
HIGH PASS

LOW PASS

I/P

O/P





ALL CMOS/LINES ARE CONNECTED TO STB
IC9-10-35 DGL11

NOTCH 1

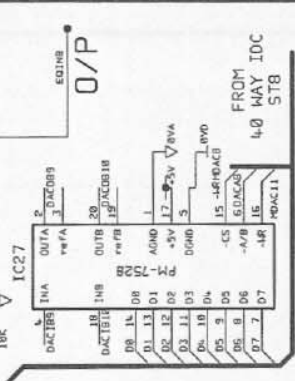
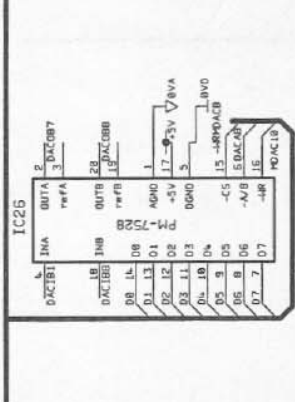
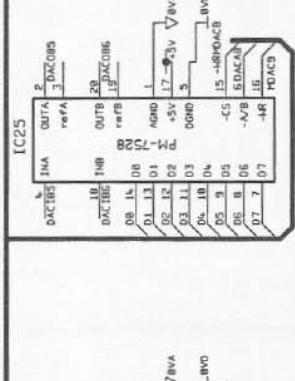
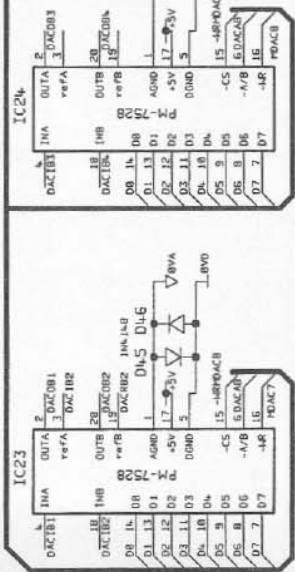
NOTCH 2

