Tooth Combinations on Bar and Matrices

MATRIX TOOTH COMBINATIONS

AMONG LINOTYPE STUDENTS, operators and machinists there are many who, we believe, feel that any description of the distribution of matrices is incomplete without at least a few paragraphs relating to the system of tooth combinations on the matrices and the distributor bar.

On a pi matrix, having no teeth removed, it should be noted that there are seven vertical levels of teeth on each side of the V-shaped tooth notch; and that the V notch is central and symmetrical in the top of the matrix; and also that the teeth on both sides of the V notch correspond as to size and as to vertical levels.

If measurements are made, it will also be noted that the horizontal top surfaces of the teeth are .050″ apart vertically and that the small vertical surfaces which look almost like sharp points on the teeth, are, when measured horizontally one from another on either side of the V, just $\frac{1}{32}$″ apart.

The fact that the matrices drop from the distributor bar is the result of the selection of tooth measurements which allow this drop without the interference of any matrix tooth with the rail at the next lower level on the bar. The tooth measurements on the matrices and distributor bar make the included angle of the V 64 degrees.

The whole system depends on the number of combinations that can be made of seven teeth and seven rail levels on the distributor bar.

A distributor bar having but one level of rails at the top on each side would provide for but one drop-off place for matrices. Two rail levels provide three drop-off places for matrices—one at the end of the first rail level, another at the end of the second rail level, and a third is possible because another rail is added on the first level to hold up the third matrix while it is being conveyed across the gap made by the removal of the second rail. Therefore, two levels of rails provide the combination (1) and also the combinations (2) and (1-2).

The addition of the third rail level provides the four additional combinations (3), (1-3), (2-3), and (1-2-3). And, as shown in the table on the next page, the fourth level provides eight more; the fifth level, 16 more; the sixth level, 32 more; and the seventh level, 64 more. Adding all these together it is found that there are 127 possible combinations with seven tooth levels. But, because the last one (1-2-3-4-5-6-7) is for pi matrices, 126 is the number of useful tooth combinations for distribution of matrices into the magazines.

Matrices are always spoken of as having combinations of "teeth." The distributor bar is spoken of as having "rails" or "teeth"; and, for purposes of this chapter, the terms may be used interchangeably—"rails" being preferred.

Examination of the table of tooth combinations of matrices in the main maga-

zine, and the application of this table to the distributor bar, shows that the distributor bar has combinations of "rails," or "teeth," which are the complement of those on the matrix which drops off the bar at any particular division on the bar. For example: the "l" matrix has the tooth combination (1-3-4). These teeth have not been removed from the matrix, but have been removed from the distributor bar, leaving the rail combination (2-5-6-7) on the distributor bar at that place. This is clearly shown in Fig. 1-20.

In the case of both the matrix and the distributor bar, the teeth are numbered from top to bottom as 1 to 7.

