Appendix H

Venus Three–stage Switching

Three–stage[§] architecture is used for very large switchers as a means of reducing crosspoints needed for a given number of inputs/outputs. An array of relatively small matrixes is arranged in an input stage, an intermediate stage, and an output stage. The path taken by a required signal through these stages is determined by software and will vary according to which circuits are already in use. An example of one level of a 512 x 512 switcher in shown in Figure H–1. The dark line shows a possible signal path.

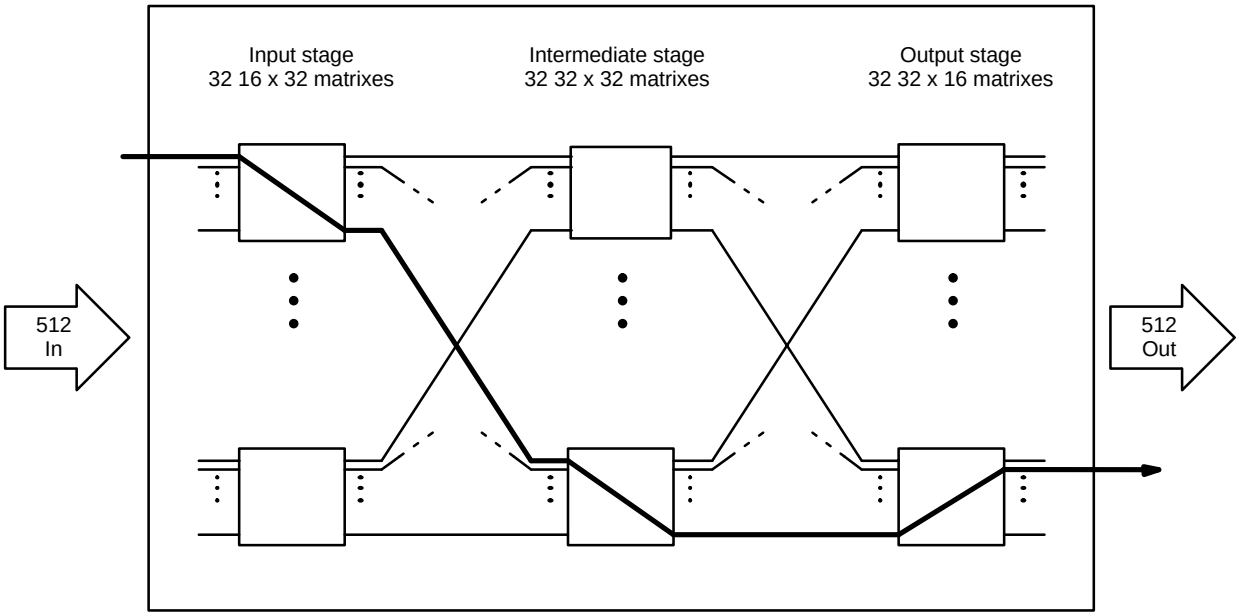


Figure H–1. *One level of three–stage switcher (example)*

Note: Three–stage switching is not the same as “path finding.” A three–stage switcher operates as one unit and is carefully designed so that all inputs are always available at all outputs; i.e., it cannot be *blocked*. Path finding, on the other hand, involves discrete switchers connected by a small number of tie lines, the number of which strictly limits the inputs available at the downstream switcher. When these tie lines are all busy, the path between the switchers is *blocked* and will remain so until one of the lines is released. (For more information about path–finding, see page 5–196.)

§ Some of the functions described in this section may be extra–cost options. For more information, see page 1–27.

VM 3000 CONTROL SYSTEM INSTALLATION

Note 1: For the purpose of the following discussion, redundant VM boards, if any, are ignored. Recall that redundant VM boards have the same logical name.

Figure H–2 shows two **logical** (named) levels: the video level and one audio level of a 512 x 512 three–stage switcher. Within each logical level are a total of 2560 outputs: 1024 outputs in the input stage, 1024 in the intermediate stage, and 512 in the output stage.

A separate VM 3000 is installed for each logical level, as shown.

Note 2: You can assign a VM 3000 to more than one logical level, up to an absolute maximum of eight logical levels.

Note 3: You cannot split a logical level between two separately–named VM 3000s.

Note 4: A VM 3000 used to control a three–stage switcher must not be used to control any other devices (e.g., no control panels, machines, remote routers, VGA displays, or party line panels).

CROSSPOINT BOARD LEVEL SETTINGS

The switcher hardware is restricted to a maximum of 1024 outputs per **physical** level. These physical levels are identified by jumper settings on the motherboards.

In Figure H–2, three physical levels will be needed to control the 2560 outputs of each logical level. Notice that within a logical level, the physical levels must be set consecutively. In this example, the physical levels are 1, 2, and 3 for video; and 10, 11, and 12 for left audio. Leaving a gap (such as between 3 and 10) is recommended to simplify future expansion.