HIGH PASS

LOW PASS

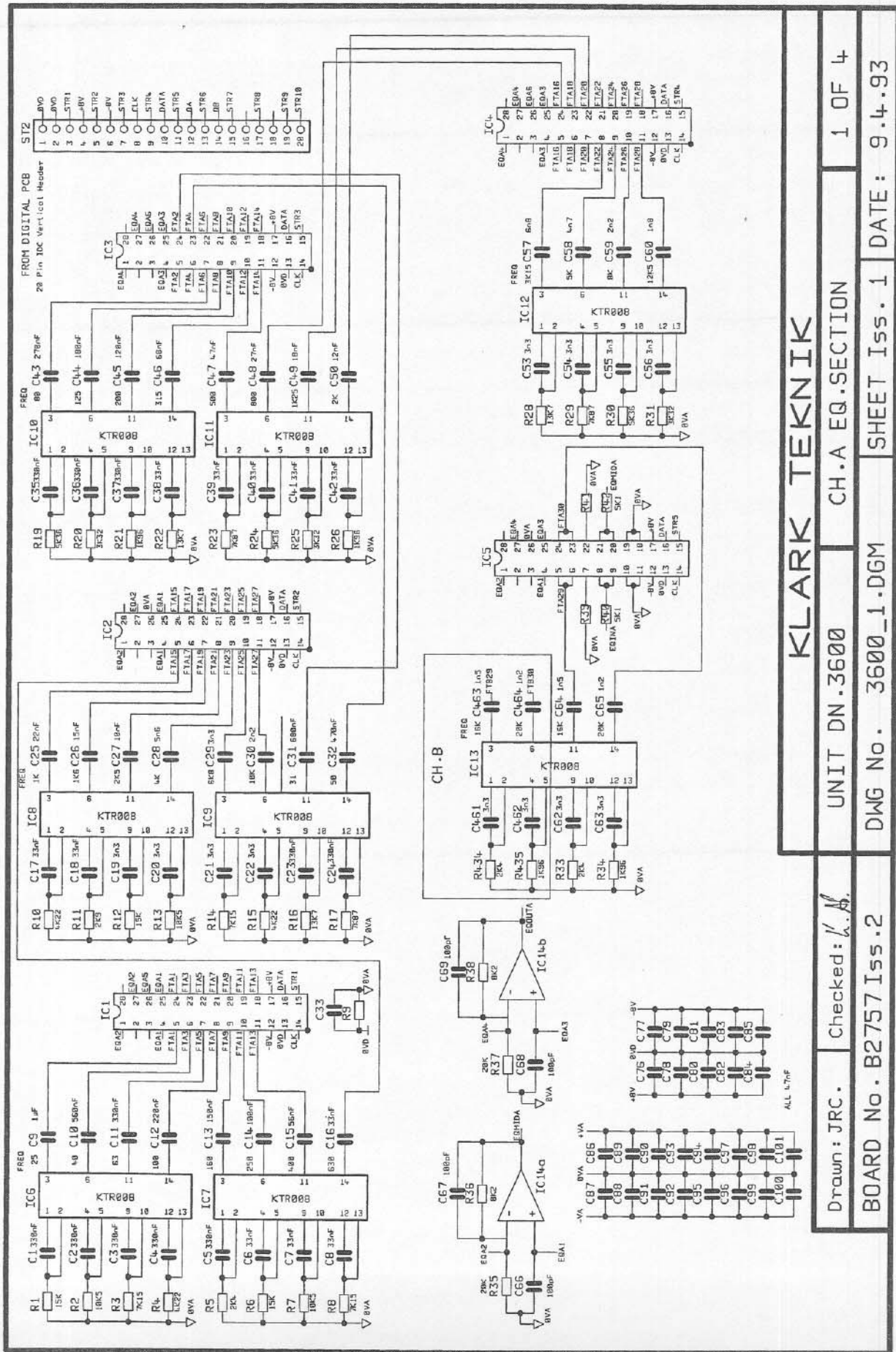
I/P

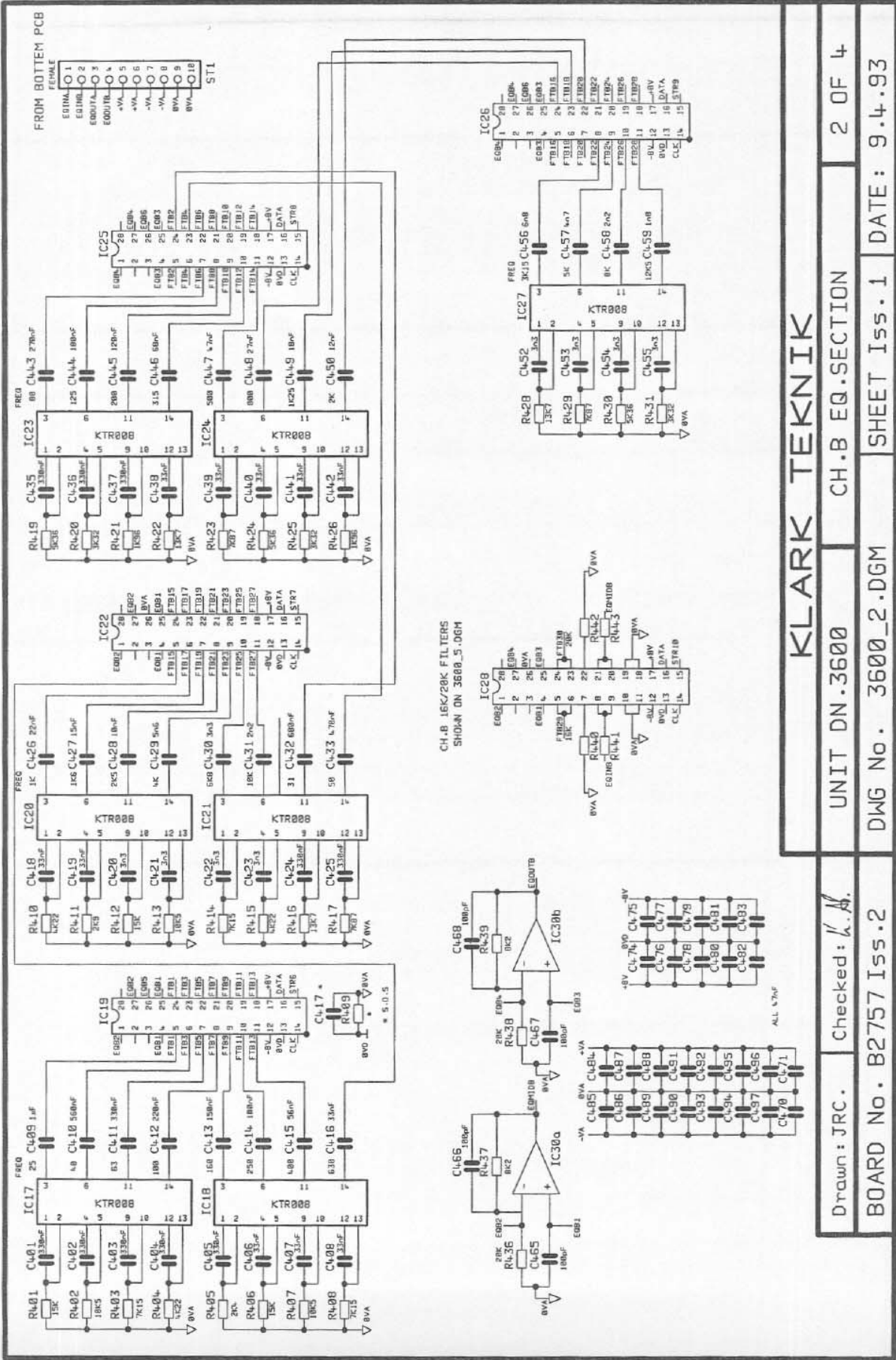
O/P



KLARK TEKNIK

Drawn: JRC.	Checked: <i>K.A.</i>	UNIT DN3600c	NOTCH/HIGH/LOW PASS CH.B	4 OF 4
BOARD No. 3600cC3 Iss.3		DWG No. 3600cC_4.DGM	SHEET Iss.3	DATE: 2/9/96

