Operating Information

DN3600

PROGRAMMABLE GRAPHIC EQUALISER

Software Version 3.0

KLARK TEKNIK

an EVI AUDIO company

SIGNAL PROCESSING BY DEFINITION

Operating Information

DN3600

PROGRAMMABLE GRAPHIC EQUALISER

Software Version 3.0

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THANK YOU FOR USING THIS KLARK TEKNIK PRODUCT

To obtain maximum performance from this precision electronic product, please study these instructions carefully. Installation and operating the DN3600 is not complicated, but the flexibility provided by its operating features merits familiarisation with it's controls and connections. This unit has been prepared to comply with the power requirements that exist in your location.

Precautions

Before connecting the unit to the mains power, ensure that the operating voltage is correct for your local supply. Operating voltage is indicated by an adhesive label on the rear panel.

Do not install this unit in a location subjected to excessive heat, dust or mechanical vibrations.

Power Connection

Connection is made by means of an IEC standard power socket.

Before connecting this unit to the mains supply, ensure that the fuse fitted is the correct type and rating, as indicated on the rear panel, adjacent to the fuse holder.

To change the mains voltage please refer to "Service" section. Mains voltage change should be carried out by a qualified service technician only.

Safety Warning

This unit is fitted with 3-pin power socket. For safety reasons the earth lead should not be disconnected. If you encounter a problem with earth-loops, remove the ground-lift link located inside the unit to isolate the signal earth from the chassis earth (see Service section for details). This should be carried out by a qualified service technician only.
To prevent shock or fire hazard, do not expose the unit to rain or moisture.

To avoid electrical shock, do not remove covers. Dangerous voltages exist inside. Refer servicing to qualified personnel only.

