FACTORS AFFECTING COLOUR SATURATION

Tomasz Stanisław Trościanko

Thesis submitted in partial fulfilment
of the requirements for the degree of
Doctor of Philosophy of
The City University

Department of Optometry and Visual Science,
Saint John Street,
LONDON EC1V 4PB.

November, 1978.

TABLE OF CONTENTS

TABLE OF CONTENTS /CONT/

LIST OF TABLES

LIST OF TABLES /cont/

LIST OF ILLUSTRATIONS

FIGURE PAGE

LIST OF ILLUSTRATIONS /CONT/

FIGURE PAGE

ACKNOWLEDGEMENTS

I would like to express my thanks to many people who have helped me in the course of this study, by their participation, advice and encouragement. Sincere thanks must go to Dr. C.A. Padgham of The City University for his enthusiastic and kind supervision. Others also provided me with much-needed advice: [redacted] of Kodak Ltd. and The City University, [redacted], formerly of The City University, [redacted] of The City University, [redacted] of Kodak Ltd., and my fellow research student [redacted].

This study would have been impossible without the participation of the six observers, who gave up to 20 hours of their valuable time to be subjected to rather uncomfortable observation sessions. I must also thank Kodak Ltd. for releasing an employee to participate in the observing.

I also wish to thank [redacted], for her advice, encouragement, and affection.

Finally, I am indebted to the Science Research Council for providing funds for this study, in the form of a Research Studentship.

DECLARATION

The author hereby declares that he grants powers of discretion to the Librarian of The City University to allow this thesis to be copied in whole or in part without further reference to the author. This permission covers only single copies made for study purposes, subject to the normal conditions of acknowledgement.

Signed [redacted]

ABSTRACT

An experimental study was undertaken whose object was the investigation of colour appearance changes undergone by chromatic stimuli viewed with achromatic surrounds of variable luminance. Another source of appearance changes arose from variations in stimulus subtense. Magnitude estimation techniques were used to give the hue, saturation (or colourfulness) and brightness of the stimuli.

The most significant variability is evident in the saturation data. For a colour of constant luminance, saturation is maximized near a brightness match between stimulus and surround. Saturation is decreased by increases or decreases in induction level arising from changes in surround luminance.

Changes in stimulus subtense also produced significant changes in estimated saturation. For "related" colours, saturation was maximized in 1° stimulus fields. For "unrelated" colours (without a light surround) this effect was totally absent; there was only a slow increase of saturation with subtense.

It is felt that an explanation of this effect may be found if a 1° chromatic field is regarded as the "fundamental" stimulus. It is shown that this leads to qualitative predictions of saturation changes which can include the maximization of the saturation function under given conditions of viewing. Furthermore, it is shown that the exact properties of the saturation changes are dependent on the general adaptation level; at high adaptation levels, appearance

changes are approximately independent of stimulus excitation purity; this is not the case for dark adaptation, when low-purity stimuli are affected more than others.

Finally, appearance data were obtained for very small (0.4 min) stimuli. These were subject to small-field tritanopia, but observers were still able to estimate saturation.

1. INTRODUCTION

1.1 Attributes of Colour Appearance

Experimental techniques in the physical sciences usually aim at yielding quantitative data to test theories expressed in concise mathematical terms, whether deterministic or probabilistic. In designing experiments, it is usually possible to use theoretical information which indicates how variables will be related, and what their dimensionality is. In such situations, a dimension is defined as a single attribute which may be varied, while all other attributes remain constant. Examples of dimensions abound: translation in a given direction, a principal quantum number or a function of elapsed time. That the neat causality interest in the physical sciences does not extend to the biological sciences is a long-recognised fact. Mach (1914), p.84-85 distinguishes between physical and biological phenomena by saying that the former are determined by effective causes and the latter, often only by final causes. This is not a very productive position, but serves rather as a starting point for scientific investigations in the biological sciences. In an attempt to be able to perform investigations in the human sciences along the same lines as in the physical sciences, it was deemed necessary to define the concept of a sensorial dimension. Titchener (1910) favoured the definition used in the physical sciences, whereas Stevens (1934) introduced a new concept for a sensorial dimension, defining the latter as an attribute capable of being kept constant while other attributes vary. The consequences of this new approach are explained by Boring (1942) p.26, particularly the lack of a one-to-one correspondence between the dimensions of sensation and the dimensions of the physical stimulus. Indeed, there is no theoretical limit on the number of possible sensorial attributes of one stimulus.

Since this study seeks to investigate how colour appearance varies when the physical conditions of viewing are changed, it is necessary to seek and define those attributes of colour appearance which will, in their variation, yield the most useful insight into the operation of the human visual system. The requirements for this subset are: (1) invariance of scale under change of viewing condition, (2) internal and external validity and (3) relevance to other known properties of the visual system.

In looking at the historical development of colour schemes, it is not immediately clear which attributes of colour appearance should be singled out for investigation. Historically, the first recorded scale of brightness differences is due to Hipparchus, who assigned magnitudes to the brightnesses of stars, Stevens (1951), Padgham and Saunders (1966). Other early studies of brightness phenomena include Bouguer's study, in 1760, of differential brightness sensitivity, Boring (1942), p.136, and a psychophysical study relating the brightness of objects to the intensity of the stimulating radiation performed by Plateau (1877). Brightness, or the apparent intensity of sources of light, thus "established" itself as a dimension, or an attribute of the perception of light.

The studies mentioned above were unidimensional inasmuch as they did not include other attributes which could vary simultaneously. Since one of the first things one notices about colour is its multi-dimensional nature, it is interesting to note that, as early as 1815, Fraunhofer (1815) performed heterochromatic brightness matching of spectral lines against a white light, finding maximum brightness at about 575 mm. Purkinje's(1825) observation of the differences between twilight and daytime vision notes the different relative brightnesses exhibited by bodies reflecting in different portions of the visible spectrum.

Having accepted that brightness can be regarded as a dimension of colour appearance, it was necessary to consider what the other dimensions are. Most attempts at defining dimensions have used "colour spaces" in which the axes of the particular coordinate system define the attributes in question. Table 1 shows the development of perceptual colour spaces from the early Seventeenth century. The list is not exhaustive of colour-mixture spaces, which have progressed from those of Helmholtz and König, resulting in the CIE 1976 spaces. The emphasis is placed on colour appearance spaces, and it can be seen that there is a marked tendency for the spaces to be three-dimensional, with distinguishable attributes or dimensions which are called, for convenience, "hue", "saturation" and "lightness" or "brightness". The purpose of this section is to clarify what is meant by these, and other related terms.

If Stevens' (1934) "liberal" definition of dimensionality is accepted, one is tempted to enumerate the plurality of attributes of

Colour Spaces

*) Denotes colour mixture spaces

**) Denotes colour appearance spaces

Originator	Dimensionality	Coordinate System	Relationship or principal perceptual attributes to geometrical axes
Forsius 1611 **) see Feller (1970)	3 (implicit)	Sperical polar (r, θ, ϕ)	No independent hue, lightness or saturation axes
Newton 1704 *) see Boring (1942)	2	Polar	θ = hue r = saturation (7 discrete sectors)
Runge 1810 **) see Boring (1942)	3	Cylindrical polar	θ = hue r = saturation z = lightness. Double pyramid.
Maxwell 1855 *) see Boring (1942)	3 (implicit)	Cylindrical polar	θ = hue r = saturation z = implicit brightness Triangle defined by primaries
Helmholtz 1911/1962 *)	2	Polar	θ = hue r = saturation Locus of spectral colours to account for different mixing purities
König 1892 *)	2	Polar, non linear	θ = hue r = saturation Primaries outside spectrum locus
Wundt 1874 **) see Boring (1842)	3	Cylindrical polar	θ = hue r = saturation z = lightness Colours contained in sphere
Wundt 1893 **) see Boring (1942)	3	Cylindrical polar	θ = hue r = saturation z = lightness Conical space, with radii of circles decreasing with decreasing lightness
Ebbinghaus 1902 **) see Boring (1942)	3	Cylindrical polar	θ = hue r = saturation z = lightness Double pyramid, irregular
Munsell 1915 **) see Nickerson (1940)	3	Cylindrical polar	Θ = hue r = chroma z = value Differences uniform throughout space
Natural colour system Hering (1874) **) see Hurvich and Jameson (1956)	3	Cylindrical polar	Θ = hue r = saturation z = lightness/brightness

TABLE 1 Historical development of colour spaces

colour appearance which relate to non-temporal and non-spatial aspects of vision. Beck (1972) p.18 lists 11 such "attributes and dimensions". Even for the attribute of brightness, it is often argued that there are several independent dimensions along which appearance varies. Evans (1964) argues, for example, that since a chromatic colour with "grey content" can be matched against one without "grey content", "greyness" and "brightness" are independent dimensions. Hering (1874, 1964) argues that lightness and brightness are independent. Similar arguments are found in Judd (1960) and Heggelund (1974). Bartleson (1977) warns against the confusion of attributes with dimensions. He argues (p.69) that it is not necessary to abandon the mathematical power of independent dimensions (in the degree-of-freedom sense): that three descriptors suffice to define any colour, and the other attributes may be deduced from a cross-comparison of all the objects in the field of view. As an example, consider an achromatic test field in a surround of higher luminance. If one wishes to determine the lightness (a relative attribute) of the test field, it is sufficient to make estimates of the brightnesses of the test field and the surround, and define lightness (say) as the ratio of the two brightnesses. Similarly, Evans' (1964) grey content can be defined as a function of brightnesses and saturations of various components of the field of view.

Reference has been made to terms such as "hue", "lightness", "saturation", "brightness" etc. without any definition of the meanings of these terms being offered. We are dealing here with one group of colour-related terms, namely ones that have been called "psychosensorial", "perceptual" or "subjective" terms. Hunt (1977) defines these as "terms denoting important attributes of sensations of light and colour. Any measures of such attributes must indicate the subjective magnitudes of response in a visual process". Two categories of colour viewing are defined, namely, the viewing of "unrelated" and "related" colours. Unrelated colours are uninfluenced by their surround, i.e. the latter is of much lower luminance than the test field, whereas related colours are those viewed in a field of similar or higher luminance, e.g. most surface colours.

Bartleson (1977) gives three subjective attributes of unrelated colours: absolute brightness, hue and absolute colourfulness. The last term is due to Hunt (1977). The term "absolute" refers to the existence of only one scale modulus and will be explained more fully in Section 1.3. Briefly, since it is necessary to measure those subjective attributes which are invariant under change of viewing condition, the attributes which are of interest must be of an absolute nature. Relative attributes are based on a comparison with a modulus either implicit or presented in the field of view, and do not therefore possess the required invariance. Since it has been stated that the trivariance of the human visual system implies that three mutually independent dimensions are sufficient to specify the colour appearance <u>of a single element within the field of view</u>, we must see whether the three variables given above satisfy the conditions for validity.

Absolute brightness is the sensation pertaining to the amount of light coming to the observer's eye from the area in question. There is only one modulus - a sensation of total darkness evokes zero brightness,

Attribute	Corresponding geometrical dimension and range	Modulus
Absolute brightness	$0 \leq z \leq \infty$	0: sensation corresponding to absence of light.
Hue	$0 \leq \theta \leq \pi$	Composite modulus, constant-sum method for proportions of unitary hues.
Absolute colourfulness	$0 \leq r \leq \infty$	0: sensation corresponding to absence of chromatic stimulation.

TABLE 2 Absolute attributes (dimensions) of colour appearance represented by cylindrical polar coordinates

i.e. a lower modulus of zero. It is a prothetic continuum, i.e. one which grows as a power function of stimulus intensity. It is therefore an intensive, not substitutional, attribute. The significance of this is explained more fully in Panek and Stevens (1966). There is no upper limit to brightness - each observer can choose his own scale based on his recollection of all brightness sensations which he has experienced. Table 2 shows how brightness, hue and colourfulness can be represented as a cylinder in three dimensions. Brightness is the z - direction on such a cylinder.

The second attribute is hue, which can only be defined in a somewhat unsatisfactory way as the difference in sensation produced by viewing colours known as "red", "green" etc. However, a more rigorous derived definition can be extracted from a scheme such as that described by Hurvich and Jameson (1956) which assumes opponent colour coding: here hue may be defined as the "direction of polarisation" of responses in the two chromatic channels, with total polarisation in any one channel resulting in the perception of a "unique" hue. The "operational" definition is useful in spite of its logical inadequacy since most people understand it readily. Hue varies in the θ - dimension in the appearance cylinder.

Hue is a metathetic continuum, i.e. one in which changes in response are substitutional, not intensive. It is thus governed by different moduli but is still an absolute scale since the perception of hue does not need a reference provided in the experiment.

The third variable is called absolute colourfulness, although Bartleson (1977) refers to it as absolute saturation. The term "colourfulness" was introduced by Hunt (1977) because the terms "saturation" and "perceived chroma" as defined in the CIE (1970) vocabulary were both relative attributes. Hunt's definition of colourfulness is an "attribute of visual sensation according to which an area appears to exhibit more or less chromatic colour". Like brightness, it has only one fixed modulus: zero colourfulness implies no chromatic content, i.e. an achromatic colour (white or grey). It is a prothetic continuum.

It is necessary to consider whether the three attributes described here are the fundamental ones which satisfy the three conditions posed earlier.

(1) Invariance under change of viewing condition. Being absolute attributes and therefore determined by the ensemble of the observer's previous (similar) sensations and not by an experimental reference, this condition is satisfied by all three attributes.

(2) Internal and external validity. Several recent studies suggest that this condition is adequately satisfied. Some, or all of the three attributes, were measured in studies by Padgham and Saunders (1966), Padgham (1971), Rowe (1972), Stevens and Stevens (1963), Nayatani et al (1972), Sobagaki et al (1974), Pointer et al. (1977), Padgham and Rowe (1973), Bartleson and Breneman (1973) and Bartleson (1977). The data reported in these studies have acceptable internal and external validity.

(3) <u>Relevance to other known properties of the visual system</u>. The three attributes are in accord with predictions made by the opponent-colours theory of vision, e.g. Hurvich and Jameson (1956). The theory, its physiological bases and its other predictions are described in Section 1.4.

The geometrical representation of the three subjective attributes has been stressed because it will be shown that it has a bearing on the permitted mathematical analysis of experimental data. The geometry is determined in a large part by a theory of colour vision, and this shows the practical necessity for the inclusion of the third condition.

Having defined the three "fundamental" attributes (dimensions) of colour appearance, the set of dependent attributes is given in Table 3. In addition, the related psychometric and psychophysical functions are included since the purpose of a psychophysical study is usually the elucidation of relations between physically measured stimuli and their evoked sensations. Psychophysical terms are defined by Hunt (1977) as "terms denoting objective measures of physical variables that are evaluated so as to relate to the important attributes of light and colour". Psychometric terms "denote objective measures of physical variables (and) are evaluated so as to relate to the magnitudes of important attributes of light and colour and (are) such that equal scale intervals represent approximately equal perceived differences in the attribute considered". Terms in brackets in Table 3 are those proposed by Hunt. Asterisks denote that the attribute occurs for both related and unrelated colours.

	PERCEPTUAL TERM	PSYCHOMETRIC TERM	PSYCHOPHYSICAL TERM
Brightness-related terms	Brightness* Lightness**	(metric brightness*) CIE 1976 metric lightness**	Luminance* Luminance factor**
Hue-related terms	Hue*	CIE 1976 metric hue-angle*	Dominant or* complementary wavelength
Colourfulness-related terms	(Colourfulness)*	(Metric colourfulness*)	No exact correspondence
	Saturation*	CIE 1976 metric saturation*	No exact correspondence
		CIE 1976 metric* purity	Excitation* purity or colorimetric purity
	Perceived** chroma	CIE 1976 metric chroma**	No exact correspondence

*) Exists for unrelated and related colours

**) Exists only for related colours

TABLE 3 Colour terms, subjective and objective.

It should be noted that it is not possible to define exact psychophysical or psychometric correlates of all perceptual attributes, and the search for correspondence is often one of a "best-fit" type, Pointer (1977). Terms, such as "greyness" or "fluorence", Evans (1964), are not included in Table 3 because they are considered here to be non-independent of other single-field attributes (such as lightness). Lightness qualifies as an independent variable if the test field alone is considered.

To summarise, it has been shown that the trivariance of the human visual system leads to a necessity for three descriptors of colour appearance, which must satisfy conditions of invariance, validity and agreement with physiologically-determined theories of colour vision. Three such attributes have been defined, and it is argued that other attributes of colour appearance can be determined from these three dimensions applied to incremental regions of the field of view.

1.2 Psychophysical Studies of Colour Appearance

Having established the fundamental dimensionality of colour it is necessary to classify studies which have sought to determine how the subjective attributes of colour vary as physical variables relating to the test field are altered. Psychophysics, the study of this physical-sensorial interaction, was "created" by Fechner (1860, 1966) as part of a general trend towards precise measurement in the physical sciences in the middle of the 19th century, see Boring (1942) p.34.

It is impossible in a short space to give a complete review of psychophysical work in vision, so this section will be oriented towards studies which yield information on colour appearance, both in terms of studies of appearance attributes per se, and those investigations which have proceeded to treat these attributes as variables dependent on a wide range of physical stimulus attributes. Since, in the present study, the values of the attributes were determined by spatial and luminous qualities of a central test field with a surround, it is possible to curtail further the choice of material included in this section.

For convenience, the psychophysical studies described here will be sub-divided into two categories - those dealing with the determination of the chromatic qualities of colour, e.g. hue and saturation, and those primarily concerned with achromatic qualities, e.g. brightness. Some investigations, including the present one, fall into the area in between, but it is nevertheless possible to make this broad distinction.

Hue and Saturation

Table 4 lists the main experimental studies which have contributed to an understanding of how hue and saturation depend on the presented stimulus. The terms "simple field" and "complex field" need to be explained. "Simple field" is taken to mean a viewing configuration in which the variable of interest is contained within one invariant bounding contour, and adaptation is constant. For example, a circular test colour with a constant surround (whether dark or light) is such a field. Obviously, the main factor affecting colour appearance in such a case, is the spectral composition of the light constituting the test colour, and the studies eliciting information about the appearance of such fields

	DIRECT ESTIMATION	MEMORY MATCHING	HAPLOSCOPIC MATCHING	DIFF RET ADAPT.	
A. Effect of colorimetric composition	Abney (1910) Beare & Siegel (1967) Dimmick & Hubbard (1939) Califret (1959) Cuirao & Mattiello (1974) Indow (1967) Indow & Stevens (1966) Jones & Lowry (1926) Mattiello (1977) Maxwell (1929) Nayatani et al (1972) Newhall et al. (1943) Padgham & Bowe (1973) Panek & Stevens (1966) Onley et al. (1963) Purdy (1931) Richardson (1929) Smith (1973) Thomson (1954) Valberg (1971) Ward & Boynton (1974) Warren (1967)	Bartleson (1960)			SIMPLE FIELDS
B. Effect of spatial or temporal composition & A	Boynton et al. (1964) Burnham (1951) Gordon & Abramov (1977) Hartridge (1945) Ingling et al. (1970) Marshall & Guilford (1934) Richardson (1929) Stevens (1934b) Weitzmann & Kinney (1967,1969)	Burnham (1951,1952) Middleton & Holmes (1949)	Burnham (1953b)		
C I. Effect of chromatic adaptation & A and/or B	Bartleson (1977) Lichengreen (1976) Evans & Swenholt (1969) Hunt (1976) Ishak et al. (1970) Jacobs (1967) Jacobs & Gaylord (1967) Jameson & Hurvich (1959) Pointer et al. (1977) Rowe (1972) Sobagaki et al. (1974)	Hambrouck (1972) Helson (1938) Helson & Jeffers (1940) Helson et al. (1952) Jameson & Hurvich (1961a) Judd (1940) Kinney (1962) Kirschmann (1890) Newhall et al. (1959) Oyama & Hsia (1966) Pearson et al. (1969) Yund & Armington (1975)	Burnham (1959) Burnham et al. (1952,1957) Burnham & Malach (1960) Hunt (1949,1950) Richter (1973) Scheibner (1966) Valberg (1974) Wassef (1959) Wassef & Aziz (1960) Wright (1934)	MacAdam (1950,1956)	COMPLEX FIELDS
C II. Effect of brightness induction & A and/or B	Bartleson (1976,1977) Boynton & Gordon (1965) Evans & Swenholt (1967,1968) Luria (1967) Mattiello & Cuirao (1973) Purdy (1937) Rowe (1972) Siegel & Siegel (1971)	Breneman (1977) Burnham (1953a) Evans (1959) Pitt & Winter (1974) Troscianko (1977)	Burnham et al. (1952) Hunt (1949,1950,1952,1953) Valberg (1975) Wright (1937)		

TABLE 4. Psychophysical studies of variation in hue and saturation

must have other aims, e.g. the validation of experimental techniques or the effect of non-colorimetric variables such as attitude, etc.

If one of the variables is the spatial or temporal composition of the (simple) test field, we have one controlled variable in addition to the colorimetric composition, and this may act as the independent variable. Studies of this kind are shown in the second row. For example, the size or position of the chromatic stimulus can be shown to have an effect on colour appearance.

The third and fourth rows of Table 4 list studies which have presented subjects with "complex fields". Traditionally, the word "complex" has been associated with visual fields containing a large amount of information, e.g. photographs, etc. The meaning of the word here is somewhat different: any visual field which needs two or more closed contours to define it is "complex". Thus the simplest possible "complex" field is the traditional centre/surround configuration. The third and fourth rows of Table 4 deal with chromatic and achromatic adaptation respectively. Chromatic adaptation, in its most general sense, may be defined as a process of modification of the visual response brought about by a coloured conditioning stimulus in proximity with the test field (Wyszecki and Stiles (1967) p.435/436). As such, it includes both rapid "simultaneous colour contrast" and studies of slower adaptive processes, particularly with regard to adapting fields seen as "white" after suitable exposure. A recent comprehensive review of the latter may be found in Bartleson(1978). Achromatic adaptation, on the other hand, may be taken to have a meaning parallel to that of chromatic adaptation, i.e.

variation in the visual response caused by changes in the luminance of the conditioning stimulus, irrespective of the latter's spectral composition. The studies listed in this row of Table 4 include only those in which this kind of variation has led to changes in the chromatic visual response.

Some notable exclusions from Table 4 must be justified. In Row A, no mention has been made of the important colour-matching studies e.g. those of Wright (1928/1929), Guild (1931) and Stiles and Burch (1959), which were certainly concerned with the effect of colorimetric composition. This omission is due to the fact that such studies serve to define stimulus attributes, but yield no information on colour appearance as such. The primary descriptor of appearance is a scaling procedure, in which (usually verbal) responses are given to describe subjective attributes of a stimulus. Less powerful appearance data may be deduced from equality of appearance under different conditions of viewing, and the appropriate methods here are memory matching (short- or long-term), haploscopic matching and differential retinal adaptation.

The methods having particular relevance to the present study are rows A, B and CII of Table 4. First, consider Row A, the effect of colorimetric composition on hue and saturation. The studies listed here can be considered under two broad groupings: (a) those which had, as their primary objective, the measurement of colour appearance as a source of insight into the nature of sensations, and (b) those which used colour appearance measurement as a convenient forum for proving the validity of the experimental techniques involved. The former group of studies generally used less elaborate techniques and the studies of Abney (1910), Richardson (1929), Maxwell (1929) and Purdy (1931) are typical of this type. Abney (1910) found that, if white light were added to a pure spectral light, for $\lambda > 577$ nm the change in wavelength was negative, i.e. colours appeared to move to the "centre" of the spectrum. For $\lambda < 577$ nm the change is positive, resulting in a net scale compression. Richardson's (1929) work was the first to undertake the scaling of saturation for red/white mixtures, and this, as well as Maxwell's (1929) report, brings out the fundamental point that saturation is a dimension of colour. Purdy (1931) used a study of saturation differences and thresholds to test predictions of the Hering and Young - Helmholtz colour vision theories. He also determined the intensities of spectral colours for which saturation was at a maximum, thus recognising that "purity" was not synonymous with "saturation".

The studies which used scaling techniques to measure hue often sought to associate a hue name with defined spectral band. Dimmick and Hubbard (1939) made estimates of those wavelengths which elicit uniquely yellow, green or blue hue sensations, and gave a review of the less rigorous work performed earlier in the subject. Hue-naming techniques were used by Beare and Siegel (1967). The remaining studies in this group were concerned with the validation of data obtained by colour scaling techniques. The results of these studies may be summarised as follows:

(a) Observers are capable of scaling hue and saturation consistently, and differences between individuals are acceptably small.

(b) Saturation is best related to excitation purity by a power function of the Stevens type, $S = Kp_e^{\beta}$.

Row B of Table 4 lists workers who have concerned themselves with the effect on colour appearance of colorimetric composition and spatial or temporal variables. The field configuration is still of the "simple" (one contour) type but the size, shape or location of the contour may vary. The majority of workers still use scaling techniques, but it is now possible to extend the types of experimental design to include quasi-static matching, based either on memory, or differential ocular adaptation. These types of experiments are less prone to criticism from those who hold that subjective responses are immeasurable, but conversely yield only indirect information about colour appearance itself. The two types of method can complement each other, for example, the results of the memory matching experiments of Burnham (1951, 1952, 1953b) on the dependence of saturation on field size show that the effect is significant and should be studied further by a direct scaling method. The "trade-off" between ease of interpretation and unequivocal validity is one that is often encountered in the human sciences.

To summarise this section, the following points may be noted:

(a) Retinal location has an effect on the number of distinguishable hues, and the saturation of test colours, Boynton et al (1964), Gordon and Abramov (1977); generally, peripheral targets are desaturated and tend more towards the psychologically unique hues.

(b) The size of the test field generally has an effect on saturation. For test fields of $\frac{1}{2}^{\circ}$ or more, saturation increases with area (Burnham 1951, 1952), Stevens (1934), although it may decrease again for large test fields, over 20° in subtense (Burnham 1951).

(c) For small test fields (20 arcmin or less in subtense) colour perception changes radically becoming similar to that experienced by tritanopic observers. This will be dealt with more fully in Section 1.6.

The studies given in row CI of Table 4 are given largely for completeness, as it is not possible to deal with the subject of chromatic adaptation here. The chief point of interest is that this row has been included under a general heading of "complex field" since all fields must now of necessity have a test portion and a surround/adapting portion. Thus, at least two contours are necessary to define the field. It should also be noted that methods other than direct estimation have been popular here until relatively recently. This is largely due to the fact that the studies here were often carried out with applied aims in view, i.e. the prediction of spectral distributions eliciting indistinguishable sensations under adaptation to various "standard" illuminants similar to those commonly encountered in practice. Haploscopic or memory matching fulfills this need perfectly. Recently, however, direct estimation methods have become more widespread. This is partly due to the fact that there is a need for fundamental data on colour appearance which are yielded directly by these methods, and also the fact that experimental design is facilitated by the choice of direct estimation as the assessment method.

Finally, row CII of Table 4 deals with complex field configurations in which the controlled variable is the degree of luminance induction due to the surround or adapting field. That this will have an effect on brightness is immediately apparent, but the effect of luminance induction on hue and saturation is less obvious. In the last 25 years, studies have been carried out in this area, adding to the knowledge of phenomena such as the Bezold-Brücke hue shift (Purdy 1937) a considerable body of data on the behaviour of both hue and saturation. Jameson and Hurvich (1964) point out that an increase in the "blackness" of a test colour caused by increased surround induction will lead to a decrease in saturation, since the latter is seen to be a ratio of chromatic to achromatic response. However, Hunt (1949, 1950, 1952, 1953) showed that the opposite is actually the case for colours undergoing induction by an achromatic surround: increasing surround luminance certainly increases the blackness, but also produces a sensation of higher saturation. Similar conclusions were drawn by Burnham, Evans and Newhall (1952), Rowe (1972), Pitt and Winter (1974), Valberg (1975), Bartleson(1977) and Troscianko (1977). All these studies compared saturations evoked by chromatic stimuli having dark surrounds with the saturations of the same stimuli with light surrounds. Against this we must note that for surface colours, a reduction in luminance factor with the surround reduces the saturation of the central field. This has been observed by Bartleson(1977) and is in agreement with the Munsell Renotation findings of Newhall, Nickerson and Judd (1943).

A stimulus of constant chromaticity and luminance, when viewed with a surround such that the colour appears to have Munsell Value 5, will appear approximately 30% more saturated at Value 7 and 30% less saturated at Value 3. This is, of course, in agreement with the Jameson and Hurvich (1964) view of saturation. However, it shows that there must be a "region of maximum saturation", whose brightness should be approximately equal to that of the surround. This is reported to be the case in Evans and Swenholt (1967, 1968). The locus of maximum saturation is said to be attained when the grey content disappears from the colour, i.e. "fluorence" sets in. This locus does not coincide with optimal limits for surface colours, Evans (1959). There is a lack of studies investigating the behaviour of the saturation function near a luminance match with the surround. Another area in which data are required is a determination of any differences in the saturation function shape which are caused by varying the subtense of the coloured area and/or the surround. Troscianko (1977) (see rear of thesis,) has shown that both these parameters have a significant effect on colour appearance, especially saturation. One of the primary objectives of the present research is to obtain quantitative information about the behaviour of the saturation function when the following are varied: illuminance, luminance factor and the angular subtense of the test field. It is hoped that such an approach may explain the discrepancies found when saturation induction has been studied with "simple" *) fields (Burnham et al (1952), Hunt (1949, 1950, 1952, 1953), Rowe (1972), Pitt and Winter (1974), Valberg (1975), Troscianko (1977)) on the one hand, and complex *) fields on the other hand, Breneman (1977).

---

*) "Simple" and "complex" field descriptors are used here and their traditional sense, i.e. "simple" refers to a concentric centre-surround organization with a uniform surround; "complex" refers to a centre or surround containing a large amount of visual information, e.g. a photograph.

a) <u>Brightness of achromatic colours</u>

Alpern and David (1959)
Broca and Sulzer (1902, 1903)
Bartleson (1974)
Bartleson and Breneman (1967a, b, 1973)
Békésy (1968)
Breneman (1962)
Cole and Diamond (1971)
Diamond (1953, 1955)
Dunn and Leibowitz (1961)
Fry and Alpern (1953)
Gibbs and Lawson (1974)
Hanes (1949, 1951)
Heggelund (1974)
Heinemann (1955)
Helson (1963)
Helson and Rholes (1959)
Hess and Pretori (1894)
Hollings (1971)
Jameson and Hurvich (1941, 1961b)
Leibowitz et al (1953)
Onley (1960, 1961)
Onley and Boynton (1962)
Padgham and Saunders (1966)
Plateau (1872)
Stevens, J.C. (1967)
Stevens, J.C. and Stevens, S.S. (1963)
Stevens and Diamond (1965)
Takasaki (1966)
Young et al (1974)

b) <u>Brightness of chromatic colours</u>

Alpern (1964)
Bauer and Röhler (1977)
Breneman (1958)
Burnham (1956)
Chapanis and Halsey (1955)
Charpentier (1886)
Evans (1959)
Evans and Swenholt (1967, 1968, 1969)
Guth (1970, 1973)
Guth et al (1968, 1969)
Guth and Graham (1975)
Guth and Lodge (1973)
Harrington (1954)
Helson (1938)
Helson and Jeffers (1940)
Ingling et al (1977)
Judd (1940)
Kaiser and Comerford (1975)
Kerr (1976)
MacAdam (1950)
Marks (1974)
Marr (1974)
Mattiello and Guirao (1973, 1974)
Newhall et al (1954)
Onley (1960, 1961)
Padgham (1971)
Sanders and Wyzecki (1957, 1958)
Saunders (1972)
Troscianko (1977)
Wagner and Boynton (1972)
Whittle (1973, 1974)
Wyszecki and Sanders (1957a, b)
Yund and Armington (1975)

TABLE 5. Experimental psychophysical studies of brightness

Brightness

The term brightness is defined as "the attribute of a colour perception permitting it to be classed as equivalent to some member of the series of achromatic colour perceptions ranging from very dim to very bright or dazzling," Wyszecki and Stiles (1967) p.229. It is clear that every luminous area possessing hue must also have a given brightness associated with it. However, since chromaticness is not a necessary prerequisite of brightness, many studies of the latter have been restricted to achromatic colours. Part (a) of Table 5 gives a list of such studies. The "classical" laws of simultaneous brightness contrast were formulated by Hess and Pretori (1894), and may be explained by a model which assumes that test field brightness is influenced not only by the luminance of the field, but also by the luminance induction caused by the surround. The studies by Alpern and David (1959), Bartleson (1974), Bartleson and Breneman (1967a, b, 1973), Breneman (1962), Diamond (1953), Heinemann (1955), Hess and Pretori (1894) and Takasaki (1966) deal with the effect on induction of surround luminance. Two types of stimulus-response functions can predict the effects of luminance induction. These are the "stimulus correction".

$$\psi = \alpha(\phi - \phi_o)^{\beta} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

and the "response correction" of Jameson and Hurvich (1964)

$$\psi = \alpha\phi^{\beta} - \psi_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Bartleson (1977) gives an analysis of nine studies in which there has been a variation in induction, showing that both sets of functions adequately predict the experimental data. For dark adaptation, $\phi_o = 0$

and $\psi_i = 0$, so $\psi = \alpha \phi^{\beta}$. In this case $\beta = 0.333$. The response-corrected value of β stays at 0.333, with α and ψ_i increasing for increasing light-adaptation, whereas in the stimulus-corrected function, ϕ_o, β and α all vary.

Introducing a separation between the test field and the inducing field lowers the degree of induction, Cole and Diamond (1971), Dunn and Leibowitz (1961), Leibowitz et al (1953), Young et al (1974). Both the test area and the surround area also affect induction, Diamond (1955), Hanes (1951), Stevens (1967). Gibbs and Lawson (1974) have shown that simultaneous contrast is not affected by stereoscopic depth adjacency, i.e. the effect occurs before the optic chiasma.

The reversal of brightness contrast, variously known as "assimilation", "similitude" or the "spreading effect", has been found to occur when the inducing surround is narrow, Bekesy (1968), Helson and Rholes (1959), Helson (1963), or when the object is blurred, Wright (1969). Hurvich (1978) p.43/44 argues that this is caused by a variation in receptive field sizes in any given region of the retina. The large receptive fields cause assimilation, whereas the small ones maintain spatial resolution.

The term "chromatic brightness" in part (b) of Table 5 refers to those studies in which brightness was not the only variable, i.e. the colours studied possessed chromatic quality. Of primary importance here is the Helmholtz-Kohlrausch effect in which the saturation of a colour contributes to its brightness, Helmholtz (1924), p.139.

Kohlrausch (1923, 1935) was the first to notice the discrepancy between different types of heterochromatic matching: saturation contributed to brightness when the latter was measured by a step-by-step or a direct comparison method, but did not contribute when brightness was measured by heterochromatic flicker photometry. In the latter case, the CIE V_λ function sufficed to predict brightness. Luminance is additive in heterochromatic flicker photometry, i.e. Abney's law holds, whereas non-additivity using "static" measuring techniques has been frequently observed: Bauer and Röhler (1977), Chapanis and Halsey (1958), Evans and Swenholt (1969), Guth (1970), Guth et al (1968, 1969), Guth and Graham (1975), Guth and Lodge (1973), Kaiser and Comerford (1975), Padgham (1971), Padgham and Saunders (1966), Sanders and Wyszecki (1957), Saunders (1972), Wagner and Boynton (1972), Wyszecki and Sanders (1957b). These studies have shown that two methods (flicker photometry and minimum-distinct-border photometry) allow luminance additivity, whereas the other "static" methods do not. In other words, saturation contributes to brightness, although doubt has been expressed whether this holds for the blue-sensitive mechanism, Ingling et al (1977), Marks (1974).

The peculiarity of the blue-sensitive mechanism is not restricted to static heterochromatic brightness matches. It has been shown that the blue-sensitive cones do not contribute to flicker brightness, Boynton and Kaiser (1978), nor to brightness as measured by minimally-distinct-borders, Tansley and Boynton (1976). Ingling et al (1972) argue that blue-sensitive cones only make a contribution to chromatic brightness then white (desaturating) light is added to the stimulus.

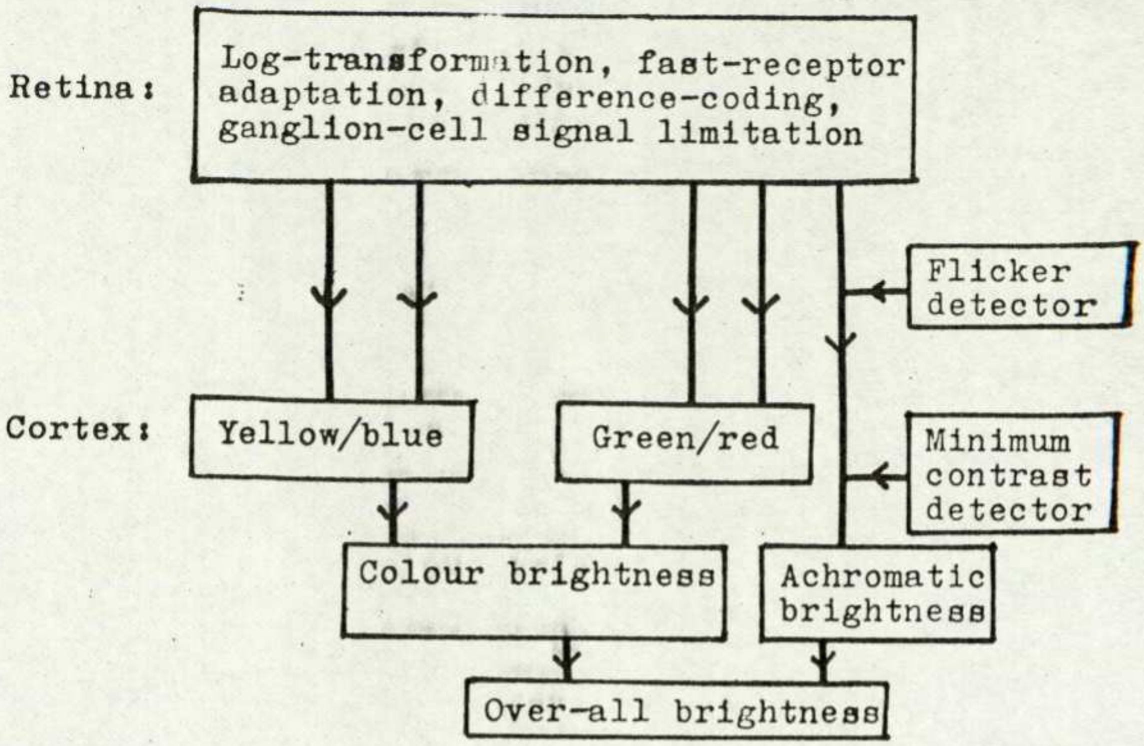


Figure 1. Colour-brightness model of Bauer & Röhler (1977)

In chromatic brightness we have additional evidence for the interaction or feedback between chromatic and achromatic channels. It is impossible therefore to study the effect of surround on saturation, while disregarding brightness. Bauer and Röhler (1977) measure the chromatic contribution to brightness, and give a model of how brightness might be generated in the human visual system. Fig. 1 shows this model.

The chromatic contribution is not allowed when the "flicker detector" and the "minimum contrast detector" produce negative signals, i.e. detect minimum flicker. Bauer and Röhler (1977) say that the chromatic channel does not transmit brightness in this case because the flicker frequency is higher than the colour fusion frequency, but this does not explain why a similar effect occurs when the border between the two colours is minimally distinct. It is only possible to speculate on the exact nature of the achromatic/chromatic interactions which occur within the cortex.

1.3 Theory and Method of Scaling and the Validity of Psychophysical Scales

The purpose of a scale is to assign values to variables in a way which yields information about the relation of the variables to each other within a specified continuum. "Scaling" is the production of such a scale. It is possible to have scales which differ in the amount and type of information which they yield about the relation of the variables to each other. There are different types of continua, and the method of production of the scale may also vary. Finally, there must be some way of assessing the generality, or validity, of any generated scale. This section will outline the directions taken by the present research with respect to the above points.

Types of Scale

Stevens (1975), p.48-49, classifies possible types of scale under four headings: nominal, ordinal, interval and ratio scales. These scales are usually, but not necessarily, defined by a particular use of numbers (although the fact that numbers need not be used is used by Stevens as an argument against the notion that the validity of a scale is determined by its behaviour under arithmetic operations). Nominal scales represent an arbitrary classification, e.g. the number on a footballer's shirt. Any member of this scale may be substituted for any other one without destroying the scale. Ordinal scales are ones in which numbers signify order, e.g. in preference lists, and here it is permitted to perform transformations which preserve that order. Thirdly, there are interval scales, in which the numbers assigned to members denote the ratio of the differences between pairs of members. There is no absolute origin in these scales, and one is free to multiply all members by a constant, or add a constant to each one. Examples of interval scales are the Farenheit or Centigrade termperature scales, or calendar time. Lastly, we have ratio scales, in which numbers denote ratios among its members. Here there is a natural origin, so one cannot disturb it by the addition of an arbitrary constant; the only transformation allowed is multiplication by a constant. Examples of ratio scales abound: the Kelvin temperature scale and, indeed, most physical scales.

We can take these four scales as providing a definition of all possible scale types. Other workers, e.g. Torgerson (1958) interpret possible scale-types somewhat differently (including an ordinal scale with a natural origin) but the ordinal-interval-ratio categorisation remains valid.

Interval and ratio scales are of primary importance here, since the object of this study is to provide the maximum amount of information about response variation. The problem is to find a means of defining a unit which may be used to construct scales. There has been a historical split into two camps on this issue: firstly, the indirect method proposed by Fechner (1860/1966) was based on the assumption that equal stimulus increments (taken to be jnd's in the physical stimulus magnitude) produce equal response increments, which can be used as "fundamental" units for the response scale. Weber's (1834) law,

$$\Delta \phi = c\phi \qquad \text{.....................} \quad (3)$$

becomes Fechner's "Fundamentalformel"

$$\delta \psi = c\phi \qquad \text{.....................} \quad (4)$$

yielding, on integration,

$$\psi = k \log\left(\frac{\phi}{\phi_o}\right) \qquad \text{.....................} \quad (5)$$

where ϕ = stimulus magnitude

ϕ_o = " " for absolute threshold

ψ = sensation magnitude

c, k = constants.

Fechner (1869/1966) regarded this as the only method permitting introspection of "physical" events. However, it seems that he did not rule out the possibility of a direct approach (p.47): "A real measure of sensation would demand that we be able to call a given sensation twice, thrice, or in general so-and-so many times as intense as another - but who could claim that as yet?" However, it is clear that he would expect a ratio scale thus generated to conform to his "Massformel" relating ψ to ϕ . It is abundantly clear that Nineteenth century workers had little faith in the ability of people to judge sensation ratios. Hering (1874/1964) p.39 states that "a colour simply as a quality has no magnitude or intensity, and only its difference from another colour can be quantitatively treated". ("Colour" here refers to achromatic colour sensations).

Fechner's indirect approach to sensation measurement, and his logarithmic response law were not the only approaches. Plateau (1872) constructed an interval scale of greyness which seemed to imply a different kind of $\psi - \phi$ relation. If we assume that Weber's law is applicable to sensations, i.e.

$$\Delta \psi = p\psi \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

then, from (3) and (6)

$$\left(\frac{\delta\psi}{\psi}\right) = \frac{p}{c}\left(\frac{\delta\phi}{\phi}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

$$\int\frac{\delta\psi}{\psi} = \frac{p}{c}\int\frac{\delta\phi}{\phi} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

$$\log\psi = \frac{p}{c}\log\phi + \log a \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

$$\psi = a\phi^{\beta} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (10)$$

where a, β are constants ($\beta = \frac{p}{c}$).

The relation between ψ and ϕ in equation (10) may be modified as in equations (1) and (2), but the rationale behind the equation remains the same. Plateau's (1872) experiments seemed to suggest that equation (10) was a better descriptor than equation (5), but his lack of conviction in this let Fechner's law prevail. Indeed, there had been earlier discussion about whether the logarithmic or power laws were correct: Bernoulli(1738/1954) proposed that the logarithmic function was the true one, but in his paper explained that Cramer, ten years earlier, had proposed a power law, see Stevens (1975) p.3-6.

It seems clear now, see Stevens (1975), Marks (1974)b, that the power law has established itself in a restricted field. The behaviour of the $\psi - \phi$ function often deviates from the simple relationship of equation (10), see Padgham (1971), Saunders (1972), Jameson and Hurvich (1964), Marks (1974) p.21, Bartleson (1977). However, equations (1) and (2) offer a solution to this. The power function also applies only to prothetic (i.e. intensive) continua such as brightness, not metathetic (substitutive) ones such as pitch (Stevens, 1974, 1975), Marks (1974).

If we accept that the "direct" approach to sensation measurement is possible, and that ratio scales are feasible, we may consider how best to instruct subjects to construct such scales. The most commonly used procedure is magnitude estimation, with its logical counterpart magnitude production. In instructing subjects to estimate the magnitude of a sensation, it is necessary to specify whether the scale is to be of an absolute (single modulus) or relative (two moduli) type. If numbers are used as the reference continuum in an absolute scale, it is necessary to decide whether to constrain their use by the presentation of a standard stimulus, evoking a sensation corresponding to a given number, or whether to allow each subject to choose his or her own standard. Both methods have their advantages and disadvantages: in the former case, the choice of standard is likely to affect the scale type (Marks, 1974 p.41); in the latter case, normalization is made difficult by the absense of any unique procedure for obtaining a central tendency measure. It is assumed that geometric means yield the most accurate measure when unconstrained numerosity is used, for they approximate to a normal distribution after logarithmic transformation. However, they are not able to cope with sets of data in which one or more members are equal to zero. Marks (1974, p.45) suggests that those values are either ignored, or the median used as a central tendency measure instead.

There is another restriction on the use of magnitude estimation scales. If the stimulus which is presented is multidimensional, great care must be exercised in the averaging process in deciding how to combine the dimensionality of the scaled values. Let us take an example: stimuli of constant brightness are scaled with respect to their hue and saturation. We are fortunate here in that we know that a geometrical representation of hue and saturation is a polar diagram, with radial measures denoting saturation and angular ones denoting hue. Having normalized the various observer's saturation scales (which are absolute), we wish to obtain the mean observer hue and saturation.

Traditionally, the two variables have been averaged separately (Rowe, 1972, Padgham and Rowe 1973, Pointer et al, 1977, Bartleson, 1977). This method does not give an overall average which is the centroid of all the individual points in hue/saturation space, because the axes are not of the rectangular Cartesian type. The centroid in hue/saturation space must be determined instead, and may give a significantly different answer, especially where the spread of the results is large. It must be recognised that hue and saturation are still independent variables (in the degree-of-freedom sense) but that they may not be averaged independently, i.e. the averaging process must be a 2-dimensional one. The scaling data obtained in the present study have been analysed in this way: a more complete explanation will be given in Section 5.1.

The question remains whether data generated by subjective scaling techniques are considered valid, particularly magnitude estimation data (on ratio scales). There has been, and still is, a debate about whether scaling data should be permitted as evidence of anything other than the ability of people to associate numbers with physical events. The "liberal" view was proposed by Stevens (1951), consisting of an attack on the validation of measurement scales by showing that they satisfy arithmetical laws, since it was clear that the numerical laws themselves had been constructed in order to allow numbers to be related to the sensation of numerosity. A "conservative" counter-view was put forward by the Optical Society of America Committee on Colorimetry (1953) which formally allowed only those data in which the human observer's contribution had been that of a null instrument, i.e. a judge of equality of sensation. Brindley (1970) p.132-133 distinguishes between the two views by calling them Class B and Class A measurements, respectively, and saying that Class B measurements should only be a kind of "back-up" to Class A ones, i.e. the validity of conclusions drawn from Class B measurements is not established until a Class A experiment is carried out to check at least some of the points. This may be termed the "judicial" view. Other objections to psychophysical scaling methods cover the alleged misuse of the word "measurement" in such situations, Savage (1970). Often, however, the objections are overridden by the power of simplicity of the ratio scaling methods - see Dember (1960) p.106: "The data collected by these very powerful procedures seem to be both reliable and valid. Though they may be based on assumptions that are offensive to many theorists, the procedures nevertheless work. And methods, after all, are built to be used, not admired". It seems, therefore, that ratio scaling methods can be very powerful, but must be used with caution. It must be shown that the three points outlined in Section 1.1 are satisfied, i.e. scale invariance under change of observation condition, internal and external validity, and agreement with other known properties of the human stimulus processing system. Care must be exercised in the training, normalizing and averaging process, and there must be objective methods of determining the degree of validity of any set of data. If these points are satisfied, we have a powerful tool at our disposal.

1.4 Physiological Bases for Appearance Attributes and the Opponent-Colours Vision Theory

It is evident that, in order to have colour vision, the receptor organ must contain photoreceptors responding maximally to different spectral stimuli, and a neural system capable of comparing the signals from these receptors. Helmholtz (1911/1962) p.142-146 accepted the trivariate nature of the cones, and postulated three overlapping sensitivity curves, with peaks in different parts of the spectrum. He also recognised, p.146-153, that people lacking one or more receptor types would confuse pairs of colours which appear different to a normal observer. Hering (1874/1964) p.47-48, recognised the fact that four psychological primaries were necessary to describe the hue of any light stimulus, and thus developed a theory based on four kinds of receptor in the retina, thus rejecting Helmholtz's theory.

The necessity for neural processing of signals from the various receptor-types is caused by the overlap of the spectral response functions. Non-overlapping functions would lead, De Valois and De Valois (1975) p.120, to a complete lack of colour discrimination within the range of one receptor type. Since we do have this discriminatory power for adjacent hues, and it has been established that trivariate colour mixtures in small fields are sufficient to produce any required colour, we must accept that there are three receptor types within the fovea & parafovea and that the outputs from these must be processed and compared in some way.

There is ample evidence for the existence of three kinds of cone photopigment in the primate retina. Marks, Dobelle and MacNichol (1964) performed spectrophotometric measurements on retinal preparations, while Rushton (1963, 1965) performed reflection densitometry on the fovea of the living eye, which was assumed to contain no short-wave sensitive cones. Wald and Brown (1965) obtained similar results using a technique similar to Marks et al (1964) and also found evidence for the existence of three cone photopigments, but their data implied that some L (long-wave sensitive) cones contain an admixture of the pigment normally found in M (medium-wave sensitive) cones.

There have been attempts to elicit the shape of the receptor primaries by psychophysical means. Vos and Walraven (1971) obtained a unique set of L, M and S primaries from considerations of luminance-invariant hues (i.e. those which do not undergo the hue shift of the Berold-Brücke effect), the Weber fractions of the three systems, and dichromatic confusion centres. The test of such a scheme is whether the confusion loci of protanopes or deuteranopes can be predicted by postulating a complete absence of either the L or M photopigments. The primaries postulated by Vos and Walraven (1971), as well as agreeing with directly measured photopigment absorption curves, do satisfy this criterion, and thus increase the confidence in the validity of the densitometric measurements. There is independent evidence, Mitchell and Rushton (1971a), that the densitometric measurements refer to the visual pigments themselves, and also Mitchell and Rushton (1971b) that protanopes and deuteranopes lack one of the photopigments. To summarise: there appear to be three cone pigments, with peak absorptions at approximately 440-450, 530-540 and 560-570 nm. Parafoveal vision is mediated exclusively by these three kinds of detector. Peripheral vision suffers from rod intrusion leading to non-additivity in matching, see, e.g. Clarke (1960, 1963), Trezona (1973) and forming the basis for tetrachromatic colorimetry.

The electrical signals generated in cones then pass to ganglion cells via bipolar cells. There are profuse synapses with horizontal cells, which are the first stage at which lateral interactions between receptor signals can, and do, take place. MacNichol and Svaetichin (1958) found that, at the horizontal cell level, light of 500 nm elicits hyperpolarization, whereas 610 nm light depolarizes the cell. Here we have a first indication of colour opponency, i.e. the differencing of signals from different kinds of receptor. No spectral opponency is found in bipolar and amacrine cells, but these do exhibit spatial opponency, with concentric excitatory and inhibitory regions, Kaneko (1970). The different behaviour of chromatic and achromatic responses is already evident at this level, and it is possible that there may be an interaction between an achromatic surround and a central chromatic field, inasmuch as the chromatic/achromatic component may be increased by an achromatic annular surround (because of a reduction in the "achromatic" signal at the centre).

The next stage in the visual pathway is the ganglion cell layer, which is the first one at which neural information is coded by the frequency of voltaic pulses. Colour signals are opponent-coded at this level. Gouras (1968) reports that "phasic" (transient-signal) cells receive inputs from M and L cones which are excitatory in the centre and inhibitory in the surround. "Tonic" (sustained-signal) cells receive their excitatory and inhibitory input from one class of cones only. The latter category is more prevalent in the parafoveal region, but the action spectra of phasic cells, when the retina is bleached by red and blue adapting lights, are similar to the Stiles π_4 and π_5

mechanisms, and, by implication, the M and L cone responses. Finally, it should be noted that there must be a considerable degree of summation at ganglion level, since a human retina contains about 6.5 million cones, 120 million rods, but only 1 million ganglion cells.

The cells of the lateral geniculate nucleus have essentially similar receptive field characteristics to ganglion cells. They exhibit opponent coding characteristics. De Valois et al (1966) present evidence to suggest that there are four categories of spectral opponent response types: +R - G, +G - R, +Y - B and +B - Y cells. Evidence for spectral opponency was also reported by Wiesel and Hubel (1966). However, when considering the question of which cone outputs feed into the opponent-colour channels, there is some uncertainty. The chromatic adaptation method described earlier was used by De Valois (1965), giving results which indicated that M and L cones were feeding into the ±G±R channels, and L and S signals into the ±Y±B channels, respectively. Wiesel and Hubel (1966) utilised the fact that the three cone distributions are non-uniform within a given LGN cell's receptive field and will thus respond differently to a small spot of light, and obtained results in agreement with De Valois (1965) on the ±G±R input, but maintained that the ±Y±B channel received its input from M and S cones; this is in agreeement with the findings of Gouras (1968) for ganglion cells using a chromatic-adaptation method. Abramov (1968) obtained results in agreement with De Valois (1965) using mixtures of two wavelengths equated for absorption by the three cone types. De Valois and De Valois (1975) point out that both kinds of connections may exist.

In addition to the spectrally opponent cells, there are spectrally nonopponent cells, i.e. ones whose excitation or inhibition is independent of the spectral quality of light incident on the retina. These types of cells were first discovered by Kuffler (1953) in ganglion cells and found to have spatial (concentric) opponent organization. For a review of the literature on the receptive fields of spectrally nonopponent cells, see Abramov and Gordon (1974) pp.346-348.

Wiesel and Hubel (1966) found that most spectrally opponent cells also show spatial opponency. Fig. 2, adapted from De Valois and De Valois (1975) p.133, shows a receptive field map for such a spectrally/spatially opponent cell. Such a cell, when mapped by a luminance change, shows spatial opponency i.e. fires more rapidly when the central RF is stimulated by increments, or the surround RF is stimulated by decrements of luminance. When the RF is mapped with a colour change, the cell fires to an increment of green, or a decrement of red.

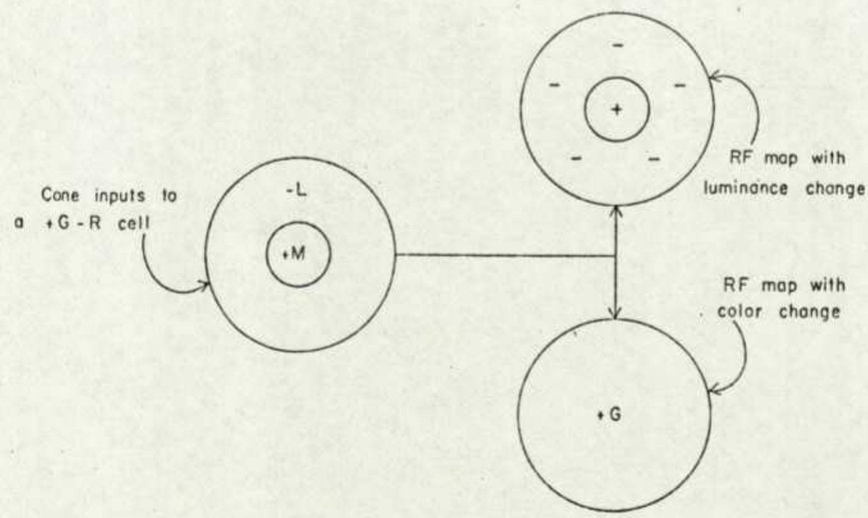


Figure 2. Receptive field map of spectrally/spatially opponent LGN cell, from DeValois & DeValois (1975)

Here, then, is direct evidence that one cell may convey both "achromatic" and "chromatic" information. The former because the cell represented in Figure 2 would fire differently to stimuli which differed from each other purely in luminance, and the latter since the same cell would fire maximally to a large green field and inhibit maximally to a large red field.

Here, also, is a problem which makes it difficult to distinguish between chromatic and achromatic responses in the cortex. Since many LGN cells convey both "luminance" and "chrominance" information, testing for cortical responses following stimulation by a flash of light (i.e. discontinuity in both chrominance and luminance) has been likened by De Valois and De Valois (1975) p.135-136, to "testing a person's colour vision by asking him whether he can see flashes of coloured light projected in turn on a screen". In spite of this drawback, cells which respond to monochromatic light of certain wavelengths but not to white light, as in Hubel and Wiesel (1968) can have some claim to be processors of chromatic information. In the simple-complex-hypercomplex classification given in that, and other studies, it seemed that simple cells are more likely to possess colour-specific properties than the other two cell categories. These "simple" cells respond optimally to line stimuli of given orientation, and Hubel and Wiesel (1962) suggested that they receive inputs from a number of LGN cells whose receptive fields are located in a straight line on the retina. Not many cells, however, seemed to respond differently to flashes of different wavelengths, and Hubel and Wiesel (1968) thus concluded that these cells formed only a small minority of the total population. But the original objection to such measurements remained until chromatic stimuli were presented on a background of equal luminance but different wavelength, De Valois and De Valois (1975) p.137-138, when it became clear that a considerable proportion of cortical cells can discriminate wavelength differences. However, the spectral characteristics of these responses were more complicated than those of LGN cells. It is likely that cortical cells receive their input from several LGN cells. De Valois and De Valois (1975), p.138, suggest that these cells respond to particular forms irrespective of the chromatic qualities of the retinal image, e.g. the cell fires equally to a red line on a green background, and vice versa. Colour information is assumed to be extracted by other cells, those which respond positively to one spectral range only, such as the double-opponent cells reported by Daw (1968) in the goldfish retina, and Hubel and Wiesel (1968) in the monkey striate cortex.

The path taken by the colour information after leaving the prestriate cortex is still somewhat in doubt. Zeki (1973) found an area, named V4, in which there was a heavy concentration of colour-coded cells. Colour-specific cells here are organised in columns, with each column responding primarily to one wavelength, but different cells in a given column have spatial preferences. A recent study by Zeki (1977) investigated the colour coding of cells in the temporal sulcus of the rhesus monkey visual cortex. The posterior bank of this body contains cells which respond to single coloured fields. There are interesting similarities, and differences, to the kinds of cell responses recorded in the LGN and Area 17 of the visual cortex. The similarity is found in the fact that many cells at this level exhibit spectral opponency; the differences are twofold: firstly, the opponent responses tend to have much narrower firing bandwidths. Figure 3 shows typical action spectra of two cells: a temporal sulcus +B-Y opponent cell, from Zeki (1977), and a +B-Y cell located in the LGN (De Valois et al, 1966). It can be seen that a considerable "sharpening" of the opponent responses has taken place between the LGN and the superior temporal sulcus. The second difference between the temporal sulcus and the LGN cells is the fact that some of the former cells only exhibit "on" responses, but different cells respond maximally to different portions of the spectrum. Hence colour information is no longer necessarily spectrally opponent at this level.

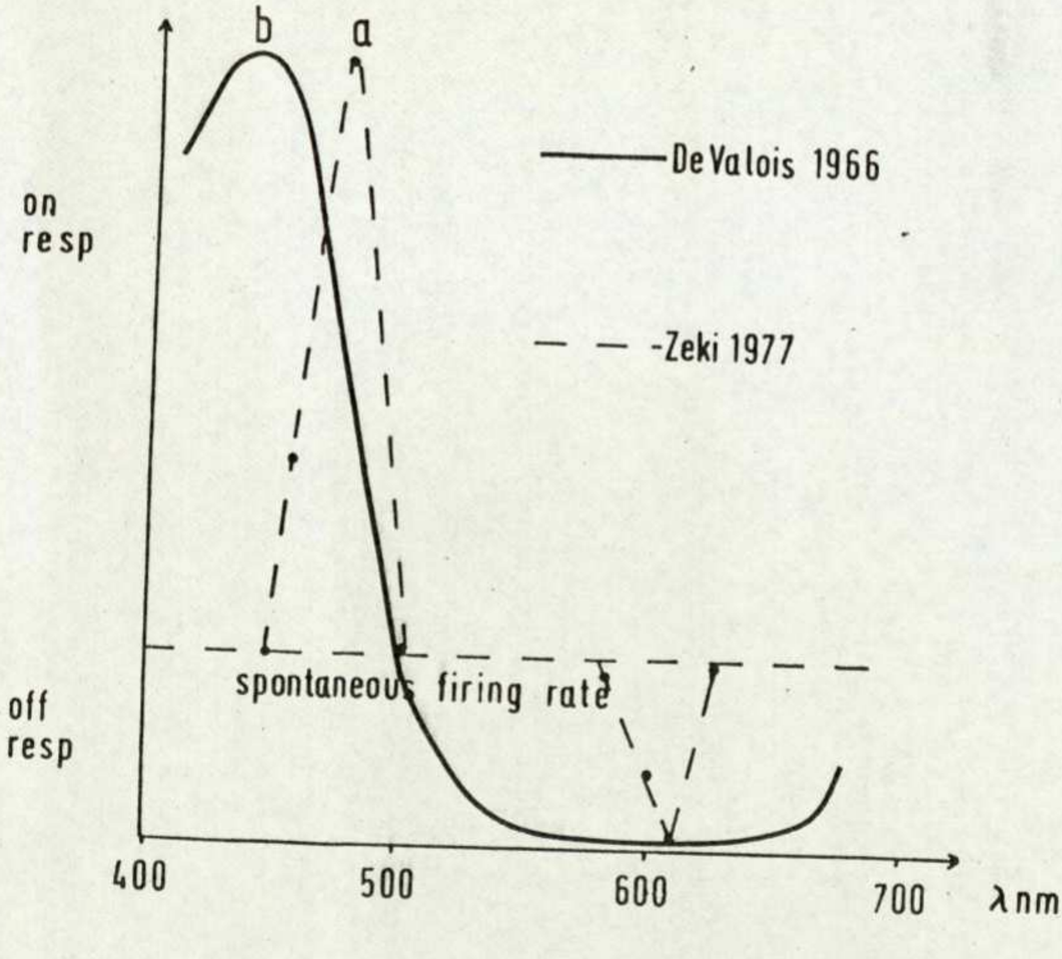


Figure 3. Spectral response characteristics of
a. the temporal sulcus and
b. the lateral geniculate nucleus

This necessarily brief outline of how colour information is coded at different stages of the visual system has been given to provide a basis for formulating hypotheses which attempt to predict appearance changes under different viewing conditions.

We can see that a colour-vision theory assuming three independent photoreceptors, and subsequent differencing of opponent-pairs, would be capable of accounting for some of the more elementary colour phenomena. "Elementary" here refers to those phenomena which rely least on presumably higher order cognitive processes, such as affective values of colour, probably even the exact description of terms like "saturation" or "brightness". In the opponent-colours theory, as quantified by Jameson and Hurvich (1955, 1956) and Hurvich and Jameson (1955, 1956), the chromatic response functions, which have been derived by a hue cancellation technique, are closely related to those measured by De Valois et al (1966). They can predict colour appearance, since the trichromatic theory is unable to account for the existence of four unique hues (Wright, 1946, p.165-166), and the fact that the S,M,L cone absorption curves do not correspond to spectral regions evoking "blue", "green" and "red" sensations respectively. The shape of the spectral saturation discrimination function, with a pronounced minimum at 570 nm, is also predictable by the Jameson and Hurvich theory, as well as spectral brightness. Of interest here is the fact that in order to account for spectral frequency-of-seeing data it is necessary, Hurvich and Jameson (1955), to include a chromatic, as well as achromatic contribution to brightness. The Bezold-Brücke hue shift may be explained by assuming that the r-g and y-b "channels" have different gains as a function of intensity; see Figure 4.

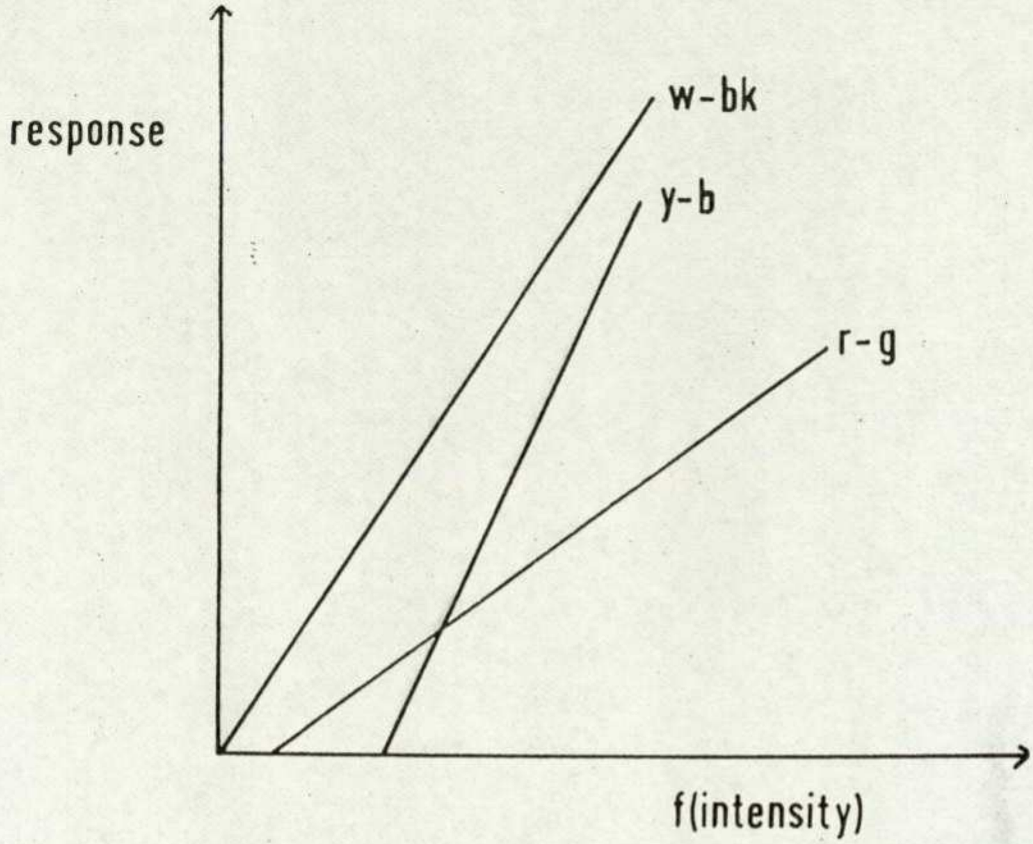


Figure 4. Differential gains of the y-b, r-g and w-bk opponent mechanisms

This is outlined by Hurvich (1978) p. 38-39 and also Walraven (1973). It is interesting to note that my pilot study (Troscianko, 1977: see Addendum) has indicated that this may be the case from considerations of saturation, not hue, changes with intensity (see Figure 10 in the above-cited work). The assumption that the responsiveness (gain) of each channel may be depressed by chromatic adaptation leads to a number of predictions about appearance variation under different adaptation conditions.

In summary, the Jameson-Hurvich opponent theory may be represented as follows:

$$\text{Hue coefficient} = \frac{|y - b|}{|y-b| + |r-g|} \qquad \text{.............} \ (11)$$

or

$$\frac{|r - g|}{|y-b| + |r-g|} \qquad \text{.............} \ (12)$$

$$\text{Saturation Coefficient} = \frac{|y-b| + |r-g|}{|y-g| + |r-g| + |w\ bk|} \qquad \text{.............} \ (13)$$

where

$$y - b = k_1 (Y-B) \qquad \text{.............} \ (14)$$

$$r - g = k_2 (R-G) \qquad \text{.............} \ (15)$$

$$\begin{aligned} w\text{-}bk = {} & k_3 (0.5B+0.5G+Y+R) \\ & - k_4 (0.5B+0.5G+Y+R) \ \text{.......} \ (16) \end{aligned}$$

and

$$B = 13.0682Y + 0.2672Z \ \text{..........} \ (17)$$

$$G = -0.6736\,X + 14.0018Y+0.0040Z \ \text{..} \ (18)$$

$$Y = -0.0039X + 13.4680Y-0.1327Z \ \text{...} \ (19)$$

$$R = 0.3329X + 13.0012Y-0.0011Z \ \text{...} \ (20)$$

Where k_1, k_2, k_3 and k_4 are the respective gain constants, and X, Y, Z are the CIE tristimulus values of the stimulus. It should be noted that equations (11) - (20) are defined for neutral adaptation;

transformations based on a different adaptation field are also given by Jameson and Hurvich (1956).

An alternative approach is possible, see Bartleson (1977) p.186-189. This is based on the relative fundamental sensitivities of König - see Wyszecki and Stiles (1967) p.413-414 for a definition in terms of the CIE 1931 Standard Observer. Jameson (1972) p.395 defines two chromatic response functions similar to equations (14) and (15):

$$C_1 = 1.66\ \bar{r} - 2.23\ \bar{g} + 0.37\ \bar{b} \quad \ldots\ldots\ldots\ldots (21)$$

$$C_2 = 0.34\ \bar{r} + 0.06\ \bar{g} - 0.71\ \bar{b} \quad \ldots\ldots\ldots\ldots (22)$$

and an achromatic function similar to equation (16):

$$A = 0.85\ \bar{r} + 0.45\ \bar{g} + 0.00\ \bar{b} \quad \ldots\ldots\ldots\ldots (23)$$

Bartleson (1977) pp.188-191 analyses the predictive power of equations (21) - (23) with regard to two expressions attempting to describe the "chromatic power" variation over the visible spectrum. These are "chrominance"

$$K = \sqrt{C_1^{\,2} + C_2^{\,2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (24)$$

and "chromatic purity"

$$P = \frac{\sqrt{C_1^{\,2} + C_2^{\,2}}}{A} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (25)$$

Bartleson finds that equations (24) and (25) are only good predictors for a "neutral" adaptation state (i.e. one close to the equal-energy point, e.g. D_{65}).

It is clear, however, that equations (11) to (25) are unable to make predictions about appearance changes caused by adaptation to fields having the same spectral composition but different intensity. As such, they are of limited use in the present study.

It is tempting to adopt an approach which attempts to account for chromatic responses by considering how the achromatic response varies under specific viewing conditions. This point is recognised by Ingling and Huong-Peng Tsou (1977) who used Vos and Walraven's (1971) fundamental receptor primaries to define the opponent-channels. The achromatic response is defined to be a linear combination of the three cone signals.

$$V_{achr} = R + G + B \qquad \ldots\ldots\ldots\ldots\ldots\ldots \qquad (26)$$

Ingling (1977) describes the changes in opponent spectral sensitivity with light adaptation in terms of three possibilities: (a) S cones feeding to the r-g channel, (b) M cones feeding to the y-b channel and (c) rods contributing to the y-b channel. This level-dependent interaction is further strengthened by Ingling, Burns and Drum's (1977) assertion that the S cones do not contribute to the achromatic response when a desaturating light is added to a blue field. Evidence for interactions between photopic response mechanisms has abounded.

