Bel BD80 SERVICE MANUAL

Refer to Audio & Digital Signal flow diagrams and printed circuit board to familiarise yourself with the layout and general expected signals.

All integrated circuits are socketed and we recommend substitution as the main fault finding operation.

The unit will be described as six main areas for defining specific integrated circuit functions :

1 Analogue signal in and out, filters and level adjustments
2 A/D and D/A conversion to obtain 14 digital 'bits' of information
3 Memory card and card sequencing
4 Memory control signals
5 Display and delay setting controls
6 Power supply

1 Diagram 1 shows the Audio signal path. Locate specific areas of faults by following signal path through input to outputs.

2 The following ICs are used in A/D conversion : ½A1 = Buffer & Offset; ½A1 and ½A2 = input sample and hold; A3 = digital to analogue convertor; A4 = comparator, A6 & A7 are a successive approximation register 14 bits wide; A5 is the clock for the register; A8 & A9 are data latches. (Conversion time approximately 12us (A5 pin 11)). VR1 is an input offset control (set for minimum noise peak).

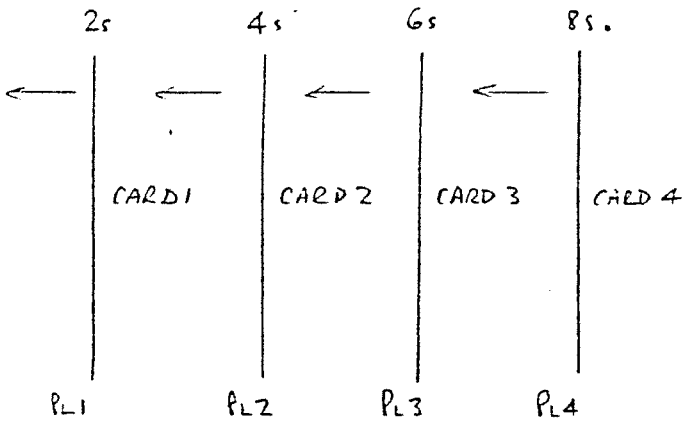
For D/A conversion A10 is the 12 bit digital to analogue convertor; ½A11 is an invertor for bit 13 and bit 14. A13 is the output amplifier and ½A12 and ½A2 are the output sample and hold.

VR2 is adjusted for zero volts change at TP2 when switching from 'sync' position to 'normal' position (use oscilloscope for this set-up).

3 The memory card consists of a 14 bit wide 64k memory.

The 74LS01 IC on this card buffers the control signals RAS, CAS and REF.

The sequence of cards when more than one card is fitted is as follows : eg 8 secs set: Card 4, 3, 2, 1 reset to card 4 etc.



The memory set on the display is counted down to zero and then reset (LED on display will flash). Thus particular card faults can easily be located to particular cards by checking which card is accessed when fault is apparent.

IC A47 sequences these cards and A49 initiates the reset. IC A40 - A44 are delay time control ICs and are set by associated delay setting ICs (A36 - A39).

4 MEMORY CONTROL (See Diagram 2) A45, A46 and A56 are buffers for the address. A51, A52, A53, A54, A55 derive the RAS and CAS and refresh signals and are fed by a master clock circuit A29, A28½ and A31/A33 (÷2) and monostable A34.

A29 is a VCO controlled by A28, A26 (FREQ = 32kHz set by C63).

A27 is the triangular wave oscillator for modulation effects (VCO modulation). The clock is enabled and disabled by A30 (comparator). This comparator is triggered by a peak detect circuit around ½A28 or by SW8.

5 DISPLAY A17 is the main display IC and is an up/down counter and 7 segment display driver. The 7 segment display information is multiplexed to PL5 (display 7 segment and display set buttons PC board).

A14 and A15 are countdown ICs. A18 and A16 drive the counter IC A17.

¼A19, ½A20, A21 and ½A22 control the max and min delay settings (one card fitted =) 2047mS stop and 0mS stop.

DELAY SETTING : A23 is the fast and slow clock for display setting of delay in mS.

Slow speed can be altered by changing value of R46
Fast speed can be altered by changing value of R45

½A22 and A24 gate the counter clock and allow a single delay count increment, or continuous slow or fast up or down count. The delay amount setting ICs A36 - A39 are set by this count.

½A25, ½A20 and ¼A19 control the mute of the audio signal while random information is emptied from the memory. The length of the mute is controlled by ¼A25.

MISCELLANEOUS display data :

When power is applied the max delay fitted is displayed for 10 secs. This is set by a 10 sec delay circuit around ¼A25. Output is high (+5v) for 10 sec and then goes to (0v).