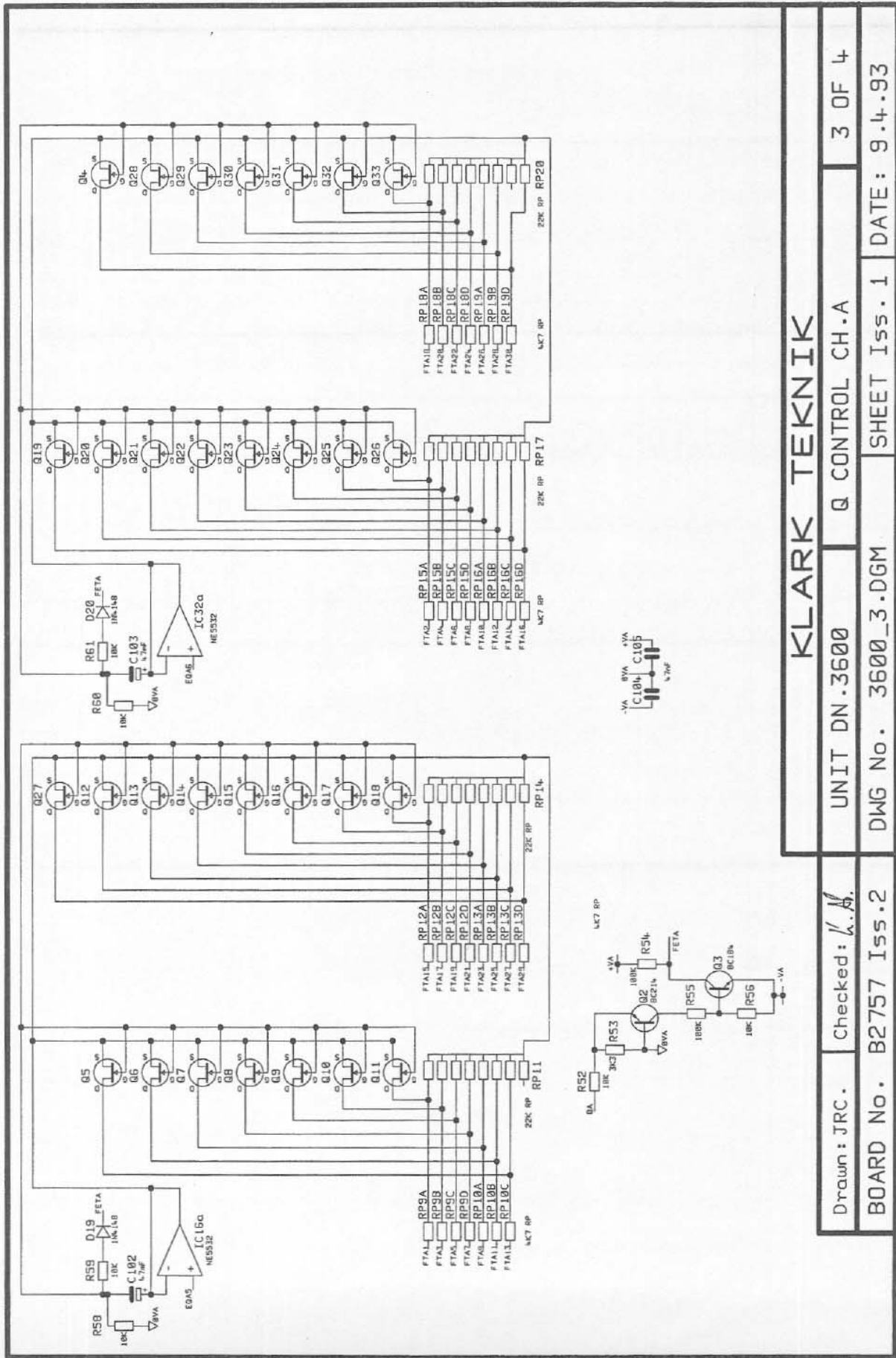




CH.B 16K/28K FILTERS
SHOJAN ON 3600_5.0GH

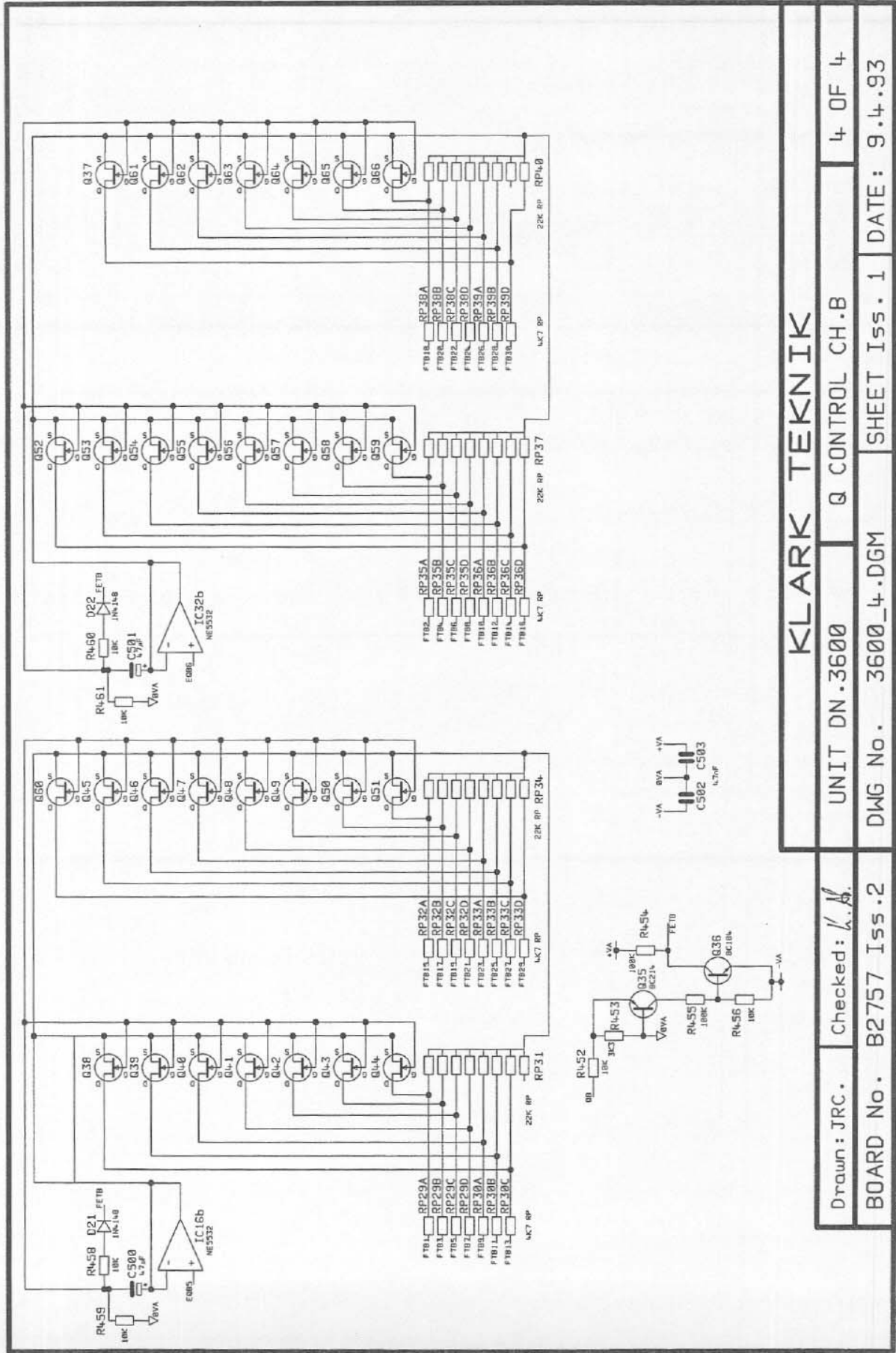
KLARK TEKNIK

Drawn: JRC.	Checked: <i>V.A.</i>	UNIT DN.3600	CH.B EQ.SECTION	2 OF 4
BOARD No. B2757 Iss.2		DWG No. 3600_2.DGM	SHEET Iss.1	DATE: 9.4.93



KLARK TEKNIK

Drawn: JRC.	Checked: <i>V.A.A.</i>	UNIT DN.3600	Q CONTROL CH.A	3 OF 4
BOARD No. B2757	Iss.2	DWG No. 3600_3.DGM	SHEET Iss. 1	DATE: 9.4.93