Sperling and Harwerth (1971) postulate that the M cone response affects L cone sensitivity, and vice versa. Larimer et al (1974) postulate differential contributions from the three cone types to determine opponent equilibria. Bender (1973), Ingling and Drum (1973) and Eichengreen (1976) also present evidence for cross-channel interactions. Sternheim et al (1977) argue that the opponent activity influences receptor sensitivity, thus establishing a cross-channel interaction.

Since it is clear that there is extensive linking between the three opponent channels, and we may expect the achromatic channel to affect the chromatic ones, let us consider evidence for the type of interaction. Rentschler (1973) gives evidence that the spatial summation of the chromatic channels is determined by achromatic discontinuities. Walraven (1977) suggests that chromatic vision may be subserved by opponent chromatic signals which arise from luminance discontinuities in the image profile. Blackness is said to be a result of such discontinuities. Guth (1973) shows that the relative luminance of an annular surround critically affects the increment thresholds of the central field. The critical nature of the centre/surround luminance factor is dealt with by Semmelroth (1970) and Emerson and Semmelroth (1975).

Since the saturation of a chromatic stimulus is affected by the brightness of the surround, it may be useful to consider saturation as a function of only chromatic and achromatic brightness, e.g.

$$\text{saturation} = f\left\{(\text{chromatic brightness})-(\text{achromatic brightness})\right\} \ldots \quad (27)$$

Since the centre-to-surround luminance factor affects both types of brightness, we may use the fact that saturation reaches a maximum for a given value of this luminance factor to predict how luminance factor may affect the two kinds of brightness. Figure 5 shows a tentative suggestion about the form of this effect on brightness. This is discussed more fully in Section 5.

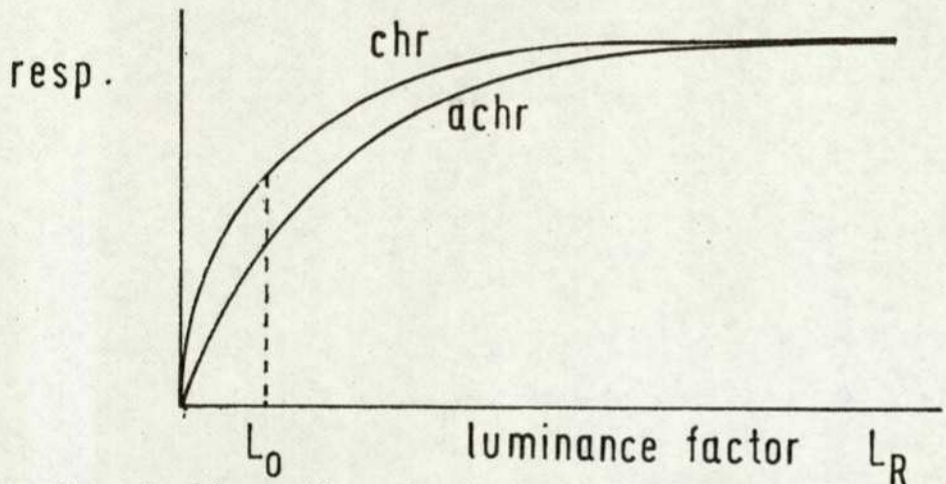


Fig. 5 Chromatic and achromatic brightness hypothesis

If $L_R > Lo$ saturation decreases with increasing L_R; if $L_R < Lo$, the reverse is true; if $L_R = L_o$, saturation is maximized. Hence saturation would be derived from brightness, which seems a reasonable assumption in view of the action of the brightness mechanism as a "colour-locking" device. Furthermore, the approach of Bauer and Röhler (1977) makes it possible to test whether Figure 5 represents the true variation of the chromatic and achromatic brightness response. This model of saturation is new inasmuch as it accounts for the presence of an optimal limit for saturation, experimental evidence for which will be given in a later section of this report.

1.5 Small-Field Dichromacy

The fact that colours subtending 20' or less can be matched with mixtures of two primaries only was first observed by König (1894). For the next 50 years this finding was largely ignored - see Wright (1946) p.338 until the notion that the fovea is a region of both maximal visual acuity and maximal hue discrimination was finally abandoned, Willmer and Wright (1945) demonstrating that colour matches in small centrally-fixated fields were subject to tritanopic confusions. Figure 6 shows the hue discrimination curve obtained in that study.

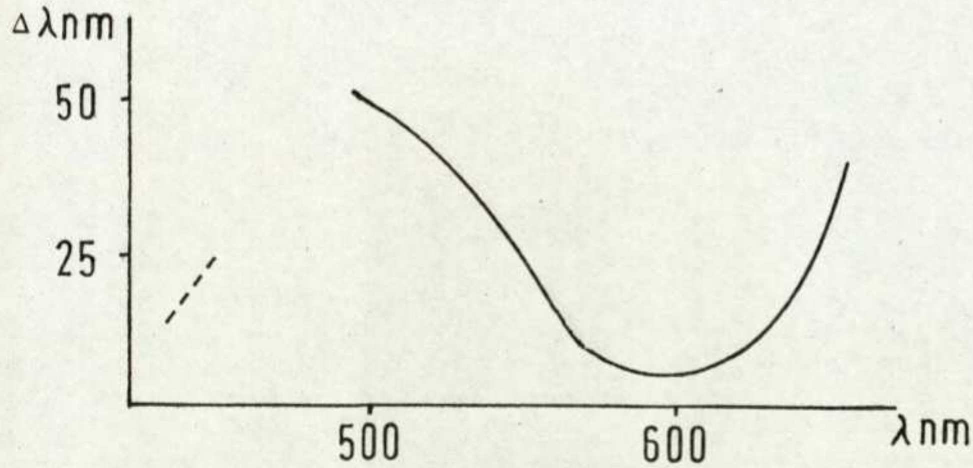


Fig. 6 Foveal hue discrimination curve, Willmer & Wright (1945)

The yellow and orange region of the spectrum yields the best hue discrimination under these conditions. Figure 7 shows the relative luminosities of red (650 nm) and blue (460 nm) primaries required to match lights of various wavelengths for a 20' field.

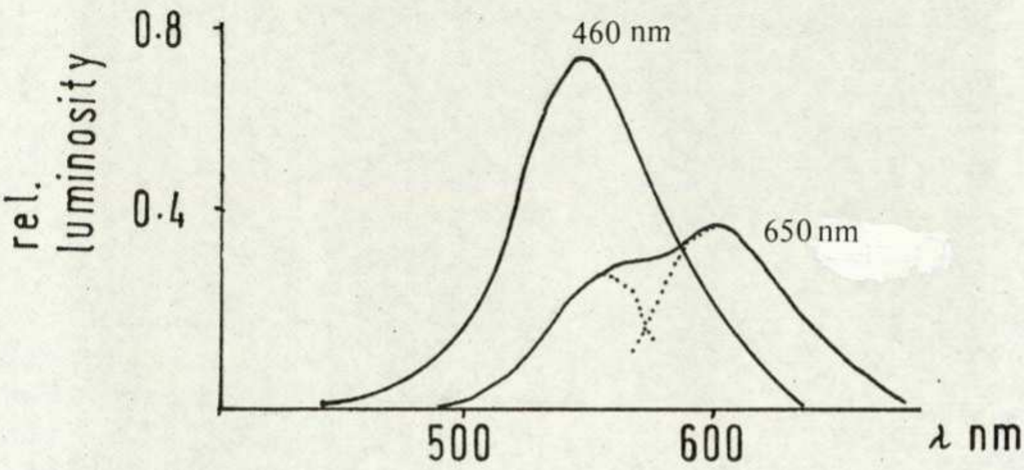


Fig. 7 Foveal spectral mixture curves, Wright (1946)

Wright (1946) p.345 supposes that the curves of Figure 7 resemble physiological response curves, and the irregular shape of the red curve may be explained by an admixture of M cone photopigment in L cones located at the fovea. Thomson and Wright (1947) obtained similar results for stimuli viewed at an eccentricity of 20' and 40'.

Middleton and Holmes (1949) used very small fields, of 1' and 2' subtense. A short-term memory match procedure was used, matching the small stimuli to larger Munsell samples. Three presentation times were used: $\frac{1}{25}$ sec, 5 sec and unlimited time. The matches made suggested that chromaticity discimination could take place only on a red-cyan (600-480 nm) axis, which again is characteristic of tritanopia. Significant reductions in saturation were also recorded, and the degree of tritanomaly increased markedly when the stimuli were presented for only $\frac{1}{25}$ sec. The presence of tritanomaly of varying degree was also found by Hartridge (1945). The extent of confusion was found to depend on illuminance, saturation and pupil diameter (retinal illuminance). There was some indication that the proximity of a larger yellow field reduced the degree of tritanopia. Two other conclusions of this study are worth noting here: firstly, tritanopia is still operative if, instead of presenting a yellow stimulus, a grey one on a blue background is shown; the effect must therefore occur at a higher level than simultaneous colour contrast. Secondly, there is a marked reduction in brightness when tritanopia sets in.

Early studies of small-field tritanopia were also undertaken by Willmer (1950) and Burnham (1953b). The former study established that dichromats suffer from "small-field monochromatism"; the latter one confirmed that there are large changes in saturation when the stimulus subtense becomes significantly less than 20'.

It can be taken as evidence for the lack of importance which was then attached to this area of colour vision, that considerations of this kind were not made in the studies by Halsey (1959a, b) whose object was to determine the usefulness of certain colours for use in signal lights. The stimuli in these experiments subtended about 5', and we would expect small field tritanopia to be a significant factor affecting possible confusions in colour identification. Indeed, the fact that the purple category was confused so often with others as to make it inacceptable for use in signalling, Halsey (1959b), points to the existence of tritanopia, since we expect the confusion lines to converge on the 400 nm end of the spectrum locus. We now find that the purple category is not used in important signalling, see e.g. British Standard 1376 (1974).

It was felt that colour naming of small fields would have significant advantages over the matching techniques, since the presence of a matching/reference field presents severe problems. Weitzman and Kinney (1967) were the first to use such a technique, and found that small subtense and short presentation led to stimuli being confused in a manner consistent with tritanopia. Their study implied that small subtense and short duration are equivalent in their effects. The effect of eye movements was also considered, and Weitzman and Kinney felt that a general explanation might be that tritanopia occurs when the proportion of "blue" receptors responding to a stimulus is small compared to the total stimulus response from a given area (the area being determined by field subtense and eye movements within the stimulus presentation time).

In a subsequent study, Weitzman and Kinney (1969) attempted to establish whether tritanopia could be established in the extrafoveal retina (at 5° and 10° eccentricity). They found that vision here was, if anything, apparently deuteranomalous, with stimuli appearing blue, red or white only. However, there is some difficulty in interpreting the confusion data in these studies, because a suppression of either the blue or green response would cause blue-green confusion. Weitzman and Kinney (1969) suggest that it is the green response which is lacking in the periphery. However, this is not firmly established:

Smith (1973), in a study of colour-naming categories of congenital tritanopes and tritanomalous subjects, found that tritanopes displayed an extended blue response in the middle of the spectrum, and red at the long wave end of the spectrum. Here there can be no question of an "enhanced blue response" in the periphery, and yet there is hardly any incidence of the colour name "green". It may be that a colour-naming chromaticity confusion experiment is what is required, and the present study is an attempt to fill this gap.

We are left with an incompletely explained phenomenon. Brindley (1970), p.244, suggests that "the signal sent to the brain by the blue-sensitive mechanism, though efficient at distinguishing the relative strengths of brief stimuli and at detecting sudden changes, is inefficient at distinguishing the strengths of prolonged stimuli". This "inefficiency" implies that there will be a gradation of dichromacy, and this is found, both by Willmer (1950), Weitzman and König (1967, 1969) on a temporal basis, and by Ingling, Scheibner and Boynton (1970), when the chromatic adaptation state of the eye was varied. Ingling et al (1970) found that small-field tritanopia became total when the background was blue, thus suggesting that we can explain small-field tritanopia as a selective adaptation of the blue-mediating system during fixation.

2. A PRELIMINARY EXPERIMENT

2.1 Design and Summary of Results

An investigation was carried out which was designed to give quantitative information on the extent of "desaturating power" of a dark surround on a chromatic field. The design of the apparatus and the experimental phase of this study fall outside the scope of this thesis, but details may be found in Troscianko (1977), to be found at the end of this thesis. Figure 1* gives the four viewing conditions used. One of these involved a short-term memory match against a test-colour with a light surround, in the manner employed by Pitt and Winter (1974). Three further viewing conditions introduced varying extents of a grey "buffer" G, surrounding the matching field C'. This matching field was simultaneously reduced in size, so that in effect parts of the chromatic field were progressively replaced by grey. The object of the study was to see what effect this had on the appearance of C', measured indirectly in the matching situation.

Figure 3* shows the results of the matches performed on a Burnham-type colorimeter, Burnham (1952b). The results are given as 95% confidence ellipses calculated in the manner described by Morrison (1967) pp.121-123. The extent of "desaturation" by the dark surround is given by the dashed line OD; this is a replication of the findings of Pitt and Winter (1974).

---

*Starred figure numbers refer to figure enumeration in Troscianko (1977).

A measure of the change in matching purity is a function fn,cc defined as:

$$fn,cc = \frac{Peo - pen}{Peo} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (28)$$

where n is the viewing condition designator (n = 1,2 or 3), pe is the 1976 metric purity, and CC = 20 or 50 denotes whether the reference stimulus was a 20 or 50 CC Kodak colour compensating filter. If fn,cc is negative, it is assumed that the grey area has had a net desaturating effect on C', and vice versa. Figures 4*, 5* and 6* are histograms showing the values of fn,cc for the various colours and purities. The most important points are as follows:

Surround 1 (a relatively thin grey buffer, and a $4^{\circ} \times 6^{\circ}$ chromatic area) has a net "saturating" effect on C'. This means that luminance induction due to G serves to reduce the desaturating effect of the dark surround D. This effect is still present, though to a lesser extent, in the second viewing condition (see Table I* for a summary of the means of fn,cc). Here the chromatic area C' subtends $3^{\circ} \times 4^{\circ}$.

Surround 3 acts in a different way. We see here that when C' is reduced to $2^{\circ} \times 3^{\circ}$ there is a difference in the appearance changes undergone by the 50cc colours and the 20cc colours. The former ones show a small but marked gain in saturation ($f3,50 = 0.124 \pm 0.078$) whereas the latter ones, a small loss of saturation ($f3,20 = -0.092 \pm 0.035$). In order to find out why this should be the case it is useful to consider the luminance of the matches. This can be measured by a function η , where

$$\eta = 1 - \beta \qquad \dots\dots\dots\dots\dots \quad (29)$$

and β is the luminance factor of the area C' to the grey buffer G (kept at a constant 15 cdm $^{-2}$). Mean values of η n,cc are given in Table II*. It will be noticed that η is highest (and presumably induction is highest) in Viewing Condition 3. It is much higher for the 50cc colours than it is for 20cc colours. Thus it may be argued that in V.C. 3, the net loss in saturation for 20cc colours is due to a combined effect of small subtense and low induction; for 50cc colours, because of the lower transmittance of the test filters, there was a higher degree of luminance induction, and the saturation was raised in spite of the small field subtense.

There was evidence, see Figures 7* and 8*, that both subtense and induction had a pronounced effect on saturation. Colours subject to a large degree of luminance induction show a more rapid gain in saturation than do those with low induction. Also, induction had the largest effect for colours of small subtense.

2.2 Conclusions

The conclusions of this preliminary experiment will be discussed in the context of the kind of information which would be useful in designing the main experiment.

The most significant result was that both stimulus subtense and luminance induction had a highly significant effect on the appearance of a chromatic field. There had been a paucity of data on the effect of subtense on colour appearance, and here was an indication that the effect of subtense might be to aid or inhibit luminance induction. It was felt that this was a new, if not unexpected finding. The design of the main experiment would reflect this, in order to yield more precise data on the kind of effect encountered here. Of particular interest was the fact that the smallest chromatic field was subject to the largest degree of induction. It was decided to extend the range of subtense to investigate effects of this nature.

The preliminary experiment was designed with economy of time as one of the main considerations. It suffered from a number of drawbacks, particularly the one that the observer's state of adaptation is indeterminate in a "short-term memory matching" condition. The aim was to see which parameters, if any, were the most worthy of further investigation. It turned out that these were:

(a) luminance factor of stimulus to surround

(b) stimulus subtense

(c) stimulus chromaticity

The ranges of the first two parameters in the preliminary study were:

(a) $1 < \beta < 2$

(b) $2.5^\circ < \alpha < 12^\circ$.

It was felt that both these ranges should be significantly increased, particularly to account for 1° fields and luminance factors of less than unity.

3. DESIGN OF MAIN EXPERIMENT

3.1 Choice of Method

It is evident that there are only two basic possible methods available to those wishing to study the effects which surround luminance and stimulus subtense have on the appearance of a coloured field. These are (a) haploscopic matching and (b) memory matching. Both these methods are asymmetrical in form, i.e. the "reference" and "test" stimuli are perceived in surrounds which differ from each other. Memory matching can be further subdivided into two groups: (1) "short-term" memory matching, in which the experimenter allows the subject to see both test and reference fields in rapid succession, and (2) "long-term" memory matching, where the reference field is presented initially (in the training period) and the subject is trained to memorise its appearance. There are two ways of accomplishing the latter: either a relevant ordering system, such as the Munsell system, is memorised by the subject, or the subject is trained to construct his own order-system (i.e. set of scales of given attributes). This last method is known as direct scaling, and the methods which can be employed here have been outlined in Section 1.3.

Each method has both advantages and disadvantages. Haploscopic matching is often thought to yield precise data, since the test and matching fields appear to the observer to be juxtaposed. The state of adaptation of each eye can be easily controlled, since haploscopic matching is almost invariably performed with Maxwellian viewing. The disadvantages of this method are twofold: firstly, it has been shown that the assumption of interocular independence necessary for the validity of conclusions drawn from haploscopic matching experiments is only valid over a range of adapting luminance disparity of about 100 to 1, Bartleson (1966), Helson and Jeffers (1940). This would exclude the use of a completely dark surround as one viewing condition. Secondly, a practical difficulty can arise if a large surround subtense is desired; and it has been shown in the preliminary experiment, Troscianko (1977), that there can be a "trade-off" between stimulus and surround if the extent of the surround is relatively small. In general, the practical difficulties encountered in haploscopic matching experiments are greater than in memory matching experiments, and use of the former would be indicated if there were a pressing need for the somewhat higher precision of this method.

"Short-term" memory matching experiments retain the interpretative unambiguity of haploscopic matching experiments but their other drawbacks limit their use to providing approximate data on the presence or absence of given effects or trends. Hence the choice of such a method for the preliminary experiment described in Section 2. Even if one were to control the relative time which the observer spent looking at the test and reference side, it would still be impossible to allow the observer's state of adaptation to be determined by only one of the two surrounds. A number of hitherto unwarranted assumptions about the relative contribution of each surround to the final adaptation still would have to be made.

This leaves the two methods involving long-term memory: either the memorization of a colour-order system, or a generation of subjective scales. The former method was used in the study by Helson, Judd and Warren (1952). Bartleson (1977), p.32-33 points out that the limitation of this method is the fact that it taxes the usual information transfer capacity. The method requires extensive training and a subsequent selection of "good" observers. This is somewhat wasteful of time and manpower.

Methods involving absolute scale generation by subjects still rely on long-term memory, since consistency between experimental sessions devoted to various viewing conditions may only be achieved by remembering how the scales were generated in previous sessions. However, it is possible to avoid the necessity of remembering exactly which numbers were used in those previous sessions: the normalization procedure used will be fully described in Section 4.1.

Relative scale generation is a simpler procedure, but it has already been pointed out that absolute scales are necessary if the results are to exhibit invariance under change of viewing condition. It is necessary to discover whether subjects are able to scale, consistently, attributes such as absolute saturation, brightness, as well as hue and lightness. A thorough study by Bartleson (1977) has shown that even previously naive subjects can be trained to generate these scales. Additional evidence for this ability comes from Pointer et al (1977), Pointer (1978), these being the studies which are conceptually most like the present proposed investigation.

If the validity and precision of ratio scaling are accepted, it is evident that this method has powerful advantages over the other ones outlined in this section. There is a need for only one stimulus, which does not have to be continuously variable (for magnitude estimation). It is simple to arrange for binocular viewing, and there are fewer problems with uncertainty about the observer's state of adaptation. A large surround can be produced, and uniform, large stimuli may be presented in Maxwellian view.

The question of validity of magnitude estimation data has been discussed earlier. It is felt that if the three requirements outlined in Section 1.1 are satisfied (scale invariance, internal and external validity, and relevance to known properties of the visual system) then there is a strong case for accepting such data. The last point, that of relevance, can be seen as a "safety factor". Some caution should be exercised before wide-ranging conclusions are claimed to be true. This is a less extreme caveat than Brindley's (1970) limitations on the validity of observations falling into his (Brindley's) "Class B", p.132-133 op. cit., but it is of the same kind. However, caution is to be exercised when drawing conclusions from any experiment, and it is always preferable to perform a replication which is conceptually similar but practically different.

With this proviso, and with a good probability of obtaining a precision of about 13% for saturation ($\frac{\Delta S}{S}$) and 3% for hue ($\frac{\Delta H}{H}$), see Bartleson (1977), p.85, it was decided to use a magnitude estimation ratio scaling procedure with a sufficient period of training for all observers to ensure good familiarity with the scale types involved.

3.2 Viewing Conditions

There were three main independent variables in the experimental investigation. These were stimulus luminance, surround luminance and stimulus subtense. Table 6 gives the values of each of these variables used in the present study, and the letters used to identify these. All observations were performed using binocular viewing with a natural pupil. Tables 7&8 give the particular combinations of the three variables which were used, and the observer numbers (from 1 to 7) of those observers who participated in any given viewing condition. The superscript in each position is a number identifying that particular viewing condition. For example, Tables 6 and 7 show that observers 3, 5 and 7 participated in viewing condition No. 24, i.e. a surround luminance of 11 cdm^{-2}, a stimulus luminance of 68 cdm^{-2} and a stimulus subtense of 2^{o}. The number of observers assigned to any viewing condition was determined by the relative importance attached to that viewing condition. It can be seen that all seven observers participated in viewing conditions 20, 23, 25, 26, 27, 28 and 29. Of these, viewing conditions 20, 23, 26 and 29 were designed to test the effect of stimulus subtense on appearance, with a constant luminance factor of 0.56 (Munsell value 7.8). Viewing conditions 25, 26, 27 and 28 were designed to test the effect of luminance factor for a 1^{o} test field. Each observer was asked to take part in between 12 and 35 viewing conditions, the typical time taken for each condition being 1½ hours. The time commitment of observers therefore ranged from 18 to 52 hours. A total of 118 viewing condition-observer repetitions were performed, each consisting of 93 judgements of hue, saturation and lightness or brightness, yielding a total of 10,974 judgements or 32,922 values of

SURROUND LUMINANCE $cd\ m^{-2}$	STIMULUS LUMINANCE $cd\ m^{-2}$	STIMULUS SUBTENSE
256 A	615 a	10° α
122 B	258 b	2° β
11 C	128 c	1° γ
0 D	68 d	20 arcmin δ
	18 e	0.4 arcmin ϵ

TABLE 6. Values of parameters in experimental study. Letters denote identificatory code used in study.

SUBT.	SURROUND LUM. cd m^{-2} 256	122	11	0	STIM. LUM. cd m^{-2}
10°	7_1	$1,6,7_2$	7_3	7_4	
2°	7_5	$1,6,7_6$			
1°	$1,6,7_7$	$1,6,7_8$	$1,6,7_9$	$1,6,7_{10}$	615
10'		$1,6,7_{11}$			
25"		$1,6,7_{12}$	$2,4,5,7_{13}$	7_{14}	
10°					
2°					
1°					258
10'					
25"			$2,4,5,7_{15}$		
10°		7_{16}			
2°					128
1°		7_{17}			
10'					
25"			$2,5,7_{18}$		
10°	$3,5,7_{19}$	$1 - 7_{20}$	$3,5,7_{21}$	$3,5,7_{22}$	
2°		$1 - 7_{23}$	$3,5,7_{24}$		
1°	$1 - 7_{25}$	$1 - 7_{26}$	$1 - 7_{27}$	$1 - 7_{28}$	68
10'		$1 - 7_{29}$			
25"			$2,5,7_{30}$	$2,3,4,5,7_{31}$	
10°		7_{32}			
2°		7_{33}			
1°		7_{34}			18
10'		7_{35}			
25"					

TABLE 7. Observer schedule of viewing conditions. Subscripts denote viewing condition number.

SURROUND / STIM. LUMINANCE CODE	SURR. LUM. cd m^{-2}	STIM. LUM. cd m^{-2}	β	$1/\beta$	MUNSELL VALUE
A a	256	615	2.40	0.42	
B a	122	615	5.04	0.20	
C a	11	615	55.9	0.018	
D a	0	615	∞	0	
C b	11	258	23.45	0.043	
B c	122	128	1.05	0.95	
C c	11	128	11.64	0.086	
A d	256	68	0.27	3.76	6.7
B d	122	68	0.56	1.79	7.8
C d	11	68	6.18	0.16	
D d	0	68	∞	0	
B e	122	18	0.15	6.78	4.5

Surround chromaticity: $u' = 0.1935 \pm 0.0025$
$v' = 0.4690 \pm 0.0030$

$$\left[D_{65} \quad : \quad \begin{matrix} u' = 0.1977 \\ v' = 0.4685 \end{matrix} \right]$$

TABLE 8. Luminance-related experimental parameters

individual attributes.

In any one experimental session, an observer would adapt to the surround illuminant for a period of 7-15 minutes, depending on the luminance of the illuminant. The observer would then make judgements of hue, saturation and lightness or brightness of 30 stimuli, in random order, with 3 repetitions of each stimulus. In addition, estimates of hue and saturation of the surround itself would be performed 3 times, giving a total of 93 judgements per session. There would be a 5 minute rest period in the middle of the session, i.e. after 35-45 minutes.

In order to ensure that adaptation was determined by the surround, and not by the stimuli themselves, a duty cycle of stimulus presentation and readaptation was selected. Using data from Burnham (1952), Bartleson (1977) and a preliminary experimental investigation, it was found that a stimulus presentation of 2 seconds duration, followed by 10 seconds of adaptation, eliminated after-images in all but a few cases. A shorter stimulus presentation would have undesirable effects of lower precision, and possibly be affected by Broca-Sulzer response latency; a longer interval between stimuli would make still heavier demands on the observers' time and was considered unjustified.

The preliminary experiment reported in Section 2 suffered from a substitution of adaptation from neutral surround to chromatic stimulus. It was felt that a certain way to overcome this would be to have a surround of large subtense. This was realised in the experiment;

the surround, which had a chromaticity similar to standard illuminant D65 (see Table 8) subtended approximately 150°, with the central 35° having a uniform luminance (the edge fall-off for this portion being less than 5%). The remainder of the surround was not as uniformly illuminated as the central 35°, but did contribute to the overall state of adaptation.

It will be seen, in conclusion, that a large proportion of viewing conditions presented chromatic stimuli with a luminance factor of more than unity. It was hoped that this would furnish data on the transition between stimuli lying within optimal limits (all surface colours) and necessarily unrelated colours seen in dark surrounds. Another aim was to compare any change in saturation caused by a given change in the luminance of a surround for related colours, with a change of similar magnitude for unrelated colours. Additional emphasis was placed on the scaling of large (10°) stimuli and small stimuli - of 20 arcmin and 0.4 arcmin. The latter two would be subject to small-field tritanopia, with the 0.4 arcmin stimulus being selected because that subtense is less than the Rayleigh criterion for optical resolution applied to the normal human eye: the chromatic stimulus would thus be equivalent to a point source of illumination.

3.3 Stimuli

Thirty stimuli were used. They consisted of Rank Strand Cinemoid filter combinations mounted in standard 2 x 2 inch slide mounts which had glass on one side only. Table 9 gives the composition, chromaticity and transmission factor of each stimulus filter. Figure 8 shows the

STIM.	COMPOSITION*)	u'	v'	TRANSMISSION FACTOR.
1	(2x6)	0.5377	0.5188	0.0560
2	39	0.0859	0.5753	0.1048
3	6,17	0.5109	0.5225	0.0519
4	38,(2x49)	0.2401	0.5593	0.4537
5	34	0.3660	0.5426	0.3086
6	48	0.4256	0.5225	0.2226
7	12	0.5045	0.4781	0.0360
8	(3x10),42	0.4157	0.4236	0.0253
9	10	0.2955	0.5221	0.4677
10	10,17	0.2621	0.5083	0.2526
11	17,42	0.1764	0.4424	0.0900
12	10,36	0.3290	0.4928	0.1426
13	(2x10),(2x17)	0.2976	0.4716	0.0735
14	19	0.1235	0.2858	0.0214
15	(2x41)	0.0955	0.3685	0.0311
16	16,17,39	0.0521	0.5625	0.0147
17	(2x16)	0.0441	0.4715	0.0341
18	(3x36)	0.3398	0.4161	0.0287
19	10,(2x17)	0.2275	0.4921	0.1453
20	(4x10),17	0.4362	0.4883	0.0664
21	(2x10),36,38	0.3753	0.5037	0.0555
22	10,17,36,42	0.2869	0.3475	0.0162
23	18,36,53,54	0.1646	0.3819	0.0163
24	(3x17)	0.1432	0.5030	0.2105
25	(4x17),(2x10)	0.2292	0.4121	0.0267
26	(4x38),49	0.1744	0.5670	0.2506
27	4	0.2830	0.5540	0.5847
28	(4x38),42	0.1212	0.5464	0.0437
29	(2x67),42	0.1563	0.4254	0.0475
30	(5x17)	0.1008	0.4783	0.1060

*) "COMPOSITION" refers to the Rank Strand Cinemoid filter numbers used in each stimulus filter pack.

TABLE 9. Composition and colorimetric data of stimuli

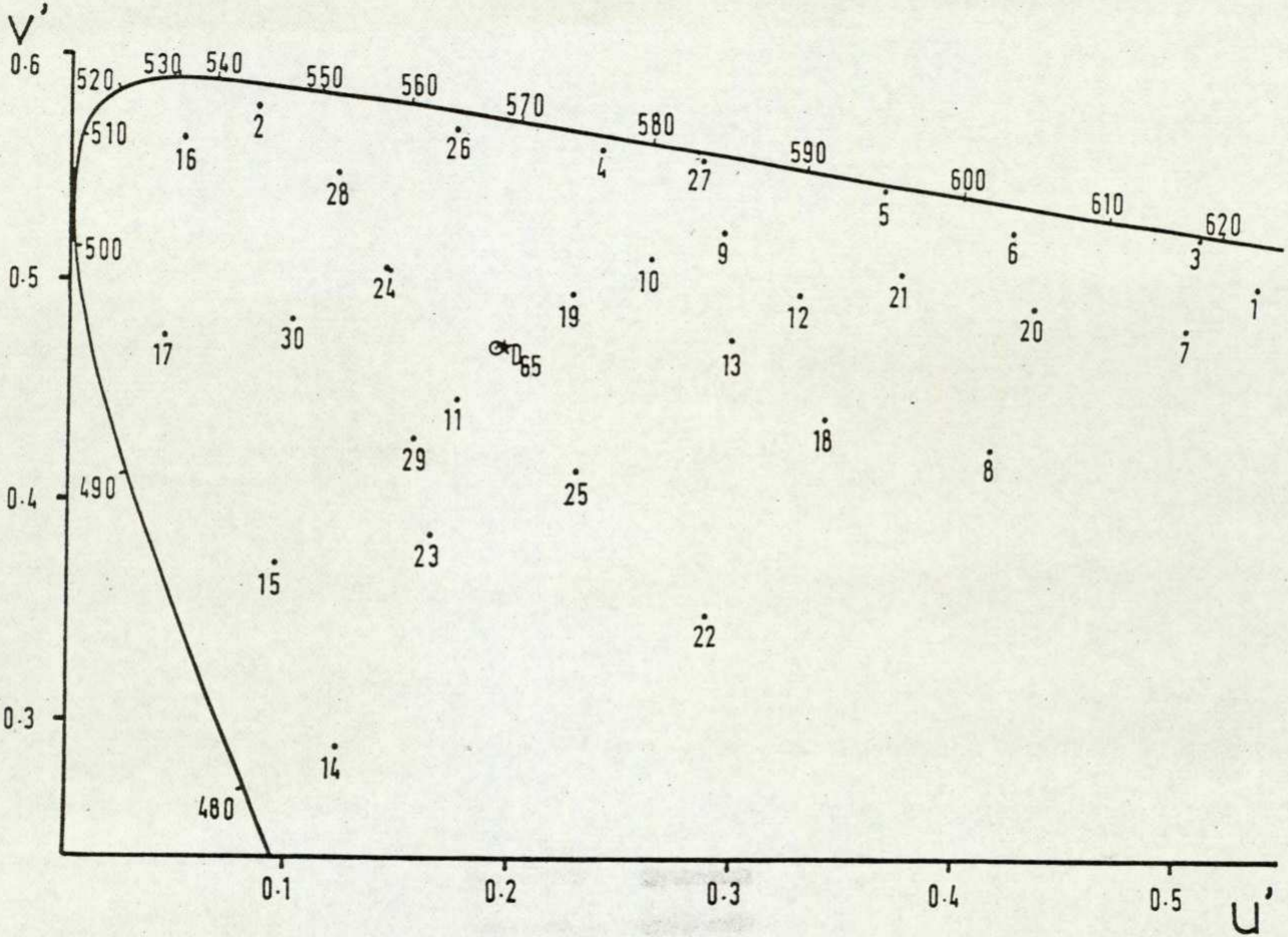


Figure 8. Experimental stimulus chromaticity coordinates

stimulus and surround chromaticities. The chromaticity coordinates were determined as follows: each filter combination was scanned on a Bausch and Lomb S505 spectrophotometer, on five different days. The mean spectral transmission curve for each filter was thus determined. The differences between transmission curves of each filter thus obtained were vanishingly small, yielding an uncertainty in chromaticity of about 0.0001. These values were taken to be the true transmission curve, the accuracy of the spectrophotometer having been established by comparison against ceramic tiles calibrated at the National Physical Laboratory. The discrepancies here were typically 0.0005 in chromaticity. The spectral power distribution of the source (a Kodak Carousel S-AV 2000 projector) and all optical components of the apparatus was determined on five occasions with a Gamma Scientific telespectroradiometer, which had been calibrated against a radiometric standard lamp supplied by the National Physical Laboratory, run at a current measured by determining the voltage drop across a standard 0.01 ohm resistor supplied by Croydon Instruments using a digital voltmeter calibrated by the Standards Laboratory of the GPO. The day-to-day random variations of the Gamma instrument were somewhat larger than those of the Bausch and Lomb spectrophotometer.

The average standard error in stimulus chromaticity arising from an uncertainty in the spectral distribution of the illuminant was 0.0017. This was therefore the least precise part of the colorimetric analysis, and it is only claimed, therefore, that the stimuli were defined to a tolerance of $\pm$ 0.002 in both u' and v'. This set an upper limit on (a) the amount of "permissible" filter fading, and (b) the "permissible" chromaticity change due to "neutral-density" optical filtering. Fading checks were carried out at regular intervals, after every 10 hours of operation of the experiment (during which time each stimulus filter would be projected for about 20 minutes). It was not found necessary to replace any filters during the 140 hour operation of the experiment. The fading control check was carried out using Gamma scientific telespectroradiometer in conjunction with the Bausch and Lomb spectrophotometer.

The stimuli were equated for luminance by spraying each filter pack with glossy black automobile paint and then cutting a hole in the latter, and subsequently heating the paint to harden it. Using a fine scalpel, it was possible to control the resulting luminance to a precision of 0.2%. The area of the hole was inversely proportional to the filter transmission factor, and weighted according to the non-uniformity of illumination in the projector gate. In situ determinations of stimulus luminance were made using a Spectra digital photometer, calibrated against the NPL radiance standard. These values were checked against expected ones from the transmission factor of each filter, and found to agree to within 2% (this discrepancy being due to an imperfect fit of the photometer sensitivity curve to the CIE V_λ curve). However, since Rank Strand Cinemoid filters display a small photochromic effect, it was decided to rely on the photometer measured value at a time of 30 seconds after the initial onset of the filter illumination. The photochromic change did not affect the stimulus chromaticity, and in 1 minute lowered the luminance of the filters by about 3%, and was thus felt to be acceptable.

The overall stimulus beam luminance was controlled by vacuum-coated (metal-on-glass) neutral density filters manufactured by Optical Electrical Coatings, Totnes, Devon. These were found to be the most satisfactory filters, changing the stimulus chromaticities by less than ± 0.002 (the uncertainty in chromaticity). These had Neutral Density values of 0.377, 0.682, 0.956 and 1.534. They were not subject to fading.

Finally, filters were also used to produce required surround illuminant chromaticity. These consisted of a pack of (3 x 17), 54 Rank Strand Cinemoid filters and a Kodak 30cc Magenta Colour Compensating filter. These were mounted so that air could circulate on both sides of them. They were monitored for fading at approximately 10 hour intervals and again, no appreciable change in chromaticity was detected during the course of the experiment. The Kodak Colour Compensating filters were replaced, however, as a precaution. The monitoring was carried out with the telespectroradiometer, which would also have detected changes in the paint forming the white surround, or the Plus Projectors which provided the surround illumination. The surround chromaticity was u' = 0.1935, v' = 0.4690.

All the electrical equipment was run off an AC power supply stabilised to 240 ± 0.5 volts. There was an independent voltage control rheostat for the surround illumination, and this was run at a constant 236 volts to prolong lamp life. A check was also kept on the uniformity of the stimulus luminance. The largest (10°) aperture was used for this. It was found that the maximum drop-off 5° off centre was 0.05%.

OBSERVER		EXPERIENCE	$\left(\frac{\Delta S}{S}\right)_{av}\%$	$\left(\frac{\Delta H}{H}\right)_{av}\%$	AGE	SEX	ANOM. QUOT.	C.A.T. SCORE
1	[redacted]	1	9.57±1.39	1.40±0.12	54	M	1.107 ±0.060	61
2	[redacted]	0	8.68±0.85	1.12±0.06	26	F	1.017 ±0.056	83
3	[redacted]	1	4.95±0.43	0.88±0.07	24	M	0.839 ±0.015	72
4	[redacted]	1	9.65±0.90	1.32±0.13	37	M	0.720 ±0.066	76
5	[redacted]	0	5.00±0.58	0.75±0.12	22	M	1.029 ±0.052	77
6	[redacted]	0	6.78±0.89	1.22±0.12	23	F	0.891 ±0.066	67
7	[redacted]	1	6.17±1.12	1.05±0.10	24	M	0.966 ±0.054	97
"AVERAGE"		0.6	7.26±0.77	1.11±0.09	30		0.938 ±0.050	76

Notes:

EXPERIENCE
- 0 = none
- 1 = some

ANOMALOQUOTIENT
- 1.00 = normal mean
- 3.16 = deutan mean
- 0.35 = protan mean

C.A.T. SCORE
- 0 - 48 "poor"
- 49 - 65 "fair"
- 66 - 74 "average"
- 75 - 83 "good"
- 84 - 109 "excellent"

TABLE 10. Obsevers used in scaling study

It was immeasurably small for the smaller apertures.

In summary, it is claimed that the colorimetric measurement and control were of a sufficient precision to be able to discount any uncertainty due to erroneous equipment or fading of filters (or changes in the emissive properties of all the light sources).

3.4 Observers

Seven observers were used. Table 10 gives relevant details about the observers and their consistency. The column labelled "experience" shows a "1" if the observer had participated in previous colour scaling experiments; "0" otherwise. The next two columns give the average percentage standard error in saturation and hue. The hue error assumes that the total scale is 400, not 100 units. The anomaloquotient given is for each observer's right eye, as measured on a Nagel anomaloscope. The column labelled "CAT" gives each observer's score in the Color Aptitude Test developed by the Inter-Society Color Council. It is basically a test of the ability to distinguish small differences in saturation in a side-by-side comparison.

The standard errors given in Table 10 are for the observers' performances in Viewing Conditions 20, 23, 25, 26, 27 and 28 only. It should be noted that the error bars are really chords of ellipses, and that the hue scaling consistency may affect apparent saturation scaling consistency, assuming covariance between the hue and saturation ratings. It is interesting to note that two trends seem to be apparent in the data: firstly,"low experience" observers may obtain low errors.

This is almost certainly due to a curtailment of the number of different responses given, particularly for hue. For example, one inexperienced observer (No. 5) tended to give fewer different hue responses than all others. Hence the low error score associated with that observer. This only seems to indicate that experience may increase channel capacity somewhat. Secondly, experienced observers also yielded data of high precision.

The CAT score did not prove to be a good predictor of observer performance. The observer's age seemed to be more important; indeed, a linear regression gave a relationship between age and saturation error with a correlation coefficient of 0.755, which has a 0.05 probability of occurring by chance.

The "average observer" showed a net saturation error of 7.67%, and a net hue error of 1.00%. It is not possible to compare this directly with other studies, because the method of analysis (to be discussed in Section 4) was markedly different in this case. However, it can readily be seen that hue can be scaled with much greater precision than saturation.

3.5 Training of Observers

It was recognised that the most important single factor determining the quality of the final data would be the training given to observers. Particularly with regard to saturation, it is easy to see that the results are highly dependent on original instructions. Rowe (1972) trained observers to scale saturation as a relative attribute. This led to a "compression" of isosaturation contours in the "yellow" region of the chromaticity diagram; Rowe recognises that the difference between his, and other results, was probably due to the different type of scale used (op. cit., p.122). This is a point made also by Pointer et al (1977) and Bartleson (1977), who describes his training procedure in detail (pp.89-99). The training procedure used in the present study was similar in many respects to that employed in Bartleson's because of the evident success of Bartleson's training procedure.

The observer was seated and asked to place his chin in the rest provided. The surround luminance was adjusted to 250 cdm^{-2}, and the observer was asked to direct his gaze to the centre of the one-degree stimulus aperture, which appeared identical to the surround. After a 10-minute adaptation period, the following verbal instructions were given:

"The object of this study is to investigate changes in the appearance of a coloured area when the viewing conditions change, for example, the brightness of the surround or the area of the colour may be varied. The way in which the appearance of the colour is assessed consists solely of a verbal description of the appearance by you, the observer. As such, there are no "right" or "wrong" answers. The purpose of this training session is to instruct you on how I would like you to estimate the appearance of any coloured field. Before we start, I would like to explain that you will see the stimulus presented in the central hole for two seconds; the white shutter will then close, and remain closed for ten seconds. The stimulus presentation will then be repeated. Now I would like you to remember that you can take as many presentation periods as you wish to come to any decision. Do not try to "remember" the appearance of the colour when the shutter is closed. If in doubt, wait to see the colour once more. (The shutter mechanism was then activated. The observer could see Test Stimulus (TS) 1 during the "open" part of the shutter cycle).

When the shutter is open you should see a colour which most people would call "blue" filling the aperture (Observer agrees). The first appearance attribute which I would like you to consider is what is called the brightness, or the lightness, of the stimulus. Let us take the term "brightness". Let us define it as "the apparent amount of light appearing to come from the coloured area". It is what is known as an absolute dimension. That means that there is no upper limit to the brightness associated with light-emitting fields. "Lightness", on the other hand, is a "relative" attribute. It is defined as the "brightness of the coloured field relative to that of the surround". It is customary to represent this ratio as a percentage, in other words, we say that a colour has a lightness of 100 if it appears to have the same brightness as the surround. A completely black field will have a brightness, and lightness, of zero. I will now show you how these two terms, both of which represent the magnitude of the sensation pertaining to the quantity, not quality, of light, can be used in practice.

Could you tell me whether the colour which you see in the aperture appears lighter than, equal in brightness to, or darker than the surround? (Observer replies "darker"). Since the colour is darker, I would like you to estimate its lightness, or the proportion of stimulus brightness to the surround brightness. Express this as a percentage. For example, if you think that the colour is half as bright as the surround, say "lightness 50" (Observer replies, typically "20". The second test stimulus, TS2 is then shown. This is a blue having the same chromaticity as TS2, but a higher luminance).

You now see a new stimulus. If it still appears darker than the surround, could you scale its lightness again? (Observer replies, typically "60". TS3 is then shown. Most observers would see this as the same blue of a brightness higher than that of the surround). Could you tell me whether the colour is now lighter, or darker than the surround? (Observer replies "lighter").

Since the colour appears lighter, I will ask you not to scale lightness any more, but to scale brightness. Look at the colour for several presentation cycles. Then assign a number to the brightness of the colour, any number you want to, to represent the amount of light coming from the stimulus. I want you to try to remember that number and the corresponding sensation of brightness. (Observer says, typically, "20").

(TS4 is then shown. This appears brighter than TS3). You now see another stimulus. Could you also scale its brightness? You are asked to do this by assigning a number which will tell me how many times brighter (or dimmer) the colour is, compared to the previous one.

You called the last brightness "20". If this colour appears twice as bright, assign to it a brightness value of "40". If it is half as bright, say "10". Above all, try to be consistent in the way you assign numbers to the brightnesses of stimuli. (Typical new brightness response "30").

(TS3 is then shown again). You now see the stimulus to which you assigned the value "20". Take note of the brightness of this stimulus.

(TS2 is then shown). Could you make an estimate of the brightness of this stimulus? (Reply: "12").

(TS1 is shown. Typical brightness reply: "5"). You have assigned brightness of "12" and "5" to the last two stimuli. These are the same stimuli to which you assigned <u>lightnesses</u> of "60" and "20". Note that you have therefore scaled the same basic attribute in two ways: a "relative" way, describing the lightness of the stimulus, and an "absolute" way, describing its brightness. The two methods yield different numbers. Take note of the distinction between the two scaling methods.

(TS1, 2, 3, 4 are shown again, and the observer makes lightness/ brightness judgements until he expresses that he is clear about what he is expected to do).

Now that you can tell the distinction between these two scales, I will ask you to scale the <u>lightness</u> of any stimulus which appears dimmer than, or of equal brightness as, the surround, and brightness otherwise. In a typical viewing session you might encounter both these categories. Please let me know which attribute you are scaling.

There is an additional point here. (TS1, 2, 3, 4 shown). Note that the two stimuli which are dimmer than the surround all possess something which we may call "greyness" or "grey content". The two stimuli which are lighter do not exhibit this. As a dim stimulus becomes brighter, it loses its "greyness". The point at which all greyness disappears may or may not be a condition of equal brightness with the surround, but remember that any colour that exhibits greyness must be dimmer than the surround, i.e. you should scale its lightness.

Now we will address the question of how to scale the hue of a stimulus. Hue is a measure of a quality, not a measure of quantity, such as brightness. We can think of it as follows: There are four primary hues: red, green, blue and yellow. Any colour that you see which is not neutral can be said to have a hue made up of a mixture of not more than two of the four primaries. No colour appears to exhibit "redness" and "greenness" simultaneously, nor "yellowness" and "blueness". The other combinations are allowed.

In practice, I want you to decide which is the predominant hue. (TS5 is shown. It is a blue-appearing stimulus). You see a stimulus now. Could you tell me whether it appears to be mostly red, green, blue or yellow? (Reply: blue). Now, since it is predominantly blue, please decide whether it is a unique blue, i.e. does not possess any trace of either red or green, or whether there is some redness/greenness in it. (Reply: it possesses some red). Could you make an estimate of how much redness there is? Do this as follows: If it appears to you that there is, say, 70% blue and 30% red, say "70 blue, 30 red". The two figures must add to 100. (Typical reply: 90 blue, 10 red). Now, can you repeat this for the following four stimuli (TS6 - 9, displaying various hues, both unique and composite. All observers reported that they were clear about what was required of them).

Lastly, I would ask you to consider the attribute which has been called "saturation" or "colourfulness". This may be defined as "the amount of chromatic colour appearing to be emitted by the stimulus". Like brightness, it is a measure of an amount of something. Similarly, it has no upper limit - it is an absolute attribute. A neutral field will have zero saturation or colourfulness. Any non-neutral field will have a given colourfulness. As an example of this, look at the stimulus now (TS10, a blue colour of low purity). Then look at the next two (TS11, 12 - stimuli of the same λ_d and luminance, but higher purity). These stimuli differ primarily in their colourfulness or saturation. I want you to look at the middle one (TS11) and assign any number that you feel confident about, to represent the amount of chromatic colour exhibited by this stimulus. (Typical response: 30). Now look at this stimulus (TS12). Could you scale its colourfulness in a way which tells me how much more, or less, colourful this is than the previous stimulus? For example, if it appears to be twice as colourful as the previous one, assign to it a colourfulness of "60". It it is half as colourful, assign to it a colourfulness of "15".

(Typical response: 45. TS10 would elicit a typical response of 20).

Note that this is an "absolute" scale, similar to brightness. This is not the only way in which saturation can be scaled. Some studies in the past have used a relative scale, and I would like to show you the differences between the two kinds of scale. I would also emphasise that, throughout this study, I will ask you to scale absolute saturation, or colourfulness, in the way you have just done.

(TS10 is shown. It possesses "greyness"). Here is the least saturated of the three stimuli. Does it possess "greyness"? (Response: yes. TS11 is then shown). Does this stimulus contain more or less "greyness"? (Response: less. TS12 is shown). Has the greyness decreased still more? (Response: yes). I would like you to make an estimate of the proportion of greyness in this stimulus. (Typical response: 15%). One of the ways of scaling relative saturation is to let "greyness" plus "colourfulness" equal 100, so if the stimulus contains 15% "greyness" we could give it a relative saturation of 85%. (TS11 and 10 are shown). On this basis, could you estimate the proportion of colour in these two stimuli? (Typical responses: 60 and 40).

You have now scaled both relative and absolute saturation, or colourfulness, of the same stimuli. You have given relative saturations of 20, 30 and 45 to the same three. You can see that the numbers are rather different. You have noted that "greyness" depends on both saturation and brightness, and that it can be used directly to estimate relative saturation, and lightness".

This forms the outline of the training instructions. It is clear that the actual numerical responses varied widely between observers, but the ones given in the above text are meant as illustrative examples of how observers responded. They were asked whether they felt that they understood what was required of them, particularly whether they understood the difference between "relative" and "absolute" scales. Some additional reinforcement was necessary in some cases, but most observers commented that they were very clear, perhaps for the first time, about what colour scaling methods could achieve.

All observers were then asked to scale the 30 experimental stimuli. This was a "dummy run", with no scaled values being noted. The total length of the training session and dummy run was about 50 minutes. The session was then terminated, with a comment that there would be a brief "resumé" of instructions at the beginning of the next session, the first "actual" one.

It is felt that the training session succeeded in making observers keenly aware of exactly what was required of them. They showed good consistency in scaling saturation in particular.

3.6 Construction of Apparatus

Figure 9 shows a schematic outline of the apparatus. P consisted of a Kodak S-AV 2000 projector, in which the stimulus filter f gave the spectral energy distribution required of each of the 30 stimuli. A

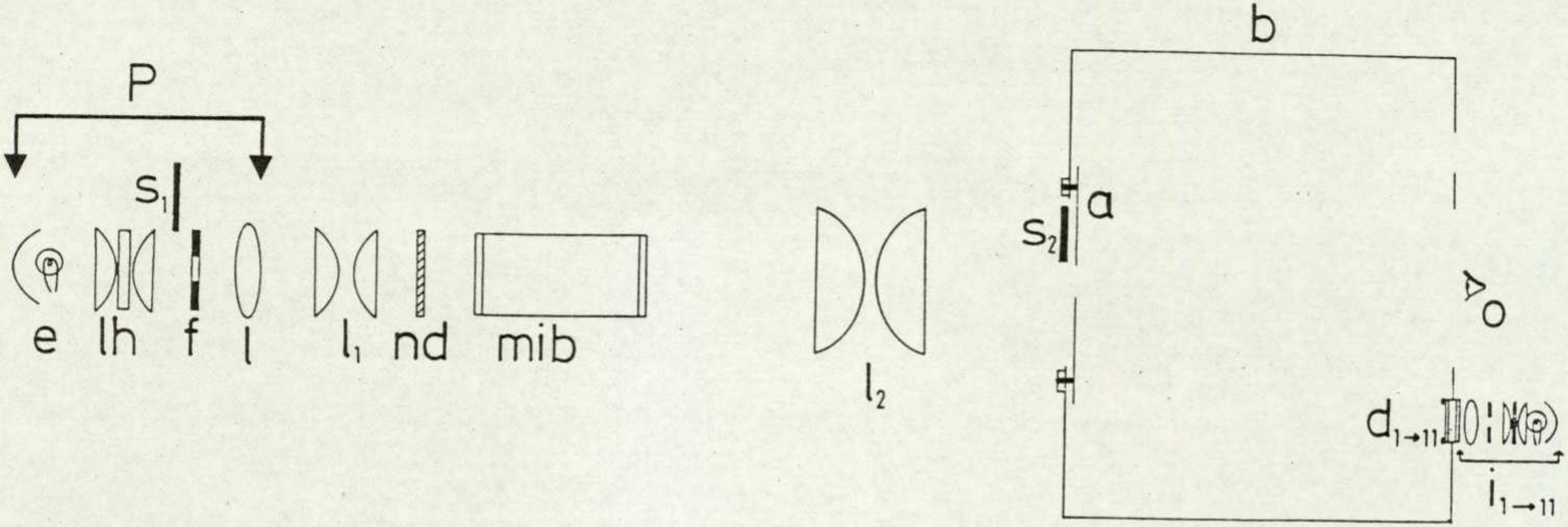


Figure 9. Schematic plan of apparatus

shutter S_1 masked off the light beam when the stimuli were being changed (this could be achieved remotely by means of the standard slide-change lead). The lens combination eh contained a heat-absorbing glass. The light source e was a 24v 250w quartz-halogen bulb. This was run from a stabilised power supply. The lens l_1 was inserted in front of the standard 85 mm objective lens l in order to image the stimulus filter f on the entry opal of the mirror integrating box mib. The stimulus beam luminance could be controlled by a vacuum-coated filter nd. The mirror integrating box was constructed so that its length was more than double the diagonal measurement of the entry and exit opals; it gave excellent beam integration. l_2 was a large condensing doublet which imaged the exit opal in the plane of the observer's eyes o. The image of the exit opal was approximately 12 cm square which allowed the stimulus to be viewed binocularly, provided the observer positioned his head in the chin-rest provided. A shutter S_2, which was painted white on the side facing the observer, and controlled by a preset switch acting on a rotary solenoid, allowed the stimulus presentation/readaptation cycle to be repeated automatically. Its rise-time for the largest aperture (the 10° stimulus) was approximately 100 msec, with a total stimulus presentation time of 2 sec. For the 1° stimulus, the rise time was only 5 msec since a lighter shutter was used for all stimuli subtending less than 10° (the times were measured using a stroboscope and time-exposure camera).

The stimulus aperture plate a could be changed by releasing three bolts affixed to its rear side. There were five plates, to produce the five desired stimuli. The plates, and the whole inside of the adaptation box, were painted with spectrally nonselective emulsion paint having a reflectivity of 96%. The smallest aperture (0.4 arcmin) was produced by a pin-prick on aluminium foil, with the resulting aperture diameter measured with a travelling microscope.

The adaptation lights were provided by eleven Plus-projectors $i_1 - i_{11}$ mounted around the observer O, with a shield between the observer and the hot projectors. They were modified by affixing a filter pack ($d_1 - d_{11}$) onto the front of each projector. This consisted of a frosted-glass diffuser and a holder for the adaptation-field filters, which consisted of a pack of (3 x 17), 54 Rank Strand Cinemoid filters, and one 30 cc magenta Kodak Colour Compensating filter. These were mounted in a way which permitted free air circulation around them; in addition, the Colour Compensating filters were mounted farthest away from the light source, and thus received the lowest level of illuminance. It was felt that these measures would retard the fading of these filters, and this was indeed found to be the case.

The power supply to the adaptation projector was the same stabilised 240v ± 0.5v supply the output of which was additionally regulated by a "Variac" variable transformer. This was necessary because the current load of, and thus the voltage across, the projectors, varied according to the number of projectors switched on. The voltage across them was thus regulated at the beginning of each session, and set to 236.0 volts, as measured on a digital voltmeter.

The adaptation field projectors were positioned along the perimeter of the adaptation box so as to remove any specular reflections off the rear surface of the lens l_2. In viewing conditions, in which the 10° aperture was presented with the surround at high luminance, each observer wore a black mask, with apertures made for the eyes, in order to prevent the imaging of his face on the exit opal of mib with a subsequent alteration of the stimulus colour. This precaution was not necessary with the smaller apertures, since the total flux from the adaptation box was reduced by a factor of 25 for the 2° aperture, and 100 for the 1° aperture.

The adaptation luminance was controlled by varying the number of projectors used to illuminate the surround. In addition, fine control could be exercised by a small degree of permitted movement in each projector. The surround luminance and its uniformity were checked at the beginning of each session. In order to produce the lowest surround luminance, opaque masks were inserted into the transparency positions of the projectors, with small holes cut in the masks. These reduced the total flux passing out of the projectors and still made it possible to use several projectors, thus increasing field uniformity.

It should be noted that there were no colour differences between different areas of the surround, since the filtration was entirely subtractive and equal on each projector. The integrating properties of the adaptation box were not sufficiently good to permit additive mixing of adaptation lights.

Stray light was excluded from the apparatus by (a) covering the projector p and subsequent optical components with blackout material and (b) by carrying out the whole experiment in a dark room. Thus the only light source illuminating the exit opal was the projector p, and the only light sources illuminating the surround were the projectors $i_1 - i_{11}$ filtered by the filter packs $d_1 - d_{11}$. This independence was verified by measuring the luminance of the stimulus/ adaptation beams when the luminance of the other beam was altered by a maximal amount.

The filter fading checks described in Section 3.3 were carried out at regular intervals, as measured by an elapsed-hour meter activated by the surround illuminators.

4. RESULTS

4.1 Analysis of Data - Normalization, etc.

The data generated by each individual observer were of the following form: firstly, the hue designation (e.g. "80 red, 20 yellow"). Secondly, the saturation (colourfulness), which was a number greater than or equal to zero (if the stimulus appeared achromatic, there was no hue). Thirdly, a number represented lightness on a 0 to 100 scale, if the observer judged the stimulus to be darker than, or equal in brightness to, the surround; if the stimulus appeared brighter than the surround, this number represented the scaled value of brightness expressed on an unconstrained numerosity scale. An additional symbol recorded whether the last number referred to lightness or brightness.

These data were transferred on to punched computer cards, and a programme was developed to perform the data analysis which gave an output consisting of normalized values for hue, saturation and lightness or brightness for each individual observer in any viewing condition, and the "mean observer", as well as an indication of (a) the random errors inherent in all the evaluations, and (b) the normalization parameters, which served as a useful guide to each observer's internal consistency (stability of scales between sessions). The purpose of this section is to outline how this was achieved.

The problem is twofold: firstly, the two "unconstrained numerosity" parameters, saturation and brightness, must be normalized so that different observers' ratings are transformed to the same scale.

Secondly, these values must be averaged, both within each observer's group of observations, and between observers. These two problems (normalization and averaging) will be considered in turn.

In normalizing values of absolute attributes, the technique used by Bartleson (1977) is useful. If Si is the individual observer's rating, and $\overline{Si}$ is the geometric mean of all observers' ratings of the same stimulus in the same viewing condition, then log Si may be plotted against log $\overline{Si}$. If this is repeated for all stimuli and observers, a regression line may be obtained for each observer, as shown in equation (30).

$$\log \overline{Si} = a \log Si + b \quad \text{.....................} \quad (30)$$

It should be noted that Si may itself be a geometric mean of several observations. A strategy for dealing with populations of numbers in which one or more of the members is zero must also be devised. Marks (1974b) p.45 suggests that it may be advisable to use the median as a measure of central tendency in this case. In the present study it was decided to retain the geometric mean, since the disadvantage of having a disproportionate number of "zero points" seemed outweighed by the conceptual and interpretative difficulties involved in the changeover between geometric means and medians in the same analysis.

It will be noted that the values of the constants a and b in equation (30) give the necessary normalization information for each observer. Another useful feature is that the constant "a" may be used

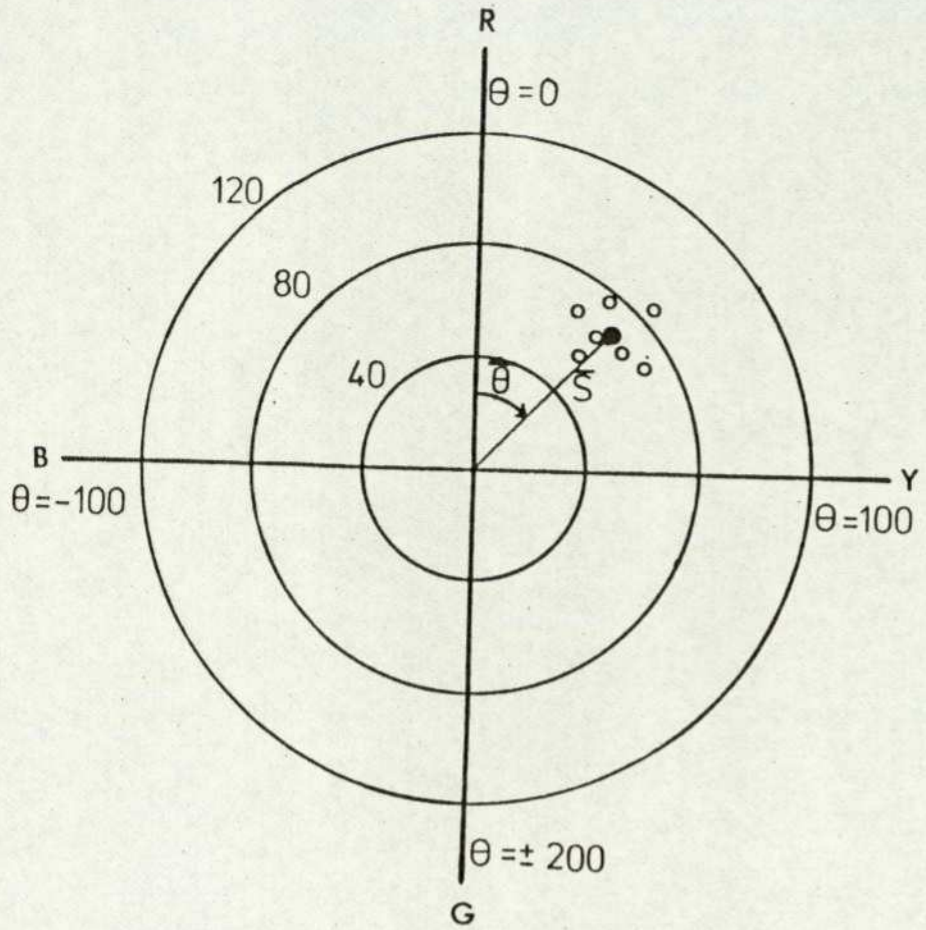


Figure 10. Representation of hue-saturation space

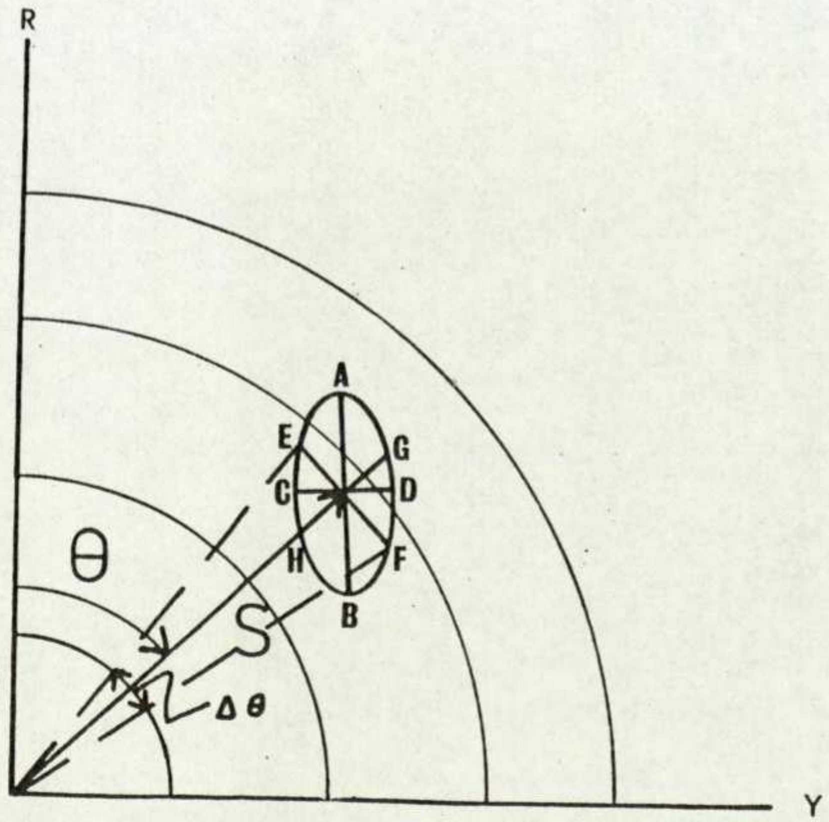


Figure 11. Ellipse of concentration in hue-saturation space

as a guide to the observer's internal consistency over several experimental sessions. This is because the scale retains the same ratio properties if a remains unchanged; alternatively, changes in b are allowed since they reflect movement up or down on the same scale.

The first part of the computer programme given in Appendix A deals with this normalizing process. Values of the constants a and b for both saturation and brightness are output at the beginning of each viewing condition listing. If only one observer is used in any given viewing condition, there can be no normalization, so a and b are set at 1 and 0 respectively.

We now come to the second part - the averaging of hue and saturation. It is useful to represent hue and saturation on a polar diagram, see Figure 10. This shows, as an example, a cluster of points P1 → P7 in the first quadrant. These points represent an orange stimulus of moderate saturation. Three approaches are possible: a visual "fit" to the apparent centroid of the distribution, or separate averaging of hue and saturation, or an approach that treats them as a single bidimensional system. The disadvantage of the first approach is that it may introduce post-hoc bias. The second approach, though tacitly used in other investigations, assumes no covariance between hue and saturation in error analysis, and because of the polar nature of the coordinate system may quite easily produce "means" which lie outside the perimeter of the distribution of all individual points. Also, it is essentially a linear fit to a circular space (i.e. one in which the end-points meet). The "average" of + 199 and - 199 is zero, i.e. the average hue of two near-greens becomes pure-red. To overcome this, a cumbersome re-centering procedure must be applied to each point cluster.

The last approach is the one which has been selected for the present data analysis. It entails fitting ellipses of concentration to encompass each sub-population in the way outlined by Morrison (1967) p.121-123, or Dempster (1969) p.126-129. The procedure is much simplified if we assume that the region of hue and saturation space in which points corresponding to one stimulus are distributed, is of a rectangular Cartesian type, i.e. we ignore the curvature of the isosaturation lines and the convergence of the isohue lines in that small region. The magnitude of error introduced by this assumption can easily be determined. From simple geometry, one can show that

$$\frac{\Delta S}{S} = 1 - \cos \frac{\Delta \Theta}{2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (31)$$

Typical errors, both in the present study, and in Bartleson (1977) were of order 1% of full scale in hue. These would lead to a $\frac{\Delta S}{S}$ value of 0.1%. A 1% error would be caused by a $\frac{\Delta H}{H}$ value of 4.5%. The highest $\frac{\Delta H}{H}$ value reported in Bartleson (1977) was 2.6%. It is therefore suggested that the above method is sufficiently accurate.

The mechanism of the averaging process will now be outlined. Consider N observations, having polar coordinates (Si, Θi), as in Figure 10. Then make the local transformation to rectangular Cartesian coordinates,

$$x_i = Si \sin \Theta i' \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (32)$$

$$y_i = Si \cos \Theta i' \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (33)$$

where

$$\Theta_i' = 0.9 \; \Theta_i \qquad \text{.....................} \; (34)$$

(the factor of 0.9 converts from grads to degrees).

The variance and covariance in x and y are given by

$$\sigma_x^2 = \frac{1}{N-1} \sum_{i=1}^{N} (x_i - \bar{x})^2 \qquad \text{.....................} \; (35)$$

$$\sigma_y^2 = \frac{1}{N-1} \sum_{i=1}^{N} (y_i - \bar{y})^2 \qquad \text{.....................} \; (36)$$

$$\sigma_{xy}^2 = \frac{1}{N-1} \left\{ \sum_{i=1}^{N} x_i y_i - \frac{1}{N} \sum_{i=1}^{N} x_i \sum_{i=1}^{N} y_i \right\} \qquad \text{..........} \; (37)$$

The variance - covariance determinant d is given by

$$d = \begin{vmatrix} \sigma_x{}^2 & \sigma_{xy}{}^2 \\ \sigma_{xy}{}^2 & \sigma_y{}^2 \end{vmatrix} \qquad \text{.....................} \; (38)$$

Morrison (1967) shows that a confidence ellipse may be defined by the equation

$$a_{11}(x-\bar{x})^2 + a_{12}(x-\bar{x})(y-\bar{y}) + a_{13}(y-\bar{y})^2 = a_{14} \qquad \text{.....................} \; (39)$$

where

$$a_{11} = \frac{(N-1)\,\sigma_y{}^2}{d} \qquad \text{.....................} \; (40)$$

$$a_{12} = \frac{(N-1)\,\sigma_{xy}{}^2}{d} \qquad \text{.....................} \; (41)$$

$$a_{13} = \frac{(N-1)}{d} \quad \sigma_x^2 \qquad \text{.....................} \; (42)$$

$$a_{14} = \frac{2(N-1)}{N-2} \cdot F_{\alpha;2,N} \qquad \text{.....................} \; (43)$$

or $$a_{14} = 1 \qquad \text{.....................} \; (44)$$

Equation (44) is used when we wish the ellipses to be ellipses of concentration, as in Dempster (1969), p.127. Equation (43) defines a confidence limit at a level of significance α , Morrison (1967), p.123. In colour scaling analysis, equation (44) is probably more useful than equation (43).

It can be shown from simple geometry that the semi-major and semi-minor axes of the ellipse are given by

$$r_{\pm} = \frac{2a_{14}}{a_{11}+a_{13} \pm A} \qquad \text{.....................} \; (45)$$

where

$$A = \sqrt{(a_{11}-a_{13})^2 + a_{12}^{\;2}} \qquad \text{.....................} \; (46)$$

The inclination, β is given by

$$\beta = 0.5 \tan^{-1} \left\{ \frac{a_{12}}{a_{11}-a_{13}} \right\} \qquad \text{.....................} \; (47)$$

We thus have a complete description of the ellipse in hue-saturation space. Figure 11 shows such an ellipse, much enlarged.

The major and minor axes are AB and CD respectively. If we are interested in hue and saturation discrimination, we evaluate the length of the chords EF and GH, and then postulate that the saturation discrimination function is

$$\frac{\Delta S}{S} = \frac{l_{GH}}{S} \qquad \text{.................... (48)}$$

and that the hue discrimination function is

$$\frac{\Delta H}{H} = \frac{\Delta \Theta}{400} = \frac{l_{EF}}{400S} \qquad \text{.................... (49)}$$

Finally, the colour discrimination function C of each observer or of the "mean observer" may be given by the area of the ellipse

$$C = \frac{\pi l_{AB} \, l_{CD}}{S} \qquad \text{.................... (50)}$$

The computer programme listed in Appendix A outputs $\bar{\Theta}$, $\bar{S}$, $\frac{\Delta S}{S}$, $\frac{\Delta H}{H}$, ΔC, l_{AB}, l_{CD}, as well as lightness, brightness, and their associated errors.