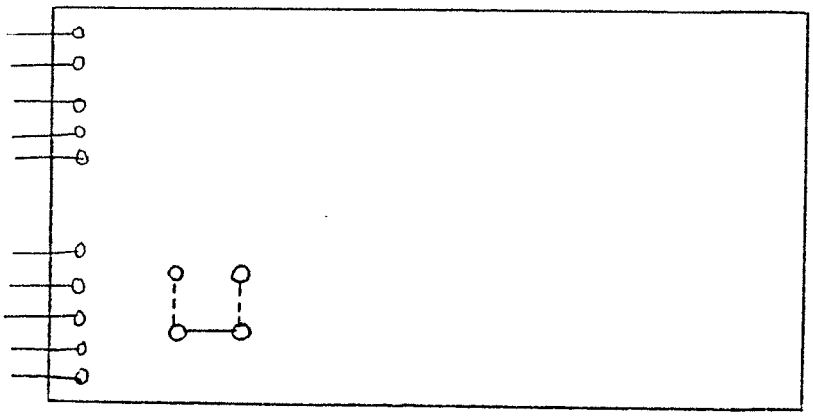
6 POWER SUPPLY

The power supply has 3 output voltages : +5, +15 and -15.
+5 is derived from 11v DC and a fixed 5v regulator ICs, with 2N305/TIP30A Power Transistors increasing current capability.

A crowbar protector circuit using an 'SCR' and 'fuse' are employed for over-voltage protection on the +5v supply rail.

+15 and -15 supplies are derived from +/-21v DC and +/-15 fixed regulator ICs.

MISC: The transformer primary can be altered for 240v or 120v use. The following connections apply :



---- 120V OPERATION LINK THESE ONLY
—— 240V " " " "

Power Supply PC Board

120V

240V

FAULT LOCATING

1 DISPLAY FAULTS ONLY (except no zero stop or max delay stop) NO AUDIO FAULT can be traced to A14, A15, A16, A17, A18, ½A19.

2 NO ZERO STOP OR MAX DELAY STOP can be traced to ICs as above and A36 to A39 and A47

3 DISPLAY FAULT WITH AUDIO FAULT can be traced to A36 to A39, A40 to A44, A47

4 SUSPECT MEMORY CARD FAULT Check all digital signals are present on particular card ie RAS, CAS, REF, WE, A0-A7, 14 bits (data input) (pins 2 - 15) and 14 bits (data output) (pins 16 - 29). Memory cards are enabled by +5v on pin 40 from A47. (Refer to memory card pin out listing diagram).

5 Any input data bits missing can be traced to the analogue/digital convertor (ICs as listed).

6 If all 14 bits of data are present on the card output then fault can be traced to the digital to analogue convertor or sample & hold (ICs as listed).

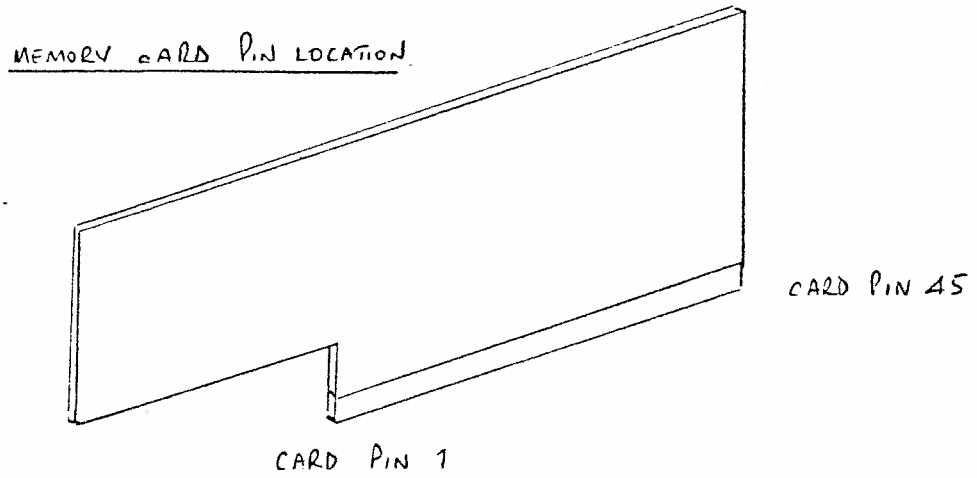
CARD CONNECTIONS :

MEMORY CARD

PIN No:	
1	+5v
2	Bit 1 (MSB) DATA INPUT
3	" 2 " "
4	" 3 " "
5	" 4 " "
6	" 5 " "
7	" 6 " "
8	" 7 " "
9	" 8 " "
10	" 9 " "
11	" 10 " "
12	" 11 " "
13	" 12 " "
14	" 13 " "
15	" 14 (LSB) " "
16	" 14 (LSB) DATA OUTPUT
17	" 13 " "
18	" 12 " "
19	" 11 " "
20	" 10 " "
21	" 9 " "
22	" 8 " "
23	" 7 " "
24	" 6 " "
25	" 5 " "
26	" 4 " "
27	" 3 " "
28	" 2 " "
29	" 1 (MSB) " "
30	REFRESH
31	WE
32	ADDRESS A7
33	A6
34	A5
35	A4
36	A3
37	A2
38	A1
39	A0
40	Card enable
41	NC
42	NC
43	RAS
44	CAS
45	GROUND