KLARK TEKNIK

4 OF 4

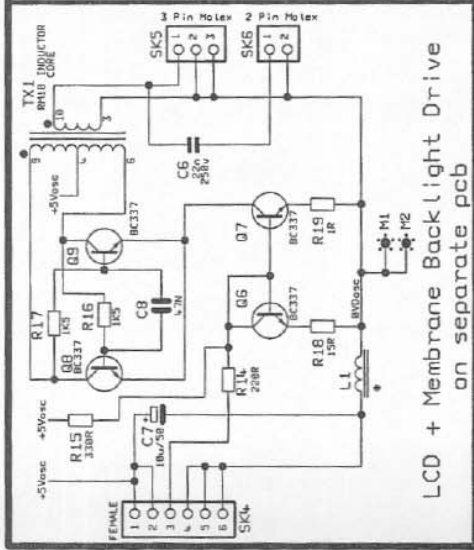
UNIT DN.3600 Q CONTROL CH.B

Drawn: JRC. Checked: *L.A.*

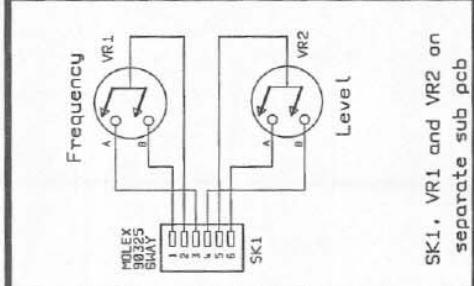
DATE: 9.4.93

DWG No. 3600_4.DGM SHEET Iss. 1

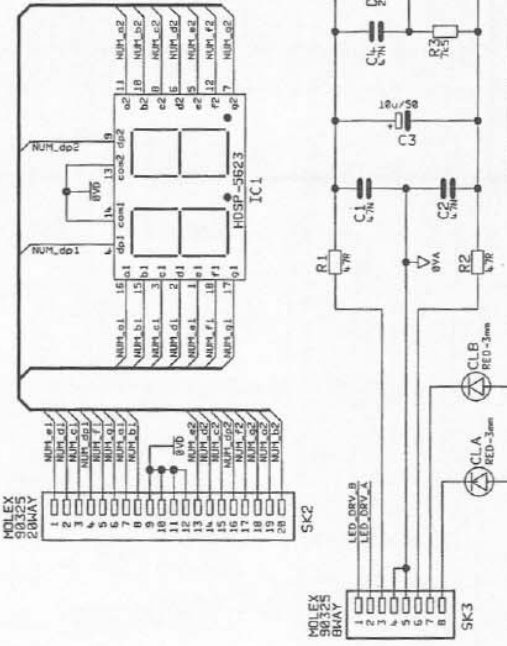
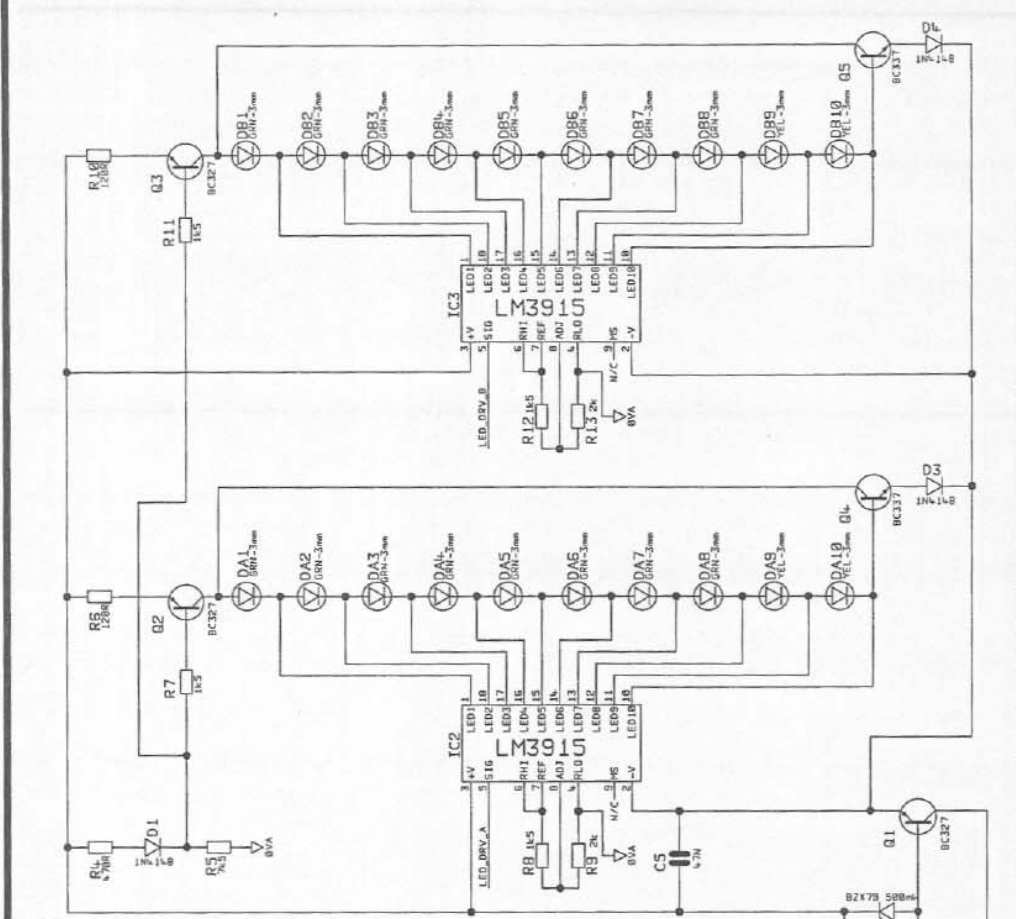
BOARD No. B2757 Iss.2



