Patch Bay Design (Andreas' music studio)

Latest modification: 21.Aug.2015

Upper: Behringer Ultrapatch Pro Px3000 (48 Stereo TRS 1/4" Jacks)
           (all 24 patch modules are switchable to 3 modes: thru, half-normalled, normalled; default normalled, unless half-normalled (broken line) or open (bold red line))

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
	MT1	MT2	MT3	MT4	DI-out	Fbd	Xm l	Xm r	MT5	MT6	MT7	MT8	Co l	Co r	Rgt	AO1	AO2	01W	DP	JV	01W'	JV'	JV"	Al,r	out
	MTI1	MTI2	MTI3	DI-MTI4	MTI5	MTI6	MTI7	MTI8	•	•	•	Igt	Ci l	Ci r	POD	XI1	XI2	AI3-4	AI5-6	AI7-8	XI9-10	XI11-12	XI13-14	XI15-16	in

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
	P1	P2	P3	P4	P5	P6	P7	P8	Stripe	R8Pl	•	•	•	•	•	•	•	•	•	•	•	•	Qsend	AdvQ	out
	R1	R2	R3	R4	R5	R6	R7	R8	•	R8Pu	•	•	•	•	•	•	•	•	•	•	IPX3B	POD I	Qret	BypQ	in

Lower: Behringer Ultrapatch Pro Px2000 (48 Mono TS 1/4" Jacks)
           (all 24 patch modules are switchable to 4 modes: parallel, half-normalled, normalled, open; default normalled, unless bold red line for open)

- •   No connection made at the back of patch bay
        Colors group devices, e.g. MTx and MTIx are two groups of channels of the pivotal Traveler mk3, or beige for RX1602 line mixer

———	full-normalled (=normalled)	Any connector plugged into patch bay interrupts, regardless wether plugged into top or bottom
– – –	half-normalled	Only bottom connector plugged into patch bay interrupts, i.e. top can be used to patch a Y-connection on the fly
▬▬▬	open (=thru)	Top is separated from bottom connector
═══	parallel	Top and bottom are always connected

░░░	Deprecated (not yet removed) functionality

inputs

MTIx	Input x into MOTU Traveler mk3 interface (balanced, TRS->XLR or TRS->TRS)
	MTI1..MTI4 use XLR connection of combo jacks; MTI5..MTI8 balanced TRS
	MTI4 is special: TS -unbalanced-> DI-box -balanced-> XLR
DI-MTI4	Input to DI-box (unbalanced, TS), connecting its XLR out (balanced) to MTI4
AIx	Input x into ADAT expander Focusrite OctoPre MkII
	AI1..2 at front of device (not available at patch bay)
	AI3..8 available at the patch bay (unbalanced, TS l,r <= TRS)
XIx	Input x to RX1602 line mixer (XI1..XI8 balanced, TRS; XI9..XI16
	unbalanced TS l,r <= TRS; XI11..XI16 operating at +4dBu)
Ci l,r	Compressor input (balanced left, right, TRS->TRS)
Ph l,r	Head Phone extension cable ending at right end of CLP (ordinary stereo)
	invisible connection (CH 3 from back of headphone amp AMP800)
Igt	Input for guitar => to Preamp Quadraverb GT (unbalanced)
AdvQ	Advance Quadraverb GT (non latching footswitch)
Qret	Return to QuadraVerb GT from external effects loop
IPX3B	Input to Pandora PX3B bass multi effect processor (unbalanced)
IPOD	Input to POD X3 (unbalanced)
Rx	Record to track x of Fostex R8 (cinch)