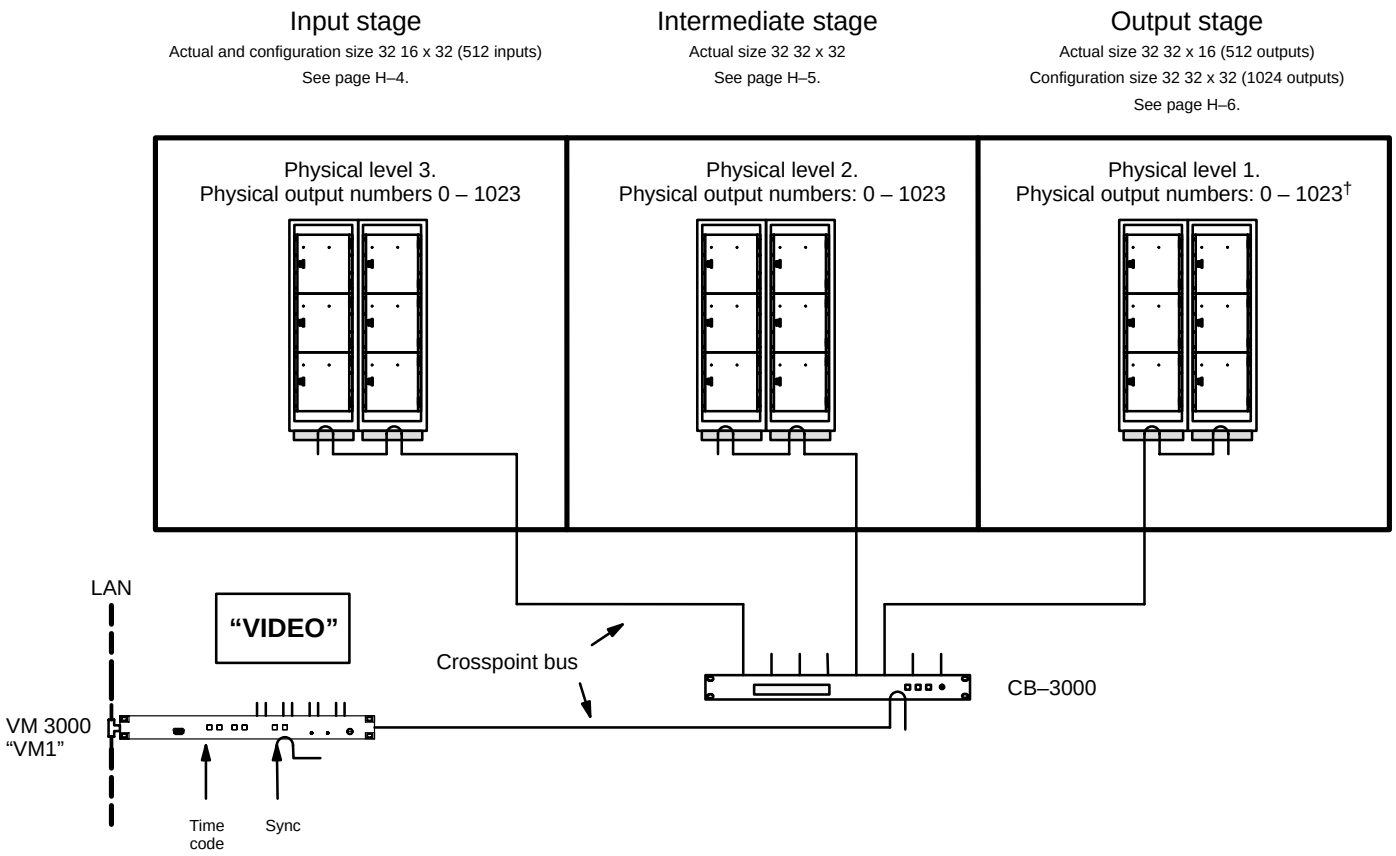
Notice that the physical level numbers start at the output stage outputs of the switcher and work backwards.

CROSSPOINT BOARD INPUT SETTINGS

In a Venus 512 x 512 three–stage switcher, all crosspoint boards are jumpered for inputs 0–31.

CROSSPOINT BOARD OUTPUT SETTINGS

The crosspoint boards within each physical level are jumpered normally, i.e., according the set of outputs they control (0–31, 32–63, etc.).



For additional details concerning VM 3000/CB–3000 connections, see page 2–3.

† Actual number of outputs is 512 (only one output board is installed in each sub–switcher).