BOARD CHECK POINTS :

TP1 Sample & hold (input)
TP2 Sample & hold (output)
X1 Bypass control logic for analogue gate
X2, X3 & X4 Oscillator gate x2 controlled (extra sweep depth)
X5 & X6 Bypass control logic (for analogue gate)
X7 & X8 x2 logic for analogue gates
X9 A/D signal input from FILTER select gate
X10 Mute for 30 secs control to gate (analogue)
X11 As TP2
X12 +15v
X13 -15v
X14 Analogue ground
X15 +5v
X16 Digital ground
X17 Analogue input A/D ground
X18 Analogue output D/A ground



AUDIO SIGNAL PATH

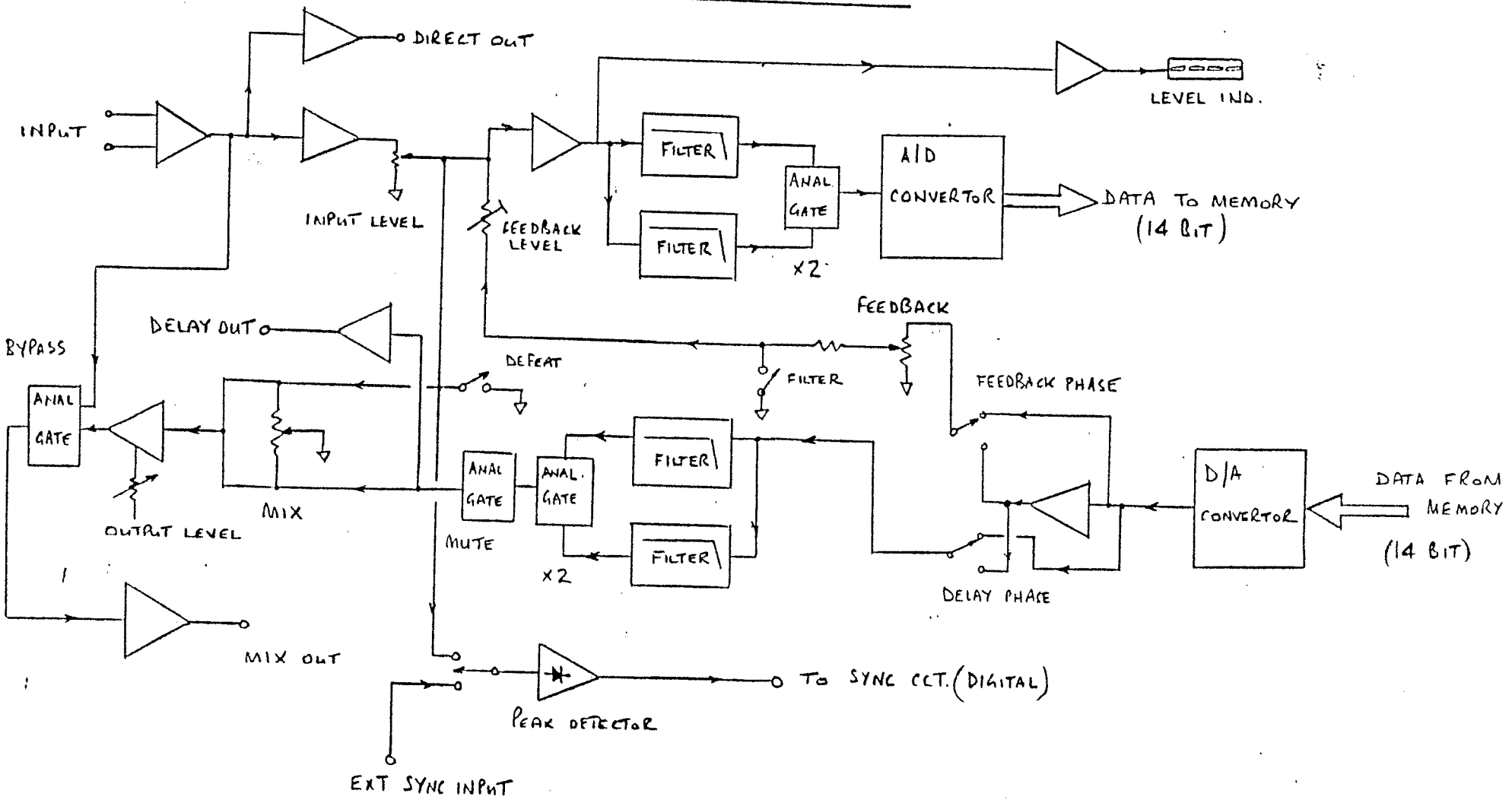


DIAGRAM 1