outputs

MTx	Out from MOTU Traveler mk3 interface (balanced cables planned, TRS->TRS) ‡
	MT1,2 invisibly y-ed to input A of AMP800
DI-Out	DI-Box unbalanced mono output (not link output)
AOx	Analog output x from ADAT expander Focusrite OctoPre MkII (balanced, TRS->TRS rectangular)
	AO1..2 at patchbay, AO3..8 hidden go to XI3..8 (all balanced, TRS) *
	All 8 channels go also digitally to Traveler mk3 (ADAT optical) where they can be mixed in CueMix FX
Xm l,r	Output from RX1602 line mixer (balanced, TRS->TRS) - invisibly y-ed to input B of AMP800
Co l,r	Compressor output (balanced left, right, TRS->TRS, +4dBu)
Fbd	Warwick Floorboard for effects output (unbalanced, +5 dBm (≥10kΩ))
	Could possibly be improved to a balanced connection from B3's XLR output
Rgt	Return guitar <= from Quadraverb GT (unbalanced, Stereo)
BypQ	Bypass Quadraverb GT (non latching footswitch)
Qsend	Send from QuadraVerb GT to external effects loop
PX3Bl,r	Output from Pandora PX3B bass multi effect processor (stereo, unbalanced)
POD	Stereo line output from POD X3 (stereo, unbalanced)
Px	Play track x from tape recorder (Fostex R8) † (cinch)
P8	Invisibly y-ed twice to SMPTE In of MIDI interface and of MTC1
Stripe	Signal from MIDI interface for striping of track 8

sound sources (outputs)

01W	Korg 01/W l,r (01/W' l,r = optional out 3,4) (unbalanced)
DPl,r	Yamaha CLP 123 digital piano (unbalanced)
JV	JV-2080 l,r (JV',JV" = direct 1,2 out l,r) (unbalanced)

Al,r	Output from external amplifier (select by FUNCTION knob) (unbalanced)
Ml,r	Mac out for headphones (mini jack out, mutes Mac built in speaker)

Fix cabling (possibly invisible and may not be accessible at the patch bay):

MT1,2	Main out from MOTU interface (left, right) (channel 1 and 2) => y-ed to headphone amp AMP800 INPUT A (left, right, balanced) (doubling adapters y' are at patch bay)
LOA	LINK OUT A from back of headphone amp AMP800 goes to external amp (preamp Rotel RC-972)
Xm l,r	Main out from XR1602 line mixer y-ed also to headphone amp AMP800 INPUT B (left, right, balanced) (doubling adapter is at back of line mixer)
Ph l,r	Headphone extension cord going to the right edge of CLP (Yahama digital piano) coming from PHONES OUT 3 at the back of headphone amp AMP800
Ph l,r'	Headphone extension cord going towards the Mac near the keyboard (two red cable ties) coming from PHONES OUT 4 at the back of headphone amp AMP800
DI-MTI4	Signal goes first to DI Box (mono) then -> MTI4 (XLR); DI Box needs phantom power on the XLR out connection (switch it on at front of Traveler mk3)
AO3..8	Connect to XI3..XI8 (balanced, TRS->TRS, mirroring digital outputs AOd3..8 of ADAT expander)
OptA,B	Two optical cables connect OPTICAL OUT from Focusrite OctoPre MkII to the MOTU Traveler mk3 OPTICAL IN A and OPTICAL IN B
WC	Word clock cable connects WORD CLOCK IN of Focusrite OctoPre MkII with the WORD CLOCK OUT of the MOTU Traveler mk3
DAT	Analog line out from DAT goes only to external amp (knob FUNCTION)
DATd	Digital output of DAT goes directly to digital input of Traveler mk3 (RCA S/PDIF)
DATdl	Digital signal from Traveler mk3 goes directly to digital input of DAT (RCA S/PDIF)
CD1	Digital (optical Toslink connection) output of CD player 1 is dangling for ad-hoc connections (left of 01/W)
P8	Sync => MTC1 in & SMPTE In of MOTU MIDI Interface (twice Y-ed)

