UR1976_07

1976/7. Computer programmes for the production of triangular variation diagrams

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Programmes for the production of triangular variation diagrams have been compiled for the Wang 700/702. The programmes enable diagrams to be prepared quickly, without the use of special graph paper, at a scale suitable for use in departmental publications.

OUTLINE OF THE PROGRAMMES

Transformation of coordinates

The triangular coordinate values for *a*, *b*, and *c*, the sum of which must equal 100 for any given point, are transformed to Cartesian coordinates in the following manner (fig. 1):

(1) Values for *c* and *b* are entered and from these *a* is calculated (*a* = *y*-axis value).
(2) An *x*-axis value is calculated relative to the perpendicular line AO, where O is the plot origin and has the values *a* = 0, *b* = 50, *c* = 50.
(3) An *x*-axis scale factor (0.58) is applied to the *x*-axis value to equalise the *x* and *y* scales.
(4) An overall scale factor (5) is applied to enable the diagram to be produced at the scale required for publication (AO = 127 mm, BC = 147 mm).

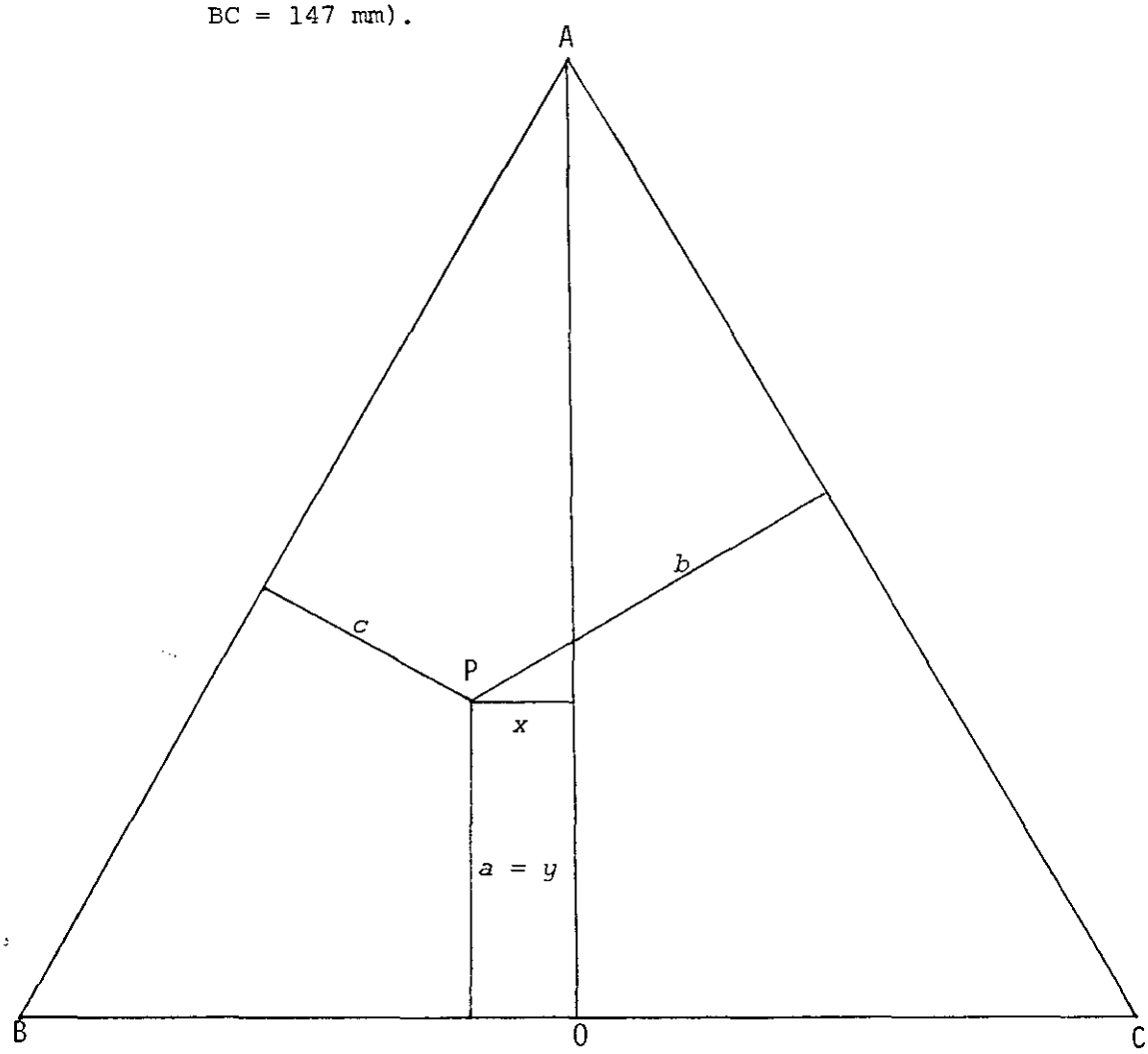

Figure 1. *Coordinate transformation.*

5 cm

Point labelling

The simplest way of distinguishing points is by the use of different symbols. Where points need to be individually labelled they will normally be designated by numbers.

Whilst it would be simplest to key the number required followed by a WRITE command, then return to the plot point, this method has two disadvantages: the value in the X-register would need to be stored and recalled in order to return to the plot origin and the digits would be widely spaced (interval 2.54 mm).

The method employed obviates the need to displace the X-register value by using a series of special WRITE ALPHA commands not listed in the manual, and at the same time enables the interval between digits to be reduced by 40%. An improved appearance may be obtained by using the Symbol type ball which has smaller numerals.

OPERATION OF PROGRAMMES

Programme 1 (15A1)

