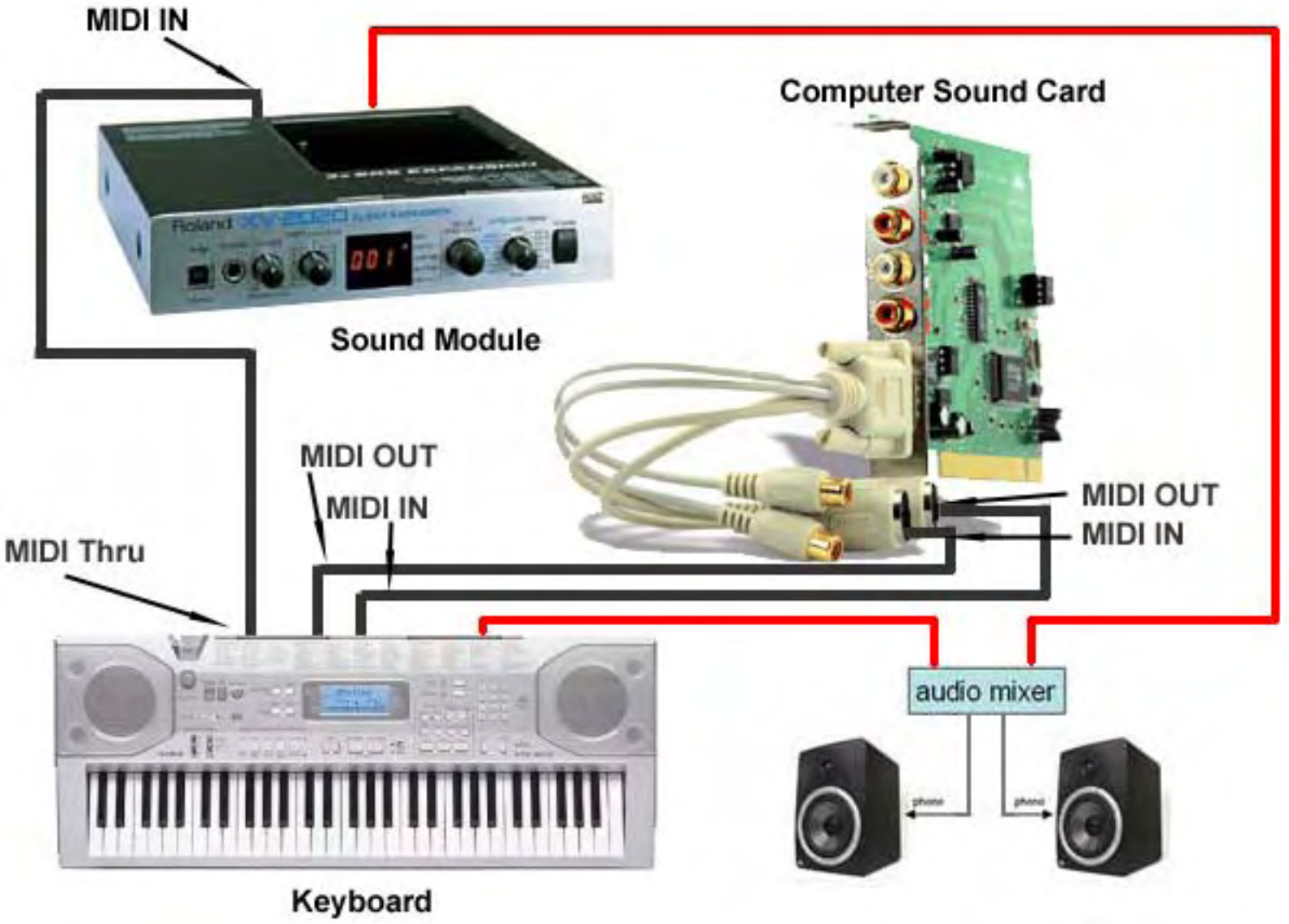
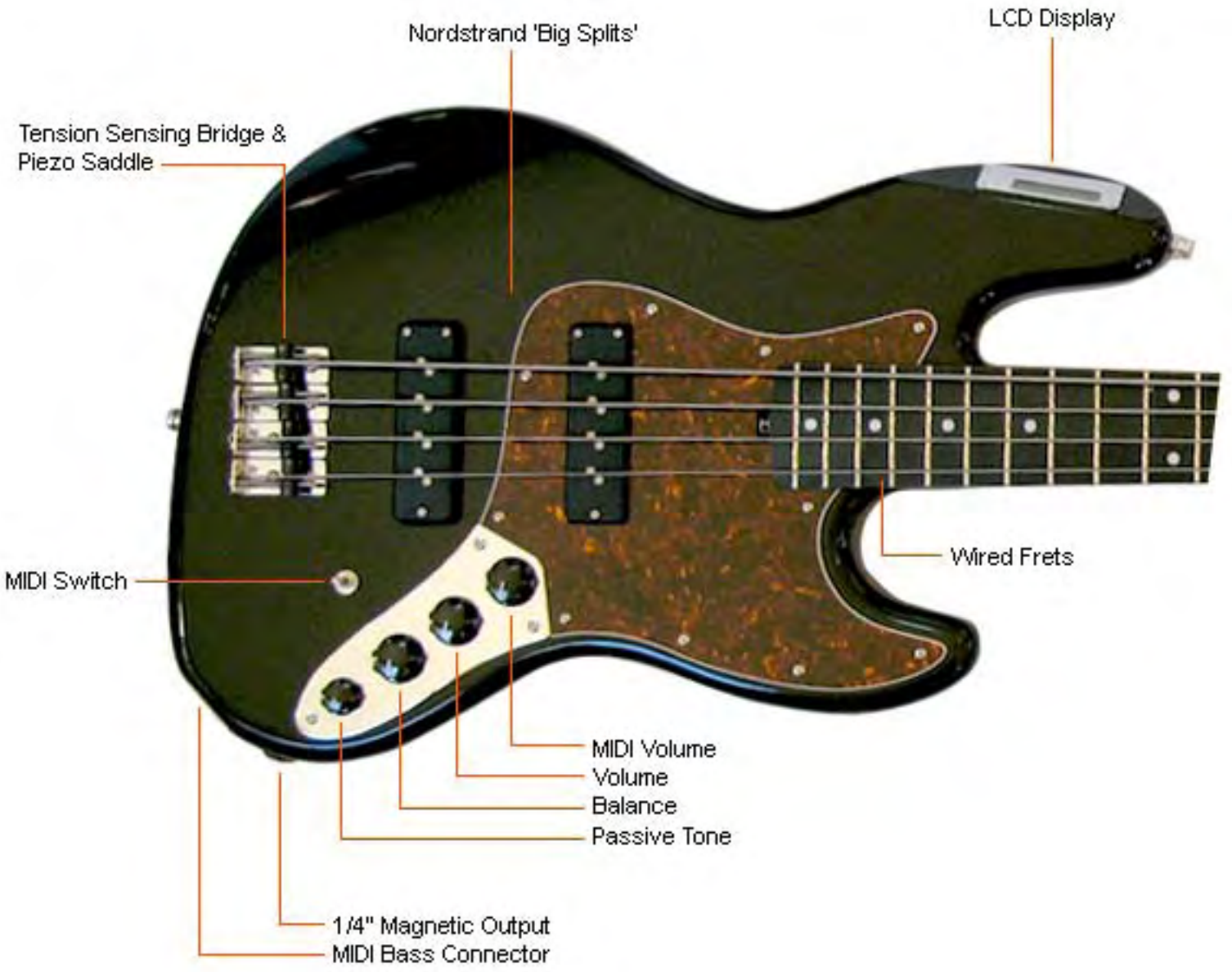
Musical
Instrument
Digital
Interface