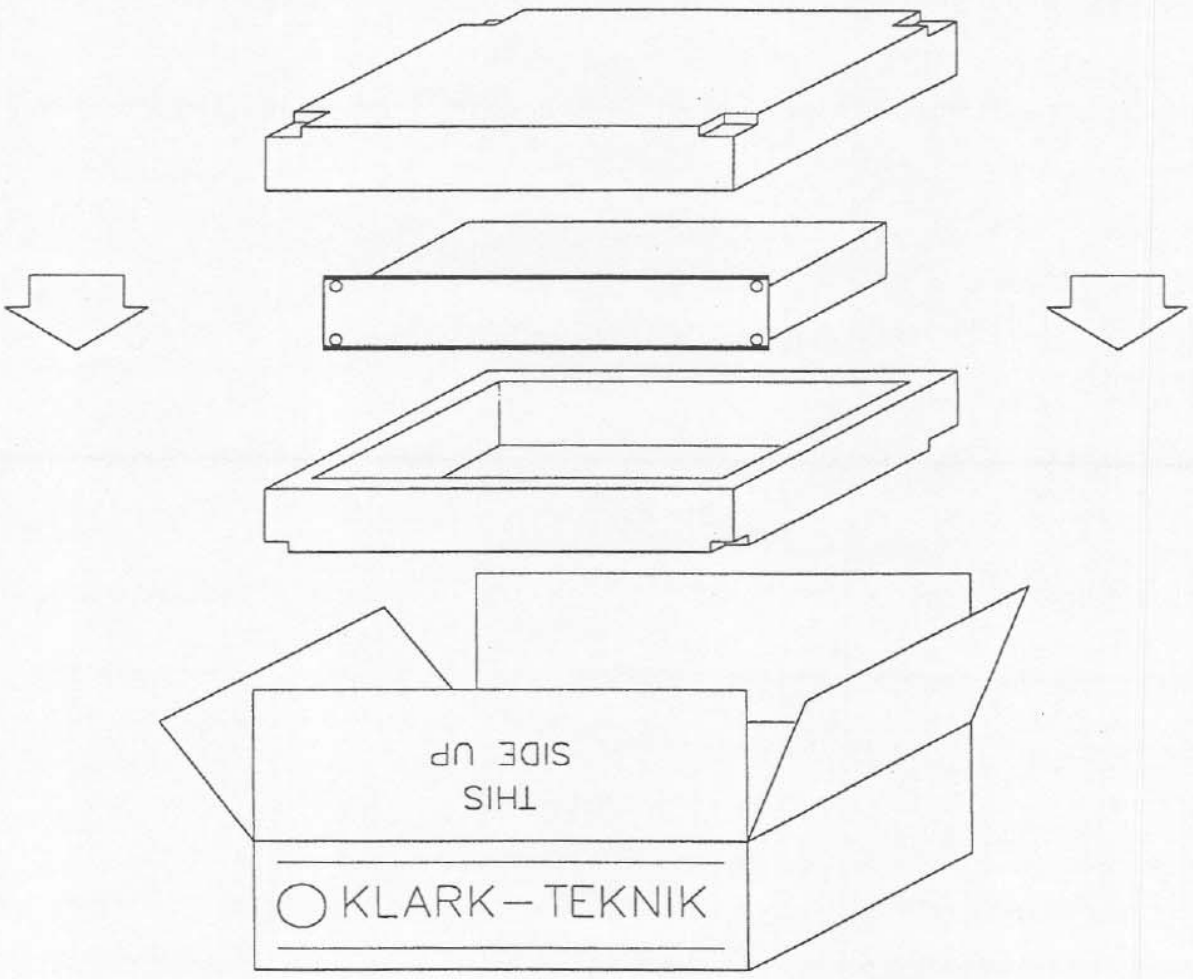
After you have unpacked the unit

Save all the packing materials - they will prove valuable should it become necessary to transport or ship this product.

Please inspect this unit carefully for any signs of damage incurred during transportation. It has undergone stringent quality control inspection and tests prior to packing and left the factory in perfect condition.

If, however, the unit shows any signs of damage, notify the transportation company without delay. Only you, the consignee, may institute a claim against the carrier for damage during transportation.

If necessary, contact your supplier or as a last resort, your Klark Teknik importing agent, who will fully co-operate under such circumstances.



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 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.

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 Real Time Spectrum Analyser for automatic equalisation and may be used to interface with future products.

Voltage Selector Switch: selects between 120v and 240v operation.

IEC Mains Socket.

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.

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.

   Note. On version V2.0 it will be necessary to reselect the **Auto/Q** menu 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.

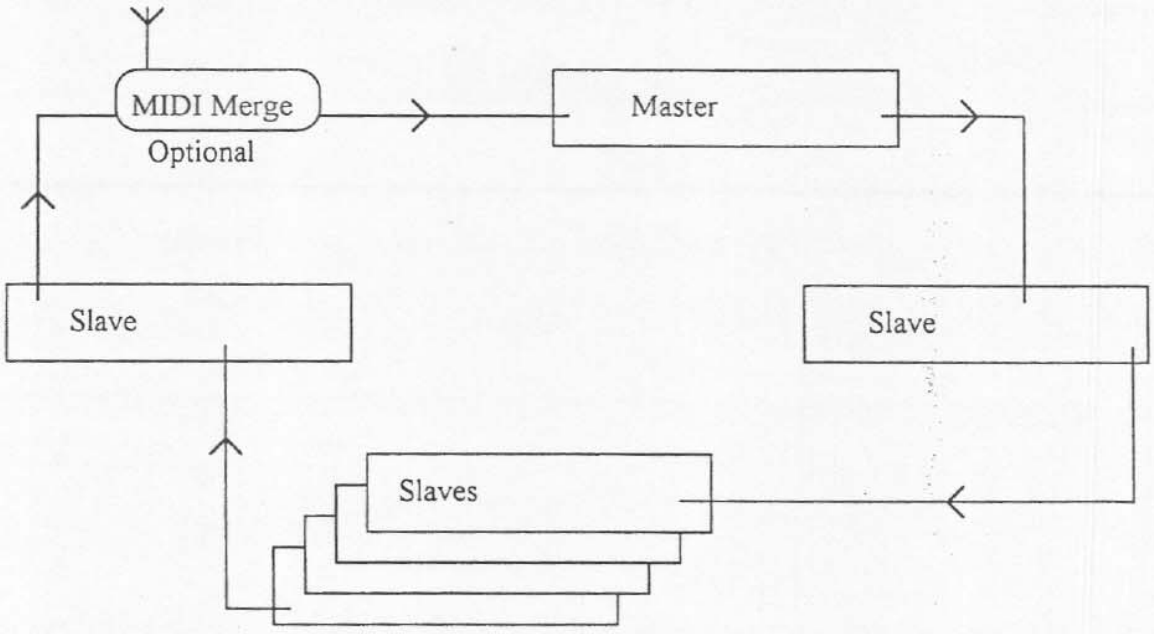
MASTER/SLAVE OPERATION

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. 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:



V3.0 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 -18 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 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.