Cable colors for all cables connecting to the patch bays are shown below. Here some excerpts for a few devices (after slash color of cable tie):
*   * Cable colors: AO1 - black/blue; AO2 - black/red; AO3 - blue; AO4 - yellow; AO5 - green; AO6 - white; AO7 - black; AO8 - red (AO3..8 rectangular TRS)
*   † Cable colors: P1 - red; P2 - blue; P3 - orange; P4 - yellow; P5 - green; P6 - white; P7 - black; P8 - brown (RCA Cinch, D')
*   ‡ Cable colors: MT1- black/blue; MT2 - black/red; MT3 - grey; MT4 - orange; MT5 - white; MT6 - yellow; MT7 - green; MT8 - blue (MT1,2 balanced TRS, MT3..8, unbalanced TS)

Notes:
Normal usage

Listening Music
Plug headphones into Behringer headphone amp AMP800 (input A comes from MT1,2, B from Xm l,r)
Use external amp (connected to LINK OUT A of the headphone amp AMP800, there is no LINK OUT B)
Plug headphones into MOTU interface outlet PHONES to listen to the Mac and the mix (max level 0dB)
Listen to external amp playing a CD, DAT, Mixer etc. via external amp/speakers or headphones connected to the amp (knobs FUNCTION, MONITOR)

Listen to Mac via Ml,r (may require PrefPane redirection)
You can plug headphones into the front jack on many other devices, e.g. XR1602, CD, DAT, JV, DP etc.

Playing bass or guitar
No patching needed; Fbd output (from floorboard) connects directly to MTI6 (use reference level of +4 dBu)
Alternatively patch Fbd to DI-MTI4 (DI-box->XLR input MTI4) to profit from Traveler mk3's OVERLOAD PROTECTION (engaging PAD and phantom power)
Use AI1, AI2, or DI-MTI4 (DI-box->XLR input MTI4) to play instruments dryly (or perhaps only through compressor Behringer Composer MDX2000)
    Note, DI-box (DI-MTI4) is phantom powered and requires the 4th phantom switch on the front of the MOTU Traveler mk3 turned on
Use Igt to feed an instrument first through QuadraVerb GT and patch Rgt (TRS, stereo, unbalanced) into input of choice
Directly hook up bass to any other input (MTIx, Aix, Xix) if signal is coming from a DI-Box, e.g. as provided by B3 or Radial StageBug™ SB-2 passive DI on Pedaltrain nano
Ci l,r and Co l,r connect to «Composer MDX 2000» and can also be used as a through signal while the device is not powered on (or IN/OUT button not engaged)
To use the POD X3 patch Fbd to POD I (TS) and patch POD (TRS stereo output (unbalanced) from POD X3) to input of choice
Altnerative use IPX3B to tune and play bass via the Pandora PX3B personal multieffect processor and patch output PX3B into input of choice
You can use an extra cable to use the Aux input of Pandora PX3B (the latter not available at the patch bay), e.g. connect AI,r with it

Singing and Microphones
Use AI1, AI2, MTI1..MTI3, DI-MTI4 (DI-box->XLR input MTI4) to plug in mic
If the mic is an electret mic, me sure phantom power is off!!!
If the mix is a condensor mic, make sure the corresponding phantom power switch is on
Ci l,r and Co l,r connect to «Composer MDX 2000» and can also be used as a through signal while the device is not powered on (or IN/OUT button not engaged)

MOTU firewire audio interface (Traveler-mk3)
Use the MOTU *Audio Setup* application to specify use of all I/O channels for monitoring and routing
Use the MOTU *CueMix FX* application to mix all signals to the main out MT1,2 of the MOTU Traveler mk3
MOTU interface is normally set to monitoring, i.e. it outputs all what it receives at its input channels at the current default outputs, normally Analog 1-2
You can use the MOTU interface's phone output (MTpl,r on front) to listening/monitoring the main output (mix) of the MOTU interface
For hard disk audio recording patch the wanted signal into any MTIx or AIx channel
Use Xm l,r to input (listen, recording) the mixdown from Behringer RX1602
Main output is MT1,2, mirrored via hidden y-connection also at headphone amp AMP800 (input A)