This programme is to be used with the normal type ball.

(1) PRIME, GO (the overall scale factor (5) will be displayed), GO.
(2) Enter *c* value, GO; enter *b* value, GO.
Repeat (2) as required.

If point labelling is required alter programme step 086 to STOP and operate as for Programme 2.

To plot the apices of the triangle key the following values, using operation (2).

c	*b*
0	0
0	100
100	0

The apices may then be joined by hand drawn lines.

Programme 2 (15A2)

This programme is to be used with the SYMBOL type ball.

(1) PRIME, GO (the overall scale factor (5) will be displayed), GO.
(2) Enter *c* value, GO; enter *b* value, GO.
(3) Label point by using the special function keys 00-09 (which will print the digits 0-9) in the required sequence; (see also tables 1 and 2) then return to plot point by pressing special function Key 11 for each digit you have printed.
(4) GO and return to operation (2).

The apices of triangle may be plotted as in Programme 1.

An example of print out is shown as Figure 2.

Programme modification

Programme steps 083 and 084 control upper or lower case and the plot symbol, respectively. If these are altered during the operation of a programme make the alteration when at the plot origin and follow by SEARCH 1.

Letter symbols may be used for labelling by adding new subroutines. Each subroutine should have the form.

```
MARK
XXXX (subroutine number not already used)
0311
WRITE ALPHA
0102/0103 (lower or upper case)
YYYY (code for letter required)
END ALPHA
RETURN
```

To print inverted triangles alter programme step 011 to 1 (0701) and step 078 to CHANGE SIGN.

To alter size of triangle key factor required during operation (1).

To alter shape of triangle change either or both factors. This may be most conveniently done after operation (1).

```
Key overall scale factor, STORE DIRECT 00.
Key x-axis scale factor, STORE DIRECT 05.
SEARCH 1.
```

For example, to increase the height of the triangle (AO) to 228 mm, keeping BC at 147 mm, the overall scale factor would be 9 and the *x*-axis scale factor 0.32.

[3 March 1976]