LCD + Membrane Backlight Drive on separate pcb

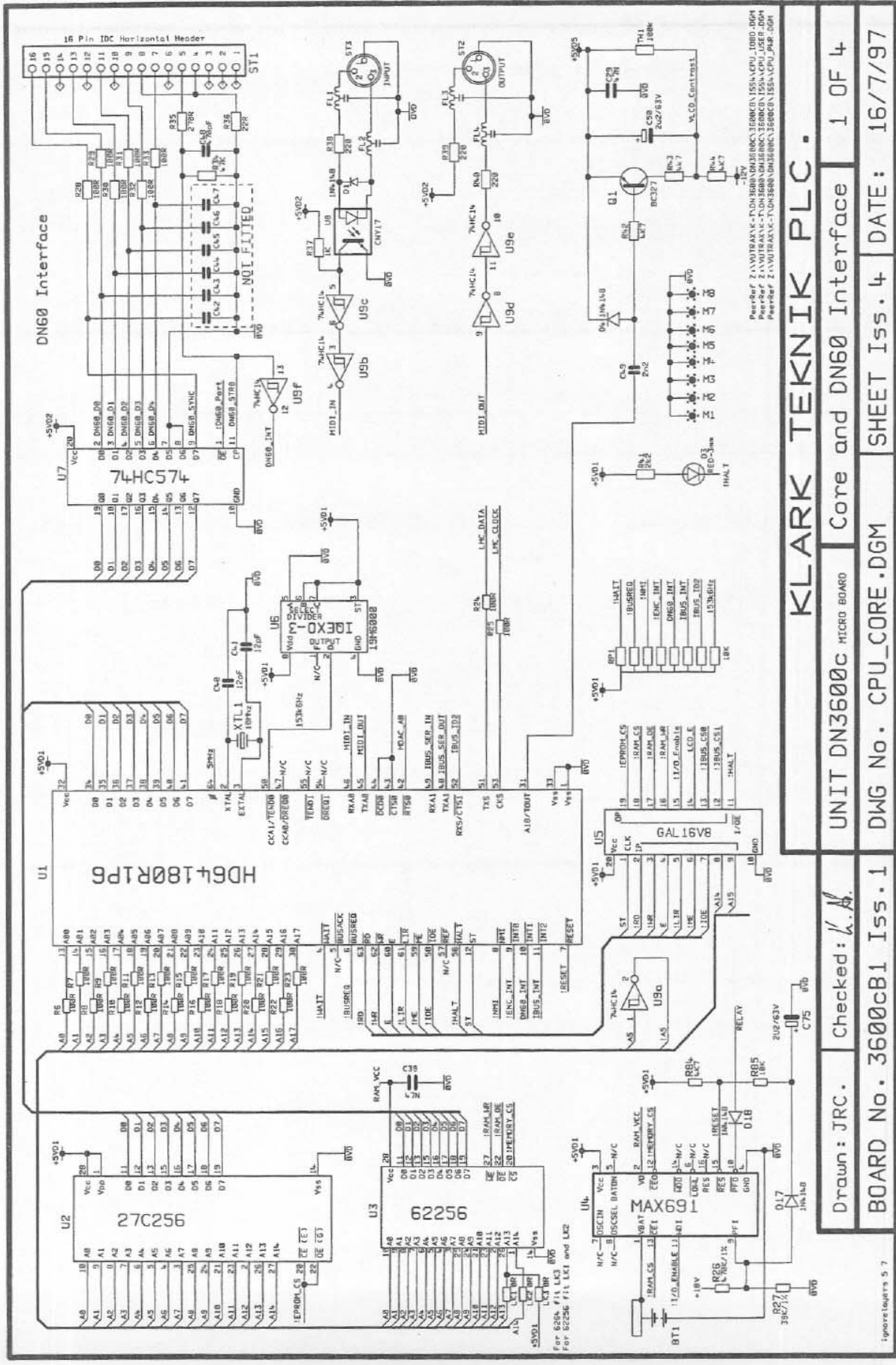


SK1, VR1 and VR2 on separate sub pcb



KLARK TEKNIK PLC.

Drawn: JRC	Checked: <i>K.A.</i>	UNIT DN3600c	Front Panel Controls	1 OF 1
BOARD No. 3600cA2		DWG No. 3600cA.DGM	SHEET Iss. 2	DATE: 6/9/96