It should be pointed out that the above analysis is two-dimensional, with the brightness dimension being omitted. It is felt that the additional complexity required by a rigorous three-dimensional approach is not warranted by the relatively secondary importance attached to that dimension. The ellipses were therefore "fixed" at the mean lightness/brightness level for each set of observations. No lightness/brightness values were computed when the same stimulus was sometimes

Viewing Condition	a^o	Surr, cdm^{-2}	Stim, cdm^{-2}	β	$\frac{1}{\beta}$	Munsell Value
7	1	256	615	2.40	0.42	
8	1	122	615	5.04	0.20	
9	1	11	615	55.9	0.018	
10	1	0	615	∞	0.0	
19	10	256	68	0.27	3.76	6.7
20	10	122	68	0.56	1.79	7.8
21	10	11	68	6.18	0.16	
22	10	0	68	∞	0.0	
25*	1	256	68	0.27	3.76	6.7
26*	1	122	68	0.56	1.79	7.8
27*	1	11	68	6.18	0.16	
28*	1	0	68		0.0	

TABLE 11

Viewing Conditions used to Investigate the Effect of Luminance Factor on Saturation

*) Main series (observers 1 - 7)

Natural pupil, binocular vision

judged to have a "brightness" and at other times a "lightness". This was taken to denote brightness equality with the surround.

4.2 Effect of Luminance Factor on Saturation

All seven observers participated in a series consisting of four viewing conditions (v.c. 25, 26, 27, 28) whose primary aim was to investigate the effect of reducing the luminance of the adapting surround from a value almost four times greater than the stimulus, to zero. Table 11 gives the parameters associated with this series, as well as the other viewing conditions treated in this section.

In order to be able to perform an averaging process to cover the whole of the portion of the 1976 CIE UCS space covered by the 30 stimuli, lines joining points equal hue and saturation were produced for the mean observer for each of the above viewing conditions. The mean observer results are given in Figures 12 - 15. Lines of equal hue are given for the four unique hues and four intermediate hues. Contours of equal saturation are given in steps of 20 units of saturation. The lines were produced by visual fitting of smoothed curves to interpolated hue/saturation coordinates. This is a standard method of producing such grids.

In order to investigate detailed changes in the shape of the grids, it was decided to fit power functions relating 1976 CIE metric purity to saturation, for the contours given in Figures 12 - 15. If a Stevens-type power function is assumed, i.e.

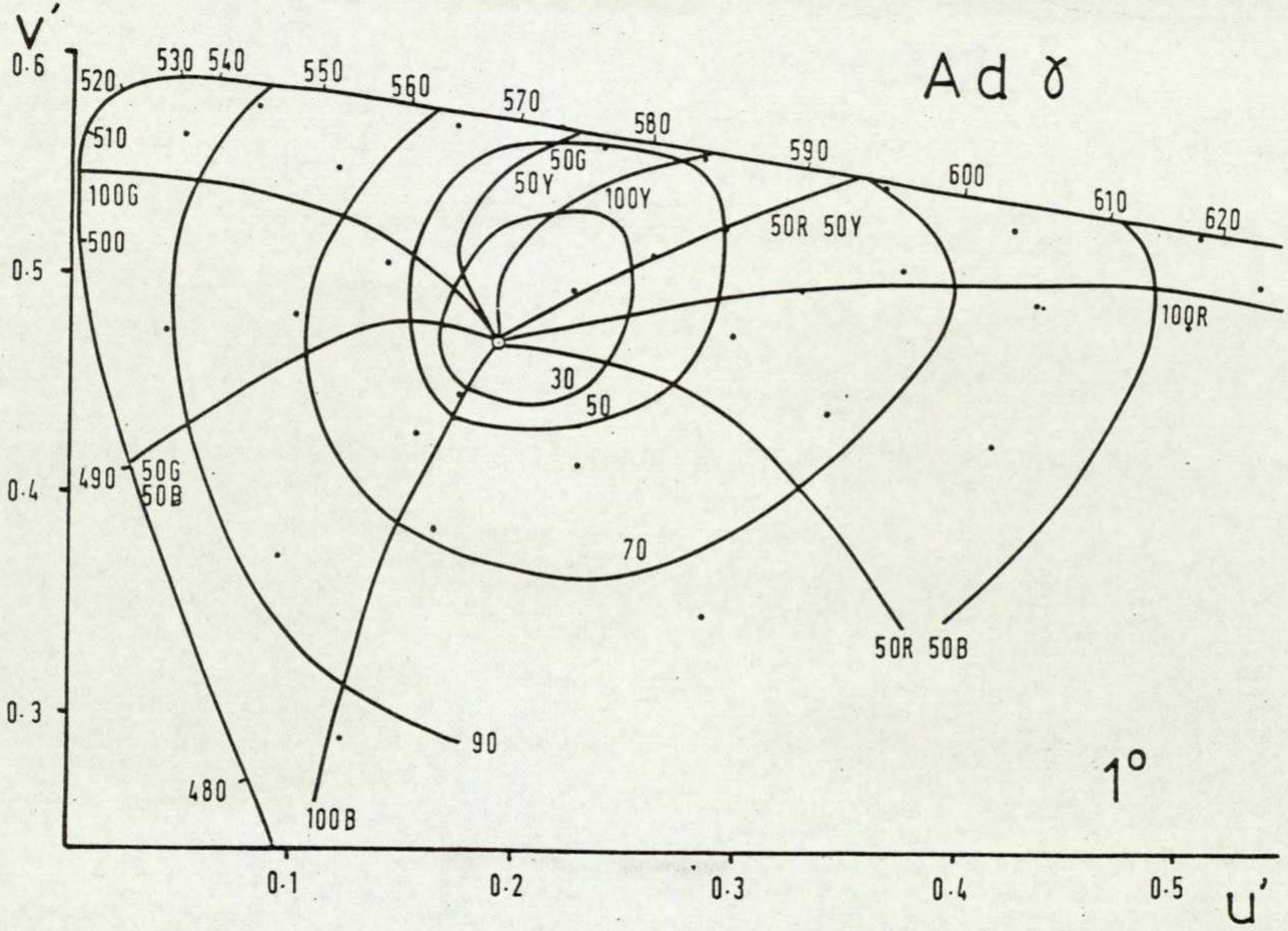


Figure 12. Mean observer results, luminance factor series

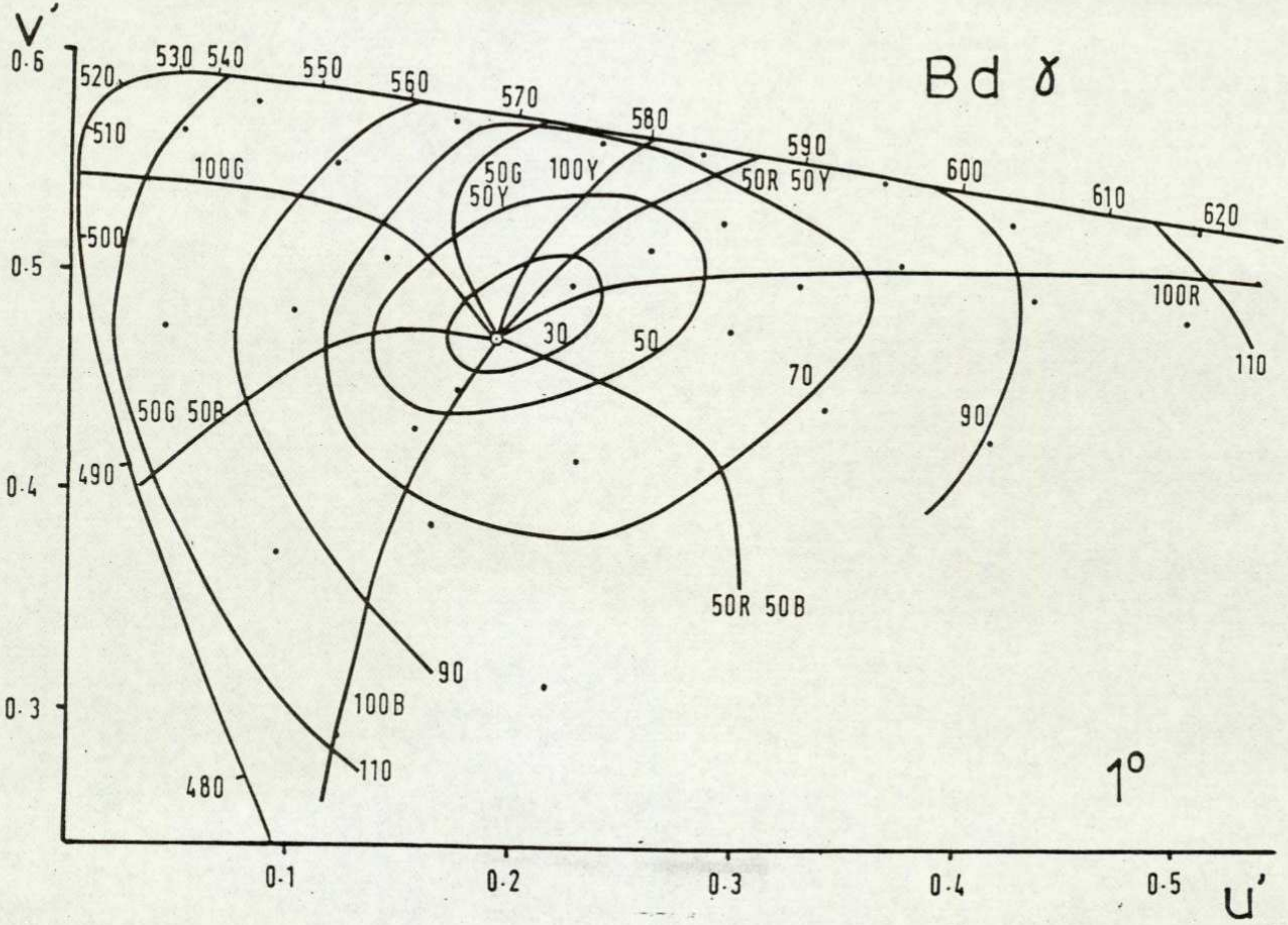


Figure 13. Mean observer results, luminance factor series

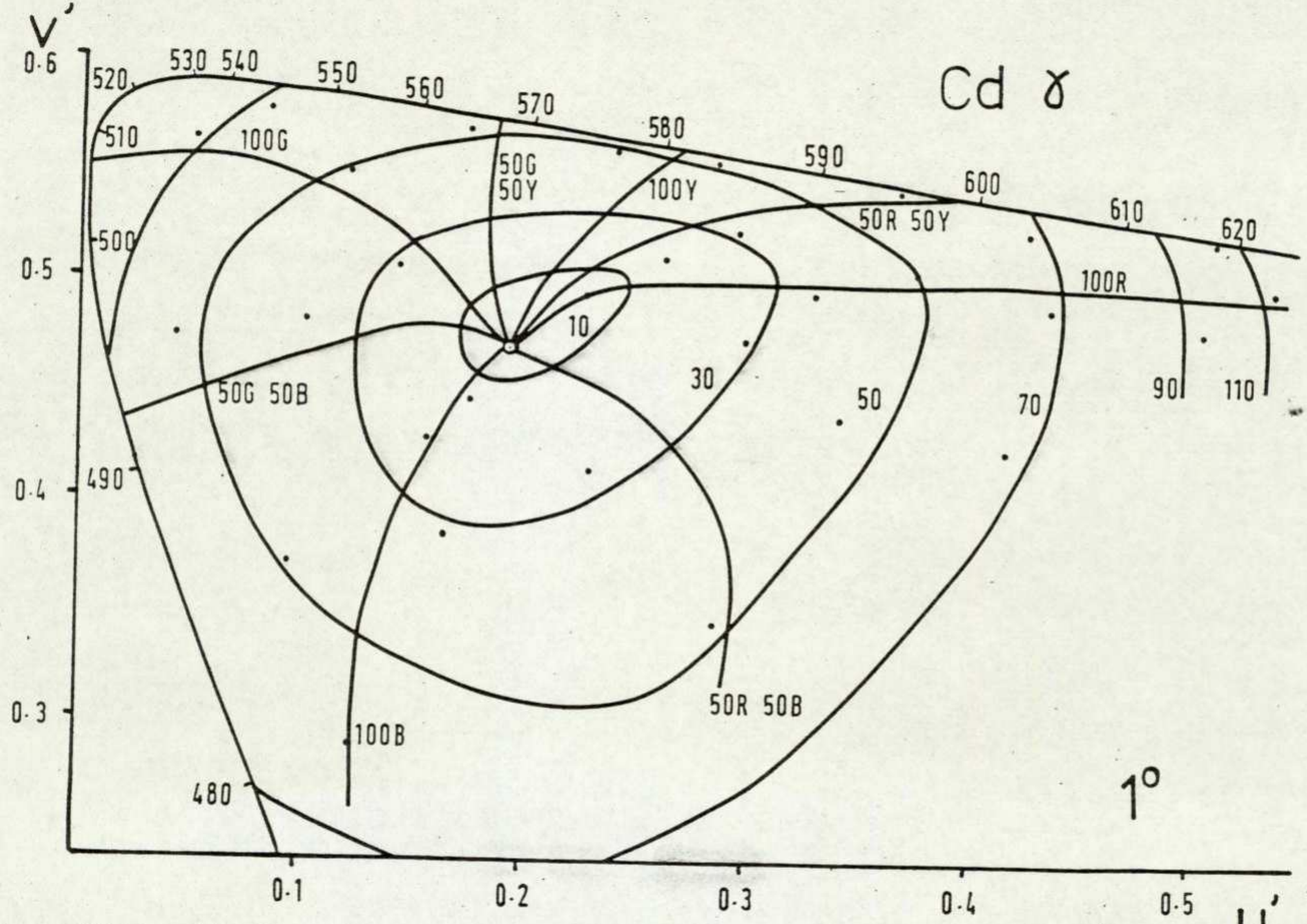


Figure 14. Mean observer results, luminance factor series

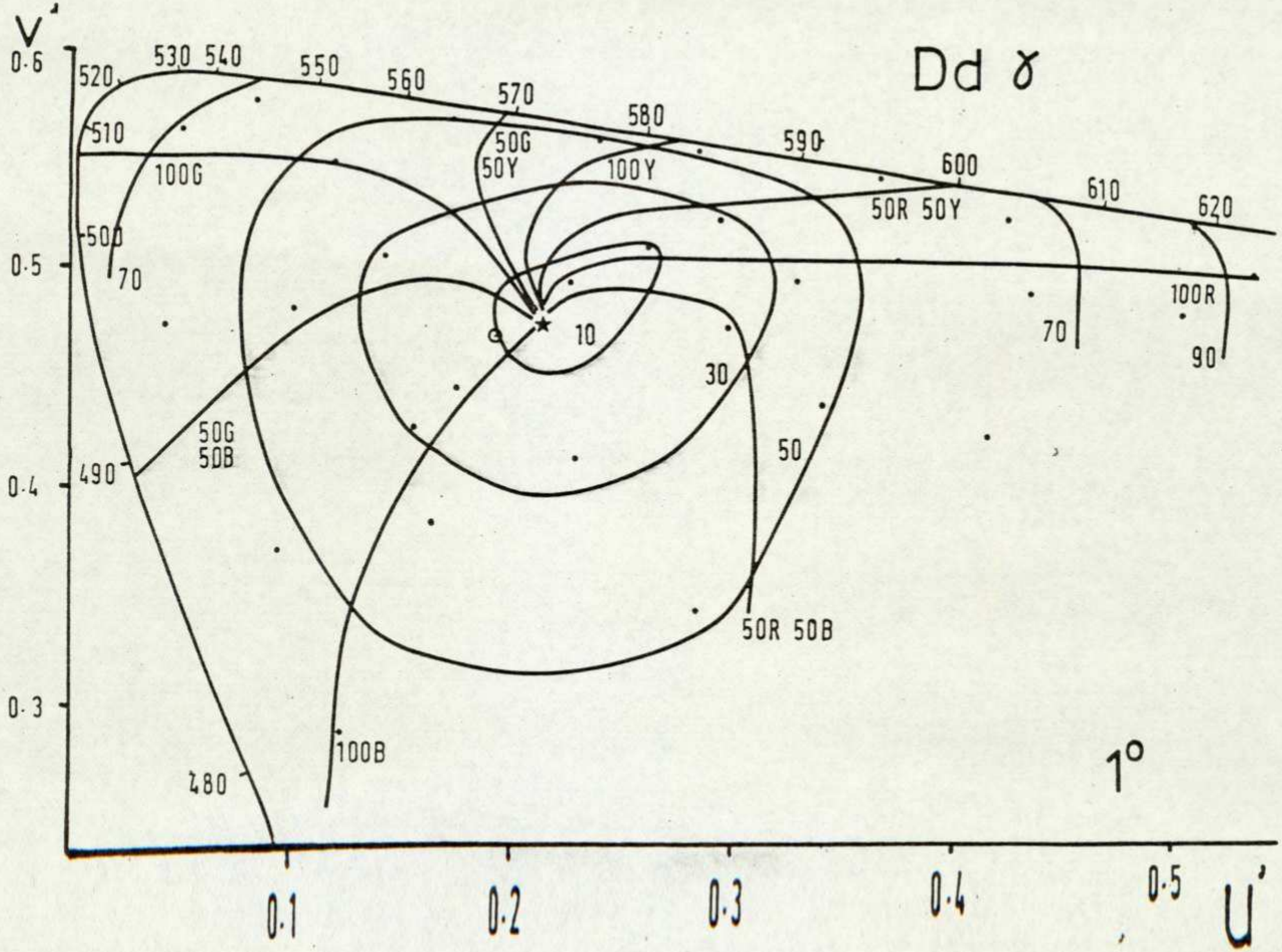


Figure 15. Mean observer results, luminance factor series

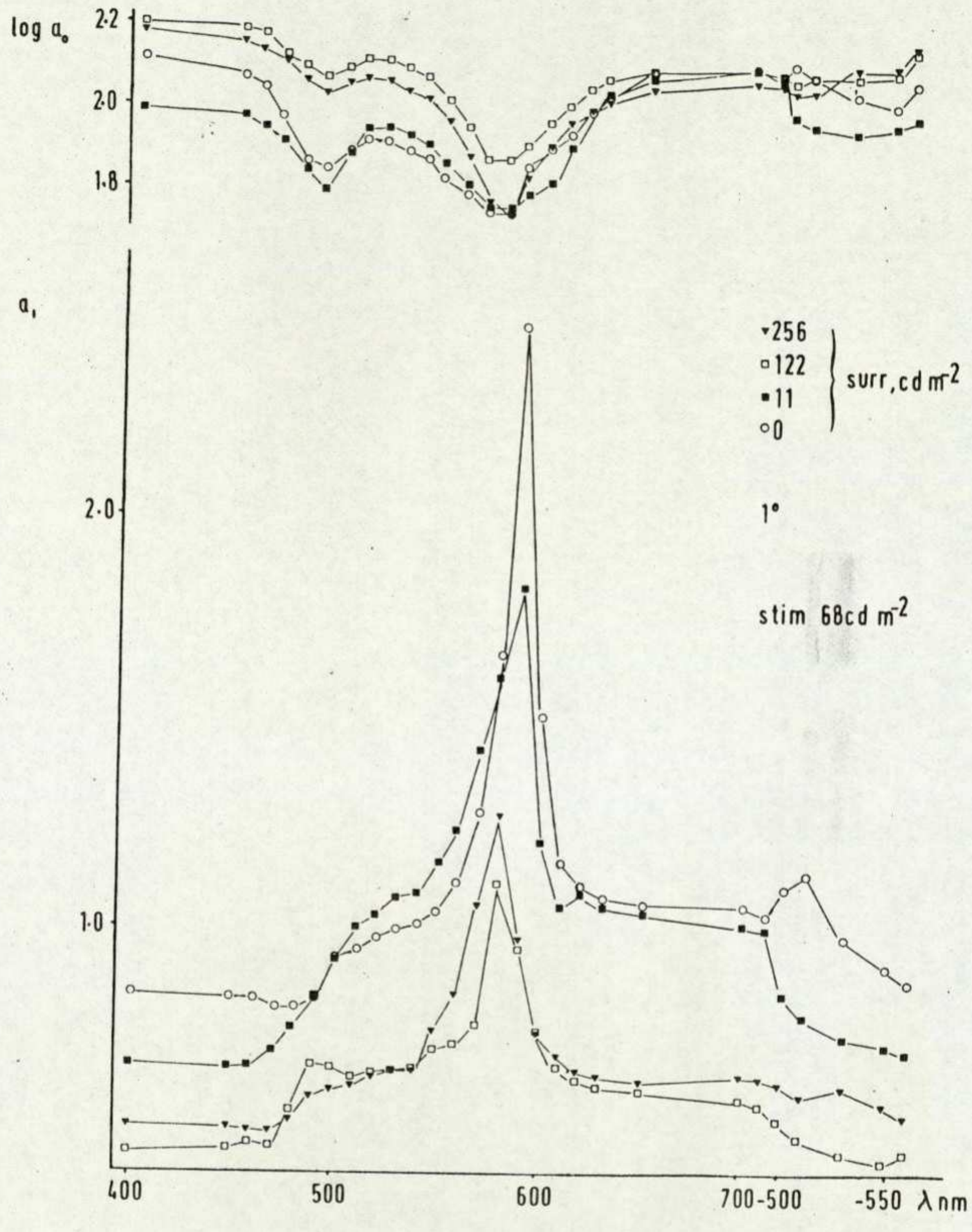


Figure 16. Variation of power-function parameters with wavelength, luminance factor series

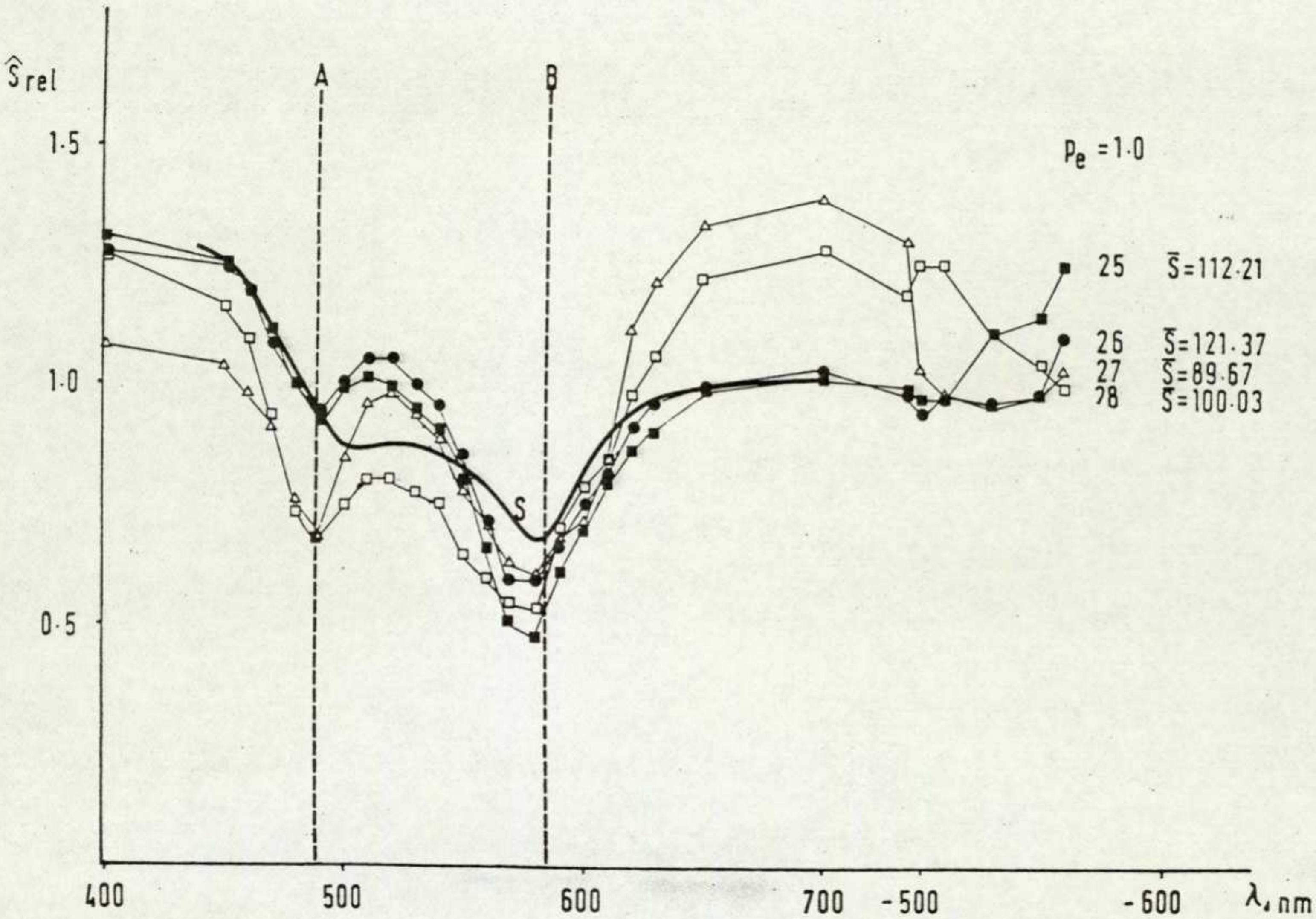


Figure 17. Variation of normalized saturation values with wavelength, luminance factor series

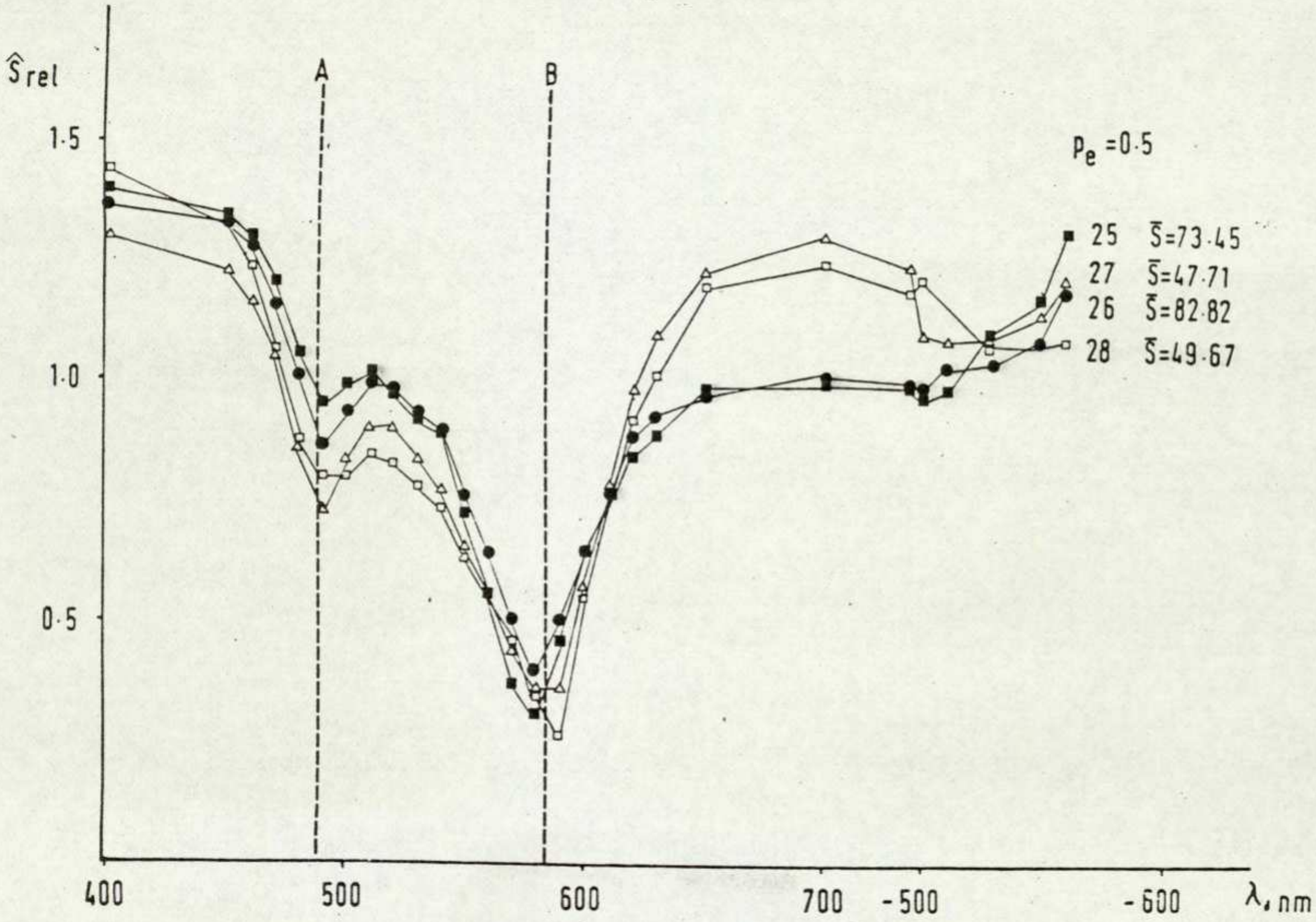


Figure 18. Variation of normalized saturation values with wavelength, luminance factor series

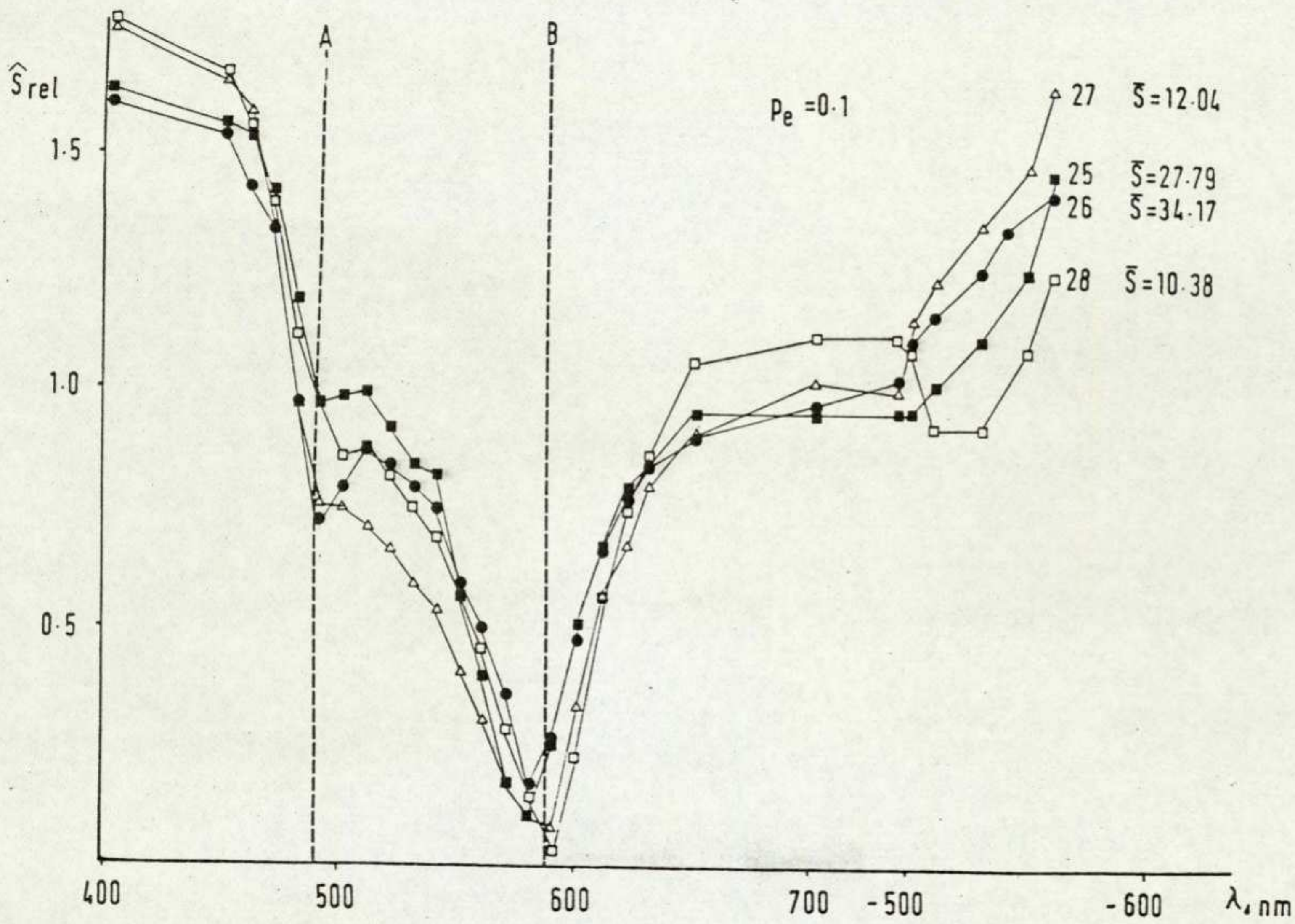


Figure 19. Variation of normalized saturation values with wavelength, luminance factor series

$$S = a_o \, (p_e)^{a_1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (51)$$

We can fit a regression line

$$\log S = a_1 \, (\log p_e) + \log a_o \ldots\ldots\ldots\ldots\ldots\ldots (52)$$

The values of a_1 and $\log a_o$ are given in Figure 16 for all four viewing conditions. It should be noted that in only 3 of the 112 curve fits was the correlation coefficient such that the probability of the results arising by chance was greater than 0.05. In most cases the fits were much better, typically with a 0.01 probability of the results being due to chance. It was therefore decided that this was a valid method.

Data could also be extracted to show the change in shape of saturation curves when the dominant wavelength was altered. This was done for 3 purity levels: 1.0 (spectral saturation curve), 0.5 and 0.1, the values being obtained from the power function parameters in Figure 14. The results are given in Figures 17 - 19. $\hat{S}_{rel}$ denotes normalized saturation: the area under each curve in Figures 17 - 19 is the same, and thus only differences in shape arise. The dashed lines A and B at 490 and 586 nm represent the intersections of the Jameson-Hurvich chromatic response functions. The line labelled S in Figure 17 is the spectral saturation curve for adaptation to an equal-energy illuminant given in Jameson and Hurvich (1956). It will be seen that the latter curve is a reasonably good fit to the "light adapted" spectral saturation curves, especially for $\lambda > 586$ nm and $\lambda < 490$ nm. There is a change in the shape of the curves as the

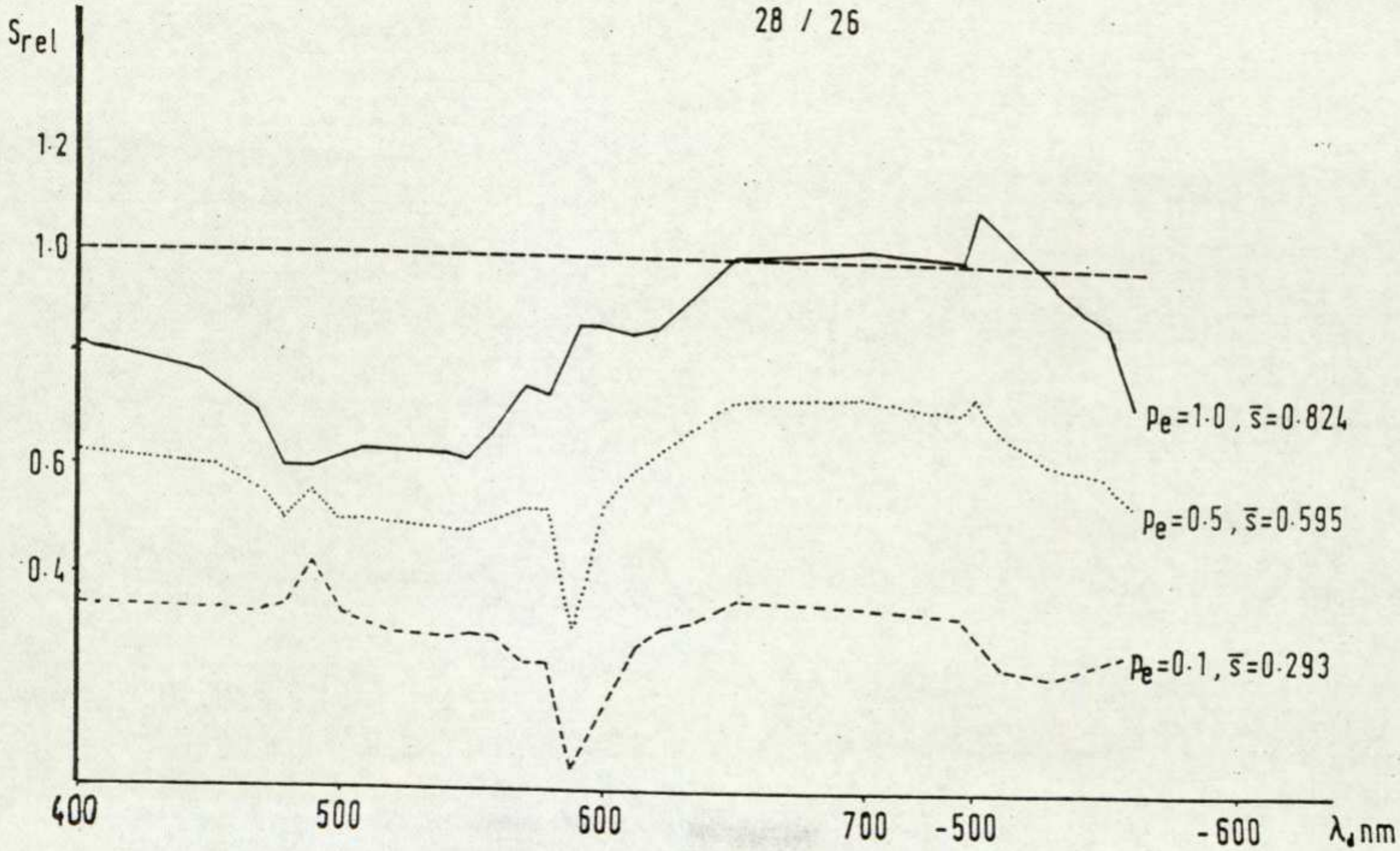


Figure 20. Variation of net saturation shift with wavelength, luminance factor series

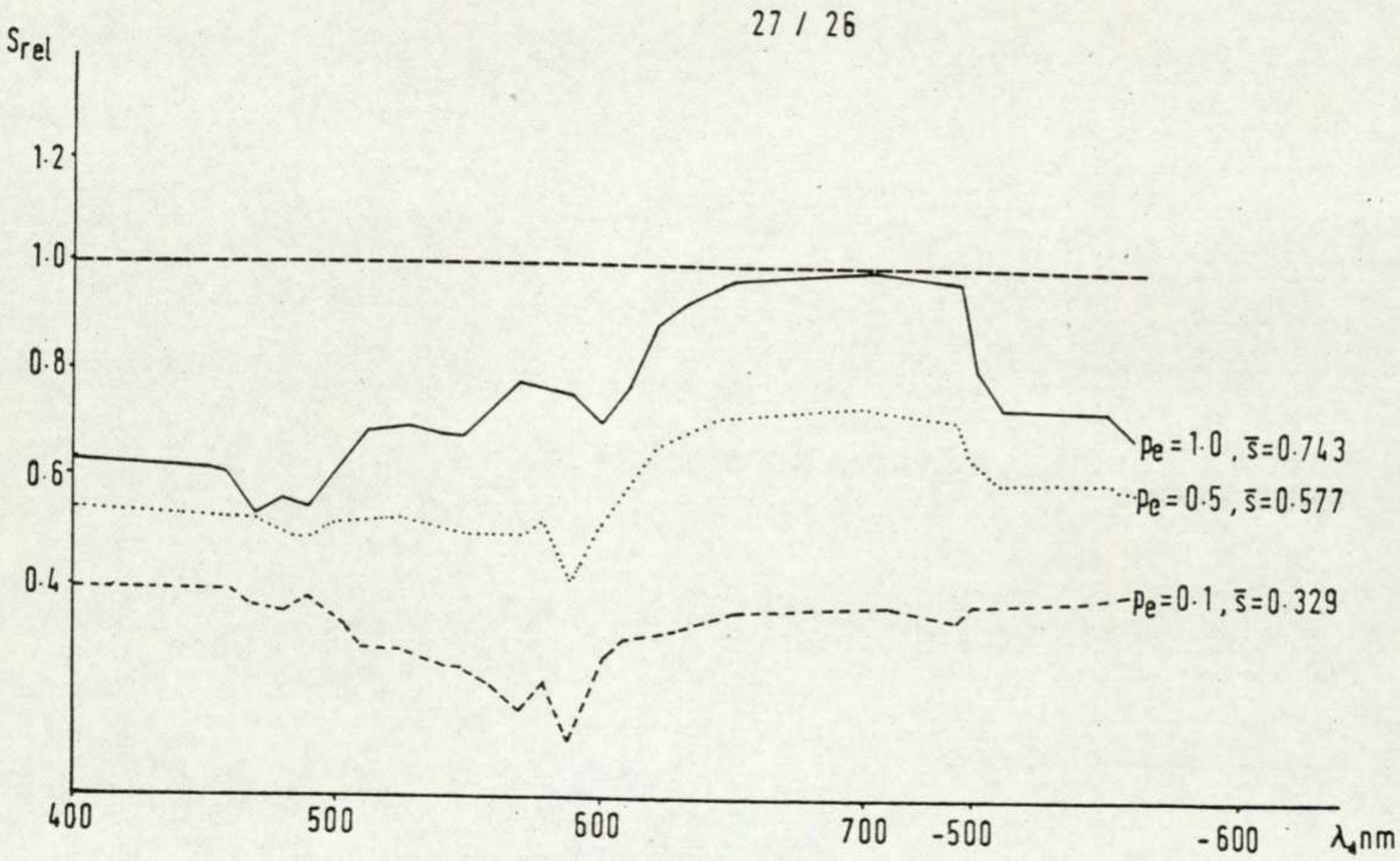


Figure 21. Variation of net saturation shift
with wavelength, luminance factor series

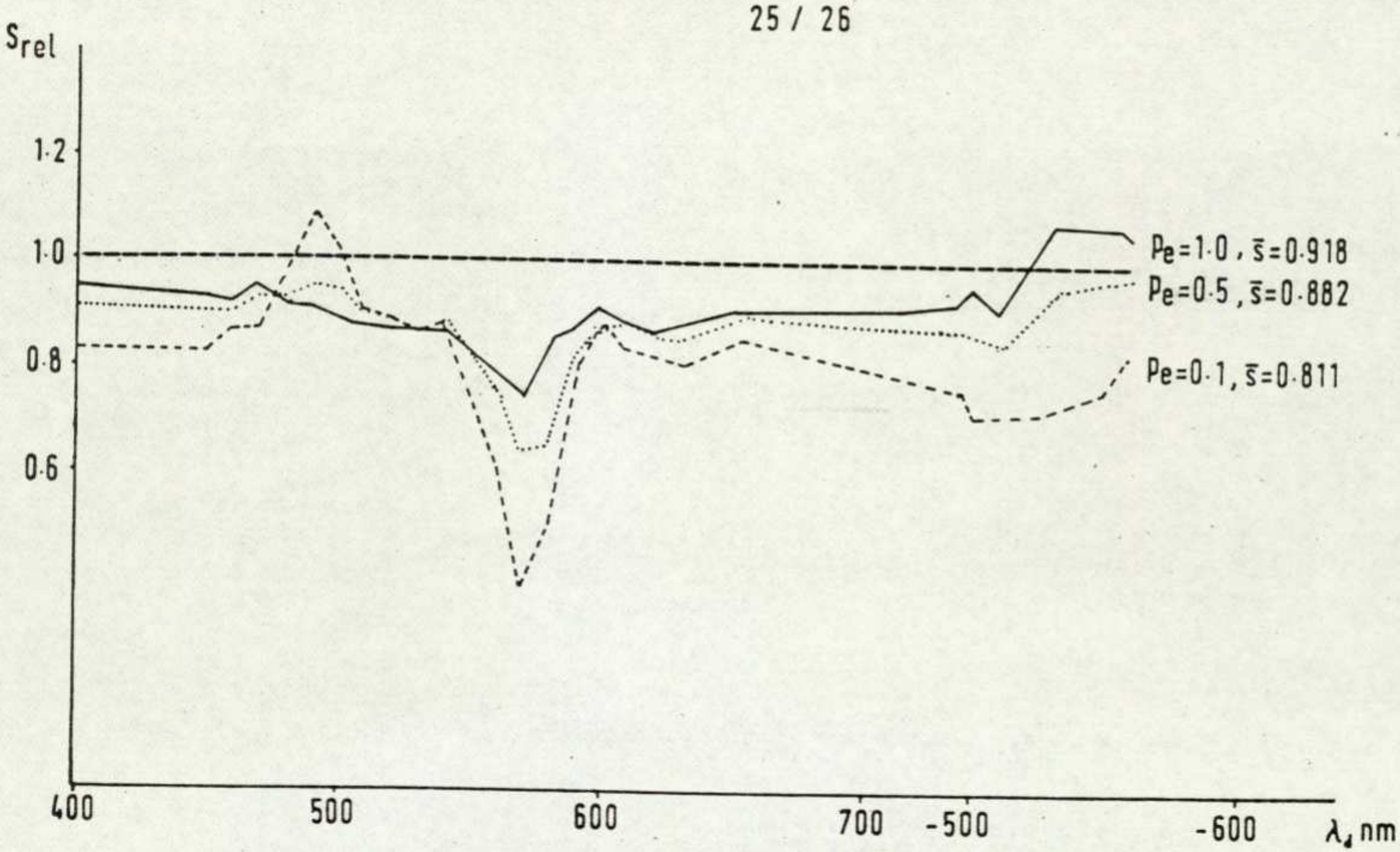


Figure 22. Variation of net saturation shift with wavelength, luminance factor series

purity is decreased with relatively much lower saturations evoked for stimuli with $\lambda_d \approx 580$ nm.

The third data analysis sought to determine how saturation varies with luminance factor. To this end, it was decided to use the saturations evoked in v.c. 26 as a "base-line", obtaining the ratio Srel.

$$\text{Srel} = \left(\frac{S_{(\text{v.c. } 25,27 \text{ or } 28)}}{S_{(\text{v.c. } 26)}} \right)_{\lambda_d, p_e} \quad \ldots\ldots (53)$$

It can be seen that if Srel $<$ 1 there has been a net decrease in saturation, and if Srel $>$ 1 there has been a net increase for that value of λ_d and p_e. These results are shown in Figures 20-22. It will be seen that in almost all cases there has been a net decrease in saturation compared to v.c. 26. The values of $\overline{\text{Srel}}$, the relative mean saturations, are given in Table 12.

Viewing Condition	l_{surr}, cdm^{-2}	$\overline{\text{Srel}}$(pe = 1.0)	$\overline{\text{Srel}}$(pe = 0.5)	$\overline{\text{Srel}}$(pe = 0.1)
25/26	256/122	0.918 $\pm$ 0.014	0.882 $\pm$ 0.015	0.311 $\pm$ 0.027
27/26	11/122	0.743 $\pm$ 0.024	0.577 $\pm$ 0.016	0.329 $\pm$ 0.014
28/26	0/122	0.824 $\pm$ 0.029	0.595 $\pm$ 0.018	0.293 $\pm$ 0.014

TABLE 12

Average Relative Shifts in Saturation Compared to v.c. 26 - Luminance Factor Series

(l_{stim} = 68 cd m^{-2}, 1° field, obs 1 - 7)

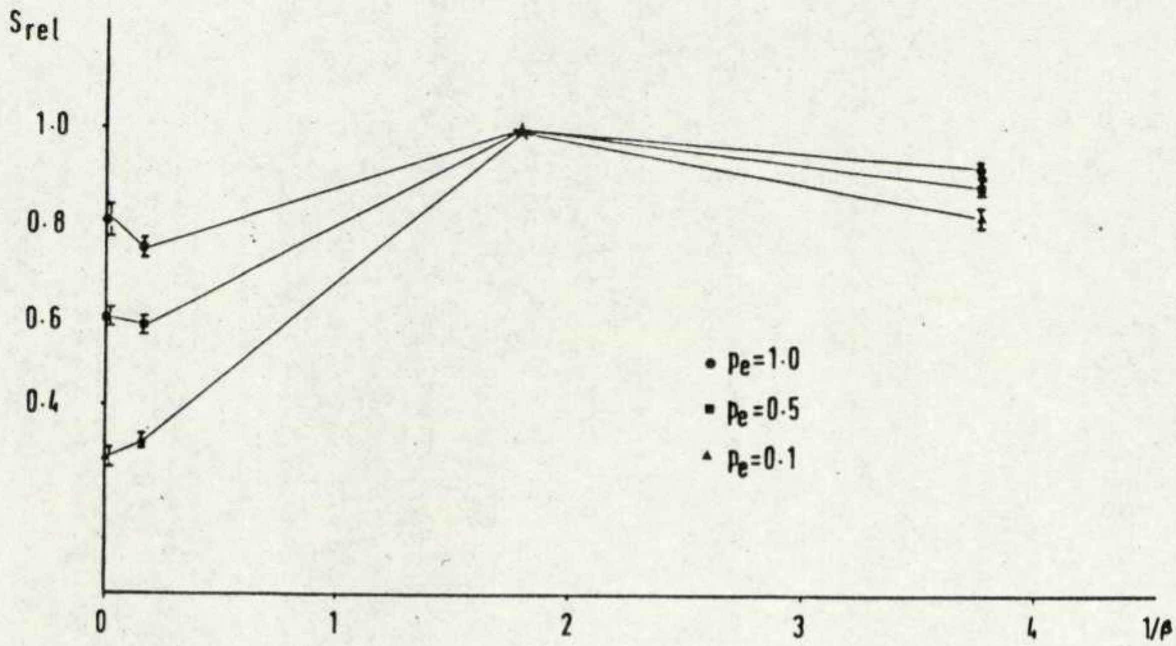


Figure 23. Relative changes in saturation compared with viewing condition 26, luminance factor series

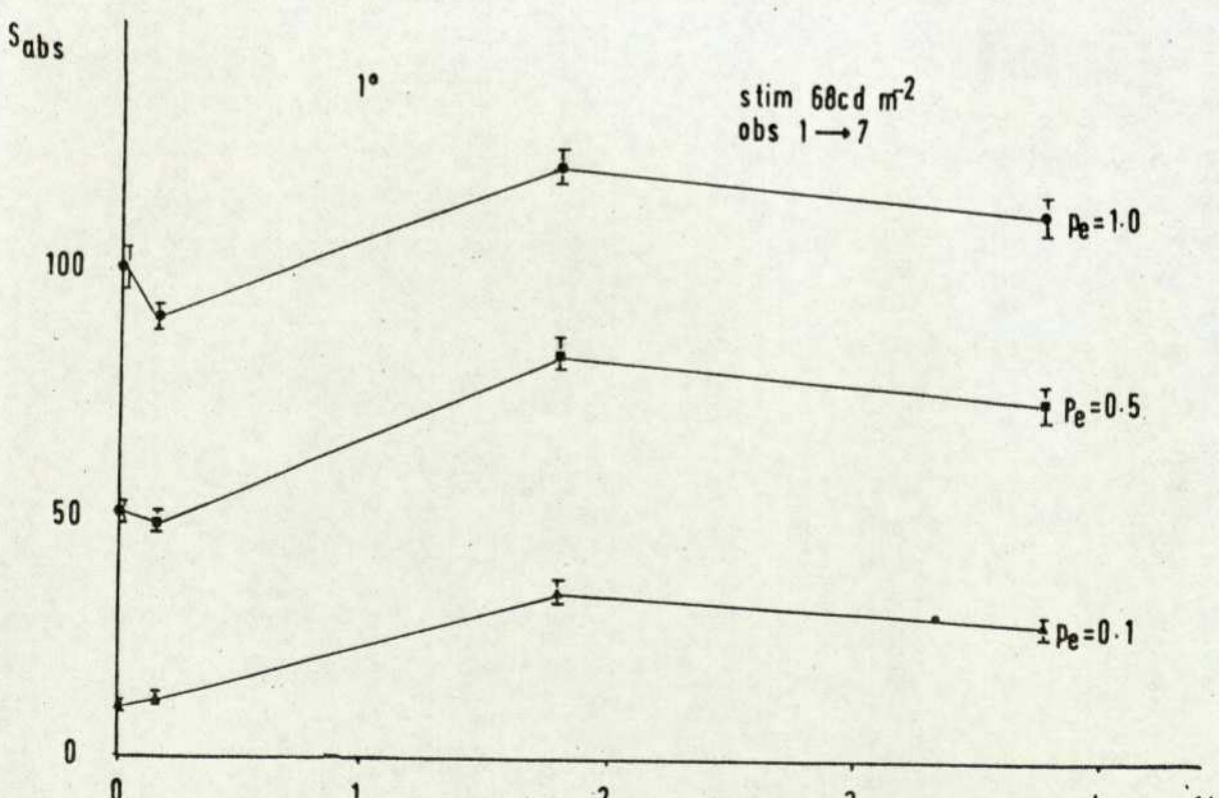


Figure 24. Changes in absolute saturation for luminance factor series

Figure 23 shows these values displayed visually, for the three purity levels. It will be seen that there is a maximum in the saturation-luminance factor function near a value of $1/\beta = 2$, i.e. $\beta = 0.5$.

Finally, we may obtain the variation in absolute saturation. Since

$$(S_{rel})_{d,p_e,} = \frac{(S_{abs})_{d,p_e,\beta}}{I_{p_e,}} \qquad \dots\dots\dots\dots\dots\dots (54)$$

where

$$I_{p_e,\beta} = \int_{\lambda=400}^{\lambda=700} (S_{abs})_{d,p_e,\beta} \cdot d\lambda \qquad \dots\dots\dots\dots\dots\dots (55)$$

we can see that the value of the integral $I_{p_e,\beta}$ can give the average saturation for that viewing condition and purity. Figure 24 shows this variable. Table 13 gives the numerical values. Again the peak at about $\beta = 0.5$ is quite apparent for all three purity levels.

Viewing Condition	l_{surr}, cdm^{-2}	$\overline{Sabs}$(pe = 1.0)	$\overline{Sabs}$(pe = 0.5)	$\overline{Sabs}$(pe = 0.1)
25	256	112.1 ± 4.5	73.3 ± 3.9	27.7 ± 2.1
26	122	121.3 ± 4.0	82.7 ± 3.7	34.1 ± 2.5
27	11	90.3 ± 3.5	47.9 ± 2.6	12.0 ± 1.1
28	0	00.4 ± 4.6	49.8 ± 2.9	10.4 ± 0.9

TABLE 13

Average Absolute Saturation Values Showing Effect of Varying Luminance Factor, 1^o Field

($l_{stim} = 68$ cd m^{-2}, 1^ofield, obs 1-7)

All the above discussion referred to the main "luminance factor" series, for v.c. 25-28. All seven observers participated. It should be noted that individual responses are not given because the nature of the saturation normalization process is such that individual differences are removed. Observer consistency will be discussed in Section 4.4.

Several other investigations were carried out with three, or fewer, observers participating. One was a repetition of the above series using a 10° stimulus instead of the 1° stimulus (v.c.19, 20, 21 and 22; observers 3, 5 and 7). Here hue/saturation grids were deemed unnecessary. Instead, saturations alone were compared by performing a linear regression of saturations in v.c. 20 against 19, 21 and 22, as shown in equation (56)

$$S_{(\text{v.c. } 19,21 \text{ or } 22)} = m.S_{(\text{v.c } 20)} + c \qquad \text{.......... (56)}$$

Values of m and c were obtained by linear regression, and this enabled saturation changes to be monitored. Figure 25 shows the results obtained. It should be noticed that there is no evidence of a peak around $\beta = 0.5$ for the 10° stimulus, unlike the 1° stimulus. Table 14 gives details of the linear regression. S50 and S100 refer to estimates of the saturations of stimuli in the other viewing condition compared to stimuli having saturations of 50 and 100 respectively in the reference viewing condition (in this case v.c. 20).

Viewing Condition	l_{surr}, cd m^{-2}	m	c	r^2	S50	S100	σ_S
19/20	256/122	1.030±0.060	-0.41±4.56	0.913	51.07	102.56	7.46
21/20	11/122	1.089±0.049	-23.11±3.74	0.946	31.35	85.80	6.12
22/20	0/122	0.778±0.045	-5.21±3.42	0.914	33.70	72.61	5.60

TABLE 14

Effect of Luminance Factor 10 ° Field

(l_{stim}=68cd m^{-2}, 10°, obs 3,5,7)

Another series was performed for the same surround luminances but a much higher stimulus luminance of 615 cdm^{-2}, for observers 1, 6 and 7 (v.c. 7, 8, 9, 10). The results are shown in Figure 26. Table 15 gives details of the linear regression operation here. Here, again, there is no indication of a maximum. Rather, there is a strong indication that chromatic stimuli having a luminance higher than their surround are still affected by changes in surround luminance.

Viewing Condition	l_{surr}, cd m^{-2}	m	c	r^2	S20	S50	S100	σ_S
7/8	256/122	1.107±0.051	0.63±2.98	0.945	22.78	56.00	111.37	7.68
9/8	11/122	0.839±0.034	0.46±1.97	0.957	17.25	42.44	84.41	5.08
10/8	0/122	0.867±0.052	-2.71±3.07	0.907	14.63	40.64	83.98	7.93

TABLE 15

Effect of Luminance Factor 1° Field

(l_{stim}=615 cd m^{-2},1°, obs 1,6,7)

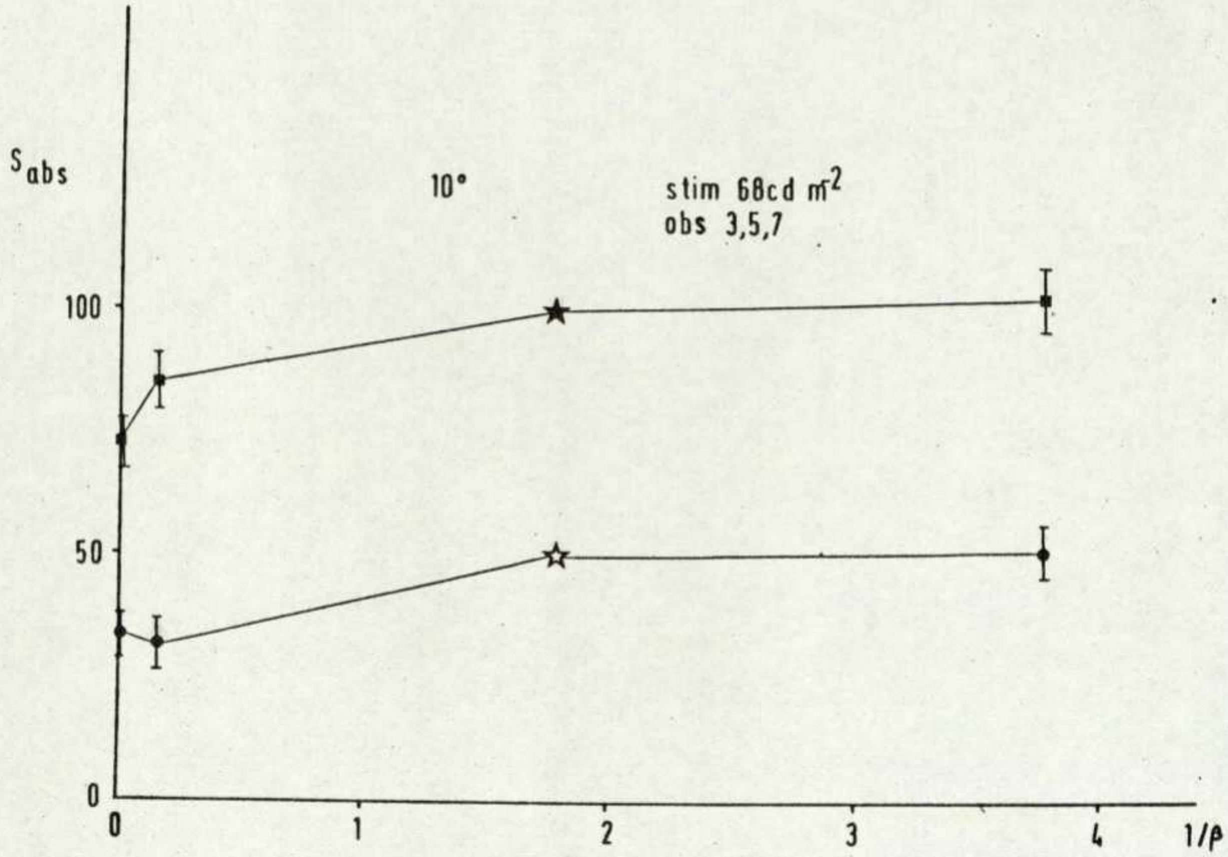


Figure 25. Changes in absolute saturation with luminance factor for 10^{o} field

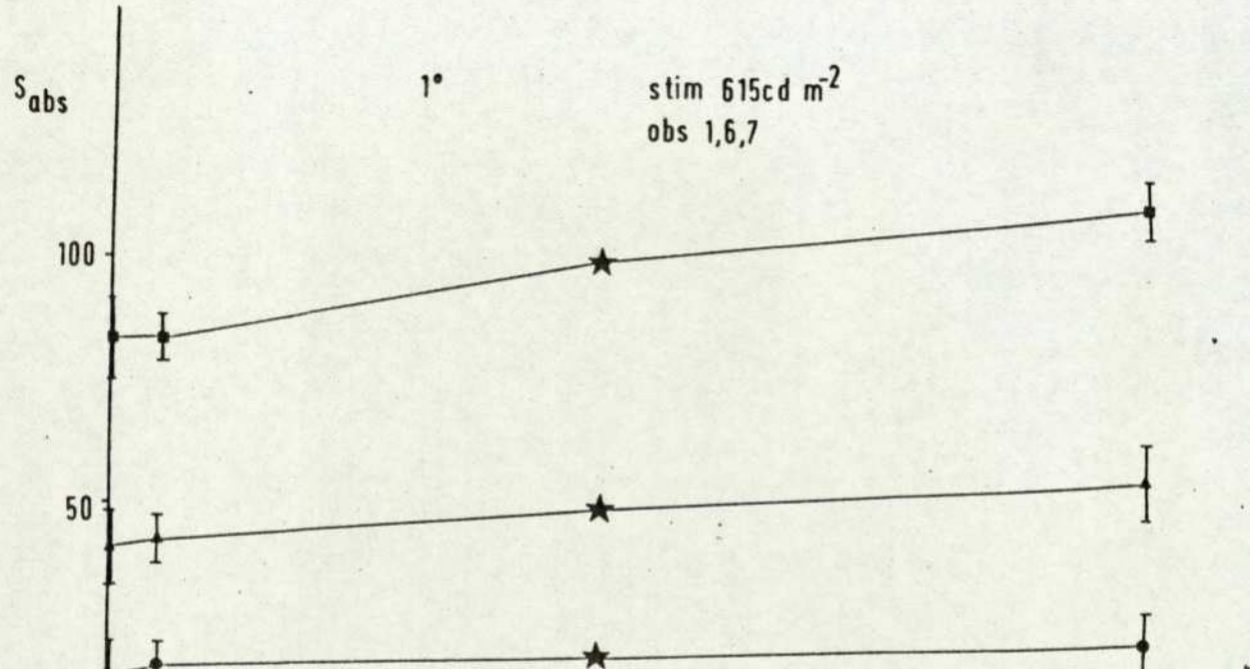


Figure 26. Changes in absolute saturation with luminance factor for unrelated colours

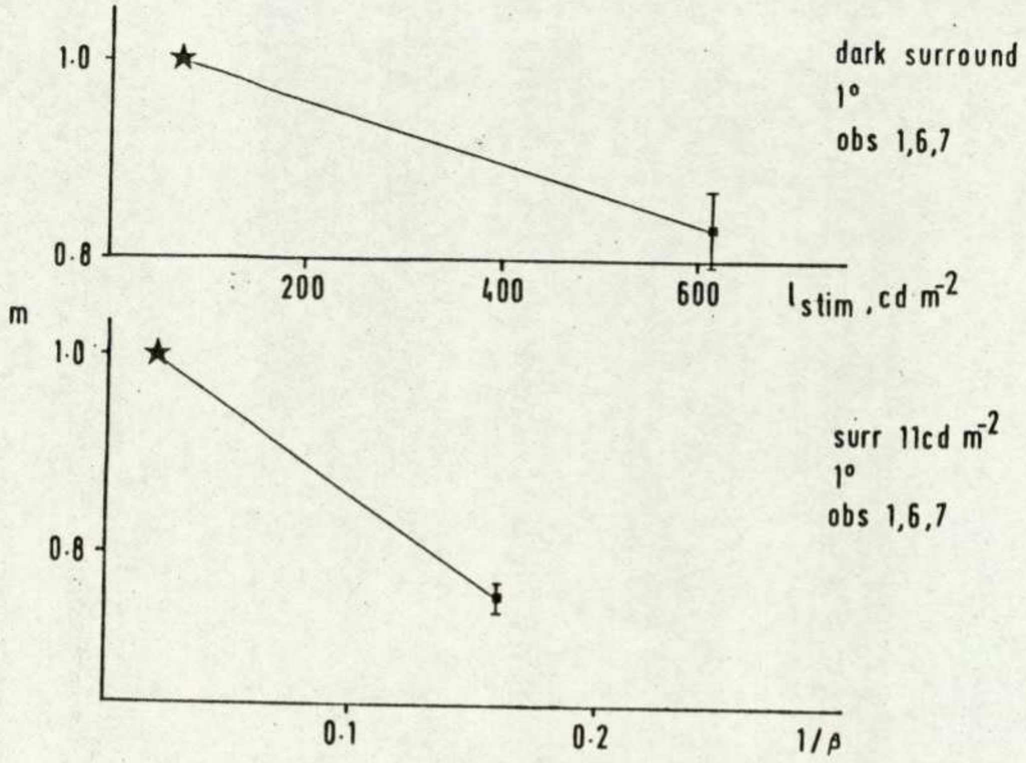


Figure 27. Changes in absolute saturation with stimulus luminance, with dark surrounds

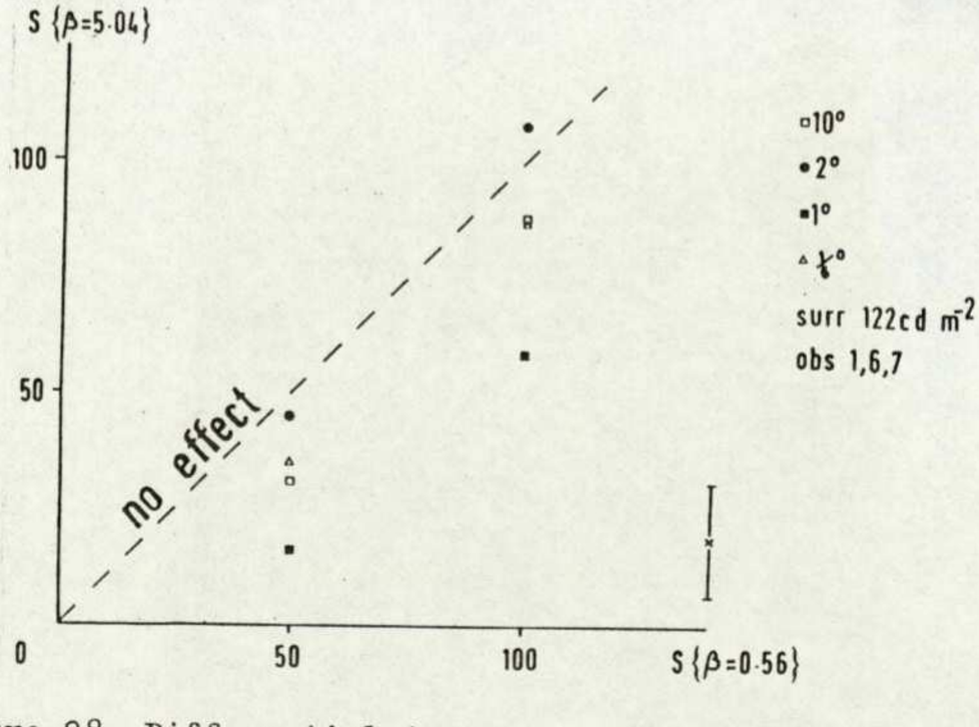


Figure 28. Differential induction effects dependent on stimulus subtense

By comparing the saturations in v.c. 10 and 28 it is possible to find how an increase in the stimulus luminance from 68 to 615 cdm^{-2} with a dark surround affects saturation. Figure 27 shows this (top graph), as well as a comparison of v.c. 9 and v.c. 27 (with a surround luminance of 11 cdm^{-2}). Table 16 lists the numerical values. It will be noticed that in both cases the saturation is significantly higher when the stimulus is at a lower luminance.

Viewing Condition	l_{surr} cd m^{-2}	l_{stim} cd m^{-2}	m	c	r^2	S20	S50	S100	σ_S
10/28	0	615/68	0.834 ± 0.041	0.77 ± 2.35	0.937	17.45	42.48	84.20	6.53
9/27	11	615/68	0.761 ± 0.029	3.05 ± 1.78	0.962	18.28	41.13	79.20	4.81

TABLE 16

Effect of Stimulus Luminance with Dark/Dim Surround 1° Field

(obs. 1, 6, 7)

Finally, it is possible to obtain data on the "effectiveness" of surround luminance in affecting saturation for four field sizes (10°, 2°, 1° and $1/6^\circ$). Figure 28 represents average saturation shifts for a 122 cdm^{-2} surround and stimuli having luminances of 615 cdm^{-2} and 68 cdm^{-2} respectively. The mean standard error on each data point is also shown. It should be noticed that the 1° stimulus is most affected by the change in surround luminance, with all other stimuli being affected to a lesser extent. Table 17 gives the results of the linear regression.

Viewing Condition	l_{stim} cd m^{-2}	a^o	m	c	r^2	S50	S100	σ_S
2/20	615/68	10^o	1.125	-25.90	0.925	30.29	86.47	9.59
6/23	615/68	2^o	1.252	-17.75	0.849	44.87	107.50	12.57
8/26	615/68	1^o	0.851	-26.43	0.701	16.10	58.64	15.65
11/29	615/68	$1/6^o$	1.041	-17.21	0.846	34.83	86.86	9.65

TABLE 17

Effect of Luminance Factor, for Different Values of Stimulus Subtense

(l_{surr} = 122 cd m^{-2}, obs 1,6,7)

In conclusion, we can point out the most important findings within this section. It has been shown that the relative spectral saturation curve (Figure 17) has two basic shapes: one, with a lower response around 700 nm and a higher one at 520 nm, for conditions of light-adaptation, and another (higher at 700 nm and lower at 520 nm) for dark adaptation. The light-adapted curve shows a reasonable goodness of fit to the Jameson-Hurvich theoretical spectral saturation curve. It has also been shown that saturation is at a maximum when the luminance factor β is approximately 0.5. This lies close to the no-grey-content condition. It has also been shown (Figure 28) that the effect of the surround seems to be greatest for 1^o stimuli. 10^o stimuli show a much reduced dependence on surround luminance (Figure 25), and it is also evident that the surround still has a small effect on the saturation of stimuli much brighter than the surround (Figure 26). For dark surrounds, it has been shown that if the stimulus luminance is increased, saturation is lowered (Figure 27).

A discussion of the implications of these results will be found in Section 5. It is not proposed to analyse the lightness/brightness data, since the effect of luminance factor on brightness is better documented. Treatment of hue variation will be found in Section 4.3.

4.3 Effect of Stimulus Subtense on Appearance

The second main objective in the experimental investigation was the study of the effect which variations in the angular subtense of the chromatic test stimuli has on colour appearance. Table 18 gives details of the viewing condition parameters.