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.

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.

More... Utilities menu
Accessed by pressing the **Utilities** key followed by the **More...** key.
Soft key options: **Slaves**
MIDI Chan
Inv 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).

KLARK TEKNIK TECHNICAL BULLETIN

Product : DN3600B
Date : 6/1/98 Bulletin No: Page: 1 of 1

Urgent
* Recommended
Information Only Implemented From S/N: All

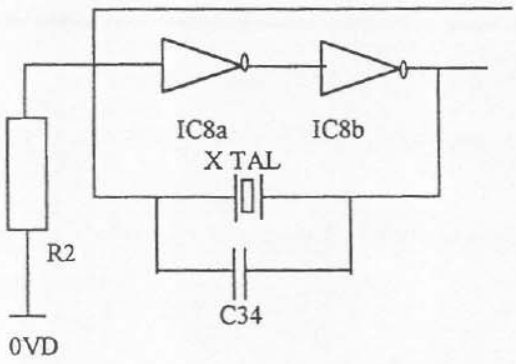
ASSEMBLY : Microboard

SUBJECT: On start up some units encounter problems with the display. Either it is corrupted or just blank, in some extreme cases data may also be loss or corrupted.

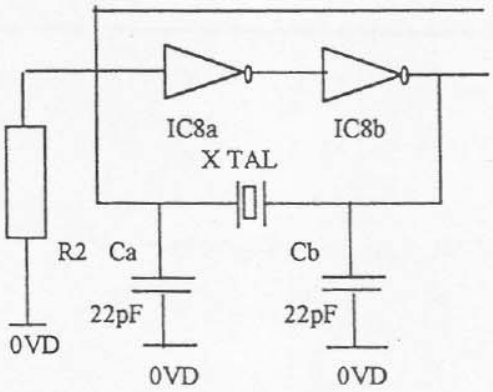
After looking into this problem for some time the problem was found to be due to the crystal oscillator not stabilising before the reset line goes high. This means the microprocessor doesn't start up correctly. This problem can be cured quite easily with a minor modification to the oscillator circuit.

Solution:

Original Circuit



Modified Circuit



1/ Remove C34.
2/ Solder Ca (22pF Part No CAP01-GK222100) across R2.
3/ Solder Cb (27pF Part No CAP01-GK222100) from pin 4 to pin 7 of IC8.

If you have any further questions regarding this bulletin please contact Karl Brant or Nigel Turner at

Display Modifications

On some of the earlier DN3600 the front panel clear window above the LCD display is plastic as opposed to the newer Perspex finish. It was found that the Perspex finish is much more durable than that of the plastic type and this was the reason for the change. To alter the front panel from plastic to Perspex the entire front panel must be swapped as the keyboard membrane and covering are all one.

If you wish to just upgrade the back light operation the following modifications must be done.

1. Find 33nF capacitor C54, marked ".033J250" or similar, close to connectors ST9 and ST10. Replace this with the 22nF capacitor supplied and marked ".022J250" or similar.
2. Find resistor R8. On Issue 4 microprocessor boards this is a 4R7 and is close to connectors ST9 and ST10. *On Issue 3 microprocessor boards, this is not labeled. It is either 4R7 or 10R, and is found directly in line with fuse F3.* Replace this with the 3R3 resistor supplied, marked orange, orange, gold, gold.
3. Find transistor Q2, close to R8 above. *On Issue 3 microprocessor boards, Q2 is not labeled.* Fit the supplied black metal heatsink over the transistor. Be sure that the heatsink does not touch the transistor legs.
4. Fit the new front panel assembly and reconnect the 4 cables in the original positions.
5. Replace the top and bottom covers.

Note: On Issue 3 boards additional modifications are required. The microprocessor board Issue number - 3 or 4 - is marked on the underside (solder side) of the board, close to the MIDI XLR connectors.

DN3600 Upgrades

There are various upgrades that are to be carried out on DN3600, which modifications apply depends upon the age of the DN3600. Usually a good indication is that all the modifications are required if the screen of the unit is of the soft plastic type.

Modifications required:

- **EPROM Upgrade**
  This modification changes the version of software that the unit is running.

- **Display Modifications**
  This modification changes the intensity of the LCD and also reduces the amount of buzz from the back light inverter within the noise floor of the unit.

- **Midi Latch Board Modifications**
  This modification reduces the amount of induced digital noise within the Input Output board.

