

Projekt Airbus A320 das virtuelle Cockpit

Ein Projektbericht von: Frank Sommer

MCDU



Zum Einsatz kommt die MCDU von Open Cockpit. Die Kosten der Bauteile liegen unter 300 €, was verglichen zu fertigen Produkten noch recht preiswert ist.

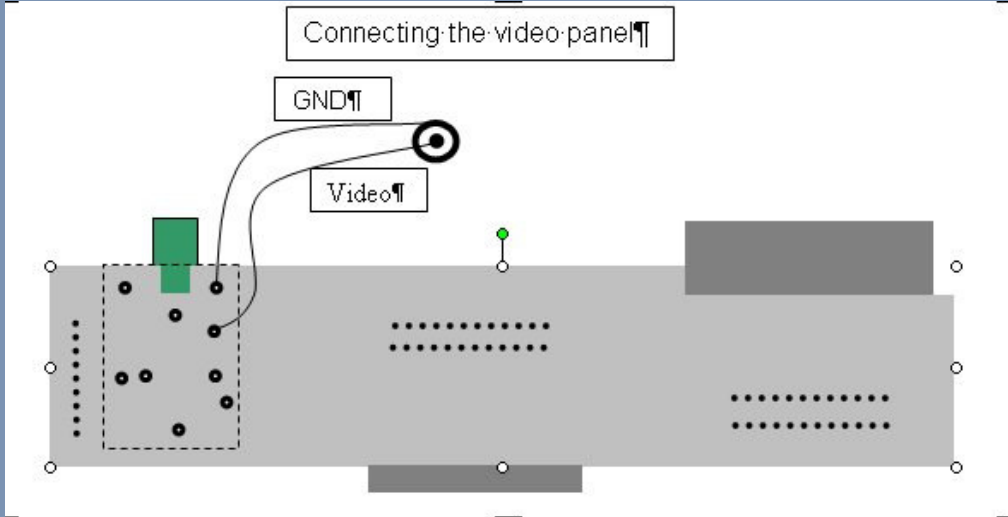
Allerdings sollte man sich für den Zusammenbau ein wenig Zeit nehmen. Die Genauigkeit mit der die Taster zusammengeklebt werden ist entscheidend für die reibungsfreie Funktion im eingebauten Zustand.

Bei dem jetzigen Flugmodell sind noch keine zwei unabhängig voneinander funktionierende MCDU`s geplant. Daher werden beide so verkabelt, dass sie synchron funktionieren.

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Das Display der PS1 wird folgendermaßen angeschlossen:



Die Ansteuerung in FSBus erfolgt im Wesentlichen über Tastatur Events. Im folgenden Verlauf werden die einzelnen Elemente beschrieben.