Een "taal" om digitaal met muziek instrumenten te communiceren


MIDI IN
Computer Sound Card
Sound Module
MIDI OUT
MIDI IN
MIDI OUT
MIDI IN
MIDI Thru
audio mixer
Keyboard

Meest bekende MIDI instrument

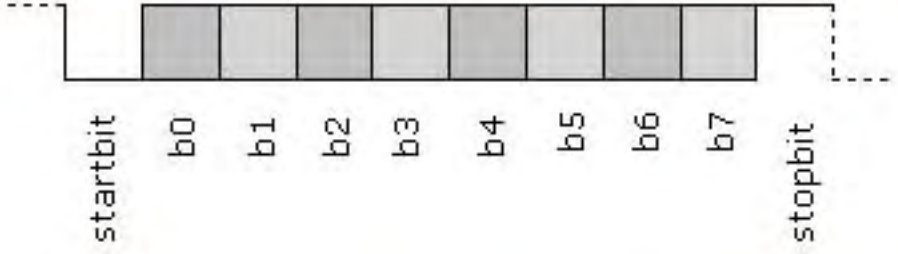

Nordstrand 'Big Splits'
LCD Display
Tension Sensing Bridge &
Piezo Saddle
MIDI Switch
Wired Frets
MIDI Volume
Volume
Balance
Passive Tone
1/4" Magnetic Output
MIDI Bass Connector