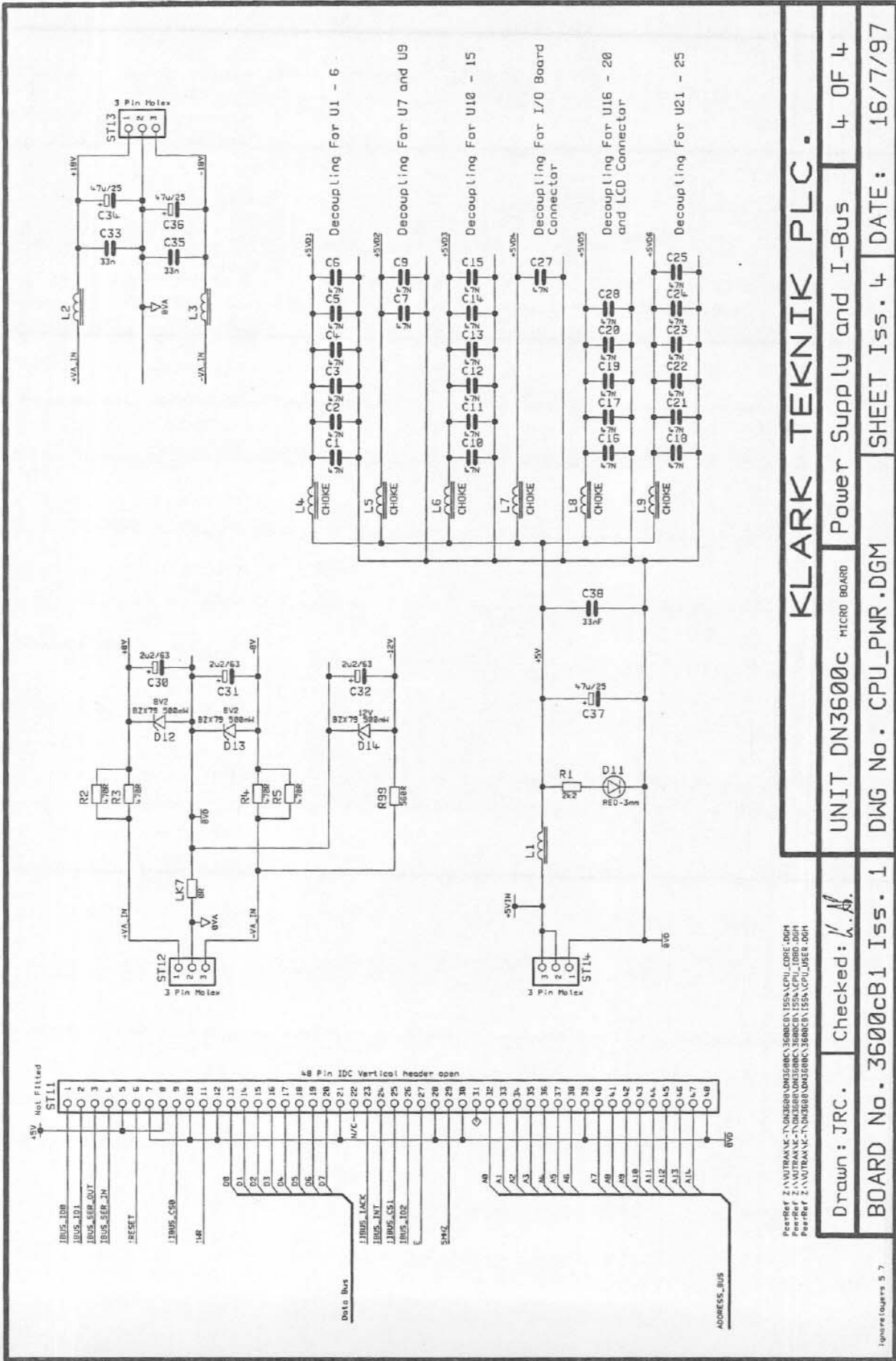
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KLARK TEKNIK PLC.

UNIT DN3600c MICRO BOARD Core and DN60 Interface 1 OF 4

BOARD No. 3600cB1 Iss. 1 DWG No. CPU_CORE.DGM SHEET Iss. 4 DATE: 16/7/97

Drawn: JRC. Checked: *[Signature]*



PartRef Z:\AUTORAM\IC-T\ON2600\UN3600C\3600C\ISSA\CPU_CORE.MCH
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KLARK TEKNIK PLC.

Drawn : JRC. Checked : *K.A.* UNIT DN3600c MICRO BOARD Power Supply and I-Bus 4 OF 4

BOARD No. 3600cB1 Iss. 1 DWG No. CPU_PWR.DGM SHEET Iss. 4 DATE: 16/7/97