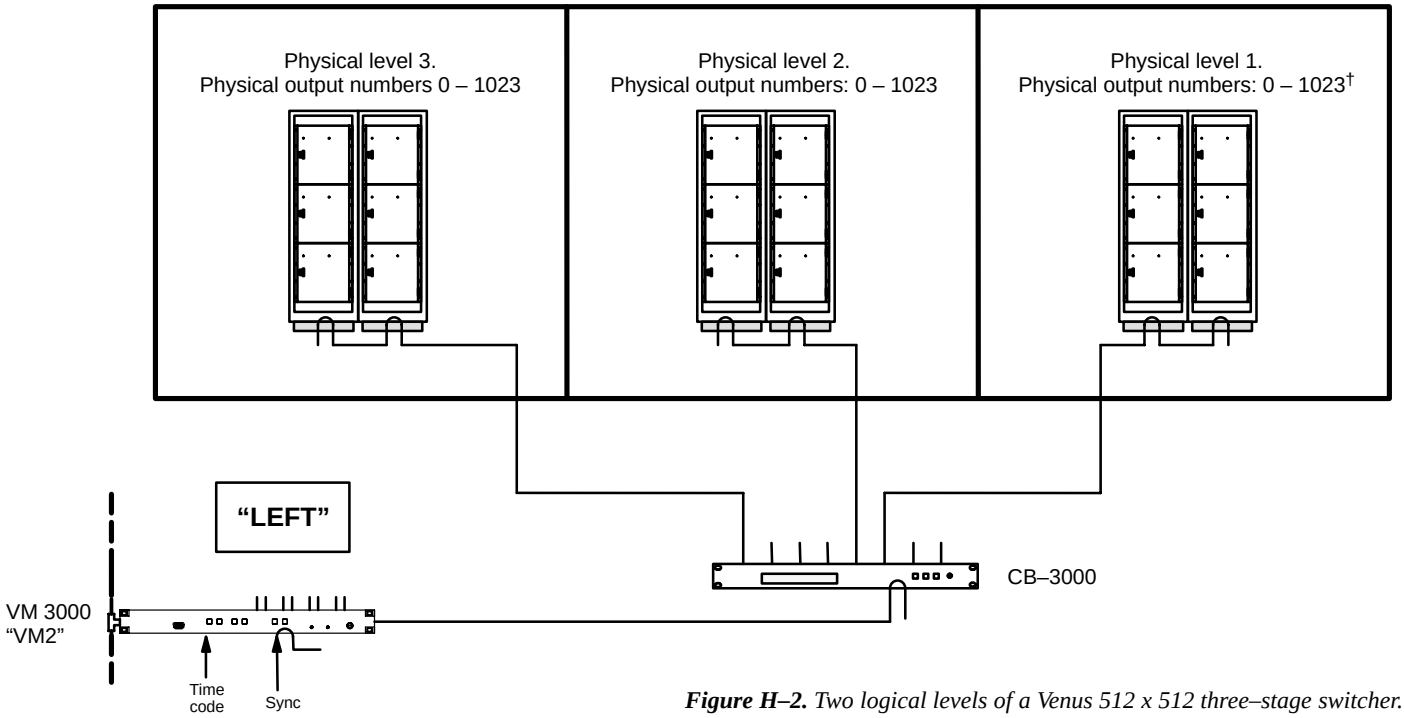


Figure H–2. *Two logical levels of a Venus 512 x 512 three–stage switcher.*

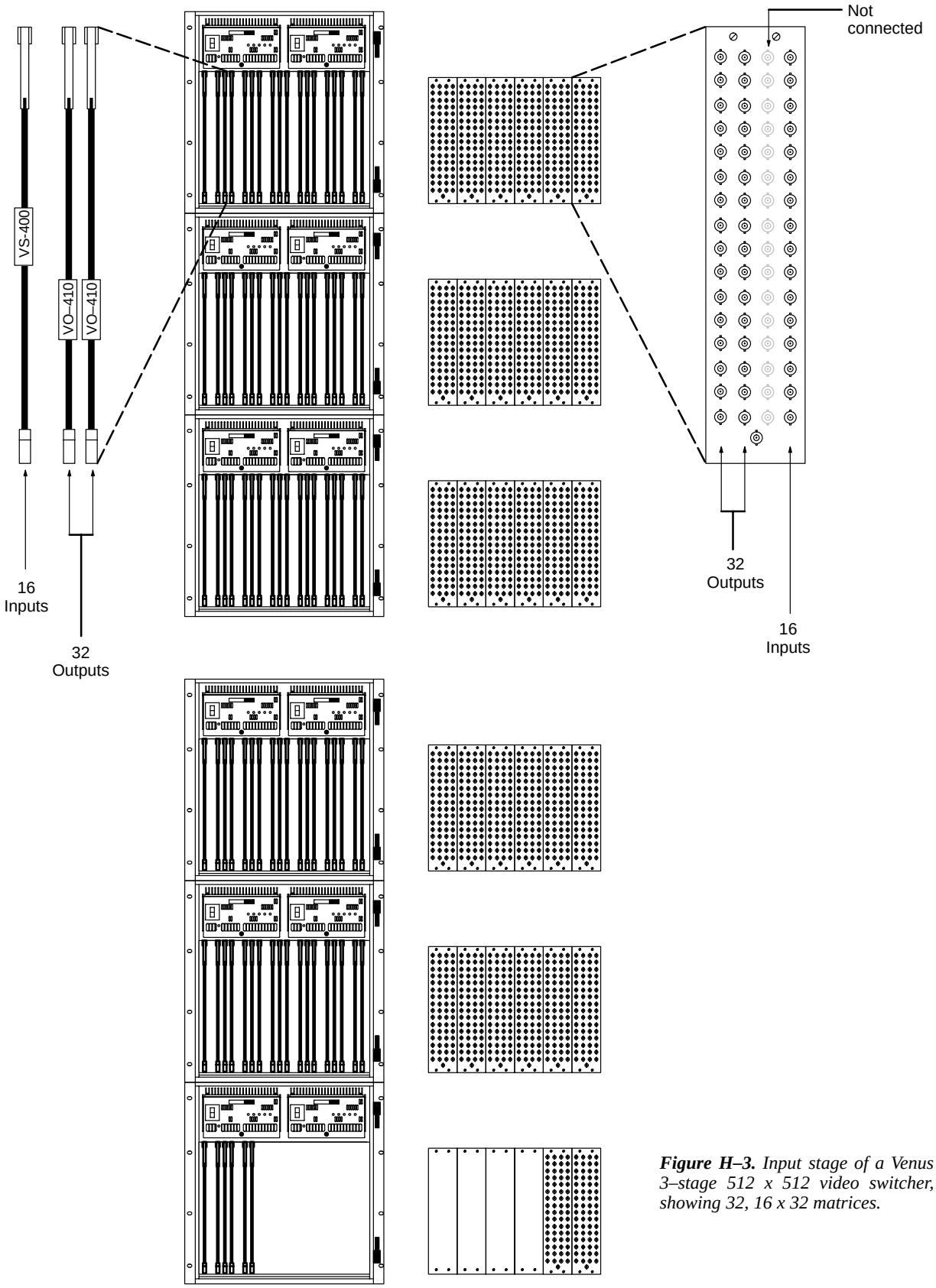


Figure H–3. *Input stage of a Venus 3–stage 