The "main series" in this case consisted of four viewing conditions (v.c. 20, 23, 26, 29). These all had $l_{stim} = 68\ cdm^{-2}$, $l_{surr} = 122\ cdm^{-2}$, and the subtense of the test stimulus was 10°, 2°, 1° and $1/6^{\circ}$ respectively. The data were analysed in the same manner as the luminance factor data analysis described in Section 4.2. Firstly, loci of constant hue and saturation (for the mean observer) are given in Figures 29-32. (Note that Figure 31 and Figure 13 are identical; the figure is reproduced here for convenience).

Secondly, power functions were fitted according to equations 51 and 52. The values of a_1 and $\log a_o$ are given in Figure 33. A comparison with Figure 16 reveals that there is comparatively less variation in the exponent a_1 but considerably more variation between viewing conditions of the log. multiplier $\log a_o$.

Furthermore, the same treatment could be applied as in Section 4.2,

V.C.	α°	Surr cdm^{-2}	Stim cdm^{-2}	β	$\frac{1}{\beta}$	Munsell Value
5	2°	256	615	2.40	0.42	
7	1°	256	615	2.40	0.42	
2	10°	122	615	5.04	0.20	
6	2°	122	615	5.04	0.20	
8	1°	122	615	5.04	0.20	
11	$1/6^{\circ}$	122	615	5.04	0.20	
19	10°	256	68	0.27	3.76	6.7
25	1°	256	68	0.27	3.76	6.7
20*	10°	122	68	0.56	1.79	7.8
23*	2°	122	68	0.56	1.79	7.8
26*	1°	122	68	0.56	1.79	7.8
29*	$1/6^{\circ}$	122	68	0.56	1.79	7.8
21	10°	11	68	6.18	0.16	
24	2°	11	68	6.18	0.16	
27	1°	11	68	6.18	0.16	
32	10°	122	18	0.15	6.78	4.5
33	2°	122	18	0.15	6.78	4.5
34	1°	122	18	0.15	6.78	4.5
35	$1/6^{\circ}$	122	18	0.15	6.78	4.5

TABLE 18

Stimulus Subtense Viewing Conditions

* Main series (observers 1 - 7)

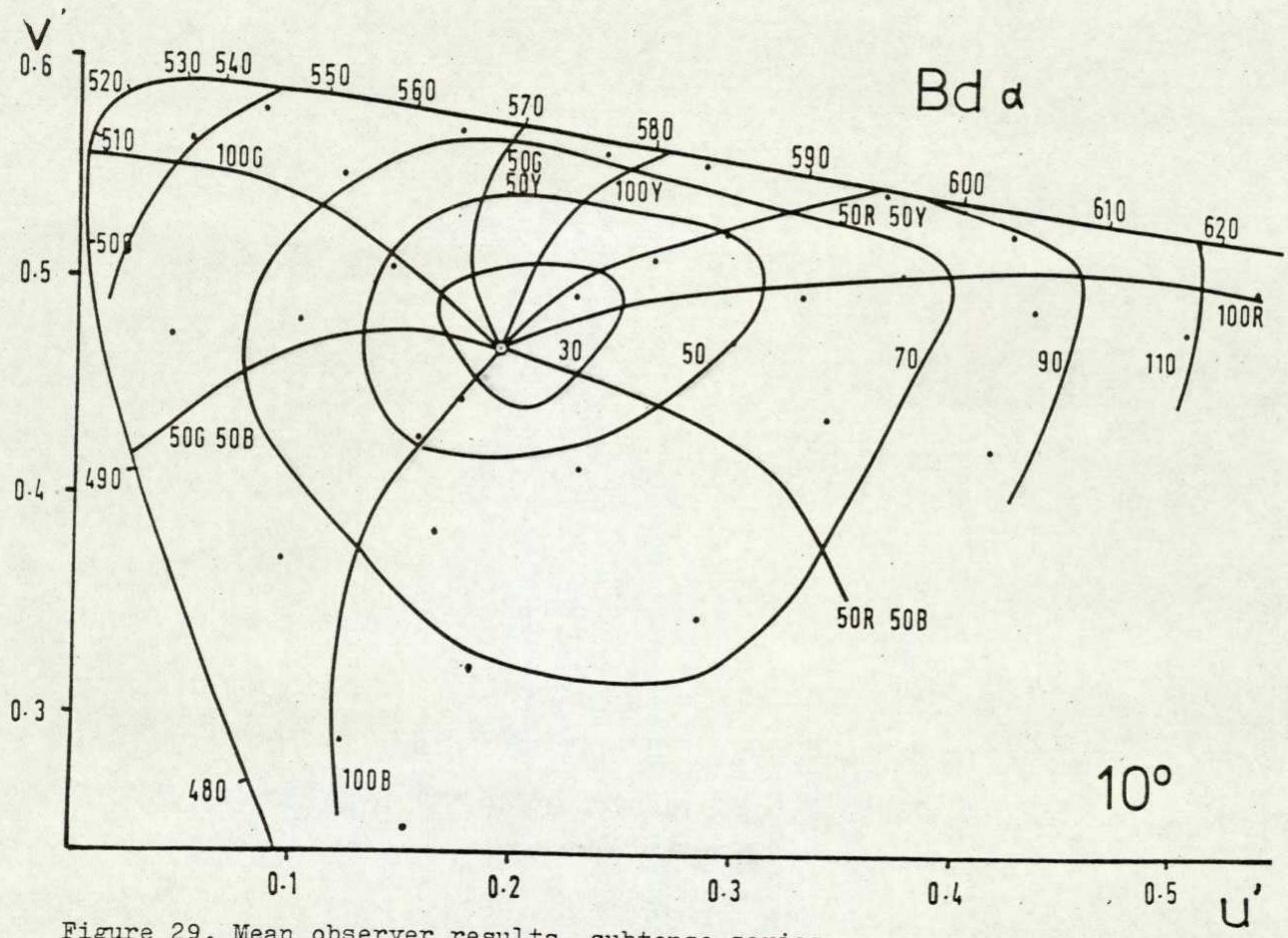


Figure 29. Mean observer results, subtense series, 10° field

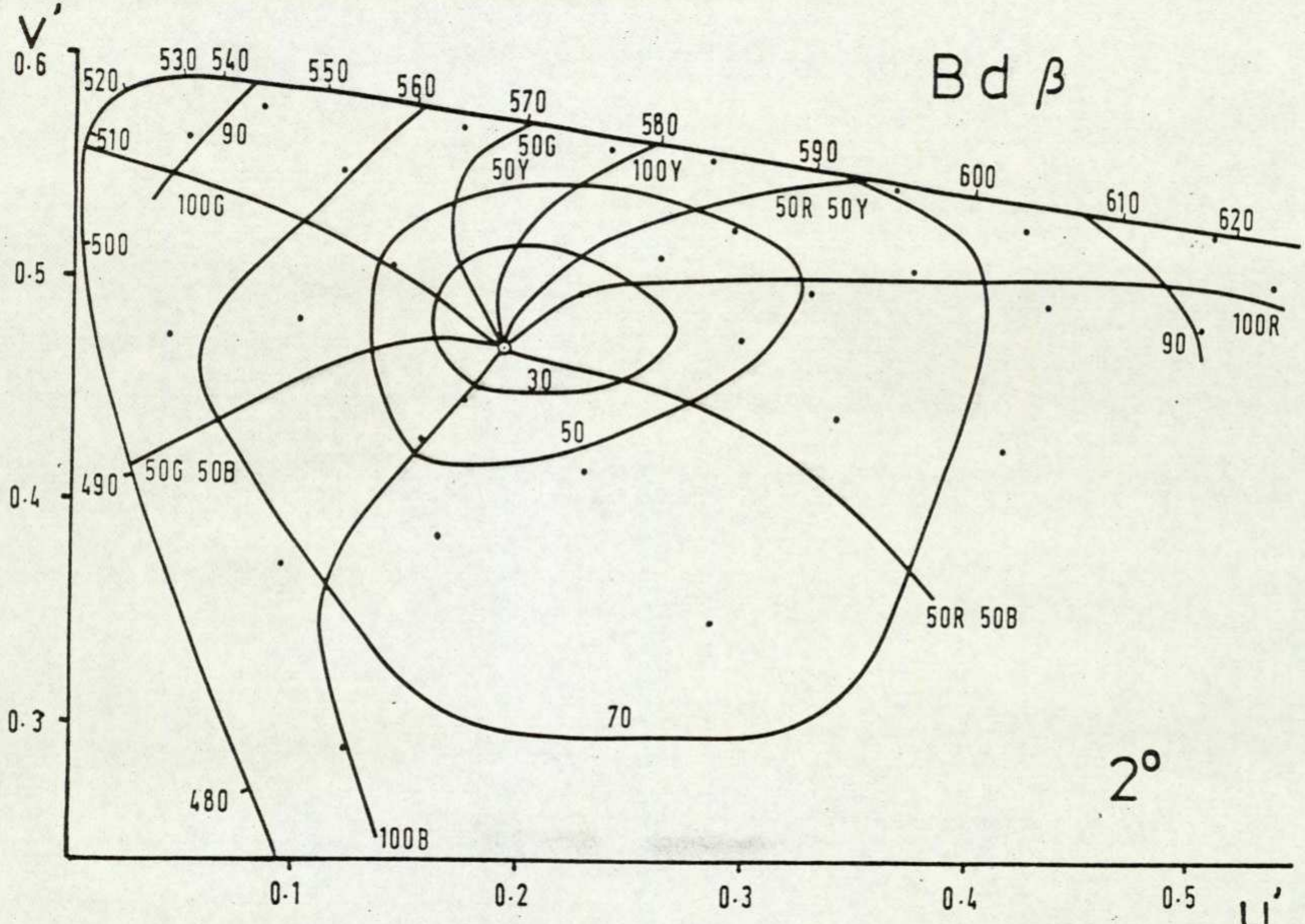


Figure 30. Mean observer results, subtense series, 2° field

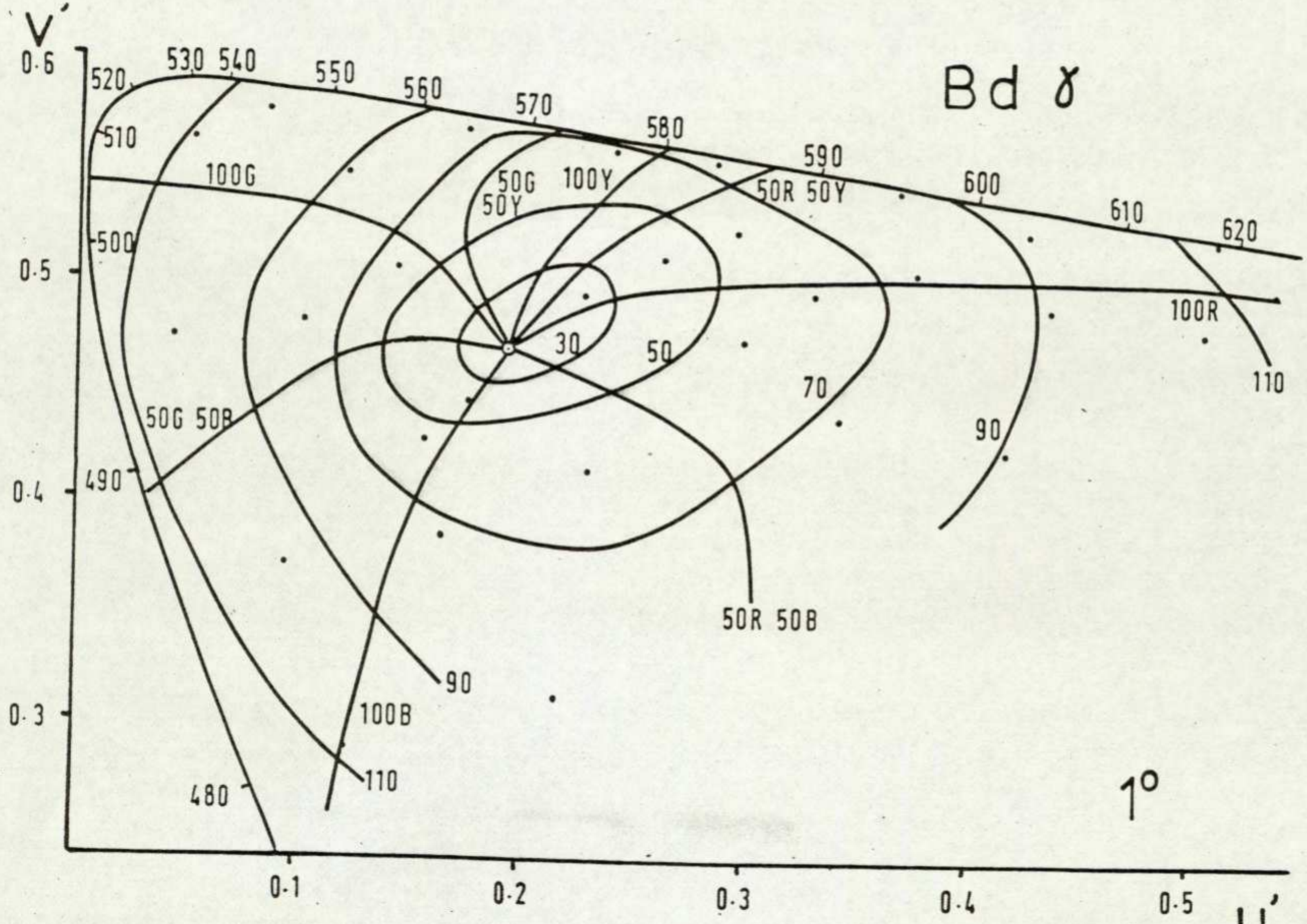


Figure 31. Mean observer results, subtense series, 1° field

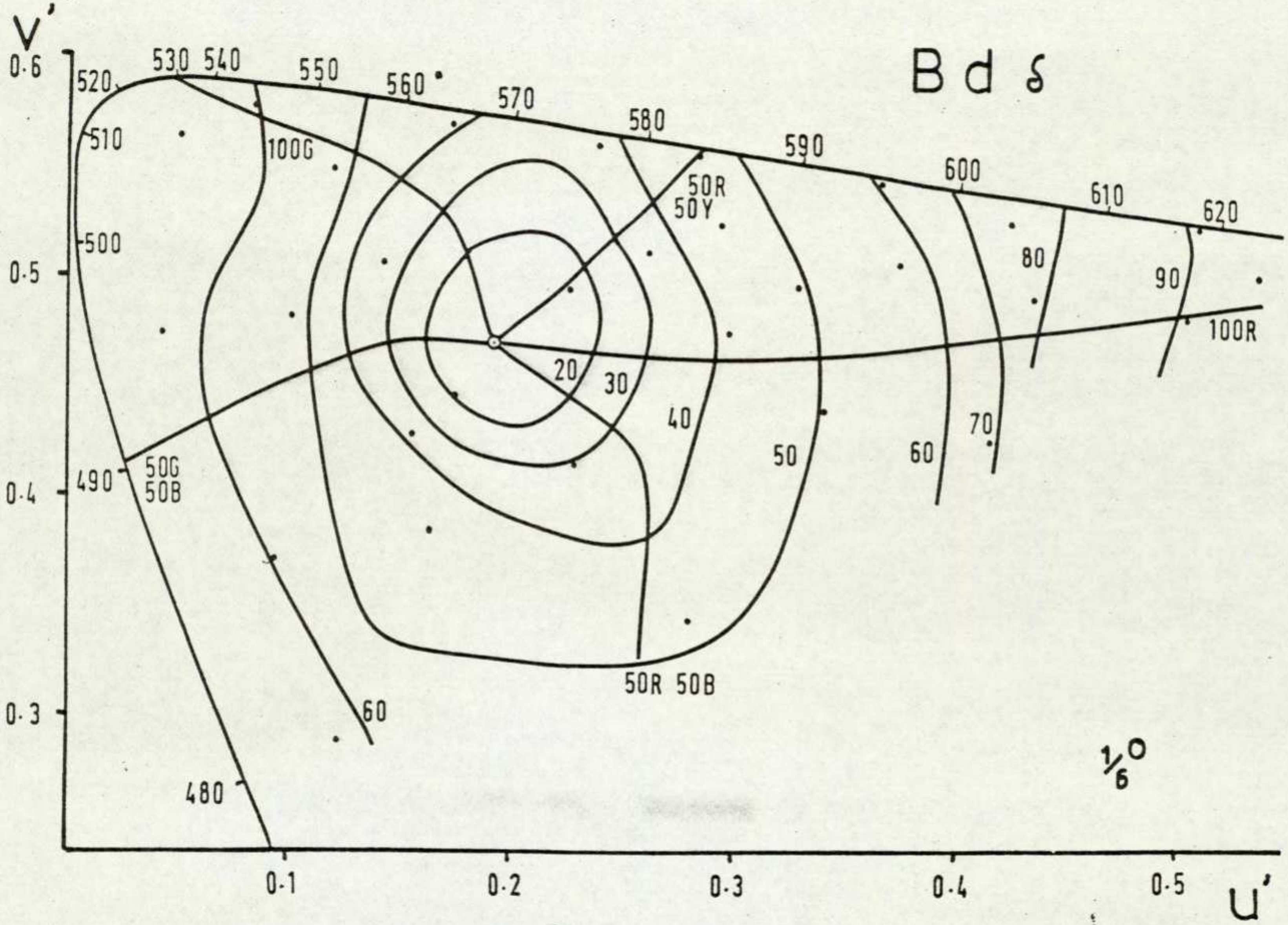


Figure 32. Mean observer results, subtense series,
10 arcmin field

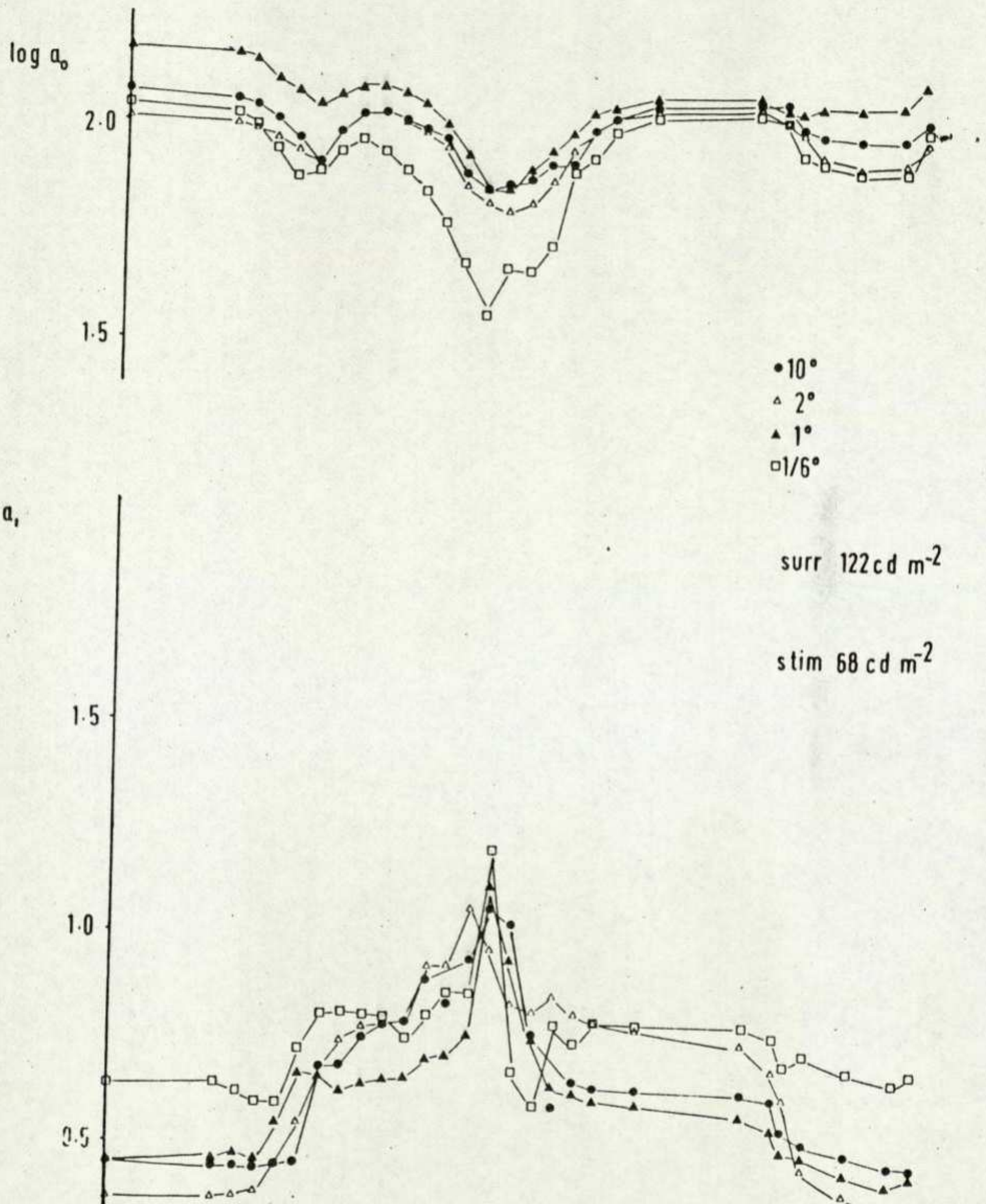


Figure 33. Variation of power-function parameters with wavelength, subtense series

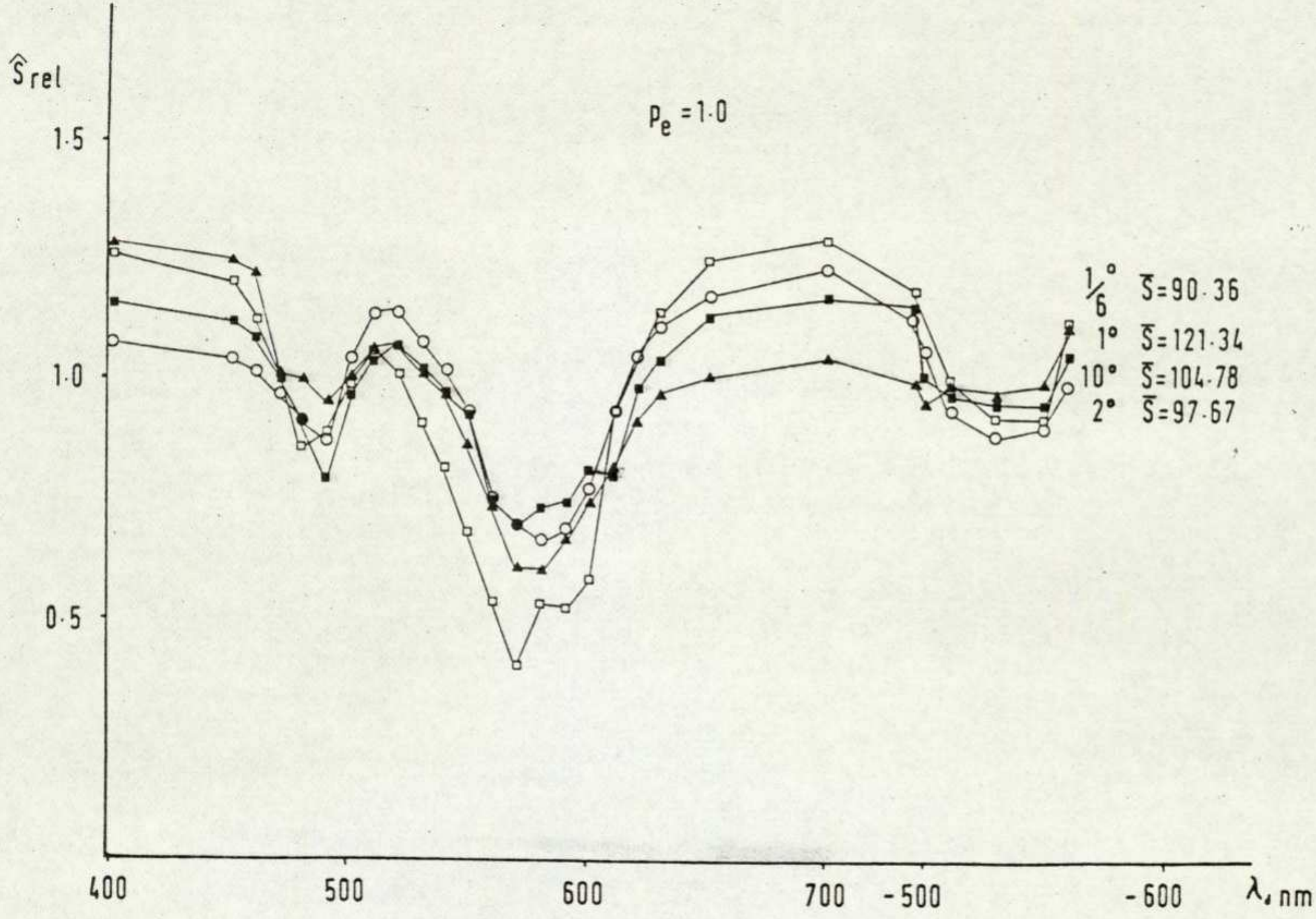


Figure 34. Variation of normalized saturation values with wavelength, subtense series

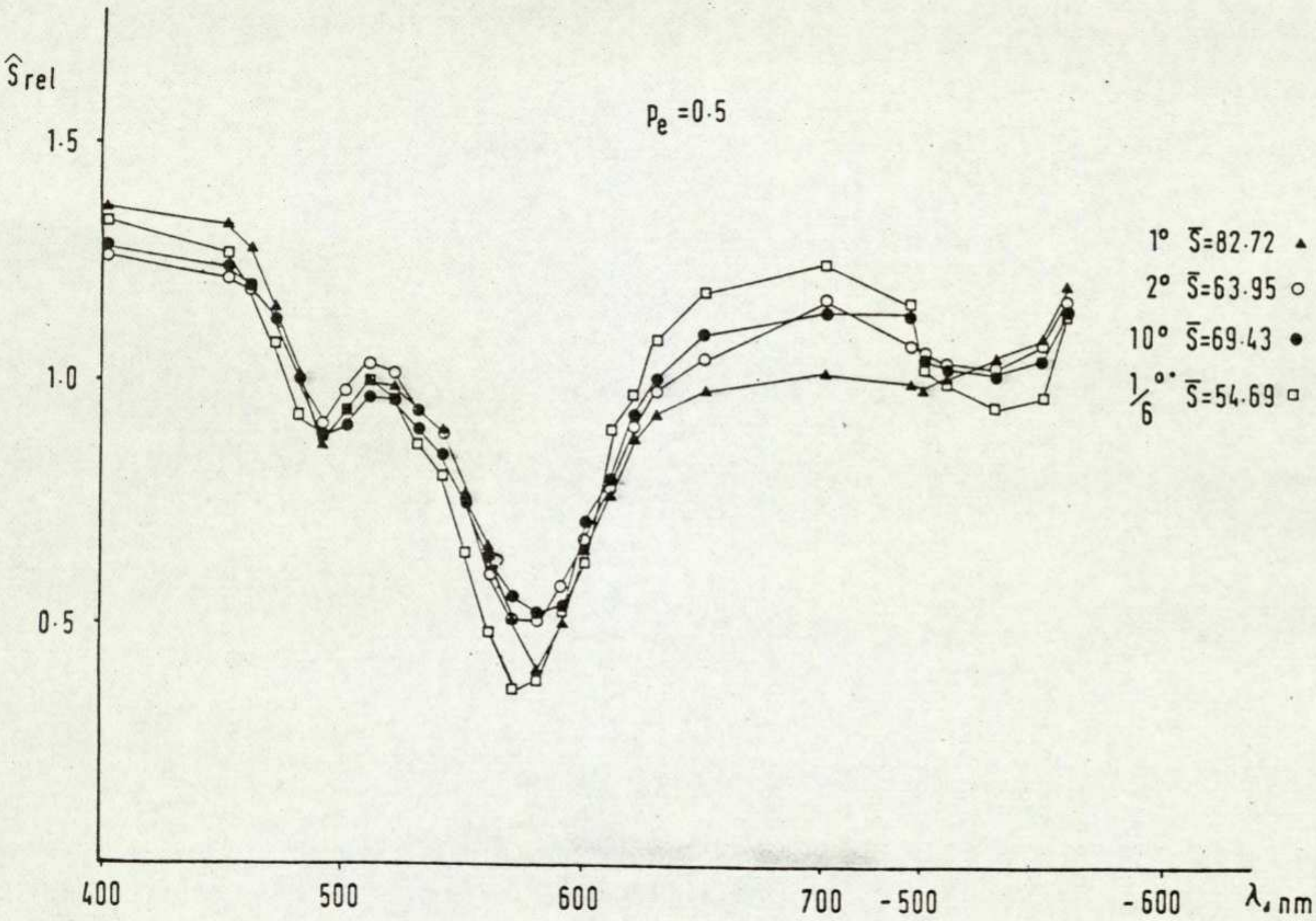


Figure 35. Variation of normalized saturation values with wavelength, subtense series

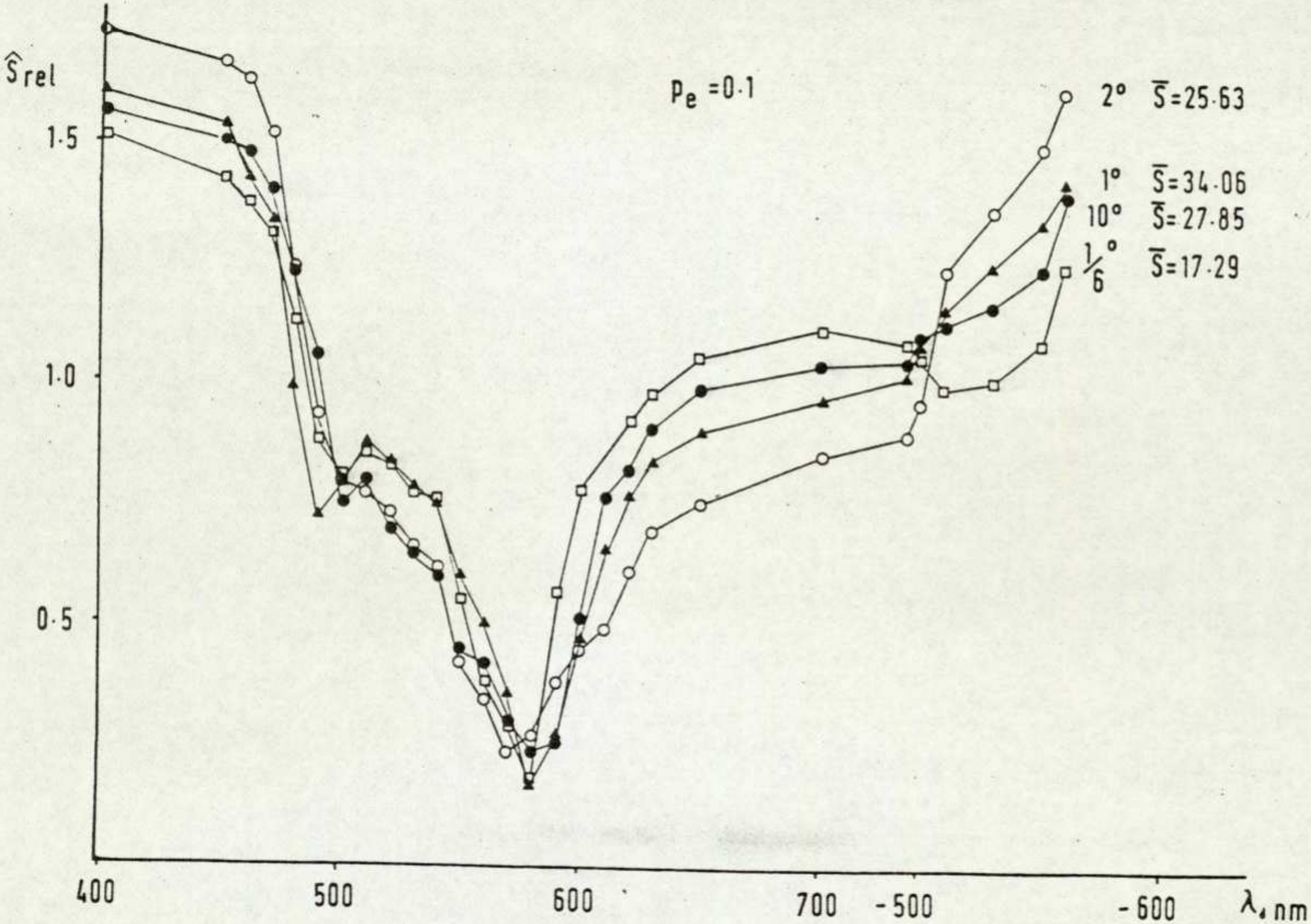


Figure 36. Variation of normalized saturation values with wavelength, subtense series

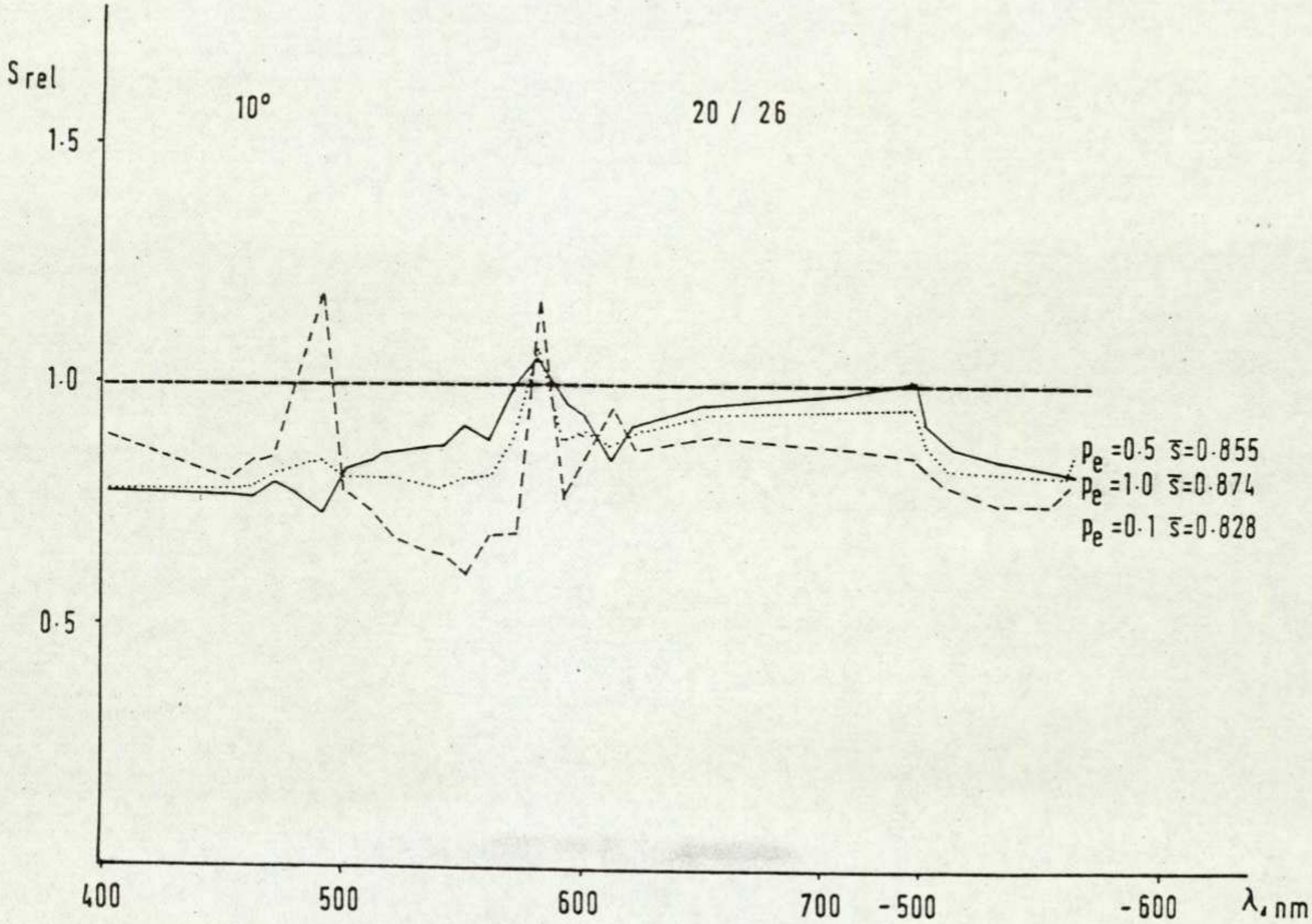


Figure 37. Variation of net saturation shift with wavelength, subtense series, $10^o/1^o$ fields

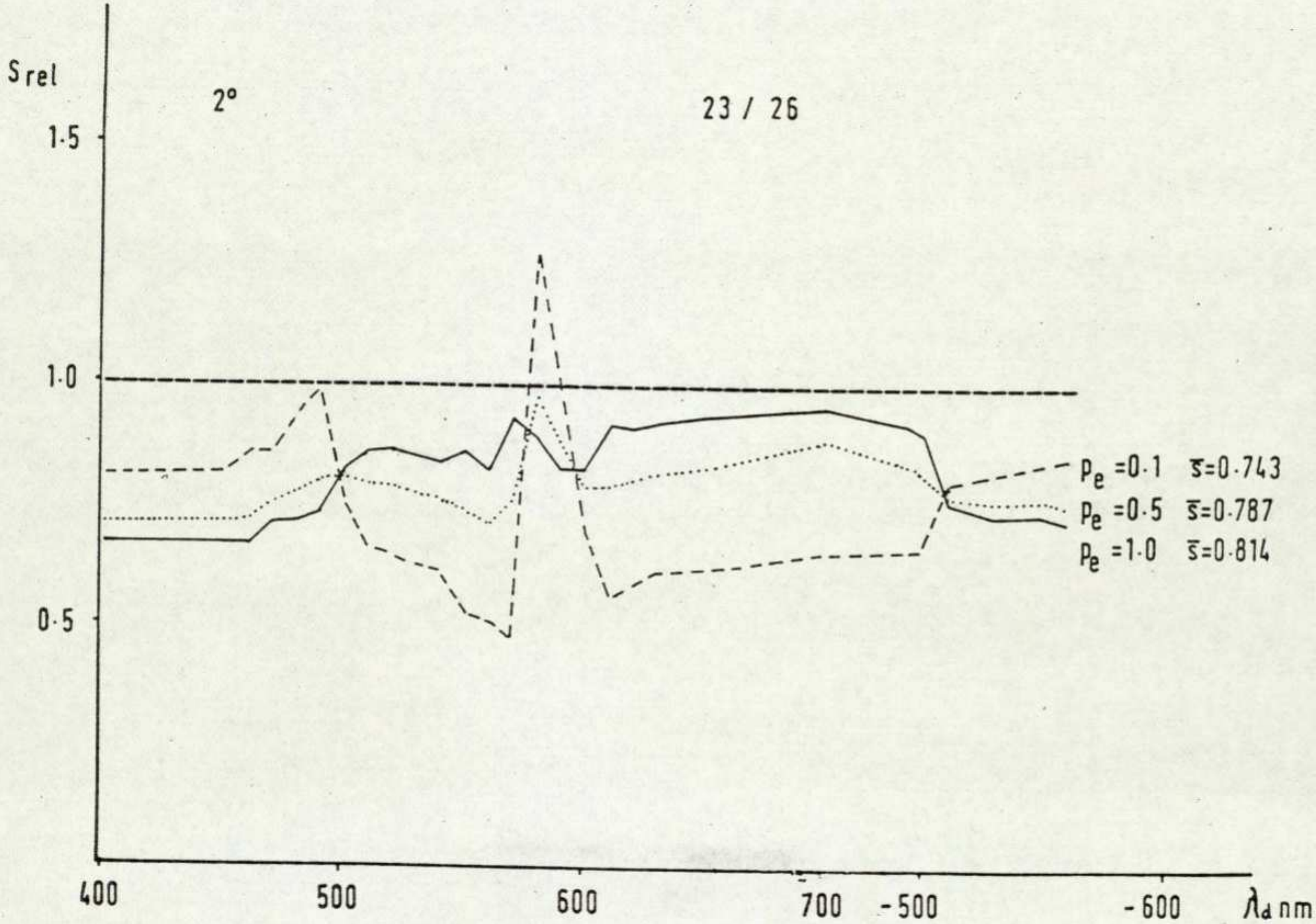


Figure 38. Variation of net saturation shift with wavelength, subtense series, 2°/1° fields

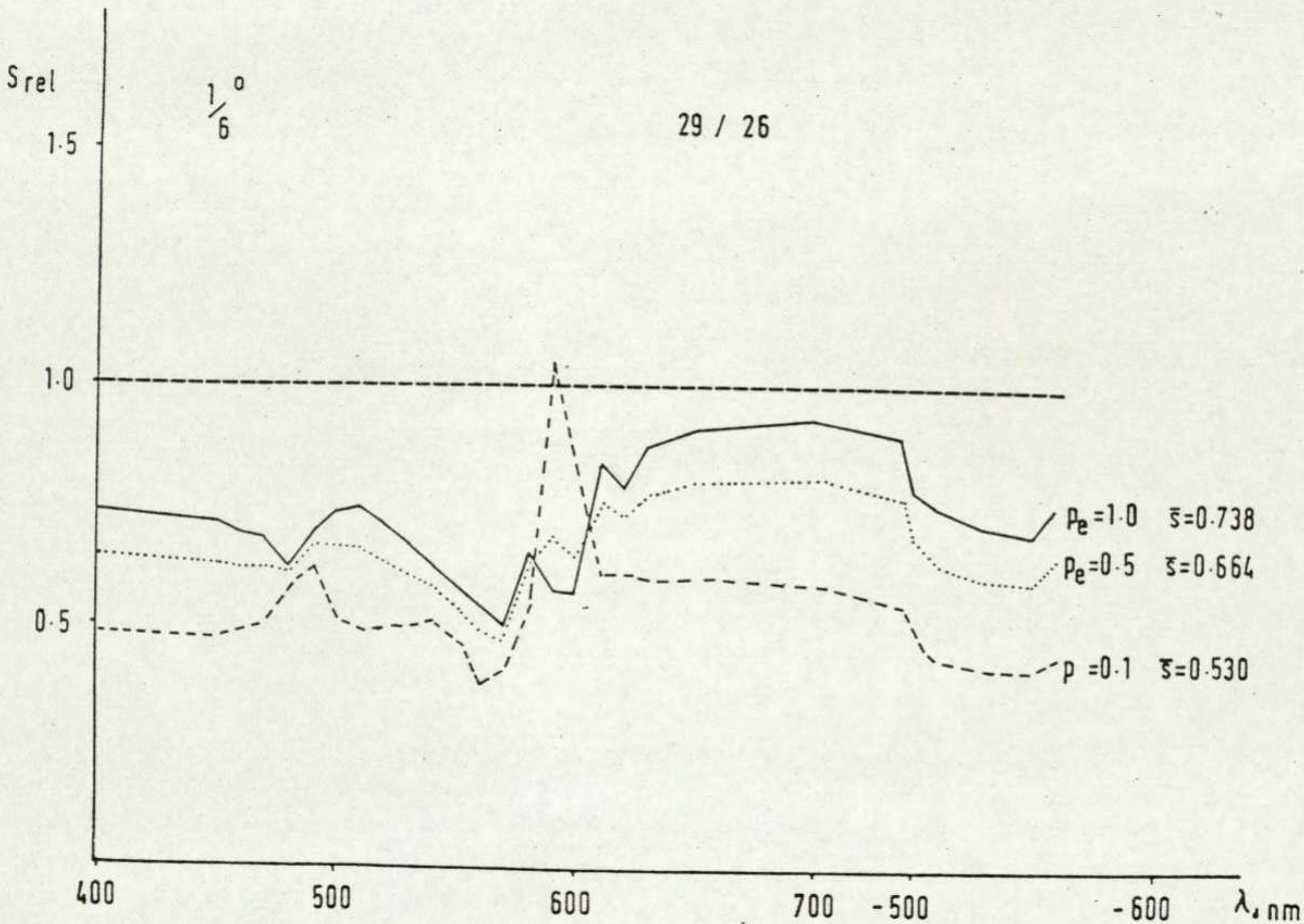


Figure 39. Variation of net saturation shift with wavelength, subtense series, 10arcmin/1° fields

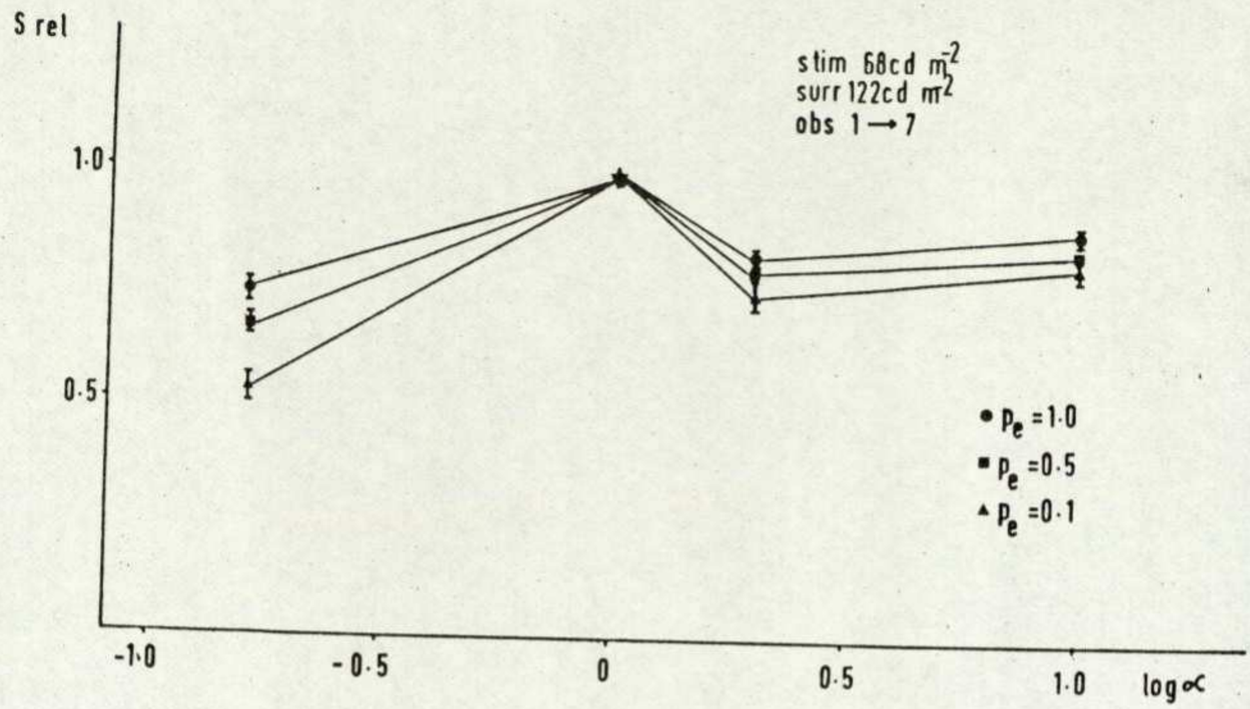


Figure 40. Relative changes in saturation compared with viewing condition 26, subtense series

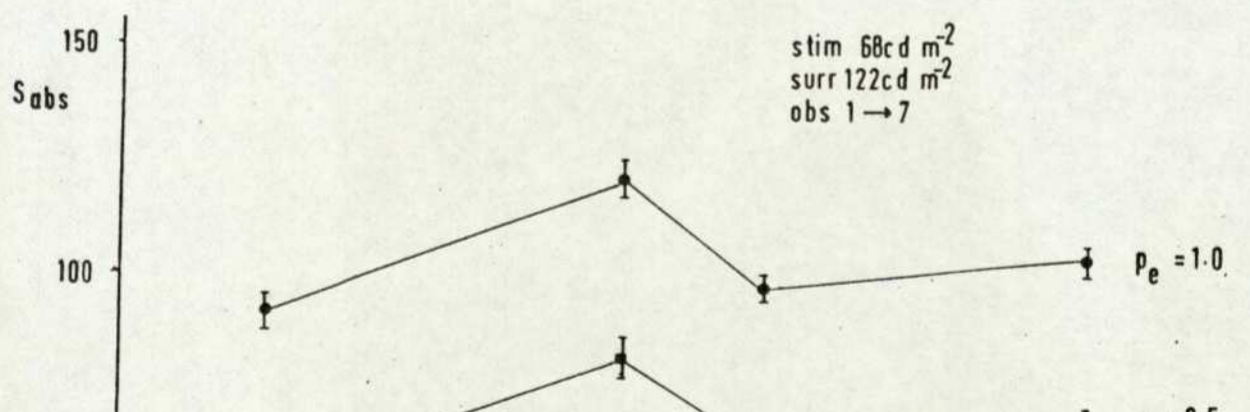


Figure 41. Changes in absolute saturation for subtense series

Figures 17-19, to give the change in shape of normalized saturation curves for 3 purity values: 1.0, 0.5 and 0.1. These results are given in Figures 34-36.

Finally, Figures 37-39 show the relative change of saturation in v.c. 20, 23 and 29 respectively compared to v.c. 26 (the 1° stimulus). This is the same treatment as Figure 20-22. It will be seen that, in each case, the saturations of the stimuli presented in the form of a 1° field is higher than when the stimuli have a larger (2° or 10°) or smaller ($1/6^{\circ}$) subtense. There is less variation between the behaviour of stimuli of varying purity than there is when luminance factor, not subtense, is the overall variable. Figure 40 shows the mean values of the relative saturations. The maximum at 1° is readily apparent (note: the abscissa on this graph is log angular subtense). Table 19 gives the average values of Srel which form the data points in this graph.

Viewing Condition	α°	$\overline{\text{Srel}}$(pe = 1.0)	$\overline{\text{Srel}}$(pe = 0.5)	$\overline{\text{Srel}}$(pe = 0.1)
20/26	10/1	0.874 ± 0.015	0.855 ± 0.013	0.828 ± 0.027
23/26	2/1	0.814 ± 0.017	0.787 ± 0.011	0.743 ± 0.034
29/26	1/6/1	0.738 ± 0.021	0.664 ± 0.016	0.530 ± 0.026

TABLE 19

Average Relative Shifts in Saturation Compared to v.c. 26 - Subtense Series

(l_{stim}=68 cd m^{-2}, l_{surr}=122 cd m^{-2}, obs 1-7)

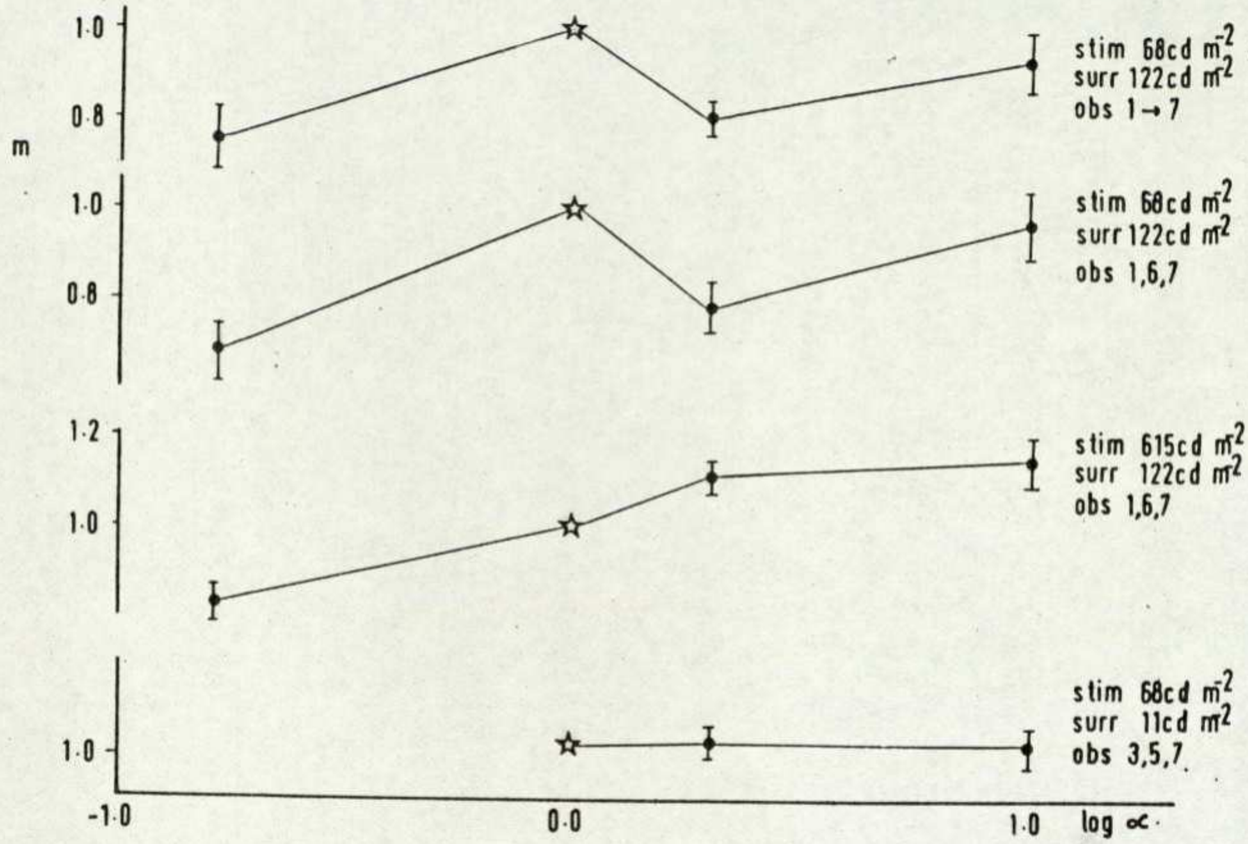


Figure 42. Changes in absolute saturation with subtense for various luminance factors

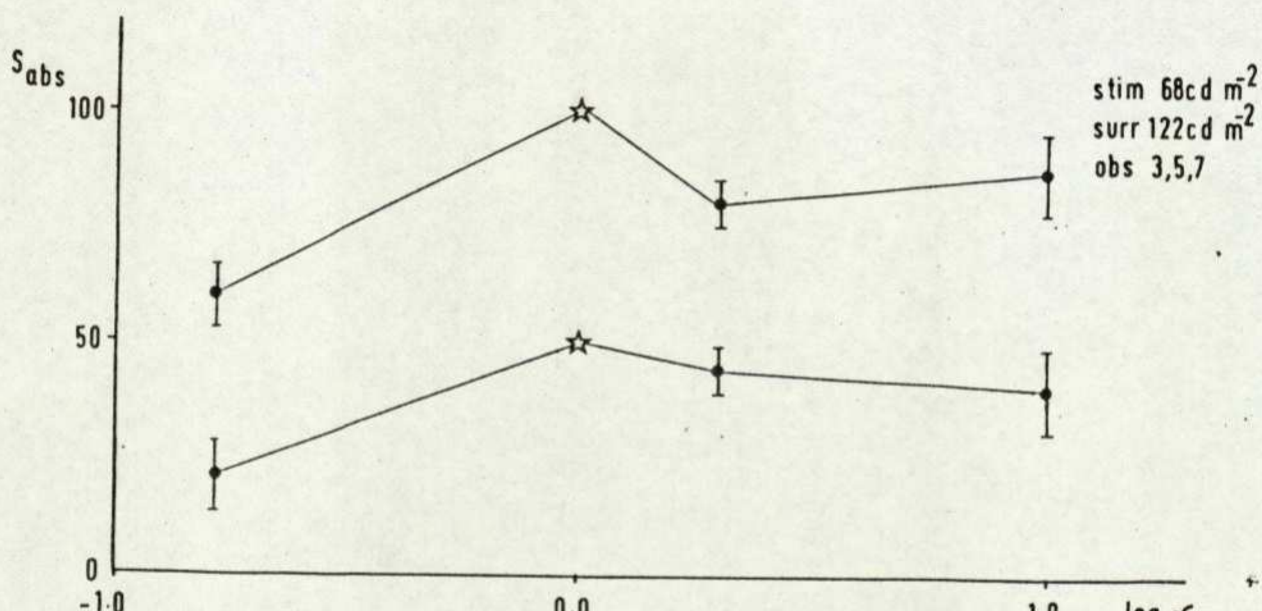


Figure 43. Changes in absolute saturation for subtense series, obs. 3,5,7

It is also possible to obtain an indication of the change in absolute values of saturation when the subtense of the stimulus is varied, for the three purity levels. Figure 41 shows these (c.f. Figure 24 for luminance series). Table 20 gives the numerical values of Sabs.

Viewing Condition	a^{o}	$\overline{Sabs}(pe = 1.0)$	$\overline{Sabs}(pe = 0.5)$	$\overline{Sabs}(pe = 0.1)$
20	10	104.8 ± 2.8	69.4 ± 2.8	27.9 ± 2.1
23	2	97.7 ± 2.4	63.9 ± 2.6	25.6 ± 2.3
26	1	121.3 ± 4.0	82.7 ± 3.7	34.1 ± 2.5
29	1/6	90.4 ± 4.2	54.7 ± 2.7	17.3 ± 1.1

TABLE 20

Average Absolute Saturation Values Showing Effect of Varying Stimulus Subtense

(l_{stim}=68 cd m^{-2}, l_{surr}=122 cd m^{-2},obs 1-7)

It is evident that the data of the main "subtense"series display a tendency to maximise saturation for the 1^{o} stimulus. All seven observers participated in the main series. It was decided to investigate whether (a) the same effect is present for the data of observers 1, 6 and 7 and 3, 5 and 7, and (b) to see whether it could be detected for other series of related colours in the experimental schedule.

Figure 42 shows the values of m (see equation 56) corresponding to (a) the series v.c. 20, 23, 26 and 29, observers 1 - 7; (b) the same series for observers 1, 6 and 7; (c) the series of unrelated colours v.c. 2, 6, 8 and 11 for observers 1, 6 and 7; and (d) the

Viewing Condit-ion	d°	m	c	r^2	S20	S50	S100	σ S
20/26	10/1	0.936±0.067	-3.58±5.44	0.876	15.14	43.22	90.03	8.18
23/26	2/1	0.804±0.042	2.22±3.44	0.929	18.30	42.41	82.60	5.17
29/26	1/6/1	0.749±0.075	-4.89±6.09	0.782	10.08	32.55	69.99	9.16

TABLE 21

Effect of Subtense, Main Series

(l_{stim}=68 cd m^{-2}, l_{surr}=122 cd m^{-2}, obs 1-7)

20/26	10/1	0.972±0.081	-12.89±7.80	0.836	6.55	35.70	84.29	12.13
23/26	2/1	0.785±0.059	-9.91±5.68	0.862	5.79	29.34	68.58	8.84
29/26	1/6/1	0.684±0.067	-3.34±6.43	0.788	10.35	30.87	65.07	10.01

TABLE 22

Effect of Subtense, Main Series

(l_{stim}=68 cd m^{-2}, l_{surr}=122 cd m^{-2}, obs 1,6,7)

2/8	10/1	1.144±0.058	1.90±3.35	0.934	24.78	59.09	116.28	6.98
6/8	2/1	1.115±0.035	2.48±2.07	0.973	24.78	58.23	113.99	5.35
11/8	1/6/1	0.830±0.041	1.80±2.44	0.935	18.40	43.30	84.80	6.28

TABLE 23

Effect of Subtense

(l_{stim}=615 cd m^{-2},l_{surr}=122 cd m^{-2},obs 1,6,7)

21/27	10/1	1.016±0.051	1.33±2.98	0.935	21.64	54.11	102.88	6.71
24/27	2/1	1.024±0.041	1.95±2.42	0.957	22.43	53.14	104.34	5.45

TABLE 24

Effect of Subtense

(l_{stim}=68 cd m^{-2}, l_{surr}=11cd m^{-2}, obs 3,5,7)

20/26	10/1	0.930±0.076	-5.81±6.59	0.844	12.79	40.68	87.18	9.28
23/26	2/1	0.714±0.043	8.66±3.76	0.907	22.93	44.34	80.02	5.29
29/26	1/6/1	0.772±0.060	-16.81±5.27	0.854	-1.37	21.80	60.40	7.42

TABLE 25

Effect of Subtense

(l_{stim}=68 cd m^{-2},l_{surr}=122 cd m^{-2}, obs 3,5,7) series of unrelated colours of v.c. 21, 24 and 27 for observers 3, 5 and 7. Figure 43 gives absolute saturation values for the "main subtense" series for observers 3, 5 and 7 (since in this case the constant c in equation 56 had non-zero values). The corresponding numerical data are given in Tables 21-25.

Figure 44 shows (a) the series v.c. 32, 33, 34 and 35, observer 7, in which the stimuli all appeared darker than the surround; (b) a comparison of v.c. 19 and 25, for observers 3, 5 and 7; and (c) a comparison of v.c. 5 and 7, observer 7. Again, graph (a) exhibits a marked peak at 1°. The numerical data are given in Tables 26-28.

Viewing Condition	a°	m	c	r^2	S20	S50	S100	σ S
32/34	10/1	0.683±0.039	9.34±3.38	0.917	23.00	43.50	77.66	9.18
33/34	2/1	0.639±0.047	10.96±4.10	0.868	23.74	42.90	74.85	11.13
35/34	1/6/1	0.491±0.038	9.22±3.33	0.854	19.05	33.79	58.35	9.05

TABLE 26

Effect of Subtense

(l_{stim}=18 cd m^{-2}, l_{surr}=122 cd m^{-2}, observer 7)

5/7	2/1	0.761±0.039	10.00±2.65	0.931	25.21	18.02	86.05	7.75

TABLE 27

Effect of Subtense

(l_{stim}=615 cd m^{-2}, l_{surr}=256 cd m^{-2}, observer 7)

10/1	19/25	0.850±0.060	7.56±4.96	0.879	24.57	50.01	92.59	8.79

TABLE 28

Effect of Subtense

(l_{stim}=68 cd m^{-2}, l_{surr}=256 cd m^{-2}, obs 3,5,7)

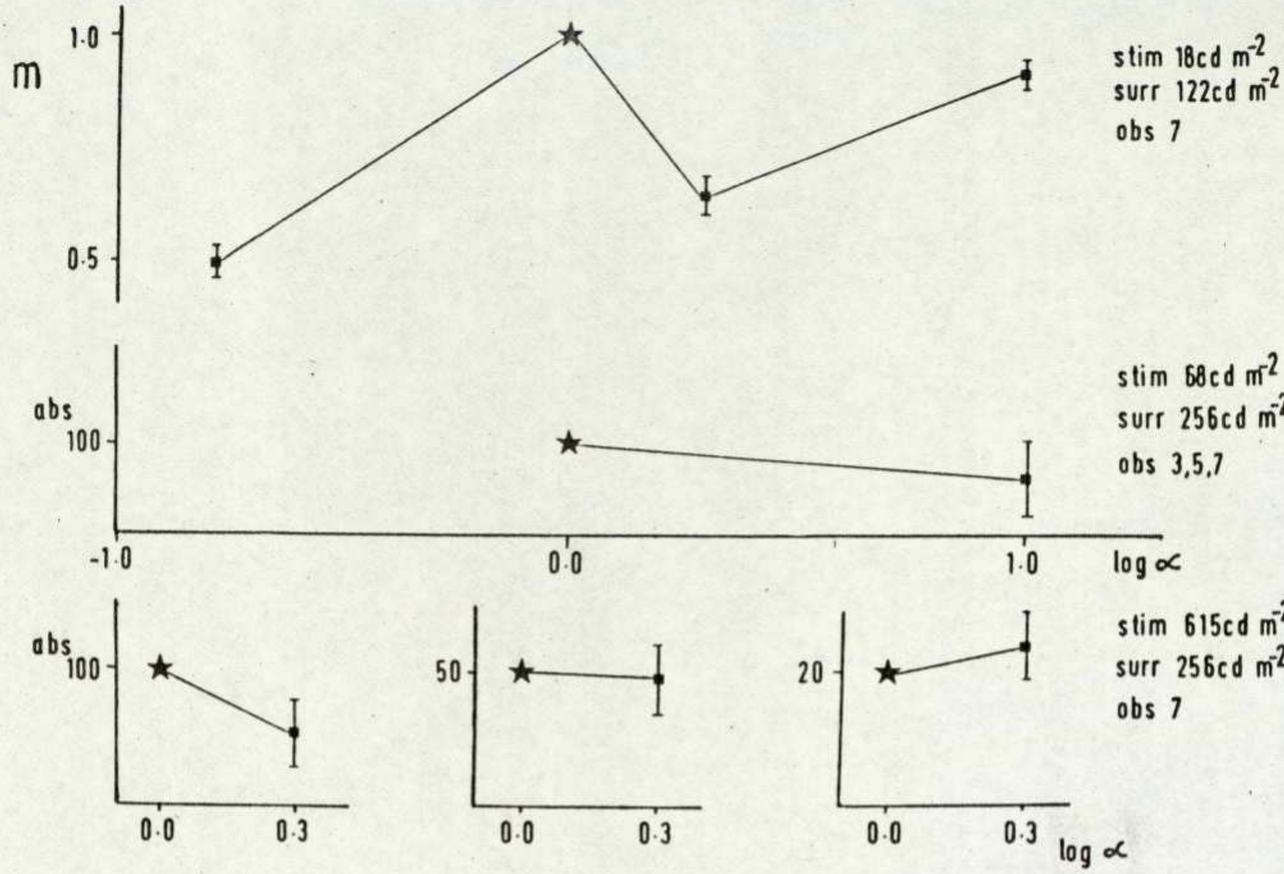


Figure 44. Changes in absolute saturation with subtense for various luminance factors

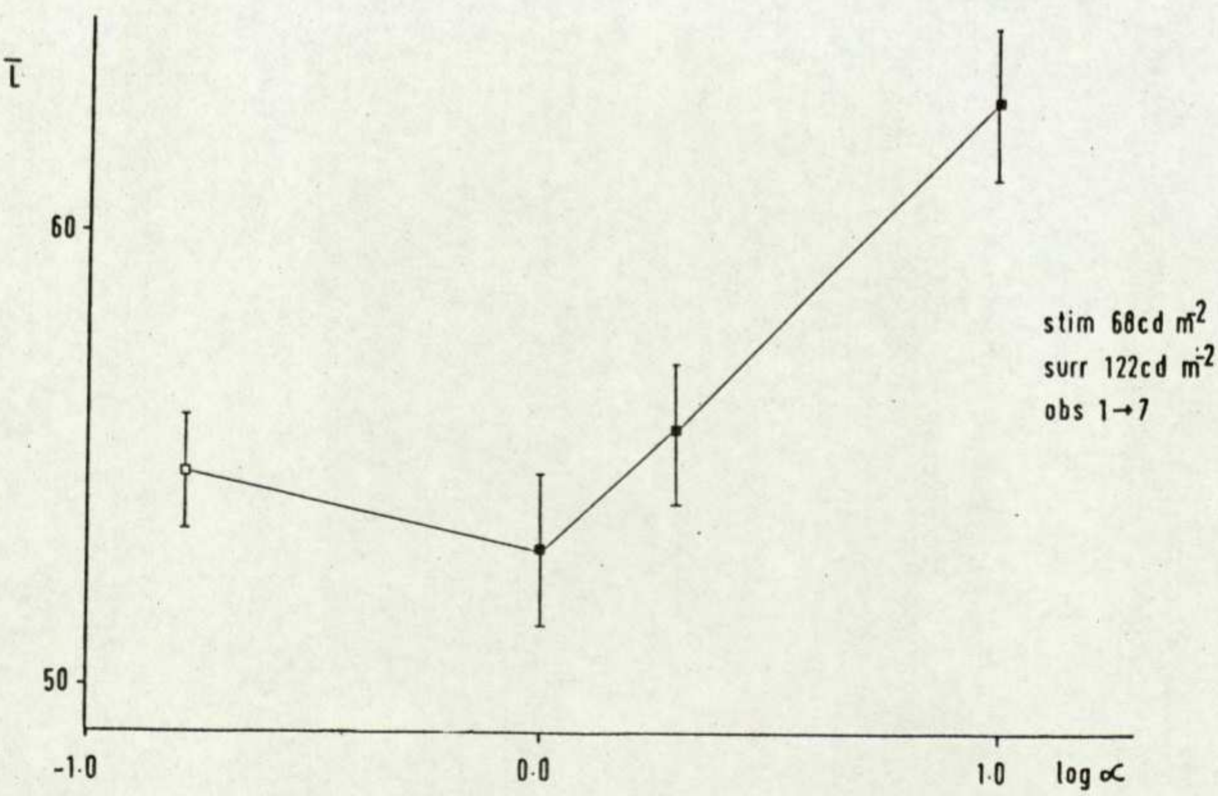


Figure 45. Changes in mean lightness values for subtense series

In view of the maximum saturation occurring for 1° stimuli, it was decided to investigate the effect of subtense on lightness, for the "main" subtense series of v.c. 20, 23, 26 and 29. Some of the stimuli presented in these viewing conditions appeared to be brighter than the surround, however, in viewing conditions 20, 23 and 26 stimuli 4, 9, 10, 13, 19, 23, 24, 26, 28 and 29 were judged by all seven observers to be darker than the surround, i.e. all observers assigned only lightness values to the brightness dimension of these stimuli. In viewing condition 29 stimuli 4, 9, 10, 11, 19, 23, 24 and 26 were given lightness values. It was decided to take arithmetic means of the lightness values of the above stimuli in each viewing condition. These are given in Table 29 and shown in Figure 45. It is not strictly possible to compare directly the extreme left-hand point (α = 1/6°) with the others because the mean lightness is computed from a different stimulus group; however, the other three points are based on the same stimulus groups and a valid comparison may therefore be made between them. It will be seen that lightness is minimum for the 1° stimulus.