| e | e | t | a | o | i | n | s | h | r | d | l | u | c | m | f |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
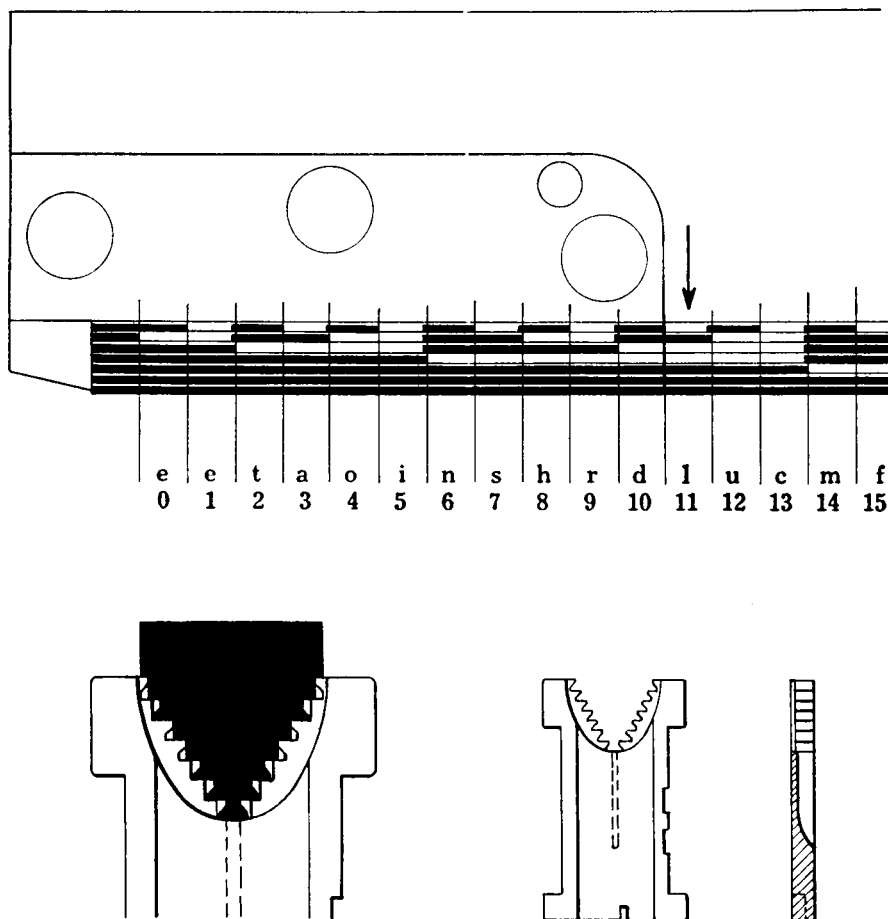
FIG. 1-20. View from the front of the machine of a portion of the distributor bar. The divisions of this bar correspond with the spacing of the channels at the back of the 90-channel main magazine. The sections removed from the bar are shown in white.

An enlarged view of the lower case "l" matrix on a section of the distributor bar is shown at the lower left. This matrix is released from the bar at the point indicated by the arrow above. The lower center view is a pi matrix, with no teeth removed. The lower right-hand view is a section through the body of a matrix.

TOOTH COMBINATION AND LUG CHART
90-Channel Magazine

Chan. No.	*Chan. Size	Char.	Teeth in Combination
0..	.050	e 1st	2
1..	.050	e	1-2
2..	.050	t	3
3..	.060	a	1-3
4..	.050	o	2-3
5..	.040	i	1-2-3
6..	.060	n	4
7..	.050	s	1-4
8..	.060	h	2-4
9..	.050	r	1-2-4
10..	.060	d	3-4
11..	.040	l	1-3-4
12..	.070	u	2-3-4
13..	.060	c	1-2-3-4
14..	.090	m	5
15..	.050	f	1-5
16..	.090	w	2-5
17..	.060	y	1-2-5
18..	.060	p	3-5
19..	.060	v	1-3-5
20..	.060	b	2-3-5
21..	.060	g	1-2-3-5
22..	.070	k	4-5
23..	.060	p	1-4-5
24..	.040	j	2-4-5
25..	.070	x	1-2-4-5
26..	.050	z	3-4-5
27..	.060	fi	1-3-4-5
28..	.060	fl	2-3-4-5
29..	.070	ff	1-2-3-4-5
30..	.090	ffi	6
31..	.090	ffl	1-6
32..	.090	Em Space	2-6
33..	.040	Comma	1-2-6
34..	.040	Period	3-6
35..	.050	Colon	1-3-6
36..	.050	Semicolon	2-3-6
37..	.060	Interrogation	1-2-3-6
38..	.055	Figure Space	4-6
39..	.040	(	1-4-6
40..	.040	Vertical Rule	2-4-6
41..	.040	Quote	1-2-4-6
42..	.050	Exclamation	3-4-6
43..	.040	Hyphen	1-3-4-6
44..	.040	Thin Space	2-3-4-6
45..	.040	)	1-2-3-4-6

