

CHROMATICITY DIAGRAM

Abstract

From 40 measured data of the spectral transmittance of a material, the program computes and prints the coordinates in the chromaticity diagram and the transmittance for the colour temperatures 2854°K (C.I.E. standard source A) and for 2360°K.

Description

The measured data of the spectral transmittance τ_λ for the 40 wavelengths 380, 390, 770nm are typed. The following equations are used to compute the transmittance τ and the coordinates of the chromaticity diagram:

Tristimulus values:

$$X = \sum \tau_\lambda \cdot \bar{x}_P$$

$$Y = \sum \tau_\lambda \cdot \bar{y}_P$$

$$Z = \sum \tau_\lambda \cdot \bar{z}_P$$

τ_λ = spectral transmittance

$\bar{x}_P, \bar{y}_P, \bar{z}_P$ = tristimulus computation data according to table 10 and 11

$Y = \tau =$ transmittance

Coordinates in the chromaticity diagram:

$$x = \frac{X}{X+Y+Z}$$

$$y = \frac{Y}{X+Y+Z}$$

$$z = \frac{Z}{X+Y+Z}$$

The values of x , y , z and $\tilde{\tau} = Y$ are printed. If the data are measured as absolute values (0.xxx) the total transmittance is 10^5 , if they are measured in percentage, the total transmittance is 10^7 .

Before a measured data is typed the computer always prints the wavelength which the data belongs to. This way the input can be easily controlled. After all 40 data are typed, any one of them can be easily corrected. Typing the wavelength followed by the correct data, automatically replaces the previously typed data at this particular wavelength.

If the tristimulus computation data for colour temperatures different from 2854°K and 2360°K are to be used according to the enclosed tables, the numbers stored in locations 1520 - 2267 (1st table) and/or 2270 - 3037 (2nd table) have to be changed. This can be done most easily with the program "Decimal to Floating Point Conversion (DECUS NO. 8-580". In one program run the computation is always executed for exactly two colour temperatures.

The program runs together with floating point package 1. DEC 08 - YQ1B - PB 4/17/70.

Storage requirements

0 - 37
63 - 75
101 - 1137
1330 - 1517 (Wavelengths)
1520 - 2267 (Table 1)
2270 - 3037 (Table 2) In addition, the floating point package 1 must be in core.

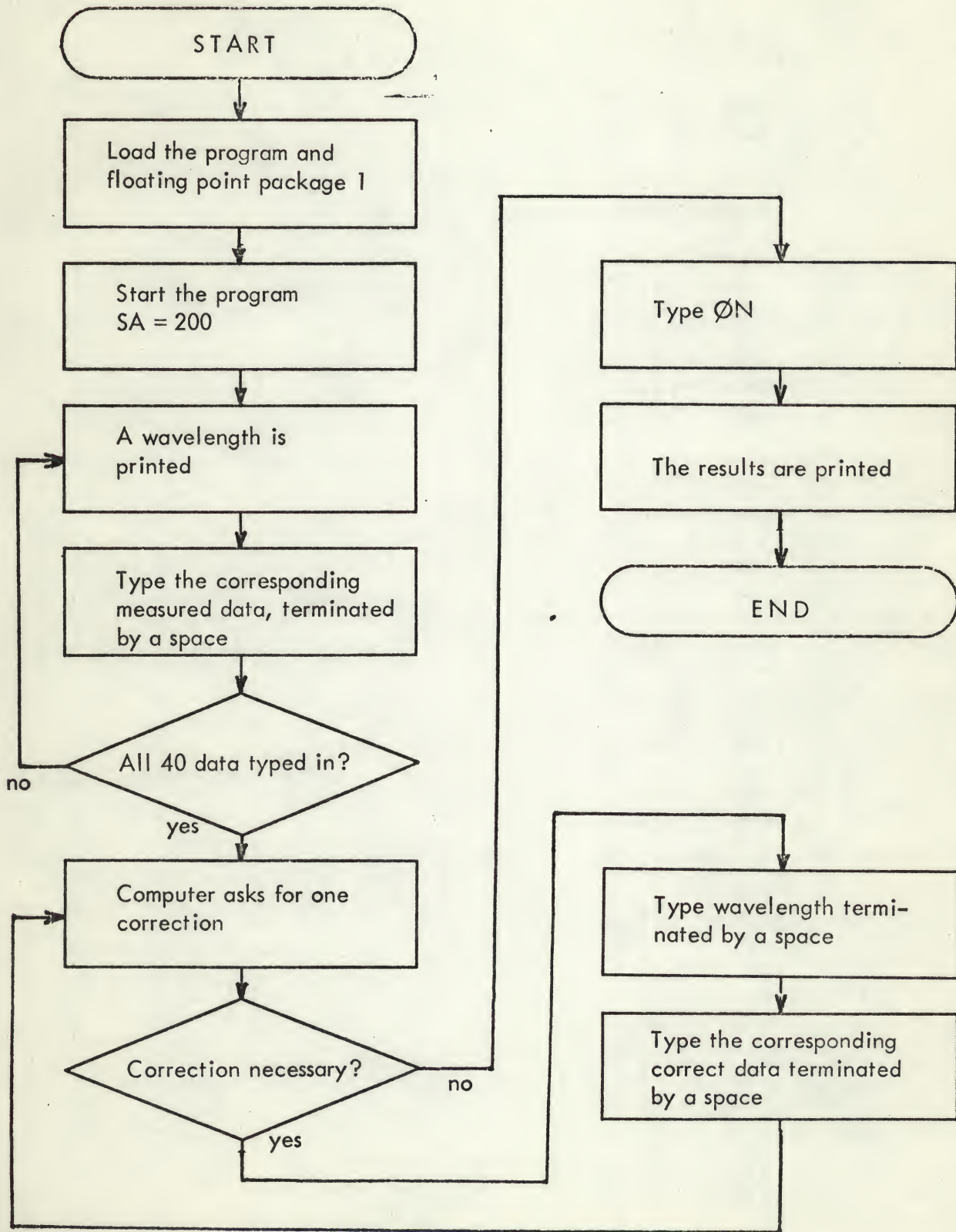
T A B L E 10
Tristimulus Computation Data for Standard Sources (C.I.E., 1931)

