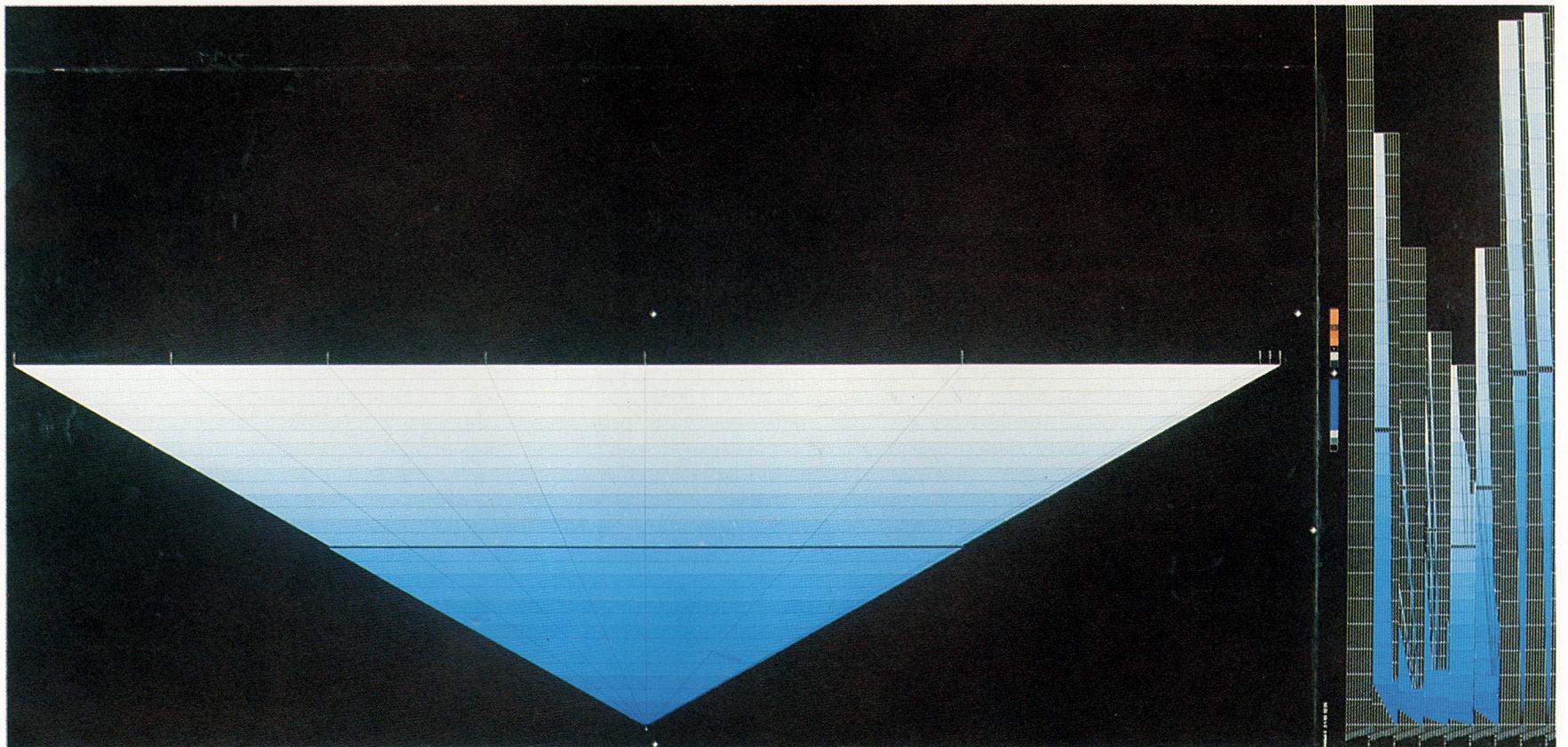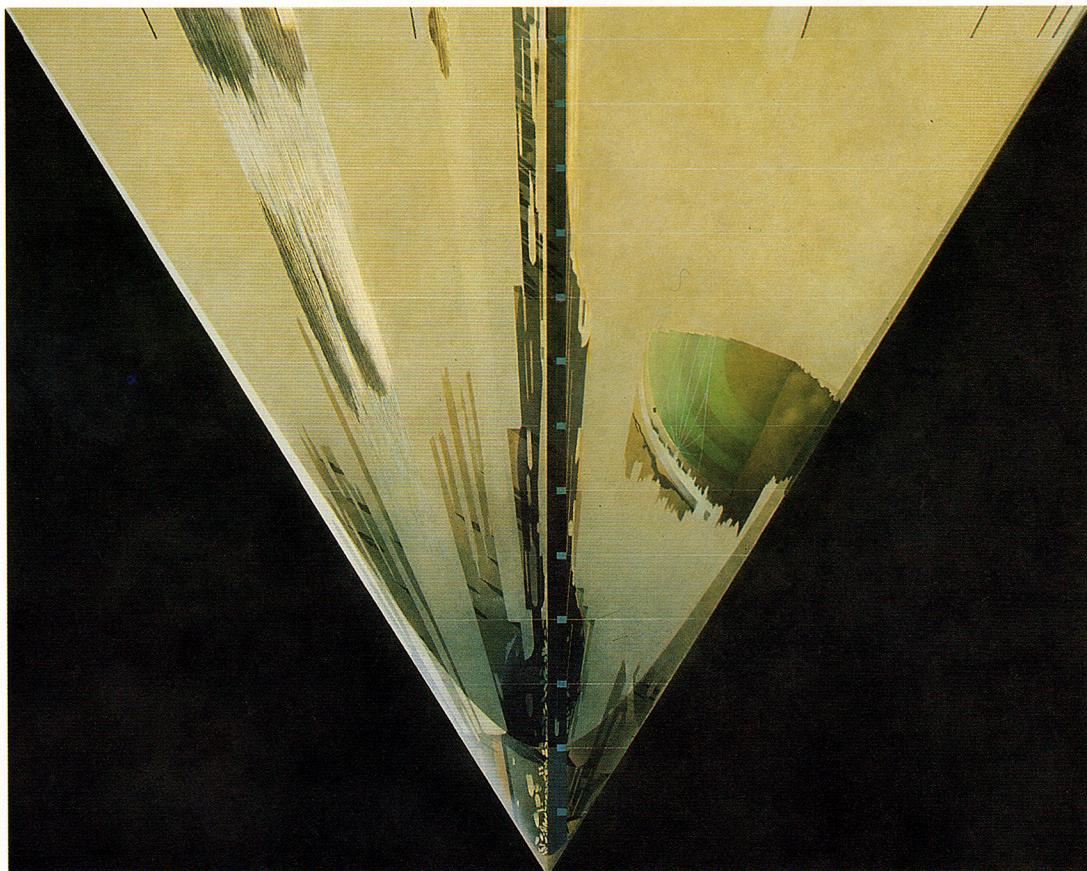# The Way to the Stars