Chan. No.	*Chan. Size	Char.	Teeth in Combination
46..	.055	En Leader	5-6
47..	.040	Apostrophe	1-5-6
48..	.055	Asterisk	2-5-6
49..	.055	1	1-2-5-6
50..	.055	2	3-5-6
51..	.055	3	1-3-5-6
52..	.055	4	2-3-5-6
53..	.055	5	1-2-3-5-6
54..	.055	6	4-5-6
55..	.055	7	1-4-5-6
56..	.055	8	2-4-5-6
57..	.055	9	1-2-4-5-6
58..	.055	0	3-4-5-6
59..	.055	$	1-3-4-5-6
60..	.100	Em Leader	2-3-4-5-6
61..	.090	E	1-2-3-4-5-6
62..	.080	T	7
63..	.090	A	1-7
64..	.080	O	2-7
65..	.060	I	1-2-7
66..	.090	N	3-7
67..	.070	S	1-3-7
68..	.100	H	2-3-7
69..	.090	R	1-2-3-7
70..	.090	D	4-7
71..	.080	L	1-4-7
72..	.090	U	2-4-7
73..	.070	C	1-2-4-7
74..	.100	M	3-4-7
75..	.080	F	1-3-4-7
76..	.110	W	2-3-4-7
77..	.090	Y	1-2-3-4-7
78..	.080	P	5-7
79..	.090	V	1-5-7
80..	.080	B	2-5-7
81..	.080	G	1-2-5-7
82..	.090	K	3-5-7
83..	.080	Q	1-3-5-7
84..	.060	J	2-3-5-7
85..	.090	X	1-2-3-5-7
86..	.070	Z	4-5-7
87..	.090	œ or @	1-4-5-7
88..	.090	æ or ℔	2-4-5-7
89..	.060	&	1-2-4-5-7
90..	.090	Em Dash	3-4-5-7

*Lugs on matrices .010 less.

TOOTH COMBINATION AND LUG CHART
72-Channel Magazine

Chan. No.	*Chan. Size	Char.	Teeth in Combination	Chan. No.	*Chan. Size	Char.	Teeth in Combination
0..	.050	e 1st	2	37..	.055	6	4–5–6
1..	.050	e	1–2	38..	.055	7	1–4–5–6
2..	.050	t	3	39..	.055	8	2–4–5–6
3..	.060	a	1–3	40..	.055	9	1–2–4–5–6
4..	.050	o	2–3	41..	.055	0	3–4–5–6
5..	.040	i	1–2–3	42..	.040	Thin Space	2–3–4–6
6..	.060	n	4	43..	.090	E	1–2–3–4–5–6
7..	.050	s	1–4	44..	.080	T	7
8..	.060	h	2–4	45..	.090	A	1–7
9..	.050	r	1–2–4	46..	.080	O	2–7
10..	.060	d	3–4	47..	.060	I	1–2–7
11..	.040	l	1–3–4	48..	.090	N	3–7
12..	.070	u	2–3–4	49..	.070	S	1–3–7
13..	.060	c	1–2–3–4	50..	.100	H	2–3–7
14..	.090	m	5	51..	.090	R	1–2–3–7
15..	.050	f	1–5	52..	.090	D	4–7
16..	.090	w	2–5	53..	.080	L	1–4–7
17..	.060	y	1–2–5	54..	.090	U	2–4–7
18..	.060	p	3–5	55..	.070	C	1–2–4–7
19..	.060	v	1–3–5	56..	.100	M	3–4–7
20..	.060	b	2–3–5	57..	.080	F	1–3–4–7
21..	.060	g	1–2–3–5	58..	.110	W	2–3–4–7
22..	.070	k	4–5	59..	.090	Y	1–2–3–4–7
23..	.060	q	1–4–5	60..	.080	P	5–7
24..	.040	j	2–4–5	61..	.090	V	1–5–7
25..	.070	x	1–2–4–5	62..	.080	B	2–5–7
26..	.050	z	3–4–5	63..	.080	G	1–2–5–7
27..	.040	Comma	1–2–6	64..	.090	K	3–5–7
28..	.040	Period	3–6	65..	.080	Q	1–3–5–7
29..	.050	Semicolon	2–3–6	66..	.060	J	2–3–5–7
30..	.090	Em Space	1–3–4–5	67..	.090	X	1–2–3–5–7
31..	.055	1	1–2–5–6	68..	.070	Z	4–5–7
32..	.055	2	3–5–6	69..	.040	Hyphen	1–4–5–7
33..	.055	3	1–3–5–6	70..	.040	Thin Space	2–4–5–7
34..	.055	4	2–3–5–6	71..	.040	Apostrophe	1–2–4–5–7
35..	.055	5	1–2–3–5–6	72..	.055	$	3–4–5–7
36..	.055	Figure Space	4–6				