512 x 512 video switcher, showing 32, 16 x 32 matrices.*

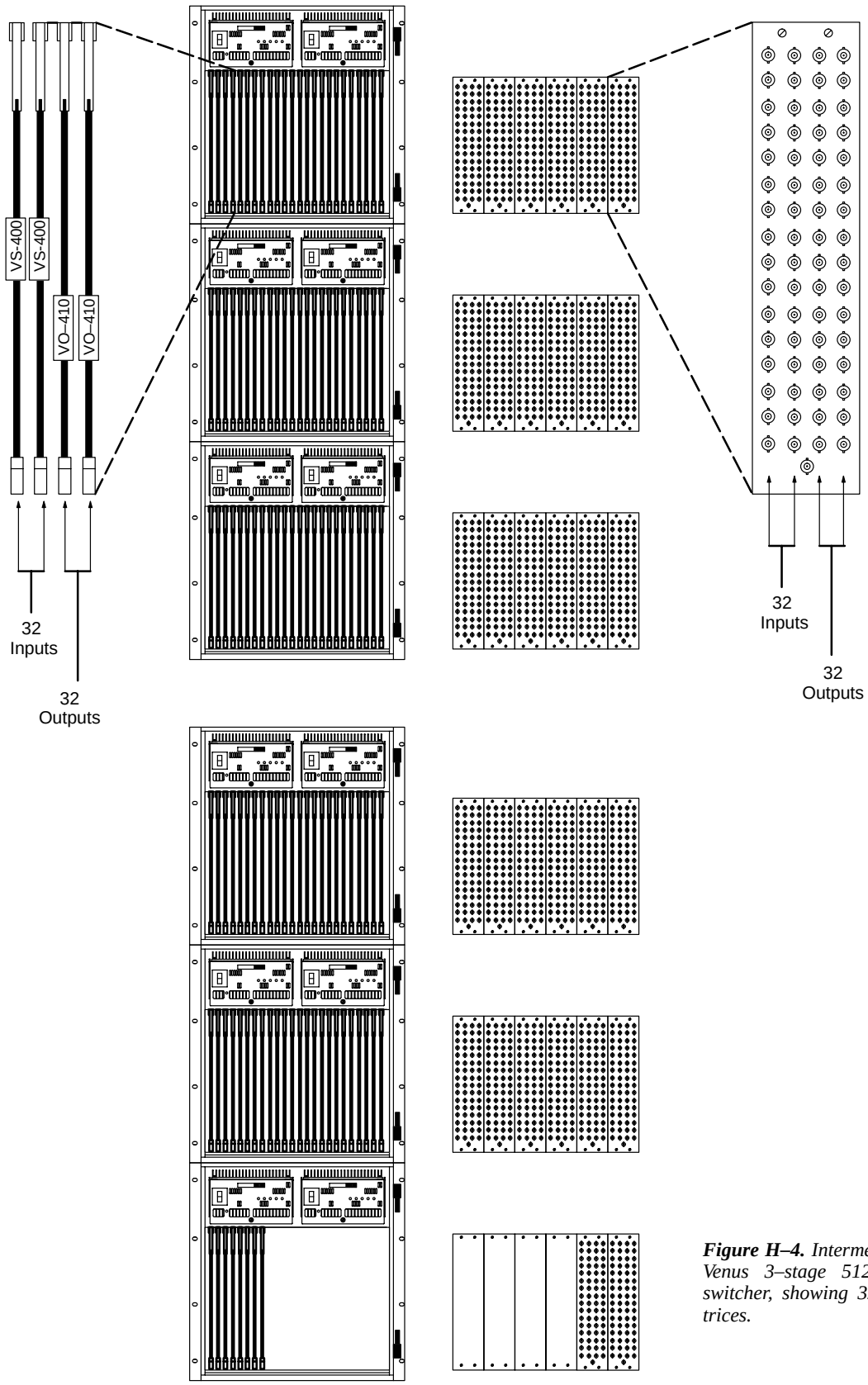


Figure H–4. *Intermediate stage of a Venus 3–stage 512 x 512 video switcher, showing 32, 32 x 32 matrices.*