ADAT expander (Focusrite OctoPre MkII)
Use AI1,2 for direct hookup of b, g, or mik (that signal is also output as balanced signal directly at AO1,2)
By default AO1,2 are patched to XI1,2 (but are offered on patch bay for repatching)
Note that AI3..8 are also output directly as balanced analog signal at AO3..8, which are hiddenly connected to XI3..8
Use Cuemix FX to mix all digital signals coming via OptA (AOd1..AOd4) and OptB (AOd5..AOd8) from ADAT expander

Line mixer (Behringer RX1602)
All outputs AO1..8 are input to first 8 channels of the line mixer, i.e. XI1..8
Remaining signals from synthies are input to channels 9..16 of the line mixer, i.e. XI9..16
Main output is Xm l,r, mirrored also at headphone amp AMP800 (input B)

Compressor (Behringer Composer MDX 2000)
To use the compressor patch into Ci l,r and patch into Co l,r to get the compressed signal
Behringer Compressor has fully balanced connections and a hard bypass function (bypass works without power on)
Both channels are set via button at the back to operate at +4 dBu
Behringer Compressor has an external key function, which is currently not supported, since no connections are made to those connectors on the back

DAT (no longer master mixdown media)
To listen to DAT (only play, no recording) set external amp FUNCTION to DAT (DAT line out outputs are connected only to the amp)
Transfer digitally (S/PDIF) data from DAT to Mac for hard disk recording via digital connection (invisible, see «Wie mache ich Musik» for details)
For recording to DAT you can still use the signal from Link A at AMP800 with main mix (however, mastering to DAT is no longer recommended, use hard disk recording instead)

Fostex R8
Tape track 8 is normally reserved for LTC/SMPTE synchronization with MIDI recorder
To record reference tones connect the test tone oscillator directly to R1..**R7 (assuming tape is striped and track 8 contains LTC/SMPTE signal)**
Patch any signal to be recorded to R1..R4 (while signals are duplicated as follows: R1->R5, R2->R6, R3->R7 assuming track 8 is left untouched since tape is already striped)
To use tape track 8 as a normal audio track, you have to patch the audio signal into R8
To stripe a tape patch Stripe to R8 and record the LTC/SMPTE as produced by the MOTU MIDI interface
P8 is y-ed 1st at Fostex R8 output to its MTC1 and a 2nd time (back of patch bay) to the LTC/SMPTE input of the MOTU MIDI interface
To playback P1..P7 of Fostex R8 tape patch P1 .. P7 best to AI1 .. AI 8 (set of patch cables prepared: 2 x M, 3 x Y)

CD player in extendible rack (CD1)
Listen to CDs via AI,r (see above)
Record digitally from CD player via Toslink (optical) cable, which is dangling for ad-hoc connections (left of 01/W)

Repatching Hints
Outputs can be easily y-ed (e.g. important when using parallel or half-normalled connections); but **NEVER Y or MERGE an INPUT!**
Channels on both patch bays are either normalled or open, meaning that all patching opens the connection from the output to the input below (if not already open)
        and none are half normalled in this patch bay design
To use the first, PRE-AMP section of the QuadraVerb-GT for guitar tracks, patch the guitar signal to Igt and Rgt to the input of a free mixer channel
        (Note, in this case the active effect of the QuadraVerb-GT's must use the send/return loop, i.e. PRE-AMP parameter EFFECT LOOP = IN)

Currently not in use:
Itu   Cable dangling and still connected to tuner above CD 2 (diskman besides Mac keyboard)

POD X3 outputs are balanced, but cables are not balanced. Sound quality may gain from balanced connections throughout
POD X3 output signal via metal female<->female connector may need to be replaced, since it can cause a very loud hum if shielding signal opens (bending of "multicore" cable is sufficient)

Cabling   (B cables are meant to be balanced and if plugged into a combo connector they go into the line connector plug (not XLR part)

Colors of slanted stripes denote the color of the cable tie(s) attached to the cable on top of the cable color (*Excel* fill color)   silver plug (Neutrik jacks come in silver and black variants)