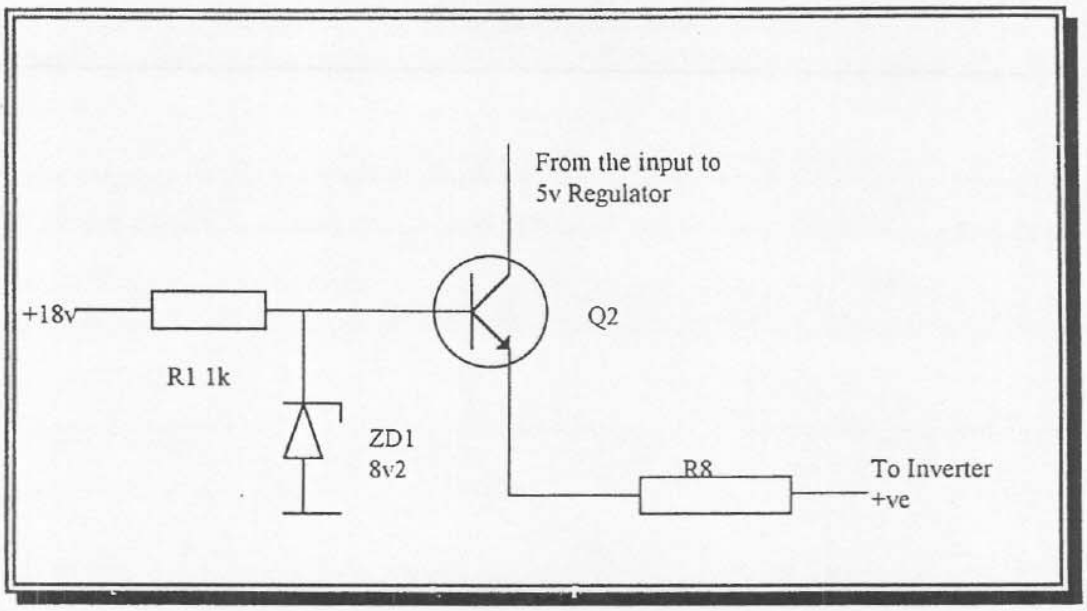
- **Input Output Board Modifications**
  This modification improves the noise floor of the unit and also reduces the amount of inverter noise induced within the unit.

- **Micro-board Modifications For B Version**
  These modifications are for the Version B software and improve unit operation.

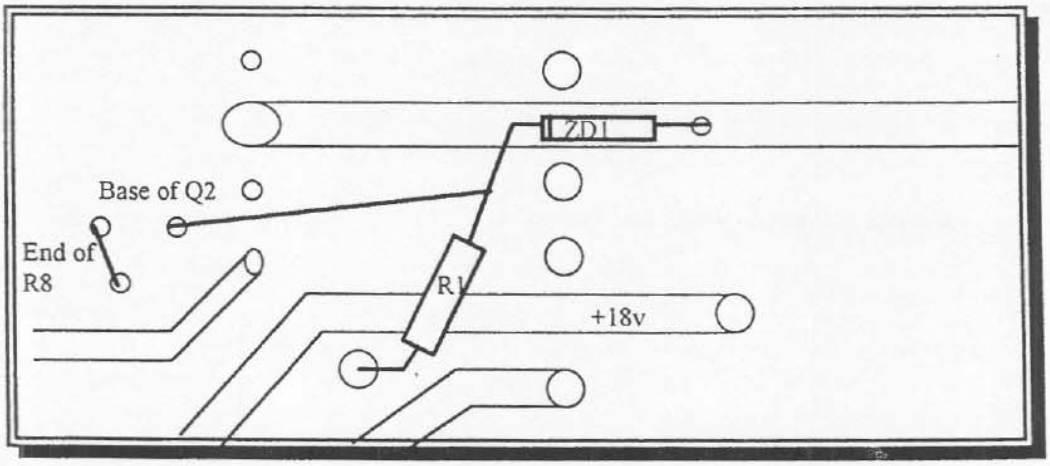
Issue 3 Microprocessor boards

This modification reduces noise pickup from back light inverter to analogue circuitry

R8 and Q2 are not labelled. They are found directly in line with fuse F3. R8 is either a 4R7 or10R. In addition to the modifications show previously, the base of Q2 must be diverted and connected to +18v via a new resistor R1 (1K 5%) and to 0v via ZD1 (8v2 400mW) to form the circuit.