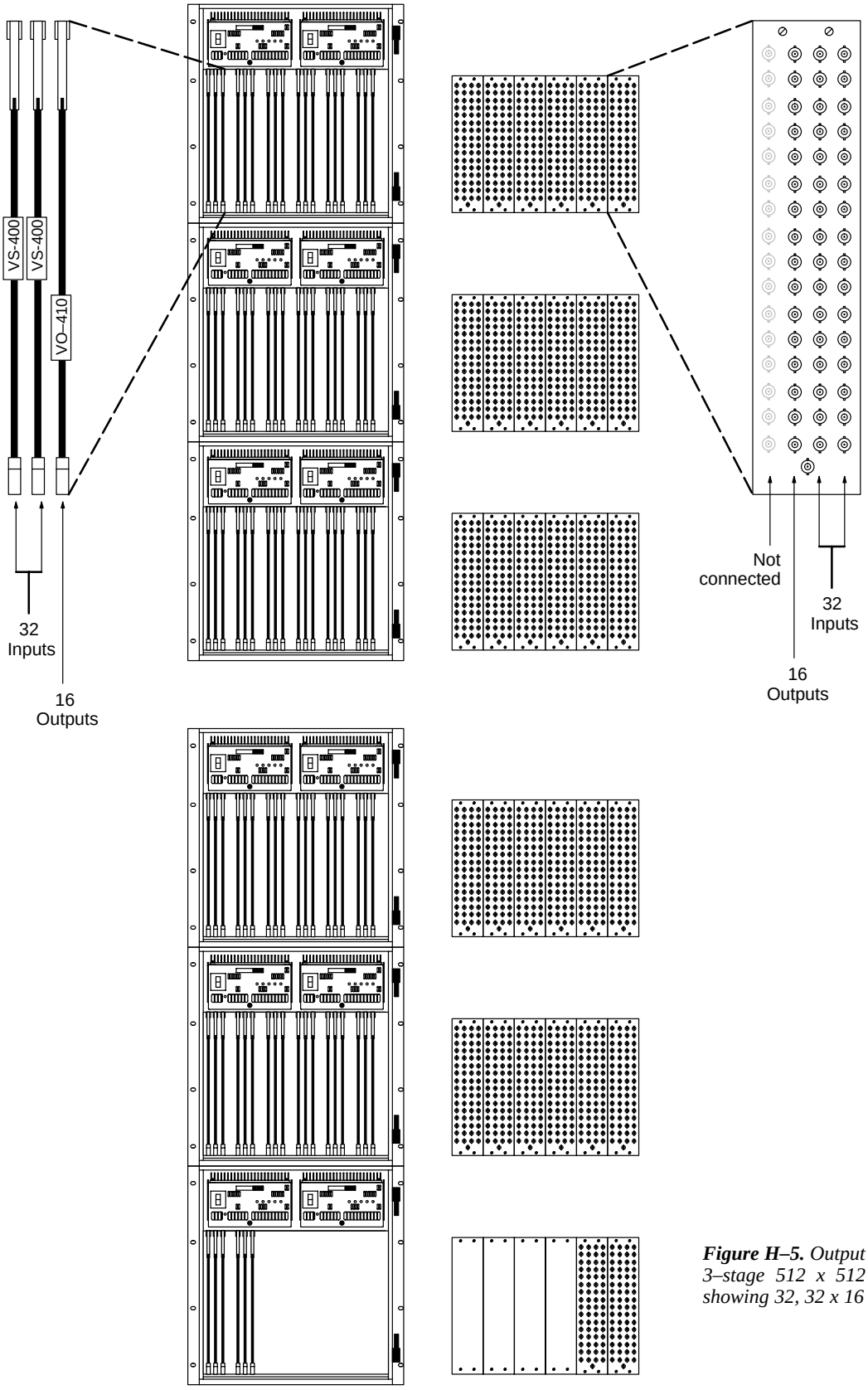


Figure H–5. *Output stage of a Venus 3–stage 512 x 512 video switcher, showing 32, 32 x 16 matrices.*

SOFTWARE CONFIGURATION

Switcher Size Terminology

Switchers have traditionally been described in terms of active inputs and outputs, but also in terms of the anticipated “fully expanded” or “pre–wired” size. The pre–wired size is the size that can be achieved simply by plugging in additional components.

For three–stage switchers, there is also a “configuration” size, which is used in the Switcher Description table.

Switcher Description

	Switcher	Name	VI	RV	MC	Board	#In	#Out	PLvL	Flw Swit	Flw Name	Dr	3 LI	3 LO	Option	Audio
1	MAINROUT	VIDEO	V		M	VM1	512	1024	1			B	16	16		
2	MAINROUT	LEFT				VM2	512	1024	10			B	16	16		
3	MAINROUT	RIGHT				VM3	512	1024	20			B	16	16		
4	MAINROUT	TC				VM4	512	1024	30			B	16	16		
5																
6																

Figure H–6. *Switcher Description table for system shown in Figure H–2.*

Entries to the Switcher Description Table

In Figure H–6, the “M Board” column shows the names of four VM 3000 boards, one per logical level. Redundant boards, if any, are not entered.

The “#In” and “#Out” columns show the correct configuration values for a Venus 512 x 512 three–stage switcher.

