

The
Apple][Forever
Anthology



By Michael Pohoreski

Version 0.3

Hi-Res Row to Address Calculation

```

a4 = ((y >> 6)          ) * 0x2A; // y/64
a3 = ((y >> 4) & 0x03) * 0x100; // y/16
a2 = ((y >> 3) & 0x01) * 0x80; // y/8
a1 = ((y          ) & 0x07) * 0x400;

```

Address	Row (Dec)	Row (Hex)	(y & 0x07) * 0x400	((y >> 3) & 0x01) * 0x80	((y / 16) & 0x03) * 0x100	(y / 64) * 0x2A
2000	0	00	0000	00	0000	00
2400	1	01	0400	00	0000	00
2800	2	02	0800	00	0000	00
2C00	3	03	0C00	00	0000	00
3000	4	04	1000	00	0000	00
3400	5	05	1400	00	0000	00
3800	6	06	1800	00	0000	00
3C00	7	07	1C00	00	0000	00
2080	8	08	0000	80	0000	00
2480	9	09	0400	80	0000	00
2880	10	0A	0800	80	0000	00
2C80	11	0B	0C00	80	0000	00
3080	12	0C	1000	80	0000	00
3480	13	0D	1400	80	0000	00
3880	14	0E	1800	80	0000	00
3C80	15	0F	1C00	80	0000	00
2100	16	10	0000	00	0100	00
2500	17	11	0400	00	0100	00
2900	18	12	0800	00	0100	00
2D00	19	13	0C00	00	0100	00
3100	20	14	1000	00	0100	00
3500	21	15	1400	00	0100	00
3900	22	16	1800	00	0100	00
3D00	23	17	1C00	00	0100	00
2180	24	18	0000	80	0100	00
2580	25	19	0400	80	0100	00
2980	26	1A	0800	80	0100	00
2D80	27	1B	0C00	80	0100	00
3180	28	1C	1000	80	0100	00
3580	29	1D	1400	80	0100	00
3980	30	1E	1800	80	0100	00
3D80	31	1F	1C00	80	0100	00
2200	32	20	0000	00	0200	00
2600	33	21	0400	00	0200	00
2A00	34	22	0800	00	0200	00
2E00	35	23	0C00	00	0200	00
3200	36	24	1000	00	0200	00
3600	37	25	1400	00	0200	00
3A00	38	26	1800	00	0200	00
3E00	39	27	1C00	00	0200	00
2280	40	28	0000	80	0200	00
2680	41	29	0400	80	0200	00
2A80	42	2A	0800	80	0200	00
2E80	43	2B	0C00	80	0200	00
3280	44	2C	1000	80	0200	00
3680	45	2D	1400	80	0200	00
3A80	46	2E	1800	80	0200	00
3E80	47	2F	1C00	80	0200	00
2300	48	30	0000	00	0300	00
2700	49	31	0400	00	0300	00
2B00	50	32	0800	00	0300	00
2F00	51	33	0C00	00	0300	00
3300	52	34	1000	00	0300	00
3700	53	35	1400	00	0300	00
3B00	54	36	1800	00	0300	00
3F00	55	37	1C00	00	0300	00
2380	56	38	0000	80	0300	00
2780	57	39	0400	80	0300	00
2B80	58	3A	0800	80	0300	00
2F80	59	3B	0C00	80	0300	00
3380	60	3C	1000	80	0300	00
3780	61	3D	1400	80	0300	00
3B80	62	3E	1800	80	0300	00
3F80	63	3F	1C00	80	0300	00
202A	64	40	0000	00	0000	2A

Hi-Res Row Address









Addr	Hex	Dec	Hi	Lo
2000	00	0	00	00
2400	01	1	04	00
2800	02	2	08	00
2C00	03	3	0C	00
3000	04	4	10	00
3400	05	5	14	00
3800	06	6	18	00
3C00	07	7	1C	00
2080	08	8	00	80
2480	09	9	04	80
2880	0A	10	08	80
2C80	0B	11	0C	80
3080	0C	12	10	80
3480	0D	13	14	80
3880	0E	14	18	80
3C80	0F	15	1C	80
2100	10	16	01	00
2500	11	17	05	00
2900	12	18	09	00
2D00	13	19	0D	00
3100	14	20	11	00
3500	15	21	15	00
3900	16	22	19	00
3D00	17	23	1D	00
2180	18	24	01	80
2580	19	25	05	80
2980	1A	26	09	80
2D80	1B	27	0D	80
3180	1C	28	11	80
3580	1D	29	15	80
3980	1E	30	19	80
3D80	1F	31	1D	80
2200	20	32	02	00
2600	21	33	06	00
2A00	22	34	0A	00
2E00	23	35	0E	00
3200	24	36	12	00
3600	25	37	16	00
3A00	26	38	1A	00
3E00	27	39	1E	00
2280	28	40	02	80
2680	29	41	06	80
2A80	2A	42	0A	80
2E80	2B	43	0E	80
3280	2C	44	12	80
3680	2D	45	16	80
3A80	2E	46	1A	80
3E80	2F	47	1E	80
2300	30	48	03	00
2700	31	49	07	00
2B00	32	50	0B	00
2F00	33	51	0F	00
3300	34	52	13	00
3700	35	53	17	00
3B00	36	54	1B	00
3F00	37	55	1F	00
2380	38	56	03	80
2780	39	57	07	80
2B80	3A	58	0B	80
2F80	3B	59	0F	80
3380	3C	60	13	80
3780	3D	61	17	80
3B80	3E	62	1B	80
3F80	3F	63	1F	80