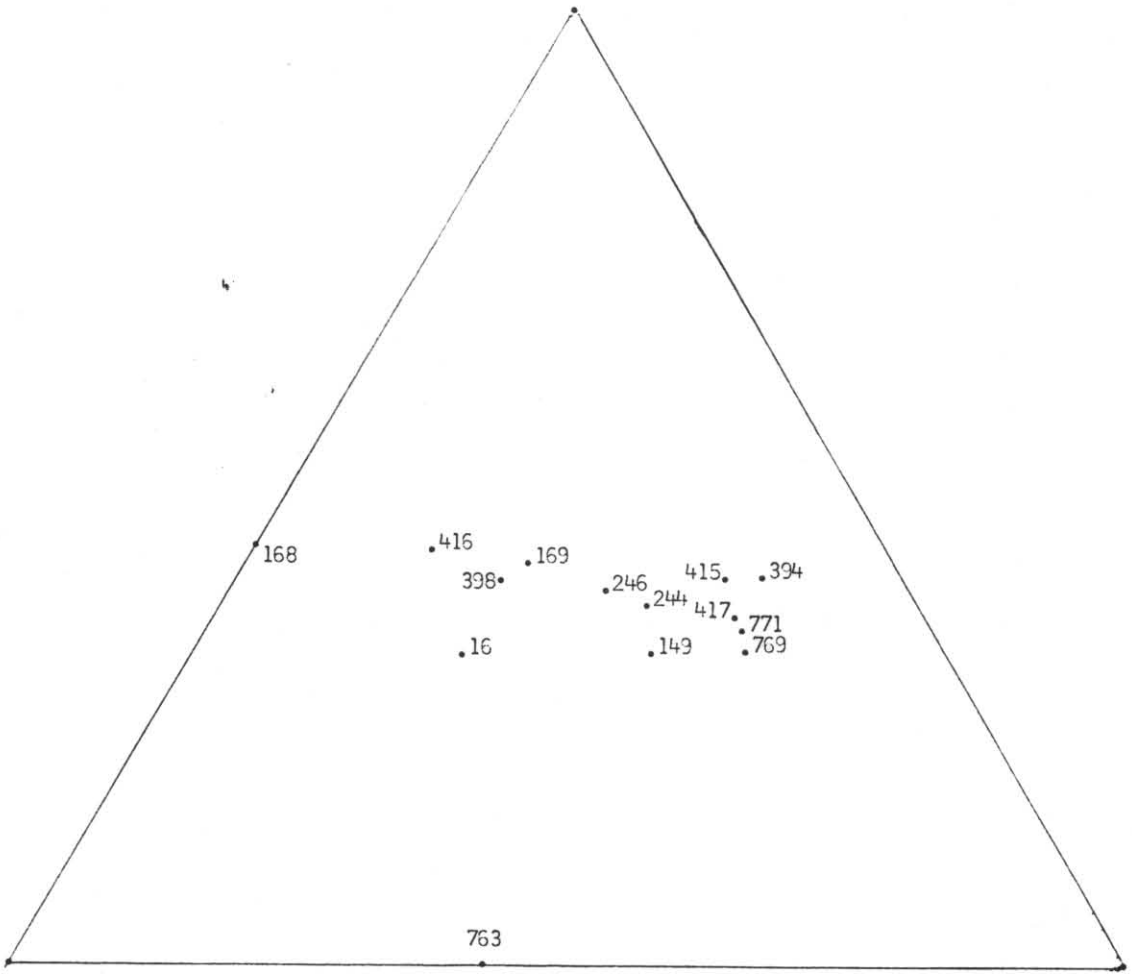

Figure 2. *Example of print out using SYMBOL 12 type ball.*

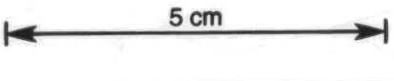

Table 1. POINT LABELLING OPERATIONS FOR PROGRAMME 1

Position of label relative to point	Operations before labelling	Operations after labelling
N	0011 x (1 +(*n* - 1)/2), 0113 x 4	0112 x 4, 0011
NE	0015	0014, 0011 x *n*
E	none	0011 x *n*
SE	0014	0015, 0011 x *n*
S	0011 x (1 +(*n* - 1)/2), 0112 x 4	0113 x 4, 0011
SW	0011 x (*n* + 1), 0014	0015, 0010
W	0011 x (*n* + 1)	0010
NW	0011 x (*n* + 1), 0015	0014, 0010

n = number of digits in label; half 0011 = 0111.

Table 2. POINT LABELLING OPERATIONS FOR PROGRAMME 2

Position of label relative to point	Operations before labelling	Operations after labelling
N	0011 x (1 +(*n* - 1)/2), 0113	0112, 0011
NE	none	0011 x *n*
E	0014	0015, 0011 x *n*
SE	0012	0013, 0011 x *n*
S	0011 x (1 +(*n* - 1)/2), 0012, 0112	0013, 0113, 0011
SW	0011 x (*n* + 1), 0012	0013, 0010
W	0011 x (*n* + 1), 0014	0015, 0010
NW	0011 x (*n* + 1)	0010

n = number of digits in label; half 0011 = 0111.