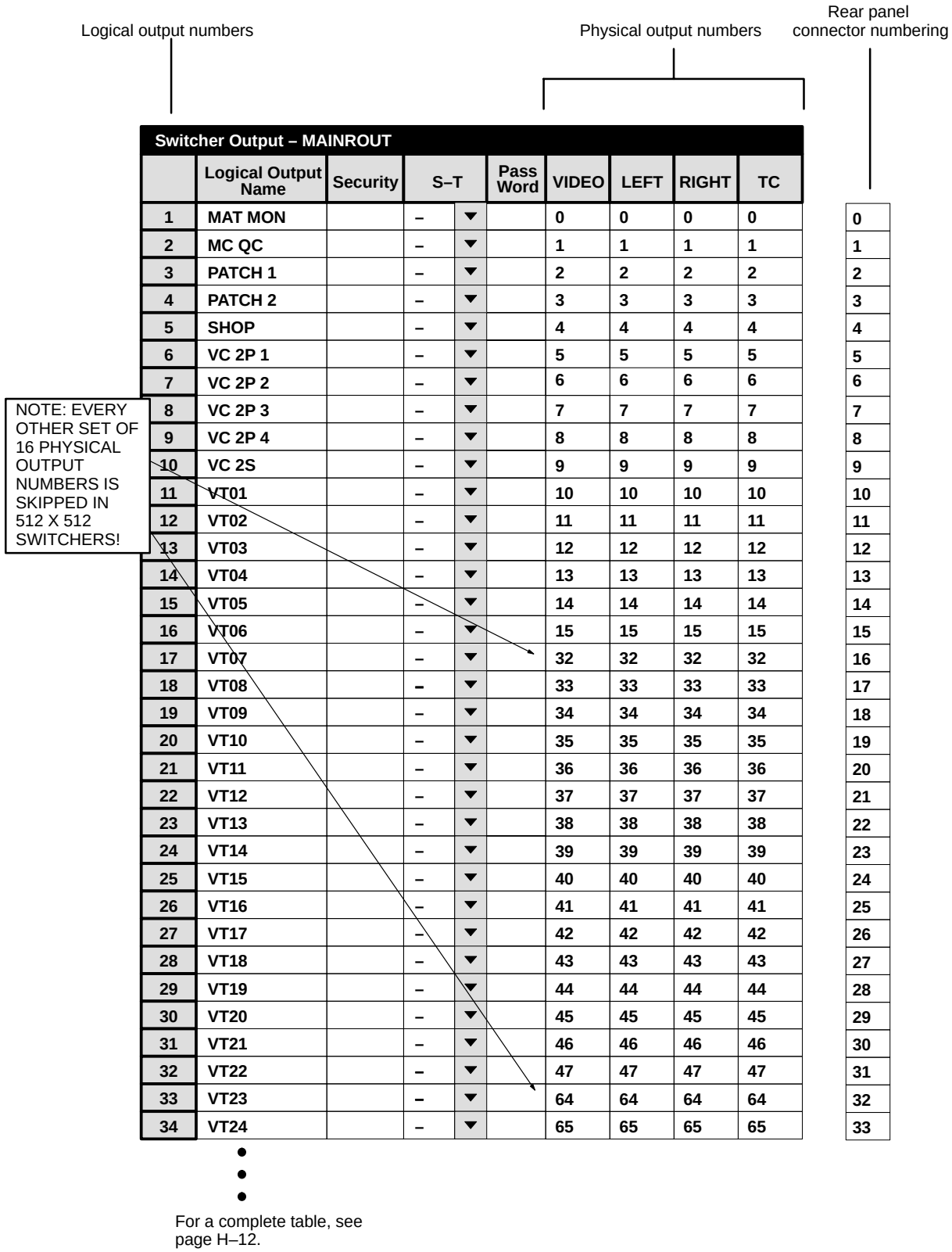
The Physical Level entries show the number of the first physical level for each logical level. The software assumes that additional physical levels will be consecutive. For example, if there are three physical levels in the video switcher, and the first physical level is “1”, then the second physical level must be set as “2,” etc.

For a Venus 512 x 512 three–stage switcher, the “3LI” and “3LO” entries are always “16.”

SWITCHER INPUT/OUTPUT TABLES

The switcher input table is filled out in the conventional way. In this example (512 x 512), there are 512 entries, with physical input numbers from zero to 511.

The switcher output table for a Venus 512 x 512 switcher has to reflect the fact that every other output board in the output stage is not installed; this is done by leaving 16–output “gaps” in the physical output numbering. However, the labels on the rear–panel connectors do not have any gaps. See page H–8.