$\bar{I}$ (10°)	$\bar{I}$ (2°)	$\bar{I}$ (1°)	$\bar{I}$ (1/6°)
62.90 ± 1.69	55.63 ± 1.51	52.98 ± 1.69	54.75 ± 1.29

TABLE 29

Mean Lightness Values, Main Subtense Series

(obs. 1 - 7)

Finally, variations in hue should be considered. Figure 46 shows the effect of subtense (top graphs) and luminance factor (bottom

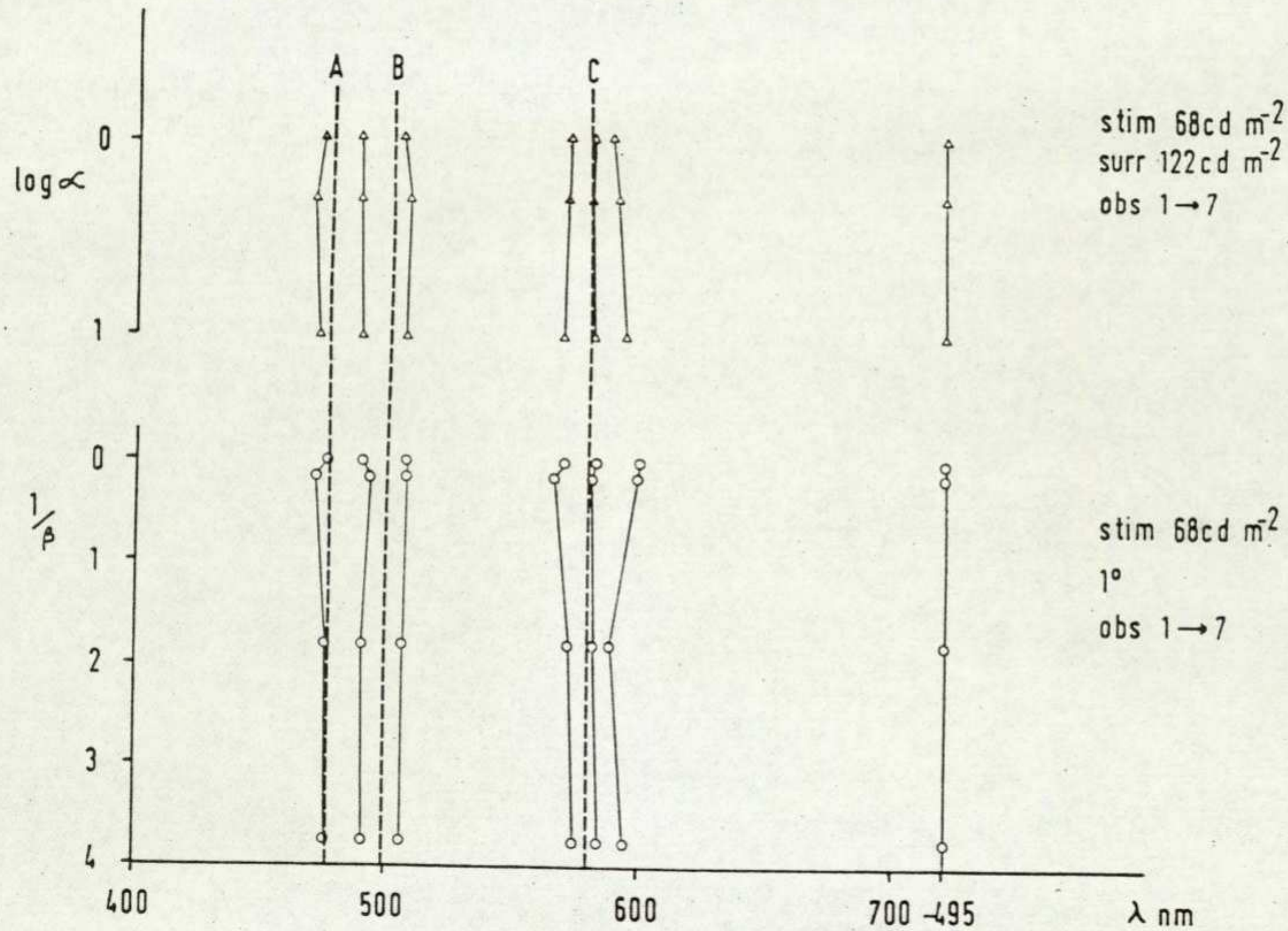


Figure 46. Changes in hue with a. subtense
and b. luminance factor

graph) on the positions of seven of the eight lines of constant hue (the 50R - 50B line being omitted because insufficient data existed to permit extrapolation to the spectrum locus). Table 30 gives the wavelengths in nm at which the lines of constant hue cross the spectrum locus for v.c. 20, 23, 25, 26, 27 and 28.

Hue	λ (vc20)	λ (vc23)	λ (vc25)	λ (vc26)	λ (vc27)	λ (vc28)
100R	-495	-495	-495	-495	-495	-495
50R 50Y	595	592	594	588	598	600
100Y	582	580	584	581	581	582
50Y 50G	570	571	575	572	566	570
100G	508	509	506	506	506	506
50G 50B	490	490	490	489	493	489
100B	473	471	476	475	472	475

TABLE 30

Wavelengths in nm Eliciting Given Hue Responses in Six of the Main Viewing Conditions

(obs 1 - 7)

The lines marked A, B and C represent the Hurvich and Jameson (1955) hue-invariant wavelength predictions of 475, 500 and 580 nm. It will be seen that variations in stimulus subtense have very little, if any, effect on hue; variations in β do affect hue, but the "unique" hues (100B, 100G, 100Y and 100R) show rather less variation than intermediate hues.

4.4 Small-Field Data

The data reported in this section all concern the smallest stimulus, which subtended 0.42 arcmin, i.e. less than the subtense required for resolution by the normal unaided human eye (according to the Rayleigh criterion).

A note is required about the units used to measure the amount of light emitted by such point sources. The "luminance" of each stimulus will be given in "cdm^{-2}". This should not be taken literally, but should mean that neutral point stimuli all appeared indistinguishable from a neutral surround having that given luminance. Whatever units of measurement are used, the rating between the numbers of units in different viewing conditions are preserved by this scheme. The conversion factor of luminance to point brilliance in lumens m^{-2} is 1.17×10^{-8} lumens m^{-2} = 1 cdm^{-2} for the viewing geometry used here.

Table 31 gives details of the viewing conditions considered in this section. Figures 47-51 show lines of constant saturation for all five viewing conditions. It was found that these lines could be drawn quite precisely; however, there were only two hues distinguishable: stimuli either elicited hues in the red-yellow quadrant of the hue circle, or in the blue-green quadrant. Thus, the dashed dividing line marked "0" in Figures 47-51 marks the transition from one hue type to the other. The other dashed lines represent tritanopic confusion loci from Wright (1952). There is apparent general agreement between the directions of these and the directions of loci of constant saturation.

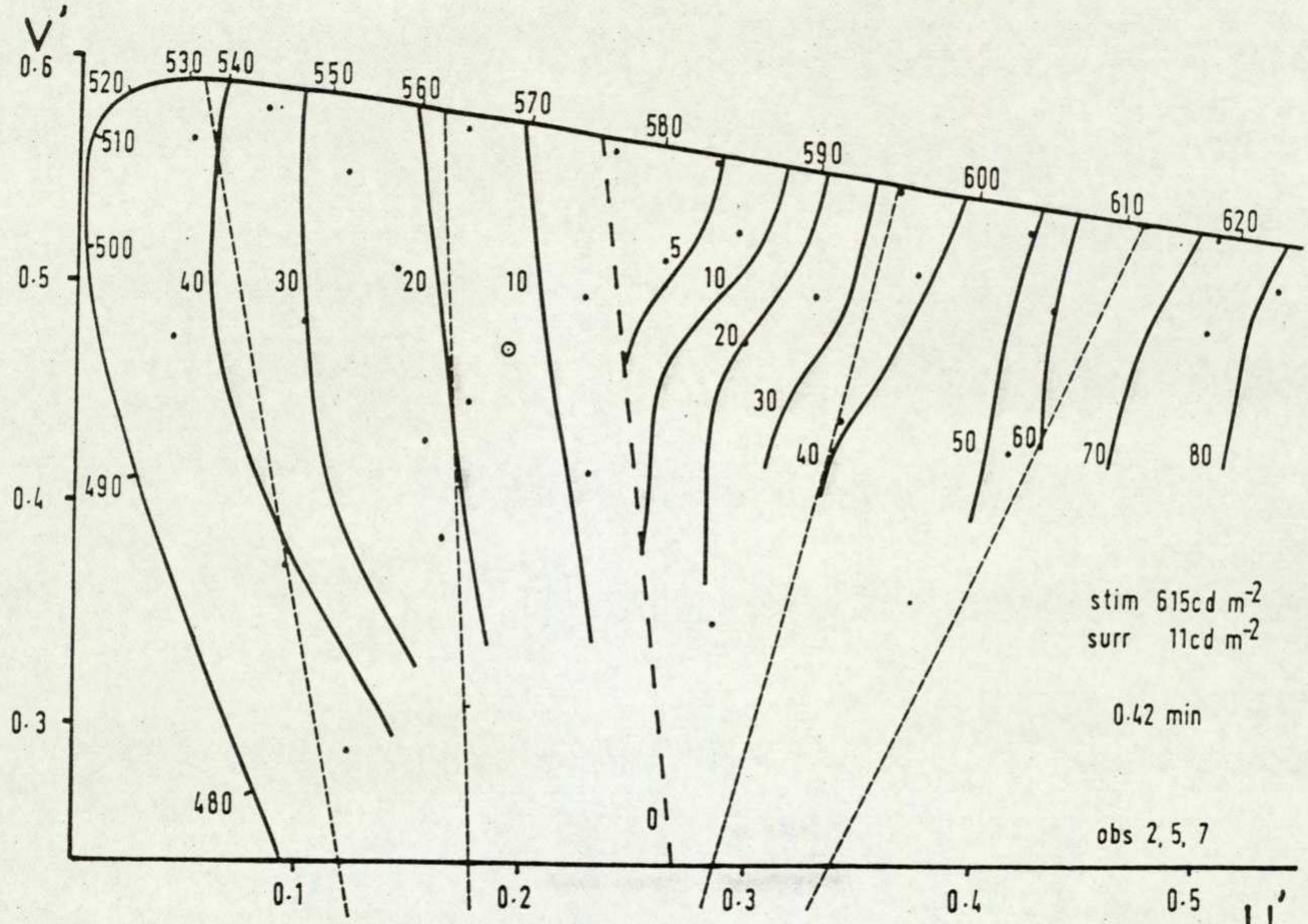


Figure 47. Mean observer data, point stimulus

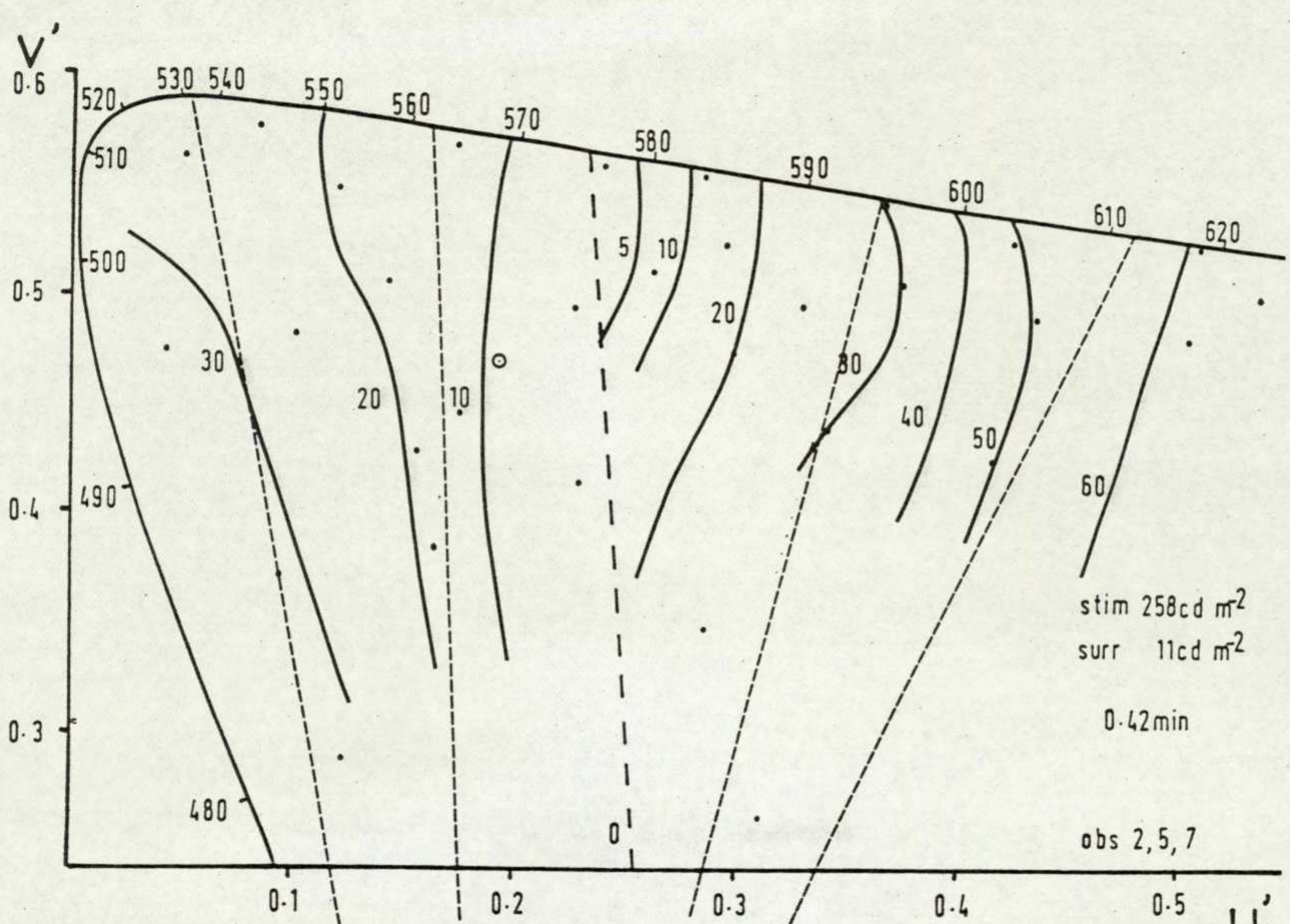


Figure 48. Mean observer data, point stimulus

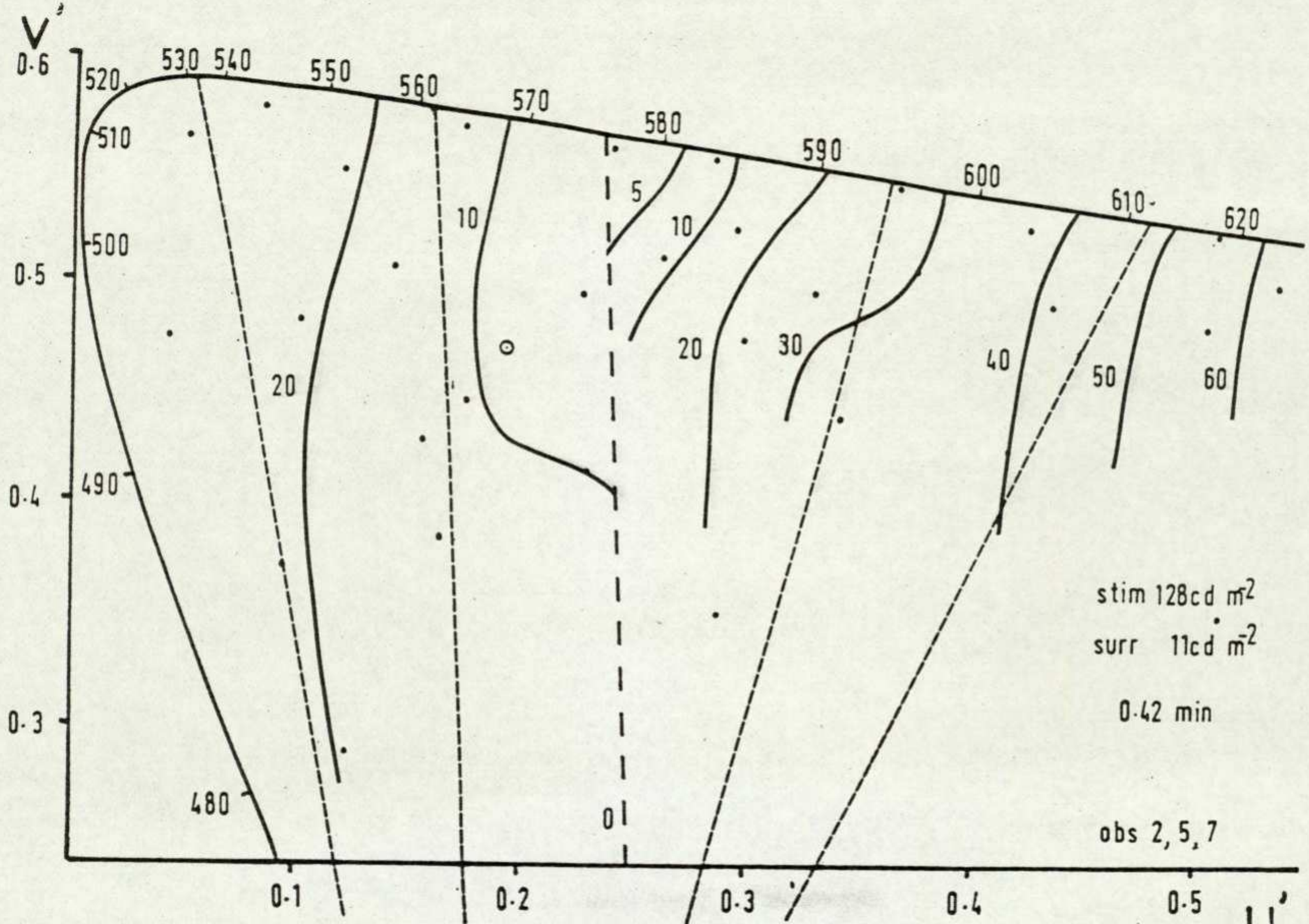


Figure 49, Mean observer adta, point stimulus

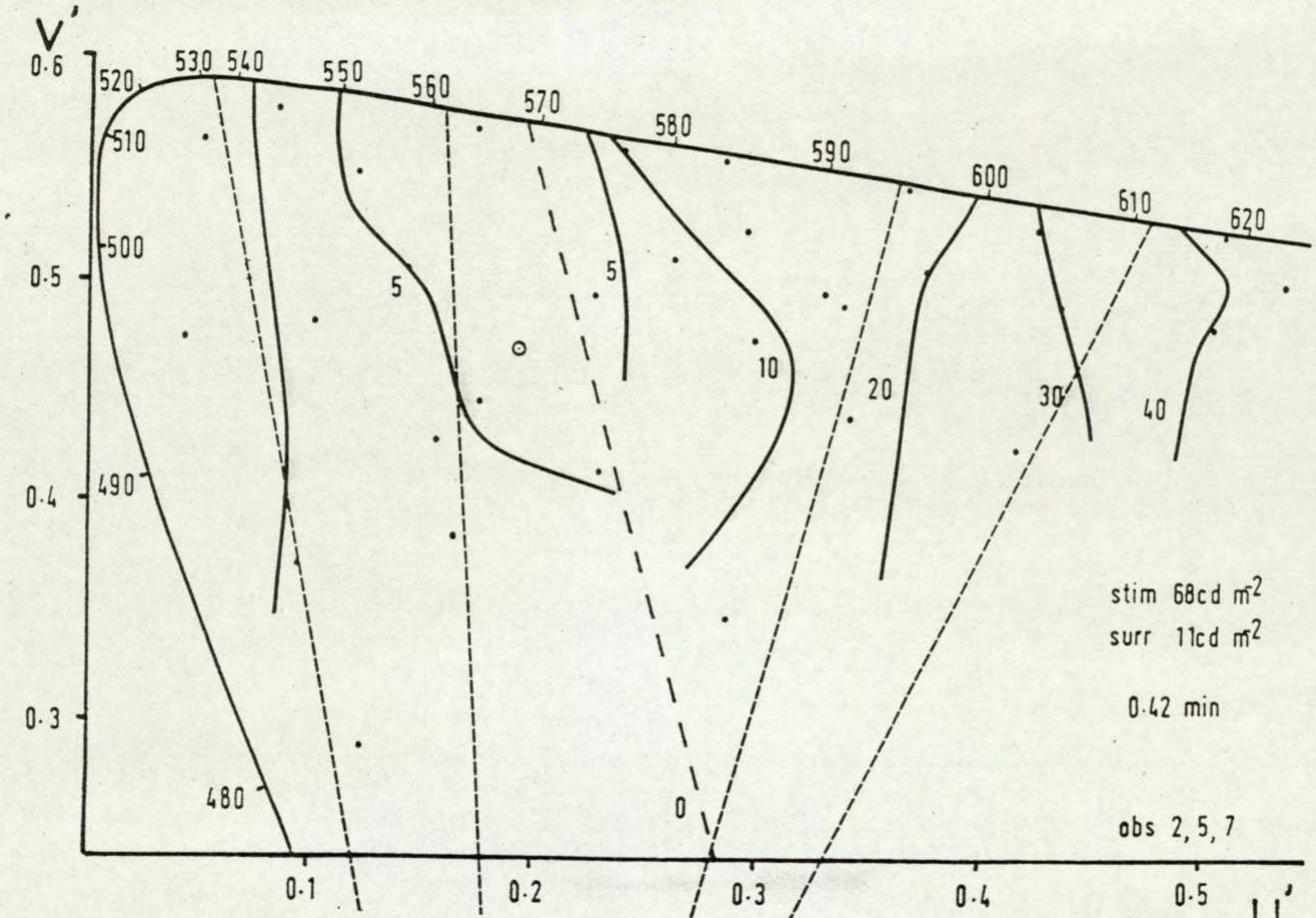


Figure 50. Mean observer data, point stimulus

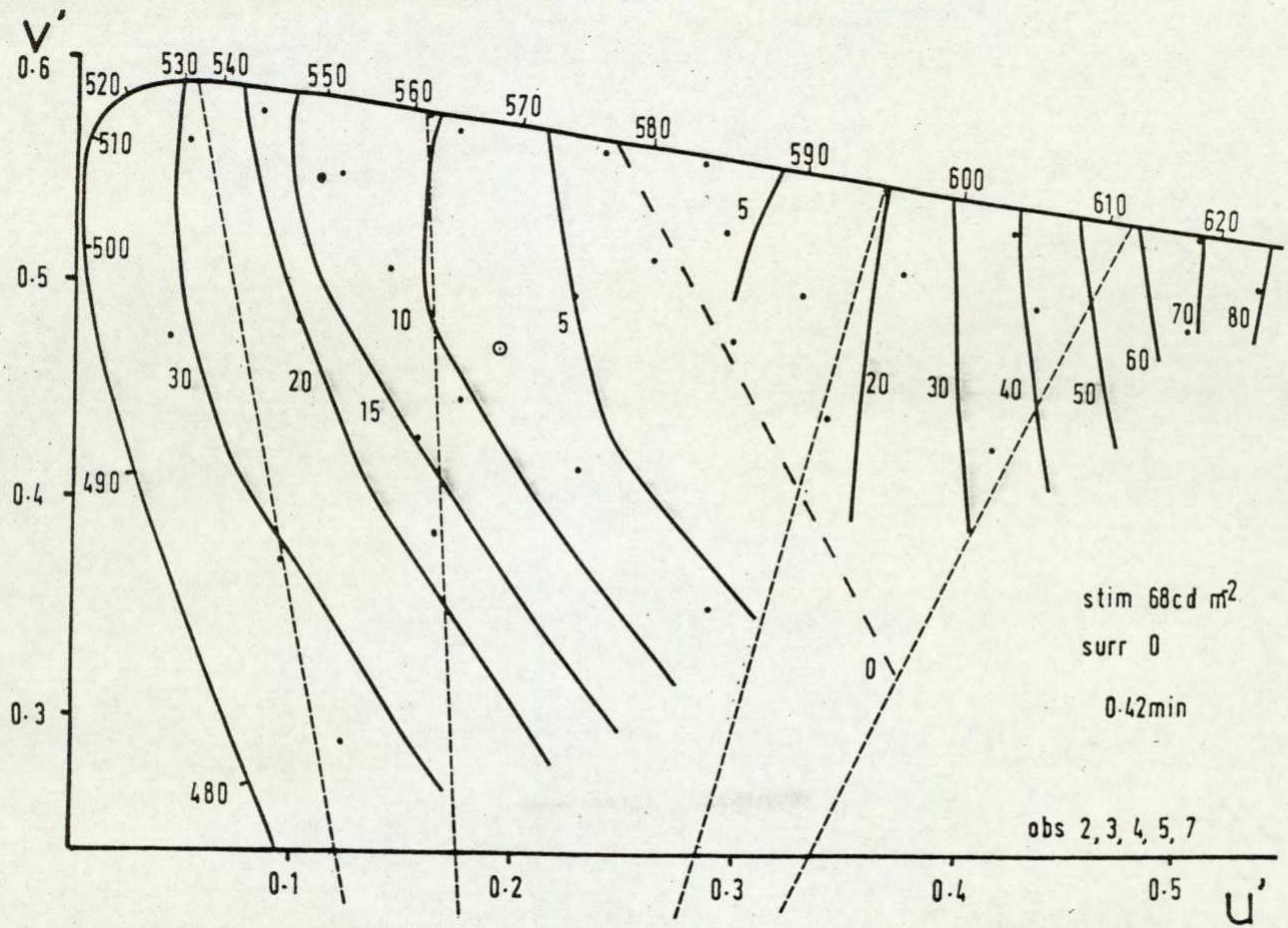


Figure 51. Mean observer data, point stimulus

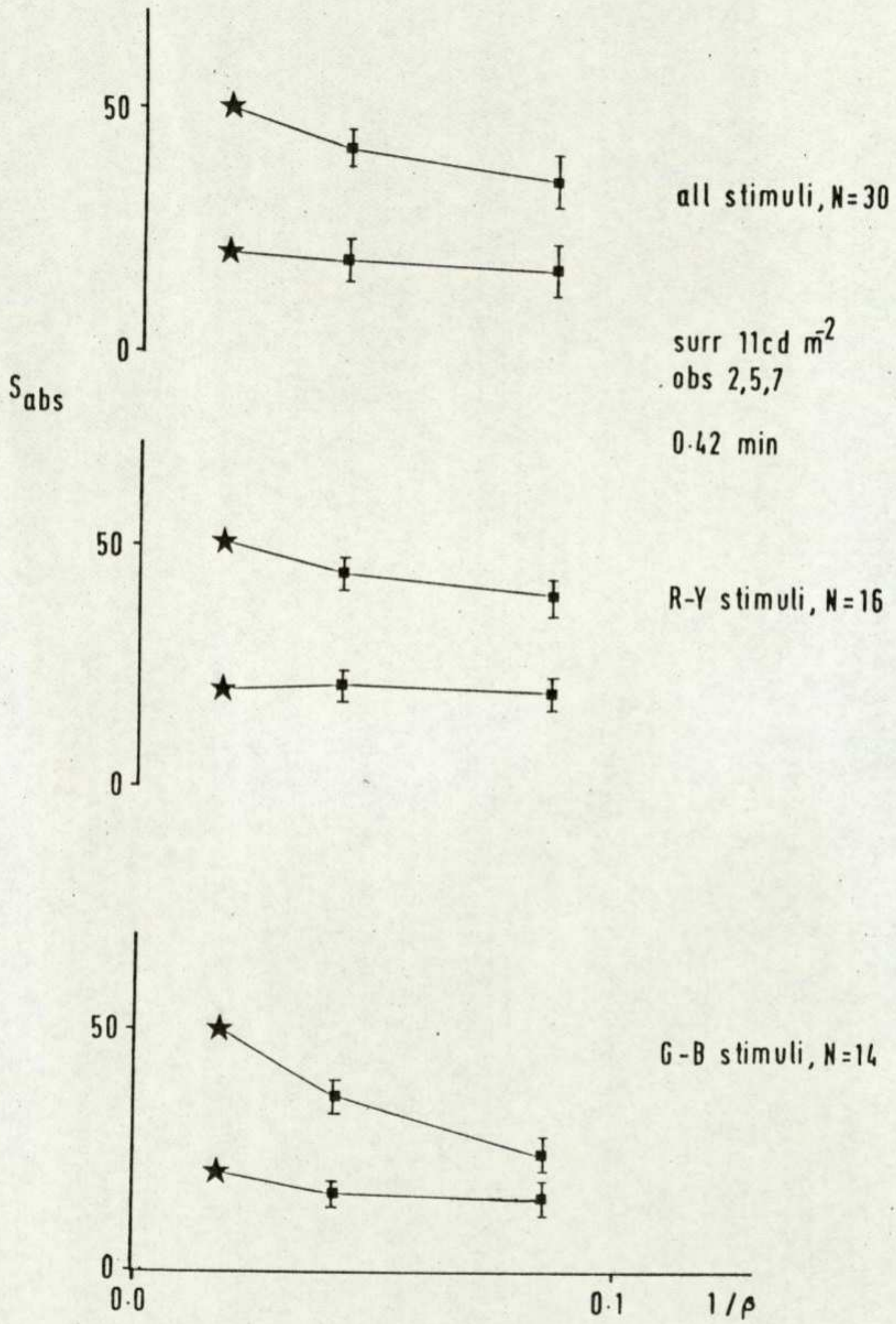


Figure 52. Changes in saturation with point brilliance

Viewing Condition	Surr cdm^{-2}	Stim cdm^{-2*}	β*	$\frac{1}{\beta}$ *	Point brilliance, lumens m^{-2}
13	11	615	55.9	0.018	7.20×10^{-6}
15	11	258	23.5	0.043	3.02×10^{-6}
18	11	128	11.6	0.086	1.50×10^{-6}
30	11	68	6.18	0.16	7.97×10^{-7}
31	0	68		0	7.97×10^{-7}

TABLE 31

Small-Field (0.42 arcmin stimulus) Viewing Conditions

*) See text for explanation of units.

It seems that the concept of "hue" in this series is of limited use to observers, but "saturation" is scaled reasonably consistently. It was decided to investigate how the saturation varied as the stimuli got dimmer, and for a surround luminance of 11 cdm^{-2} (i.e. v.c. 13, 15 and 18, observers 2, 5 and 7). Figure 52 shows how saturation varied as the brightness of the stimuli relative to the surround was reduced. Table 32 gives details of the linear regression analysis. There are three groups of graphs in Figure 52. The top graphs represent overall changes in saturation. The bottom two groups show changes in saturation for the "red-yellow" and "green-blue" stimuli respectively. In all cases, it can be seen that saturation decreases as the stimuli become dimmer. Finally, the stimuli begin to appear neutral, and then disappear altogether.

Viewing Condition	Point Brilliance lumens m^{-2} $x10^{-6}$	m	c	r^2	S20	S50	σ_S
18/13	1.5/7.2	0.623±0.051	4.53±1.97	0.844	16.99	35.67	6.14
15/13	3.02/7.2	0.775±0.038	2.84±1.48	0.937	18.33	41.50	4.62
18/13 "orange"	1.5/7.2	0.652±0.036	6.88±1.61	0.960	19.91	39.46	3.71
18/13 "cyan"	1.5/7.2	0.322±0.071	8.55±2.15	0.630	14.99	24.67	3.90
15/13 "orange"	3.02/7.2	0.760±0.036	6.04±1.61	0.970	21.24	44.04	3.71
15/13 "cyan"	3.02/7.2	0.677±0.061	2.39±1.83	0.912	15.93	36.23	3.32

TABLE 32

Effect of Stimulus Brilliance

(obs. 2, 5, 7, 0.42 arcmin field)

There is also evidence that the errors in both hue and saturation increase as the stimulus brightness (and also saturation) decreases. Table 33 gives the mean values of $\frac{\Delta S}{S}$ and $\frac{\Delta H}{H}$ for v.c. 13, 15, 18 and 30, as well as v.c. 31. It is apparent that the errors, and thus also the extent of chromaticity confusions, are lowest in v.c. 31 and 13 (highest stimulus brightness) and highest in v.c. 30 (lowest stimulus brightness).

Viewing Condition	Mean $\frac{\Delta S}{S}$	Mean $\frac{\Delta H}{H}$
13	16%	3.1%
15	32%	4.3%
18	27%	3.8%
30	72%	5.1%
31	19%	2.8%

TABLE 33

Mean Observer Errors in Saturation and Hue, For Small-Field Viewing Conditions

However, when individual observer data are examined, it can be seen that there is considerable variation between observers in terms of individual errors. The data for all five observers are given in Table 34.

Observer	2	3	4	5	7	Average
$\frac{\Delta S}{S}$	20%	6.4%	28%	5.3%	12%	20%
$\frac{\Delta H}{H}$	1.4%	1.3%	2.6%	0.8%	2.5%	2.6%

TABLE 34

Individual Observer Saturation and Hue Errors, Small-Field Data, and Mean Observer Errors

4.5 Variability of Scaled Values and Observer Consistency

The purpose of this section is to record the magnitudes of errors on the hue and saturation estimates of individual observers. Only data from the two "main series" will be considered here (v.c. 20, 23, 25, 26, 27 and 28) since it was only in these viewing conditions that all seven observers participated; v.c. 29 is omitted since the stimulus appearance here was subject to tritanopic confusions.

Table 10 gives the average errors in hue and saturation for each observer, and for the mean observer. Table 35 gives the data from which these values were computed. It should be noted that the mean error (in %) of the mean observer is $\frac{\Delta S}{S} = 7.67 \pm 0.74$, $\frac{\Delta H}{H} = 1.00 \pm 0.03$. This may be compared with the mean error, in %, of the individual observers. Here we have $\frac{\Delta S}{S} = 7.26 \pm 0.77$, $\frac{\Delta H}{H} = 1.11 \pm 0.09$. It is readily apparent that there is no significant difference between these values. This means that there was acceptable agreement in the hue scaling of different observers. The same cannot be said for saturation, since the normalization procedure reduced all values to a common mean.

In order to test saturation scale consistency, it is necessary to consider the constancy of exponents used in the normalization procedure (see Section 4.1). Table 36 gives the exponents generated by all seven observers in the six "main" viewing conditions (the only ones in which all seven observers participated). It is necessary to test the assumption that the observers were consistent in their scale production (i.e. the exponent for each observer remains approximately constant). The simplest way of testing this assumption is a one-way analysis of variance on the exponents in Table 36. Such an analysis of variance gives an F-value (variance ratio) of 9.57 ($n_1 = 6$, $n_2 = 35$). This means that $p < 0.001$ that the individual observer exponents come from the same parent distribution ($F_{6,35,0.001} = 4.9$). This constitutes very powerful evidence that the within-observer variability was much less than the between-observer variability. In consequence, the validity of the saturation estimates for these viewing conditions has been established.

Obs.	1	2	3	4	5	6	7	Average	
$\frac{\Delta S}{S}$	5.3	5.9	4.4	6.5	4.7	3.7	5.5	6.8	v.c.
$\frac{\Delta H}{H}$	1.2	1.0	0.8	0.9	0.7	1.4	1.0	1.0	20
$\frac{\Delta S}{S}$	10.0	8.4	3.3	9.6	3.7	6.7	2.9	11.0	v.c.
$\frac{\Delta H}{H}$	1.3	1.1	0.7	1.1	0.5	1.4	0.9	1.1	23
$\frac{\Delta S}{S}$	8.0	2.3	5.5	9.0	3.8	7.9	11.0	8.4	v.c
$\frac{\Delta H}{H}$	1.4	1.1	0.8	1.4	0.5	1.1	1.2	0.9	25
$\frac{\Delta S}{S}$	7.1	9.4	5.2	13.0	4.7	4.7	4.5	7.1	v.c.
$\frac{\Delta H}{H}$	1.0	1.1	0.8	1.2	0.8	0.8	0.7	1.0	26
$\frac{\Delta S}{S}$	14.0	12.0	6.4	8.8	5.6	8.9	6.4	6.6	v.c
$\frac{\Delta H}{H}$	1.8	1.4	1.2	1.5	1.3	1.0	1.4	1.0	27
$\frac{\Delta S}{S}$	13.0	9.1	4.9	11.0	7.5	8.8	6.7	6.1	v.c.
$\frac{\Delta H}{H}$	1.7	1.0	1.0	1.8	0.7	1.6	1.1	1.0	28
$\frac{\Delta S}{S}$ mean	9.57	8.68	4.95	9.65	5.00	6.78	6.17	7.67±0.74	all viewing conditions
$\frac{\Delta H}{H}$ mean	1.40	1.12	0.88	1.32	0.75	1.22	1.05	1.00±0.03	all viewing conditions

TABLE 35

Individual and Mean Observer Standard Errors (in %), Main Series

Observer	1	2	3	4	5	6	7	
saturation exponent	1.100	1.014	1.492	0.962	1.137	0.537	0.737	v.c.20
	1.323	1.005	1.046	0.934	0.947	0.670	0.571	v.c.23
	1.158	0.948	1.015	1.001	1.421	0.810	0.905	v.c.25
	1.076	1.001	1.067	1.014	0.958	0.757	0.886	v.c.26
	1.143	0.906	1.120	0.993	0.978	0.690	0.940	v.c.27
	1.212	1.205	1.221	0.711	0.793	0.716	0.678	v.c.28
	1.169	1.013	1.160	0.936	1.039	0.697	0.786	

TABLE 36

Saturation Exponents used in Data Normalization Procedure, for each Observer and Viewing Condition in the "Main Series"

5. DISCUSSION

The purpose of Section 4 was to give the main experimental results with the minimum of comment, so that the overall picture could be presented before any conclusions were drawn, either detailed or general. The purpose of this section is to act as a guide through the results given in Section 4, explaining their meanings, possible causes, and placing them in context with respect to other work in the field.

The first topic for discussion is the effect which luminance factor has on saturation. The results in Section 4.2 are in general agreement with the work of previous investigations, such as Rowe (1972), Pitt and Winter (1974), Bartleson (1973). A colour with a dark surround (e.g. in v.c. 27 and 28) is seen as having a lower saturation than that same stimulus with a light surround (in v.c. 25 and 26). Additionally, Bartleson (1977) found that saturation increases steadily as the Munsell value (i.e. lightness) of a related colour is increased between value 3 and value 7. The two "related" viewing conditions in the present investigation corresponded to value 6.7 and value 7.8. It was therefore expected that there would be an increase in saturation from v.c. 25 to v.c. 26; this was indeed found to be the case, as shown in Figures 22 and 23.

The stimulus therefore has a maximum value of saturation near a brightness-match point with the surround. There is nothing unexpected about this; Evans and Swenholt (1959) suggested a similar behaviour for the saturation function. What is of more interest is the dependence of this effect on the purity of the stimulus. This is illustrated well in Figure 16. The value of a_1, the exponent in a Stevens-type power function, see Equation (51), is seen to depend very strongly on whether the eye is basically light-adapted (v.c. 25 and 26) or dark-adapted (v.c. 27 and 28). There is considerably less variation in the value of log a_0. This will be seen more readily if a comparison is made with Figure 33, which shows the effect of subtense on log a_0 and a_1. Here, there is much less variation in a_1 and more in a_0.

Now, for <u>low</u> values of pe in Equation (51), changes in a_1 have much more effect on the value of S than changes in a_0. However, at a purity of 1.0, S is independent of a_1. Changes in a_0 therefore represent high-purity stimulus behaviour, and changes in a_1 show what happens to low-purity stimuli. Changes in adaptation-level thus affect low-purity stimuli considerably, especially changes from light to dark adaptation. This is clearly the case in Figure 20 and 21. Values of Srel for pe = 0.1 are reduced much more than the corresponding values of Srel for pe = 1.0 stimuli. This effect is diminished, if not totally absent, in Figure 22. Thus, at high adaptation levels, the effect of surround luminance is spread more equally between high- and low-purity stimuli. This is also apparent in Figure 23; the spread of the points at the highest value of $1/\beta$ (highest surround luminance) is least.

We cannot therefore conclude that changing surround luminance always affects low-purity stimuli more than high-purity ones. This is true if the surround is changed from dark to light, as in most of the studies referred to earlier; however, if surround luminance is changed from a high value to an even higher one, as in Figure 22, thus differential effect either disappears, or becomes less pronounced.

It is at this stage that it begins to be useful to question the traditional concept of "stimulus" and "surround". Traditionally, the visual "stimulus" area has been assumed to correspond to a (physically) uniform region of the visual field, and the surround comprised the immediate vicinity of that region, and was measurably different from the stimulus field. This has formed a useful working basis for visual studies, but the limitations of such a scheme become apparent when we try to explain variations in "surround effect" as the "stimulus subtense" is altered. For example, we see from Figure 25 that the "surround" has much less effect on the 10° "stimulus" than it does on the 1° "stimulus". We can argue here that the 10° stimulus appears non-uniform, but this makes the condition of physical uniformity of the stimulus area appear redundant. Additionally, we can postulate variable "range effects" for the surround, e.g. that the "surround" is incapable of affecting significantly the appearance of a chromatic field point separated by more than, say, $\frac{1}{2}^{\circ}$ from it. However, from this can emerge a more useful "definition" of what constitutes a "stimulus" and "surround". We can say that the "stimulus" is the largest region of the visual field in which physical uniformity is matched by subjective uniformity; a corollary of this is the assertion that any "surround" (adjacent area of the visual field) will affect the "stimulus" in a way which will preserve uniformity of appearance of the latter: uniform action-at-a-distance.

It seems, from the present study, that the optimal size for such a stimulus designation is a 1° or slightly smaller field. This corresponds closely to the extent of the rod-free foveola in the human retina; it is a size over which the surround effect is optimized (for additional evidence, see the discussion on the effect of subtense, below; or see Figure 28); it corresponds to a typical "chromatic cell" receptive-field size, see De Valois and De Valois (1975). Wiesel and Hubel (1966) give a typical r.f. size of $\frac{1}{2}^\circ$ for type I (spatial/spectral) opponent cells. The present study allows no distinction to be made between $\frac{1}{2}^\circ$ and 1° fields; the optimum stimulus size could lie anywhere between $\frac{1}{2}^\circ$ and 1°.

We have to consider the effect of (a) decreasing, and (b) increasing, the size of the (physically uniform) "stimulus field". If the size of the "stimulus" is decreased significantly, we can begin to expect the reversal of classical contrast, since there will be an attempt to impose visual uniformity on a physically nonuniform visual field. Hence, we may expect the kind of "assimilation" or "spreading effect" reported by Helson and Rholes (1959) and others. An achromatic field element will take on an appearance more similar to that of its immediate vicinity; a chromatic field element will appear more similar to its (usually achromatic) surround, i.e. its saturation will become lower.

If the "stimulus" size is increased beyond 1°, say to 2°, we may be justified in considering the central 1° to represent the "true" stimulus (satisfying the criterion of uniformity and surround dependence) and the 1° annulus to constitute a "surround". If we may assume that there is a degree of spatial opponency in colour-sensitive receptors, as in Wiesel and Hubel (1966) Type I cells, we would expect the saturation of the central portion to be reduced by the chromatic surround, and hence also expect the net result of desaturation of the centre compared to the 1° case, if the latter had been affected by a light surround. This last condition is important, since we can still claim that the lightness induction has been determined by the light surround. This is only true if the adjective "light" is taken to mean "significantly lighter than the stimulus".

If the surround is "dark" we may expect a different behaviour. Reducing the stimulus size to much less than 1° will still reduce saturation. However, increasing stimulus size to 2° leads to a more complicated situation. On the one hand, the spatial/spectral opponency would tend to reduce the saturation of the central 1°; however, the extra "surround" may be expected to be more effective at raising the lightness induction level and thus making the central 1° appear more saturated again. For a 10° field, this happens to an even greater extent. The lightness induction level is largely determined by control over activation of the achromatic channel. A chromatic field in the near periphery may contribute more to achromatic than chromatic activity. This has been suggested to be the case for 10° fields, Palmer (1978). For field sizes greater than 10°, it is possible that there exists a different saturation-affecting mechanism, which may lead to an eventual decrease in saturation, of the kind reported by Burnham (1952). Too little is known about the properties of long-range retinal interactions to enable definite predictions to be made about possible mechanisms underlying this kind of effect. It is reasonable to suppose that there is a mechanism which is responsible for constancy of colour and brightness of large fields, which would otherwise appear very nonuniform. Such a constancy would almost certainly be expected to "desaturate" a large field which is centrally fixated. This is obviously not a physiological explanation; it is little more than a reiteration of the original problem. However, it may provide an insight into the kind of possible mechanism which would produce such a constancy.

For field sizes less than 10°, the scheme reported here predicts qualitatively the changes in appearance which should be apparent when the physical stimulus size is varied - and these predictions have been made solely on the assumption that the "true" stimulus field size may be considered to subtend approximately 1°. The verity of this assumption may be further tested by an interpretation of other experimental data provided by the present study. In particular, the assumption of maximum saturation of stimuli subtending 1° if the surround is light, is readily testable. It is readily apparent from Figures 35-39 that this is indeed the case. The saturations of stimuli presented in v.c. 26 (a 1° field with $\beta = 0.56$) are consistently higher than the saturations attributed to the same stimuli when the latter subtended 10° (v.c. 20), 2° (v.c. 23) and $1/6^{\circ}$ (v.c. 29).

Furthermore, it can be seen from Figure 33 and Figure 40 that this saturation shift is not critically dependent on the purity of the stimulus. In Figure 33, there is little dependence of a_1 on stimulus subtense (c.f. Figure 16, where large variations in a_1 with luminance factor were found). In Figure 40, there is only a small dependence of Srel on pe (c.f. Figure 23). In Figure 23, only the points for a high level of $1/\beta$ (i.e. low β, light surround) are close together. Thus, we find again that induction level controls the properties of the saturation shift. In the "subtense" series of viewing conditions, the stimuli are all seen at the same (high) adaptation level (to a first approximation), and the shift is largely in a_0, not a_1.

Figures 42-44 serve as additional confirmatory evidence for the kind of behaviour expected to be caused by changes in stimulus subtense. We find that the "1° peak" is only present when the surround is lighter than the stimulus. Otherwise, there is a slow upward trend of the saturation function from $1/6^\circ$ to 10°, with no apparent "peak".

Finally, Figure 45 shows the effect of stimulus subtense on mean lightness. If we postulate that the 1° field is most susceptible to surround induction, we would expect, and indeed find, the lightness function to have a minimum at 1°. In fairness, it ought to be pointed out that the change in mean lightness from 1° to 2° is less than the change from 2° to 10°; this is in contrast to the behaviour of saturation. However, this shows how brightness is increased for large field sizes; presumably, this does serve to raise the general adaptation level and can explain the increase in saturation found between 2° and 10°.

To summarize: it has been shown that a 1° field is optimally affected by luminance induction from a surround; that the saturation of such a field at first increases with induction (when the surround is changed from dark to light) and then decreases again (as the surround gets lighter still, and induces "greyness" into the chromatic stimulus). The first stage (dark - light surround) affects low purity colours more than high purity ones; the second stage affects all colours approximately to the same extent. It has been shown that the marked "subtense" effect (the dependence of saturation on stimulus subtense) can be explained by considering the central 1° of the visual field as the effective stimulus, with the rest of the stimulus providing chromatic contrast or luminance induction.

It is tempting to propose a "model" to explain the behaviour of the saturation/induction function. A detailed model is beyond the scope of the present study, but a tentative qualitative model will be outlined here. It should be pointed out that this "model" has been chosen at random from several which would also predict the qualitative trends observed in the present data. However, its main use will be to summarize, on one diagram, all the trends observed in the present study, with the exception of the small-field data. Figure 53 shows such a model. If we postulate that the chromatic and achromatic responses vary thus with induction, we see that at high induction levels (left-hand side of graph) increasing induction lowers the difference between

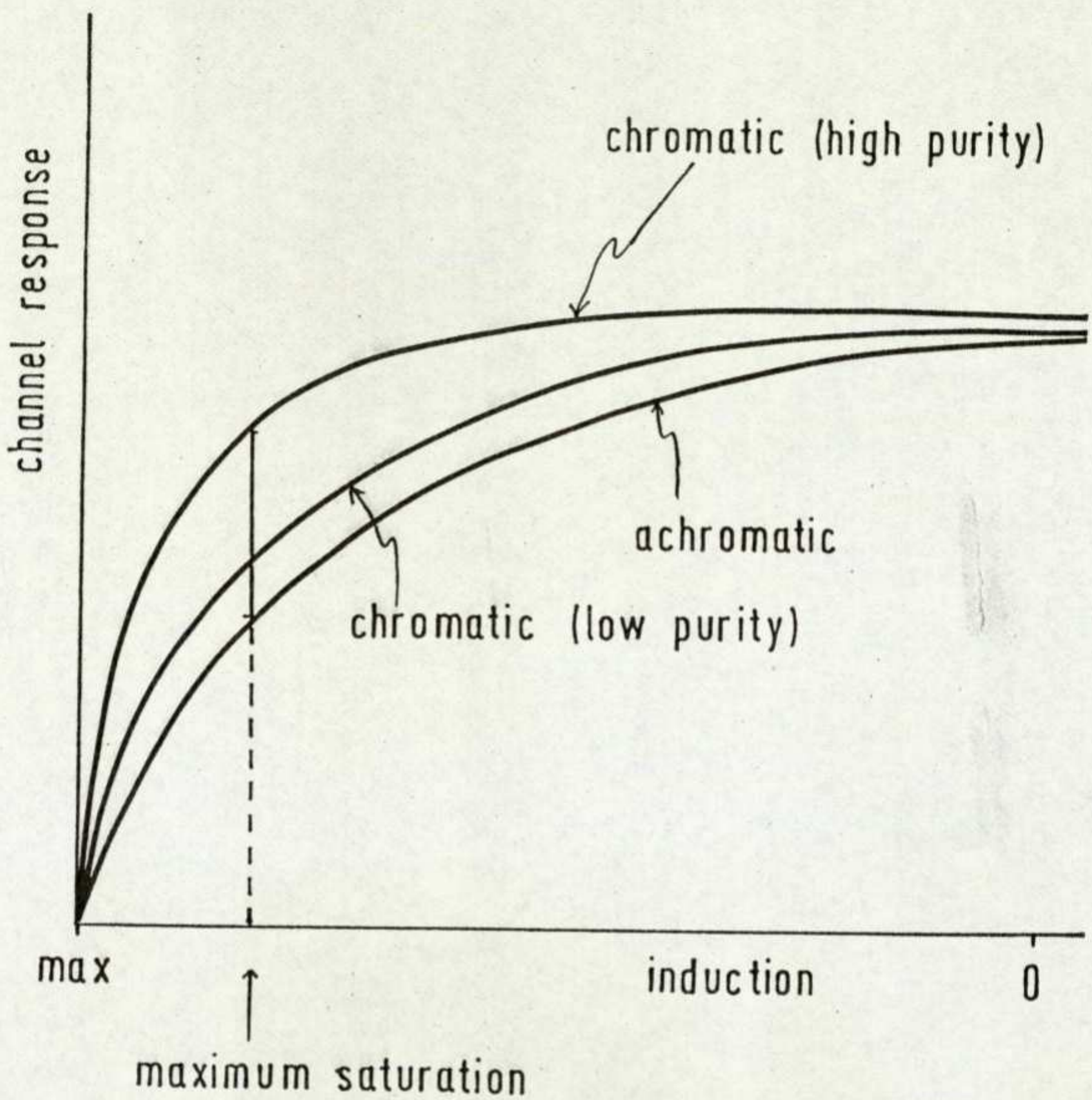


Figure 53. Qualitative model illustrating changes in saturation with induction.

Saturation $\propto \{ [\text{chromatic resp}] - [\text{achromatic resp}] \}$

chromatic response and achromatic response to the same extent; at low levels of induction (right-hand side), this difference increases more rapidly for low-purity stimuli than for high-purity stimuli. It remains to assume that saturation is linearly related to the difference between chromatic activity and achromatic activity. It is suggested that this assumption is plausible in view of the fact that it is clear that difference-signals are common in visual processing.

We can see that, for a chromatic stimulus of given chromaticity, any change in appearance due to variation in surround luminance or stimulus subtense can be portrayed by a "sideways" shift on Figure 53. At first sight, it would appear necessary to have a different set of graphs for each dominant wavelength; however, it is suggested that wavelength variability may be adequately described by selecting a wavelength-dependent "entry point" in Figure 53. This might be accomplished by considering the total brightness (i.e. achromatic and chromatic brightness) of the stimulus and surround in computing induction.

It is clear that such a "model" would be of limited value if it were only valid for what have traditionally been named "simple" stimulus configurations, to the exclusion of "complex" scenes. It is becoming increasingly apparent - see, for example, Bartleson (1977) that there is no need to make a distinction between these categories. This is why all centre/surround studies have been labelled in Section 1 as dealing with "complex fields". It has now been shown, from Bartleson's work and the present study, that it is sufficient to consider inductive appearance shifts in terms of relative brightness and extent of "colour" and "surround", and self-induced chromatic contrast in large stimuli. This leaves completely unanswered questions regarding chromatic contrast between adjacent chromatic fields, but this falls outside the original aims of the present study, which was strictly limited to achromatic surround presentation. However, this implies that the approach of Breneman (1977), using complex stimuli, does not differ widely from any "simple-field" approach: a "complex scene" consists of many simple elements, and the present study has shown that, for colour appearance studies, the "elements" need not be much smaller than 1° in subtense.

There are few references in the literature which would suggest that induction due to the presence of a light surround acts optimally on stimulus fields of 1° or less. However, there is some evidence that this might be the case. In Blackwell's (1946) extensive study, in which over 450,000 estimations of achromatic contrast threshold were made for a wide range of stimulus sizes (0.6 min - 6°) it was found that at high levels of adaptation brightness, the contrast threshold remained constant with changes in surround for all stimuli subtending 1° or more; for smaller stimuli, the threshold was strongly dependent on the surround.

Additional evidence that the extent of achromatic contrast is of order 1° comes from the study of Mach bands by Fiorentini and Radici (1958), in which the gradient of a (constant) luminance change was varied; when the luminance change occurred over a range of about

50 min, the brightness enhancement of the maximum bright band was much reduced.

Data for chromatic fields seem even more scarce. Westheimer (1970) measured increment thresholds for a 5 min test spot in the centre of a variable-diameter adapting field. The investigation involving the cone mechanism showed that the increment threshold was maximized when the diameter of the adapting background was of order $\frac{1}{2}^{\circ}$; the peak for the rod system was at a somewhat higher value of subtense. There was certainly no further dependence on the adapting-field subtense when the latter subtended more than 1° (the study only used adapting fields of 2° or less).

It is of interest that the behaviour of the small-field (0.4 min) data is also predicted by the model. The model suggests that, for fields subtending significantly less than 1°, the surround and stimulus will be "averaged". We would thus expect the saturation of the chromatic field to be lowered as the surround luminance is increased. This is in agreement with the trends shown in Figure 50.

Another interesting point emerges from the small-field data: that "saturation" is still a valid and useful concept for such fields, even though hue is not. Thus, as we reduce the "visibility" of a chromatic stimulus, the first attribute to disappear is hue, whereas saturation is still a meaningful attribute; next, that disappears, and one can only be aware of the presence of (neutral) light, i.e. brightness is the only remaining attribute; finally, the stimulus disappears completely. There are large inter-observer differences between the exact transition points for these changes in perception; however, all observers showed this tendency of abandoning first hue, then saturation, and finally brightness. It may be argued that this is a point in favour of attaching more importance to the saturation dimension than is usually the case.

The purpose of this study was to investigate colour appearance changes produced by changes in surround luminance and stimulus subtense. Because this has been the first study in which both of the above parameters have been investigated, it presented a unique opportunity of a comparison between the effect of surround luminance and stimulus subtense on stimulus appearance. It has been found that there are similarities, and differences, between these effects. Considerations of this nature have led to the assertion that the "fundamental stimulus" subtense is between $\frac{1}{2}^{\circ}$ and 1°; any future studies aiming to investigate induction effects should aim to present stimuli of such a subtense.

The results of the present study readily suggest lines for future research. More should be known about the nature of saturation; the "model" presented in Figure 53 has only been chosen because it predicts the qualitative changes observed here. However, it is reasonable to suppose that "saturation" is based on a comparison of chromatic and achromatic neural activity. These two channels have separate, parallel processing apparatus. However, their outputs seem to interact in the production of "saturation". We can make use of the differences between individual channels in the study of their interaction.

For example, a detailed comparison should be made between the behaviour of (i) achromatic fields and (ii) chromatic fields at isoluminance, when the stimulus subtense is varied. The data from this study suggest that there may be range differences between the chromatic and achromatic contrast effects. Another topic for investigation is the behaviour of large fields, whether for example the brightness of the centre is determined to a large extent by the peripheral appearance, and the hue by the central appearance. Data of this nature, in conjunction with the chromatic/achromatic contrast range data, may be used to provide a more general, quantitative model of saturation, its nature and its properties.

6. CONCLUSIONS

Three attributes of colour appearance were scaled by a total of seven observers in the main experimental study. The object of this study was to investigate any changes in the values of these attributes when (a) the luminance of an extensive surround and (b) the subtense of the chromatic field comprising the stimulus, were varied. The effect of both parameters was found to be of such a nature that they primarily affected the absolute saturation responses of the observers.

If the stimulus size was kept constant at 1°, it was found that saturation was maximized when the brightness of the test stimulus approximately matched that of the surround. Further increases in surround luminance led to an induction of "greyness" into the chromatic field, and a consequent reduction in saturation. Decreasing surround luminance made the stimulus appear self-luminous, and also led to a reduction in saturation. However, this reduction was fundamentally different in nature from the reduction with increasing "greyness"; in the case of a self-luminous stimulus, low purity colours are desaturated more than high-purity colours, whereas for "surface" colours relative changes in saturation are similar for both high- and low-purity colours.

For a larger (10°) field, it was found that the effect of surround luminance on saturation was much less pronounced.

The "effect of subtense" was primarily determined for colours with a light surround. In this case, it was found that the saturation of a 1° field was higher than that of either a 1/6° or a 2° field. However, this "1° peak" did not occur if the surround was dimmer than the stimulus. If the surround was light, there was little dependence of this effect on stimulus purity.

It is suggested that this hitherto unreported effect is caused by optimal surround induction in the 1° stimulus field. If this is the case, then it becomes useful to consider the 1° size as a "fundamental stimulus" size. The present study only shows that this need be so for central fixation; it seems reasonable to suppose, however, that a similar effect could be apparent in the near periphery. This seems reasonable also in view of the fact that this corresponds approximately to the extent of the rod-free foveola and to a typical receptive field size. There is some evidence in the literature that luminance induction does indeed act over such a range.

If the 1° size (this could mean anything between $\frac{1}{2}^{\circ}$ and 1° in practice) were to be taken as a fundamental stimulus size, all the effects described in this study can be predicted from considerations of self-induction (if the stimulus is larger than 1°), signal averaging (if the stimulus is much smaller than 1°), and differential luminance-colour induction arising from the visual nonuniformity of chromatic fields subtending more than 2°. Such a model is outlined. It is only capable at present of qualitative, not quantitative, prediction.

Small-field tritanopia was also a topic of investigation in the present study. Two important effects were found here: firstly, that the stimulus and surround were increasingly "averaged". This could be attributed to stray intra-ocular light, or to a physiological averaging process or, more likely, a mixture of the two. Secondly, it was found that saturation and brightness were the attributes whose meaning was preserved more than that of hue. This suggests that saturation is an important factor in our judgement of small field appearance; when visibility is lessened, hue "disappears" first, followed by saturation (when the colour suddenly appears neutral) and, finally, brightness.

This gives an insight into why it is desirable that saturation should be studied further. Saturation may be thought of as indicating the "degree of importance" which the human visual system gives to chromatic information. This "degree of importance" is determined by a comparison of chromatic and achromatic stimulation. This interaction between the two parallel channels may be of a quite simple nature and deserves further investigation. The result of such studies will have the benefit of being useful in two greatly differing fields; firstly, they will further our understanding of the properites of the human visual system. Secondly, such results may be applied to fields where colour appearance plays an important role, particularly in colour reproduction studies. It is hoped that the present investigation has served to simplify the task of deciding which factors, out of an almost infinite initial number, are likely to affect colour appearance significantly. At a time when the effects of chromatic adaptation are being charted in detail, it has been shown that the effects of achromatic adaptation are both pronounced and may give us a useful insight into the kind of processing which visual information undergoes.

KEY TO APPENDIX A

Appendix A											
1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55					

Fig. 54 Frame layout of Appendix A (on enclosed microfiche)

KEY TO APPENDIX A (CONT.)

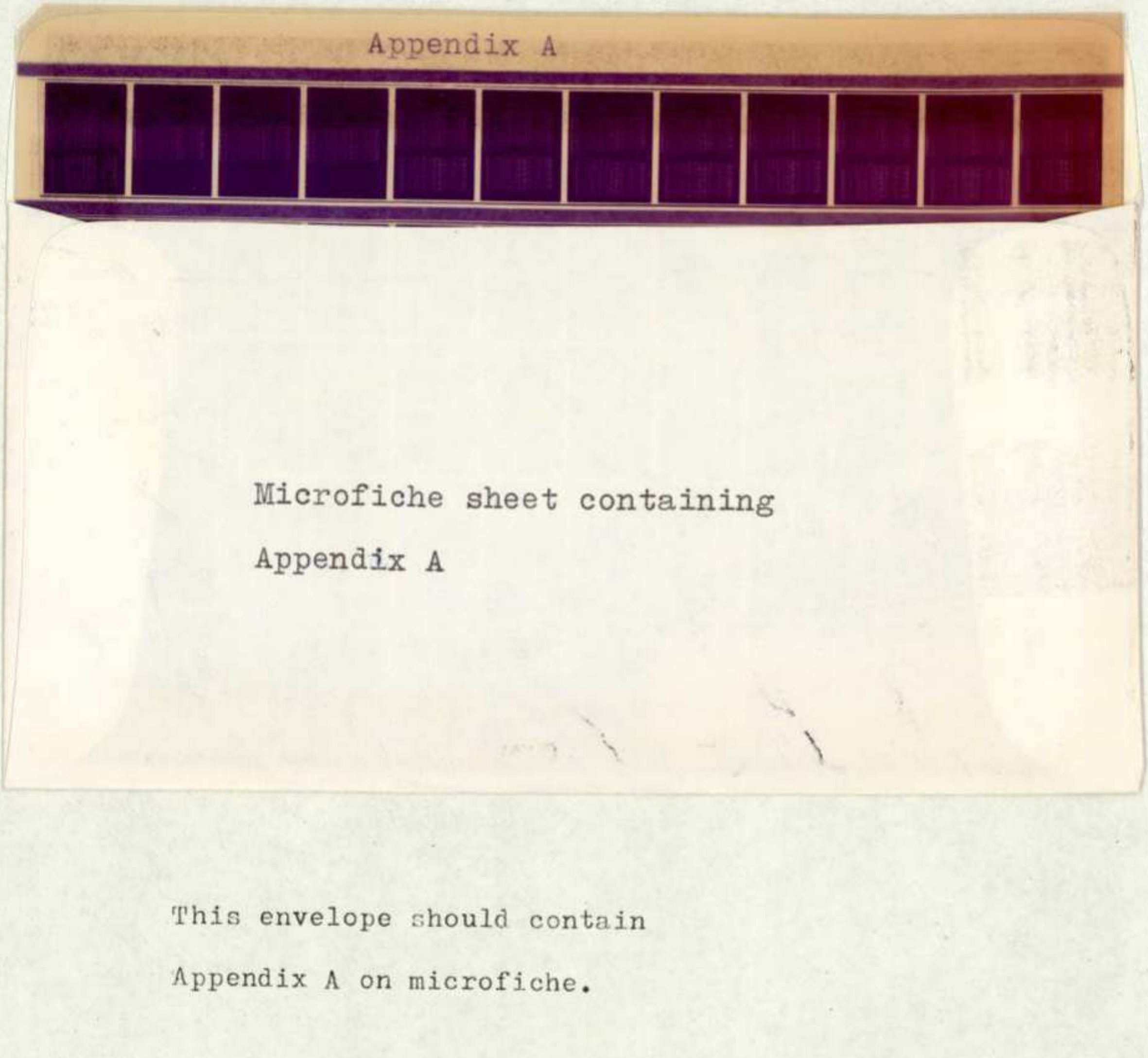
FRAME	VIEWING CONDITION	OBSERVERS
1	2	7 ; 1,6,7
2	3	7
3	4	7
4	5	7
5	6	7 ; 1,6,7
6	7	7 ; 1,6,7
7	8	7 ; 1,6,7
8	9	7 ; 1,6,7
9	10	7 ; 1,6,7
10	11	7 ; 1,6,7
11	12	7 ; 1,6,7
12	13	7 ; 2,4,5,7
13	13	2,5,7
14	14	7
15	15	7 ; 2,4,5,7
16	15	2,5,7
17	16	7
18	17	7
19	18	7 ; 2,5,7
20	19	7 ; 3,5,7
21	20	7 ; 1,6,7
22	20	3,5,7 ; 1,2,3,4,5,6,7
23	21	7 ; 3,5,7
24	22	7 ; 3,5,7
25	23	7 ; 1,6,7
26	23	3,5,7 ; 1,2,3,4,5,6,7
27	24	7 ; 3,5,7
28	25	7 ; 1,6,7
29	25	3,5,7 ; 1,2,3,4,5,6,7
30	26	7 ; 1,6,7
31	26	3,5,7 ; 1,2,3,4,5,6,7
32	27	7 ; 1,6,7
33	27	3,5,7 ; 1,2,3,4,5,6,7
34	28	7 ; 1,6,7
35	28	3,5,7 ; 1,2,3,4,5,6,7
36	29	7 ; 1,6,7
37	29	3,5,7 ; 1,2,3,4,5,6,7
38	30	7 ; 2,5,7
39	31	7 ; 2,3,4,5,7
40	31	2,5,7
41	32	7
42	33	7
43	34	7
44	35	7

Frames 45-48 blank.

Frames 49-53 FORTRAN normalization/averaging program listing

Explanatory notes on data output format (Frames 1-44)

COLUMN LABEL	NOTES
HUE	Average hue in grads, 0 = Red 100 = Yellow 200 = Green -100 = Blue
SATN	Absolute saturation (colourfulness)
AXIS1	One axis of concentration ellipse
AXIS2	Other axis of ellipse
INCL	Inclination of Axis1 to horizontal.
SIGS	Relative saturation error $\frac{\sigma S}{S}$
SIGH	Relative hue error $\frac{\sigma H}{400}$
AREA	Area of concentration ellipse
LTNESS	Lightness (only given if stimulus judged to be darker than the surround by all observers).
SIGL	Relative lightness error $\frac{\sigma L}{L}$
BTNESS	Brightness (only given if stimulus judged to be lighter than the surround by all observers).
SIGB	Relative brightness error $\frac{\sigma B}{B}$
XXXX	If this appears after the SIGB column, then either both lightness and brightness values have been assigned to the stimulus, or the stimulus was not visible to some observers. The symbol XXXX also appears for STIM 31, which gives the hue/saturation of the surround.
S ERROR	Average SIGS } For all stimuli
H ERROR	Average SIGH } For all stimuli
L ERROR	Average SIGL } For all stimuli
B ERROR	Average SIGB } For all stimuli



This envelope should contain
Appendix A on microfiche.

REFERENCES

ABNEY, W. de W. (1910). On the change in hue of spectrum colours by dilution with white light. Proc. Roy. Soc. (Lond.) A83, 120-127.

ABRAMOV, I. (1968). Further analysis of the responses of LGN cells. J. Opt. Soc. Am. 58, 574-579.

ABRAMOV, I. & GORDON, J. (1974). Vision. Ch. 16 in E.C. Carterette & M.P. Friedman (eds.). Handbook of perception, vol. III, pp.327-357, Academic Press.

ALPERN, M. (1964). Relation between brightness and color contrast. J. Opt. Soc. Am. 54, 1491-1492.

ALPERN, M & DAVID, H. (1959). The additivity of contrast in the human eye. J. Gen. Physiol. 43, 109-126.

BARTLESON, C.J. (1960). Memory-colors of familiar objects. J. Opt. Soc. Am 50, 73-77.

BARTLESON, C.J. (1966). Color-appearance measurement. I. A colorimeter for haploscopic matching. Phot. Sci. Eng. 10, 104-110.

BARTLESON, C.J. (1974). Optimum image tone reproduction. Journal SMPTE 84, 613-618.

BARTLESON, C.J. (1976). Brown. Color Res. Appl. 1, 181-191.

BARTLESON, C.J. (1977). Factors affecting color appearance and measurement by psychophysical methods. PhD Thesis, The City University, London.

BARTLESON, C.J. (1978). A review of chromatic adaptation. Proc. 3rd AIC Congress Color 77, Troy, N.Y., p.63-96. Adam Hilger.

BARTLESON, C.J. & BRENEMAN, E.J. (1967a). Brightness perception in complex fields. J. Opt.Soc.Am 57, 953-957.

BARTLESON, C.J. & BRENEMAN, E.J. (1967b). Brightness rproduction in the photographic process. Phot. Sci. Eng. 11, 254-262.

BARTLESON, C.J. & BRENEMAN, E.J. (1973). Differences among responses of observers in scaling brightness. Proc. 2nd AIC Congress, York, pp. 398-400. Adam Hilger.

BAUER, H.D. & RÖHLER, R. (1977). Brightness generation in the human visual system. Colour-brightness: a contribution of cortical colour channels to brightness sensation. Vis. Res. 17, 1211-1216.

BEARE, A.C. & SIEGEL, M.H. (1967). Color name as a function of wavelength and instruction. Percept. Psychophys. 2, 521-527.

BECK, J. (1972). Surface Color Perception. Cornell University Press.

BEKESY, G.J. (1968). Mach- and Hering-type lateral inhibition in vision. Vis. Res. 8, 1483-1499.

BENDER, B.G. (1973). Spatial interaction between the red- and green-sensitive colour mechanisms of the human visual system. Vis Res. 13, 2205-2218.

BERNOULLI, D. (1738/1954). Exposition of a new theory on the measurement of risk (Originally published in Latin in 1738). Translation in Econometrica 22, 23-35 (1954).

BLACKWELL, H.P. (1946). Contrast thresholds in the human eye. J. Opt. Soc. Am 36, 624-643.

BORING, E.G. (1942). Sensation and perception in the history of experimental psychology. Appleton-Century-Crofts.

BOYNTON, R.M. & GORDON, J. (1965). Bezold-Brucke hue shift measured by color-naming technique. J. Opt. Soc. Am. 55, 78-86.

BOYNTON, R.M. & KAISER, P.K. (1978). Temporal analog of the minimally-distinct border. Vis. Res. 18, 111-113.

BOYNTON, R.M., SCHAFFER, W. & NEUN, M.E. (1964). Hue-wavelength relation measured by color-naming method for three retinal locations. Science, N.Y. 146, 666-668.

BRENEMAN, E.J. (1958). Dependence of luminance required for constant brightness upon chromaticity and chromatic adaptation. J. Opt. Soc. Am. 48, 228-232.

BRENEMAN, E.J. (1962). The effect of level of illuminance and relative surround luminance on the appearance of black-and-white photographs. Phot. Sci. Eng. 6, 172-179.

BRENEMAN, E.J. (1977). Perceived saturation in complex stimuli viewed in light and dark surrounds. J. Opt. Soc. Am. 67, 657-662.

BRINDLEY, G.S. (1970). Physiology of the retina and visual pathway. Second Edition. Edward Arnold, London.

BRITISH STANDARD 1376 (1974). Specification of colours of light signals. British Standards Institution, London.

BROCA, A. & SULZER, D. (1902, 1903). La sensation lumineuse en fonction du temps. Comptes Rendus, Academie des Sciences, Paris, 134, 831-834; 137, 944-946, 977-979 & 1046-1049.

BURNHAM, R.W. (1951). The dependence of color upon area. Amer. J. Psychol. 64, 521-533.

BURNHAM, R.W. (1952). Comparative effects of area and luminance on color. Amer. J. Psychol. 65, 27-38.

BURNHAM, R.W. (1952b). A colorimeter for research in color perception. Am. J. Psychol. 65, 603-608.

BURNHAM, R.W. (1953a). Bezold's color-mixtures effect. Amer. J. Psychol. 66, 377-385.

BURNHAM, R.W. (1953b). Color perception in small test fields. J. Opt. Soc. Am. 43, 899-902.

BURNHAM, R.W. (1959). Predictions of shifts in color appearance with a change from daylight to tungsten illumination. J. Opt. Soc. Am. 49, 254-263.

BURNHAM, R.W., EVANS, R.M. & NEWHALL, S.M. (1952). Influence on color perception of adaptation to illumination. J. Opt. Soc. Am. 42, 597-605.

BURNHAM, R.W., EVANS, R.M. & NEWHALL, S.M. (1957). Prediction of color appearance with different adaptation illuminations. J. Opt. Soc. Am. 47, 35-42.

BURNHAM, R.W. & MALACH, R.J. (1960). Color appearance specification with adaptation to daylight and tungsten illumination. J. Opt. Soc. Am. 50, 1071-1074.

CHAPANIS, A. & HALSEY, R.M. (1955). Luminance of equally bright colors. J. Opt. Soc. Am. 45, 1-6.

CHARPENTIER, A. (1886). Sur une condition physiologique influencant les mésures photometriques. Lumiere Electrique 21, 165.

CIE (1970). CIE Publication No. 17, International Lighting Vocabulary. Commission Internationale de l'Eclairage.