This should be carried out on the underside of the PCB in the area underneath the rectifier diodes D4 to D12, Thus

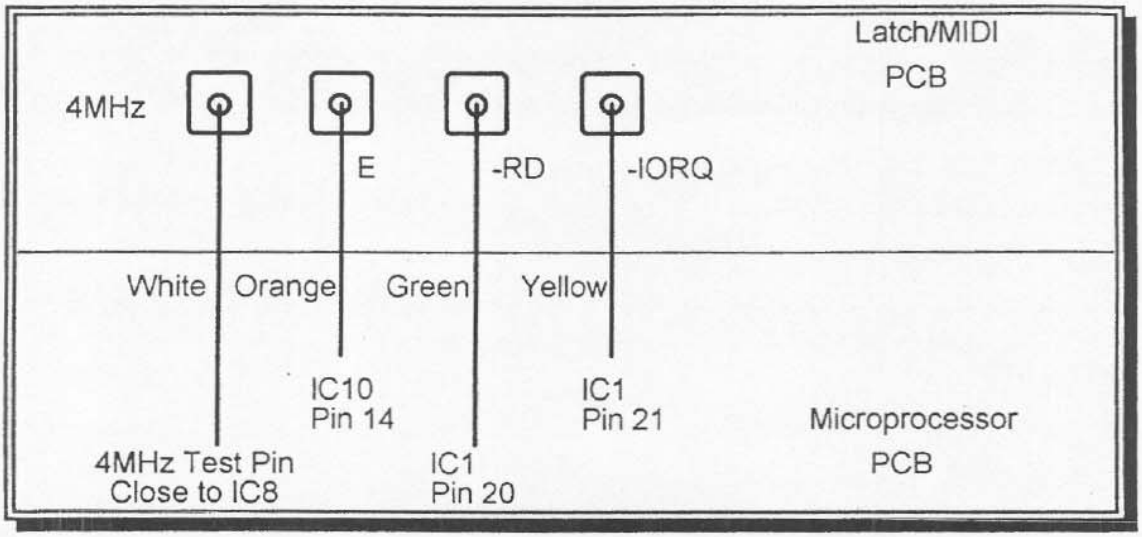


Note: The microprocessor board Issue number - 3 or 4 - is marked on the underside (solder side) of the board, close to the MIDI XLR connectors.

MIDI LATCH BOARD MODIFICATION

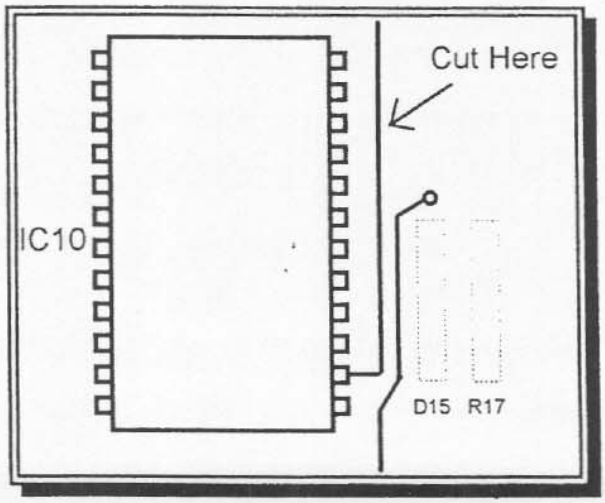
This plug-in board affects a wide range of hardware and software functions, including MIDI operation and audio signal purity.

The Latch/MIDI circuit board plugs onto ST1 on the Microprocessor board in place of the 40-way ribbon from the I/O board. Most DN3600 units already have a latch PCB in this position. This should be discarded. The 40-way ribbon cable then plugs onto the top of the Latch/MIDI PCB. The new Latch/MIDI board should be fixed down via a 10 or 12mm pillar (supplied), depending on the height of the connector on the Microprocessor PCB. 4 Lengths of insulated copper wire from the new PCB should be soldered to parts of the Microprocessor board according to the following scheme:



These wires should be stuck down to the PCB with silicon glue.