Switcher Output – MAINROUT									
	Logical Output Name	Security	S–T		Pass Word	VIDEO	LEFT	RIGHT	TC	
1	MAT MON		–	▼		0	0	0	0	0
2	MC QC		–	▼		1	1	1	1	1
3	PATCH 1		–	▼		2	2	2	2	2
4	PATCH 2		–	▼		3	3	3	3	3
5	SHOP		–	▼		4	4	4	4	4
6	VC 2P 1		–	▼		5	5	5	5	5
7	VC 2P 2		–	▼		6	6	6	6	6
8	VC 2P 3		–	▼		7	7	7	7	7
9	VC 2P 4		–	▼		8	8	8	8	8
10	VC 2S		–	▼		9	9	9	9	9
11	VT01		–	▼		10	10	10	10	10
12	VT02		–	▼		11	11	11	11	11
13	VT03		–	▼		12	12	12	12	12
14	VT04		–	▼		13	13	13	13	13
15	VT05		–	▼		14	14	14	14	14
16	VT06		–	▼		15	15	15	15	15
17	VT07		–	▼		32	32	32	32	16
18	VT08		–	▼		33	33	33	33	17
19	VT09		–	▼		34	34	34	34	18
20	VT10		–	▼		35	35	35	35	19
21	VT11		–	▼		36	36	36	36	20
22	VT12		–	▼		37	37	37	37	21
23	VT13		–	▼		38	38	38	38	22
24	VT14		–	▼		39	39	39	39	23
25	VT15		–	▼		40	40	40	40	24
26	VT16		–	▼		41	41	41	41	25
27	VT17		–	▼		42	42	42	42	26
28	VT18		–	▼		43	43	43	43	27
29	VT19		–	▼		44	44	44	44	28
30	VT20		–	▼		45	45	45	45	29
31	VT21		–	▼		46	46	46	46	30
32	VT22		–	▼		47	47	47	47	31
33	VT23		–	▼		64	64	64	64	32
34	VT24		–	▼		65	65	65	65	33

Figure H–7. *Example of output numbering for Venus 3–stage 512 x 512 switcher.*

Logical no.	Physical no.	Connector no.
1	0	0
2	1	1
3	2	2
4	3	3
5	4	4
6	5	5
7	6	6
8	7	7
9	8	8
10	9	9
11	10	10
12	11	11
13	12	12
14	13	13
15	14	14
16	15	15
17	32	16
18	33	17
19	34	18
20	35	19
21	36	20
22	37	21
23	38	22
24	39	23
25	40	24
26	41	25
27	42	26
28	43	27
29	44	28
30	45	29
31	46	30
32	47	31
Logical no.	**Physical no.**	**Connector no.**
33	64	32

34	65	33
35	66	34
36	67	35
37	68	36
38	69	37
39	70	38
40	71	39
41	72	40
42	73	41
43	74	42
44	75	43
45	76	44
46	77	45
47	78	46
48	79	47
49	96	48
50	97	49
51	98	50
52	99	51
53	100	52
54	101	53
55	102	54
56	103	55
57	104	56
58	105	57
59	106	58
60	107	59
61	108	60
62	109	61
63	110	62
64	111	63
Logical no.	**Physical no.**	**Connector no.**
65	128	64
66	129	65
67	130	66

68	131	67
69	132	68
70	133	69
71	134	70
72	135	71
73	136	72
74	137	73
75	138	74
76	139	75
77	140	76
78	141	77
79	142	78
80	143	79
81	160	80
82	161	81
83	162	82
84	163	83
85	164	84
86	165	85
87	166	86
88	167	87
89	168	88
90	169	89
91	170	90
92	171	91
93	172	92
94	173	93
95	174	94
96	175	95
Logical no.	**Physical no.**	**Connector no.**
97	192	96
98	193	97
99	194	98
100	195	99
101	196	100

102	197	101
103	198	102
104	199	103
105	200	104
106	201	105
107	202	106
108	203	107
109	204	108
110	205	109
111	206	110
112	207	111
113	224	112
114	225	113
115	226	114
116	227	115
117	228	116
118	229	117
119	230	118
120	231	119
121	232	120
122	233	121
123	234	122
124	235	123
125	236	124
126	237	125
127	238	126
128	239	127

Figure H–8. *Example of output numbering for Venus 3–stage 512 x 512 switcher.*

Logical no.	Physical no.	Connector no.
129	256	128
130	257	129
131	258	130
132	259	131
133	260	132
134	261	133
135	262	134
136	263	135
137	264	136
138	265	137
139	266	138
140	267	139
141	268	140
142	269	141
143	270	142
144	271	143
145	288	144
146	289	145
147	290	146
148	291	147
149	292	148
150	293	149
151	294	150
152	295	151
153	296	152
154	297	153
155	298	154
156	299	155
157	300	156
158	301	157
159	302	158
160	303	159
Logical no.	**Physical no.**	**Connector no.**
161	320	160

162	321	161
163	322	162
163	323	163
165	324	164
166	325	165
167	326	166
168	327	167
169	328	168
170	329	169
171	330	170
172	331	171
173	332	172
174	333	173
175	334	174
176	335	175
177	352	176
178	353	177
179	354	178
180	355	179
181	356	180
182	357	181
183	358	182
184	359	183
185	360	184
186	361	185
187	362	186
188	363	187
189	364	188
190	365	189
191	366	190
192	367	191
Logical no.	**Physical no.**	**Connector no.**
193	384	192
194	385	193
195	386	194

196	387	195
197	388	196
198	389	197
199	390	198
200	391	199
201	392	200
202	393	201
203	394	202
204	395	203
205	396	204
206	397	205
207	398	206
208	399	207
209	416	208
210	417	209
211	418	210
212	419	211
213	420	212
214	421	213
215	422	214
216	423	215
217	424	216
218	425	217
219	426	218
220	427	219
221	428	220
222	429	221
223	430	222
224	431	223
Logical no.	**Physical no.**	**Connector no.**
225	448	224
226	449	225
227	450	226
228	451	227
229	452	228