*Lugs on matrices .010 less.

TOOTH COMBINATION AND LUG CHART
28-Channel Auxiliary Magazine

Chan. No.	*Chan. Size	Char.	Teeth in Combination
1..	.070...	A	1–3–4–5–7
2..	.070...	O	1–2–3–4–5–7
3..	.070...	H	6–7
4..	.070...	V	1–6–7
5..	.070...	B	2–6–7
6..	.070...	P	1–2–6–7
7..	.070...	I	3–6–7
8..	.070...	W	1–3–6–7
9..	.070...	C	2–3–6–7
10..	.070...	Q	1–2–3–6–7
11..	.070...	J	4–6–7
12..	.070...	X	1–4–6–7
13..	.070...	D	2–4–6–7
14..	.070...	R	1–2–4–6–7
15..	.070...	K	3–4–6–7
16..	.070...	Y	2–3–4–6–7
17..	.070...	E	1–3–4–6–7
18..	.070...	S	1–2–3–4–6–7
19..	.070...	L	5–6–7
20..	.070...	Z	1–5–6–7
21..	.070...	F	2–5–6–7
22..	.070...	T	1–2–5–6–7
23..	.070...	M	3–5–6–7
24..	.070...	Period	2–3–5–6–7
25..	.070...	G	1–3–5–6–7
26..	.070...	U	1–2–3–5–6–7
27..	.070...	N	4–5–6–7
28..	.070...	Comma	1–4–5–6–7

*Lugs on matrices .010 less.

TOOTH COMBINATION AND LUG CHART
34-Channel Auxiliary Magazine

Chan. No.	*†Chan. Size	Char.	Teeth in Combination
1..	.055...	1	2–3–4–5–7
2..	.055...	2	1–3–4–5–7
3..	.050...	3	1–2–3–4–5–7
4..	.040...	4	6–7
5..	.040...	5	1–6–7
6..	.050...	6	2–6–7
7..	.055...	7	1–2–6–7
8..	.055...	8	3–6–7
9..	.055...	9	1–3–6–7
10..	.055...	0	2–3–6–7
11..	.055...	Space	1–2–3–6–7
12..	.050...	E	4–6–7
13..	.050...	T	1–4–6–7
14..	.060...	A	2–4–6–7
15..	.050...	O	1–2–4–6–7
16..	.040...	I	3–4–6–7
17..	.060...	N	2–3–4–6–7
18..	.050...	S	1–3–4–6–7
19..	.060...	H	1–2–3–4–6–7
20..	.050...	R	5–6–7
21..	.060...	D	1–5–6–7
22..	.040...	L	2–5–6–7
23..	.070...	U	1–2–5–6–7
24..	.060...	C	3–5–6–7
25..	.090...	M	2–3–5–6–7
26..	.050...	F	1–3–5–6–7
27..	.090...	W	1–2–3–5–6–7
28..	.060...	Y	4–5–6–7
29..	.060...	P	1–4–5–6–7
30..	.060...	V	2–4–5–6–7
31..	.060...	B	1–2–4–5–6–7
32..	.060...	G	3–4–5–6–7
33..	.070...	K	2–3–4–5–6–7
34..	.040...	J	1–3–4–5–6–7

* Lugs on matrices .010 less.