Black cables are shown in dark grey only, grey cables are shown in light grey, white cables have a thin border

same cable set   same cable set

		B		B	M			Brect	Brect	B	B	B	B	Bxl	Bxlr	Y			y	y	Y	y	Y	y	y
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
MT1	MT2	MT3	MT4	DI-out	Fbd	Xm l	Xm r	MT5	MT6	MT7	MT8	Co l	Co r	Rgt	AO1	AO2	01W	DP	JV	01W'	JV'	JV''	AI,r		out
MTI1	MTI2	MTI3	DI-MTI4	MTI5	MTI6	MTI7	MTI8	•	•	•	lgt	Ci l	Ci r	POD	XI1	XI2	AI3-4	AI5-6	AI7-8	XI9-10	XI11-12	XI13-14	XI5-16		in
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Bxlr	Bxlr	Bxlr	M & xlr	B	B	B	B			M	Bxlr	Bxlr	Y	B	B		Y	Y	Y	Y	Y	Y	Y		

D'	D'	D'	D'	D'	D'	D'	M	M	M												M	M		
							M yM & D'																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
P1	P2	P3	P4	P5	P6	P7	P8	Stripe	R8Pl	•	•	•	•	•	•	•	•	•	•	•	Qsend	AdvQ		out
R1	R2	R3	R4	R5	R6	R7	R8	•	R8Pu	•	•	•	•	•	•	•	•	•	•	IPX3B	POD l	Qret	BypQ	in
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
D'	D'	D'	D'			D'		M													M	M	M	

Cable types:

y   1/4" Jack TRS =< 2xRCA Cinch (female) (Y-connector)

y'   1/4" Jack TRS =< 2x1/4" Jack TRS (female) (Y-connector)

y''   1/4" Jack TRS =< mini jack TRS (female) connecting to Y-cable (2xRCA Cinch male at end)

yM   All 1/4" Jacks mono (Y-connector)

(actual plug can be stereo, but will function as mono if TS-plug (Tip-Sleeve) plugged in

Y   1/4" Jack TRS =< 2x1/4" Jack (Mono) (Y-cable)   TRS (Tip/Ring/Sleeve) Y-cable: Tip~Left, Ring~Right (R~R)

Y   Same as Y but mono ends are inserted into patch bay

(other end is in channel access or bus insert)

Y'   1/4" Jack TRS =< 2xRCA Cinch (male) (Y-cable)

ym   Mini Jack TRS =< 2xRCA Cinch (male)

<   1/4" Jack TRS < Mini Jack TRS

Hm   Mini jack TRS headphone adapter (6 mm => 3.5 mm) to connect headphone extension cable

M   1/4" Jack TS == 1/4" Jack TS (unbalanced || cable)

B   1/4" Jack TRS == 1/4" Jack TRS (|| cable)

B'   1/4" Jack TRS == XLR (||| cable)

xlr   Ordinary XLR balanced connection: XLR male ==> XLR female (all 3 connections made)

Bxlr   1/4" Jack (balanced TRS) ==> XLR (all 3 connections made)

Mxlr   1/4" Jack (Mono, TS) -- XLR (1 (shielding) shorted with 3 (- phase))

R   2xRCA Cinch (male) == 2xRCA Cinch (male) (|| cable)

r   RCA Cinch (male) -- RCA Cinch (male)

D   1/4" Jack (Mono) -- RCA Cinch (male)

D'   1/4" Jack (Mono)-RCA Cinch (female) adapter <-> RCA Cinch (male) <--> RCA Cinch (male)

S   1/4" Jack TRS == soldered to wall mounted rack plug (external rack connection)

S'   1/4" Jack TS == soldered to wall mounted rack plug (external rack connection)

S''   1/4" Jack TRS == soldered to wall mounted rack 2 RCA (stereo) plugs (external rack connection)

X   1/4" Jack TRS >>=<< 1/4" Jack TRS (crossed quadruple Y)

Labeling

Labels on patch bay are rectangles of 6 by 20.5 mm

Within a row the left borders of the labels have a distance of 21 mm between them