Wave-length (m μ)	C.I.E. standard Source A (Planck 2854 $^{\circ}$, c = 1.438)			C.I.E. standard Source B			C.I.E. standard Source C		
	\bar{x}_P	\bar{y}_P	\bar{z}_P	\bar{x}_P	\bar{y}_P	\bar{z}_P	\bar{x}_P	\bar{y}_P	\bar{z}_P
380	1		6						
390	5		23	3		14	4		20
400				13		60	19		89
410	19	1	93	56	2	268	85	2	404
420	71	2	340	217	6	1033	329	9	1570
430	262	8	1256	812	24	3899	1238	37	5949
440	649	27	3167	1983	81	9678	2997	122	14628
450	926	61	4647	2689	178	13489	3975	262	19938
460	1031	117	5435	2744	310	14462	3915	443	20638
470	1019	210	5851	2454	506	14685	3362	694	19299
480	-776	362	5116	1718	800	11319	2272	1058	14972
490	428	622	3636	879	1265	7396	1112	1618	9461
500	160	1039	2324	295	1918	4290	363	2358	5274
510	27	1792	1509	44	2908	2449	52	3401	2864
520	57	3080	969	81	4360	1371	89	4833	1520
530	425	4771	525	541	6072	669	576	6462	712
540	1214	6322	369	1458	7594	372	1523	7934	388
550	2313	7600	162	2689	8834	188	2785	9149	195
560	3732	8568	75	4183	9603	84	4282	9832	86
570	5510	9222	36	5840	9774	38	5880	9841	39
580	7571	9457	21	7472	9334	21	7322	9147	20
590	9719	9228	18	8843	8396	16	8417	7992	16
600	11579	8540	12	9728	7176	10	8984	6627	10
610	12704	7547	10	9948	5909	7	8949	5316	7
620	12669	6356	4	9436	4734	3	8325	4176	2
630	11373	5071	3	8140	3630	2	7070	3153	2
640	8980	3704		6200	2558		5309	2190	
650	6558	2562		4374	1709		3693	1443	
660	4336	1637		2815	1062		2349	886	
670	2628	972		1655	612		1361	504	
680	1448	530		876	321		708	259	
690	804	292		465	169		369	134	
700	404	146		220	80		171	62	
710	209	75		108	39		82	29	
720	110	40		53	19		39	14	
730	57	19		26	9		19	6	
740	28	10		12	4		8	3	
750	14	6		6	2		4	2	
760	6	2		2	1		2	1	
770	4	2		2	1		1	1	
770	2			1			1		
TOTALS	109828	100000	35547	95072	100000	85223	98041	100000	118103
	x=0.4476	y=0.4075		x=0.3485	y=0.3518		x=0.3101	y=0.3163	

T. A. B. I. E. 11
Tristimulus Computation Data for Planckian Radiators*

Wave- length	1000°K			1500°K			1900°K			2300°K			3000°K			3500°K			4800°K			
	XP	YP	ZP	XP	YP	ZP	XP	YP	ZP	XP	YP	ZP	XP	YP	ZP	XP	YP	ZP	XP	YP	ZP	
380																						
390																						
400																						
410																						
420																						
430																						
440																						
450																						
460																						
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750																						
760																						
770																						
TOTALS	189183	1000000	818	148750	1000000	5428	130662	1000000	12501	117921	1000000	23058	108019	1000000	39514	103666	1000000	52371	98473	1000000	82379	
	$x=0.6524$	$y=0.3448$		$x=0.5852$	$y=0.3934$		$x=0.5372$	$y=0.4114$		$x=0.4893$	$y=0.4150$		$x=0.4364$	$y=0.4040$		$x=0.4050$	$y=0.3905$		$x=0.3506$	$y=0.3561$		