000	04 08	050	04 05	100	04 12	150	03 04	200	04 08	250	02 10
001	07 00	051	00 05	101	01 02	151	04 13	201	00 11	251	02 10
002	07 05	052	06 02	102	03 01	152	05 11	202	04 12	252	02 10
003	05 15	053	04 14	103	04 13	153	04 08	203	02 03	253	04 13
004	04 04	054	00 04	104	05 11	154	00 07	204	02 03	254	04 08
005	00 00	055	04 07	105	04 08	155	03 11	205	02 03	255	01 13
006	07 12	056	07 03	106	00 01	156	04 12	206	04 13	256	04 12
007	07 05	057	04 08	107	03 11	157	01 02	207	04 08	257	02 10
008	07 08	058	07 02	108	04 12	158	03 13	208	01 11	258	02 10
009	04 04	059	06 06	109	01 02	159	04 13	209	04 12	259	04 13
010	00 05	060	06 01	110	02 09	160	05 11	210	02 03	260	05 11
011	07 07	061	04 05	111	04 13	161	04 08	211	02 03	261	04 08
012	07 00	062	00 05	112	05 11	162	00 08	212	02 03	262	03 11
013	07 00	063	06 02	113	04 08	163	03 11	213	04 13	263	04 12
014	07 11	064	06 05	114	00 02	164	04 12	214	05 11	264	02 03
015	06 04	065	07 11	115	03 11	165	01 02	215	04 08	265	02 03
016	07 05	066	04 04	116	04 12	166	03 12	216	00 12	266	02 03
017	07 05	067	00 04	117	01 02	167	04 13	217	04 12	267	02 03
018	07 00	068	04 08	118	03 06	168	05 11	218	02 11	268	04 13
019	04 12	069	07 03	119	04 13	169	04 08	219	02 11	269	05 11
020	01 08	070	04 05	120	05 11	170	00 09	220	02 11		
021	11 08	071	00 00	121	04 08	171	03 11	221	02 11		
022	04 13	072	04 02	122	00 03	172	04 12	222	02 11	V = 3081	
023	04 08	073	00 03	123	03 11	173	01 02	223	04 13		
024	07 01	074	04 02	124	04 12	174	03 00	224	04 08	DO NOT USE	
025	07 15	075	00 04	125	01 02	175	04 13	225	00 14	with SYMBOL 12	
026	05 15	076	04 05	126	03 14	176	05 11	226	04 12	element.	
027	04 04	077	00 03	127	04 13	177	04 08	227	02 11		
028	00 01	078	05 14 ∇	128	05 11	178	01 00	228	02 11	To label points	
029	06 04	079	06 04	129	04 08	179	03 11	229	02 11	step 086 must be	
030	07 15	080	04 05	130	00 04	180	04 12	230	04 13	changed to STOP	
031	05 15	081	00 04	131	03 11	181	01 02	231	04 08		
032	04 04	082	04 12	132	04 12	182	01 06	232	01 12		
033	00 02	083	01 03 v/c	133	01 02	183	04 13	233	04 12		
034	06 00	084	09 06 PLOT SYMBOL	134	03 09	184	05 11	234	02 11		
035	07 01	085	04 13	135	04 13	185	04 08	235	02 11		
036	07 00	086	05 14	136	05 11	186	00 10	236	04 13		
037	07 00	087	05 14	137	04 08	187	04 12	237	05 11		
038	06 06	088	07 11	138	00 05	188	02 02	238	04 08		
039	06 01	089	06 06	139	03 11	189	02 02	239	00 13		
040	04 14	090	07 11	140	04 12	190	02 02	240	04 12		
041	00 03	091	06 06	141	01 02	191	04 13	241	02 10		
042	04 15	092	04 12	142	03 05	192	04 08	242	02 10		
043	00 01	093	11 08	143	04 13	193	01 10	243	02 10		
044	04 05	094	04 13	144	05 11	194	04 12	244	02 10		
045	00 02	095	04 07	145	04 08	195	02 02	245	02 10		
046	05 07	096	07 01	146	00 06	196	02 02	246	04 13		
047	04 07	097	04 08	147	03 11	197	02 02	247	04 08		
048	07 02	098	00 00	148	04 12	198	04 13	248	00 15		
049	06 01	099	03 11	149	01 02	199	05 11	249	04 12		