Addr	Hex	Dec	Hi	Lo
202A	40	64		2A
242A	41	65		2A
282A	42	66		2A
2C2A	43	67		2A
302A	44	68		2A
342A	45	69		2A
382A	46	70		2A
3C2A	47	71		2A
20AA	48	72		AA
24AA	49	73		AA
28AA	4A	74		AA
2CAA	4B	75		AA
30AA	4C	76		AA
34AA	4D	77		AA
38AA	4E	78		AA
3CAA	4F	79		AA
212A	50	80		2A
252A	51	81		2A
292A	52	82		2A
2D2A	53	83		2A
312A	54	84		2A
352A	55	85		2A
392A	56	86		2A
3D2A	57	87		2A
21AA	58	88		AA
25AA	59	89		AA
29AA	5A	90		AA
2DAA	5B	91		AA
31AA	5C	92		AA
35AA	5D	93		AA
39AA	5E	94		AA
3DAA	5F	95		AA
222A	60	96		2A
262A	61	97		2A
2A2A	62	98		2A
2E2A	63	99		2A
322A	64	100		2A
362A	65	101		2A
3A2A	66	102		2A
3E2A	67	103		2A
22AA	68	104		AA
26AA	69	105		AA
2AAA	6A	106		AA
2EAA	6B	107		AA
32AA	6C	108		AA
36AA	6D	109		AA
3AAA	6E	110		AA
3EAA	6F	111		AA
232A	70	112		2A
272A	71	113		2A
2B2A	72	114		2A
2F2A	73	115		2A
332A	74	116		2A
372A	75	117		2A
3B2A	76	118		2A
3F2A	77	119		2A
23AA	78	120		AA
27AA	79	121		AA
2BAA	7A	122		AA
2FAA	7B	123		AA
33AA	7C	124		AA
37AA	7D	125		AA
3BAA	7E	126		AA
3FAA	7F	127		AA

Addr	Hex	Dec
2054	80	128
2454	81	129
2854	82	130
2C54	83	131
3054	84	132
3454	85	133
3854	86	134
3C54	87	135
20D4	88	136
24D4	89	137
28D4	8A	138
2CD4	8B	139
30D4	8C	140
34D4	8D	141
38D4	8E	142
3CD4	8F	143
2154	90	144
2554	91	145
2954	92	146
2D54	93	147
3154	94	148
3554	95	149
3954	96	150
3D54	97	151
21D4	98	152
25D4	99	153
29D4	9A	154
2DD4	9B	155
31D4	9C	156
35D4	9D	157
39D4	9E	158
3DD4	9F	159
2254	A0	160
2654	A1	161
2A54	A2	162
2E54	A3	163
3254	A4	164
3654	A5	165
3A54	A6	166
3E54	A7	167
22D4	A8	168
26D4	A9	169
2AD4	AA	170
2ED4	AB	171
32D4	AC	172
36D4	AD	173
3AD4	AE	174
3ED4	AF	175
2354	B0	176
2754	B1	177
2B54	B2	178
2F54	B3	179
3354	B4	180
3754	B5	181
3B54	B6	182
3F54	B7	183
23D4	B8	184
27D4	B9	185
2BD4	BA	186
2FD4	BB	187
33D4	BC	188
37D4	BD	189
3BD4	BE	190
3FD4	BF	191