230	453	229
231	454	230
232	455	231
233	456	232
234	457	233
235	458	234
236	459	235
237	460	236
238	461	237
239	462	238
240	463	239
241	480	240
242	481	241
243	482	242
244	483	243
245	484	244
246	485	245
247	486	246
248	487	247
249	488	248
250	489	249
251	490	250
252	491	251
253	492	252
254	493	253
255	494	254
256	495	255

Figure H–8. *Example of output numbering for Venus 3–stage 512 x 512 switcher (continued).*

Logical no.	Physical no.	Connector no.
257	512	256
258	513	257
259	514	258
260	515	259
261	516	160
262	517	261
263	518	262
263	519	263
265	520	264
266	521	265
267	522	266
268	523	267
269	524	268
270	525	269
271	526	270
272	527	271
273	544	272
274	545	273
275	546	274
276	547	275
277	548	276
278	549	277
279	550	278
280	551	279
281	552	280
282	553	281
283	554	282
284	555	283
285	556	284
286	557	285
287	558	286
288	559	287
Logical no.	**Physical no.**	**Connector no.**
289	576	288

290	577	289
291	578	290
292	579	291
293	580	292
294	581	293
295	582	294
296	583	295
297	584	296
298	585	297
299	586	298
300	587	299
301	588	300
302	589	301
303	590	302
304	591	303
305	608	304
306	609	305
307	610	306
308	611	307
309	612	308
310	613	309
311	614	310
312	615	311
313	616	312
314	617	313
315	618	314
316	619	315
317	620	316
318	621	317
319	622	318
320	623	319
Logical no.	**Physical no.**	**Connector no.**
321	640	320
322	641	321
323	642	322

324	643	323
325	644	324
326	645	325
327	646	326
328	647	327
329	648	328
330	649	329
331	650	330
332	651	331
333	652	332
334	653	333
335	654	334
336	655	335
337	672	336
338	673	337
339	674	338
340	675	339
341	676	340
342	677	341
343	678	342
344	679	343
345	680	344
346	681	345
347	682	346
348	683	347
349	684	348
350	685	349
351	686	350
352	687	351
Logical no.	**Physical no.**	**Connector no.**
353	704	352
354	705	353
355	706	354
356	707	355
357	708	356

358	709	357
359	710	358
360	711	359
361	712	360
362	713	361
363	714	362
364	715	363
365	716	364
366	717	365
367	718	366
368	719	367
369	736	368
370	737	369
371	738	370
372	739	371
373	740	372
374	741	373
375	742	374
376	743	375
377	744	376
378	745	377
379	746	378
380	747	379
381	748	380
382	749	381
383	750	382
384	751	383

Figure H–8. *Example of output numbering for Venus 3–stage 512 x 512 switcher (continued).*

Logical no.	Physical no.	Connector no.
385	768	384
386	769	385
387	770	386
388	771	387
389	772	388
390	773	389
391	774	390
392	775	391
393	776	392
394	777	393
395	778	394
396	779	395
397	780	396
398	781	397
399	782	398
400	783	399
401	800	400
402	801	401
403	802	402
404	803	403
405	804	404
406	805	405
407	806	406
408	807	407
409	808	408
410	809	409
411	810	410
412	811	411
413	812	412
414	813	413
415	814	414
416	815	415
Logical no.	**Physical no.**	**Connector no.**
417	832	416

418	833	417
419	834	418
420	835	419
421	836	420
422	837	421
423	838	422
424	839	423
425	840	424
426	841	425
427	842	426
428	843	427
429	844	428
430	845	429
431	846	430
432	847	431
433	864	432
434	865	433
435	866	434
436	867	435
437	868	436
438	869	437
439	870	438
440	871	439
441	872	440
442	873	441
443	874	442
444	875	443
445	876	444
446	877	445
447	878	446
448	879	447
Logical no.	**Physical no.**	**Connector no.**
449	896	448
450	897	449
451	898	450

452	899	451
453	900	452
454	901	453
455	902	454
456	903	455
457	904	456
458	905	457
459	906	458
460	907	459
461	908	460
462	909	461
463	910	462
464	911	463
465	928	464
466	929	465
467	930	466
468	931	467
469	932	468
470	933	469
471	934	470
472	935	471
473	936	472
474	937	473
475	938	474
476	939	475
477	940	476
478	941	477
479	942	478
480	943	479
Logical no.	**Physical no.**	**Connector no.**
481	960	480
482	961	481
483	962	482
484	963	483
485	964	484

486	965	485
487	966	486
488	967	487
489	968	488
490	969	489
491	970	490
492	971	491
493	972	492
494	973	493
495	974	494
496	975	495
497	992	496
498	993	497
499	994	498
500	995	499
501	996	500
502	997	501
503	998	502
504	999	503
505	1000	504
506	1001	505
507	1002	506
508	1003	507
509	1004	508
510	1005	509
511	1006	510
512	1007	511

Figure H–8. *Example of output numbering for Venus 3–stage 512 x 512 switcher (continued).*