' Cockpit Objects MCDU						
'C Name	Type	CID	RID	FLAGS	P1	P2 P3
C, CS1L,	SWITCH,	3,	36,	TOGGLE	,	0, 0, 0
C, CS2L,	SWITCH,	3,	24,	TOGGLE	,	0, 0, 0
C, CS3L,	SWITCH,	3,	37,	TOGGLE	,	0, 0, 0
C, CS4L,	SWITCH,	3,	25,	TOGGLE	,	0, 0, 0
C, CS5L,	SWITCH,	3,	26,	TOGGLE	,	0, 0, 0
C, CS6L,	SWITCH,	3,	27,	TOGGLE	,	0, 0, 0
C, CS1R,	SWITCH,	3,	32,	TOGGLE	,	0, 0, 0
C, CS2R,	SWITCH,	3,	33,	TOGGLE	,	0, 0, 0
C, CS3R,	SWITCH,	3,	34,	TOGGLE	,	0, 0, 0
C, CS4R,	SWITCH,	3,	35,	TOGGLE	,	0, 0, 0
C, CS5R,	SWITCH,	3,	39,	TOGGLE	,	0, 0, 0
C, CS6R,	SWITCH,	3,	38,	TOGGLE	,	0, 0, 0
C, CSDIR,	SWITCH,	3,	28,	TOGGLE	,	0, 0, 0
C, CSPROG,	SWITCH,	3,	29,	TOGGLE	,	0, 0, 0
C, CSPERF,	SWITCH,	3,	30,	TOGGLE	,	0, 0, 0
C, CSINIT,	SWITCH,	3,	19,	TOGGLE	,	0, 0, 0
C, CSDATA,	SWITCH,	3,	18,	TOGGLE	,	0, 0, 0
C, CSFPLN,	SWITCH,	3,	56,	TOGGLE	,	0, 0, 0
C, CSRADNAV,	SWITCH,	3,	57,	TOGGLE	,	0, 0, 0
C, CSFUELPRED,	SWITCH,	3,	31,	TOGGLE	,	0, 0, 0
C, CSSECFPLN,	SWITCH,	3,	23,	TOGGLE	,	0, 0, 0
C, CSATCCOM,	SWITCH,	3,	22,	TOGGLE	,	0, 0, 0
C, CSMCDUMENU,	SWITCH,	3,	21,	TOGGLE	,	0, 0, 0
C, CSBRT,	SWITCH,	3,	16,	TOGGLE	,	0, 0, 0
C, CSDIM,	SWITCH,	3,	20,	TOGGLE	,	0, 0, 0
C, CSAIRPORT,	SWITCH,	3,	58,	TOGGLE	,	0, 0, 0
C, CSLH,	SWITCH,	3,	60,	TOGGLE	,	0, 0, 0
C, CSRH,	SWITCH,	3,	63,	TOGGLE	,	0, 0, 0
C, CSUP,	SWITCH,	3,	61,	TOGGLE	,	0, 0, 0
C, CSDOWN,	SWITCH,	3,	62,	TOGGLE	,	0, 0, 0
C, CS1,	SWITCH,	4,	35,	TOGGLE	,	0, 0, 0
C, CS2,	SWITCH,	4,	34,	TOGGLE	,	0, 0, 0

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C, CS3,	SWITCH,	4, 33,	TOGGLE	, 0, 0, 0
C, CS4,	SWITCH,	4, 38,	TOGGLE	, 0, 0, 0
C, CS5,	SWITCH,	4, 39,	TOGGLE	, 0, 0, 0
C, CS6,	SWITCH,	4, 37,	TOGGLE	, 0, 0, 0
C, CS7,	SWITCH,	4, 3,	TOGGLE	, 0, 0, 0
C, CS8,	SWITCH,	4, 2,	TOGGLE	, 0, 0, 0
C, CS9,	SWITCH,	4, 1,	TOGGLE	, 0, 0, 0
C, CSDOT,	SWITCH,	4, 7,	TOGGLE	, 0, 0, 0
C, CS0,	SWITCH,	4, 6,	TOGGLE	, 0, 0, 0
C, CSMINUS,	SWITCH,	4, 5,	TOGGLE	, 0, 0, 0
C, CSSLASH,	SWITCH,	3, 47,	TOGGLE	, 0, 0, 0
C, CSSP,	SWITCH,	3, 46,	TOGGLE	, 0, 0, 0
C, CSOVFY,	SWITCH,	3, 45,	TOGGLE	, 0, 0, 0
C, CSCLR,	SWITCH,	3, 44,	TOGGLE	, 0, 0, 0
C, CSA,	SWITCH,	3, 17,	TOGGLE	, 0, 0, 0
C, CSB,	SWITCH,	3, 51,	TOGGLE	, 0, 0, 0
C, CSC,	SWITCH,	3, 50,	TOGGLE	, 0, 0, 0
C, CSD,	SWITCH,	3, 49,	TOGGLE	, 0, 0, 0
C, CSE,	SWITCH,	3, 48,	TOGGLE	, 0, 0, 0
C, CSF,	SWITCH,	3, 59,	TOGGLE	, 0, 0, 0
C, CSG,	SWITCH,	3, 52,	TOGGLE	, 0, 0, 0
C, CSH,	SWITCH,	3, 53,	TOGGLE	, 0, 0, 0
C, CSI,	SWITCH,	3, 54,	TOGGLE	, 0, 0, 0
C, CSJ,	SWITCH,	3, 55,	TOGGLE	, 0, 0, 0
C, CSK,	SWITCH,	4, 32,	TOGGLE	, 0, 0, 0
C, CSL,	SWITCH,	3, 11,	TOGGLE	, 0, 0, 0
C, CSM,	SWITCH,	3, 10,	TOGGLE	, 0, 0, 0
C, CSN,	SWITCH,	3, 9,	TOGGLE	, 0, 0, 0
C, CSO,	SWITCH,	3, 8,	TOGGLE	, 0, 0, 0
C, CSP,	SWITCH,	4, 36,	TOGGLE	, 0, 0, 0
C, CSQ,	SWITCH,	3, 15,	TOGGLE	, 0, 0, 0
C, CSR,	SWITCH,	3, 14,	TOGGLE	, 0, 0, 0
C, CSS,	SWITCH,	3, 13,	TOGGLE	, 0, 0, 0
C, CST,	SWITCH,	3, 12,	TOGGLE	, 0, 0, 0
C, CSU,	SWITCH,	4, 0,	TOGGLE	, 0, 0, 0
C, CSV,	SWITCH,	3, 43,	TOGGLE	, 0, 0, 0
C, CSW,	SWITCH,	3, 42,	TOGGLE	, 0, 0, 0
C, CSX,	SWITCH,	3, 41,	TOGGLE	, 0, 0, 0
C, CSY,	SWITCH,	3, 40,	TOGGLE	, 0, 0, 0
C, CSZ,	SWITCH,	4, 4,	TOGGLE	, 0, 0, 0