Contiguous Pixels with Half-Pixel Shift

Address	1 px	2 px	3 px	4 px	5 px	6 px	7 px	8 px
2000:	01 00	03 00	07 00	0F 00	1F 00	3F 00	7F 00	7F 01
2400:	81 00	83 00	87 00	8F 00	9F 00	BF 00	FF 00	FF 81
2800:	02 00	06 00	0E 00	1E 00	3E 00	7E 00	7E 01	7E 03
2C00:	82 00	86 00	8E 00	9E 00	BE 00	FE 00	FE 81	FE 83
3000:	04 00	0C 00	1C 00	3C 00	7C 00	7C 01	7C 03	7C 07
3400:	84 00	8C 00	9C 00	BC 00	FC 00	FC 81	FC 83	FC 87
3800:	08 00	18 00	38 00	78 00	78 01	78 03	78 07	78 0F
3C00:	88 00	98 00	B8 00	F8 00	F8 81	F8 83	F8 87	F8 8F
2080:	10 00	30 00	70 00	70 01	70 03	70 07	70 0F	70 1F
2480:	90 00	B0 00	F0 00	F0 81	F0 83	F0 87	F0 8F	F0 9F
2880:	20 00	60 00	60 01	60 03	60 07	60 0F	60 1F	60 3F
2C80:	A0 00	E0 00	E0 81	E0 83	E0 87	E0 8F	E0 9F	E0 BF
3080:	40 00	40 01	40 03	40 07	40 0F	40 1F	40 3F	40 7F
3480:	C0 00	C0 81	C0 83	C0 87	C0 8F	C0 9F	C0 BF	C0 FF
3880:	00 01	00 03	00 07	00 0F	00 1F	00 3F	00 7F	00 7F
3C80:	80 81	80 83	80 87	80 8F	80 9F	80 BF	80 FF	80 FF

Bit 7 (HiBit)	Bit a	Bit b	Color	Byte0	Byte1	HCOLOR	Single Pixel	RGB	Color Sample
0	0	0	Black0	00	00	0	00	000000	
0	0	1	Green	2A	55	1	02	10D000	
0	1	0	Magenta	55	2A	2	01	00D030	
0	1	1	White0	7F	7F	3	03	FFFFFF	
1	0	0	Black1	80	80	4	80	000000	
1	0	1	Orange	AA	D5	5	82	F06000	
1	1	0	Blue	D5	AA	6	81	2020F0	
1	1	1	White1	FF	FF	7	83	FFFFFF	

- Notes:** - Bit 'a' is 0th, 2nd, 4th, or 6th bit of Byte 0; or 1st, 3rd, 5th bit of Byte 1.
 - Bit 'b' is 1st, 3rd, 5th bit of Byte 1, or 0th, 2nd, 4th, or 6th bit of Byte 1.
 - Half-Shifted pixels *never* over-flow past the 7-pixel "column" into the next pixel 0 column.

Byte	Half Pixel Shift?	1 st Column Pixels Bits of Byte 0							2 nd Column Pixels Bits of Byte 1								
		0	1	2	3	4	5	6	0	1	2	3	4	5	6		
70	No						X	X	X	X	n/a						
F0	Yes							X	X	X	n/a						
		a		a				a				a		a			a
			b			b			b				b			b	

@reference: Technote tn-iigs-063 "Master Color Values"

Color Register Values									
	Color	Reg	LR	HR	DHR	Master	Authentic	Tweaked	NTSC
	Name		#	#	#	Value			Corrected
	Black	0	0	0,4	0	\$0000	(00,00,00)	(00,00,00)	00,00,00
(Magenta)	Deep Red	1	1		1	\$0D03	(D0,00,30)	(D0,00,30)	90,17,40
	Dark Blue	2	2		8	\$0009	(00,00,90)	(00,00,80)	40,2C,A5
(Violet)	Purple	3	3	2	9	\$0D2D	(D0,20,D0)	(FF,00,FF)	D0,43,E5
	Dark Green	4	4		4	\$0072	(00,70,20)	(00,80,00)	00,69,40
(Gray 1)	Dark Gray	5	5		5	\$0555	(50,50,50)	(80,80,80)	80,80,80
(Blue)	Medium Blue	6	6	6	C	\$022F	(20,20,F0)	(00,00,FF)	2F,95,E5
(Cyan)	Light Blue	7	7		D	\$06AF	(60,A0,F0)	(60,A0,FF)	BF,AB,FF
	Brown	8	8		2	\$0850	(80,50,00)	(80,50,00)	40,54,00
	Orange	9	9	5	3	\$0F60	(F0,60,00)	(FF,80,00)	D0,6A,1A
(Gray 2)	Light Gray	A	A		A	\$0AAA	(A0,A0,A0)	(C0,C0,C0)	80,80,80
	Pink	B	B		B	\$0F98	(F0,90,80)	(FF,90,80)	FF,96,BF
(Green)	Light Green	C	C	1	6	\$01D0	(10,D0,00)	(00,FF,00)	2F,BC,1A
	Yellow	D	D		7	\$0FF0	(F0,F0,00)	(FF,FF,00)	BF,D3,5A
(Aqua)	Aquamarine	E	E		E	\$04F9	(40,F0,90)	(40,FF,90)	6F,E8,BF
	White	F	F	3,7	F	\$0FFF	(F0,F0,F0)	(FF,FF,FF)	FF,FF,FF

Legend:

LR: Lo-Res HR: Hi-Res DHR: Double Hi-Res