CASIO
DH-400

500
DD-55

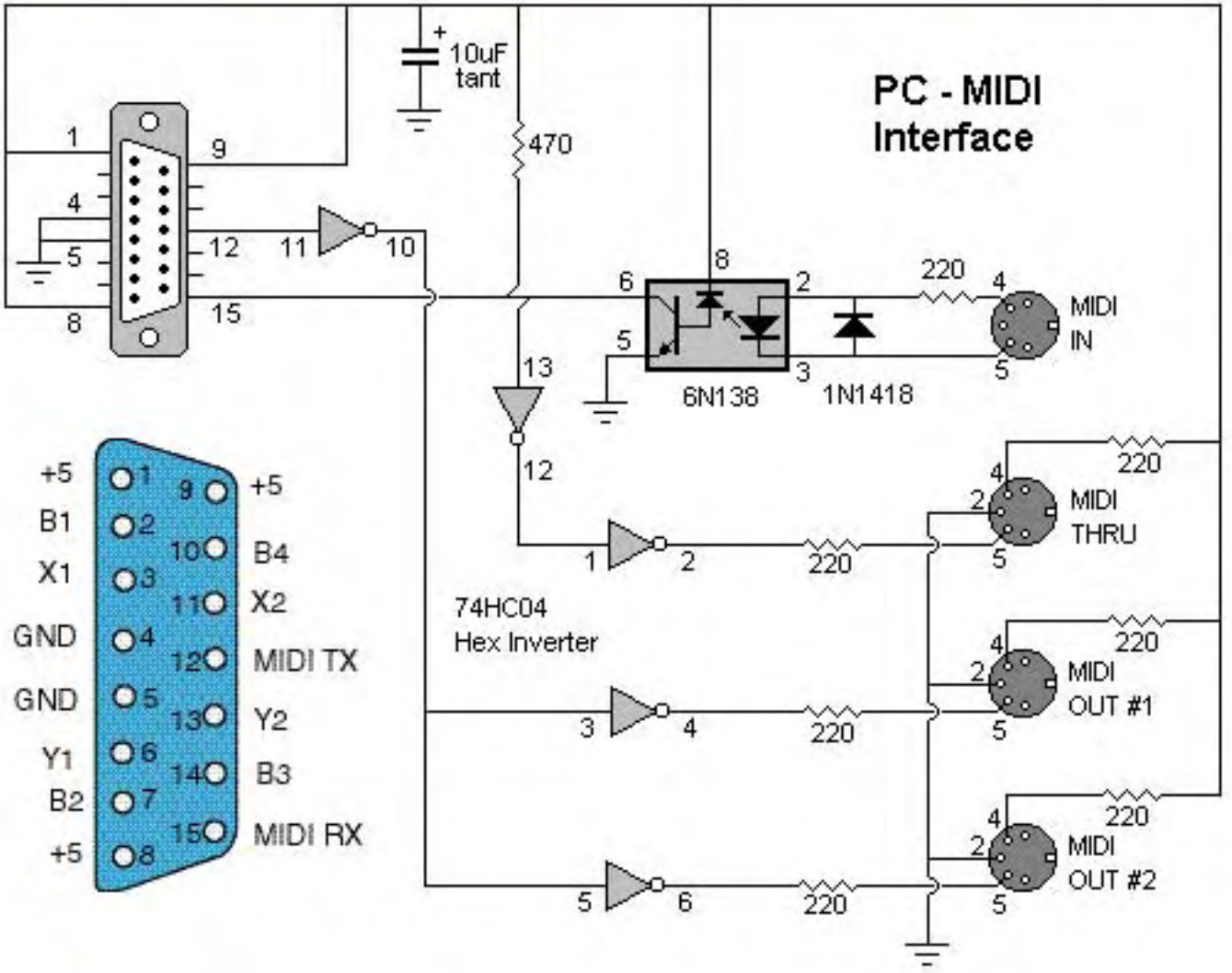
Inleiding Hardware

- seriële communicatie



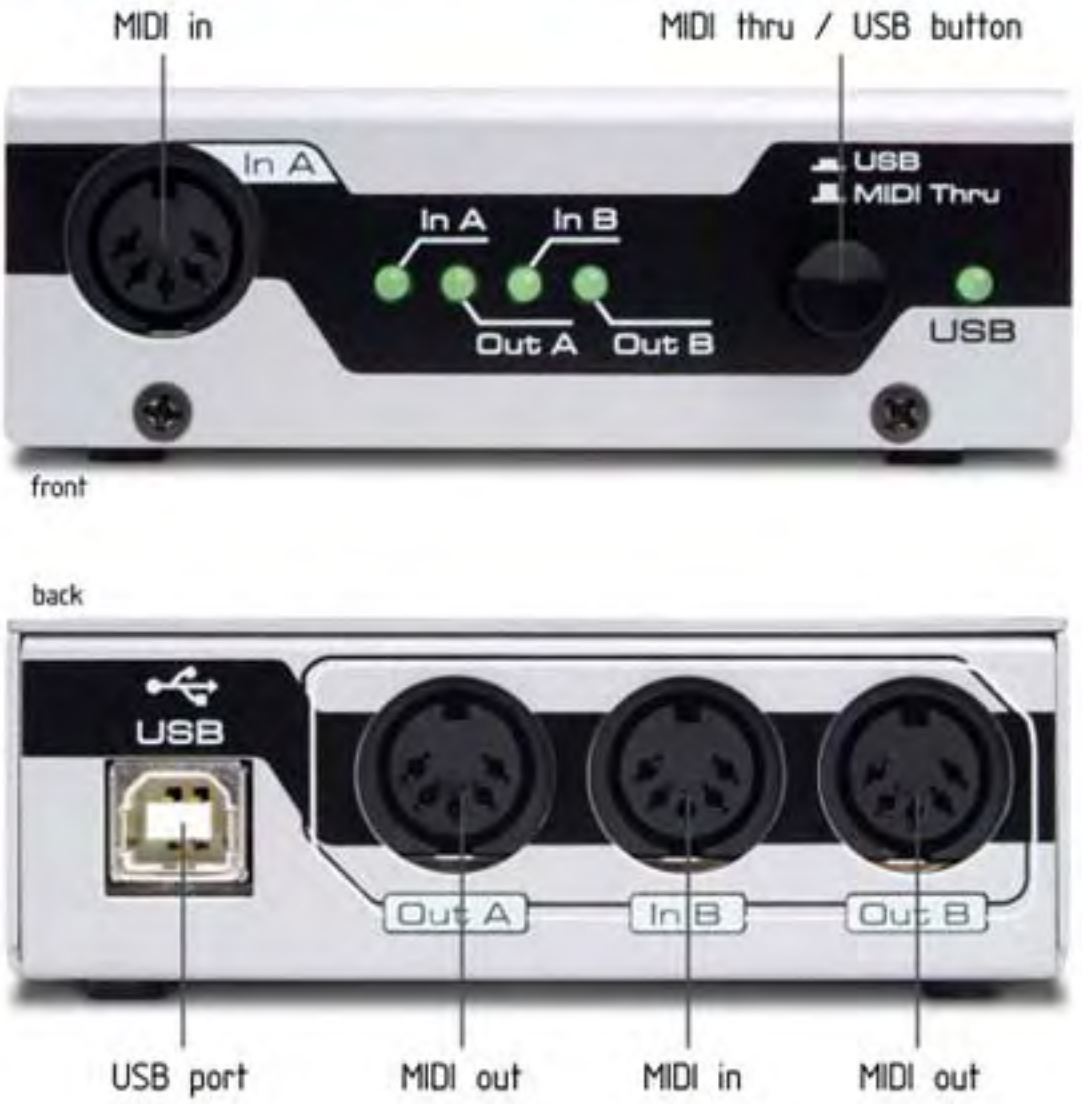
31250 baud, geen pariteitsbit,
8 databits en 1 stopbit.

MIDI Interface (gameport)

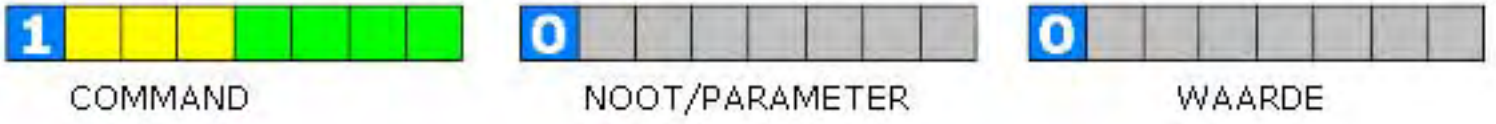


MIDI Interface (USB)

MIDI Interface (USB max 5m)



Data formaat



- 16 kanalen (4 bit)
- 8 groepen commando's (3 bit)
- 128 beschikbare parameters (7 bit)
- 128 beschikbare noten (7 bit)
- Waarde bereik 0 t/m 127 (7 bit)

MIDI boodschappen (bit 7 = "1")

- Kanaal boodschappen
  - Toets (Noot) commando's
  - Mode berichten
- System boodschappen
  - System Realtime berichten
  - System Common berichten
  - System Exclusive berichten