' System Route MCDU

'S	Name	Source	DestCID	OnSeq	OffSeq	Flags
S, ,	CS1L,	0,	"L+1052,80","L-1052,80"			, COMPLEX
S, ,	CS2L,	0,	"L+1052,105","L-1052,105"			, COMPLEX
S, ,	CS3L,	0,	"L+1052,137","L-1052,137"			, COMPLEX
S, ,	CS4L,	0,	"L+1052,167","L-1052,167"			, COMPLEX
S, ,	CS5L,	0,	"L+1052,197","L-1052,197"			, COMPLEX
S, ,	CS6L,	0,	"L+1052,225","L-1052,225"			, COMPLEX
S, ,	CS1R,	0,	"L+1362,80","L-1362,80"			, COMPLEX
S, ,	CS2R,	0,	"L+1362,105","L-1362,105"			, COMPLEX
S, ,	CS3R,	0,	"L+1362,137","L-1362,137"			, COMPLEX
S, ,	CS4R,	0,	"L+1362,167","L-1362,167"			, COMPLEX
S, ,	CS5R,	0,	"L+1362,197","L-1362,197"			, COMPLEX
S, ,	CS6R,	0,	"L+1362,225","L-1362,225"			, COMPLEX
S, ,	CSDIR,	0,	"L+1088,303","L-1088,303"			, COMPLEX
S, ,	CSPROG,	0,	"L+1133,303","L-1133,303"			, COMPLEX
S, ,	CSPERF,	0,	"L+1177,303","L-1177,303"			, COMPLEX
S, ,	CSINIT,	0,	"L+1226,303","L-1226,303"			, COMPLEX
S, ,	CSDATA,	0,	"L+1268,303","L-1268,303"			, COMPLEX
S, ,	CSRADNAV,	0,	"L+1133,335","L-1133,335"			, COMPLEX
S, ,	CSFUELPRED,	0,	"L+1177,335","L-1177,335"			, COMPLEX
S, ,	CSFUELPRED,	0,	"L+1226,335","L-1226,335"			, COMPLEX
S, ,	CSMCDUMENU,	0,	"L+1316,335","L-1316,335"			, COMPLEX
S, ,	CSBRT,	0,	"L+1333,305","L-1333,305"			, COMPLEX
S, ,	CSDIM,	0,	"L+1308,305","L-1308,305"			, COMPLEX
S, ,	CSAIRPORT,	0,	"L+1088,368","L-1088,368"			, COMPLEX
S, ,	CSLH,	0,	"L+1088,403","L-1088,403"			, COMPLEX
S, ,	CSRH,	0,	"L+1088,403","L-1088,403"			, COMPLEX
S, ,	CSUP,	0,	"L+1133,368","L-1133,368"			, COMPLEX