Michael Webb

note to the reader:
when a word appearing in the text is followed by a numeral, refer to the Random House College Diction ary (1975 revised edition) for the precise meaning intended.

Foreword:
The article concerns the mathematics of simple one point perspective projection, a.k.a. "Renaissance" perspective; its focus the author's intent to quan tify that most fundamental of properties regarding our perception of material objects in space1: that the apparent* size of an object is in inverse pro portion to its distance from the eye; the greater the distance, the smaller the object seems.....but how much smaller? and is there an underlying3 math ematical progression....a series....governing this phenomenon1? Whoops!** by hitting ENTER instead of DELETE I've created a seism in t   he text , strewing frag ments of w ords   , and con sequent

ly the   ir mean
i ng, all overt
he s creen .. accident ally forming new
ones irrelevant to the text, like 'overt' and
'ally' . i 16 n 't 'a fun to /183 (
play trains with the locomotive
cursor shunting strings of freight car words
around from line to line .
To anyone but a   child of the   steam age
all this would be nothing to get steamed up over.
But in this dissolution is the potential for recon stitution: of letter and consonant into diagrams, rebus like substitutes for words, composed of the same electronic material as the words themselves.

notes to the reader:
*the actual size of the object as projected on the picture plane.
**Citibank expletive of choice as projected on the ATM screens.

Article:
The author of Don Quixote tells us of his being re commended to include within the text:"a few meagre scraps of Latin [so that he] may perhaps be taken for a scholar, which is both honorable and profit able these days; and, in the margin(or footnotes), to quote Horace, or whoever said [them]."

MONTES PARTURIUNT NASCETUR RIDICULUS   MUS*
                                          [little]
the mountains heave: born is a ridiculous   mouse

When constructing via CAD the vanishing point and horizon** of even the most rudimentary perspective projection......my mouse creates and then inhabits a domain the size of the universe....precisely the size of the universe. Symptoms of such an apparent megalomania include the desire, more a longing, to explore+ and quantify this awesome+ domain; and ask of it questions: are you near or are you far? are you, perhaps, where the end of the rainbow is? and by going there, could you ever actually arrive?