		050	04 05	100	04 12	150	03 04	200	04 08	250	02 10
000	04 08	051	00 05	101	01 02	151	04 13	201	00 11	251	02 10
001	07 00	052	06 02	102	03 01	152	05 11	202	04 12	252	02 10
002	07 05	053	04 14	103	04 13	153	04 08	203	02 03	253	04 13
003	05 15	054	00 04	104	05 11	154	00 07	204	02 03	254	04 08
004	04 04	055	04 07	105	04 08	155	03 11	205	02 03	255	01 13
005	00 00	056	07 03	106	00 01	156	04 12	206	04 13	256	04 12
006	07 12	057	04 08	107	03 11	157	01 02	207	04 08	257	02 10
007	07 05	058	07 02	108	04 12	158	03 13	208	01 11	258	02 10
008	07 08	059	06 06	109	01 02	159	04 13	209	04 12	259	04 13
009	04 04	060	06 01	110	03 05	160	05 11	210	02 03	260	05 11
010	00 05	061	04 05	111	04 13	161	04 08	211	02 03	261	04 08
011	07 07	062	00 05	112	05 11	162	00 08	212	02 03	262	03 11
012	07 00	063	06 02	113	04 08	163	03 11	213	04 13	263	04 12
013	07 00	064	06 05	114	00 02	164	04 12	214	05 11	264	02 03
014	07 11	065	07 11	115	03 11	165	01 02	215	04 08	265	02 03
015	06 04	066	04 04	116	04 12	166	03 12	216	00 12	266	02 03
016	07 05	067	00 04	117	01 02	167	04 13	217	04 12	267	02 03
017	07 05	068	04 08	118	03 06	168	05 11	218	02 11	268	04 13
018	07 00	069	07 03	119	04 13	169	04 08	219	02 11	269	05 11
019	04 12	070	04 05	120	05 11	170	00 09	220	02 11		
020	01 08	071	00 00	121	04 08	171	03 11	221	02 11		
021	11 08	072	04 02	122	00 03	172	04 12	222	02 11	V = 3088	
022	04 13	073	00 03	123	03 11	173	01 02	223	04 13		
023	04 08	074	04 02	124	04 12	174	03 00	224	04 08	Use with	
024	07 01	075	00 04	125	01 02	175	04 13	225	00 14	SYMBOL 12	
025	07 15	076	04 05	126	03 14	176	05 11	226	04 12	element only.	
026	05 15	077	00 03	127	04 13	177	04 08	227	02 11		
027	04 04	078	05 14 ▽	128	05 11	178	01 00	228	02 11		
028	00 01	079	06 04	129	04 08	179	03 11	229	02 11		
029	06 04	080	04 05	130	00 04	180	04 12	230	04 13		
030	07 15	081	00 04	131	03 11	181	01 02	231	04 08		
031	05 15	082	04 12	132	04 12	182	01 06	232	01 12		
032	04 04	083	01 03 U/C	133	01 02	183	04 13	233	04 12		
033	00 02	084	09 05 PLOT SYMBOL	134	03 09	184	05 11	234	02 11		
034	06 00	085	04 13	135	04 13	185	04 08	235	02 11		
035	07 01	086	05 15	136	05 11	186	00 10	236	04 13		
036	07 00	087	05 14	137	04 08	187	04 12	237	05 11		
037	07 00	088	07 11	138	00 05	188	02 02	238	04 08		
038	06 06	089	06 06	139	03 11	189	02 02	239	00 13		
039	06 01	090	07 11	140	04 12	190	02 02	240	04 12		
040	04 14	091	06 06	141	01 02	191	04 13	241	02 10		
041	00 03	092	04 12	142	03 05	192	04 08	242	02 10		
042	04 15	093	11 08	143	04 13	193	01 10	243	02 10		
043	00 01	094	04 13	144	05 11	194	04 12	244	02 10		
044	04 05	095	04 07	145	04 08	195	02 02	245	02 10		
045	00 02	096	07 01	146	00 06	196	02 02	246	04 13		
046	05 07	097	04 08	147	03 11	197	02 02	247	04 08		
047	04 07	098	00 00	148	04 12	198	04 13	248	00 15		
048	07 02	099	03 11	149	01 02	199	05 11	249	04 12		
049	06 01										