Find and cut the track that leads to IC10 pin 14:



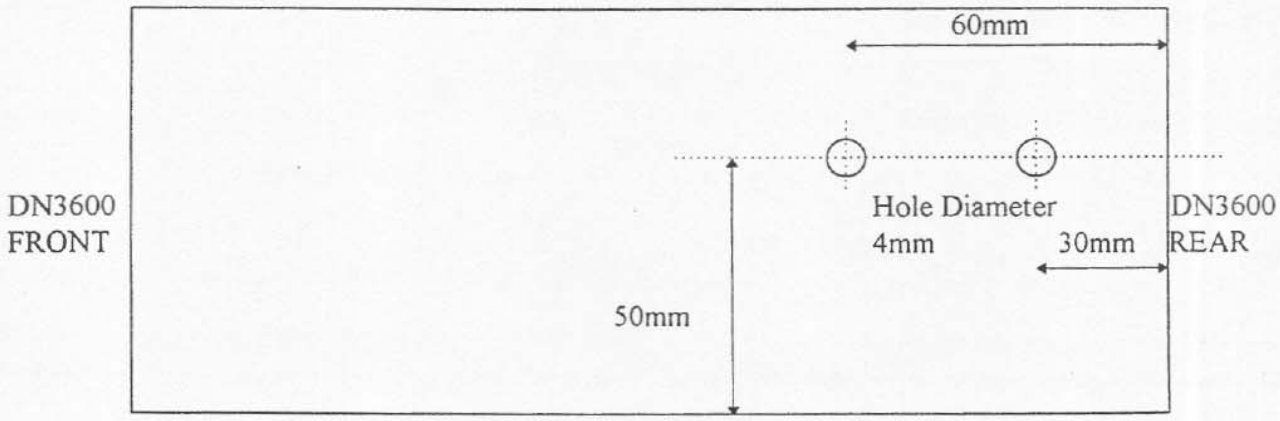
1) Switch More EQ. out on both channels.
2) Flatten all faders.
3) Select the bank from 1K25 to 5K and fully boost the bank.

This will highlight the noise being introduced by the inverter.

Now, listening to the noise, move the inverter along the side of the chassis in the vicinity if the two possible positions as shown by the holes. Try it in both positions - the back pair of holes and the front pair. Also try angling the inverter so that it is not perpendicular to the chassis. In all cases the aim is to null out as much of the inverter tone as possible.
Check that the tone has been nulled successfully on both channels.

When satisfied that it is in its best position, remove the backing from the double-sided foam, and firmly press the inverter to the side of the chassis. Then encircle the inverter with the tyrap, being careful not to trap any wires in it, and pull tight.

Fig 1 New Position of Inverter

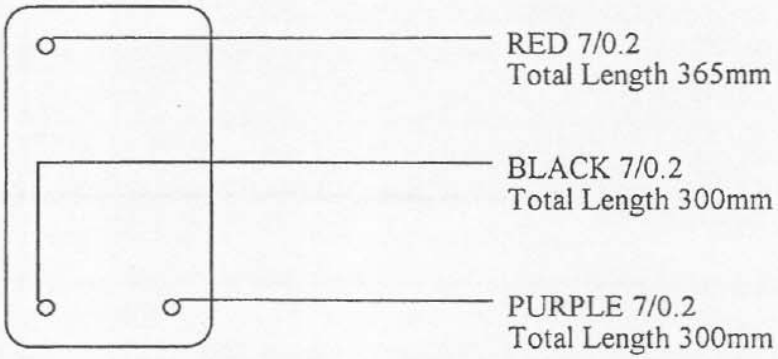


DN3600 Chassis Side View

PREPARATION OF THE INVERTER

Three holes will need to be drilled into the chassis of the DN3600 just to the right of the transformer when looking from the front of the unit see Fig 1.

Solder three lengths of wire to the terminals of the inverter as outlined below:



Insulate the connections with short lengths of heatshrink sleeving.

MODIFICATION TO THE **DN3600 ONLY.**

Insert tyrap (KT part no. H1-CA003) through two of the three holes in the chassis so that both ends are inside the case. Do NOT close the tyrap!!!