The WW2 film "The Way to the Stars"++(1942) might, due to its title, seem to suggest the flight path, as it were, to enlightenment, but in fact the plot itself merely lists the glamorous exploits, both on and off duty, of young RAF fighter pilots; the title, presumably, being intended to connect with the motto of the RAF: PER ARDUA AD ASTRA*** which doesn't get you very far at all.

So......discarding the viewless wings of poesy**** proffered by England's wartime movie industry as a means of transportation, there remains but an exam ination, patient and laborious, of the mathematics of perspective projection and the vasty+++universe it seems to enfold; and it's that most rudimentary system of projection, that Cyclopean system taught to students of architecture numberless, which has the greatest ability to amuse,not just because the picture generated yields an acceptable simulacrum of the subject (the subject)****but because it is a discrete mathematical construct possessing certain charms that just happens to have been corralled in to picture making duties. Actually, the two dimen sional reading the picture offers of the three dim ensional object is accurate only at the point of the center of vision; to travel outward from that point, over the surface of the field of vision, is to encounter ever greater distortion, until at the periphery the distortions become infinite.

So as to familiarize, or rather refamiliarize our selves with perspective's basic principles let us blow the dust off "Rudimentary Projection Methods" by W.B.'Dice' Belham, (1833-1937) ISBN 77 81 02931 and wade through chapter one, which begins with a series of diagrams, shown here in somewhat more con temporary raiment,that seek to explain perspective with the aid of a case study, namely, the Royal Re gatta course at Henley-on-Thames. Dots in the dia grams represent course markers; B defines the loc ation of the Beholder (in Belham's quaint jargon) a.k.a Observer. The term "Beholder" may have been chosen by him so as to reserve the O, the unattain able O, for the vanishing point (see the column of figures at right)..or, given Belham's known fetish for personal hygiene, it is just possible that the adjacency of the two letters,in marking on the pic ture(the perspectival image)the coincidence of the location of the beholder and the vanishing point, ...would have appealed to him.

	START .1.
1 unit	512'from START .1.
2 units	1024'from START .1.
3 units	1536'from START .1.
4 units	2048'from START .1.
5 units	2560'from START .1.
6 units	3072'from START .1.
7 units	3584'from START .1.
8 units	4096'from START .1.
9 units	4608'from START .1.
10 units	5120'from START .1.
11 units	5632'from START .1.
12 units	6144'from START .1.
13 units	6656'from START .1.
14 units	7168'from START .1.
15 units	7680'from START .1.
16 units	8192'from START .1. FINISH

16/505= .0317
16/504= .0317
16/503= .0318
16/502= .0319
16/501= .0319
16/500= .0320
16/499= .0320
16/498= .0321
16/497= .0322
16/496= .0322
16/495= .0323
16/494= .0323
16/493= .0324
16/492= .0325
16/491= .0326
16/490= .0326
16/489= .0327
16/488= .0328
16/487= .0328
16/486= .0329
16/485= .0330
16/484= .0330
16/483= .0331
16/4 82= .0332
16/481= .0332
16/480= .0333
16/479= .0333
.0334 (
16/477= .0335
16/476= .0336
16/475= .0336
16/474= .0337
16/473= .0338
16/472= .0339
16/471= .0339
16/470= .0340
16/469= .0341
16/468= .0342
16/467= .0342
16/466= .0343
16/465= .0344
16/464= .0344
16/463= .0345
16/462= .0346
16/461= .0347
16/460= .0347
16/459= .0348
16/458= .0349
16/457= .0350
16/456= .0350
16/455= .0351
16/454= .0352
16/453= .0353
16/452= .0353
16/451= .0354
16/450= .0354
16/449= .0355
16/448= .0356
16/447= .0357
16/446= .0357
16/445= .0358
16/444= .0359
16/443= .0360
16/442= .0361
16/441= .0362
16/440= .0362
16/438= .0365
16/437= .0366
16/436= .0367
16/435= .0367
16/434= .0368
16/433= .0369
16/432= .0370
16/431= .0371
16/430= .0372
16/429= .0373
16/428= .0373
16/427= .0374
16/426= .0375
16/425= .0376
16/424= .0377
16/423= .0378
16/422= .0379
16/421= .0380
16/420= .0380
16/419= .0381
16/418= .0382
16/417= .0383
16/416= .0384
16/415= .0385
16/414= .0386
16/413= .0387
16/412= .0388
16/411= .0389
16/410= .0390
16/409= .0391
16/408= .0392
16/407= .0393
16/406= .0394
16/405= .0395
16/404= .0396
16/403= .0397
16/402= .0398
16/401= .0399
16/400= .0400
16/399= .0401
16/398= .0402
16/397= .0403
16/396= .0404
16/395= .0405
16/394= .0406
16/393= .0407
16/392= .0408
16/391= .0409
16/390= .0410
16/389= .0411
16/388= .0412
16/387= .0413
16/386= .0414
16/385= .0415
16/384= .0416
16/383= .0417
16/382= .0418
16/381= .0420
16/380= .0421
16/379= .0422
16/378= .0423
16/377= .0424
16/376= .0425
16/375= .0426
16/374= .0427
16/373= .0428
16/372= .0430
16/371= .0431
16/370= .0432