CLARKE, F.J.J. (1960). Extra-foveal colour metrics. Optica Acta 7, 355-384.

CLARKE, F.J.J. (1963). Further studies of extra-foveal colour metrics. Optica Acta 10, 257-284.

COLE, R.E. & DIAMOND, A.L. (1971). Amount of surround and test-inducing separations in simultaneous brightness contrast. Percept. Psychophys. 1, 125-128.

DAW, N.W. (1968). Goldfish retina: organization for simultaneous color contrast. Science, 158, 942-944.

DEMBER, W.N. (1960). The psychology of perception. Holt, Rinehart & Winston.

DEMPSTER, A.P. (1969). Elements of continuous multivariate analysis. Addison-Wesley.

De VALOIS, R.L. (1965). Analysis and coding of color vision in the primate visual system. Cold Spring Harbor Sympos. quant. Biol. 30, 567-579.

De VALOIS, R.L., ABRAMOV, I. & JACOBS, G.H. (1966). Analysis of response patterns of LGN cells. J. Opt. Soc. Am. 56, 966-977.

De VALOIS, R.L. & De VALOIS, K.K. (1975). Neural coding of color. In E.C. Carterette & M.P. Friedman (eds.). Handbook of Perception, vol. 5, pp. 117-166.

DIAMOND, A.L. (1953). Foveal simultaneous brightness contrast as a function of inducing-and test-field luminances. J. exp. Psychol. 45, 304-314.

DIAMOND, A.L. (1955). Foveal simultaneous contrast as a function of inducing-field area. J. exp. Psychol. 50, 144-152.

DIMMICK, F.L. & HUBBARD, M.R. (1939). The spectral location of psychologically unique yellow, green and blue. Am. J. Psychol. 52, 242-254.

DUNN, B. & LEIBOWITZ, H. (1961). The effect of separation between test and inducing fields on brightness constancy. J. exp. Psychol. 50, 144-152.

EICHENGREEN, J.M. (1976). Unique hue loci: induced shifts with complementary surrounds. Vis. Res. 16, 199-203.

EMERSON, P.L. & SEMMELROTH, C.C. (1975). Filter model for lightness and brightness on different backgrounds. J. Opt. Soc. Am. 65, 1101-1105.

EVANS, R.M. (1959). Fluorescence and grey content of surface colors. J. Opt. Soc. Am. 49, 1049-1059 .

EVANS, R.M. (1964). Variables of perceived color. J. Opt. Soc. Am. 54, 1467-1474.

EVANS, R.M. & SWENHOLT, B.K. (1967). Chromatic strength of colors: dominant wavelength and purity. J. Opt. Soc. Am. 57, 1319-1324.

EVANS, R.M. & SWENHOLT, B.K. (1968). Chromatic strength of colors, part II. The Munsell system. J. Opt. Soc. Am. 58, 580-584.

EVANS, R.M. & SWENHOLT, B.K. (1969). Chromatic strength of colors, III. Chromatic surrounds and discussion. J. Opt. Soc. Am. 59, 628-634.

FECHNER, G.T. (1860/1966). Elemente der Psychophysik, Leipzig, Breitkopf & Härtel. Trans. H.E. Adler, D.H. Howes & E.G. Boring (eds.) as Elements of Psychophysics, vol. I. H. Holt, New York (1966).

FELLER, R.L. (1970). On the colour space of Sigfrid Forsius 1611. Colour Engineering, June 1970, 48-51.

FIORENTINI, A. & RADICI, T. (1958). Brightness, width and position of Mach bands as a function of the rate of variation of luminance gradient. Atti. Fond. Giorgio Ronchi, 13, 145-155.

FRAUNHOFER, J. (1815). Bestimmung des Brechungs - und Farbenzestreuungs-Vermögens Verschiedener Glasarten, in Bezug auf die Vervolkommung achromatischer Fernrohre. Denkshr. Acad. Wiss. München (Math. Naturwiss, a.) 5, 193-226.

FRY, G.A. & ALPERN, M. (1953). The effect of peripheral glare upon the apparent brightness of an object. J. Opt. Soc. Am. 43, 189-195.

GALIFRET, Y. (1959). Les psychophysiques de la saturation chromatique. L'Annee Psychologique 59, 35-46.

GIBBS, T. & LAWSON, R.B. (1974). Simultaneous brightness contrast in stereoscopic space. Vis. Res. 14, 983-987.

GORDON, J. & ABRAMOV, I. (1977). Color vision in the peripheral retina II. Hue and saturation. J. Opt. Soc. Am. 67, 202-207.

GOURAS, P. (1968). Identification of cone mechanisms in monkey ganglion cells. J. Physiol. (Lond.), 199, 533-547.

GUILD, J. (1931). The colorimetric properties of the spectrum. Phil. Trans. Roy. Soc. (London), A230, 149.

GUIRAO, M. & MATTIELLO, M.L.F. De (1974). Saturation scales for surface colors. Vis. Res. 14, 487-493.

GUTH, S.L. (1970). Photometric and colorimetric additivity at various intensities. Proc. 1st AIC Congress, Stockholm, June 1969. Musterschmidt, Berlin.

GUTH, S.L. (1973). On neural inhibition, contrast effects and visual sensitivity. Vis. Res. 13, 937-957.

GUTH, S.L., ALEXANDER, J.V., CHUMBLY, J.I., GILLMAN, C.B. & PATTERSON, M.M. (1968). Factors affecting luminance additivity at threshold among normal and colorblind subjects and elaborations of a trichromatic-opponent colors theory. Vis. Res. 8, 913-928.

GUTH, S.L., DONLEY, N.J. & MARROCCO, P.T. (1969). On luminance additivity and related topics. Vis. Res. 9, 537-575.

GUTH, S.L. & GRAHAM, B.V. (1975). Heterochromatic additivity and the acuity response. Vis. Res. 15, 317-319.

GUTH, S.L. & LODGE, H.R. (1973). Heterochromatic additivity, foveal spectral sensitivity and a new color model. J. Opt. Soc. Am. 63, 450-462.

HALSEY, R. (1959a). Identification of signal lights. I. Blue, green, white and purple. J. Opt. Soc. Am. 49, 45-55.

HALSEY, R. (1959b). Identification of signal lights. II. Elimination of the purple category. J. Opt. Soc. Am. 49, 167-169.

HAMBROUCK, M. (1975). Etude psychophysique des contrastes chromatiques simultanes. Vis. Res. 15, 9-21.

HANES, R.M. (1949). A scale of subjective brightness. J. exp. Psychol. 39, 438-452.

HANES, R.M. (1951). Suprathreshold area brightness relationships. J. Opt. Soc. Am. 41, 28-31.

HARRINGTON, R.E. (1954). Effect of color temperature on apparent brightness. J. Opt. Soc. Am. 44, 113-116.

HARTRIDGE, H. (1945a). The change from trichromatic to dichromatic vision in the human retina. Nature 155, 391-392.

HARTRIDGE, H. (1945b). The change from trichromatic to dichromatic vision in the human retina. Nature 155, 657-662.

HEGGELUND, P. (1974). Achromatic color vision - II. Measurement of simultaneous achromatic contrast within a bidimensional system. Vis. Res. 14, 1081-1088.

HEINEMANN, E.G. (1955). Simultaneous brightness induction as a function of inducing-and test-field luminances. J. exp. Psychol. 50, 89-96.

v. HELMHOLTZ, H.L.F. (1911/1962). Handbuch der physiologischen Optik, vol. II. Trans. as Handbook of physiological optics vol. II (J.P.C. Southall). Dover, N.Y.

HELSON, H. (1938). Fundamental problems incolor vision. I. The principle governing changes in hue, saturation, and lightness of non-selective samples in chromatic illumination. J. Exp. Psychol. 23, 439-476.

HELSON, H. (1963). Studies of anomalous contrast and assimilation. J. Opt. Soc. Am. 53, 179-184.

HELSON, H. & JEFFERS, V.B. (1940). Fundamental problems in color vision. II. Hue, lightness and saturation of selective samples in chromatic illumination. J. Exp. Psychol. 26, 1-27.

HELSON, H., JUDD, D.B. & WARREN, H.H. (1952). Object-color changes from day-light to incandescent filament illumination. Illum. Eng. 47, 221-233.

HELSON, H. & RHOLES, F.H. (1959). A quantitative study of reversal of classical lightness-contrast. Amer. J. Psychol. 72, 530-538.

HERING, E. (1874, 1964). Grundzüge der Lehre vom Lichtsinn, Berlin, Springer. Trans. L.M. Hurvich & D. Jameson (1964), Outlines of a theory of the light sense. Harvard University Press.

HESS, C. & PRETORI, H. (1894). Messende Untersuchungen über die gesatzenässigkeit des simultanen Helligkeitskontrastes. Graefe's Archiv fuer Ophthalmologie 40, 1-24.

HOLLINS, M. (1971). Brightness contrast at low luminances. Vis. Res. 11, 1459-1472.

HUBEL, D.H. & WIESEL, T.N. (1962). Receptive fields, binocular interaction and functional architecture in the cat's visual cortex. J. Physiol. (Lond.) 160, 106-154.

HUBEL, D.H. & WIESEL, T.N. (1968). Receptive fields and functional architecture of monkey striate cortex. J. Physiol. (Lond.) 195, 215-243.

HUNT, R.W.G. (1950). The effects of daylight and tungsten light adaptation on color perception. J. Opt. Soc. Am. 40, 362-371.

HUNT, R.W.G. (1952). Light and dark adaptation and the perception of color. J. Opt. Soc. Am. 42, 190-199.

HUNT, R.W.G. (1953). The perception of color in 1° fields for different states of adaptation. J. Opt. Soc. Am. 43, 479-484.

HUNT, R.W.G. (1976). Sky-blue pink. Color Res. Appl. 1, 11-16.

HUNT, R.W.G. (1977a). The specification of colour appearance. I. Concepts and terms. Color Res. Appl. 2, 55-68.

HURVICH, L.M. (1978). Two decades of opponent processes. Proc. 3rd AIC Congress, Color 77, Troy, N.Y. pp. 33-61. Adam Hilger.

HURVICH, L.M. & JAMESON, D. (1955). Some quantitative aspects of an opponent-colors theory, II. Brightness, saturation and hue in normal and dichromatic vision. J. Opt. Soc. Am. 45, 602-616.

HURVICH, L.M. & JAMESON, D. (1956). Some quantitative aspects of an opponent-colors theory. IV. A psychological color specification system. J. Opt. Soc. Am. 46, 416-421.

INDOW, T. (1967). Saturation scales for red. Vis. Res. 7, 481-495.

INDOW, T. & STEVENS, S.S. (1966). Scaling of saturation and hue. Percept. Psychophys. 1, 253-271.

INGLING, C.R. (1977). The spectral sensitivity of the opponent - color channels. Vis. Res. 17, 1083-1089.

INGLING, C.R., BURNS, S. & DRUM, B.A. (1977). Desaturating blue increases only chromatic brightness. Vis. Res. 17, 501-503.

INGLING, C.R. & DRUM, B.A. (1973). How neural adaptation changes chromaticity coordinates. J. Opt. Soc. Am. 63, 369-373.

INGLING, C.R. & HUONG-PENG TSOU , B. (1977). Orthogonal combination of three visual channels. Vis. Res. 17, 1075-1082.

INGLING, C.R., SCHEIBNER, H.M.O. & BOYNTON, R.M. (1970). Color naming of small foveal fields. Vis. Res. 10, 501-511.

ISHAK, I.H.G., BOUMA, H. & VAN BUSSEL, H.J.J. (1970). Subjective estimates of colour attributes for surface colours. Vis. Res. 10, 489-500.

JACOBS, G.H. (1967). Saturation estimates and chromatic adaptation. Percept. Psychophys. 2, 271-274.

JACOBS, G.H. & GAYLORD, H.A. (1967). Effects of chromatic adaptation on color-naming. Vis. Res. 7, 645-653.

JAMESON, D. (1972). Theoretical issues of color vision, pp. 381-412, in D. Jameson & L.M. Hurvich (eds.). Handbook of sensory physiology, Volume VII/4 Visual psychophysics. Berlin, Springer.

JAMESON, D. & HURVICH, L.M. (1949). Levels of adaptation and brightness changes during color adaptation. Science 110, 92-93.

JAMESON, D. & HURVICH, L.M. (1955). Some quantitative aspects of an opponent-colors theory. I. Chromatic responses and spectral saturation. J. Opt. Soc. Am. 45, 546-552.

JAMESON, D. & HURVICH, L.M. (1956). Some quantitative aspects of an opponent-colors theory, III. Changes in brightness, saturation and hue with chromatic adaptation. J. Opt. Soc. Am. 46, 405-415.

JAMESON, D. & HURVICH, L.M. (1959). Perceived color and its dependence on focal, surrounding and preceding stimulus variables. J. Opt. Soc. Am. 49, 890-898.

JAMESON, D. & HURVICH, L.M. (1961a). Opponent chromatic induction: experimental evaluation and theoretical account. J. Opt. Soc. Am. 51, 46-53.

JAMESON, D. & HURVICH, L.M. (1961b). Complexities of perceived brightness. Science 133, 174-179.

JAMESON, D. & HURVICH, L.M. (1964). Theory of brightness and color contrast in human vision. Vis. Res. 4, 135-154.

JONES, L.A. & LOWRY, E.M. (1926). Retinal sensibility to saturation differences. J. Opt. Soc. Am. 13, 25-34.

JUDD, D.B. (1940). Hue, saturation and lightness of surface colors with chromatic illumination. J. Opt. Soc. Am. 30, 2-32.

JUDD, D.B. (1960). Appraisal of Land's work on two-primary color projections. J. Opt. Soc. Amer. 50, 254-267.

KAISER, P.K. & COMERFORD, J.P. (1975). Flicker photometry of equally bright lights. Vis. Res. 15, 1399-1402.

KANEKO, A. (1970). Physiological and morphological identification of horizontal, bipolar and amacrine cells in goldfish retina. J. Physiol. (Lond.) 207, 623-633.

KERR, L. (1976). Effect of chromatic contrast on stimulus brightness. Vis. Res. 16, 463-468.

KINNEY, J.A. (1962). Factors affecting induced color. Vis. Res. 2, 503-525.

KIRSCHMANN, A. (1890). Über die quantitativen Verhältnisse des simultanen Helligkeits - und - Farben-contrastes. Psychol. Stud. (Wundt) 6, 417-491.

KOHLRAUSCH, A. (1923). Über den Helligkeitsvergleich verschiedener Farben. Pflugers. Arch. ges. Physiol. 200, 210-215.

KOHLRAUSCH, A. (1935). Zur Photometrie Farbiger Lichter. Das Licht, 5, 259-260.

KONIG, A. (1894). Uber den menschlichen Sehpurpur und seine Bedeutung fur das Sehen. S.B. Akad. Wiss. Berlin, 1894, 577-598.

KUFFLER, S.W. (1953). Discharge patterns and functional organization of mammalian retina. J. Neurophysiol. 16, 37-68.

LARIMER, J., KRANTZ, D.H. & CICERONE, C.M. (1974). Opponent-process additivity - I: Red/Green equilibria. Vis. Res. 14, 1127-1140.

LEIBOWITZ, H., MOTE, F.A. & THURLOW, W.R. (1953). Simultaneous contrast as a function of separation between test and inducing fields. J. exp. Psychol. 46, 453-456.

LURIA, S.M. (1967). Color-name as a function of stimulus - intensity and duration. Amer. J. Psychol. 80, 14-27.

MACADAM, D.L. (1950). Loci of constant hue and brightness determined with various surrounding colors. J. Opt. Soc. Am. 40, 589-595.

MACADAM, D.L. (1956). Chromatic adaptation. J. Opt. Soc. Am. 46, 500-513.

MACH, E. (1914). The analysis of sensations and the relation of the physical to the psychical. Trans. by C.M. Williams. Open Court Publishing Company.

MACNICHOL, E.F.Jr. & SVAETICHIN, G. (1958). Electric responses from the isolated retinas of fishes. Am. J. Ophthal. 46, 26-46.

MARKS, L.E. (1974a). Blue-sensitive cones can mediate brightness. Vis. Res. 14, 1493-1494.

MARKS, L.E. (1974b). Sensory processes: the new psychophysics. Academic Press.

MARKS, W.B., DOBELLE, W.H. & MACNICHOL, E.F. (1964). Visual pigments of single primate cones. Science 143, 1181-1182.

MARR, D. (1974). The computation of lightness by the primate retina. Vis. Res. 14, 1377-1388.

MARSHALL, B.H. & GUILFORD, J.P. (1934). The dependence of hue, tint and chroma upon area. Amer. J. Psychol. 46, 465-469.

MATTIELLO, M.L.F. De. (1977). Individual color functions. Percept. Psychophys. 21, 396-398.

MATTIELLO, M. & GUIRAO, M. (1973). Lightness and saturation for surface colours. Proc. 2nd AIC Congress, York, 1973. Adam Hilger.

MATTIELLO, M. & GUIRAO, M. (1974). Direct estimation of lightness of surface colors. J. Opt. Soc. Am. 64, 206-209.

MAXWELL, R.S. (1929). The quantitative estimation of the sensation of colour. Brit. J. Psychol. 20, 181-189.

MIDDLETON, W.E.K. & HOLMES, M.C. (1949). The apparent colors of surfaces of a small subtense - a preliminary report. J. Opt. Soc. Am. 39, 582-592.

MITCHELL, D.E. & RUSHTON, W.A.H. (1971a). Visual pigments in dichromats. Vis. Res. 11, 1033-1043.

MITCHELL, D.E. & RUSHTON, W.A.H. (1971b). The red/green pigments of normal vision. Vis. Res. 11, 1045-1056.

MORRISON, D.F. (1967). Multivariate statistical methods. McGraw-Hill series in probability and statistics. McGraw-Hill.

NAYATANI, Y., YAMANAKA, T. & SOBAGAKI, H. (1972). Subjective estimation of color attributes for surface colors. Part I. Reproducibility of estimates. Acta Chromatica 2, 129-138.

NEWHALL, S.M., BURNHAM, R.W. & EVANS, R.M. (1959). Influence of shadow quality on color appearances. J. Opt. Soc. Am. 49, 909-917.

NEWHALL, S.M. NICKERSON, D. & JUDD, D.B. (1943). Final report of the OSA subcommittee on the spacing of the Munsell colors. J. Opt. Soc. Am. 33, 385-418.

NICKERSON, D. (1940). History of the Munsell color system and its scientific application. J. Opt. Soc. Am. 30, 575-586.

ONLEY, J.W. (1960). Brightness scaling of white and colored stimuli. Science 132, 1668-1670.

ONLEY, S.W. (1961). Light adaptation and the brightness of brief foveal stimuli. J. Opt. Soc. Am. 51, 667-673.

ONLEY, J.W. & BOYNTON, R.M. (1962). Visual responses to equally bright stimuli of unequal luminance. J. Opt. Soc. Am. 52, 934-940.

ONLEY, J.W., KLINGBERG, G.L., DAINOFF, M.J. & ROLLMAN, G.B. (1963). Quantitative estimates of saturation. J. Opt. Soc. Am. 53, 487-493.

OPTICAL SOCIETY OF AMERICA - COMMITTEE ON COLORIMETRY (1953). The Science of Color. O.S.A., Washington, D.C.

OYAMA, T. & HSIA, Y. (1966). Compensatory hue shift in simultaneous color contrast as a function of separation between inducing and test fields. J. Exp. Psychol. 71, 405-413.

PADGHAM, C.A. (1971). The direct estimation of the luminosity of coloured light sources. Vis. Res. 11, 577-590.

PADGHAM, C.A. & ROWE, S.C.H. (1973). A mass colour scaling experiment. Proc. 2nd AIC Congress, York. Adam Hilger, pp. 393-398.

PADGHAM, C.A. & SAUNDERS, J.E. (1966). Scales of apparent brightness. Trans. Illum. Eng. Soc. (London) 31, 122-142.

PALMER, D.A. (1978). Private communication, and in lecture to colour group of Great Britain, 11 January 1978.

PANEK, D.W. & STEVENS, S.S. (1966). Saturation of red: a prothetic continuum. Percept. Psychophys. 1, 59-66.

PEARSON, D.S., RUBINSTEIN, D.B. & SPIVACK, G.J. (1969). Comparison of perceived color in two-primary computer-generated artificial images with predictions based on the Helson-Judd formulation. J. Opt. Soc. Am. 59, 644-658.

PITT, I.T. & WINTER, L.M. (1974). Effect of surround on perceived saturation. J. Opt. Soc. Am. 64, 1328-1331.

PLATEAU, J.A.F. (1872). Sur la mesure des sensations physiques, et sur la loi qui lie l'intensite de ces sensations a l'intensite de la cause excitante. Bull. Acad. Roy. Belg. 33, 376-388.

POINTER, M.R. (1978). Colourfulness: a new concept. Proc. 3rd AIC Congress, Troy. Adam Hilger, pp. 327-330.

POINTER, M.R., ENSELL, J.S. & BULLOCK, L.M. (1977). Grids for assessing colour appearance. Color Res. Appl. 2, 131-136.

PURDY, D. McL. (1931). On the saturations and chromatic thresholds of the spectral colours. Brit. J. Psychol. 21, 283-313.

PURDY, D. McL. (1937). The Bezold-Brücke phenomenon and contours for constant hue. Amer. J. Psychol. 49, 313-315.

PURKINJE, J.E. (1825). Neue Beiträge zur Kenntniss des Sehens in subjectiver Hinsicht, p. 108-110.

RENTSCHLER, I. (1973). Spatial summation in color-receptive pathways. Vis. Res. 13, 325-336.

RICHARDSON, L.F. (1929). Quantitative mental estimates of light and colour. Brit. J. Psychol. 20, 27-37.

RICHTER, K. (1973). Berschreibung der Farbumstimmung und Anwendung zur Berechnung der Farbwiedergabe. Die Farbe 22, 45-57.

ROWE, S.C.H. (1972). The subjective scaling of hue and saturation. PhD Thesis, The City University, London.

RUSHTON, W.A.H. (1963). A foveal pigment in the protanope. J. Physiol. (Lond.) 168, 345-359.

RUSHTON, W.A.H. (1965). A foveal pigment in the deuteranope. J. Physiol. (Lond.) 176, 24-37.

SANDERS, C.L. & WYSZECKI, G. (1957). Correlate for lightness in terms of CIE - tristimulus values, Part I. J. Opt. Soc. Am. 47, 398-404.

SANDERS, C.L. & WYSZECKI, G. (1958). L/Y ratios in terms of CIE chromaticity coordinates. J. Opt. Soc. Am. 48, 389-392.

SAUNDERS, J.E. (1972). The validity of magnitude estimations of luminosity and the measurement of the relative effects of pre-adaptation and contrast. Vis. Res. 12, 689-698.

SAVAGE, C.W. (1970). The measurement of sensation. University of California Press.

SCHEIBNER, H. (1966). Adaptive color shifts. J. Opt. Soc. Am. 56, 938-942.

SEMMELROTH, C.C. (1970). Prediction of lightness and brightness on different backgrounds. J. Opt. Soc. Am. 60, 1685-1689.

SIEGEL, M.H. & SIEGEL, A.B. (1971). Color name as a function of surround luminance and stimulus duration. Percept. Psychophys. 9, 140-144.

SMITH, D.P. (1973). Color naming and hue discrimination in congenital tritanopia and tritanomaly. Vis. Res. 13, 209-218.

SOBAGAKI, H., YAMANAKA, T., TAKAHAMA, K. & NAYATANI, Y. (1974). Chromatic-adaptation study by subjective-estimation method. J. Opt. Soc. Am. 64, 743-749.

SPERLING, H.G. & HARWERTH, R.S. (1971). Red-greed cone interactions in the increment - threshold spectral sensitivity of primates. Science 172, 180-184.

STEVENS, J.C. (1967). Brightness inhibition re size of surround. Percept. Psychophys. 2, 189-192.

STERNHEIM, C.E. GORINSON, R. & MARKOVITZ, N. (1977). Visual sensitivity during successive chromatic contrast: evidence for interactions between photopic mechanisms. Vis. Res. 17, 45-49.

STEVENS, J.C. & STEVENS, S.S. (1963). Brightness function: effects of adaptation. J. Opt. Soc. Am. 53, 375-385.

STEVENS, S.S. (1934a). The attributes of tone. Proc. Nat. Acad. Sci. (Washington) 20, 457-459.

STEVENS, S.S. (1934b). The relation of saturation to the size of the retinal image. Amer. J. Psychol. 46, 70-79.

STEVENS, S.S. (1951). Mathematics, measurement and psychophysics. Handbook of experimental psychology (ed. S.S. Stevens) Ch. 1 1-49. New York, John Wiley.

STEVENS, S.S. (1974). Perceptual magnitude and its measurement. Ch. 11 in E.C. Carterette & M.P. Friedman (eds.) Handbook of Perception, Vol. II. Psychophysical judgement and measurement, pp. 361-389.

STEVENS, S.S. (1975). Psychophysics. Introduction to its perceptual, neural and social prospects (ed. G. Stevens). John Wiley.

STEVENS, S.S. & DIAMOND, A.L. (1965). Effect of glare angle on the brightness function for a small target. Vis. Res. 5, 649-659.

STILES, W.S. & BURCH, J.M. (1959). N.P.L. Colour-matching investigation: final report. Optica Acta 6, 1 - 26.

TAKASAKI, H. (1966). Lightness change of greys induced by change in reflectance of grey background. J. Opt. Soc. Am. 56, 504-509.

TANSLEY, B.W. & BOYNTON, R.M. (1976). A line, not a space, represents visual distinctness of borders formed by different colors. Science 191, 954-957.

THOMSON, L.C. (1954). Sensation aroused by monochromatic stimuli and their prediction. Optica Acta 1, 93-102.

THOMSON, L.C. & WRIGHT, W.D. (1947). The colour sensitivity of the retina within the central fovea of man. J. Physiol. 105, 316-331.

TITCHENER, E.B. (1910). A text-book of psychology. New York, MacMillan.

TREZONA, P.W. (1973). Tetrachromatic colour measurement. Proc. 2nd AIC Congress Colour 73, York, pp. 324-328. Adam Hilger.

TROSCIANKO, T.S. (1977). Effect of subtense and surround luminance on the perception of a coloured field. Color Res. Appl. 2, 153-159.

VALBERG, A. (1971). A method for the precise determination of achromatic colours including white. Vis. Res. 11, 157-160.

VALBERG, A. (1974). Color induction: dependence on luminance, purity and dominant or complementary wavelength of inducing stimuli. J. Opt. Soc. Am. 64, 1531-1540.

VALBERG, A. (1975). Light adaptation and the saturation of colours. Vis. Res. 15, 401-404.

VOS, J.J. & WALRAVEN, P.L. (1971). On the derivation of the foveal receptor primaries. Vis. Res. 11, 799-818.

WAGNER, G. & BOYNTON, R.M. (1972). Comparison of four methods of heterochromatic photometry. J. Opt. Soc. Am. 62, 1508-1515.

WALD, G. & BROWN, P.K. (1965). Human color vision and color blindness. Coldspring Harbor Sympos. Quant. Biol. 30, 345-359.

WALRAVEN, P.L. (1973). Theoretical models of the colour vision network. Proc. 2nd AIC Congress, York, pp. 11-20. Adam Hilger.

WALRAVEN, J. (1977). Colour signals from incremental and decremental light stimuli. Vis. Res. 17, 71-76.

WARD, F. & BOYNTON, R.M. (1974). Scaling of large chromatic differences. Vis. Res. 14, 943-949.

WARREN, R.M. (1967). Quantitative judgements of color: the square root rule. Percept. Psychophys. 2, 448-452.

WASSEF, E.G.T. (1959). Linearity of the relationship between the tristimulus values of corresponding colours seen under different conditions of chromatic adaptation. Optica Acta 6, 378-383.

WASSEF, E.G.T. & AZIZ, E. (1960). Changes in the position of the invariant colours with the sate of adaptation of the eye. Optica Acta 7, 341-354.

WEBER, E.H. (1834). De pulsu, resorptione, auditu et tactu: annotationes anatomicae et physiologicae. Leipzig, Köhler.

WEITZMAN, D.O. & KINNEY, J.A.S. (1967). Appearance of color for small, brief, spectral stimuli, in the central fovea. J. Opt. Soc. Am. 57, 665-670.

WEITZMAN, D.O. & KINNEY, J.A.S. (1969). Effect of stimulus size, duration and retinal location upon the appearance of color. J. Opt. Soc. Am. 59, 640-643.

WESTHEIMER, G. (1970). Rod-cone independence for sensitizing interaction in the human retina. J. Physiol. (Lond.) 206, 109-116.

WHITTLE, P. (1973). The brightness of coloured flashes on backgrounds of various colours and luminances. Vis. Res. 13, 621-638.

WHITTLE, P. (1974). Intensity discrimination between flashes which do not differ in brightness: some new measurements on the "blue" cones. Vis. Res. 14, 599-601.

WIESEL, T.N. & HUBEL, D.H. (1966). Spatial and chromatic interactions in the lateral geniculate body of the rhesus monkey. J. Neurophysiol. 29, 1115-1156.

WILLMER, E.N. (1950). The monochromatism of the central fovea in red-green blind subjects. J. Physiol. 110, 377-385.

WILLMER, E.N. & WRIGHT, W.D. (1945). Colour sensitivity of the fovea centralis. Nature, London. 156, 119-121.

WRIGHT, W.D. (1928/29). A re-determination of the trichromatic coefficients of the spectral colours. Trans. Opt. Soc. 30, 141.

WRIGHT, W.D. (1934). The measurement and analysis of colour adaptation phenomena. Proc. Roy. Soc. (Lond.) 115B, 49-87.

WRIGHT, W.D. (1937). The foveal light adaptation process. Proc. Roy. Soc. (Lond.) B122, 220-245.

WRIGHT, W.D. (1946). Researches on normal and defective colour vision. Henry Kimpton, London.

WRIGHT, W.D. (1952). Characteristics of tritanopia. J. Opt. Soc. Am. 42, 509-521.

WRIGHT, W.D. (1969). The measurement of colour, 4th ed. London, Adam Hilger.

WYSZECKI, G. & SANDERS, C.L. (1957a). Additional studies of the correlate of lightness in terms of CIE - tristimulus values. J. Opt. Soc. Am. 47, 338.

WYSZECKI, G. & SANDERS, C.L. (1957b). Correlate for lightness in terms of CIE - tristimulus values. Part II. J. Opt. Soc. Am. 47, 840-842.

WYSZECKI, G. & STILES, W.S. (1967). Color science: concepts and methods, quantitative data and formulas. John Wiley & Sons.

YOUNG, R.S.L., DIAMOND, A.L. & COLE, R.E. (1974). Effects of inducer duration and separation on test threshold. Vis. Res. 14, 83-87.

YUND, E.W. & ARMINGTON, J.C. (1975). Color and brightness contrast effects as a function of spatial variables. Vis. Res. 15, 917-929.

ZEKI, S.M. (1973). Colour coding in rhesus monkey prestriate cortex. Brain Research 53, 422-427.

ZEKI, S.M. (1977). Colour coding in the superior temporal sulcus of the rhesus monkey visual cortex. Proc. R. Soc. Lond. B, 197, 195-223.

UNIT: 0 OPP212 DATE: 26/06/78 TIME: 14/37/34

J.C. 2 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	10.0	206.7	16E 02	31E-06	81.0	.77E-01	31E-07	.75E-05	0.0	.00E 00	246.7	.14E-01	
SUBJ 1	STIM 2	146.5	84.8	57E 01	36E 01	142.2	.58E-01	86E-02	.75E 00	0.0	.00E 00	165.0	.17E-01	
SUBJ 1	STIM 3	6.3	158.2	20E 02	68E 00	85.3	.12E 00	35E-02	.27E 00	0.0	.00E 00	226.7	.15E-01	
SUBJ 1	STIM 4	107.4	70.7	93E 01	30E 00	56.1	.60E-01	19E-01	.12E 00	0.0	.00E 00	158.3	.46E-01	
SUBJ 1	STIM 5	63.0	89.8	67E 01	86E-06	74.1	.56E-01	.77E-02	.20E-06	0.0	.00E 00	140.0	.56E-01	
SUBJ 1	STIM 6	0.0	75.0	42E-06	51E 01	171.0	.67E-01	31E-06	.88E-05	0.0	.00E 00	171.7	.97E-02	
SUBJ 1	STIM 7	-5.0	160.0	83E-06	10E 02	13.5	.63E-01	26E-06	.17E-06	0.0	.00E 00	230.0	.25E-01	
SUBJ 1	STIM 8	-55.3	83.4	13E 02	44E 01	79.9	.92E-01	22E-01	.22E 01	0.0	.00E 00	171.7	.97E-02	
SUBJ 1	STIM 9	63.1	43.2	36E 01	17E 01	59.1	.78E-01	80E-02	.44E 00	0.0	.00E 00	146.7	.23E-01	
SUBJ 1	STIM 10	45.2	20.7	46E 01	23E-06	153.9	.56E-01	34E-01	.16E-06	0.0	.00E 00	153.3	.22E-01	
SUBJ 1	STIM 11	-70.8	13.0	93E 01	10E 01	50.1	.18E 00	11E 00	.23E 01	0.0	.00E 00	153.3	.22E-01	
SUBJ 1	STIM 12	-0.2	44.0	31E 01	16E 01	127.6	.65E-01	68E-02	.35E 00	0.0	.00E 00	153.3	.47E-01	
SUBJ 1	STIM 13	-41.7	33.3	17E 01	77E 00	144.9	.50E-01	43E-02	.12E 00	0.0	.00E 00	140.0	.41E-01	
SUBJ 1	STIM 14	-135.0	79.7	16E-06	17E 01	94.5	.23E-01	98E-07	.12E-05	0.0	.00E 00	165.0	.30E-01	
SUBJ 1	STIM 15	-111.4	79.6	63E 01	36E 00	174.9	.84E-01	38E-02	.99E-01	0.0	.00E 00	168.3	.26E-01	
SUBJ 1	STIM 16	135.0	85.0	58E-06	51E 01	13.5	.60E-01	29E-06	.11E-06	0.0	.00E 00	163.3	.27E-01	
SUBJ 1	STIM 17	-140.5	79.1	75E 01	26E 01	134.7	.59E-01	15E-01	.87E 00	0.0	.00E 00	156.7	.21E-01	
SUBJ 1	STIM 18	-40.0	56.7	44E 01	52E-06	144.0	.77E-01	15E-06	.13E-06	0.0	.00E 00	148.3	.49E-01	
SUBJ 1	STIM 19	60.5	4.5	16E 01	19E 00	132.4	.60E-01	54E-01	.21E 00	0.0	.00E 00	136.7	.24E-01	
SUBJ 1	STIM 20	-20.5	83.3	13E 02	12E 01	45.4	.71E-01	22E-01	.56E 00	0.0	.00E 00	173.3	.25E-01	
SUBJ 1	STIM 21	2.5	56.4	69E 01	10E 01	109.6	.11E 00	11E-01	.75E 00	0.0	.00E 00	160.0	.22E-05	
SUBJ 1	STIM 22	-66.7	40.0	29E 01	26E 01	170.1	.58E-01	84E-02	.47E 00	0.0	.00E 00	150.0	.31E-01	
SUBJ 1	STIM 23	-99.7	31.6	27E-06	73E 01	105.4	.22E 00	10E-01	.20E-06	0.0	.00E 00	156.7	.21E-01	
SUBJ 1	STIM 24	148.0	38.4	85E 01	37E 00	167.7	.88E-01	32E-01	.26E 00	0.0	.00E 00	143.3	.23E-01	
SUBJ 1	STIM 25	-72.3	28.3	46E 01	33E 00	140.5	.16E 00	68E-02	.17E 00	0.0	.00E 00	146.7	.45E-01	
SUBJ 1	STIM 26	163.5	60.8	37E 01	29E 01	24.4	.41E-01	.83E-02	.47E 00	0.0	.00E 00	155.0	.32E-01	
SUBJ 1	STIM 27	93.0	82.6	83E 01	19E 01	76.2	.41E-01	15E-01	.61E 00	0.0	.00E 00	166.7	.26E-01	
SUBJ 1	STIM 28	142.0	57.8	56E 01	56E 00	35.1	.33E-01	15E-01	.17E 00	0.0	.00E 00	153.3	.43E-01	
SUBJ 1	STIM 29	-138.4	31.6	73E 01	78E 00	9.7	.23E 00	42E-02	.56E 00	0.0	.00E 00	153.3	.43E-01	
SUBJ 1	STIM 30	-151.8	46.3	43E 01	17E 01	124.3	.40E-01	15E-01	.50E 00	0.0	.00E 00	150.0	.38E-01	
SUBJ	STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.80E-01 H ERROR=0.14E-01 L ERROR=0.00E 00 B ERROR=0.29E-01

J.C. 2 OBS 1, 6, 7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	9.2	148.0	14E 02	.48E 01	77.0	.92E-01	.52E-02	.14E 01	0.0	.00E 00	138.3	.25E-01	
STIM 2	109.7	78.3	42E 01	.22E 01	30.0	.33E-01	.82E-02	.37E 00	0.0	.00E 00	100.1	.20E-01	
STIM 3	12.7	130.5	81E 01	.50E 01	49.6	.58E-01	.72E-02	.98E 00	0.0	.00E 00	135.0	.25E-01	
STIM 4	106.2	64.6	46E 01	.17E 01	30.7	.59E-01	.75E-02	.37E 00	0.0	.00E 00	100.6	.34E-01	
STIM 5	51.7	85.1	55E 01	.34E 01	110.8	.45E-01	.98E-02	.70E 00	0.0	.00E 00	111.0	.20E-01	
STIM 6	15.2	75.3	76E 01	.21E 01	63.6	.99E-01	.56E-02	.68E 00	0.0	.00E 00	111.2	.21E-01	
STIM 7	-15.2	125.3	73E 01	.39E 01	109.1	.58E-01	.50E-02	.72E 00	0.0	.00E 00	134.0	.27E-01	
STIM 8	-40.1	85.5	11E 02	.39E 01	54.3	.59E-01	.20E-01	.16E 01	0.0	.00E 00	116.5	.29E-01	
STIM 9	46.2	37.1	38E 01	.28E 01	174.9	.86E-01	.15E-01	.89E 00	0.0	.00E 00	94.8	.20E-01	
STIM 10	40.4	14.8	24E 01	.10E 01	169.0	.92E-01	.23E-01	.51E 00	0.0	.00E 00	96.1	.19E-01	
STIM 11	-94.2	17.9	36E 01	.14E 01	24.0	.18E 00	.19E-01	.88E 00	0.0	.00E 00	90.5	.24E-01	
STIM 12	-8.4	36.0	34E 01	.25E 01	173.8	.71E-01	.15E-01	.73E 00	0.0	.00E 00	94.4	.23E-01	
STIM 13	-40.7	31.5	35E 01	.15E 01	68.7	.71E-[illegible]	.16E-01	.51E 00	0.0	.00E 00	90.6	.13E-01	
STIM 14	-101.4	77.1	35E 01	.39E 00	167.5	.44E-01	.19E-02	.55E-01	0.0	.00E 00	106.4	.18E-01	
STIM 15	-133.6	67.9	36E 01	.18E 01	167.0	.51E-01	.47E-02	.30E 00	0.0	.00E 00	100.5	.27E-01	
STIM 16	101.8	81.8	68E 01	.26E 01	64.3	.71E-01	.83E-02	.67E 00	0.0	.00E 00	101.0	.21E-01	
STIM 17	-168.9	57.0	72E 01	.16E 01	119.2	.73E-01	.17E-01	.63E 00	0.0	.00E 00	100.3	.34E-01	
STIM 18	-53.5	54.5	53E 01	.31E 01	31.2	.61E-01	.15E-01	.94E 00	0.0	.00E 00	100.9	.23E-01	
STIM 19	40.9	3.2	92E 00	.35E 00	121.1	.13E 00	.43E-01	.32E 00	0.0	.00E 00	80.4	.96E-02	
STIM 20	-15.0	84.7	81E 01	.60E 01	20.6	.71E-01	.15E-01	.18E 01	0.0	.00E 00	113.8	.21E-01	
STIM 21	13.5	45.1	41E 01	.23E 01	46.7	.82E-01	.10E-01	.65E 00	0.0	.00E 00	97.9	.21E-01	
STIM 22	-61.2	50.2	33E 01	.24E 01	145.6	.66E-01	.76E-02	.50E 00	0.0	.00E 00	102.4	.32E-01	
STIM 23	-99.9	30.8	30E 01	.37E 00	5.5	.96E-01	.24E-02	.11E 00	0.0	.00E 00	94.8	.23E-01	
STIM 24	-175.5	30.8	63E 01	.31E 01	169.1	.11E 00	.32E-01	.20E 01	0.0	.00E 00	91.8	.23E-01	
STIM 25	-68.5	23.9	22E 01	.11E 01	168.3	.91E-01	.80E-02	.31E 00	0.0	.00E 00	88.6	.23E-01	
STIM 26	163.4	50.5	37E 01	.30E 01	128.1	.63E-01	.81E-02	.59E 00	0.0	.00E 00	98.4	.32E-01	
STIM 27	91.5	78.2	56E 01	.27E 01	146.4	.58E-01	.86E-02	.61E 00	0.0	.00E 00	101.0	.24E-01	
STIM 28	146.5	53.3	27E 01	.18E 01	55.1	.42E-01	.69E-02	.28E 00	0.0	.00E 00	94.1	.30E-01	
STIM 29	-102.8	27.6	37E 01	.70E 00	2.6	.14E 00	.40E-02	.30E 00	0.0	.00E 00	93.5	.25E-01	
STIM 30	-136.8	44.3	45E 01	.18E 01	147.1	.55E-01	.15E-01	.57E 00	0.0	.00E 00	94.2	.23E-01	
STIM 31	-180.0	0.3	48E-05	.10E-10	180.0	.15E-04	.66E-11	.49E-15	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.75E-01 H ERROR=0.12E-01 L ERROR=0.00E 00 B ERROR=0.24E-01

V.C.3 OBS 7

VIEWING CONDITION 3

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	14.0	153.0	.15E 02	.28E 01	104.0	.87E-01	.75E-02	.84E 00	0.0	.00E 00	416.7	.40E-01	
SUBJ 1	STIM 2	183.2	61.5	.33E 01	.13E 01	175.0	.28E-01	.82E-02	.23E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 3	6.7	144.7	.30E 02	.68E 01	20.2	.10E 00	.29E-01	.44E 01	0.0	.00E 00	400.0	.72E-01	
SUBJ 1	STIM 4	150.0	56.2	.58E 01	.18E 01	113.3	.62E-01	.14E-01	.57E 00	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 5	66.3	67.6	.10E-03	.73E 01	13.8	.31E-01	.17E-01	.34E-06	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 6	16.2	56.5	.53E 01	.93E 00	110.8	.77E-01	.89E-02	.27E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 7	-20.0	140.0	.57E 01	.62E-06	108.0	.41E-01	.71E-07	.80E-05	0.0	.00E 00	400.0	.72E-01	
SUBJ 1	STIM 8	-83.5	57.2	.27E 02	.22E 01	93.3	.15E 00	.69E-01	.33E 01	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 9	32.2	20.6	.51E 01	.31E 01	81.9	.17E 00	.18E-01	.17E 01	0.0	.00E 00	250.0	.12E 00	
SUBJ 1	STIM 10	20.0	11.0	.13E-04	.20E 01	162.0	.18E 00	.83E-06	.75E-05	0.0	.00E 00	250.0	.28E-05	
SUBJ 1	STIM 11	-108.4	12.3	.15E 01	.31E 00	10.6	.12E 00	.41E-02	.12E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 12	-34.3	34.6	.44E 01	.10E 01	168.7	.88E-01	.15E-01	.40E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 13	-30.7	35.3	.65E 01	.29E-04	59.7	.99E-01	.25E-01	.17E-04	0.0	.00E 00	266.7	.62E-01	
SUBJ 1	STIM 14	-104.7	63.2	.48E 01	.20E 01	159.5	.71E-01	.68E-02	.48E 00	0.0	.00E 00	323.3	.45E-01	
SUBJ 1	STIM 15	-110.0	51.7	.29E-04	.17E 01	90.0	.33E-01	.16E-06	.30E-05	0.0	.00E 00	316.7	.53E-01	
SUBJ 1	STIM 16	102.7	62.0	.99E 01	.27E 01	25.7	.66E-01	.24E-01	.13E 01	0.0	.00E 00	316.7	.53E-01	
SUBJ 1	STIM 17	-172.7	54.4	.64E 01	.14E 01	176.5	.49E-01	.17E-01	.52E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 18	-63.7	40.9	.51E 01	.24E 01	163.9	.10E 00	.88E-02	.78E 00	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 19	5.5	3.7	.15E-05	.71E 00	4.0	.18E 00	.05E-02	.92E-06	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 20	-37.2	68.7	.95E 01	.27E 01	18.5	.52E-01	.21E-01	.12E 01	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 21	17.7	43.0	.50E 01	.17E 01	125.9	.78E-01	.15E-01	.62E 00	0.0	.00E 00	316.7	.53E-01	
SUBJ 1	STIM 22	-80.0	46.7	.30E-04	.17E 01	72.0	.35E-01	.17E-06	.33E-05	0.0	.00E 00	316.7	.53E-01	
SUBJ 1	STIM 23	-82.9	33.3	.45E 01	.68E 00	1.4	.13E 00	.45E-02	.28E 00	0.0	.00E 00	250.0	.12E 00	
SUBJ 1	STIM 24	182.1	24.5	.46E 01	.96E 00	58.8	.13E 00	.22E-01	.56E 00	0.0	.00E 00	266.7	.62E-01	
SUBJ 1	STIM 25	-60.0	25.0	.73E-04	.17E-04	166.7	.29E-05	.12E-06	.16E-09	0.0	.00E 00	266.7	.62E-01	
SUBJ 1	STIM 26	160.9	53.3	.11E-03	.17E 01	34.0	.31E-01	.36E-06	.11E-04	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 27	63.2	61.6	.34E 01	.14E 01	21.6	.54E-01	.43E-02	.25E 00	0.0	.00E 00	316.7	.53E-01	
SUBJ 1	STIM 28	181.5	43.3	.65E-04	.20E 01	49.5	.39E-01	.40E-02	.94E-05	0.0	.00E 00	283.3	.59E-01	
SUBJ 1	STIM 29	-110.9	28.2	.20E-04	.38E 01	73.7	.12E 00	.03E-02	.84E-05	0.0	.00E 00	283.3	.59E-01	
SUBJ 1	STIM 30	-146.1	37.9	.79E-04	.42E 01	85.8	.50E-01	.16E-01	.28E-04	0.0	.00E 00	283.3	.59E-01	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.79E-01 H ERROR=0.12E-01 L ERROR=0.00E 00 B ERROR=0.53E-01

V.C.4 OBS 7

VIEWING CONDITION 4

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	8.4	150.9	.69E 01	.16E 01	48.9	.36E-01	.40E-02	.22E 00	0.0	.00E 00	500.0	.28E-05	
SUBJ 1	STIM 2	183.1	58.2	.55E-04	.35E 01	74.6	.30E-01	.81E-02	.10E-04	0.0	.00E 00	383.3	.87E-01	
SUBJ 1	STIM 3	13.2	146.3	.89E 01	.47E 01	128.3	.46E-01	.81E-02	.91E 00	0.0	.00E 00	400.0	.66E-01	
SUBJ 1	STIM 4	105.4	64.9	.57E 01	.12E 01	145.0	.77E-01	.75E-02	.32E 00	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 5	81.5	60.0	.51E 01	.12E 01	26.8	.84E-01	.40E-02	.33E 00	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 6	8.4	53.3	.34E 01	.11E 01	68.4	.63E-01	.40E-02	.22E 00	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 7	-20.0	133.3	.16E-03	.67E 01	18.0	.50E-01	.28E-06	.26E-04	0.0	.00E 00	483.3	.34E-01	
SUBJ 1	STIM 8	-60.0	50.0	.57E-04	.50E 01	54.0	.10E 00	.43E-06	.18E-04	0.0	.00E 00	466.7	.94E-01	
SUBJ 1	STIM 9	87.7	21.4	.35E 01	.22E 01	166.4	.15E 00	.18E-01	.11E 01	0.0	.00E 00	366.7	.53E-01	
SUBJ 1	STIM 10	81.2	5.7	.23E 01	.64E-01	20.0	.41E 00	.40E-02	.84E-01	0.0	.00E 00	366.7	.53E-01	
SUBJ 1	STIM 11	-107.0	16.6	.45E 01	.34E 00	170.4	.27E 00	.61E-02	.28E 00	0.0	.00E 00	366.7	.53E-01	
SUBJ 1	STIM 12	5.0	20.6	.36E 01	.12E 00	178.4	.73E-02	.19E-01	.44E-01	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 13	-42.9	27.9	.39E 01	.30E 01	86.6	.13E 00	.20E-01	.13E 01	0.0	.00E 00	383.3	.12E 00	
SUBJ 1	STIM 14	-104.2	61.7	.60E 01	.53E 00	170.6	.97E-01	.18E-02	.16E 00	0.0	.00E 00	416.7	.40E-01	
SUBJ 1	STIM 15	-120.2	30.5	.88E 01	.93E 00	57.9	.19E 00	.19E-01	.65E 00	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 16	100.0	58.3	.32E-04	.43E 01	9.0	.73E-01	.34E-06	.73E-05	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 17	-180.8	47.2	.13E-03	.76E 01	55.1	.49E-01	.24E-01	.67E-04	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 18	-26.9	28.6	.12E 02	.70E-01	17.9	.47E-01	.67E-01	.94E-01	0.0	.00E 00	383.3	.87E-01	
SUBJ 1	STIM 19	100.0	1.0	.26E-04	.14E-10	180.0	.26E-04	.22E-09	.11E-14	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 20	-12.6	51.4	.57E 01	.26E 00	61.1	.85E-01	.11E-01	.91E-01	0.0	.00E 00	400.0	.72E-01	
SUBJ 1	STIM 21	13.9	20.9	.50E 01	.16E 01	69.8	.17E 00	.90E-02	.83E 00	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 22	-66.1	40.5	.92E 01	.41E 01	3.9	.20E 00	.24E-01	.29E 01	0.0	.00E 00	450.0	.13E 00	
SUBJ 1	STIM 23	-111.8	18.3	.17E 01	.45E 00	18.5	.91E-01	.44E-02	.13E 00	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 24	102.0	25.0	.50E 01	.68E 00	94.5	.20E 00	.46E-02	.43E 00	0.0	.00E 00	366.7	.53E-01	
SUBJ 1	STIM 25	-71.9	13.1	.17E 01	.15E 01	47.2	.12E 00	.21E-01	.64E 00	0.0	.00E 00	350.0	.82E-01	
SUBJ 1	STIM 26	131.2	56.0	.13E 02	.34E 01	31.6	.12E 00	.31E-01	.24E 01	0.0	.00E 00	350.0	.82E-01	
SUBJ 1	STIM 27	102.7	56.2	.81E 01	.27E 01	141.1	.12E 00	.15E-01	.12E 01	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 28	166.0	43.9	.17E 02	.57E 00	41.5	.74E-01	.59E-01	.69E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 29	-137.5	1.2	.45E 01	.16E 00	0.3	.32E 01	.26E 00	.19E 01	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 30	-186.1	24.3	.88E 01	.54E 01	40.5	.31E 00	.38E-01	.57E 01	0.0	.00E 00	383.3	.43E-01	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.21E 00 H ERROR=0.22E-0[illegible] L ERROR=0.00E 00 B ERROR=0.49E-01

V.C.-5 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	5.0	120.7	.59E 01	.13E 00	166.5	.10E-02	.72E-02	.19E-01	0.0	.00E 00	206.7	.11E-01	
SUBJ 1 STIM 2	131.8	60.0	.32E 01	.76E 00	78.9	.48E-01	.43E-02	.13E 00	0.0	.00E 00	226.7	.15E-01	
SUBJ 1 STIM 3	20.0	120.0	.57E 01	.81E-04	72.0	.48E-01	.11E-06	.12E-04	0.0	.00E 00	270.0	.37E-01	
SUBJ 1 STIM 4	110.7	51.2	.50E 01	.55E 00	54.9	.31E-01	.15E-01	.17E 00	0.0	.00E 00	203.3	.16E-01	
SUBJ 1 STIM 5	54.2	60.8	.62E 01	.99E-04	77.8	.70E-01	.88E-02	.28E-04	0.0	.00E 00	236.7	.51E-01	
SUBJ 1 STIM 6	8.5	61.6	.46E 01	.90E 00	57.6	.72E-01	.39E-02	.21E 00	0.0	.00E 00	236.7	.37E-01	
SUBJ 1 STIM 7	-3.1	116.4	.85E-04	.68E 01	132.4	.30E-01	.80E-02	.16E-04	0.0	.00E 00	226.7	.23E-01	
SUBJ 1 STIM 8	-8.4	71.6	.22E 01	.12E 01	156.9	.23E-01	.41E-02	.12E 00	0.0	.00E 00	240.0	.42E-01	
SUBJ 1 STIM 9	54.0	33.0	.43E 01	.21E 01	178.2	.10E 00	.16E-01	.85E 00	0.0	.00E 00	203.3	.43E-01	
SUBJ 1 STIM 10	52.6	20.4	.62E 01	.28E 01	169.2	.21E 00	.41E-01	.26E 01	0.0	.00E 00	183.3	.18E-01	
SUBJ 1 STIM 11	-163.0	16.6	.18E 01	.64E 00	164.2	.10E 00	.79E-02	.21E 00	0.0	.00E 00	193.3	.34E-01	
SUBJ 1 STIM 12	6.0	36.6	.18E 01	.75E 00	104.7	.46E-01	.41E-02	.11E 00	0.0	.00E 00	190.0	.11E 00	
SUBJ 1 STIM 13	-20.3	31.4	.33E 01	.57E 00	54.2	.51E-01	.15E-01	.19E 00	0.0	.00E 00	200.0	.35E-05	
SUBJ 1 STIM 14	-106.6	61.6	.20E 01	.11E 01	143.8	.27E-01	.41E-02	.12E 00	0.0	.00E 00	240.0	.42E-01	
SUBJ 1 STIM 15	-110.0	56.7	.10E-04	.17E 01	90.0	.30E-01	.12E-06	.97E-06	0.0	.00E 00	213.3	.78E-01	
SUBJ 1 STIM 16	138.4	68.3	.35E 01	.14E 01	81.5	.49E-01	.41E-02	.23E 00	0.0	.00E 00	223.3	.15E-01	
SUBJ 1 STIM 17	-100.0	65.0	.41E-04	.20E 01	171.0	.44E-01	.20E-06	.56E-05	0.0	.00E 00	243.0	.31E-01	
SUBJ 1 STIM 18	-60.0	50.0	.60E-04	.20E 01	54.0	.58E-01	.30E-06	.11E-04	0.0	.00E 00	210.0	.27E-01	
SUBJ 1 STIM 19	36.1	6.9	.33E 01	.18E 01	163.8	.28E 00	.73E-01	.27E 01	0.0	.00E 00	170.0	.34E-01	
SUBJ 1 STIM 20	-8.3	71.6	.35E 01	.16E 01	78.2	.46E-01	.43E-02	.25E 00	0.0	.00E 00	246.7	.14E-01	
SUBJ 1 STIM 21	15.0	43.2	.20E 01	.16E 01	166.5	.37E-01	.75E-02	.24E 00	0.0	.00E 00	220.0	.31E-05	
SUBJ 1 STIM 22	-69.6	46.3	.45E 01	.56E 00	81.9	.34E-01	.15E-01	.17E 00	0.0	.00E 00	203.3	.16E-01	
SUBJ 1 STIM 23	-65.0	30.0	.10E-06	.10E-06	0.0	.33E-08	.53E-09	.10E-14	0.0	.00E 00	216.7	.15E-01	
SUBJ 1 STIM 24	100.0	26.7	.76E-05	.40E 01	0.0	.15E 00	.67E-06	.36E-05	0.0	.00E 00	200.0	.35E-05	
SUBJ 1 STIM 25	-80.0	35.0	.44E-04	.56E-04	38.0	.15E-05	.22E-06	.22E-09	0.0	.00E 00	203.3	.16E-01	
SUBJ 1 STIM 26	167.1	46.1	.53E 01	.28E 01	49.3	.69E-01	.17E-01	.10E 01	0.0	.00E 00	200.0	.29E-01	
SUBJ 1 STIM 27	76.0	58.2	.32E 01	.14E 01	94.7	.28E-01	.85E-02	.24E 00	0.0	.00E 00	193.3	.34E-01	
SUBJ 1 STIM 28	185.0	53.2	.65E 01	.30E 00	81.0	.11E 00	.73E-02	.15E 00	0.0	.00E 00	200.0	.35E-05	
SUBJ 1 STIM 29	-106.6	26.6	.44E 01	.64E 00	2.8	.17E 00	.41E-02	.33E 00	0.0	.00E 00	200.0	.76E-01	
SUBJ 1 STIM 30	-174.2	41.6	.56E-04	.45E 01	116.3	.83E-01	.11E-01	.19E-04	0.0	.00E 00	215.0	.36E-01	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.66E-01 H ERROR=0.04E-02 L ERROR=0.00E 00 B ERROR=0.30E-01

V.C. 6 OBS 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

			HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM	1	0.0	214.7	.33E 01	.64E-04	81.0	.15E-01	.47E-07	.31E-05	0.0	.00E 00	286.7	.47E-01	
SUBJ 1	STIM	2	180.2	74.0	.71E 01	.48E 00	29.6	.20E-01	.15E-01	.14E 00	0.0	.00E 00	150.0	.38E-01	
SUBJ 1	STIM	3	3.3	170.9	.47E 01	.48E-03	168.7	.34E-03	.42E-02	.40E-04	0.0	.00E 00	216.7	.77E-01	
SUBJ 1	STIM	4	120.8	77.7	.71E 01	.57E 01	23.4	.81E-01	.13E-01	.16E 01	0.0	.00E 00	158.7	.21E-01	
SUBJ 1	STIM	5	64.8	98.1	.55E 01	.12E 01	86.7	.33E-01	.73E-02	.21E 00	0.0	.00E 00	154.7	.56E-01	
SUBJ 1	STIM	6	16.5	91.6	.48E 01	.13E 01	09.1	.48E-01	.40E-02	.22E 00	0.0	.00E 00	178.3	.61E-01	
SUBJ 1	STIM	7	-16.0	106.1	.10E 02	.20E 01	23.0	.16E-01	.84E-02	.48E 00	0.0	.00E 00	240.0	.87E-01	
SUBJ 1	STIM	8	-16.9	81.5	.72E 01	.31E 01	147.2	.82E-01	.80E-02	.87E 00	0.0	.00E 00	163.3	.41E-01	
SUBJ 1	STIM	9	43.4	47.4	.68E 01	.12E 01	141.4	.26E-01	.23E-01	.56E 00	0.0	.00E 00	143.3	.23E-01	
SUBJ 1	STIM	10	27.1	34.9	.51E 01	.13E 01	53.3	.14E 00	.77E-02	.61E 00	0.0	.00E 00	120.0	.48E-01	
SUBJ 1	STIM	11	-112.8	33.3	.18E 01	.30E 00	24.6	.50E-01	.35E-02	.50E-01	0.0	.00E 00	130.0	.44E-01	
SUBJ 1	STIM	12	-15.2	53.2	.28E 01	.78E 00	159.8	.32E-01	.71E-02	.13E 00	0.0	.00E 00	140.0	.41E-01	
SUBJ 1	STIM	13	-25.7	48.2	.13E 02	.30E 01	37.5	.10E 00	.42E-01	.33E 01	0.0	.00E 00	143.3	.23E-01	
SUBJ 1	STIM	14	-101.0	71.6	.12E-03	.20E 01	125.7	.25E-01	.26E-02	.11E-06	0.0	.00E 00	151.7	.10E 00	
SUBJ 1	STIM	15	-105.2	74.8	.61E 01	.28E 01	28.9	.76E-01	.77E-02	.73E 00	0.0	.00E 00	145.0	.53E-01	
SUBJ 1	STIM	16	180.3	93.1	.98E 01	.34E 00	125.2	.95E-01	.73E-02	.11E 00	0.0	.00E 00	164.7	.53E-01	
SUBJ 1	STIM	17	-180.0	87.3	.44E 01	.89E-04	77.0	.53E-01	.46E-06	.15E-04	0.0	.00E 00	170.0	.59E-01	
SUBJ 1	STIM	18	-46.5	75.8	.80E 01	.14E 01	51.4	.25E-01	.17E-01	.46E 00	0.0	.00E 00	158.3	.28E-01	
SUBJ 1	STIM	19	34.9	2.4	.19E 01	.23E-05	113.5	.24E 00	.53E-01	.29E-05	0.0	.00E 00	105.0	.27E-01	
SUBJ 1	STIM	20	-4.1	98.4	.14E 02	.75E 01	34.0	.09E-01	.21E-01	.34E 01	0.0	.00E 00	173.3	.51E-01	
SUBJ 1	STIM	21	3.5	70.0	.51E 01	.14E 01	65.9	.72E-01	.40E-02	.33E 00	0.0	.00E 00	156.7	.21E-01	
SUBJ 1	STIM	22	-66.8	68.2	.62E-04	.30E 01	123.3	.26E-01	.81E-02	.11E-04	0.0	.00E 00	143.3	.23E-01	
SUBJ 1	STIM	23	-07.0	44.8	.39E 01	.17E 01	49.6	.62E-01	.12E-01	.48E 00	0.0	.00E 00	125.0	.69E-01	
SUBJ 1	STIM	24	143.6	46.5	.14E-04	.27E 01	137.3	.31E-01	.77E-02	.26E-05	0.0	.00E 00	126.7	.11E 00	
SUBJ 1	STIM	25	-78.0	46.5	.66E 01	.27E 01	167.6	.15E 00	.96E-02	.12E 01	0.0	.00E 00	133.3	.25E-01	
SUBJ 1	STIM	26	146.2	91.4	.13E 02	.13E 01	00.0	.13E 00	.91E-02	.60E 00	0.0	.00E 00	150.0	.67E-01	
SUBJ 1	STIM	27	85.2	88.2	.53E 01	.25E 01	155.3	.51E-01	.69E-02	.48E 00	0.0	.00E 00	165.0	.17E-01	
SUBJ 1	STIM	28	145.5	73.2	.69E 01	.57E 00	74.0	.82E-01	.73E-02	.17E 00	0.0	.00E 00	153.3	.22E-01	
SUBJ 1	STIM	29	-68.3	40.0	.58E 01	.10E 01	0.1	.14E 00	.42E-02	.47E 00	0.0	.00E 00	126.7	.11E 00	
SUBJ 1	STIM	30	-166.8	68.2	.39E 01	.95E-04	123.3	.26E-01	.81E-02	.17E-04	0.0	.00E 00	153.3	.22E-01	
SUBJ 1	STIM	31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.65E-01 H ERROR=0.11E-01 L ERROR=0.00E 00 B ERROR=0.69E-01

V.C. 6 OBS 1, 6, 7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM	1	8.7	144.1	.91E 01	.24E 01	54.2	.57E-01	.53E-02	.47E 00	0.0	.00E 00	137.2	.26E-01	
STIM	2	189.1	74.2	.59E 01	.26E 01	59.6	.64E-01	.92E-02	.64E 00	0.0	.00E 00	92.0	.33E-01	
STIM	3	9.4	123.1	.59E 01	.17E 01	31.5	.33E-01	.60E-02	.26E 00	0.0	.00E 00	128.1	.23E-01	
STIM	4	110.5	68.6	.65E 01	.25E 01	36.3	.71E-01	.12E-01	.74E 00	0.0	.00E 00	92.7	.30E-01	
STIM	5	52.4	79.6	.50E 01	.31E 01	114.7	.42E-01	.97E-02	.62E 00	0.0	.00E 00	98.5	.34E-01	
STIM	6	15.0	71.4	.49E 01	.41E 01	13.3	.60E-01	.11E-01	.89E 00	0.0	.00E 00	101.8	.20E-01	
STIM	7	-11.5	126.5	.75E 01	.52E 01	131.2	.55E-01	.74E-02	.98E 00	0.0	.00E 00	126.3	.27E-01	
STIM	8	-34.8	77.5	.70E 01	.48E 01	45.0	.64E-01	.15E-01	.15E 01	0.0	.00E 00	104.1	.23E-01	
STIM	9	41.7	40.3	.36E 01	.23E 01	67.9	.86E-01	.94E-02	.63E 00	0.0	.00E 00	87.6	.19E-01	
STIM	10	32.2	20.6	.33E 01	.19E 01	61.5	.16E 00	.15E-01	.97E 00	0.0	.00E 00	82.5	.32E-01	
STIM	11	-101.3	18.9	.32E 01	.23E 00	7.3	.17E 00	.20E-02	.12E 00	0.0	.00E 00	82.0	.17E-01	
STIM	12	1.8	37.9	.34E 01	.23E 01	4.3	.61E-01	.14E-01	.64E 00	0.0	.00E 00	87.1	.22E-01	
STIM	13	-27.4	38.1	.45E 01	.20E 01	18.2	.53E-01	.19E-01	.73E 00	0.0	.00E 00	88.7	.19E-01	
STIM	14	-100.2	77.8	.77E 01	.28E 00	179.3	.99E-01	.64E-03	.88E-01	0.0	.00E 00	94.2	.33E-01	
STIM	15	-101.6	60.6	.38E 01	.12E 01	179.6	.63E-01	.31E-02	.23E 00	0.0	.00E 00	89.9	.21E-01	
STIM	16	101.8	74.7	.47E 01	.24E 01	63.9	.56E-01	.70E-02	.47E 00	0.0	.00E 00	98.8	.18E-01	
STIM	17	-161.6	60.9	.78E 01	.28E 01	145.6	.45E-01	.20E-01	.11E 01	0.0	.00E 00	97.1	.24E-01	
STIM	18	-35.8	64.7	.48E 01	.17E 01	53.9	.37E-01	.11E-01	.41E 00	0.0	.00E 00	93.3	.24E-01	
STIM	19	5.3	4.0	.15E 01	.24E 00	102.6	.33E 00	.27E-01	.27E 00	0.0	.00E 00	80.8	.42E-01	
STIM	20	-12.4	77.2	.56E 01	.47E 01	23.5	.62E-01	.11E-01	.11E 01	0.0	.00E 00	105.3	.16E-01	
STIM	21	12.9	53.7	.37E 01	.25E 01	38.3	.60E-01	.90E-02	.53E 00	0.0	.00E 00	94.2	.11E-01	
STIM	22	-60.9	56.4	.41E 01	.30E 01	43.8	.55E-01	.12E-01	.70E 00	0.0	.00E 00	94.9	.22E-01	
STIM	23	-98.9	32.9	.35E 01	.77E 00	0.8	.11E 00	.38E-02	.26E 00	0.0	.00E 00	85.4	.31E-01	
STIM	24	-173.1	30.4	.80E 01	.26E 01	160.3	.89E-01	.42E-01	.22E 01	0.0	.00E 00	82.8	.33E-01	
STIM	25	-69.4	33.0	.30E 01	.23E 01	2.6	.85E-01	.12E-01	.64E 00	0.0	.00E 00	84.6	.25E-01	
STIM	26	165.1	67.6	.67E 01	.25E 01	52.6	.50E-01	.15E-01	.77E 00	0.0	.00E 00	87.2	.26E-01	
STIM	27	85.4	68.5	.58E 01	.30E 01	86.1	.49E-01	.13E-01	.81E 00	0.0	.00E 00	92.6	.29E-01	
STIM	28	189.6	55.3	.41E 01	.19E 01	65.2	.64E-01	.80E-02	.44E 00	0.0	.00E 00	87.0	.26E-01	
STIM	29	-100.9	27.6	.35E 01	.67E 00	2.5	.16E 00	.47E-02	.33E 00	0.0	.00E 00	81.4	.23E-01	
STIM	30	-159.5	44.9	.60E 01	.29E 01	141.6	.66E-01	.21E-01	.12E 01	0.0	.00E 00	85.6	.27E-01	
STIM	31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.79E-01 H ERROR=0.11E-01 L ERROR=0.00E 00 B ERROR=0.25E-01

V.C. 7 OBS 7

VIEWING CONDITION 3

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	11.5	170.9	.16E 02	.31E 01	91.6	.85E-01	.39E-02	.84E 00	0.0	.00E 00	300.0	.15E-01	
SUBJ 1	STIM 2	140.0	61.7	.33E 01	.56E-04	108.0	.54E-01	.48E-06	.94E-05	0.0	.00E 00	316.7	.53E-01	
SUBJ 1	STIM 3	20.0	133.3	.24E-04	.33E 01	167.0	.24E-01	.11E-06	.18E-05	0.0	.00E 00	380.0	.40E-01	
SUBJ 1	STIM 4	133.6	51.1	.57E 01	.30E 01	90.7	.87E-01	.17E-01	.14E 01	0.0	.00E 00	276.7	.53E-01	
SUBJ 1	STIM 5	40.0	66.7	.57E-04	.17E 01	126.0	.25E-01	.18E-06	.45E-05	0.0	.00E 00	326.7	.20E-01	
SUBJ 1	STIM 6	22.9	58.2	.52E 01	.72E 00	100.9	.77E-01	.77E-02	.20E 00	0.0	.00E 00	320.0	.36E-01	
SUBJ 1	STIM 7	-20.0	146.7	.14E 02	.17E-03	108.0	.99E-01	.19E-06	.54E-06	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 8	-40.0	70.0	.48E-04	.21E-03	13.3	.27E-05	.21E-06	.45E-09	0.0	.00E 00	343.3	.68E-01	
SUBJ 1	STIM 9	60.0	31.7	.36E-04	.44E 01	126.0	.14E 00	.65E-06	.16E-06	0.0	.00E 00	276.7	.53E-01	
SUBJ 1	STIM 10	13.1	21.6	.44E 01	.10E 01	74.9	.20E 00	.81E-07	.66E 00	0.0	.00E 00	226.7	.64E-01	
SUBJ 1	STIM 11	-102.9	16.6	.18E 01	.64E 00	20.3	.10E 00	.79E-02	.21E 00	0.0	.00E 00	250.0	.48E-01	
SUBJ 1	STIM 12	3.0	41.2	.44E 01	.13E 01	13.0	.43E-01	.16E-01	.45E 00	0.0	.00E 00	300.0	.96E-01	
SUBJ 1	STIM 13	-20.0	34.7	.17E 01	.24E-04	108.0	.45E-01	.10E-06	.33E-05	0.0	.00E 00	253.3	.11E 00	
SUBJ 1	STIM 14	-106.0	63.3	.35E 01	.13E 01	168.8	.53E-01	.41E-02	.22E 00	0.0	.00E 00	306.7	.22E-01	
SUBJ 1	STIM 15	-108.4	61.6	.20E 01	.11E 01	49.7	.27E-01	.41E-02	.12E 00	0.0	.00E 00	310.0	.32E-01	
SUBJ 1	STIM 16	143.0	66.3	.53E 01	.17E 01	130.6	.67E-01	.79E-02	.43E 00	0.0	.00E 00	310.0	.32E-01	
SUBJ 1	STIM 17	-140.0	66.7	.46E-04	.33E 01	167.0	.50E-01	.22E-06	.72E-05	0.0	.00E 00	340.0	.29E-01	
SUBJ 1	STIM 18	-46.6	40.5	.40E 01	.21E-04	45.0	.43E-02	.13E-01	.52E-05	0.0	.00E 00	310.0	.32E-01	
SUBJ 1	STIM 19	13.0	8.2	.17E 01	.89E 00	93.6	.20E 00	.18E-01	.57E 00	0.0	.00E 00	216.7	.77E-01	
SUBJ 1	STIM 20	-2.3	54.5	.58E 01	.43E 00	151.0	.56E-01	.15E-01	.15E 00	0.0	.00E 00	306.7	.97E-01	
SUBJ 1	STIM 21	3.8	43.2	.47E 01	.16E 01	53.4	.10E 00	.89E-02	.55E 00	0.0	.00E 00	306.7	.22E-01	
SUBJ 1	STIM 22	-60.0	45.0	.78E-04	.13E-03	31.7	.27E-05	.31E-06	.69E-09	0.0	.00E 00	270.0	.37E-01	
SUBJ 1	STIM 23	-80.8	38.3	.23E 01	.60E 00	125.6	.44E-01	.71E-02	.13E 00	0.0	.00E 00	270.0	.37E-01	
SUBJ 1	STIM 24	173.5	38.2	.23E 01	.13E 01	55.3	.43E-01	.55E-02	.25E 00	0.0	.00E 00	260.0	.12E 00	
SUBJ 1	STIM 25	-80.0	36.7	.51E-04	.17E 01	72.0	.45E-01	.28E-06	.72E-05	0.0	.00E 00	216.7	.15E 00	
SUBJ 1	STIM 26	172.7	40.4	.59E 01	.14E 01	1.3	.54E-01	.18E-01	.52E 00	0.0	.00E 00	276.7	.53E-01	
SUBJ 1	STIM 27	85.0	61.5	.27E 01	.17E 01	103.5	.28E-01	.70E-02	.24E 00	0.0	.00E 00	260.0	.12E 00	
SUBJ 1	STIM 28	173.6	46.5	.36E 01	.21E 01	84.9	.71E-01	.86E-02	.31E 00	0.0	.00E 00	270.0	.37E-01	
SUBJ 1	STIM 29	-105.0	25.0	.18E-04	.18E-04	0.0	.70E-06	.11E-06	.39E-10	0.0	.00E 00	250.0	.69E-01	
SUBJ 1	STIM 30	-140.0	46.7	.55E-04	.17E 01	162.0	.36E-01	.24E-06	.62E-05	0.0	.00E 00	266.7	.12E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.60E-01 H ERROR=0.58E-02 L ERROR=0.00E 00 B ERROR=0.58E-01