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S,	CSDOWN,	0,	"L+1133,403","L-1133,403"	, COMPLEX
S,	CS1,	0,	"L+1084,440","L-1084,440"	, COMPLEX
S,	CS2,	0,	"L+1120,440","L-1120,440"	, COMPLEX
S,	CS3,	0,	"L+1154,440","L-1154,440"	, COMPLEX
S,	CS4,	0,	"L+1084,475","L-1084,475"	, COMPLEX
S,	CS5,	0,	"L+1120,475","L-1120,475"	, COMPLEX
S,	CS6,	0,	"L+1154,475","L-1154,475"	, COMPLEX
S,	CS7,	0,	"L+1084,510","L-1084,510"	, COMPLEX
S,	CS8,	0,	"L+1120,510","L-1120,510"	, COMPLEX
S,	CS9,	0,	"L+1154,510","L-1154,510"	, COMPLEX
S,	CSDOT,	0,	"L+1084,543","L-1084,543"	, COMPLEX
S,	CS0,	0,	"L+1120,543","L-1120,543"	, COMPLEX
S,	CSMINUS,	0,	"L+1223,540","L-1223,540"	, COMPLEX
S,	CS SLASH,	0,	"L+1154,545","L-1154,545"	, COMPLEX
S,	CSSP,	0,	"L+1260,540","L-1260,540"	, COMPLEX
S,	CSOVFY,	0,	"L+1290,540","L-1290,540"	, COMPLEX
S,	CSCLR,	0,	"L+1330,540","L-1330,540"	, COMPLEX
S,	CSA,	0,	"L+1190,370","L-1190,370"	, COMPLEX
S,	CSB,	0,	"L+1225,370","L-1225,370"	, COMPLEX
S,	CS C,	0,	"L+1260,370","L-1260,370"	, COMPLEX
S,	CSD,	0,	"L+1290,370","L-1290,370"	, COMPLEX
S,	CSE,	0,	"L+1330,370","L-1330,370"	, COMPLEX
S,	CSF,	0,	"L+1190,410","L-1190,410"	, COMPLEX
S,	CSG,	0,	"L+1225,410","L-1225,410"	, COMPLEX
S,	CSH,	0,	"L+1260,410","L-1260,410"	, COMPLEX
S,	CSI,	0,	"L+1290,410","L-1290,410"	, COMPLEX
S,	CSJ,	0,	"L+1330,410","L-1330,410"	, COMPLEX
S,	CSK,	0,	"L+1190,443","L-1190,443"	, COMPLEX
S,	CSL,	0,	"L+1225,443","L-1225,443"	, COMPLEX
S,	CSM,	0,	"L+1260,443","L-1260,443"	, COMPLEX
S,	CSN,	0,	"L+1290,443","L-1290,443"	, COMPLEX
S,	CSO,	0,	"L+1330,443","L-1330,443"	, COMPLEX
S,	CSP,	0,	"L+1190,475","L-1190,475"	, COMPLEX
S,	CSQ,	0,	"L+1225,475","L-1225,475"	, COMPLEX
S,	CSR,	0,	"L+1260,475","L-1260,475"	, COMPLEX
S,	CSS,	0,	"L+1290,475","L-1290,475"	, COMPLEX
S,	CST,	0,	"L+1330,475","L-1330,475"	, COMPLEX
S,	CSU,	0,	"L+1190,510","L-1190,510"	, COMPLEX
S,	CSV,	0,	"L+1225,510","L-1225,510"	, COMPLEX
S,	CSW,	0,	"L+1260,510","L-1260,510"	, COMPLEX
S,	CSX,	0,	"L+1290,510","L-1290,510"	, COMPLEX
S,	CSY,	0,	"L+1330,510","L-1330,510"	, COMPLEX
S,	CSZ,	0,	"L+1190,540","L-1190,540"	, COMPLEX

Anhand der Koordinaten von den Maus Events erkennt man, dass die MCDU mit ihren Clickspots auf dem zweiten Bildschirm ausgelagert wurde.

Das originale Panel wurde so verändert, dass alle Subpanels auf einen zusätzlichen Bildschirm gelegt wurden. Dies dient der Zuordnung und Synchronisation zwieschen Panel und FSBus Systemen.