course markers. The plane may be located anywhere within the cone of vision (a fabrication3 composed of a cone whose axis is the center of vision , and whose vertex is in the eye of the Beholder.....the idea being that by limiting the field of vision to that which is enclosed within the cone, distortion can be avoided: see: lines 16/450- 16/455) as long as its orientation is perpendicular to the center of vision. A seventeen sided dice rolled by Belham decided the Start as the location of the plane.

___picture plane/ START__1_ width projected on PP_
:1

B

___picture plane/ START___ width projected on PP_
1 unit 512'from START _____ :1x (15+1)/15

15

B

___picture plane/ START___ width projected on PP_
2 units 1024'from START _____ :1x (14+2)/14

14

___picture plane/ START___ width projected on PP_
3 units 1536'from START _____ :1x (13+3)/13

13

B

___picture plane/ START___ width projected on PP_
4 units 2048'from START _____ :1x (12+4)/12

12

B

___picture plane/ START___ width projected on PP_
5 units 2560'from START _____ :1x (11+5)11

11

B

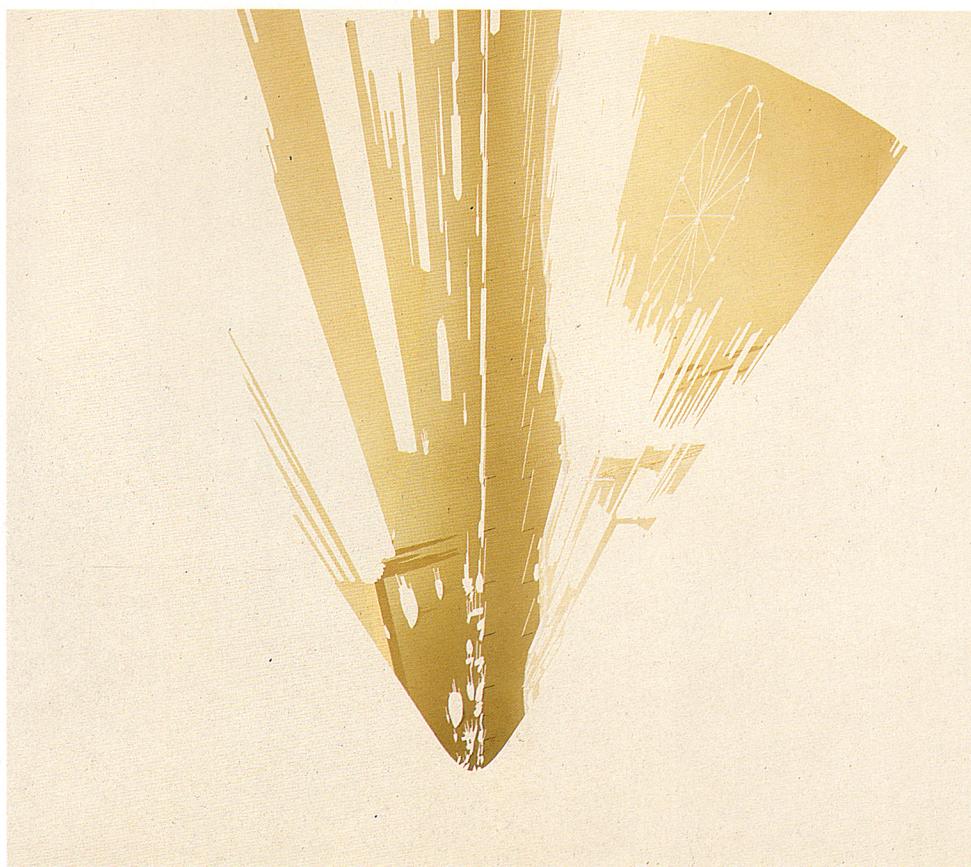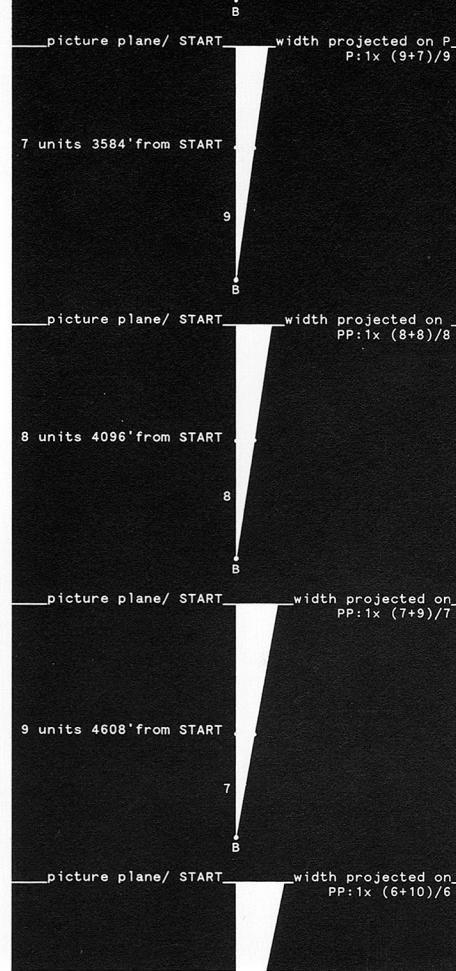___picture plane/ START___ width projected on P_
P:1x (10+6)/10