† Also used for Wide 34-channel Auxiliary Magazine when specified for condensed faces.

TOOTH COMBINATION AND LUG CHART
Wide 34-Channel Auxiliary Magazine

Chan. No.	*Chan. Size	*†Chan. Size	Char.	Teeth in Combination	Chan. No.	*Chan. Size	Char.	Teeth in Combination
1..	.055..	.090	1	2–3–4–5–7	18..	.070........	S	1–3–4–6–7
2..	.055..	.090	2	1–3–4–5–7	19..	.100........	H	1–2–3–4–6–7
3..	.050..	.090	3	1–2–3–4–5–7	20..	.090........	R	5–6–7
4..	.040..	.090	4	6–7	21..	.090........	D	1–5–6–7
5..	.040..	.090	5	1–6–7	22..	.080........	L	2–5–6–7
6..	.050..	.090	6	2–6–7	23..	.090........	U	1–2–5–6–7
7..	.055..	.090	7	1–2–6–7	24..	.070........	C	3–5–6–7
8..	.055..	.090	8	3–6–7	25..	.100........	M	2–3–5–6–7
9..	.055..	.090	9	1–3–6–7	26..	.080........	F	1–3–5–6–7
10..	.055..	.090	0	2–3–6–7	27..	.100........	W	1–2–3–5–6–7
11..	.055..	.090	Space .1–2–3–6–7–0		28..	.090........	Y	4–5–6–7
12..	.090........		E	4–6–7	29..	.080........	P	1–4–5–6–7
13..	.080........		T	1–4–6–7	30..	.090........	V	2–4–5–6–7
14..	.090........		A	2–4–6–7	31..	.080........	B	1–2–4–5–6–7
15..	.080........		O	1–2–4–6–7	32..	.080........	G	3–4–5–6–7
16..	.060........		I	3–4–6–7	33..	.090........	K	2–3–4–5–6–7
17..	.090........		N	2–3–4–6–7	34..	.060........	J	1–3–4–5–6–7

*Lugs on matrices .010 less.
†Channel size used where large display faces are to be used exclusively.

TOOTH COMBINATION AND LUG CHART
Advertising Figures
34-Channel Auxiliary Magazine
Diagram No. 51A (2 Sets of Figures)

Char.	Chan.	*†Chan. Size	Teeth in Combination	Char.	Chan.	*†Chan. Size	Teeth in Combination
1 1	....	.055	2–3–4–5–7	1 C	....	.060	3–5–6–7
2 2	....	.055	1–3–4–5–7	2 ......M	....	.090	2–3–5–6–7
3 3	....	.050	1–2–3–4–5–7	3 ......F	....	.050	1–3–5–6–7
4 4	....	.040	6–7	4 ......W	....	.090	1–2–3–5–6–7
5 5	....	.040	1–6–7	5 ......Y	....	.060	4–5–6–7
6 6	....	.050	2–6–7	6 ......P	....	.060	1–4–5–6–7
7 7	....	.055	1–2–6–7	7 V	....	.060	2–4–5–6–7
8 8	....	.055	3–6–7	8 ......B	....	.060	1–2–4–5–6–7
9 9	....	.055	1–3–6–7	9 ......G	....	.060	3–4–5–6–7
0 0	....	.055	2–3–6–7	0 ......K	....	.070	2–3–4–5–6–7
Period .E	....	.050	4–6–7	Period .R	....	.050	5–6–7
Comma T	....	.050	1–4–6–7	Comma D	....	.060	1–5–6–7
$ ......A	....	.060	2–4–6–7	$ L	....	.040	2–5–6–7
¢ ......O	....	.050	1–2–4–6–7	¢ ......U	....	.070	1–2–5–6–7

*Lugs on matrices .010 less.
†Also for Wide 34-channel Auxiliary Magazine with narrow lug channels.

