THE CHARACTER GENERATOR ROM

Character generator adds character or animated text to video in video editing. It is based on hardware and software.

Most computers today use a special device called a *character generator ROM* to convert the ASCII bytes to a tiny dot matrix pattern for displaying on the tv screen. This dot matrix can have a density ranging from 5×7 (the most coarse and not allowing lowercase) to 10×12 (the most dense and allowing all symbols of the alphabet). As the resolution of the dot matrix of the character increases so does the cost of the ROM chip; so, the 5×7 and 7×9 matrixes have become popular, the 7×9 in Fig. 2-4B having uppercase, lowercase, and Greek math symbols. Besides cost, another factor that limits the character matrix density is maximum dot frequency permitted by the tv. This simply means that the internal circuits of the television set will not allow a dot pattern to be resolved if there are frequency components in it which exceed about 6 MH.

A3... A6 A0 ..A4	0000 D6...D0	0011 D6...D0	0010 D6...D0	0011 D6...D0	0100 D6...D0	0101 D6...D0	0110 D6...D0	0111 D6...D0
000 (R0–R8)	∝	₱	Ɣ	₷	ε	₷	η	θ
001 (R0–R8)	ρ	σ	τ	υ	Φ	χ	Ψ	ω
010 (R0–R8)		!	"	#	$	%	&	'
011 (R0–R8)	0	1	2	3	4	5	6	7
100 (R0–R8)	@	A	B	C	D	E	F	G
101 (R0–R8)	P	Q	R	S	T	U	V	W
110 (R0–R8)	`	a	b	c	d	e	f	g
111 (R0–R8)	p	q	r	s	t	u	v	w

☞ = Shifted Character   The character is shifted three rows to R3 at the top of the font and R11 at

The basic trick to making a memory-mapped display work is shown in above fig. The large switch shown to the left of center in the figure represents circuits that scan the bytes in the screen memory and send them to the character generator ROM.

The purpose of the character generator ROM is to accept the ASCII bytes from memory and convert them to a row of dots for the character that these bytes represent.
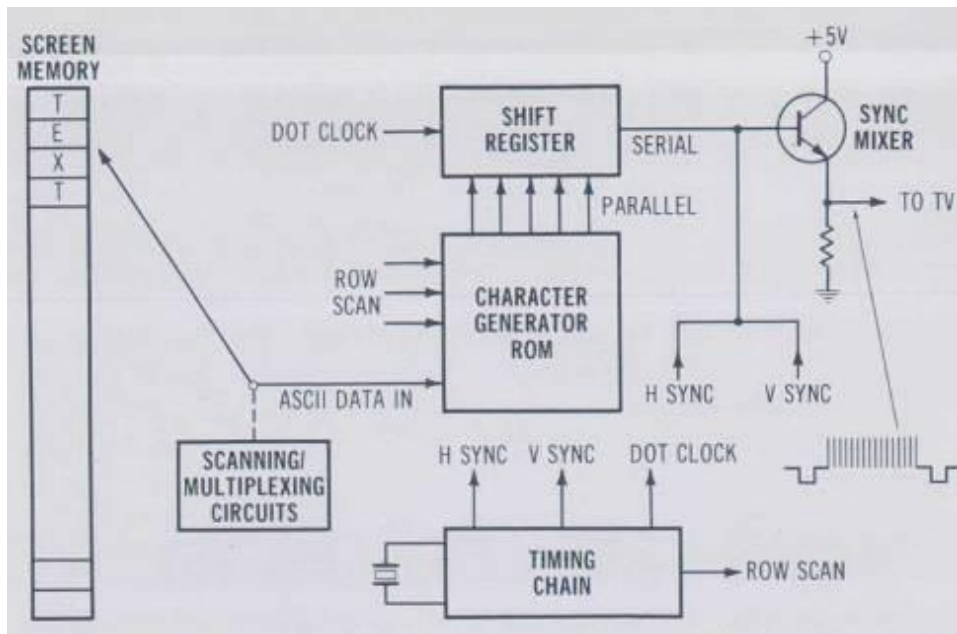
The secret to understanding how the video circuits work is to realize that the ROM puts out all the dots for one row of all the characters on a single line of text on the screen (which might be 25 to 80 characters long. This is shown in above fig. In this figure the top row of dots of *all* characters on the first line are being displayed. Each row here takes 63 μs. Characters in a line are presented to the ROM eight times, once for each row.

Thus, each character on a line of text is accessed from screen memory several times until all the rows are laid down. If the characters are on a 5×7 matrix then each character is accessed seven times, one time for each of the seven rows. The more rows in the character matrix, the better and faster the video circuits must be.

Data from: https://www.atariarchives.org/cgp/Ch02_Sec04.php