6 units 3072'from START

10

16/365=	.0438
16/364=	.0439
16/363=	.0440
16/362=	.0442
16/361=	.0443
16/360=	.0444
16/359=	.0445
16/358=	.0446
16/357=	.0447
16/356=	.0449
16/355=	.0450
16/354=	.0451
16/353=	.0453
16/352=	.0454
16/351=	.0456
16/350=	.0457
16/349=	.0458
16/348=	.0459
16/347=	.0461
16/346=	.0462
16/345=	.0463
16/344=	.0465
16/343=	.0466
16/342=	.0467
16/341=	.0469
16/340=	.0470
16/339=	.0472
16/338=	.0473
16/337=	.0474
16/336=	.0475
16/335=	.0477
16/334=	.0479
16/333=	.0480
16/332=	.0481
16/331=	.0483
16/330=	.0484
16/329=	.0486
16/328=	.0487
16/327=	.0489
16/326=	.0490
16/325=	.0492
16/324=	.0493
16/323=	.0495
16/322=	.0496
16/321=	.0498
16/320=	.0500
16/319=	.0501
16/318=	.0503
16/317=	.0504
16/316=	.0506
16/315=	.0507
16/314=	.0509
16/313=	.0511
16/312=	.0512
16/311=	.0514
16/310=	.0516
16/309=	.0517
16/308=	.0519
16/307=	.0521
16/306=	.0522
16/305=	.0524
16/304=	.0526
16/303=	.0528
16/302=	.0529
16/301=	.0531
16/300=	.0533
16/298=	.0536
16/297=	.0538
16/296=	.0540
16/295=	.0542
16/294=	.0544
16/293=	.0546
16/292=	.0547
16/291=	.0549
16/290=	.0551
16/289=	.0553
16/288=	.0555
16/287=	.0557
16/286=	.0559
16/285=	.0561
16/284=	.0563
16/283=	.0565
16/282=	.0567
16/281=	.0569
16/280=	.0571
16/279=	.0573
16/278=	.0575
16/277=	.0577
16/276=	.0579
16/275=	.0581
16/274=	.0584
16/273=	.0586
16/272=	.0588
16/271=	.0594
16/270=	.0592
16/269=	.0594
16/268=	.0597
16/267=	.0599
16/266=	.0601
16/265=	.0603
16/264=	.0606
16/263=	.0608
16/262=	.0610
16/261=	.0613
16/260=	.0615
16/259=	.0617
16/258=	.0620
16/257=	.0622
16/256=	.0625
16/255=	.0627
16/254=	.0629
16/253=	.0632
16/252=	.0634
16/251=	.0637
16/250=	.0640
16/249=	.0642
16/248=	.0645
16/247=	.0647
16/246=	.0650
16/245=	.0652
16/244=	.0655
16/243=	.0658
16/242=	.0661
16/241=	.0663
16/240=	.0666
16/239=	.0669
16/238=	.0672
16/237=	.0675
16/236=	.0677
16/235=	.0680
16/234=	.0683
16/233=	.0686
16/232=	.0689
16/231=	.0692
16/230=	.0695