V.C. 7 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	11.8	148.9	.17E 02	.52E 01	72.7	.11E 00	.59E-02	.19E 01	0.0	.00E 00	161.7	.15E-01	
STIM 2	184.6	70.9	.49E 01	.27E 01	20.3	.38E-01	.11E-01	.58E 00	0.0	.00E 00	125.0	.39E-01	
STIM 3	16.6	110.9	.10E 02	.54E 01	53.6	.87E-01	.89E-02	.15E 01	0.0	.00E 00	156.0	.16E-01	
STIM 4	119.8	58.3	.62E 01	.24E 01	36.8	.70E-01	.14E-01	.81E 00	0.0	.00E 00	110.7	.35E-01	
STIM 5	45.3	73.0	.50E 01	.27E 01	129.1	.38E-01	.11E-01	.58E 00	0.0	.00E 00	125.0	.35E-01	
STIM 6	32.2	71.8	.47E 01	.34E 01	65.6	.66E-01	.75E-02	.70E 00	0.0	.00E 00	127.4	.34E-01	
STIM 7	-20.3	120.7	.13E 02	.67E 01	112.0	.11E 00	.89E-02	.23E 01	0.0	.00E 00	156.9	.23E-01	
STIM 8	-46.7	82.7	.70E 01	.27E 01	171.3	.69E-01	.95E-02	.73E 00	0.0	.00E 00	143.2	.30E-01	
STIM 9	53.3	30.5	.34E 01	.19E 01	78.4	.75E-01	.10E-01	.52E 00	0.0	.00E 00	107.2	.27E-01	
STIM 10	28.4	21.5	.33E 01	.13E 01	44.5	.14E 00	.12E-01	.63E 00	0.0	.00E 00	99.1	.22E-01	
STIM 11	-100.7	15.1	.98E 00	.23E 00	5.2	.65E-01	.26E-02	.47E-01	0.0	.00E 00	93.8	.27E-01	
STIM 12	3.4	31.8	.36E 01	.31E 01	0.5	.99E-01	.18E-01	.11E 01	0.0	.00E 00	107.9	.45E-01	
STIM 13	-29.5	31.4	.36E 01	.22E 01	56.7	.84E-01	.17E-01	.79E 00	0.0	.00E 00	100.9	.49E-01	
STIM 14	-110.9	76.1	.15E 02	.36E 01	136.9	.12E 00	.25E-01	.22E 01	0.0	.00E 00	132.5	.19E-01	
STIM 15	-104.4	71.0	.45E 01	.18E 01	160.0	.59E-01	.56E-02	.36E 00	0.0	.00E 00	128.4	.17E-01	
STIM 16	186.2	82.8	.61E 01	.35E 01	36.7	.49E-01	.11E-01	.81E 00	0.0	.00E 00	130.7	.14E-01	
STIM 17	-175.3	74.3	.51E 01	.35E 01	161.2	.47E-01	.11E-01	.75E 00	0.0	.00E 00	126.8	.34E-01	
STIM 18	-44.4	58.9	.61E 01	.31E 01	55.8	.58E-01	.16E-01	.10E 01	0.0	.00E 00	122.4	.37E-01	
STIM 19	18.3	7.4	.99E 00	.53E 00	133.8	.91E-01	.19E-01	.22E 00	0.0	.00E 00	96.9	.33E-01	
STIM 20	-8.4	68.0	.58E 01	.33E 01	150.1	.65E-01	.12E-01	.89E 00	0.0	.00E 00	131.1	.36E-01	
STIM 21	17.7	45.6	.36E 01	.24E 01	26.7	.66E-01	.11E-01	.60E 00	0.0	.00E 00	120.4	.27E-01	
STIM 22	-56.5	55.4	.34E 01	.15E 01	138.9	.61E-01	.43E-02	.29E 00	0.0	.00E 00	114.9	.30E-01	
STIM 23	-94.0	32.5	.34E 01	.11E 01	171.5	.11E 00	.52E-02	.35E 00	0.0	.00E 00	100.8	.43E-01	
STIM 24	105.2	27.7	.40E 01	.24E 01	153.8	.11E 00	.21E-01	.11E 01	0.0	.00E 00	103.5	.41E-01	
STIM 25	-70.7	32.6	.31E 01	.26E 01	8.6	.91E-01	.14E-01	.78E 00	0.0	.00E 00	101.0	.60E-01	
STIM 26	175.0	50.6	.40E 01	.19E 01	97.4	.77E-01	.65E-02	.46E 00	0.0	.00E 00	107.8	.28E-01	
STIM 27	82.8	74.3	.53E 01	.35E 01	111.0	.47E-01	.11E-01	.77E 00	0.0	.00E 00	110.2	.40E-01	
STIM 28	174.4	30.2	.17E 02	.39E 01	95.9	.42E 00	.25E-01	.54E 01	0.0	.00E 00	117.3	.50E-01	
STIM 29	-100.9	19.9	.17E 01	.48E 00	7.7	.85E-01	.41E-02	.13E 00	0.0	.00E 00	102.2	.28E-01	
STIM 30	-152.2	45.7	.69E 01	.17E 01	149.2	.48E-01	.23E-01	.81E 00	0.0	.00E 00	110.2	.39E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.86E-01 H ERROR=0.12E-01 L ERROR=0.00E 00 B ERROR=0.32E-01

U.C. 8 OBS 7

VIEWING CONDITION 4

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ	STIM 1	5.1	153.0	.78E 01	.13E 01	9.7	.21E-01	.73E-02	.21E 00	0.0	.00E 00	366.7	.91E-01	
SUBJ	STIM 2	145.1	50.9	.34E 01	.20E 01	65.7	.49E-01	.69E-02	.35E 00	0.0	.00E 00	260.0	.38E-01	
SUBJ	STIM 3	70.0	135.0	.29E 01	.14E-03	63.0	.21E-01	.17E-06	.97E-05	0.0	.00E 00	350.0	.00E 00	
SUBJ	STIM 4	118.4	61.6	.20E 01	.11E 01	121.3	.27E-01	.41E-02	.17E 00	0.0	.00E 00	243.3	.96E-01	
SUBJ	STIM 5	62.1	61.4	.17E 02	.43E 01	155.2	.12E 00	.27E-01	.27E 01	0.0	.00E 00	276.7	.53E-01	
SUBJ	STIM 6	7.6	57.9	.66E 01	.20E 01	121.7	.81E-01	.14E-01	.72E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 7	-3.7	136.6	.15E 02	.11E 01	113.8	.11E 00	.37E-02	.38E 00	0.0	.00E 00	376.7	.39E-01	
SUBJ	STIM 8	-45.2	66.2	.13E-03	.55E 01	115.4	.22E-01	.13E-01	.33E-04	0.0	.00E 00	300.0	.00E 00	
SUBJ	STIM 9	57.4	37.6	.54E 01	.85E 00	148.0	.53E-01	.21E-01	.38E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 10	20.1	18.2	.22E 01	.74E 00	105.7	.94E-01	.14E-01	.28E 00	0.0	.00E 00	276.7	.77E-01	
SUBJ	STIM 11	-106.7	15.0	.38E-04	.30E 00	6.7	.34E-03	.42E-02	.31E-05	0.0	.00E 00	200.0	.35E-05	
SUBJ	STIM 12	-5.0	43.3	.10E-04	.40E 01	4.5	.92E-01	.36E-06	.29E-05	0.0	.00E 00	223.3	.65E-01	
SUBJ	STIM 13	-3.2	20.3	.52E 01	.11E 01	48.8	.11E 00	.23E-01	.58E 00	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ	STIM 14	-141.4	50.8	.41E 01	.12E 01	131.4	.47E-01	.87E-02	.26E 00	0.0	.00E 00	276.7	.53E-01	
SUBJ	STIM 15	-110.1	50.9	.34E 01	.20E 01	46.8	.49E-01	.69E-02	.35E 00	0.0	.00E 00	203.3	.59E-01	
SUBJ	STIM 16	101.7	65.0	.17E 01	.19E-03	6.7	.34E-03	.42E-02	.15E-04	0.0	.00E 00	250.0	.00E 00	
SUBJ	STIM 17	-131.7	66.6	.34E 01	.15E 01	90.9	.50E-01	.43E-02	.25E 00	0.0	.00E 00	203.3	.23E-01	
SUBJ	STIM 18	-55.6	52.3	.82E 01	.52E 00	71.2	.57E-01	.23E-01	.25E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 19	0.0	1.7	.10E-06	.10E-06	0.0	.60E-07	.95E-08	.19E-13	0.0	.00E 00	276.7	.77E-01	
SUBJ	STIM 20	-13.6	64.8	.43E 01	.12E 01	154.7	.43E-01	.86E-02	.26E 00	0.0	.00E 00	203.3	.23E-01	
SUBJ	STIM 21	4.5	40.7	.48E 01	.13E 01	134.8	.56E-01	.13E-01	.39E 00	0.0	.00E 00	236.7	.37E-01	
SUBJ	STIM 22	-71.2	40.8	.45E 01	.22E 00	105.2	.59E-01	.11E-01	.61E-01	0.0	.00E 00	200.0	.38E-01	
SUBJ	STIM 23	-100.8	30.9	.60E 01	.12E 01	161.7	.14E 00	.92E-02	.59E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 24	105.9	44.3	.61E 01	.11E 01	28.1	.61E-01	.20E-01	.49E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 25	-40.0	3?.7	.38E-04	.34E 01	72.0	.11E 00	.46E-06	.13E-04	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 26	173.2	5?.5	.29E 01	.13E 01	178.9	.33E-01	.82E-02	.23E 00	0.0	.00E 00	200.0	.38E-01	
SUBJ	STIM 27	106.8	65.0	.33E 01	.81E 00	144.2	.44E-01	.43E-02	.13E 00	0.0	.00E 00	253.3	.57E-01	
SUBJ	STIM 28	178.6	53.1	.40E 01	.62E 00	44.4	.33E-01	.11E-01	.15E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ	STIM 29	-108.3	20.9	.29E 01	.16E 01	2.6	.96E-01	.84E-02	.47E 00	0.0	.00E 00	276.7	.77E-01	
SUBJ	STIM 30	-162.8	30.6	.18E 02	.44E 01	16.0	.35E 00	.48E-01	.61E 01	0.0	.00E 00	283.3	.12E 00	
SUBJ	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.65E-01 H ERROR=0.11E-01 L ERROR=0.00E 00 B ERROR=0.36E-01

U.C. 8 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	14.7	123.9	.97E 01	.47E 01	79.2	.78E-01	.60E-02	.11E 01	0.0	.00E 00	125.7	.29E-01	
STIM 2	188.1	50.9	.41E 01	.27E 01	74.8	.65E-01	.81E-02	.59E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	16.4	113.0	.10E 02	.25E 01	24.3	.61E-01	.11E-01	.69E 00	0.0	.00E 00	123.5	.53E-01	
STIM 4	108.7	57.2	.46E 01	.31E 01	173.3	.80E-01	.87E-02	.78E 00	0.0	.00E 00	82.3	.29E-01	
STIM 5	51.0	58.2	.62E 01	.47E 01	60.0	.10E 00	.13E-01	.16E 01	0.0	.00E 00	88.8	.43E-01	
STIM 6	28.3	65.1	.59E 01	.46E 01	84.9	.89E-01	.12E-01	.13E 01	0.0	.00E 00	93.9	.28E-01	
STIM 7	-7.4	115.3	.98E 01	.77E 01	136.4	.78E-01	.12E-01	.21E 01	0.0	.00E 00	112.7	.51E-01	
STIM 8	-40.8	68.5	.47E 01	.25E 01	22.5	.39E-01	.11E-01	.54E 00	0.0	.00E 00	102.3	.66E-02	
STIM 9	46.8	39.0	.29E 01	.14E 01	99.7	.54E-01	.10E-01	.33E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 10	31.7	12.0	.20E 01	.83E 00	40.5	.16E 00	.14E-01	.43E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	-101.6	16.9	.25E 01	.20E 00	177.6	.15E 00	.25E-02	.94E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	2.0	38.2	.41E 01	.24E 01	152.4	.73E-01	.16E-01	.81E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	-18.9	30.3	.41E 01	.19E 01	163.1	.91E-01	.18E-01	.79E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-100.4	68.2	.52E 01	.84E 00	177.3	.76E-01	.21E-02	.20E 00	0.0	.00E 00	98.7	.53E-01	
STIM 15	-103.4	54.4	.24E 01	.16E 01	6.0	.43E-01	.48E-02	.22E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	189.9	66.0	.41E 01	.20E 01	30.7	.36E-01	.94E-02	.38E 00	0.0	.00E 00	88.7	.38E-01	
STIM 17	-167.2	50.8	.64E 01	.29E 01	131.9	.57E-01	.16E-01	.97E 00	0.0	.00E 00	92.7	.43E-01	
STIM 18	-51.2	55.9	.41E 01	.25E 01	91.1	.60E-01	.96E-02	.58E 00	0.0	.00E 00	86.7	.39E-01	
STIM 19	9.7	3.3	.15E 01	.54E 00	40.9	.46E 00	.27E-01	.77E 00	0.0	.00E 00	78.5	.25E-01	
STIM 20	7.2	55.9	.96E 01	.61E 01	129.2	.14E 00	.23E-01	.32E 01	0.0	.00E 00	99.0	.18E-01	
STIM 21	15.3	45.9	.35E 01	.25E 01	31.2	.67E-01	.11E-01	.60E 00	0.0	.00E 00	88.0	.40E-01	
STIM 22	-62.5	44.8	.26E 01	.21E 01	91.2	.50E-01	.87E-02	.38E 00	0.0	.00E 00	92.9	.34E-01	
STIM 23	-65.3	32.9	.25E 01	.18E 01	12.9	.74E-01	.89E-02	.42E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	-100.0	20.7	.37E 01	.26E 01	61.4	.12E 00	.15E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 25	-65.3	25.3	.19E 01	.15E 01	64.1	.61E-01	.12E-01	.36E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	176.0	51.8	.38E 01	.18E 01	97.9	.71E-01	.59E-02	.40E 00	0.0	.00E 00	83.4	.28E-01	
STIM 27	181.7	57.1	.49E 01	.13E 01	172.8	.86E-01	.40E-02	.37E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 28	186.6	47.5	.32E 01	.18E 01	32.9	.42E-01	.10E-01	.37E 00	0.0	.00E 00	79.8	.33E-01	
STIM 29	-104.4	22.8	.26E 01	.70E 00	4.9	.12E 00	.49E-02	.25E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-154.2	34.1	.55E 01	.34E 01	169.2	.12E 00	.24E-01	.17E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-50.0	1.3	.16E-05	.58E 00	45.0	.43E 00	.17E-05	.21E-05	0.0	.00E 00	0.0	.00E 00	XXXX

V.C. 9   OBS 7

VIEWING CONDITION 5

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	0.0	131.7	.50E-04	.17E 01	171.0	.13E-01	.83E-07	.20E-05	0.0	.00E 00	423.3	.34E-01	
SUBJ 1 STIM 2	148.3	60.0	.13E-03	.16E 01	101.2	.34E-03	.42E-02	.11E-04	0.0	.00E 00	350.0	.00E 00	
SUBJ 1 STIM 3	20.0	100.0	.14E-03	.14E-03	0.0	.14E-05	.22E-06	.62E-09	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 4	120.0	57.8	.54E 01	.14E 01	72.0	.25E-01	.15E-01	.42E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 5	66.8	57.7	.62E 01	.43E 01	123.4	.75E-01	.17E-01	.15E 01	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 6	6.8	46.5	.26E 01	.13E 01	13.7	.36E-01	.82E-02	.23E 00	0.0	.00E 00	350.0	.00E 00	
SUBJ 1 STIM 7	-8.3	110.9	.19E-03	.31E 01	105.7	.34E-03	.42E-02	.16E-04	0.0	.00E 00	423.3	.34E-01	
SUBJ 1 STIM 8	-40.0	55.0	.10E-03	.10E-03	0.0	.18E-05	.29E-06	.57E-09	0.0	.00E 00	353.3	.75E-01	
SUBJ 1 STIM 9	64.5	15.6	.43E 01	.12E 01	116.8	.13E 00	.40E-01	.10E 01	0.0	.00E 00	300.0	.00E 00	
SUBJ 1 STIM 10	23.3	5.0	.26E 00	.56E-05	157.5	.14E-02	.83E-02	.91E-06	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 11	-106.3	13.3	.45E 01	.26E 00	12.8	.33E 00	.73E-02	.27E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 12	-9.7	30.5	.84E 01	.34E 01	144.6	.23E 00	.30E-01	.29E 01	0.0	.00E 00	350.0	.00E 00	
SUBJ 1 STIM 13	-40.0	26.7	.15E-04	.57E 01	34.0	.21E 00	.84E-06	.97E-05	0.0	.00E 00	300.0	.00E 00	
SUBJ 1 STIM 14	-103.5	51.6	.45E 01	.75E 00	16.2	.86E-01	.39E-02	.21E 00	0.0	.00E 00	300.0	.28E-01	
SUBJ 1 STIM 15	-108.3	45.0	.64E-04	.12E 01	6.7	.34E-03	.42E-02	.52E-05	0.0	.00E 00	343.3	.68E-01	
SUBJ 1 STIM 16	166.6	53.2	.30E 01	.14E 01	173.4	.31E-01	.85E-02	.24E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 17	-133.5	56.5	.12E-03	.34E 01	47.6	.28E-01	.86E-02	.23E-04	0.0	.00E 00	326.7	.12E 00	
SUBJ 1 STIM 18	-53.1	42.9	.46E 01	.14E 01	55.4	.36E-01	.17E-01	.49E 00	0.0	.00E 00	316.7	.55E-01	
SUBJ 1 STIM 19	-23.3	2.1	.12E 01	.36E 00	25.3	.18E 00	.87E-01	.64E 00	0.0	.00E 00	300.0	.00E 00	
SUBJ 1 STIM 20	-7.0	54.9	.39E 01	.96E 00	147.8	.54E-01	.79E-02	.22E 00	0.0	.00E 00	376.7	.39E-01	
SUBJ 1 STIM 21	3.4	41.6	.18E 01	.84E 00	53.4	.40E-01	.41E-02	.11E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 22	-74.2	30.6	.48E 01	.11E 01	28.9	.78E-01	.16E-01	.41E 00	0.0	.00E 00	353.3	.94E-02	
SUBJ 1 STIM 23	-83.5	28.3	.18E 01	.13E-04	16.6	.60E-01	.40E-02	.26E-05	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 24	101.5	27.2	.72E-04	.60E 01	74.4	.87E-01	.32E-01	.50E-04	0.0	.00E 00	350.0	.00E 00	
SUBJ 1 STIM 25	-80.0	21.7	.14E-04	.17E 01	72.0	.77E-01	.32E-06	.33E-05	0.0	.00E 00	333.3	.26E-01	
SUBJ 1 STIM 26	143.3	40.9	.29E 01	.26E 01	143.1	.58E-01	.84E-02	.47E 00	0.0	.00E 00	326.7	.44E-01	
SUBJ 1 STIM 27	103.5	61.0	.65E 01	.14E 01	08.2	.30E-01	.17E-01	.46E 00	0.0	.00E 00	360.0	.28E-01	
SUBJ 1 STIM 28	164.8	41.6	.25E 01	.58E 00	153.6	.40E-01	.74E-02	.11E 00	0.0	.00E 00	333.3	.43E-01	
SUBJ 1 STIM 29	-106.8	23.3	.44E 01	.64E 00	6.1	.19E 00	.44E-02	.38E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 30	-164.7	30.0	.74E 01	.16E 00	138.2	.43E-01	.38E-01	.12E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.70E-01   H ERROR=0.13E-01   L ERROR=0.00E 00   B ERROR=0.36E-01

V.C. 9   OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	13.7	102.3	.76E 01	.34E 01	07.5	.70E-01	.63E-02	.78E 00	0.0	.00E 00	174.1	.67E-01	
STIM 2	179.6	52.5	.46E 01	.20E 01	50.9	.57E-01	.12E-01	.55E 00	0.0	.00E 00	114.4	.52E-01	
STIM 3	15.6	92.0	.43E 01	.17E 01	175.5	.20E-01	.73E-02	.25E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	112.9	52.0	.33E 01	.25E 01	38.1	.54E-01	.91E-02	.49E 00	0.0	.00E 00	112.2	.34E-01	
STIM 5	56.6	57.9	.53E 01	.35E 01	149.6	.65E-01	.14E-01	.10E 01	0.0	.00E 00	110.5	.57E-01	
STIM 6	19.9	50.5	.44E 01	.22E 01	9.3	.56E-01	.13E-01	.62E 00	0.0	.00E 00	129.2	.64E-01	
STIM 7	-21.3	96.7	.67E 01	.46E 01	85.0	.66E-01	.83E-02	.10E 01	0.0	.00E 00	177.6	.51E-01	
STIM 8	-38.1	60.3	.49E 01	.15E 01	52.0	.34E-01	.12E-01	.38E 00	0.0	.00E 00	148.6	.53E-01	
STIM 9	52.2	17.3	.50E 01	.21E 01	02.7	.21E 00	.37E-01	.19E 01	0.0	.00E 00	90.9	.55E-01	
STIM 10	46.7	8.1	.23E 01	.17E 01	164.8	.23E 00	.43E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	-102.2	13.0	.19E 01	.31E 00	6.2	.15E 00	.42E-02	.14E 00	0.0	.00E 00	97.7	.81E-01	
STIM 12	-4.1	31.1	.43E 01	.29E 01	163.5	.99E-01	.21E-01	.12E 01	0.0	.00E 00	106.0	.55E-01	
STIM 13	-34.5	25.1	.44E 01	.20E 01	0.2	.11E 00	.25E-01	.11E 01	0.0	.00E 00	95.2	.62E-01	
STIM 14	-101.1	55.1	.20E 01	.63E 00	179.4	.36E-01	.18E-02	.71E-01	0.0	.00E 00	136.5	.43E-01	
STIM 15	-102.5	40.0	.29E 01	.94E 00	171.4	.59E-01	.35E-02	.18E 00	0.0	.00E 00	125.6	.57E-01	
STIM 16	107.2	55.8	.41E 01	.34E 01	145.0	.65E-01	.11E-01	.77E 00	0.0	.00E 00	126.1	.67E-01	
STIM 17	-169.1	40.5	.62E 01	.15E 01	131.0	.54E-01	.19E-01	.60E 00	0.0	.00E 00	117.6	.64E-01	
STIM 18	-49.5	43.3	.27E 01	.15E 01	7.0	.47E-01	.85E-02	.29E 00	0.0	.00E 00	114.8	.37E-01	
STIM 19	56.6	2.9	.20E 01	.55E 00	161.3	.39E 00	.90E-01	.12E 01	0.0	.00E 00	107.9	.68E-01	
STIM 20	-22.3	57.4	.49E 01	.32E 01	34.5	.58E-01	.13E-01	.87E 00	0.0	.00E 00	142.6	.39E-01	
STIM 21	19.4	39.0	.52E 01	.19E 01	37.8	.11E 00	.14E-01	.79E 00	0.0	.00E 00	108.2	.53E-01	
STIM 22	-63.7	46.7	.36E 01	.21E 01	04.7	.39E-01	.11E-01	.51E 00	0.0	.00E 00	128.1	.26E-01	
STIM 23	-97.8	27.5	.23E 01	.50E 00	179.9	.82E-01	.29E-02	.13E 00	0.0	.00E 00	103.9	.62E-01	
STIM 24	-170.4	21.1	.44E 01	.15E 01	149.1	.73E-01	.33E-01	.98E 00	0.0	.00E 00	98.7	.67E-01	
STIM 25	-64.4	22.1	.19E 01	.97E 00	92.1	.60E-01	.12E-01	.26E 00	0.0	.00E 00	90.6	.68E-01	
STIM 26	154.8	43.8	.60E 01	.27E 01	42.1	.61E-01	.22E-01	.12E 01	0.0	.00E 00	108.7	.51E-01	
STIM 27	100.6	55.6	.35E 01	.22E 01	148.4	.57E-01	.75E-02	.44E 00	0.0	.00E 00	122.2	.60E-01	
STIM 28	102.1	35.3	.57E 01	.29E 01	153.5	.11E 00	.23E-01	.15E 01	0.0	.00E 00	90.3	.31E-01	
STIM 29	-105.8	24.0	.19E 01	.79E 00	12.0	.78E-01	.54E-02	.19E 00	0.0	.00E 00	103.2	.49E-01	
STIM 30	-150.0	30.6	.34E 01	.14E 01	140.0	.45E-01	.17E-01	.47E 00	0.0	.00E 00	98.4	.57E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.86E-01   H ERROR=0.16E-01   L ERROR=0.00E 00   B ERROR=0.55E-01

V.C. 10 OBS 7

VIEWING CONDITION 6

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	8.2	138.2	.79E 01	.22E 01	104.7	.52E-01	.43E-02	.39E 00	0.0	.00E 00	200.0	.58E-01	
SUBJ 1	STIM 2	143.7	65.0	.78E 01	.24E 00	94.0	.12E 00	.36E-02	.91E-01	0.0	.00E 00	220.0	.69E-01	
SUBJ 1	STIM 3	6.7	126.6	.40E 01	.26E 01	38.1	.26E-01	.42E-02	.24E 00	0.0	.00E 00	103.3	.34E-01	
SUBJ 1	STIM 4	133.3	63.9	.85E 01	.28E 01	63.8	.46E-01	.21E-01	.12E 01	0.0	.00E 00	218.3	.40E-01	
SUBJ 1	STIM 5	72.6	75.8	.92E 01	.14E 01	90.0	.53E-01	.18E-01	.52E 00	0.0	.00E 00	226.7	.29E-01	
SUBJ 1	STIM 6	0.9	61.3	.49E 01	.14E 01	148.5	.29E-01	.12E-01	.35E 00	0.0	.00E 00	103.3	.91E-01	
SUBJ 1	STIM 7	-8.4	131.6	.36E 01	.14E 01	170.2	.13E-01	.41E-02	.12E 00	0.0	.00E 00	236.7	.86E-01	
SUBJ 1	STIM 8	-28.9	77.4	.97E 01	.33E 01	1.1	.63E-01	.17E-01	.12E 01	0.0	.00E 00	240.0	.42E-01	
SUBJ 1	STIM 9	30.0	23.3	.26E-04	.17E 01	142.0	.71E-01	.36E-06	.58E-05	0.0	.00E 00	103.3	.96E-01	
SUBJ 1	STIM 10	-1.9	7.0	.21E 01	.20E 00	91.4	.30E 00	.46E-02	.19E 00	0.0	.00E 00	186.7	.64E-01	
SUBJ 1	STIM 11	-101.8	17.3	.40E 01	.20E 00	10.0	.23E 00	.59E-02	.21E 00	0.0	.00E 00	253.3	.92E-01	
SUBJ 1	STIM 12	6.3	26.6	.34E 01	.13E 01	87.1	.12E 00	.89E-02	.53E 00	0.0	.00E 00	196.7	.45E-01	
SUBJ 1	STIM 13	-56.2	17.8	.88E 01	.11E 01	28.7	.19E 00	.72E-01	.17E 01	0.0	.00E 00	213.3	.31E-01	
SUBJ 1	STIM 14	-101.0	66.4	.45E 01	.18E 01	97.7	.27E-01	.11E-01	.38E 00	0.0	.00E 00	323.3	.45E-01	
SUBJ 1	STIM 15	-108.6	58.3	.46E 01	.41E 00	24.6	.76E-01	.38E-02	.10E 00	0.0	.00E 00	283.3	.31E-01	
SUBJ 1	STIM 16	160.0	75.0	.10E-06	.10E-06	0.0	.13E-08	.21E-09	.42E-[illegible]	0.0	.00E 00	253.3	.66E-01	
SUBJ 1	STIM 17	108.8	68.3	.94E 01	.20E 00	91.1	.14E 00	.35E-02	.87E-01	0.0	.00E 00	200.0	.55E-01	
SUBJ 1	STIM 18	-60.0	61.7	.79E-04	.33E 01	54.0	.54E-01	.29E-06	.13E-04	0.0	.00E 00	240.0	.24E-01	
SUBJ 1	STIM 19	-80.0	3.0	.88E-05	.22E-05	0.0	.28E-05	.18E-06	.20E-10	0.0	.00E 00	216.7	.31E-01	
SUBJ 1	STIM 20	-3.3	69.8	.96E-04	.37E 01	103.5	.14E-02	.83E-02	.16E-04	0.0	.00E 00	210.0	.73E-01	
SUBJ 1	STIM 21	1.8	41.5	.34E 01	.29E 01	47.6	.78E-01	.12E-01	.75E 00	0.0	.00E 00	186.7	.36E-01	
SUBJ 1	STIM 22	-80.0	55.0	.19E-04	.30E 01	72.0	.54E-01	.22E-06	.32E-05	0.0	.00E 00	266.7	.33E-01	
SUBJ 1	STIM 23	-85.0	25.0	.50E 01	.91E 00	166.5	.20E 00	.58E-02	.57E 00	0.0	.00E 00	263.3	.25E-01	
SUBJ 1	STIM 24	102.6	38.2	.62E 01	.11E 01	109.6	.16E 00	.73E-02	.56E 00	0.0	.00E 00	216.7	.41E-01	
SUBJ 1	STIM 25	-75.4	18.7	.36E 01	.12E 01	137.2	.19E 00	.15E-01	.77E 00	0.0	.00E 00	220.0	.91E-01	
SUBJ 1	STIM 26	163.3	54.8	.30E 01	.28E 01	167.5	.53E-01	.84E-02	.47E 00	0.0	.00E 00	220.0	.91E-01	
SUBJ 1	STIM 27	97.1	69.7	.64E 01	.28E 01	130.7	.72E-01	.11E-01	.79E 00	0.0	.00E 00	201.7	.79E-01	
SUBJ 1	STIM 28	101.3	50.0	.58E-04	.52E 01	29.7	.10E 00	.37E-02	.19E-04	0.0	.00E 00	216.7	.15E-01	
SUBJ 1	STIM 29	-108.7	24.9	.60E 01	.70E 00	23.4	.23E 00	.11E-01	.53E 00	0.0	.00E 00	240.0	.87E-01	
SUBJ 1	STIM 30	-164.4	44.6	.95E 01	.14E 01	37.0	.20E 00	.13E-01	.94E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.95E-01 H ERROR=0.93E-02 L ERROR=0.00E 00 B ERROR=0.54E-01

V.C. 10 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	8.9	105.0	.55E 01	.21E 01	140.1	.33E-01	.73E-02	.34E 00	0.0	.00E 00	112.7	.58E-01	
STIM 2	102.2	64.0	.75E 01	.89E 00	75.3	.11E 00	.72E-02	.33E 00	0.0	.00E 00	104.5	.37E-01	
STIM 3	8.9	93.3	.50E 01	.41E 01	111.7	.51E-01	.74E-02	.69E 00	0.0	.00E 00	109.6	.57E-01	
STIM 4	97.2	36.0	.15E 02	.63E 01	107.2	.20E 00	.65E-01	.83E 01	0.0	.00E 00	104.3	.23E-01	
STIM 5	59.4	58.1	.60E 01	.24E 01	123.1	.41E-01	.17E-01	.77E 00	0.0	.00E 00	107.1	.22E-01	
STIM 6	34.1	46.5	.11E 02	.50E 01	155.7	.11E 00	.36E-01	.36E 01	0.0	.00E 00	102.5	.41E-01	
STIM 7	-20.1	89.3	.62E 01	.44E 01	68.4	.62E-01	.92E-02	.95E 00	0.0	.00E 00	124.6	.57E-01	
STIM 8	-37.5	59.5	.68E 01	.22E 01	5.2	.64E-01	.16E-01	.80E 00	0.0	.00E 00	110.8	.35E-01	
STIM 9	62.7	11.4	.43E 01	.25E 01	142.4	.25E 00	.58E-01	.31E 01	0.0	.00E 00	103.1	.38E-01	
STIM 10	54.9	4.0	.18E 01	.88E 00	152.9	.27E 00	.67E-01	.13E 01	0.0	.00E 00	99.8	.39E-01	
STIM 11	-92.4	13.1	.25E 01	.95E 00	8.7	.19E 00	.14E-01	.57E 00	0.0	.00E 00	112.7	.36E-01	
STIM 12	19.7	18.9	.44E 01	.13E 01	37.7	.19E 00	.23E-01	.96E 00	0.0	.00E 00	100.2	.24E-01	
STIM 13	-36.9	21.6	.35E 01	.31E 01	91.4	.16E 00	.23E-01	.15E 01	0.0	.00E 00	102.5	.19E-01	
STIM 14	-100.5	58.6	.43E 01	.10E 01	178.4	.73E-01	.29E-02	.24E 00	0.0	.00E 00	131.4	.45E-01	
STIM 15	-102.3	56.5	.46E 01	.99E 00	173.2	.80E-01	.34E-02	.25E 00	0.0	.00E 00	119.0	.39E-01	
STIM 16	105.6	57.0	.38E 01	.37E 01	144.9	.66E-01	.11E-01	.79E 00	0.0	.00E 00	111.3	.34E-01	
STIM 17	-176.3	44.6	.95E 01	.42E 01	143.2	.11E 00	.33E-01	.28E 01	0.0	.00E 00	115.4	.43E-01	
STIM 18	-53.4	44.8	.26E 01	.21E 01	20.6	.49E-01	.87E-02	.37E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	-107.6	2.5	.92E 00	.56E 00	158.8	.34E 00	.41E-01	.64E 00	0.0	.00E 00	108.3	.29E-01	
STIM 20	-9.8	47.7	.40E 01	.24E 01	147.0	.67E-01	.11E-01	.63E 00	0.0	.00E 00	105.1	.30E-01	
STIM 21	-4.2	20.1	.48E 01	.40E 01	3.4	.14E 00	.26E-01	.20E 01	0.0	.00E 00	101.0	.35E-01	
STIM 22	-66.9	34.1	.32E 01	.29E 01	150.5	.87E-01	.13E-01	.81E 00	0.0	.00E 00	113.1	.34E-01	
STIM 23	-93.5	24.0	.37E 01	.11E 01	2.4	.15E 00	.78E-02	.31E 00	0.0	.00E 00	111.8	.28E-01	
STIM 24	-104.7	27.4	.50E 01	.31E 01	137.4	.18E 00	.31E-01	.22E 01	0.0	.00E 00	102.5	.25E-01	
STIM 25	-83.8	13.4	.15E 01	.97E 00	136.7	.11E 00	.13E-01	.35E 00	0.0	.00E 00	111.5	.34E-01	
STIM 26	153.6	48.3	.10E 02	.14E 01	19.9	.85E-01	.32E-01	.98E 00	0.0	.00E 00	100.6	.31E-01	
STIM 27	98.3	61.6	.79E 01	.13E 01	177.2	.13E 00	.37E-02	.52E 00	0.0	.00E 00	105.2	.40E-01	
STIM 28	100.2	39.0	.58E 01	.41E 01	63.2	.13E 00	.19E-01	.19E 01	0.0	.00E 00	105.3	.32E-01	
STIM 29	-108.2	21.3	.35E 01	.67E 00	18.7	.16E 00	.71E-02	.35E 00	0.0	.00E 00	106.8	.37E-01	
STIM 30	-152.7	36.9	.35E 01	.22E 01	172.8	.74E-01	.14E-01	.66E 00	0.0	.00E 00	108.3	.29E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.12E 00 H ERROR=0.20E-01 L ERROR=0.00E 00 B ERROR=0.36E-01

**** END OF STREAM OPR212 1054

**** END OF STREAM OOP212   319   OOP212   DATE: 26/06/78   TIME: 14/43/18
UNIT: 0

V.C. II OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	11.6	113.3	.39E 01	.21E 01	117.3	.30E-01	.41E-02	.23E 00	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 2	170.9	52.9	.64E 01	.10E 01	69.7	.84E-01	.14E-01	.39E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1	STIM 3	20.0	103.3	.33E 01	.86E-04	72.0	.32E-01	.13E-06	.86E-05	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 4	160.0	40.0	.41E-04	.29E 01	36.0	.71E-01	.36E-06	.92E-05	0.0	.00E 00	163.3	.34E-01	
SUBJ 1	STIM 5	66.5	61.0	.65E 01	.14E 01	108.8	.30E-01	.17E-01	.46E 00	0.0	.00E 00	263.3	.70E-01	
SUBJ 1	STIM 6	32.7	54.4	.64E 01	.14E 01	120.5	.49E-01	.17E-01	.52E 00	0.0	.00E 00	266.7	.33E-01	
SUBJ 1	STIM 7	-32.1	83.1	.21E-03	.18E 02	136.3	.64E-01	.32E-01	.14E-03	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 8	-37.5	61.5	.40E 01	.25E 01	165.6	.53E-01	.86E-02	.50E 00	0.0	.00E 00	286.7	.23E-01	
SUBJ 1	STIM 9	86.8	33.3	.12E 02	.10E 01	9.3	.35E 00	.55E-02	.11E 01	0.0	.00E 00	266.7	.32E-01	
SUBJ 1	STIM 10	0.3	15.5	.91E 01	.19E 00	126.4	.47E 00	.55E-01	.36E 00	0.0	.00E 00	233.3	.63E-01	
SUBJ 1	STIM 11	-65.0	18.2	.18E 01	.16E 01	85.5	.87E-01	.16E-01	.49E 00	0.0	.00E 00	233.3	.78E-01	
SUBJ 1	STIM 12	3.5	27.5	.97E 01	.33E 01	10.7	.18E 00	.52E-01	.37E 01	0.0	.00E 00	200.0	.58E-01	
SUBJ 1	STIM 13	-40.0	24.2	.45E 01	.41E 00	36.0	.17E-01	.29E-01	.24E 00	0.0	.00E 00	160.0	.30E-01	
SUBJ 1	STIM 14	-138.5	60.0	.32E 01	.65E 00	33.2	.48E-01	.40E-02	.11E 00	0.0	.00E 00	260.0	.38E-01	
SUBJ 1	STIM 15	-110.0	58.3	.35E-04	.17E 01	90.0	.29E-01	.15E-06	.31E-05	0.0	.00E 00	266.7	.14E-01	
SUBJ 1	STIM 16	170.7	50.5	.54E 01	.27E 01	178.6	.52E-01	.14E-01	.76E 00	0.0	.00E 00	253.3	.13E-01	
SUBJ 1	STIM 17	-156.8	61.5	.33E 01	.13E 01	121.0	.28E-01	.82E-02	.23E 00	0.0	.00E 00	270.0	.37E-01	
SUBJ 1	STIM 18	-40.0	46.7	.47E-04	.17E 01	36.0	.36E-01	.21E-06	.53E-05	0.0	.00E 00	250.0	.28E-05	
SUBJ 1	STIM 19	-41.9	7.4	.15E 01	.79E 00	100.5	.57E 00	.64E-01	.15E 01	0.0	.00E 00	186.7	.36E-01	
SUBJ 1	STIM 20	-28.8	54.7	.47E 01	.23E 00	167.5	.56E-01	.11E-01	.62E-01	0.0	.00E 00	250.0	.23E-01	
SUBJ 1	STIM 21	24.8	41.3	.72E 01	.62E 00	97.1	.15E 00	.14E-01	.34E 00	0.0	.00E 00	223.3	.54E-01	
SUBJ 1	STIM 22	-63.2	41.6	.24E 01	.12E 01	90.5	.41E-01	.82E-02	.23E 00	0.0	.00E 00	243.3	.27E-01	
SUBJ 1	STIM 23	-90.0	25.0	.10E-06	.10E-06	0.0	.40E-08	.64E-09	.13E-14	0.0	.00E 00	233.3	.38E-01	
SUBJ 1	STIM 24	166.5	36.3	.39E 01	.13E 01	11.7	.49E-01	.16E-01	.45E 00	0.0	.00E 00	206.7	.32E-01	
SUBJ 1	STIM 25	-80.0	20.0	.12E-04	.20E 01	72.0	.15E 00	.58E-06	.57E-05	0.0	.00E 00	163.3	.34E-01	
SUBJ 1	STIM 26	166.6	44.5	.47E 01	.11E-03	27.0	.55E-02	.17E-01	.35E-04	0.0	.00E 00	236.7	.14E-01	
SUBJ 1	STIM 27	38.9	51.6	.46E 01	.49E 00	174.5	.85E-01	.45E-02	.14E 00	0.0	.00E 00	266.7	.36E-01	
SUBJ 1	STIM 28	166.8	46.5	.26E 01	.13E 01	58.7	.36E-01	.82E-02	.23E 00	0.0	.00E 00	236.7	.37E-01	
SUBJ 1	STIM 29	-100.0	23.3	.16E 01	.11E 01	180.0	.70E-01	.77E-02	.25E 00	0.0	.00E 00	243.3	.27E-01	
SUBJ 1	STIM 30	-140.3	34.8	.18E 02	.30E 01	148.6	.18E 00	.77E-01	.63E 01	0.0	.00E 00	233.3	.57E-01	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.10E 00   H ERROR=0.16E-01   L ERROR=0.00E 00   B ERROR=0.31E-01

V.C. II OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	2.4	102.1	.75E 01	.43E 01	41.4	.59E-01	.97E-02	.10E 01	0.0	.00E 00	130.1	.13E-01	
STIM 2	101.4	49.6	.42E 01	.38E 01	5.7	.78E-01	.14E-01	.10E 01	0.0	.00E 00	114.8	.22E-01	
STIM 3	14.3	98.0	.63E 01	.18E 01	30.9	.47E-01	.77E-02	.36E 00	0.0	.00E 00	135.1	.15E-01	
STIM 4	123.2	37.9	.66E 01	.27E 01	42.3	.10E 00	.25E-01	.13E 01	0.0	.00E 00	97.2	.31E-01	
STIM 5	48.3	53.6	.54E 01	.34E 01	158.7	.70E-01	.15E-01	.11E 01	0.0	.00E 00	114.9	.31E-01	
STIM 6	21.1	53.7	.43E 01	.33E 01	33.6	.74E-01	.11E-01	.83E 00	0.0	.00E 00	115.1	.20E-01	
STIM 7	-14.1	88.0	.87E 01	.31E 01	32.2	.47E-01	.13E-01	.97E 00	0.0	.00E 00	131.4	.88E-02	
STIM 8	-44.3	66.2	.74E 01	.24E 01	28.7	.41E-01	.17E-01	.83E 00	0.0	.00E 00	122.3	.39E-01	
STIM 9	62.3	37.5	.45E 01	.33E 01	48.4	.12E 00	.14E-01	.12E 01	0.0	.00E 00	101.1	.19E-01	
STIM 10	21.5	15.4	.33E 01	.21E 01	146.1	.14E 00	.33E-01	.14E 01	0.0	.00E 00	101.2	.33E-01	
STIM 11	-98.3	14.9	.13E 01	.49E 00	179.3	.90E-01	.52E-02	.14E 00	0.0	.00E 00	94.0	.36E-01	
STIM 12	18.1	28.6	.46E 01	.20E 01	23.2	.12E 00	.21E-01	.10E 01	0.0	.00E 00	102.5	.41E-01	
STIM 13	-27.4	23.2	.58E 01	.14E 01	11.3	.83E-01	.39E-01	.11E 01	0.0	.00E 00	99.0	.29E-01	
STIM 14	-102.8	61.3	.47E 01	.14E 01	179.9	.77E-01	.38E-02	.35E 00	0.0	.00E 00	115.6	.24E-01	
STIM 15	-104.9	50.5	.40E 01	.16E 01	163.6	.64E-01	.55E-02	.34E 00	0.0	.00E 00	115.7	.24E-01	
STIM 16	-102.4	56.1	.90E 01	.46E 01	152.6	.95E-01	.24E-01	.23E 01	0.0	.00E 00	112.7	.25E-01	
STIM 17	-132.5	58.8	.70E 01	.23E 01	123.7	.41E-01	.19E-01	.87E 00	0.0	.00E 00	114.6	.30E-01	
STIM 18	-48.9	52.9	.50E 01	.20E 01	22.6	.50E-01	.14E-01	.61E 00	0.0	.00E 00	112.1	.12E-01	
STIM 19	86.3	3.2	.22E 01	.40E 00	173.6	.64E 00	.42E-01	.86E 00	0.0	.00E 00	98.1	.32E-01	
STIM 20	-13.6	61.9	.69E 01	.49E 01	15.1	.79E-01	.18E-01	.17E 01	0.0	.00E 00	119.1	.25E-01	
STIM 21	21.1	36.9	.55E 01	.16E 01	55.5	.14E 00	.92E-02	.76E 00	0.0	.00E 00	108.6	.23E-01	
STIM 22	-58.8	45.2	.52E 01	.15E 01	120.6	.11E 00	.85E-02	.53E 00	0.0	.00E 00	107.5	.24E-01	
STIM 23	-94.7	22.5	.23E 01	.79E 00	3.8	.10E 00	.60E-02	.25E 00	0.0	.00E 00	99.5	.32E-01	
STIM 24	107.5	22.0	.70E 01	.27E 01	148.9	.20E 00	.43E-01	.27E 01	0.0	.00E 00	97.5	.19E-01	
STIM 25	-67.0	17.4	.20E 01	.11E 01	98.0	.87E-01	.16E-01	.40E 00	0.0	.00E 00	95.9	.22E-01	
STIM 26	174.4	36.2	.36E 01	.20E 01	148.3	.87E-01	.12E-01	.61E 00	0.0	.00E 00	102.4	.30E-01	
STIM 27	84.7	51.3	.64E 01	.23E 01	132.8	.72E-01	.18E-01	.91E 00	0.0	.00E 00	114.0	.30E-01	
STIM 28	168.4	34.3	.45E 01	.29E 01	154.8	.10E 00	.19E-01	.12E 01	0.0	.00E 00	104.6	.20E-01	
STIM 29	-100.0	19.0	.17E 01	.29E 00	180.0	.89E-01	.24E-02	.81E-01	0.0	.00E 00	104.2	.23E-01	
STIM 30	-147.4	35.7	.72E 01	.44E 01	144.6	.13E 00	.32E-01	.28E 01	0.0	.00E 00	104.3	.27E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.10E 00   H ERROR=0.17E-01   L ERROR=0.00E 00   B ERROR=0.25E-01

U.C. 12 OBS 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	24.7	56.2	.10E 02	.12E 01	94.9	.16E 00	.14E-01	.67E 00	83.3	.80E-01	0.0	.00E 00	
SUBJ 1	STIM 2	163.5	13.6	.11E 02	.42E 01	34.0	.48E 00	.11E 00	.11E 02	45.0	.17E 00	0.0	.00E 00	
SUBJ 1	STIM 3	30.0	45.0	.29E 01	.32E-04	63.0	.64E-01	.11E-06	.64E-05	76.7	.22E-01	0.0	.00E 00	
SUBJ 1	STIM 4	120.0	13.5	.81E 01	.14E 01	96.3	.26E 00	.85E-01	.27E 01	40.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 5	40.4	30.9	.55E 01	.36E 01	96.0	.14E 00	.25E-01	.20E 01	68.3	.24E-01	0.0	.00E 00	
SUBJ 1	STIM 6	32.2	37.9	.55E 01	.24E 01	106.4	.11E 00	.18E-01	.11E 01	76.7	.87E-01	0.0	.00E 00	
SUBJ 1	STIM 7	33.2	36.6	.22E 01	.12E 01	110.3	.46E-01	.81E-02	.23E 00	71.7	.23E-01	0.0	.00E 00	
SUBJ 1	STIM 8	34.0	33.0	.38E 01	.82E-04	178.9	.56E-01	.16E-01	.29E-04	60.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 9	41.9	33.9	.68E 01	.73E 00	167.5	.88E-01	.29E-01	.46E 00	66.7	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 10	45.2	25.4	.60E 01	.57E 01	142.0	.23E 00	.37E-01	.42E 01	53.3	.27E 00	0.0	.00E 00	
SUBJ 1	STIM 11	135.1	12.5	.95E 01	.43E 01	112.5	.65E 00	.82E-01	.10E 02	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 12	66.9	37.9	.41E 01	.14E 01	128.9	.41E-01	.17E-01	.49E 00	65.0	.44E-01	0.0	.00E 00	
SUBJ 1	STIM 13	61.3	20.1	.90E 01	.20E 01	72.8	.36E 00	.45E-01	.29E 01	46.7	.19E 00	0.0	.00E 00	
SUBJ 1	STIM 14	-178.4	22.2	.15E 02	.12E 01	30.0	.53E 00	.71E-01	.26E 01	40.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 15	-173.4	10.0	.13E 02	.86E 01	10.6	.53E 00	.94E-01	.18E 02	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 16	-166.9	37.9	.44E 01	.41E 01	73.8	.11E 00	.17E-01	.15E 01	50.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 17	-185.8	34.2	.14E 02	.14E 01	148.4	.13E 00	.59E-01	.18E 01	43.3	.31E 00	0.0	.00E 00	
SUBJ 1	STIM 18	53.9	27.1	.60E 01	.14E 01	133.0	.53E-01	.35E-01	.98E 00	61.7	.27E-01	0.0	.00E 00	
SUBJ 1	STIM 19	17.2	23.2	.29E-04	.80E 01	135.4	.34E 00	.11E-01	.31E-04	56.7	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 20	36.7	30.9	.29E 01	.21E 01	49.2	.72E-01	.84E-02	.47E 00	68.3	.24E-01	0.0	.00E 00	
SUBJ 1	STIM 21	46.6	34.6	.35E 01	.34E-04	135.0	.53E-02	.16E-01	.11E-04	63.3	.53E-01	0.0	.00E 00	
SUBJ 1	STIM 22	80.0	16.7	.10E-06	.10E-06	0.0	.60E-08	.95E-09	.19E-14	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 23	165.0	10.9	.10E 02	.14E 01	121.5	.50E 00	.11E-01	.21E 01	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 24	160.3	17.8	.18E 02	.20E 01	80.8	.11E 00	.15E 00	.64E 01	46.7	.26E 00	0.0	.00E 00	
SUBJ 1	STIM 25	148.8	10.1	.21E 02	.14E 01	40.8	.24E 00	.26E 00	.91E 01	51.7	.20E 00	0.0	.00E 00	
SUBJ 1	STIM 26	157.4	18.0	.13E 02	.34E 01	67.7	.20E 00	.11E 00	.75E 01	43.3	.15E 00	0.0	.00E 00	
SUBJ 1	STIM 27	80.0	18.3	.18E-04	.65E 01	108.0	.36E 00	.16E-05	.20E-04	56.7	.26E 00	0.0	.00E 00	
SUBJ 1	STIM 28	-165.1	25.0	.37E-04	.15E 02	72.0	.14E 00	.91E-01	.70E-04	46.7	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 29	120.7	8.2	.15E 02	.18E 01	35.4	.11E 01	.21E 00	.11E 02	36.7	.33E 00	0.0	.00E 00	
SUBJ 1	STIM 30	176.7	30.9	.21E 01	.42E-04	27.5	.14E-02	.82E-02	.69E-05	50.0	.20E 00	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.23E 00 H ERROR=0.53E-01 L ERROR=0.13E 00 B ERROR=0.00E 00

U.C. 12 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	11.3	0.8	.14E 00	.70E-01	81.6	.19E 00	.15E-01	.42E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	-200.0	0.2	.19E 00	.12E 00	180.0	.66E 00	.16E 00	.40E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	22.8	0.4	.17E 00	.47E-01	69.1	.40E 00	.17E-01	.39E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	104.9	0.3	.14E 00	.11E 00	13.9	.51E 00	.62E-01	.17E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 5	37.7	0.4	.16E 00	.87E-01	54.7	.40E 00	.34E-01	.11E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	20.0	0.5	.17E 00	.73E-01	72.0	.32E 00	.22E-01	.72E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	25.1	0.4	.17E 00	.54E-01	66.7	.40E 00	.20E-01	.68E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	20.0	0.5	.17E 00	.73E-01	72.0	.32E 00	.22E-01	.72E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	40.0	0.3	.16E 00	.52E-01	54.0	.50E 00	.25E-01	.81E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 10	50.8	0.4	.16E 00	.11E 00	35.3	.40E 00	.47E-01	.14E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	80.0	0.2	.16E 00	.11E 00	108.0	.62E 00	.13E 00	.31E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	51.1	0.4	.16E 00	.10E 00	35.2	.40E 00	.41E-01	.13E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	73.6	0.3	.15E 00	.77E-01	22.3	.50E 00	.40E-01	.12E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-146.6	0.4	.21E 00	.12E 00	8.3	.43E 00	.56E-01	.19E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-150.8	0.2	.14E 00	.12E 00	171.9	.53E 00	.88E-01	.22E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-133.1	0.6	.15E 00	.14E 00	157.8	.25E 00	.40E-01	.12E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-146.5	0.4	.16E 00	.14E 00	160.3	.34E 00	.58E-01	.17E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	53.1	0.3	.16E 00	.59E-01	43.2	.50E 00	.29E-01	.93E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	33.4	0.3	.16E 00	.30E-01	59.9	.50E 00	.15E-01	.47E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 20	27.7	0.4	.17E 00	.59E-01	64.1	.40E 00	.22E-01	.74E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	35.3	0.4	.17E 00	.77E-01	56.4	.40E 00	.29E-01	.96E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	80.0	0.2	.18E-06	.14E 00	108.0	.65E 00	.29E-05	.37E-06	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-178.3	0.3	.21E 00	.11E 00	144.6	.37E 00	.10E 00	.22E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	84.9	0.1	.19E 00	.13E 00	30.2	.18E 01	.18E 00	.74E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 25	131.0	0.2	.18E 00	.88E-01	27.3	.78E 00	.14E 00	.31E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	81.3	0.3	.17E 00	.14E 00	79.6	.56E 00	.98E-01	.28E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 27	80.0	0.3	.16E-06	.25E 00	108.0	.75E 00	.33E-05	.37E-06	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 28	-171.6	0.3	.17E 00	.12E 00	142.1	.41E 00	.84E-01	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 29	109.2	0.1	.19E 00	.49E-01	31.4	.10E 01	.13E 00	.20E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-188.6	0.4	.19E 00	.12E 00	137.1	.36E 00	.68E-01	.18E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-180.0	0.1	.51E-11	.48E-05	90.0	.44E-04	.17E-09	.70E-15	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.50E 00 H ERROR=0.57E-01 L ERROR=0.00E 00 B ERROR=0.00E 00

V.C. 13 OBS 7

VIEWING CONDITION 3

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	16.5	133.0	.83E 01	.51E 01	125.5	.49E-01	.86E-02	.10E 01	0.0	.00E 00	100.0	.53E-01	
SUBJ 1	STIM 2	-177.0	58.8	.86E 01	.21E 01	140.7	.43E-01	.23E-01	.98E 00	0.0	.00E 00	150.0	.38E-01	
SUBJ 1	STIM 3	8.0	91.6	.10E 02	.12E 01	95.7	.11E 00	.45E-02	.43E 00	0.0	.00E 00	178.3	.61E-01	
SUBJ 1	STIM 4	100.0	4.3	.74E-04	.41E-10	180.0	.17E-04	.15E-09	.22E-14	0.0	.00E 00	123.3	.12E 00	
SUBJ 1	STIM 5	30.0	46.7	.17E 01	.60E-04	63.0	.38E-01	.21E-06	.68E-05	0.0	.00E 00	155.0	.49E-01	
SUBJ 1	STIM 6	26.8	61.5	.46E 01	.30E 01	46.1	.72E-01	.82E-02	.69E 00	0.0	.00E 00	140.0	.22E-05	
SUBJ 1	STIM 7	14.9	126.4	.64E 01	.16E 01	137.8	.27E-01	.71E-02	.26E 00	0.0	.00E 00	104.7	.45E-01	
SUBJ 1	STIM 8	7.0	56.0	.62E 01	.29E 01	179.1	.57E-01	.17E-01	.10E 01	0.0	.00E 00	140.0	.22E-05	
SUBJ 1	STIM 9	40.0	16.7	.10E-06	.10E-06	0.0	.60E-08	.95E-09	.10E-14	0.0	.00E 00	138.7	.65E-01	
SUBJ 1	STIM 10	52.8	6.3	.22E 01	.37E 00	0.9	.26E 00	.37E-01	.41E 00	0.0	.00E 00	135.0	.21E-01	
SUBJ 1	STIM 11	-157.1	36.1	.97E 01	.29E 01	159.1	.11E 00	.41E-01	.24E 01	0.0	.00E 00	134.7	.49E-01	
SUBJ 1	STIM 12	33.3	39.9	.29E 01	.21E 01	67.8	.72E-01	.84E-02	.47E 00	0.0	.00E 00	153.3	.43E-01	
SUBJ 1	STIM 13	5.7	23.1	.37E 01	.16E 01	76.8	.15E 00	.15E-01	.81E 00	0.0	.00E 00	140.0	.41E-01	
SUBJ 1	STIM 14	-126.8	68.2	.43E 01	.23E 01	70.7	.50E-01	.81E-02	.45E 00	0.0	.00E 00	158.3	.28E-01	
SUBJ 1	STIM 15	-130.9	55.5	.22E 02	.67E 00	119.5	.47E-01	.63E-01	.85E 00	0.0	.00E 00	150.0	.38E-01	
SUBJ 1	STIM 16	-150.3	67.5	.23E 02	.13E 01	140.4	.27E-01	.54E-01	.14E 01	0.0	.00E 00	158.3	.46E-01	
SUBJ 1	STIM 17	-153.8	70.2	.88E 01	.38E 01	120.6	.66E-01	.16E-01	.13E 01	0.0	.00E 00	140.0	.36E-01	
SUBJ 1	STIM 18	24.3	40.8	.81E 01	.60E 00	47.6	.15E 00	.92E-02	.31E 00	0.0	.00E 00	136.7	.24E-01	
SUBJ 1	STIM 19	40.0	6.7	.21E-04	.80E 01	144.0	.12E 01	.54E-05	.80E-04	0.0	.00E 00	146.7	.23E-01	
SUBJ 1	STIM 20	20.0	68.3	.65E-04	.17E 01	167.0	.24E-01	.19E-06	.50E-05	0.0	.00E 00	100.0	.63E-01	
SUBJ 1	STIM 21	26.3	44.9	.36E 01	.10E 01	106.7	.63E-01	.88E-02	.26E 00	0.0	.00E 00	143.3	.23E-01	
SUBJ 1	STIM 22	5.6	20.9	.50E 01	.10E 01	90.2	.19E 00	.93E-02	.63E 00	0.0	.00E 00	136.7	.49E-01	
SUBJ 1	STIM 23	-125.6	41.3	.75E 01	.11E 01	6.2	.17E 00	.93E-02	.63E 00	0.0	.00E 00	135.0	.57E-01	
SUBJ 1	STIM 24	-168.2	47.3	.83E 01	.11E 01	7.7	.11E 00	.23E-01	.58E 00	0.0	.00E 00	143.3	.23E-01	
SUBJ 1	STIM 25	-180.0	5.0	.33E 01	.11E-04	72.0	.65E 00	.57E-05	.22E-04	0.0	.00E 00	140.0	.41E-01	
SUBJ 1	STIM 26	-132.5	26.6	.73E 01	.41E 00	79.6	.27E 00	.47E-02	.36E 00	0.0	.00E 00	146.7	.23E-01	
SUBJ 1	STIM 27	71.8	16.0	.76E 01	.25E 01	45.0	.44E 00	.36E-01	.37E 01	0.0	.00E 00	147.7	.42E-01	
SUBJ 1	STIM 28	-163.7	42.0	.10E-06	.10E-06	0.0	.24E-08	.38E-09	.75E-15	0.0	.00E 00	151.7	.11E-01	
SUBJ 1	STIM 29	-140.3	24.1	.54E 01	.12E 01	106.8	.11E 00	.32E-01	.83E 00	0.0	.00E 00	140.0	.00E 00	
SUBJ 1	STIM 30	-147.8	51.1	.15E 02	.12E 02	154.1	.24E 00	.46E-01	.11E 02	0.0	.00E 00	153.3	.22E-01	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.16E 00 H ERROR=0.16E-01 L ERROR=0.00E 00 B ERROR=0.38E-01

V.C. 13 OBS 2.4.5.7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	8.0	79.3	.45E 01	.29E 01	79.9	.12E 00	.59E-02	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	-152.6	21.2	.51E 01	.35E 01	134.4	.16E 00	.38E-01	.26E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	6.6	69.0	.68E 01	.18E 01	67.8	.95E-01	.59E-02	.55E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	63.6	1.8	.88E 00	.41E 00	45.4	.49E 00	.39E-01	.63E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 5	20.4	20.4	.35E 01	.30E 01	57.5	.12E 00	.16E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	14.4	42.1	.52E 01	.17E 01	67.5	.12E 00	.70E-02	.65E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	5.3	71.7	.64E 01	.22E 01	96.0	.88E-01	.55E-02	.62E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	10.6	52.6	.63E 01	.25E 01	72.4	.12E 00	.66E-02	.76E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	40.9	7.5	.17E 01	.71E 00	44.5	.23E 00	.16E-01	.51E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 10	41.5	7.2	.32E 01	.59E 00	45.2	.43E 00	.16E-01	.81E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	-141.1	13.4	.26E 01	.23E 01	143.9	.17E 00	.31E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	31.3	22.3	.32E 01	.21E 01	38.7	.14E 00	.16E-01	.93E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	41.2	14.9	.26E 01	.17E 01	174.8	.13E 00	.26E-01	.94E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-133.4	36.0	.67E 01	.29E 01	137.0	.94E-01	.29E-01	.17E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-132.3	33.0	.69E 01	.35E 01	153.2	.15E 00	.29E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-144.2	30.4	.72E 01	.32E 01	147.0	.12E 00	.36E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-153.3	30.9	.73E 01	.28E 01	139.5	.89E-01	.37E-01	.20E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	7.4	30.0	.30E 01	.19E 01	55.8	.98E-01	.11E-01	.61E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	-19.4	1.3	.14E 01	.58E 00	32.9	.51E 00	.15E 00	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 20	9.3	53.5	.36E 01	.22E 01	96.6	.66E-01	.69E-02	.46E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	8.8	33.0	.62E 01	.23E 01	101.7	.17E 00	.17E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	31.8	13.7	.30E 01	.20E 01	28.7	.20E 00	.28E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-121.0	16.4	.30E 01	.14E 01	6.0	.20E 00	.16E-01	.88E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	-144.6	17.0	.35E 01	.26E 01	136.7	.15E 00	.33E-01	.17E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 25	-161.3	0.8	.12E 01	.30E 00	70.9	.15E 01	.88E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	-145.1	8.5	.29E 01	.21E 01	158.7	.27E 00	.51E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 27	49.2	6.7	.19E 01	.10E 01	41.5	.29E 00	.24E-01	.92E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 28	-155.4	14.8	.40E 01	.28E 01	132.2	.19E 00	.43E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 29	-148.2	9.5	.23E 01	.17E 01	136.7	.18E 00	.39E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-146.8	24.4	.55E 01	.33E 01	146.5	.14E 00	.35E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	81.8	0.5	.44E 00	.16E 00	123.0	.39E 00	.13E 00	.44E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.23E 00 H ERROR=0.33E-01 L ERROR=0.00E 00 B ERROR=0.00E 00

J.C. 13   OBS 2,5,7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	RTNESS	SIGR	
STIM	1	7.2	81.5	46E 01	26E 01	34.6	.44E-01	.76E-02	.46E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	2	-152.8	33.4	91E 01	42E 01	137.6	.12E 00	.43E-01	.36E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	3	7.4	77.7	34E 01	10E 01	107.4	.44E-01	.33E-02	.15E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	4	100.0	1.0	69E 00	16E-05	180.0	.68E 00	.62E-05	.33E-05	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	5	51.2	35.7	52E 01	31E 01	175.7	.98E-01	.22E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	6	3.6	40.4	35E 01	29E 01	56.6	.68E-01	.96E-02	.63E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	7	7.5	78.0	42E 01	33E 01	46.0	.50E-01	.75E-02	.56E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	8	8.2	53.1	43E 01	25E 01	106.6	.77E-01	.86E-02	.63E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	9	10.7	7.2	20E 01	15E 01	35.8	.28E 00	.33E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	10	35.2	3.8	11E 01	73E 00	37.4	.28E 00	.33E-01	.66E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	11	-145.5	21.3	47E 01	28E 01	138.8	.13E 00	.35E-01	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	12	29.6	26.1	37E 01	31E 01	100.0	.13E 00	.20E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	13	44.2	18.6	43E 01	23E 01	162.2	.14E 00	.35E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	14	-131.9	47.5	12E 02	21E 01	142.8	.11E 00	.36E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	15	-134.6	42.5	11E 02	31E 01	141.6	.11E 00	.39E-01	.26E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	16	-144.5	43.9	12E 02	30E 01	145.0	.11E 00	.43E-01	.35E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	17	-153.0	45.0	13E 02	33E 01	141.1	.76E-01	.46E-01	.30E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	18	7.9	42.0	39E 01	29E 01	32.8	.84E-01	.13E-01	.85E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	19	-18.9	1.7	22E 01	92E 00	32.8	.53E 00	.18E 00	.37E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	20	8.8	60.8	45E 01	17E 01	122.9	.59E-01	.83E-02	.38E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	21	25.2	34.8	53E 01	34E 01	123.2	.12E 00	.22E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	22	37.1	27.8	47E 01	23E 01	5.8	.14E 00	.29E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	23	-124.6	20.1	47E 01	24E 01	4.8	.23E 00	.21E-01	.18E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	24	-147.3	26.9	63E 01	28E 01	136.7	.11E 00	.37E-01	.21E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	25	-100.0	1.3	10E-06	36E-05	72.0	.78E-07	.45E-06	.88E-12	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	26	-148.8	14.6	50E 01	25E 01	150.4	.19E 00	.55E-01	.27E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	27	51.6	5.4	25E 01	15E 01	37.1	.47E 00	.67E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	28	-156.8	25.2	72E 01	24E 01	134.8	.10E 00	.45E-01	.22E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	29	-152.0	15.4	43E 01	16E 01	130.7	.11E 00	.44E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	30	-151.3	30.2	65E 01	38E 01	132.1	.13E 00	.45E-01	.34E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	31	0.0	6.8	10E-06	10E-06	0.0	.13E-06	.21E-07	.42E-13	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.16E 00   H ERROR=0.31E-0[illegible]   I ERROR=0.00E 00   R ERROR=0.00E 00

J.C. 14 #5? 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	3.0	61.5	.52E 01	.16E 01	110.0	.73E-01	.78E-02	.42E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 2	108.0	33.8	.10E 02	.65E 00	6.7	.32E-01	.47E-01	.62E 00	0.0	.00E 00	266.7	.15E 00	
SUBJ 1 STIM 3	0.9	58.2	.30E 01	.81E 00	140.0	.29E-01	.71E-02	.13E 00	0.0	.00E 00	250.0	.12E 00	
SUBJ 1 STIM 4	102.3	7.3	.27E 01	.23E 00	177.2	.36E 00	.50E-02	.26E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 5	26.3	26.6	.34E 01	.13E 01	78.1	.12E 00	.89E-02	.53E 00	0.0	.00E 00	266.7	.62E-01	
SUBJ 1 STIM 6	7.4	41.9	.79E 01	.45E 01	169.1	.11E 00	.30E-01	.27E 01	0.0	.00E 00	233.3	.14E 00	
SUBJ 1 STIM 7	-11.2	47.1	.15E 02	.97E 01	160.7	.24E 00	.46E-01	.96E 01	0.0	.00E 00	250.0	.12E 00	
SUBJ 1 STIM 8	-68.6	46.1	.83E 01	.71E-04	173.4	.14E 00	.18E-01	.40E-04	0.0	.00E 00	283.3	.59E-01	
SUBJ 1 STIM 9	40.0	18.3	.10E-06	.10E-06	0.0	.55E-08	.87E-09	.17E-14	0.0	.00E 00	266.7	.20E 00	
SUBJ 1 STIM 10	-84.9	3.9	.31E 01	.28E 00	160.0	.78E 00	.18E-01	.70E 00	0.0	.00E 00	266.7	.77E-01	
SUBJ 1 STIM 11	-112.2	7.6	.26E 01	.13E 01	102.8	.17E 00	.55E-01	.14E 01	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 12	16.4	22.9	.84E 01	.37E 01	13.8	.23E 00	.52E-01	.43E 01	0.0	.00E 00	200.0	.25E 00	
SUBJ 1 STIM 13	23.8	18.9	.73E 01	.79E 00	35.6	.33E 00	.34E-01	.96E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 14	-120.0	55.0	.69E-04	.50E 01	108.0	.92E-01	.41E-06	.20E-04	0.0	.00E 00	266.7	.77E-01	
SUBJ 1 STIM 15	-133.8	47.8	.54E 01	.25E 01	90.2	.72E-01	.16E-01	.88E 00	0.0	.00E 00	250.0	.12E 00	
SUBJ 1 STIM 16	-160.0	43.3	.72E-04	.50E 01	144.0	.14E 00	.60E-06	.31E-04	0.0	.00E 00	250.0	.12E 00	
SUBJ 1 STIM 17	-155.8	54.3	.15E 02	.44E 01	120.5	.12E 00	.42E-01	.38E 01	0.0	.00E 00	300.0	.00E 00	
SUBJ 1 STIM 18	-27.6	34.6	.46E 01	.13E 01	171.5	.79E-01	.18E-01	.54E 00	0.0	.00E 00	200.0	.25E 00	
SUBJ 1 STIM 19	-20.0	3.3	.34E-05	.10E-06	18.0	.30E-07	.16E-06	.32E-12	0.0	.00E 00	266.7	.77E-01	
SUBJ 1 STIM 20	6.3	43.2	.25E 01	.14E 01	130.3	.38E-01	.85E-02	.25E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 21	11.3	33.5	.10E 02	.50E 01	138.5	.16E 00	.47E-01	.48E 01	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 22	-63.7	30.9	.35E 01	.98E 00	3.9	.71E-01	.88E-02	.27E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 23	-108.0	14.4	.81E 01	.12E 01	26.8	.53E 00	.32E-01	.21E 01	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 24	180.3	10.5	.65E 01	.15E 01	154.2	.44E 00	.72E-01	.29E 01	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 25	-70.7	0.0	.56E 01	.81E-01	152.3	.62E 00	.27E-02	.16E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 26	160.0	11.7	.41E 01	.25E-04	126.0	.35E 00	.31E-05	.28E-04	0.0	.00E 00	266.7	.62E-01	
SUBJ 1 STIM 27	80.1	8.0	.19E 01	.12E 01	58.9	.20E 00	.31E-01	.90E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 28	168.9	14.4	.49E 01	.17E 00	141.5	.27E 00	.19E-01	.16E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 29	-128.0	16.6	.33E 01	.21E-04	35.8	.19E 00	.57E-02	.13E-04	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 30	-149.3	35.3	.50E-04	.86E 01	12.3	.13E 00	.33E-01	.38E-04	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.20E 00 H ERROR=0.21E-01 L ERROR=0.00E 00 B ERROR=0.84E-01