- Toets/Noot commando's
  - Aanzetten van een toon (noot)
  - Uitzetten van een toon (noot)
  - Drukeffect voor enkele toets
  - Gezamelijk drukeffect
- Mode berichten
  - Instrument kiezen
  - Regelaars instellen (bv Volume)
  - Hoogte van toon veranderen

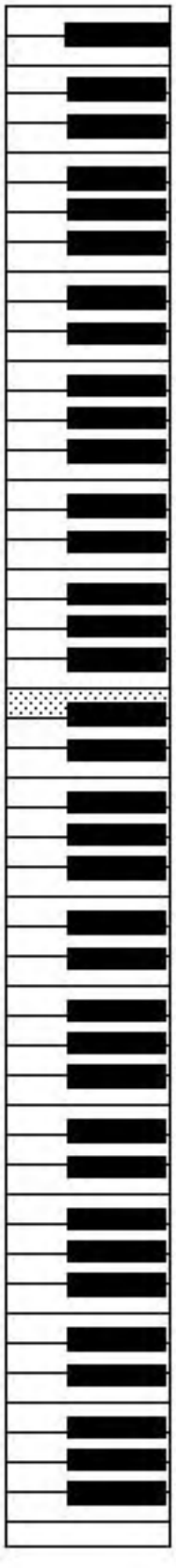
- System Realtime berichten
  - MIDI Klok signaal
  - Start, Hervat, Stop sequencer
  - Systeem opnieuw instellen (reset)
  - Hartslag (active sensing)

- System Exclusive berichten
  - Speciale effecten aansturen
  - Firmware, wavedata etc.
  - Fabrikant extra mogelijkheden

- System Common berichten
  - Song positie regelen
  - Song uitkiezen
  - Instrument stemmen (Tuning)
  - Afsluiten System Exclusive

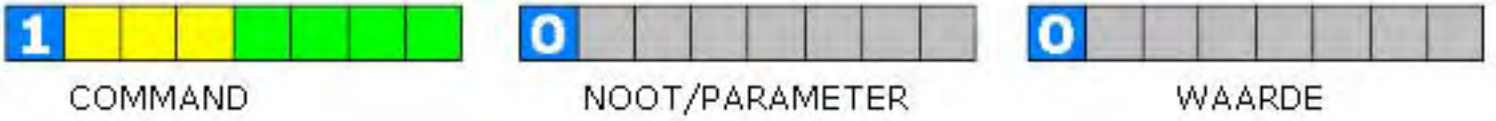
Stemvork 440 Hz (Tuning)

Omzetting toon <=> waarde

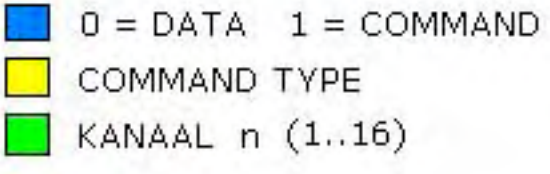
MIDI number	Note name	Keyboard	Frequency
21	A0		27.500
22			29.135
23	B0		30.868
24	C1		32.703
25			34.648
26	D1		36.708
27			38.891
28	E1		41.203
29	F1		43.654
30			46.249
31	G1		48.999
32			51.913
33	A1		55.000
34			58.270
35	B1		61.735
36	C2		65.406
37			69.296
38	D2		73.416
39			77.782
40	E2		82.407
41	F2		87.307
42			92.499
43	G2		97.999
44			103.83
45	A2		110.00
46			116.54
47	B2		123.47
48	C3		130.81
49			138.59
50	D3		146.83
51			155.56
52	E3		164.81
53	F3		174.61
54			185.00
55	G3		196.00
56			207.65
57	A3		220.00
58			233.08
59	B3		246.94
60	**C4**		**261.63**
61			277.18
62	D4		293.67
63			311.13
64	E4		329.63
65	F4		349.23
66			369.99
67	G4		392.00
68			415.30
69	**A4**		**440.00**
70			466.16
71	B4		493.88
72	C5		523.25
73			554.37
74	D5		587.33
75			622.25
76	E5		659.26
77	F5		698.46
78			739.99
79	G5		783.99
80			830.61
81	A5		880.00
82			932.33
83	B5		987.77
84	C6		1046.5
85			1108.7
86	D6		1174.7
87			1244.5
88	E6		1318.5
89	F6		1396.9
90			1480.0
91	G6		1568.0
92			1661.2
93	A6		1760.0
94			1864.7
95	B6		1975.5
96	C7		2093.0
97			2217.5
98	D7		2349.3
99			2489.0
100	E7		2637.0
101	F7		2793.0
102			2960.0
103	G7		3136.0
104			3322.4
105	A7		3520.0
106			3729.3
107	B7		3951.1
108	C8		4186.0