picture plane/ START	width projected on P P:1x (9+7)/9

7 units 3584'from START
9
B

picture plane/ START	width projected on PP:1x (8+8)/8

8 units 4096'from START
8
B

picture plane/ START	width projected on PP:1x (7+9)/7

9 units 4608'from START
7
B

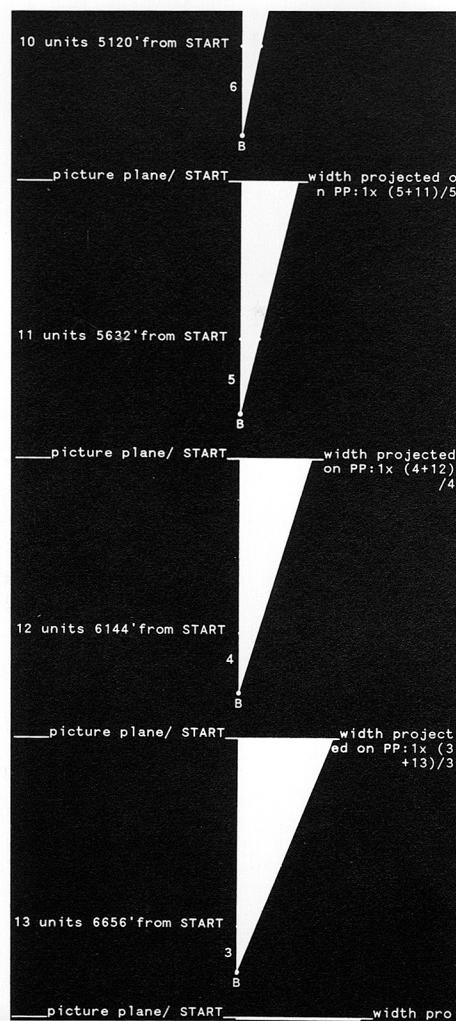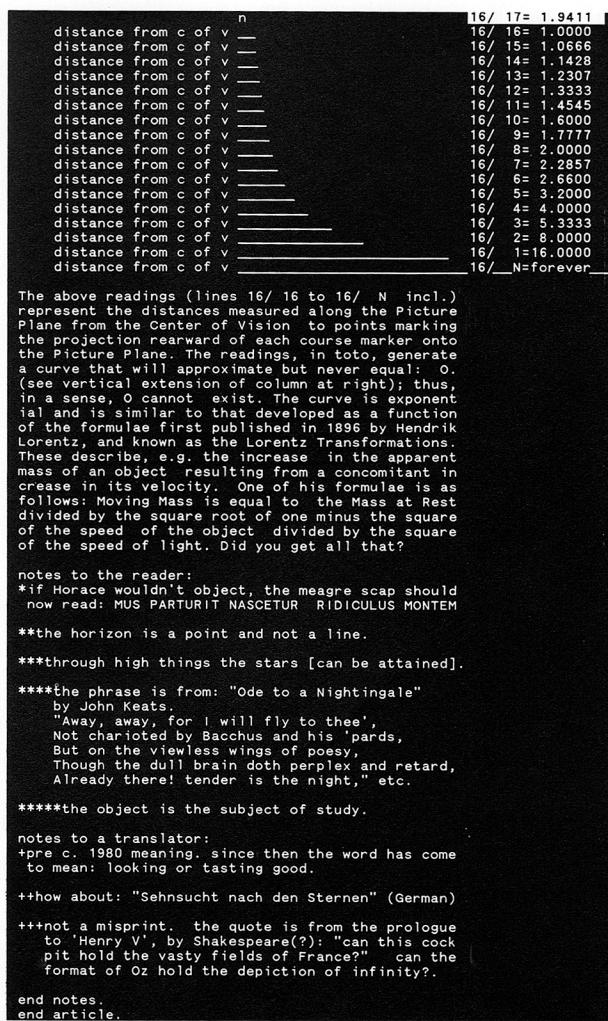|	
picture plane/ START	width projected on PP:1x (6+10)/6

```
16/222=  .0720
16/221=  .0723
16/220=  .0727
16/219=  .0730
16/218=  .0733
16/217=  .0737
16/216=  .0740
16/215=  .0744
16/214=  .0747
16/213=  .0751
16/212=  .0754
16/211=  .0758
16/210=  .0761
16/209=  .0765
16/208=  .0769
16/207=  .0773
16/206=  .0777
16/205=  .0780
16/204=  .0784
16/203=  .0788
16/202=  .0792
16/201=  .0796
16/200=  .0800
16/199=  .0804
16/198=  .0808
16/197=  .0812
16/196=  .0816
16/195=  .0820
16/194=  .0824
16/193=  .0829
16/192=  .0833
16/191=  .0837
16/190=  .0842
16/189=  .0846
16/188=  .0851
16/187=  .0855
16/186=  .0860
16/185=  .0864
16/184=  .0869
16/183=  .0874
16/182=  .0879
16/181=  .0883
16/180=  .0888
16/179=  .0892
16/178=  .0898
16/177=  .0903
16/176=  .0909
16/175=  .0914
16/174=  .0919
16/173=  .0924
16/172=  .0930
16/171=  .0935
16/170=  .0941
16/169=  .0946