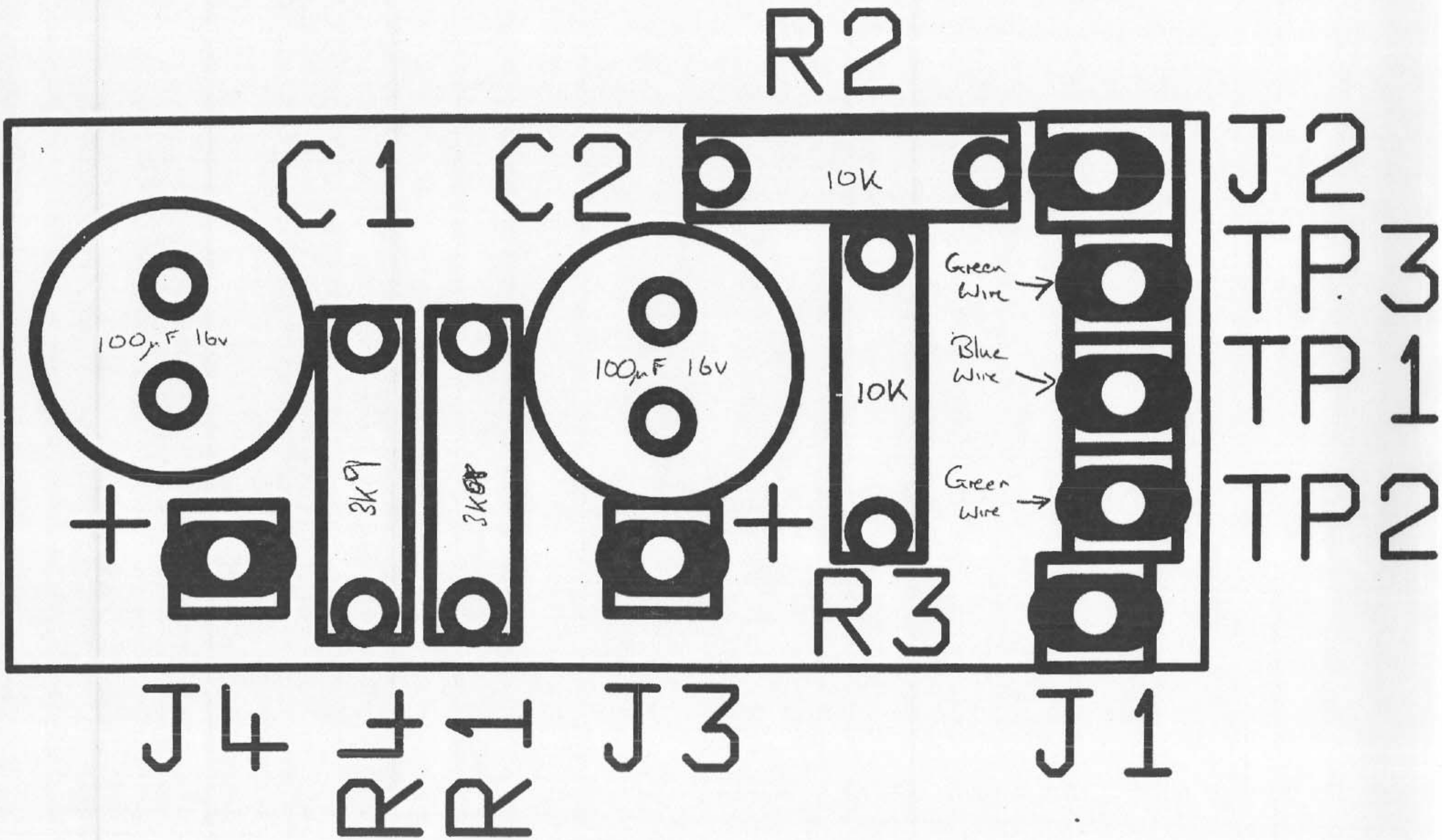
Prepare the inverter by sticking a piece of double-sided adhesive foam to it on the side so that when it is stuck to the chassis by test, the single pin is at the top facing the front of the unit. Do NOT peel off the outer side of the foam - leave it for test to do.

Feed the three wires along the edge of the chassis through the same cable clips as used by the mains switch, and solder the wires onto the pads where the inverter should fit as follows:
The **black** wire in the **front right** hole marked with a '-' sign.
The **red** wire in the **back** hole marked with a '+' sign.
The **purple** wire in the **front left** hole which is unmarked.

Put spots of silicon glue on the board where the wires have been soldered in to the insulate the connections.

INVERTER RE-FITTING PROCEDURE

Before the inverter is secured to the chassis the best position for noise must be found.



R2
C1
C2
10K
J2
TP3
TP1
TP2
100µF 16v
100µF 16V
3K9
10K
Green Wire
Blue Wire
Green Wire
R3
J4
R4
R1
J3
J1