Conversie tabel

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F



8n = Uitzetten van een toon (noot)
9n = Aanzetten van een toon (noot)
An = Drukeffect voor enkele toets
Bn = Regelaars instellen (bv Volume)
Cn = Instrument kiezen
Dn = Gezamelijk drukeffect
En = Hoogte van toon veranderen



F2 = Song positie regelen

F3 = Song kiezen

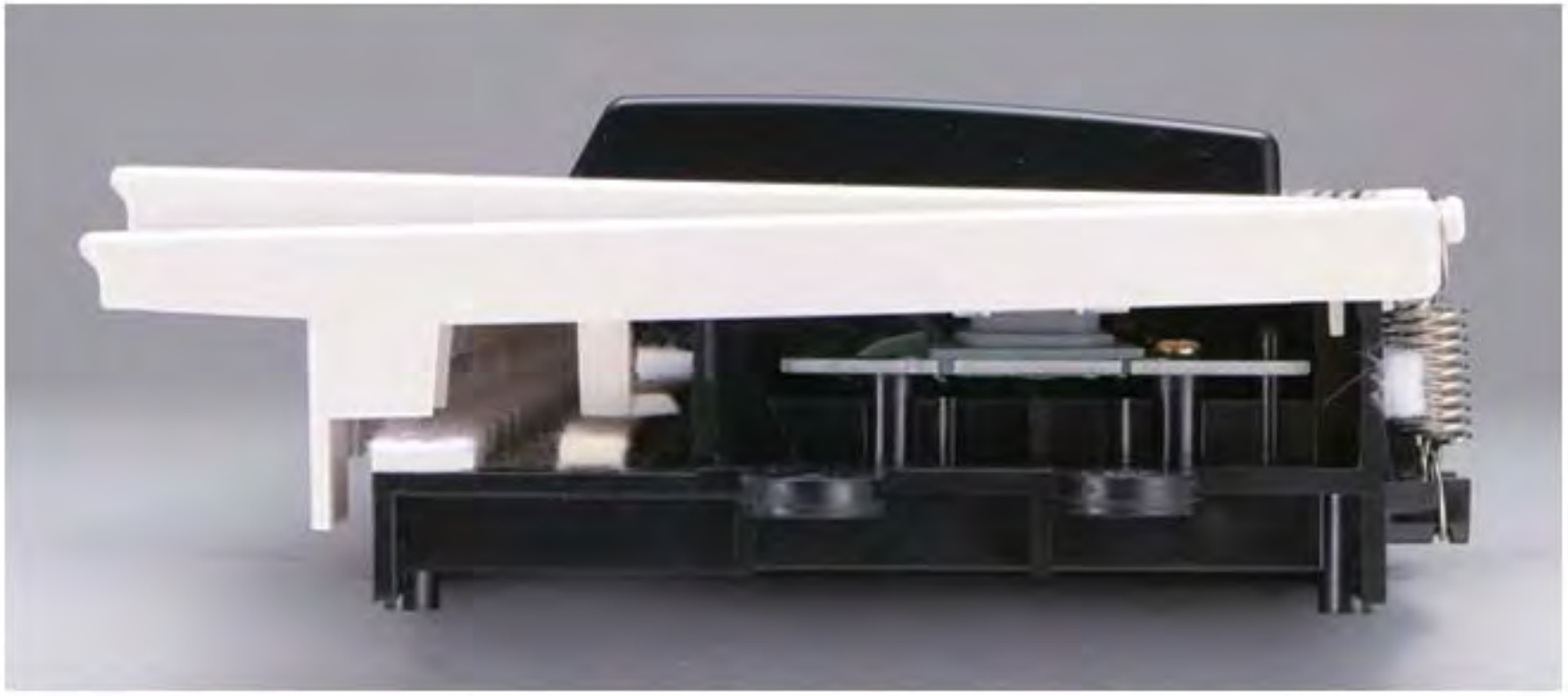
F6 = Instrument stemmen

F0 = Start System Exclusive bericht

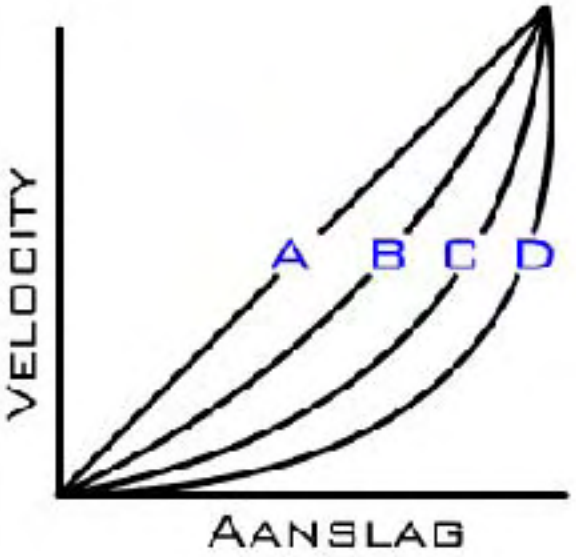
F7 = Einde System Exclusive bericht

F8 = MIDI klok signaal
FA = Start sequencer
FB = Hervat sequencer
FC = Stop sequencer
FE = Hartslag (active sensing)
FF = Systeem opnieuw instellen