16/168=  .0952
16/167=  .0958
16/166=  .0963
16/165=  .0969
16/164=  .0975
16/163=  .0981
16/162=  .0987
16/161=  .0993
16/160=  .1000
16/159=  .1006
```
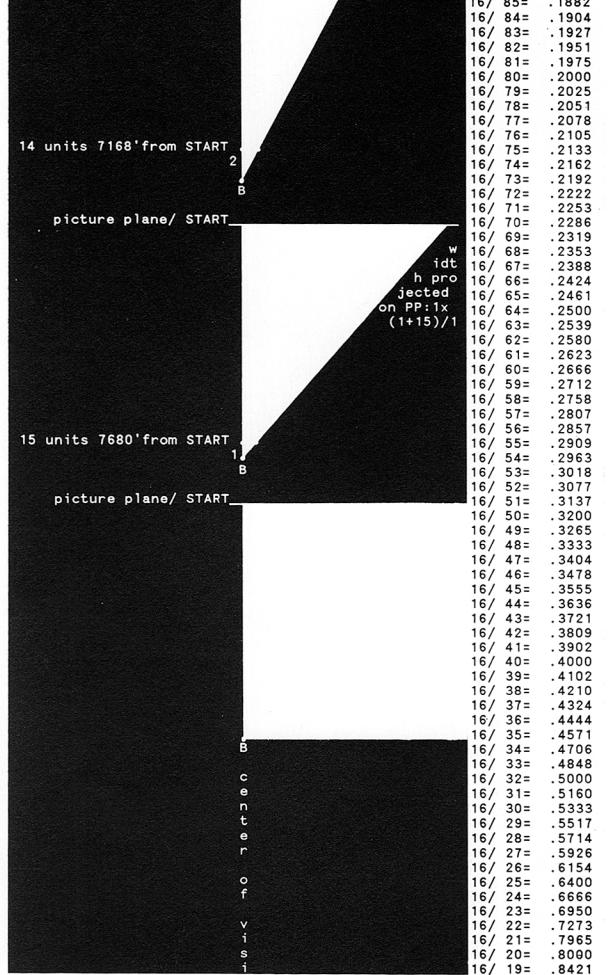
```
16/ 85=  .1882
16/ 84=  .1904
16/ 83=  .1927
16/ 82=  .1951
16/ 81=  .1975
16/ 80=  .2000
16/ 79=  .2025
16/ 78=  .2051
16/ 77=  .2078
16/ 76=  .2105
16/ 75=  .2133
16/ 74=  .2162
16/ 73=  .2192
16/ 72=  .2222
16/ 71=  .2253
16/ 70=  .2286
16/ 69=  .2319
16/ 68=  .2353
16/ 67=  .2388
16/ 66=  .2424
16/ 65=  .2461
16/ 64=  .2500
16/ 63=  .2539
16/ 62=  .2580
16/ 61=  .2623
16/ 60=  .2666
16/ 59=  .2712
16/ 58=  .2758
16/ 57=  .2807
16/ 56=  .2857
16/ 55=  .2909
16/ 54=  .2963
16/ 53=  .3018
16/ 52=  .3077
16/ 51=  .3137
16/ 50=  .3200
16/ 49=  .3265
16/ 48=  .3333
16/ 47=  .3404
16/ 46=  .3478
16/ 45=  .3555
16/ 44=  .3636
16/ 43=  .3721
16/ 42=  .3809
16/ 41=  .3902
16/ 40=  .4000
16/ 39=  .4102
16/ 38=  .4210
16/ 37=  .4324
16/ 36=  .4444
16/ 35=  .4571
16/ 34=  .4706
16/ 33=  .4848
16/ 32=  .5000
16/ 31=  .5160
16/ 30=  .5333
16/ 29=  .5517
16/ 28=  .5714
16/ 27=  .5926
16/ 26=  .6154
16/ 25=  .6400
16/ 24=  .6666
16/ 23=  .6950
16/ 22=  .7273
16/ 21=  .7965
16/ 20=  .8000
16/ 19=  .8421
```