Instructions



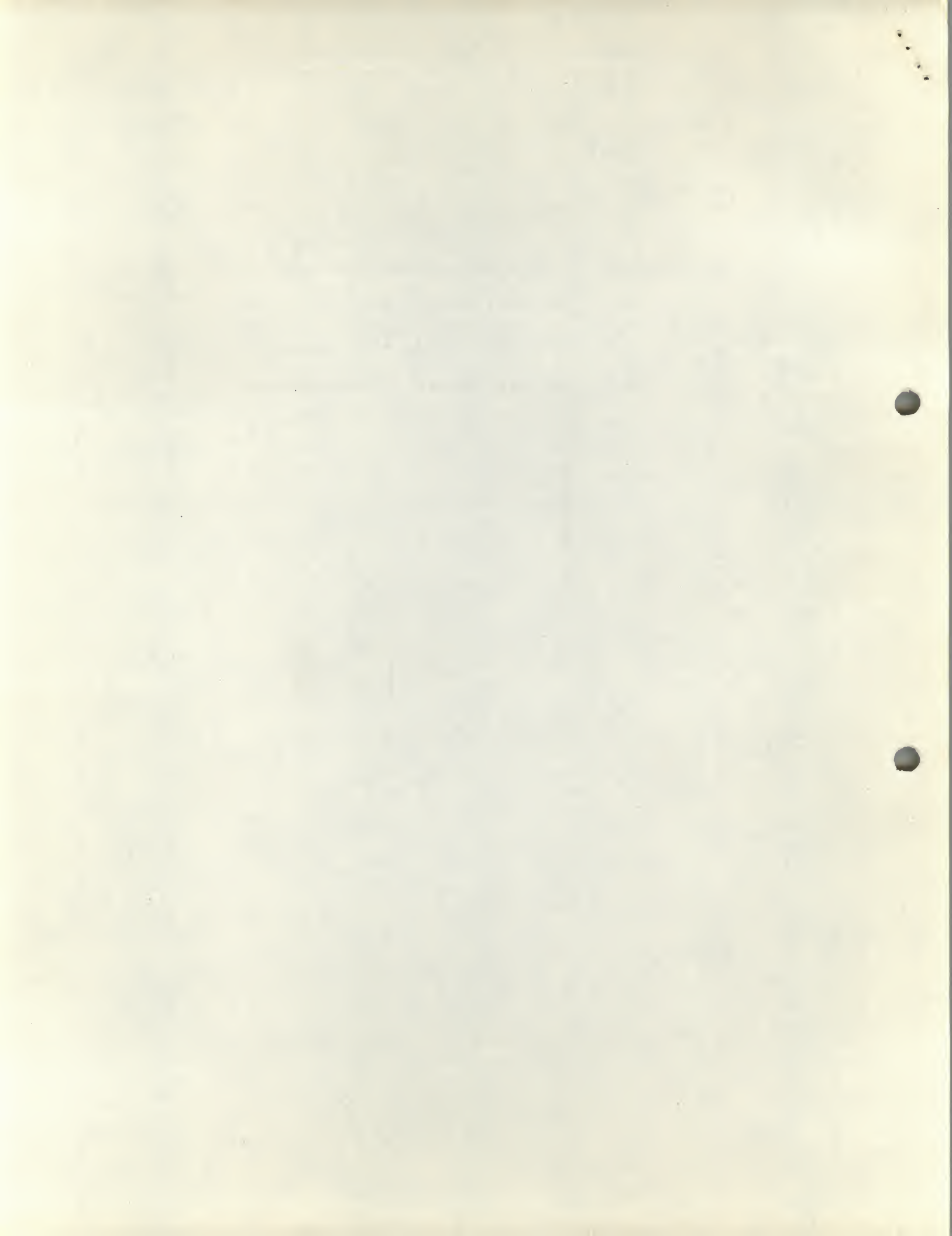
Example

WAVE- LENGTH	DATA
380	0
390	0
400	0.9
410	0.9
420	1
430	0.5
440	0.6
450	0.6
460	0.3
470	0.6
480	0.8
490	1.5
500	4.5
510	10.1
520	16.
530	8 22.5
540	27
550	30.6
560	33
570	34.8
580	37
590	40.2
600	43.1
610	45.6
620	47.
630	48.7
640	50.2
650	52.1
660	54.9
670	57.8
680	61.2
690	65.2
700	69.2
710	69.5
720	70
730	70
740	70
750	70
760	70
770	70

CORRECTION:
520 16.8

CORRECTION:
0N

COORDINATES:	2854 DEG. K	2360 DEG. K
X =	+0.562125E+00	+0.579223E+00
Y =	+0.429912E+00	+0.415026E+00
Z =	+0.796337E-02	+0.575144E-02
TAU =	+0.341941E+07	+0.357265E+07





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PROGRAM LIBRARY

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DATE	September 8, 1973
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