Aanslaggevoeligheid (velocity)



Toetsdruk (Aftertouch/pressure)


VELOCITY
A B C D
AANSLAG

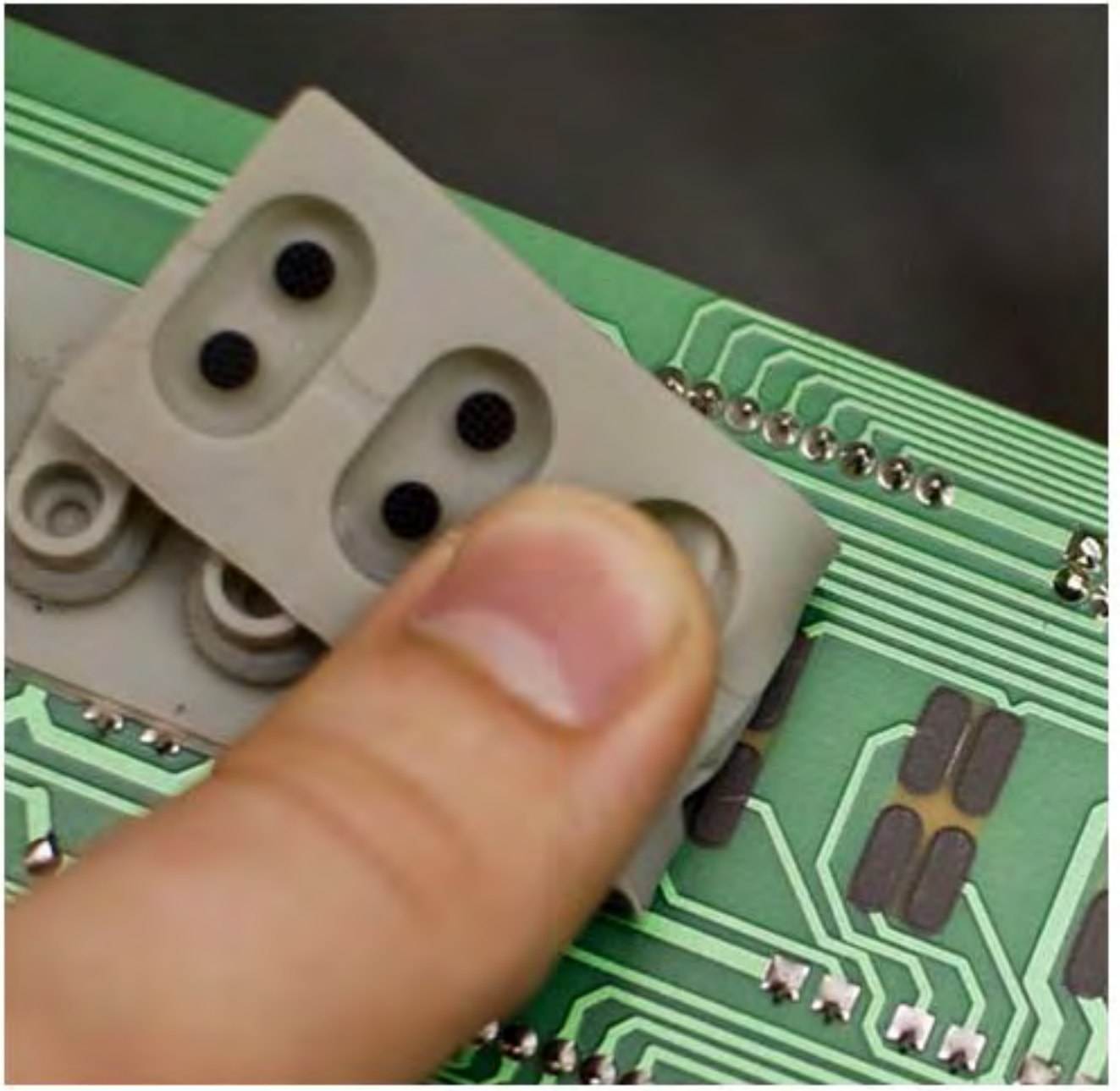
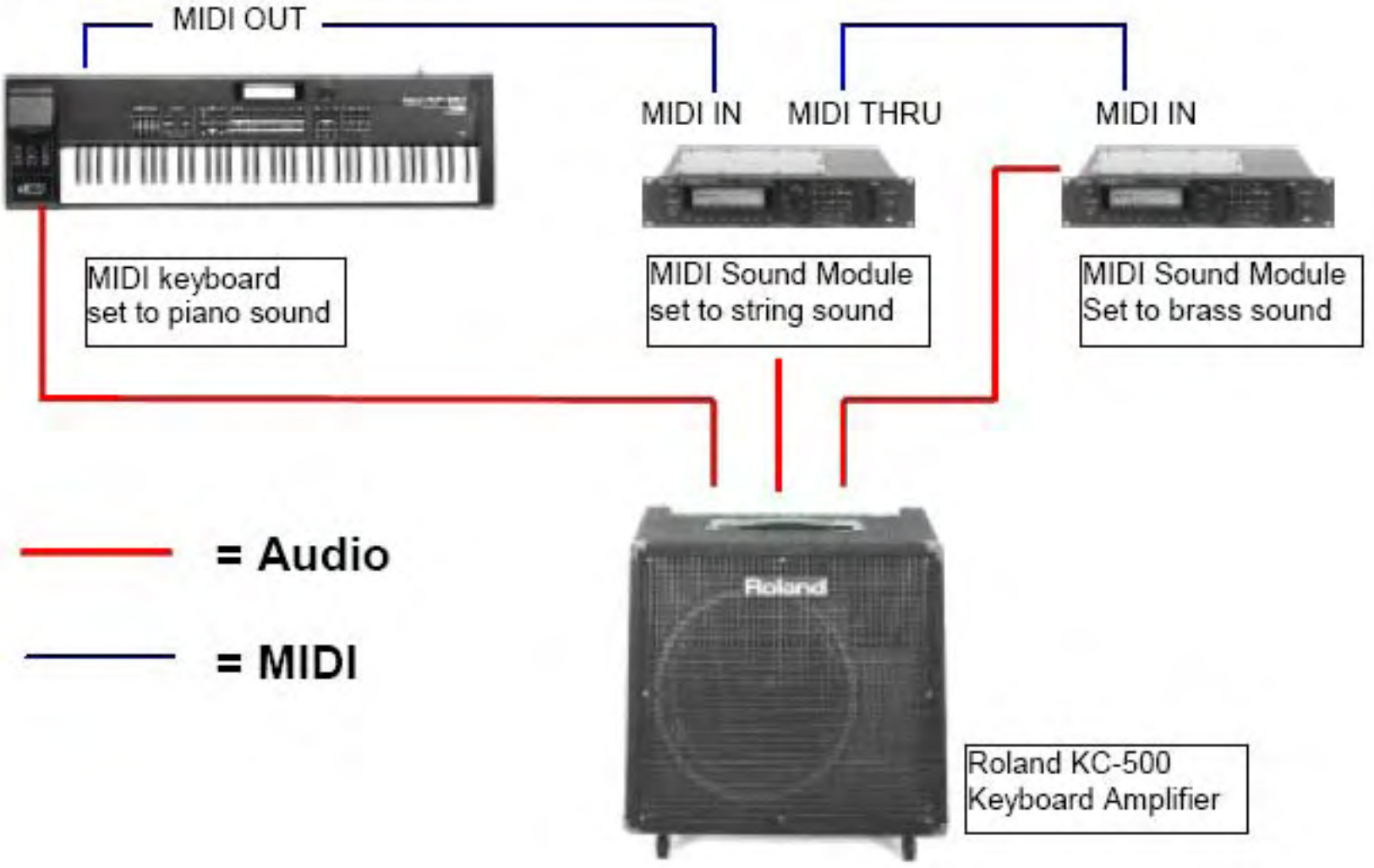


Fig. 3 MIDI and Audio Connections



MIDI Files

- Opslag voor MIDI data
- Tags voor titel, copyright, key
- 3 formaten
  - 0 - Alles op 1 track
  - 1 - Meer tracks (max 256)
- Tags voor entertainment
  bv licht, motoren, lyrics, score

CONCLUSIES

- Simpel protocol
- Voldoet nog redelijk
- Traag om grote hoeveelheden data over te brengen.
  (Nieuwe samples of effecten)
- 30..70 Kb voor ~ 3 minuten
  WAV=30..40 MB MP3=3..5 MB

BESTEMMING BEREIKT!

Vragen ???