TOOTH COMBINATION AND LUG CHART *(Adv't Fig. Cont'd)*
28-Channel Auxiliary Magazine
Diagram No. 96 (2 Sets of Figures)

Char.	Chan.	*Chan. Size	Teeth in Combination	Char.	Chan.	*Chan. Size	Teeth in Combination
1	A	.070	1–3–4–5–7	1	O	.070	1–2–3–4–5–7
2	B	.070	2–6–7	2	P	.070	1–2–6–7
3	C	.070	2–3–6–7	3	Q	.070	1–2–3–6–7
4	D	.070	2–4–6–7	4	R	.070	1–2–4–6–7
5	E	.070	1–3–4–6–7	5	S	.070	1–2–3–4–6–7
6	F	.070	2–5–6–7	6	T	.070	1–2–5–6–7
7	G	.070	1–3–5–6–7	7	J	.070	1–2–3–5–6–7
8	H	.070	6–7	8	V	.070	1–6–7
9	I	.070	3–6–7	9	W	.070	1–3–6–7
0	J	.070	4–6–7	0	X	.070	1–4–6–7
Period	K	.070	3–4–6–7	Period	Y	.070	2–3–4–6–7
Comma	L	.070	5–6–7	Comma	Z	.070	1–5–6–7
$	M	.070	3–5–6–7	$	Period	.070	2–3–5–6–7
¢	N	.070	4–5–6–7	¢	Comma	.070	1–4–5–6–7

*Lugs on matrices .010 less.

34-Channel Wide Auxiliary Magazine
Diagram No. 51A (2 Sets of Figures)

Char.	Chan.	*Chan. Size		Teeth in Combination	Char.	Chan.	*Chan. Size	Teeth in Combination
1	1	.055.	†.090	2–3–4–5–7	1	C	.070	3–5–6–7
2	2	.055.	.090	1–3–4–5–7	2	M	.100	2–3–5–6–7
3	3	.050.	.090	1–2–3–4–5–7	3	F	.080	1–3–5–6–7
4	4	.040.	.090	6–7	4	W	.100	1–2–3–5–6–7
5	5	.040.	.090	1–6–7	5	Y	.090	4–5–6–7
6	6	.050.	.090	2–6–7	6	P	.080	1–4–5–6–7
7	7	.055.	.090	1–2–6–7	7	V	.090	2–4–5–6–7
8	8	.055.	.090	3–6–7	8	B	.080	1–2–4–5–6–7
9	9	.055.	.090	1–3–6–7	9	G	.080	3–4–5–6–7
0	0	.055.	.090	2–3–6–7	0	K	.090	2–3–4–5–6–7
Period	E	.090		4–6–7	Period	R	.090	5–6–7
Comma	T	.080		1–4–6–7	Comma	D	.090	1–5–6–7
$	A	.090		2–4–6–7	$	L	.080	2–5–6–7
¢	O	.080		1–2–4–6–7	¢	J	.090	1–2–5–6–7

*Lugs on matrices .010 less.
†Channel size used where large display faces are to be used exclusively.

90-Channel Magazine (Diagram No. 32)

Char.	Chan.	*Chan. Size	Teeth in Combination	Char.	Chan.	*Chan. Size	Teeth in Combination
1	fi	.060	2–3–4–5	8	Z	.070	4–5–7
2	ffi	.090	6	9	@	.090	1–4–5–7
3	ffl	.090	1–6	0	lb	.090	2–4–5–7
4	Interrogat'n	.060	1–2–3–6	$	Exclamat'n	.050	3–4–6
5	Vertic'l R'le	.040	2–4–5	Period	(	.040	1–4–6
6	Asterisk	.055	2–5–6	Comma	)	.040	1–2–3–4–6
7	X	.090	1–2–3–5–7	¢	&	.060	1–2–4–5–7

*Lugs on matrices .010 less.