14 units 7168'from START
2
B

picture plane/ START
w
idt
h pro
jected
on PP:1x
(1+15)/1

15 units 7680'from START
1
B

picture plane/ START
B
c
e
n
t
e
r
o
f
v
i
s
i

10 units 5120'from START
6
B

picture plane/ START	width projected o n PP:1x (5+11)/5

11 units 5632'from START
5
B

picture plane/ START	width projected on PP:1x (4+12)/4

12 units 6144'from START
4
B

picture plane/ START	width project ed on PP:1x (3 +13)/3

13 units 6656'from START
3
B

picture plane/ START   width pro

```
16/157=  .1019
16/156=  .1025
16/155=  .1032
16/154=  .1039
16/153=  .1046
16/152=  .1052
16/151=  .1059
16/150=  .1066
16/149=  .1073
16/148=  .1081
16/147=  .1088
16/146=  .1095
16/145=  .1103
16/144=  .1111
16/143=  .1118
16/142=  .1126
16/141=  .1134
16/140=  .1142
16/139=  .1151
16/138=  .1159
16/137=  .1142
16/136=  .1176
16/135=  .1185
16/134=  .1194
16/133=  .1203
16/132=  .1212
16/131=  .1221
16/130=  .1230
16/129=  .1240
16/128=  .1250
16/127=  .1259
16/126=  .1269
16/125=  .1280
16/124=  .1290
16/123=  .1301
16/122=  .1311
16/121=  .1322
16/120=  .1333
16/119=  .1344
16/118=  .1356
16/117=  .1367
16/116=  .1397
16/115=  .1391
16/114=  .1403
16/113=  .1415
16/112=  .1428
16/111=  .1441
16/110=  .1454
16/109=  .1468
16/108=  .1481
16/107=  .1495
16/106=  .1509
16/105=  .1523
16/104=  .1538
16/103=  .1553
16/102=  .1568
16/101=  .1584
16/100=  .1600
16/ 99=  .1616
16/ 98=  .1632
16/ 97=  .1649
16/ 96=  .1666
16/ 95=  .1684
16/ 94=  .1702
16/ 93=  .1720
16/ 92=  .1739
16/ 91=  .1758
16/ 90=  .1777
16/ 89=  .1797
```

```
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
distance from c of v ___
```

```
16/ 17= 1.9411
16/ 16= 1.0000
16/ 15= 1.0666
16/ 14= 1.1428
16/ 13= 1.2307
16/ 12= 1.3333
16/ 11= 1.4545
16/ 10= 1.6000
16/  9= 1.7777
16/  8= 2.0000
16/  7= 2.2857
16/  6= 2.6600
16/  5= 3.2000
16/  4= 4.0000
16/  3= 5.3333
16/  2= 8.0000
16/  1=16.0000
16/  N=forever
```

The above readings (lines 16/ 16 to 16/ N incl.) represent the distances measured along the Picture Plane from the Center of Vision to points marking the projection rearward of each course marker onto the Picture Plane. The readings, in toto, generate a curve that will approximate but never equal: O. (see vertical extension of column at right); thus, in a sense, O cannot exist. The curve is exponential and is similar to that developed as a function of the formulae first published in 1896 by Hendrik Lorentz, and known as the Lorentz Transformations. These describe, e.g. the increase in the apparent mass of an object resulting from a concomitant increase in its velocity. One of his formulae is as follows: Moving Mass is equal to the Mass at Rest divided by the square root of one minus the square of the speed of the object divided by the square of the speed of light. Did you get all that?

notes to the reader:
*if Horace wouldn't object, the meagre scap should now read: MUS PARTURIT NASCETUR RIDICULUS MONTEM

**the horizon is a point and not a line.

***through high things the stars [can be attained].

****the phrase is from: "Ode to a Nightingale" by John Keats.
"Away, away, for I will fly to thee',
Not charioted by Bacchus and his 'pards,
But on the viewless wings of poesy,
Though the dull brain doth perplex and retard,
Already there! tender is the night," etc.

*****the object is the subject of study.

notes to a translator:
+pre c. 1980 meaning. since then the word has come to mean: looking or tasting good.

++how about: "Sehnsucht nach den Sternen" (German)

+++not a misprint. the quote is from the prologue to 'Henry V', by Shakespeare(?): "can this cock pit hold the vasty fields of France?" can the format of Oz hold the depiction of infinity?.

end notes.
end article.