V.C. [redacted]15 OBS 7

VIEWING CONDITION 4

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	6.7	74.8	39E 01	20E 01	171.7	.39E-01	83E-02	47E 00	0.0	.00E 00	135.0	37E-01	
SUBJ 1 STIM 2	-167.1	32.9	12E 02	36E 01	134.6	.25E 00	42E-01	40E 01	0.0	.00E 00	108.3	55E-01	
SUBJ 1 STIM 3	6.4	73.1	80E-04	52E 01	36.2	.44E-01	87E-02	.18E-04	0.0	.00E 00	133.3	50E-01	
SUBJ 1 STIM 4	10.0	2.0	99E 00	27E 00	63.0	.50E 00	22E-01	43E 00	0.0	.00E 00	91.7	18E-01	
SUBJ 1 STIM 5	13.0	27.8	59E 01	74E 00	23.8	17E 00	20E-01	.49E 00	0.0	.00E 00	111.7	39E-01	
SUBJ 1 STIM 6	0.3	40.6	66E 01	35E 01	111.3	.11E 00	16E-01	.15E 01	0.0	.00E 00	123.3	54E-01	
SUBJ 1 STIM 7	8.5	65.0	33E 01	69E 00	45.8	.65E-01	40E-02	11E 00	0.0	.00E 00	120.0	20E-05	
SUBJ 1 STIM 8	23.5	54.8	29E 01	13E-03	157.5	.14E-02	83E-02	22E-06	0.0	.00E 00	115.0	25E-01	
SUBJ 1 STIM 9	27.5	13.2	18E 01	12E 01	27.7	.12E 00	18E-01	53E 00	0.0	.00E 00	98.3	61E-01	
SUBJ 1 STIM 10	15.0	0.2	37E 01	14E 01	107.0	29E 00	50E-01	17E 01	0.0	.00E 00	108.3	10E 00	
SUBJ 1 STIM 11	-142.4	16.6	66E 01	24E 01	38.8	.33E 00	41E-01	30E 01	0.0	.00E 00	96.7	17E-01	
SUBJ 1 STIM 12	16.0	24.9	31E 01	73E 00	81.3	.11E 00	90E-02	28E 00	0.0	.00E 00	105.0	27E-01	
SUBJ 1 STIM 13	13.4	10.8	21E 01	24E-04	153.0	.55E-02	17E-01	77E-05	0.0	.00E 00	103.3	32E-01	
SUBJ 1 STIM 14	-152.7	43.5	95E 01	12E 01	171.0	.11E 00	30E-01	.83E 00	0.0	.00E 00	93.3	12E 00	
SUBJ 1 STIM 15	-147.6	44.8	14E 02	34E 00	113.6	.15E 00	44E-01	33E 00	0.0	.00E 00	100.0	10E 00	
SUBJ 1 STIM 16	-145.5	34.8	15E 02	68E 01	38.9	36E 00	49E-01	93E 01	0.0	.00E 00	98.3	17E-01	
SUBJ 1 STIM 17	-143.4	42.5	67E 01	13E 01	164.4	30E-01	23E-01	58E 00	0.0	.00E 00	96.7	34E-01	
SUBJ 1 STIM 18	17.1	34.9	33E 01	68E 00	28.2	.84E-01	77E-02	20E 00	0.0	.00E 00	108.3	67E-01	
SUBJ 1 STIM 19	148.8	4.4	44E 01	14E 01	80.3	.89E 00	86E-01	.44E 01	0.0	.00E 00	96.7	34E-01	
SUBJ 1 STIM 20	20.6	43.0	41E 01	99E 00	131.8	.41E-01	14E-01	.30E 00	0.0	.00E 00	116.7	29E-01	
SUBJ 1 STIM 21	27.6	34.9	60E 01	63E 00	51.9	.17E 00	.68E-02	34E 00	0.0	.00E 00	110.0	52E-01	
SUBJ 1 STIM 22	13.9	24.7	61E 01	27E 00	73.6	.32E 00	13E-01	.28E 00	0.0	.00E 00	101.7	43E-01	
SUBJ 1 STIM 23	-140.2	21.4	28E-04	80E 01	131.4	.35E 00	21E-01	33E-04	0.0	.00E 00	101.7	43E-01	
SUBJ 1 STIM 24	-175.8	27.4	51E 01	31E 01	8.0	.14E 00	27E-01	18E 01	0.0	.00E 00	110.0	45E-01	
SUBJ 1 STIM 25	158.4	3.3	36E 01	56E 00	108.5	10E 01	60E-01	19E 01	0.0	.00E 00	86.7	38E-01	
SUBJ 1 STIM 26	-134.9	17.7	80E 01	49E 00	67.9	44E 00	17E-01	49E 00	0.0	.00E 00	103.3	32E-01	
SUBJ 1 STIM 27	45.2	12.5	65E 01	10E 01	56.1	52E 00	16E-01	16E 01	0.0	.00E 00	103.3	32E-01	
SUBJ 1 STIM 28	142.3	37.0	70E 01	45E 01	4.6	.12E 00	30E-01	.26E 01	0.0	.00E 00	110.0	31E-05	
SUBJ 1 STIM 29	104.9	16.7	61E 01	33E 01	25.6	.23E 00	55E-01	38E 01	0.0	.00E 00	101.7	43E-01	
SUBJ 1 STIM 30	-174.7	34.3	56E 01	90E 00	128.4	.82E-01	23E-01	.46E 00	0.0	.00E 00	101.7	43E-01	
SUBJ 1 STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.23E 00 H ERROR=0.25E-01 L ERROR=0.00E 00 B ERROR=0.43E-01

V.C. 15 OBS 2,4,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	3.8	62.5	.36E 01	.19E 01	104.7	.56E-01	.54E-02	.34E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	-158.6	15.3	.50E 01	.22E 01	129.4	.16E 00	.50E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	5.1	57.7	.36E 01	.18E 01	97.7	.61E-01	.54E-02	.36E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	111.7	2.2	.17E 01	.85E 00	127.2	.64E 00	.94E-01	.21E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 5	18.3	24.9	.32E 01	.22E 01	106.2	.12E 00	.16E-01	.86E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	10.7	45.6	.40E 01	.22E 01	95.2	.86E-01	.83E-02	.61E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	1.8	60.5	.39E 01	.16E 01	108.2	.61E-01	.54E-02	.32E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	8.3	46.3	.50E 01	.19E 01	107.3	.10E 00	.93E-02	.64E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	27.7	13.1	.23E 01	.20E 01	45.0	.18E 00	.25E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 10	32.1	6.7	.15E 01	.10E 01	61.5	.23E 00	.24E-01	.73E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	-152.1	8.4	.27E 01	.17E 01	112.5	.23E 00	.49E-01	.18E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	16.3	20.4	.23E 01	.16E 01	105.8	.10E 00	.14E-01	.55E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	24.9	15.8	.25E 01	.17E 01	103.7	.14E 00	.20E-01	.86E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-138.9	30.3	.75E 01	.26E 01	148.5	.13E 00	.30E-01	.20E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-150.9	24.1	.57E 01	.23E 01	119.4	.11E 00	.36E-01	.17E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-155.4	18.0	.55E 01	.36E 01	138.7	.20E 00	.48E-01	.35E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-152.6	26.4	.66E 01	.21E 01	137.9	.79E-01	.40E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	10.9	27.8	.38E 01	.21E 01	95.4	.13E 00	.13E-01	.89E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	4.1	0.5	.13E 01	.57E 00	95.7	.25E 01	.17E 00	.45E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 20	7.2	51.2	.54E 01	.25E 01	98.7	.10E 00	.87E-02	.82E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	10.4	24.6	.29E 01	.15E 01	66.9	.11E 00	.11E-01	.56E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	23.7	17.5	.31E 01	.22E 01	60.6	.17E 00	.20E-01	.12E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-130.7	13.5	.37E 01	.18E 01	158.9	.19E 00	.38E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	-152.9	13.0	.30E 01	.21E 01	103.7	.19E 00	.34E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 25	-119.0	1.9	.15E 01	.66E 00	169.5	.70E 00	.73E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	-161.3	8.8	.29E 01	.25E 01	85.2	.32E 00	.46E-01	.26E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 27	27.8	10.0	.19E 01	.15E 01	61.5	.19E 00	.24E-01	.90E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 28	-170.5	13.4	.44E 01	.26E 01	132.6	.21E 00	.50E-01	.26E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 29	-158.6	11.5	.35E 01	.26E 01	103.4	.28E 00	.44E-01	.25E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-160.2	17.6	.49E 01	.13E 01	111.2	.17E 00	.38E-01	.12E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-78.0	0.8	.68E 00	.14E 00	4.2	.75E 00	.58E-01	.36E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.28E 00 H ERROR=0.36E-01 L ERROR=0.00E 00 B ERROR=0.00E 00

U.C. 15   OBS 2,5,7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	RTNESS	SIGR	
STIM	1	5.9	66.9	.33E 01	.16E 01	11.5	.27E-01	.76E-02	.25E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	2	-164.7	23.1	.79E 01	.23E 01	135.1	.12E 00	.52E-01	.25E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	3	7.0	61.9	.32E 01	.21E 01	26.8	.40E-01	.74E-02	.33E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	4	-145.3	3.0	.28E 01	.61E 00	132.5	.93E 00	.37E-01	.18E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	5	8.0	31.1	.48E 01	.30E 01	115.3	.13E 00	.20E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	6	0.4	50.2	.37E 01	.22E 01	125.5	.61E-01	.97E-02	.52E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	7	5.8	64.4	.33E 01	.18E 01	152.2	.32E-01	.77E-02	.29E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	8	9.0	51.1	.32E 01	.21E 01	165.6	.42E-01	.98E-02	.41E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	9	27.5	17.6	.37E 01	.30E 01	35.6	.20E 00	.29E-01	.20E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	10	6.3	6.2	.21E 01	.92E 00	89.0	.34E 00	.26E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	11	-158.0	12.4	.43E 01	.26E 01	121.3	.23E 00	.52E-01	.29E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	12	11.3	24.3	.33E 01	.20E 01	106.5	.13E 00	.15E-01	.87E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	13	23.7	20.3	.38E 01	.25E 01	109.2	.16E 00	.25E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	14	-145.3	37.9	.11E 02	.30E 01	145.3	.11E 00	.46E-01	.26E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	15	-156.4	32.3	.91E 01	.32E 01	122.0	.13E 00	.42E-01	.28E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	16	-160.3	25.3	.73E 01	.45E 01	127.8	.20E 00	.43E-01	.41E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	17	-162.3	33.5	.10E 02	.25E 01	136.4	.89E-01	.47E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	18	2.6	31.4	.35E 01	.29E 01	133.1	.99E-01	.17E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	19	-142.6	0.4	.19E 01	.11E 01	98.6	.37E 01	.37E 00	.18E 02	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	20	7.7	50.7	.52E 01	.17E 01	123.6	.80E-01	.11E-01	.53E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	21	0.9	30.4	.34E 01	.25E 01	74.2	.11E 00	.13E-01	.88E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	22	9.4	25.6	.41E 01	.32E 01	38.3	.15E 00	.22E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	23	-130.4	18.1	.60E 01	.26E 01	157.8	.21E 00	.46E-01	.27E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	24	-156.0	20.0	.46E 01	.26E 01	126.6	.14E 00	.36E-01	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	25	-120.1	2.8	.26E 01	.10E 01	171.9	.85E 00	.82E-01	.29E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	26	-158.8	15.2	.46E 01	.33E 01	128.6	.22E 00	.47E-01	.31E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	27	4.0	12.1	.30E 01	.17E 01	84.5	.25E 00	.22E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	28	-174.9	10.3	.71E 01	.27E 01	134.5	.19E 00	.54E-01	.31E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	29	-161.7	16.9	.56E 01	.42E 01	115.5	.27E 00	.49E-01	.44E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	30	-170.0	24.0	.72E 01	.16E 01	116.0	.17E 00	.35E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	31	8.9	0.6	.31E 00	.15E 00	72.3	.53E 00	.41E-01	.25E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.32E 00   H ERROR=0.43E-01   L ERROR=0.0 E 00   R ERROR=0.00E 00

**** END OF STREAM 000212   310

UNIT: 0   0PA024   DATE: 27/06/78 TIME: 11/38/29

V.C. 16 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	11.7	170.9	.47E 01	.31E-03	168.7	.34E-03	.42E-02	.25E-04	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 2	131.5	70.0	.33E 01	.74E 00	136.2	.42E-01	.40E-02	.11E 00	0.0	.00E 00	163.3	.41E-01	
SUBJ 1	STIM 3	20.9	171.7	.24E-03	.17E 01	162.0	.97E-02	.23E-06	.73E-05	0.0	.00E 00	300.0	.00E 00	
SUBJ 1	STIM 4	100.0	53.3	.34E-04	.17E 01	81.0	.31E-01	.17E-06	.33E-05	93.3	.36E-01	0.0	.00E 00	
SUBJ 1	STIM 5	66.9	80.8	.88E 01	.29E 01	124.1	.39E-01	.17E-01	.98E 00	0.0	.00E 00	186.7	.36E-01	
SUBJ 1	STIM 6	14.9	74.8	.40E 01	.21E 01	132.9	.38E-01	.75E-02	.35E 00	0.0	.00E 00	183.3	.68E-01	
SUBJ 1	STIM 7	-20.0	163.3	.65E 01	.60E-04	108.0	.40E-01	.59E-07	.75E-05	0.0	.00E 00	206.7	.23E-01	
SUBJ 1	STIM 8	-46.4	82.4	.68E 01	.27E 01	58.0	.43E-01	.16E-01	.91E 00	0.0	.00E 00	196.7	.17E-01	
SUBJ 1	STIM 9	54.0	40.5	.57E 01	.12E 01	162.7	.63E-01	.16E-01	.42E 00	96.7	.17E-01	0.0	.00E 00	
SUBJ 1	STIM 10	24.5	36.4	.69E 01	.54E 00	93.5	.17E 00	.13E-01	.32E 00	91.7	.18E-01	0.0	.00E 00	
SUBJ 1	STIM 11	-110.0	45.0	.23E-04	.29E 01	99.0	.64E-01	.26E-06	.46E-05	90.0	.32E-01	0.0	.00E 00	
SUBJ 1	STIM 12	1.7	49.1	.59E-04	.64E 01	92.2	.86E-02	.21E-01	.24E-04	95.0	.30E-01	0.0	.00E 00	
SUBJ 1	STIM 13	-27.1	51.1	.13E-03	.57E 01	100.3	.27E-01	.17E-01	.47E-04	98.3	.17E-01	0.0	.00E 00	
SUBJ 1	STIM 14	-108.3	68.3	.21E 01	.13E 01	137.1	.24E-01	.42E-02	.12E 00	0.0	.00E 00	166.7	.80E-01	
SUBJ 1	STIM 15	-118.4	68.3	.10E-03	.24E 01	152.4	.25E-01	.41E-02	.11E-04	0.0	.00E 00	170.0	.59E-01	
SUBJ 1	STIM 16	153.6	78.1	.61E-04	.54E 01	147.0	.47E-01	.88E-02	.13E-04	0.0	.00E 00	170.0	.90E-01	
SUBJ 1	STIM 17	-180.0	76.7	.58E 01	.45E-04	72.0	.76E-01	.63E-06	.11E-04	0.0	.00E 00	170.0	.59E-01	
SUBJ 1	STIM 18	-60.0	64.7	.96E-04	.17E 01	54.0	.25E-01	.25E-06	.75E-05	0.0	.00E 00	136.7	.65E-01	
SUBJ 1	STIM 19	20.0	18.3	.33E 01	.21E-04	72.0	.18E 00	.19E-06	.12E-04	84.7	.19E-01	0.0	.00E 00	
SUBJ 1	STIM 20	-6.9	81.3	.18E 02	.27E 01	179.5	.42E-01	.34E-01	.19E 01	0.0	.00E 00	183.3	.48E-01	
SUBJ 1	STIM 21	20.0	60.0	.10E-06	.10E-06	0.0	.17E-08	.27E-09	.52E-15	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 22	-76.9	58.2	.10E-03	.34E 01	128.6	.30E-01	.81E-02	.19E-04	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 23	-60.0	50.0	.10E-06	.10E-06	0.0	.20E-08	.32E-09	.63E-15	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 24	106.4	46.2	.49E 01	.14E 01	168.7	.39E-01	.16E-01	.46E 00	95.0	.30E-01	0.0	.00E 00	
SUBJ 1	STIM 25	-80.0	45.0	.10E-06	.10E-06	0.0	.22E-08	.35E-09	.70E-15	93.3	.18E-01	0.0	.00E 00	
SUBJ 1	STIM 26	176.7	59.8	.11E-03	.31E 01	112.5	.14E-02	.83E-02	.18E-04	96.7	.17E-01	0.0	.00E 00	
SUBJ 1	STIM 27	80.0	70.0	.11E-03	.94E-04	48.6	.15E-05	.22E-06	.45E-09	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 28	181.7	63.3	.20E 01	.12E 01	60.6	.26E-01	.42E-02	.12E 00	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 29	-110.0	48.3	.17E-04	.17E 01	99.0	.35E-01	.15E-06	.19E-05	91.7	.18E-01	0.0	.00E 00	
SUBJ 1	STIM 30	-173.6	56.1	.59E 01	.14E 01	144.0	.33E-01	.16E-01	.46E 00	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.37E-01   H ERROR=0.71E-02   L ERROR=0.23E-01   B ERROR=0.43E-01

J.L. 17 OBS 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	13.1	150.6	.12E 02	.50E 01	112.3	.63E-01	.81E-02	.13E 01	0.0	.00E 00	283.3	.58E-01	
SUBJ 1 STIM 2	180.0	56.7	.59E-04	.34E 01	18.0	.59E-01	.31E-06	.11E-04	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 3	20.0	144.7	.16E-03	.67E 01	162.0	.46E-01	.27E-06	.23E-04	0.0	.00E 00	263.3	.33E-01	
SUBJ 1 STIM 4	125.6	53.2	.92E 01	.11E 01	175.3	.16E 00	.93E-02	.62E 00	80.0	.36E-01	0.0	.00E 00	
SUBJ 1 STIM 5	54.8	67.7	.52E-04	.99E 01	91.5	.12E 00	.16E-01	.26E-04	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 6	23.0	54.0	.39E 01	.96E 00	111.8	.54E-01	.79E-02	.22E 00	0.0	.00E 00	130.0	.77E-01	
SUBJ 1 STIM 7	-20.0	126.7	.85E-04	.67E 01	18.0	.53E-01	.23E-06	.14E-04	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 8	-60.0	73.3	.78E-04	.17E 01	54.0	.23E-01	.19E-06	.56E-05	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 9	60.0	40.0	.10E-06	.10E-06	0.0	.25E-08	.40E-09	.79E-15	80.0	.36E-01	0.0	.00E 00	
SUBJ 1 STIM 10	46.3	31.3	.47E 01	.20E 01	72.4	.14E 00	.16E-01	.13E 01	85.0	.59E-01	0.0	.00E 00	
SUBJ 1 STIM 11	-105.3	28.3	.20E 01	.58E 00	39.6	.59E-01	.70E-02	.13E 00	80.0	.36E-01	0.0	.00E 00	
SUBJ 1 STIM 12	3.0	41.2	.44E 01	.13E 01	13.0	.43E-01	.16E-01	.45E 00	83.3	.40E-01	0.0	.00E 00	
SUBJ 1 STIM 13	-46.9	42.9	.46E 01	.14E 01	34.6	.36E-01	.17E-01	.49E 00	83.3	.40E-01	0.0	.00E 00	
SUBJ 1 STIM 14	-106.8	73.1	.17E-03	.41E 01	160.8	.24E-01	.82E-02	.30E-04	0.0	.00E 00	166.7	.53E-01	
SUBJ 1 STIM 15	-106.7	66.6	.16E-03	.24E 01	143.4	.25E-01	.43E-02	.18E-04	0.0	.00E 00	133.3	.11E 00	
SUBJ 1 STIM 16	186.6	68.1	.37E 01	.14E 01	170.0	.24E-01	.84E-02	.24E 00	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 17	-186.3	71.5	.58E 01	.10E 01	35.5	.60E-01	.88E-02	.26E 00	0.0	.00E 00	140.0	.71E-01	
SUBJ 1 STIM 18	-60.0	55.0	.86E-04	.20E 01	54.0	.52E-01	.32E-06	.14E-04	91.7	.48E-01	0.0	.00E 00	
SUBJ 1 STIM 19	33.1	0.6	.92E-05	.21E 01	54.0	.23E-01	.34E-01	.63E-05	76.7	.22E-01	0.0	.00E 00	
SUBJ 1 STIM 20	-13.8	60.1	.13E 02	.29E 00	3.3	.31E-01	.30E-01	.18E 00	0.0	.00E 00	160.0	.63E-01	
SUBJ 1 STIM 21	0.0	48.3	.13E-04	.17E 01	171.0	.35E-01	.16E-06	.15E-05	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 22	-63.4	48.2	.27E 01	.14E 01	35.4	.34E-01	.85E-02	.25E 00	83.3	.40E-01	0.0	.00E 00	
SUBJ 1 STIM 23	-66.8	36.6	.19E 01	.25E-04	28.3	.45E-01	.43E-02	.41E-05	86.7	.19E-01	0.0	.00E 00	
SUBJ 1 STIM 24	185.0	30.4	.48E 01	.15E 00	16.4	.73E-02	.19E-01	.59E-01	81.7	.20E-01	0.0	.00E 00	
SUBJ 1 STIM 25	-80.0	36.7	.92E-05	.40E 01	77.0	.11E 00	.43E-06	.31E-05	78.3	.21E-01	0.0	.00E 00	
SUBJ 1 STIM 26	177.2	48.2	.50E 01	.60E 00	84.2	.93E-01	.75E-02	.20E 00	86.7	.38E-01	0.0	.00E 00	
SUBJ 1 STIM 27	78.6	63.0	.46E 01	.65E 00	130.8	.28E-01	.11E-01	.15E 00	81.7	.41E-01	0.0	.00E 00	
SUBJ 1 STIM 28	183.8	48.2	.32E-04	.44E 01	155.3	.71E-01	.93E-02	.93E-05	85.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 29	-105.0	38.3	.18E 01	.16E 01	94.5	.42E-01	.75E-02	.24E 00	65.0	.34E-01	0.0	.00E 00	
SUBJ 1 STIM 30	-183.1	48.2	.78E-04	.30E 01	110.3	.36E-01	.80E-02	.15E-04	98.3	.17E-01	0.0	.00E 00	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.52E-01 H ERROR=0.86E-02 L ERROR=0.32E-01 B ERROR=0.66E-01

V.C. 18 OBS 7

VIEWING CONDITION 5

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	21.7	47.8	.79E 01	.11E 01	113.9	.12E 00	.18E-01	.59E 00	35.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 2	-172.2	20.6	.51E 01	.31E 01	44.1	.17E 00	.18E-01	.17E 01	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 3	25.0	39.6	.68E 01	.13E 01	96.8	.15E 00	.14E-01	.71E 00	31.7	.53E-01	0.0	.00E 00	
SUBJ 1	STIM 4	99.7	14.1	.85E 01	.25E 00	81.5	.94E-01	.02E-01	.47E 00	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 5	32.5	10.7	.52E 00	.20E 01	68.8	.26E 00	.17E-01	.16E 01	30.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 6	29.7	26.4	.51E 01	.51E 00	94.5	.16E 00	.16E-01	.31E 00	30.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 7	20.0	51.7	.24E-04	.34E 01	162.0	.66E-01	.30E-06	.51E-05	38.3	.43E-01	0.0	.00E 00	
SUBJ 1	STIM 8	36.8	36.6	.22E 01	.12E 01	6.7	.46E-01	.81E-02	.23E 00	33.3	.50E-01	0.0	.00E 00	
SUBJ 1	STIM 9	47.8	23.2	.37E-04	.65E 01	152.6	.28E 00	.86E-02	.33E-06	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 10	98.3	9.3	.52E 01	.35E 00	69.7	.21E 00	.81E-01	.62E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 11	-175.8	21.8	.73E 01	.24E 00	24.7	.24E 00	.36E-01	.26E 00	20.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 12	31.1	20.6	.60E 01	.37E-04	97.5	.17E 00	.19E-01	.24E-06	30.0	.19E 00	0.0	.00E 00	
SUBJ 1	STIM 13	52.3	21.4	.20E 01	.94E-05	117.9	.51E-01	.12E-01	.28E-05	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 14	-164.2	27.4	.95E 01	.31E 01	114.0	.21E 00	.47E-01	.33E 01	15.0	.19E 00	0.0	.00E 00	
SUBJ 1	STIM 15	-160.0	26.7	.10E-06	.18E-04	72.0	.38E-08	.11E-06	.22E-12	13.3	.25E 00	0.0	.00E 00	
SUBJ 1	STIM 16	-187.0	23.8	.59E 01	.10E 01	21.5	.15E 00	.34E-01	.15E 01	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 17	-160.4	28.0	.67E 01	.89E 00	91.2	.21E 00	.19E-01	.67E 00	21.7	.34E 00	0.0	.00E 00	
SUBJ 1	STIM 18	41.2	24.6	.45E-04	.86E 01	147.6	.32E 00	.42E-02	.46E-06	30.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 19	61.9	17.4	.51E 01	.30E-06	88.4	.17E 00	.37E-01	.35E-06	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 20	33.4	34.6	.37E 01	.58E-06	153.0	.56E-02	.17E-01	.19E-06	31.7	.53E-01	0.0	.00E 00	
SUBJ 1	STIM 21	47.3	28.3	.61E 01	.74E 00	61.0	.21E 00	.68E-02	.50E 00	26.7	.13E 00	0.0	.00E 00	
SUBJ 1	STIM 22	35.7	23.1	.63E 01	.11E 01	43.6	.26E 00	.13E-01	.91E 00	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 23	-168.9	20.6	.64E 01	.10E 01	91.0	.19E 00	.19E-01	.13E 01	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 24	-141.5	22.4	.97E 01	.74E 00	20.3	.32E 00	.48E-01	.10E 01	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 25	47.7	8.3	.41E 01	.20E 01	93.9	.38E 00	.62E-01	.31E 01	16.7	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 26	174.7	20.1	.20E-04	.10E-06	8.5	.24E-06	.15E-06	.31E-12	26.7	.67E-01	0.0	.00E 00	
SUBJ 1	STIM 27	140.0	5.0	.81E-05	.10E-06	18.0	.20E-07	.26E-06	.51E-12	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 28	-173.0	28.0	.44E 01	.31E 01	65.6	.16E 00	.17E-01	.15E 01	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 29	167.8	7.5	.16E 02	.24E 00	67.6	.18E 01	.15E 00	.16E 01	20.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 30	-175.6	29.7	.10E 02	.17E 01	78.2	.34E 00	.13E-01	.19E 01	23.3	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.22E 00 H ERROR=0.27E-01 L ERROR=0.84E-01 B ERROR=0.00E 00

V.C. 18 OBS 2,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	6.3	64.0	.37E 01	.24E 01	117.2	.77E-01	.92E-02	.67E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	-152.5	21.9	.58E 01	.37E 01	130.5	.17E 00	.42E-01	.31E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	6.9	55.1	.59E 01	.24E 01	109.2	.99E-01	.97E-02	.83E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	4.2	3.4	.51E 01	.43E 01	8.8	.13E 01	.20E 00	.20E 02	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 5	11.2	27.7	.32E 01	.20E 01	107.2	.11E 00	.13E-01	.72E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	9.5	38.8	.64E 01	.19E 01	101.7	.16E 00	.12E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	7.1	57.1	.34E 01	.28E 01	37.1	.54E-01	.87E-02	.52E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	17.1	40.3	.46E 01	.42E 01	62.2	.11E 00	.17E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	26.8	18.0	.44E 01	.25E 01	59.8	.24E 00	.23E-01	.19E 01	47.8	.28E 00	0.0	.00E 00	
STIM 10	26.8	8.5	.43E 01	.17E 01	98.8	.44E 00	.51E-01	.27E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	-178.6	9.6	.45E 01	.16E 01	58.4	.46E 00	.30E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	14.0	28.7	.27E 01	.26E 01	26.6	.92E-01	.15E-01	.76E 00	47.2	.27E 00	0.0	.00E 00	
STIM 13	16.9	25.2	.38E 01	.28E 01	108.7	.14E 00	.20E-01	.13E 01	41.7	.32E 00	0.0	.00E 00	
STIM 14	-180.3	18.7	.69E 01	.32E 01	84.8	.36E 00	.29E-01	.37E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-182.0	20.6	.74E 01	.28E 01	89.6	.35E 00	.28E-01	.32E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-160.8	23.2	.73E 01	.20E 01	139.6	.91E-01	.49E-01	.20E 01	40.0	.35E 00	0.0	.00E 00	
STIM 17	-176.8	27.7	.80E 01	.44E 01	108.8	.25E 00	.35E-01	.40E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	15.8	31.6	.38E 01	.33E 01	50.6	.12E 00	.17E-01	.12E 01	47.8	.27E 00	0.0	.00E 00	
STIM 19	-11.9	6.4	.63E 01	.28E 01	16.7	.45E 00	.14E 00	.88E 01	40.2	.36E 00	0.0	.00E 00	
STIM 20	10.4	41.7	.42E 01	.25E 01	138.1	.75E-01	.15E-01	.81E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	23.7	29.4	.43E 01	.36E 01	18.1	.13E 00	.22E-01	.17E 01	48.3	.25E 00	0.0	.00E 00	
STIM 22	15.0	20.5	.48E 01	.27E 01	75.0	.23E 00	.21E-01	.20E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-167.0	16.1	.55E 01	.29E 01	71.2	.34E 00	.30E-01	.32E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	-165.4	13.3	.40E 01	.38E 01	63.1	.34E 00	.45E-01	.41E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 25	-2.4	12.6	.40E 01	.29E 01	69.3	.31E 00	.39E-01	.29E 01	37.4	.35E 00	0.0	.00E 00	
STIM 26	-178.6	14.2	.68E 01	.31E 01	129.7	.31E 00	.66E-01	.46E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 27	5.8	6.4	.43E 01	.44E 00	95.1	.67E 00	.22E-01	.94E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 28	-158.7	22.6	.66E 01	.37E 01	124.2	.18E 00	.44E-01	.34E 01	41.7	.31E 00	0.0	.00E 00	
STIM 29	-121.7	10.5	.60E 01	.45E 01	28.3	.57E 00	.67E-01	.80E 01	38.8	.36E 00	0.0	.00E 00	
STIM 30	-166.3	21.2	.69E 01	.61E 01	115.4	.30E 00	.50E-01	.62E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-100.0	1.3	.10E-06	.10E-06	0.0	.78E-07	.12E-07	.24E-13	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.27E 00 H ERROR=0.38E-01 L ERROR=0.31E 00 B ERROR=0.00E 00

**** END OF STREAM 0PP212 581
UNIT: 0 0PP212 DATE: 26/06/78 TIME: 14/55.23

J.C. 19 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	0.0	200.0	20E-03	20E-03	0.0	.10E-05	16E-06	.62E-09	100.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 2	143.3	81.6	12E-03	27E 01	68.1	.20E-01	42E-02	.13E-04	48.3	34E-01	0.0	00E 00	
SUBJ 1	STIM 3	20.0	186.7	33E 01	12E-03	72.0	.18E-01	11E-06	70E-05	100.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 4	140.0	63.3	12E-03	33E 01	54.0	53E-01	38E-06	20E-06	36.7	.45E-01	0.0	00E 00	
SUBJ 1	STIM 5	47.4	80.0	11E 02	27E 01	163.4	.60E-01	18E-01	.11E 01	46.7	71E-01	0.0	00E 00	
SUBJ 1	STIM 6	5.2	104.8	66E 01	20E 01	34.3	.48E-01	70E-02	39E 00	50.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 7	-20.0	200.0	28E-03	28E-03	0.0	.14E-05	22E-06	12E-08	100.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 8	-37.8	95.6	11E 02	40E 01	18.2	.72E-01	16E-01	.18E 01	50.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 9	30.3	47.9	45E 01	10E 01	172.0	.37E-01	14E-01	.30E 00	40.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 10	20.0	41.7	43E-04	44E 01	162.0	.11E 00	.50E-06	.14E-04	33.3	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 11	-106.7	40.0	11E-03	10E 01	6.7	.34E-03	42E-02	87E-05	33.3	.50E-01	0.0	00E 00	
SUBJ 1	STIM 12	-3.4	51.6	19E 01	10E 01	135.2	32E-01	41E-02	11E 00	38.3	87E-01	0.0	00E 00	
SUBJ 1	STIM 13	-41.3	44.9	13E 02	29E 01	44.6	.73E-01	46E-01	26E 01	40.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 14	-105.0	103.3	62E-05	23E 02	94.5	.22E 00	86E-06	.43E-05	51.7	.32E-01	0.0	00E 00	
SUBJ 1	STIM 15	-145.3	78.2	67E 01	22E 01	42.4	.76E-01	76E-02	.58E 00	50.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 16	187.1	113.0	11E-03	88E 01	152.6	.60E-01	78E-02	.28E-06	48.3	.34E-01	0.0	00E 00	
SUBJ 1	STIM 17	-188.1	112.8	86E 01	76E 00	10.2	.28E-01	11E-01	.18E 00	51.7	.32E-01	0.0	00E 00	
SUBJ 1	STIM 18	-60.0	68.3	82E-04	17E 01	54.0	24E-01	21E-06	.63E-05	40.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 19	-0.0	6.6	74E-05	20E 01	34.4	.27E 00	21E-01	.70E-05	30.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 20	-6.9	114.4	69E 01	26E-03	164.6	.30E-01	81E-02	.48E-04	55.0	.52E-01	0.0	00E 00	
SUBJ 1	STIM 21	3.6	50.8	52E 01	28E 01	55.5	.83E-01	.87E-02	.77E 00	41.7	.40E-01	0.0	00E 00	
SUBJ 1	STIM 22	-80.0	75.0	34E-04	29E 01	72.0	.39E-01	.17E-06	.42E-05	43.3	.38E-01	0.0	00E 00	
SUBJ 1	STIM 23	-95.0	58.3	00E-05	10E-06	85.5	.17E-08	.22E-07	.43E-13	43.3	.38E-01	0.0	00E 00	
SUBJ 1	STIM 24	103.6	54.8	40E 01	11E 01	48.7	.51E-01	.87E-02	26E 00	35.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 25	-80.0	48.3	10E-06	10E-06	0.0	.21E-08	33E-09	.65E-15	36.7	.45E-01	0.0	00E 00	
SUBJ 1	STIM 26	170.5	60.4	77E 01	40E 01	61.5	.80E-01	15E-01	14E 01	43.3	.77E-01	0.0	00E 00	
SUBJ 1	STIM 27	70.5	72.7	74E 01	11E 01	140.8	.44E-01	15E-01	.37E 00	40.0	.72E-01	0.0	00E 00	
SUBJ 1	STIM 28	143.6	73.1	10E-03	51E 01	143.8	.44E-01	.87E-02	.23E-04	41.7	.40E-01	0.0	00E 00	
SUBJ 1	STIM 29	-110.0	50.0	18E-04	10E-03	0.0	.47E-06	.31E-06	.11E-09	36.7	.91E-01	0.0	00E 00	
SUBJ 1	STIM 30	-173.4	60.2	73E 01	10E-03	153.0	.56E-02	17E-01	.33E-04	40.0	.72E-01	0.0	00E 00	
SUBJ 1	STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.51E-01 H ERROR=0.78E-02 L ERROR=0.35E-01 B ERROR=0.00E 00

J.C. 19 OBS 3,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	7.7	132.4	.11E 02	.29E 01	72.6	.79E-01	.42E-02	.74E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	188.0	80.7	.43E 01	.15E 01	22.4	.21E-01	.84E-02	.25E 00	58.9	.73E-01	0.0	.00E 00	
STIM 3	10.3	120.0	.10E 02	.14E 01	43.2	.65E-01	.80E-02	.34E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	126.8	67.5	.57E 01	.16E 01	49.5	.33E-01	.13E-01	.42E 00	52.8	.13E 00	0.0	.00E 00	
STIM 5	27.5	74.0	.78E 01	.22E 01	149.0	.38E-01	.16E-01	.71E 00	68.3	.12E 00	0.0	.00E 00	
STIM 6	7.0	80.4	.45E 01	.35E 01	40.5	.45E-01	.71E-02	.55E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-16.2	115.5	.16E 02	.24E 00	114.7	.13E 00	.38E-02	.10E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-38.8	77.4	.74E 01	.30E 01	8.5	.55E-01	.14E-01	.91E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	20.5	52.7	.38E 01	.29E 01	20.1	.61E-01	.10E-01	.64E 00	50.0	.73E-01	0.0	.00E 00	
STIM 10	12.0	40.8	.30E 01	.20E 01	101.1	.70E-01	.85E-02	.46E 00	40.6	.72E-01	0.0	.00E 00	
STIM 11	-105.2	52.6	.35E 01	.12E 01	172.8	.65E-01	.42E-02	.25E 00	44.4	.71E-01	0.0	.00E 00	
STIM 12	-8.6	60.3	.45E 01	.31E 01	7.5	.51E-01	.12E-01	.72E 00	48.9	.63E-01	0.0	.00E 00	
STIM 13	-23.4	54.8	.57E 01	.20E 01	55.5	.67E-01	.14E-01	.66E 00	48.9	.53E-01	0.0	.00E 00	
STIM 14	-101.6	96.9	.29E 01	.12E 01	177.2	.30E-01	.21E-02	.12E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-104.3	87.7	.56E 01	.24E 01	154.3	.57E-01	.62E-02	.47E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	101.6	97.3	.53E 01	.29E 01	51.5	.44E-01	.71E-02	.50E 00	67.8	.11E 00	0.0	.00E 00	
STIM 17	-182.6	91.1	.11E 02	.30E 01	136.7	.63E-01	.17E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-49.3	73.0	.68E 01	.38E 01	27.8	.57E-01	.14E-01	.11E 01	58.3	.12E 00	0.0	.00E 00	
STIM 19	-2.3	10.9	.37E 01	.40E 00	90.0	.34E 00	.61E-02	.43E 00	32.8	.37E-01	0.0	.00E 00	
STIM 20	-15.4	87.6	.53E 01	.36E 01	129.1	.57E-01	.72E-02	.68E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	-0.4	64.2	.46E 01	.18E 01	144.1	.48E-01	.96E-02	.41E 00	65.6	.14E 00	0.0	.00E 00	
STIM 22	-76.5	77.5	.57E 01	.97E 00	63.3	.15E-01	.12E-01	.24E 00	57.2	.79E-01	0.0	.00E 00	
STIM 23	-101.0	70.6	.45E 01	.17E 01	11.6	.63E-01	.42E-02	.34E 00	55.6	.11E 00	0.0	.00E 00	
STIM 24	-103.4	60.4	.48E 01	.29E 01	163.6	.50E-01	.13E-01	.74E 00	43.3	.77E-01	0.0	.00E 00	
STIM 25	-80.6	60.4	.41E 01	.19E 01	10.9	.64E-01	.59E-02	.40E 00	46.1	.59E-01	0.0	.00E 00	
STIM 26	164.2	63.3	.71E 01	.17E 01	41.0	.32E-01	.18E-01	.60E 00	53.9	.82E-01	0.0	.00E 00	
STIM 27	73.5	68.4	.82E 01	.10E 01	131.6	.39E-01	.18E-01	.38E 00	56.1	.12E 00	0.0	.00E 00	
STIM 28	187.9	76.1	.40E 01	.25E 01	19.1	.33E-01	.83E-02	.41E 00	58.9	.96E-01	0.0	.00E 00	
STIM 29	-106.2	54.8	.24E 01	.28E 00	146.7	.34E-01	.44E-02	.39E-01	47.8	.82E-01	0.0	.00E 00	
STIM 30	-175.3	63.1	.10E 02	.19E 01	131.9	.75E-01	.23E-01	.94E 00	51.1	.80E-01	0.0	.00E 00	
STIM 31	-110.0	1.8	.92E 00	.15E 00	0.0	.50E 00	.13E-01	.23E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.77E-01 H ERROR=0.10E-01 L ERROR=0.87E-01 B ERROR=0.00E 00

V.C. 20 OBS 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ	STIM 1	1.5	270.8	13E 02	30E 01	109.2	.42E-01	.40E-07	.44E 00	0.0	.00E 00	266.7	.62E-01	
SUBJ	STIM 2	188.4	96.6	27E 01	13E 01	36.6	.17E-01	.41E-02	.12E 00	50.0	.10E 00	0.0	.00E 00	
SUBJ	STIM 3	4.7	156.2	63E 02	10E 02	75.8	.40E 00	.10E-01	.13E 02	0.0	.00E 00	103.3	.34E-01	
SUBJ	STIM 4	164.9	88.7	11E 02	32E 01	86.1	.36E-01	.19E-01	.12E 01	40.0	.00E 00	0.0	.00E 00	
SUBJ	STIM 5	63.1	118.0	74E 01	11E 01	86.1	.39E-01	.80E-02	.22E 00	61.7	.72E-01	0.0	.00E 00	
SUBJ	STIM 6	1.4	116.1	85E 01	13E 01	146.5	.31E-01	.11E-01	.29E 00	86.7	.77E-01	0.0	.00E 00	
SUBJ	STIM 7	-3.4	223.2	10E 02	32E 01	131.6	.40E-01	.40E-02	.45E 00	0.0	.00E 00	103.3	.34E-01	
SUBJ	STIM 8	-63.7	136.3	14E 02	58E 01	160.8	.11E 00	.88E-02	.21E 01	83.3	.12E 00	0.0	.00E 00	
SUBJ	STIM 9	50.2	58.5	98E 01	43E 01	116.0	.79E-01	.26E-01	.23E 01	46.7	.71E-01	0.0	.00E 00	
SUBJ	STIM 10	30.0	41.3	36E 01	18E 01	153.0	.44E-01	.14E-01	.50E 00	40.0	.13E 00	0.0	.00E 00	
SUBJ	STIM 11	-133.1	48.3	38E-04	36E 01	70.8	.69E-01	.44E-02	.89E-05	45.0	.00E 00	0.0	.00E 00	
SUBJ	STIM 12	5.0	63.3	40E 01	12E-04	85.5	.63E-01	.34E-07	.23E-05	45.0	.64E-01	0.0	.00E 00	
SUBJ	STIM 13	-31.8	56.0	99E 01	42E 01	85.2	.15E 00	.18E-01	.23E 01	50.0	.00E 00	0.0	.00E 00	
SUBJ	STIM 14	-100.0	123.3	48E-08	47E-02	90.0	.38E-04	.15E-09	.57E-12	68.3	.65E-01	0.0	.00E 00	
SUBJ	STIM 15	-106.2	100.9	64E 01	24E 01	34.7	.52E-01	.55E-02	.44E 00	66.7	.50E-01	0.0	.00E 00	
SUBJ	STIM 16	118.4	128.2	11E 02	20E 01	92.2	.85E-01	.40E-02	.78E 00	75.0	.67E-01	0.0	.00E 00	
SUBJ	STIM 17	-143.0	100.9	13E 02	30E 00	60.7	.11E 00	.45E-02	.15E 00	53.3	.83E-01	0.0	.00E 00	
SUBJ	STIM 18	-70.0	70.4	68E 01	53E 01	63.0	.67E-01	.14E-01	.14E 01	51.7	.65E-01	0.0	.00E 00	
SUBJ	STIM 19	33.2	17.2	52E 01	20E 01	109.9	.21E 00	.38E-01	.19E 01	33.3	.50E-01	0.0	.00E 00	
SUBJ	STIM 20	-6.8	110.1	14E 02	75E 01	11.5	.69E-01	.20E-01	.29E 01	71.7	.47E-01	0.0	.00E 00	
SUBJ	STIM 21	6.9	66.6	47E 01	60E 00	62.0	.66E-01	.44E-02	.13E 00	55.0	.52E-01	0.0	.00E 00	
SUBJ	STIM 22	-76.9	81.5	16E-03	53E 01	110.0	.42E-01	.80E-02	.34E-04	46.7	.94E-01	0.0	.00E 00	
SUBJ	STIM 23	-65.0	65.0	10E-06	10E-06	0.0	.15E-08	.24E-09	.48E-15	51.7	.65E-01	0.0	.00E 00	
SUBJ	STIM 24	103.0	61.0	67E 01	20E 01	173.7	.52E-01	.17E-01	.10E 01	45.0	.64E-01	0.0	.00E 00	
SUBJ	STIM 25	-77.2	50.0	64E 01	12E 01	3.7	.98E-01	.75E-02	.40E 00	40.0	.72E-01	0.0	.00E 00	
SUBJ	STIM 26	170.6	70.4	83E 01	26E 01	61.2	.65E-01	.14E-01	.85E 00	45.0	.64E-01	0.0	.00E 00	
SUBJ	STIM 27	71.5	87.3	96E 01	82E 01	75.9	.10E 00	.17E-01	.29E 01	40.0	.13E 00	0.0	.00E 00	
SUBJ	STIM 28	146.7	74.9	20E 01	24E-03	11.2	.34E-03	.42E-02	.20E-04	51.7	.32E-01	0.0	.00E 00	
SUBJ	STIM 29	-111.8	60.0	32E 01	76E 00	38.1	.48E-01	.43E-02	.13E 00	46.7	.36E-01	0.0	.00E 00	
SUBJ	STIM 30	-166.6	74.2	78E 01	28E 01	154.4	.39E-01	.17E-01	.94E 00	56.7	.59E-01	0.0	.00E 00	
SUBJ	STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.72E-01 H ERROR=0.10E-01 L ERROR=0.64E-01 B ERROR=0.44E-01

V.C. 20 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	0.6	154.6	18E 02	49E 01	72.4	.11E 00	.56E-02	.17E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	163.1	97.6	56E 01	36E 01	75.5	.55E-01	.64E-02	.65E 00	58.3	.78E-01	0.0	.00E 00	
STIM 3	10.1	126.0	16E 02	47E 01	70.1	.12E 00	.69E-02	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	127.6	60.9	12E 02	19E 01	58.7	.33E-01	.26E-01	.10E 01	55.6	.84E-01	0.0	.00E 00	
STIM 5	48.2	87.5	81E 01	28E 01	164.0	.51E-01	.13E-01	.81E 00	70.0	.79E-01	0.0	.00E 00	
STIM 6	13.3	94.5	53E 01	34E 01	13.8	.40E-01	.84E-02	.59E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-0.7	135.4	12E 02	37E 01	113.1	.89E-01	.56E-02	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-40.3	90.7	10E 02	38E 01	38.4	.43E-01	.18E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	18.6	40.5	53E 01	17E 01	138.9	.36E-01	.17E-01	.57E 00	66.1	.17E 00	0.0	.00E 00	
STIM 10	74.4	36.7	26E 01	13E 01	153.6	.36E-01	.11E-01	.29E 00	56.7	.11E 00	0.0	.00E 00	
STIM 11	-100.9	47.5	25E 01	38E 00	173.8	.52E-01	.16E-02	.62E-01	60.0	.95E-01	0.0	.00E 00	
STIM 12	0.6	52.7	39E 01	18E 01	1.0	.33E-01	.12E-01	.41E 00	66.1	.12E 00	0.0	.00E 00	
STIM 13	-27.6	52.7	31E 01	15E 01	81.4	.51E-01	.63E-02	.26E 00	61.7	.78E-01	0.0	.00E 00	
STIM 14	-100.0	90.9	32E-08	17E-02	90.0	.17E-04	.67E-10	.17E-12	73.3	.75E-01	0.0	.00E 00	
STIM 15	-112.0	93.8	57E 01	18E 01	0.2	.60E-01	.30E-02	.34E 00	68.3	.67E-01	0.0	.00E 00	
STIM 16	106.9	101.6	52E 01	28E 01	153.6	.35E-01	.74E-02	.45E 00	70.6	.81E-01	0.0	.00E 00	
STIM 17	-109.1	83.6	13E 02	45E 01	131.1	.75E-01	.24E-01	.22E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-67.6	71.0	11E 02	38E 01	75.1	.65E-01	.24E-01	.19E 01	49.6	.96E-01	0.0	.00E 00	
STIM 19	8.5	15.2	25E 01	15E 01	58.2	.16E 00	.17E-01	.78E 00	40.0	.81E-01	0.0	.00E 00	
STIM 20	-7.7	92.6	81E 01	30E 01	16.2	.35E-01	.14E-01	.84E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	8.7	55.7	27E 01	17E 01	151.1	.33E-01	.73E-02	.26E 00	58.3	.11E 00	0.0	.00E 00	
STIM 22	-70.1	71.4	45E 01	26E 01	113.6	.54E-01	.78E-02	.52E 00	59.4	.76E-01	0.0	.00E 00	
STIM 23	-68.5	67.5	36E 01	67E 00	5.1	.58E-01	.20E-02	.12E 00	60.6	.62E-01	0.0	.00E 00	
STIM 24	-166.1	52.5	48E 01	35E 01	100.2	.90E-01	.11E-01	.10E 01	56.7	.78E-01	0.0	.00E 00	
STIM 25	-67.6	60.4	61E 01	30E 01	117.6	.11E 00	.13E-01	.13E 01	55.0	.76E-01	0.0	.00E 00	
STIM 26	176.2	69.0	39E 01	18E 01	61.4	.42E-01	.74E-02	.33E 00	57.2	.91E-01	0.0	.00E 00	
STIM 27	62.6	75.0	75E 01	41E 01	126.5	.54E-01	.16E-01	.13E 01	59.4	.13E 00	0.0	.00E 00	
STIM 28	160.1	70.0	34E 01	27E 01	39.6	.41E-01	.73E-02	.41E 00	57.6	.68E-01	0.0	.00E 00	
STIM 29	-163.7	55.9	36E 01	16E 01	172.0	.64E-01	.50E-02	.33E 00	57.8	.85E-01	0.0	.00E 00	
STIM 30	-152.9	67.7	75E 01	35E 01	137.9	.51E-01	.18E-01	.12E 01	58.9	.58E-01	0.0	.00E 00	
STIM 31	-100.0	2.4	10E-06	10E-06	0.0	.42E-07	.67E-08	.13E-13	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.58E-01 H ERROR=0.10E-01 L ERROR=0.87E-01 B ERROR=0.30E 00

**** END OF STREAM 000212 762

U.C. 20 OBS 3,5,7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	DTNESS	SIGD	
STIM	1	6.3	132.4	.73E 01	.31E 01	59.0	.51E-01	.50E-02	.54E 00	0.0	.00E 00	112.9	.14E-01	
STIM	2	160.6	77.1	.26E 01	.19E 01	108.2	.33E-01	.40E-02	.20E 00	66.7	.78E-01	0.0	.00E 00	
STIM	3	6.0	111.2	.10E 02	.43E 01	81.8	.90E-01	.62E-02	.12E 01	0.0	.00E 00	111.1	.13E-01	
STIM	4	100.0	76.1	.43E 01	.32E 01	155.0	.55E-01	.70E-02	.57E 00	53.9	.70E-01	0.0	.00E 00	
STIM	5	46.3	87.5	.10E 02	.19E 01	141.7	.23E-01	.19E-01	.73E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	6	6.0	87.7	.35E 01	.25E 01	21.3	.30E-01	.58E-02	.29E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	7	-46.8	115.6	.64E 01	.43E 01	83.6	.53E-01	.63E-02	.74E 00	0.0	.00E 00	108.1	.18E-01	
STIM	8	-19.3	83.6	.11E 02	.28E 01	29.5	.36E-01	.20E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	9	13.8	48.5	.70E 01	.29E 01	157.7	.63E-01	.23E-01	.13E 01	53.0	.51E-01	0.0	.00E 00	
STIM	10	14.2	42.0	.36E 01	.17E 01	5.0	.40E-01	.13E-01	.46E 00	48.9	.56E-01	0.0	.00E 00	
STIM	11	-102.8	43.6	.14E 01	.81E 00	177.3	.33E-01	.30E-02	.83E-01	49.4	.31E-01	0.0	.00E 00	
STIM	12	-6.2	53.9	.32E 01	.22E 01	41.9	.48E-01	.85E-02	.41E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	13	-22.5	56.3	.31E 01	.23E 01	67.2	.50E-01	.78E-02	.40E 00	55.0	.40E-01	0.0	.00E 00	
STIM	14	-180.0	87.6	.22E-02	.16E-08	180.0	.25E-04	.73E-11	.13E-12	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	15	-161.9	90.0	.23E 01	.13E 01	150.9	.25E-01	.29E-02	.11E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	16	103.9	80.0	.34E 01	.22E 01	7.6	.25E-01	.61E-02	.27E 00	77.2	.39E-01	0.0	.00E 00	
STIM	17	-170.4	80.9	.54E 01	.27E 01	175.6	.36E-01	.10E-01	.56E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	18	-18.9	60.2	.89E 01	.32E 01	46.8	.52E-01	.20E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	19	10.3	26.0	.33E 01	.90E 00	135.6	.79E-01	.17E-01	.36E 00	43.3	.64E-01	0.0	.00E 00	
STIM	20	-5.0	86.4	.36E 01	.16E 01	13.1	.19E-01	.66E-02	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	21	-0.4	61.7	.29E 01	.26E 01	84.6	.48E-01	.66E-02	.38E 00	67.2	.71E-01	0.0	.00E 00	
STIM	22	-64.2	69.3	.67E 01	.18E 01	56.7	.26E-01	.15E-01	.55E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	23	-66.6	61.8	.22E 01	.79E 00	172.8	.36E-01	.21E-02	.89E-01	54.4	.73E-01	0.0	.00E 00	
STIM	24	-165.6	50.2	.38E 01	.12E 01	161.3	.30E-01	.12E-01	.28E 00	50.0	.37E-01	0.0	.00E 00	
STIM	25	-84.3	50.3	.30E 01	.16E 01	21.9	.44E-01	.59E-02	.26E 00	50.6	.60E-01	0.0	.00E 00	
STIM	26	156.4	63.4	.10E 02	.29E 01	36.1	.46E-01	.26E-01	.15E 01	54.6	.49E-01	0.0	.00E 00	
STIM	27	82.6	80.2	.52E 01	.36E 01	165.3	.60E-01	.80E-02	.72E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	28	162.3	70.0	.28E 01	.17E 01	86.3	.39E-01	.40E-02	.21E 00	57.8	.44E-01	0.0	.00E 00	
STIM	29	-106.1	5[illegible].5	.26E 01	.89E 00	32.1	.46E-01	.44E-02	.14E 00	52.2	.36E-01	0.0	.00E 00	
STIM	30	-169.2	63.2	.08E 01	.24E 01	144.6	.40E-01	.17E-01	.80E 00	60.0	.37E-01	0.0	.00E 00	
STIM	31	-160.0	0.8	.23E-10	.53E-04	90.0	.69E-34	.27E-00	.50E-14	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.41E-01 H ERROR=0.04E-02 L ERROR=0.52E-01 D ERROR=0.15E-01

U.C. 20 OBS 1,2,3,4,5,6,7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	DTNESS	SIGD	
STIM	1	7.1	120.6	.54E 01	.23E 01	67.8	.42E-01	.38E-02	.32E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	2	101.1	87.1	.31E 01	.19E 01	102.3	.36E-01	.35E-02	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	3	5.9	110.8	.56E 01	.27E 01	70.9	.49E-01	.42E-02	.43E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	4	115.5	71.9	.56E 01	.25E 01	56.3	.42E-01	.12E-01	.61E 00	67.4	.50E-01	0.0	.00E 00	
STIM	5	45.7	85.5	.51E 01	.20E 01	151.1	.26E-01	.93E-02	.37E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	6	10.5	85.8	.30E 01	.20E 01	36.7	.30E-01	.47E-02	.22E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	7	-12.5	108.1	.42E 01	.29E 01	108.2	.39E-01	.44E-02	.36E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	8	-35.6	81.8	.58E 01	.28E 01	31.4	.35E-01	.11E-01	.63E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	9	31.6	47.6	.30E 01	.18E 01	156.3	.39E-01	.99E-02	.36E 00	69.0	.63E-01	0.0	.00E 00	
STIM	10	17.1	36.2	.27E 01	.12E 01	170.9	.35E-01	.12E-01	.29E 00	59.3	.52E-01	0.0	.00E 00	
STIM	11	-101.7	43.0	.16E 01	.65E 00	3.2	.37E-01	.24E-02	.75E-01	64.0	.60E-01	0.0	.00E 00	
STIM	12	-6.8	51.5	.20E 01	.16E 01	6.3	.30E-01	.62E-02	.19E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	13	-24.8	51.3	.18E 01	.13E 01	112.2	.36E-01	.40E-02	.14E 00	66.7	.53E-01	0.0	.00E 00	
STIM	14	-69.9	82.9	.31E 01	.14E 00	0.8	.37E-01	.29E-03	.17E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	15	-101.8	85.6	.25E 01	.11E 01	179.5	.29E-01	.20E-02	.10E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	16	105.6	90.9	.25E 01	.17E 01	167.4	.19E-01	.42E-02	.14E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	17	-171.7	78.8	.55E 01	.28E 01	138.7	.39E-01	.11E-01	.61E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	18	-45.0	64.8	.62E 01	.25E 01	58.1	.47E-01	.15E-01	.77E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	19	6.3	20.8	.19E 01	.13E 01	176.0	.62E-01	.14E-01	.37E 00	69.0	.60E-01	0.0	.00E 00	
STIM	20	-12.3	83.6	.35E 01	.16E 01	15.1	.20E-01	.66E-02	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	21	0.3	54.5	.23E 01	.17E 01	3.1	.31E-01	.67E-02	.22E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	22	-60.1	66.5	.38E 01	.18E 01	63.3	.28E-01	.85E-02	.30E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	23	-67.3	57.2	.21E 01	.55E 00	2.2	.3[illegible]-01	.16E-02	.64E-01	66.7	.60E-01	0.0	.00E 00	
STIM	24	-102.8	46.3	.24E 01	.20E 01	97.8	.5[illegible]	.69E-02	.32E 00	58.6	.45E-01	0.0	.00E 00	
STIM	25	-75.9	54.7	.34E 01	.23E 01	110.5	.32E-01	.85E-02	.44E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	26	163.9	66.7	.59E 01	.25E 01	39.9	.39E-01	.14E-01	.69E 00	64.5	.55E-01	0.0	.00E 00	
STIM	27	76.6	78.8	.49E 01	.27E 01	144.6	.45E-01	.88E-02	.53E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	28	109.1	73.2	.27E 01	.17E 01	124.2	.35E-01	.42E-02	.20E 00	64.8	.50E-01	0.0	.00E 00	
STIM	29	-102.0	48.7	.22E 01	.96E 00	3.3	.45E-01	.32E-02	.14E 00	66.9	.63E-01	0.0	.00E 00	
STIM	30	-164.1	61.5	.44E 01	.18E 01	143.0	.30E-01	.11E-01	.41E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	31	-130.3	0.7	.76E 00	.19E 00	170.0	.99E 00	.00E-01	.66E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.68E-01 H ERROR=0.08E-02 L ERROR=0.56E-01 D ERROR=0.00E 00

J.C. 21 OBS 7
VIEWING CONDITION 3

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	10.0	180.0	.14E-03	.14E-03	0.0	.78E-06	.12E-06	.35E-09	0.0	.00E 00	413.3	.16E-01	
SUBJ 1	STIM 2	141.4	60.0	.51E 01	.68E-04	127.5	.81E-01	.36E-02	.18E-04	0.0	.00E 00	283.3	.66E-01	
SUBJ 1	STIM 3	20.0	163.3	.33E 01	.13E-03	72.0	.20E-01	.13E-06	.85E-05	0.0	.00E 00	306.7	.84E-02	
SUBJ 1	STIM 4	125.2	40.0	.11E 02	.34E-04	51.9	.60E-01	.35E-01	.24E-04	0.0	.00E 00	253.7	.66E-02	
SUBJ 1	STIM 5	66.8	67.6	.72E 01	.14E 01	123.4	.22E-01	.17E-01	.48E 00	0.0	.00E 00	203.3	.23E-01	
SUBJ 1	STIM 6	20.0	61.7	.45E-04	.17E 01	142.0	.27E-01	.17E-06	.38E-05	0.0	.00E 00	286.7	.23E-01	
SUBJ 1	STIM 7	-7.1	175.5	.38E 02	.27E 01	177.5	.37E-01	.34E-01	.18E 01	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 8	-53.7	57.7	.24E-04	.63E 01	119.6	.35E-01	.16E-01	.84E-05	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 9	40.0	38.3	.43E 01	.44E-04	54.0	.11E 00	.19E-06	.16E-04	0.0	.00E 00	230.0	.75E-01	
SUBJ 1	STIM 10	20.0	25.0	.18E-04	.70E-04	0.0	.27E-05	.17E-06	.16E-09	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 11	-64.8	18.2	.17E-04	.38E 01	113.1	.19E 00	.15E-01	.11E-04	0.0	.00E 00	226.7	.64E-01	
SUBJ 1	STIM 12	6.3	44.2	.60E 01	.31E 01	167.1	.71E-01	.21E-01	.13E 01	0.0	.00E 00	236.7	.78E-01	
SUBJ 1	STIM 13	-33.4	30.6	.65E-04	.42E 01	117.0	.55E-02	.17E-01	.28E-04	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 14	-101.5	55.0	.51E 01	.11E 01	172.1	.91E-01	.40E-02	.32E 00	0.0	.00E 00	300.0	.38E-01	
SUBJ 1	STIM 15	-153.1	48.2	.11E-03	.30E 01	47.3	.36E-01	.80E-02	.21E-04	0.0	.00E 00	263.3	.63E-01	
SUBJ 1	STIM 16	145.6	50.9	.64E 01	.26E 00	78.2	.97E-01	.71E-02	.88E-01	0.0	.00E 00	270.0	.57E-01	
SUBJ 1	STIM 17	-176.7	40.0	.69E 01	.40E 00	156.8	.98E-02	.22E-01	.18E 00	0.0	.00E 00	253.3	.57E-01	
SUBJ 1	STIM 18	-44.0	54.4	.62E 01	.12E 01	19.7	.58E-01	.16E-01	.43E 00	0.0	.00E 00	255.0	.20E-01	
SUBJ 1	STIM 19	20.0	14.3	.16E-04	.33E 01	162.0	.23E 00	.10E-05	.11E-04	0.0	.00E 00	233.3	.38E-01	
SUBJ 1	STIM 20	-16.8	56.5	.45E 01	.27E 01	121.8	.78E-01	.82E-02	.69E 00	0.0	.00E 00	270.0	.57E-01	
SUBJ 1	STIM 21	7.3	40.9	.62E 01	.97E 00	54.4	.12E 00	.73E-02	.38E 00	0.0	.00E 00	246.7	.36E-01	
SUBJ 1	STIM 22	-71.0	51.2	.64E 01	.20E 00	20.8	.86E-01	.15E-01	.77E-01	0.0	.00E 00	266.7	.67E-01	
SUBJ 1	STIM 23	-65.2	38.1	.32E 01	.14E 01	70.3	.42E-01	.13E-01	.37E 00	0.0	.00E 00	243.3	.49E-01	
SUBJ 1	STIM 24	187.5	26.6	.40E 01	.11E-04	108.0	.15E 00	.28E-02	.50E-05	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 25	-67.2	20.9	.32E 01	.50E 00	174.7	.98E-01	.75E-02	.20E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1	STIM 26	166.2	52.8	.59E 01	.25E 01	3.6	.66E-01	.16E-01	.89E 00	0.0	.00E 00	246.7	.97E-01	
SUBJ 1	STIM 27	80.4	61.8	.99E 01	.26E 01	83.2	.61E-01	.25E-01	.13E 01	0.0	.00E 00	203.3	.23E-01	
SUBJ 1	STIM 28	180.0	46.7	.17E 01	.22E-04	108.0	.35E-01	.32E-06	.25E-05	0.0	.00E 00	250.0	.28E-05	
SUBJ 1	STIM 29	-108.6	23.3	.19E-04	.17E 01	116.2	.70E-01	.37E-02	.43E-05	0.0	.00E 00	240.0	.42E-01	
SUBJ 1	STIM 30	-171.2	30.0	.69E 01	.43E 01	132.2	.12E 00	.27E-01	.24E 01	0.0	.00E 00	256.7	.13E-01	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.68E-01 H ERROR=0.11E-01 L ERROR=0.00E 00 B ERROR=0.45E-01

J.C. 21 OBS 3.5.7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	5.7	119.2	.10E 02	.19E 01	71.9	.84E-01	.40E-02	.32E 00	0.0	.00E 00	155.2	.30E-01	
STIM 2	160.5	66.5	.35E 01	.15E 01	43.6	.33E-01	.71E-02	.24E 00	0.0	.00E 00	74.7	.75E-01	
STIM 3	10.1	113.3	.95E 01	.33E 01	47.6	.72E-01	.83E-02	.88E 00	0.0	.00E 00	155.0	.35E-01	
STIM 4	107.0	63.3	.68E 01	.16E 01	41.6	.75E-01	.13E-01	.53E 00	0.0	.00E 00	63.7	.59E-01	
STIM 5	57.3	65.6	.89E 01	.18E 01	133.4	.30E-01	.22E-01	.77E 00	0.0	.00E 00	87.3	.37E-01	
STIM 6	8.0	71.5	.49E 01	.19E 01	117.1	.58E-01	.71E-02	.41E 00	0.0	.00E 00	109.2	.91E-01	
STIM 7	-0.9	113.1	.10E 02	.98E 01	84.0	.91E-01	.14E-01	.28E 01	0.0	.00E 00	156.8	.62E-01	
STIM 8	-20.7	67.3	.91E 01	.53E 01	35.1	.85E-01	.21E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	34.0	32.4	.49E 01	.18E 01	179.5	.91E-01	.21E-01	.87E 00	0.0	.00E 00	61.5	.56E-01	
STIM 10	12.2	23.1	.37E 01	.96E 00	64.9	.16E 00	.90E-02	.49E 00	0.0	.00E 00	61.1	.59E-01	
STIM 11	-09.2	28.5	.31E 01	.44E 00	4.9	.11E 00	.30E-02	.15E 00	0.0	.00E 00	66.1	.45E-01	
STIM 12	1.1	41.2	.35E 01	.20E 01	61.6	.79E-01	.94E-02	.55E 00	0.0	.00E 00	64.0	.45E-01	
STIM 13	-20.6	36.6	.27E 01	.23E 01	149.8	.65E-01	.11E-01	.52E 00	0.0	.00E 00	67.6	.38E-01	
STIM 14	-100.4	71.0	.53E 01	.30E 00	177.7	.74E-01	.10E-02	.92E-01	0.0	.00E 00	97.8	.46E-01	
STIM 15	-103.3	65.1	.46E 01	.47E 00	157.6	.64E-01	.49E-02	.10E 00	0.0	.00E 00	91.2	.60E-01	
STIM 16	105.8	68.2	.37E 01	.95E 00	54.3	.43E-01	.58E-02	.16E 00	0.0	.00E 00	85.9	.29E-01	
STIM 17	-175.0	51.1	.65E 01	.21E 01	169.0	.47E-01	.20E-01	.83E 00	0.0	.00E 00	76.0	.36E-01	
STIM 18	-29.9	54.7	.55E 01	.24E 01	36.6	.46E-01	.16E-01	.76E 00	0.0	.00E 00	77.4	.28E-01	
STIM 19	10.7	10.5	.21E 01	.36E 00	65.1	.19E 00	.98E-02	.22E 00	0.0	.00E 00	55.7	.70E-01	
STIM 20	-0.8	66.8	.44E 01	.36E 01	1.6	.55E-01	.10E-01	.75E 00	0.0	.00E 00	96.0	.85E-01	
STIM 21	0.7	43.0	.46E 01	.22E 01	70.2	.10E 00	.87E-02	.74E 00	0.0	.00E 00	69.1	.44E-01	
STIM 22	-71.6	45.4	.41E 01	.22E 01	13.5	.76E-01	.11E-01	.63E 00	0.0	.00E 00	87.3	.49E-01	
STIM 23	-98.6	47.5	.35E 01	.99E 00	5.8	.73E-01	.36E-02	.23E 00	0.0	.00E 00	76.7	.44E-01	
STIM 24	-180.4	25.7	.39E 01	.29E 01	169.2	.11E 00	.24E-01	.14E 01	0.0	.00E 00	98.4	.22E 00	
STIM 25	-81.3	35.2	.38E 01	.21E 01	156.5	.11E 00	.94E-02	.69E 00	0.0	.00E 00	70.4	.51E-01	
STIM 26	171.6	50.8	.77E 01	.24E 01	29.8	.48E-01	.24E-01	.11E 01	0.0	.00E 00	65.5	.58E-01	
STIM 27	61.6	67.8	.43E 01	.37E 01	74.1	.56E-01	.10E-01	.74E 00	0.0	.00E 00	75.9	.65E-01	
STIM 28	106.1	50.3	.35E 01	.27E 01	69.2	.66E-01	.90E-02	.58E 00	0.0	.00E 00	64.8	.53E-01	
STIM 29	-102.1	34.6	.28E 01	.48E 00	171.4	.80E-01	.32E-02	.12E 00	0.0	.00E 00	68.5	.31E-01	
STIM 30	-159.7	44.2	.68E 01	.31E 01	148.5	.72E-01	.25E-01	.15E 01	0.0	.00E 00	69.8	.56E-01	
STIM 31	-104.8	1.9	.96E 00	.90E-01	177.8	.50E 00	.12E-01	.14E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.92E-01 H ERROR=0.11E-01 L ERROR=0.00E 00 B ERROR=0.57E-01

UNIT: 0   DPP212   DATE: 26/06/78   TIME: 15/05/35

V.C. 22 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	3.2	103.1	.57E 01	.26E 01	147.9	.33E-01	.82E-02	.46E 00	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 2	183.7	65.0	.78E 01	.24E 00	94.0	.12E 00	.36E-02	.91E-01	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 3	6.4	93.1	.59E 01	.10E-03	132.7	.34E-01	.85E-02	.20E-04	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 4	110.9	70.0	.10E-06	.10E-06	0.0	.14E-08	.23E-09	.45E-15	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 5	60.0	71.7	.59E-04	.33E 01	124.0	.46E-01	.24E-06	.86E-05	0.0	.00E 00	340.0	.61E-01	
SUBJ 1	STIM 6	23.0	46.5	.30E 01	.10E-03	11.3	.35E-01	.86E-02	.21E-04	0.0	.00E 00	340.0	.68E-01	
SUBJ 1	STIM 7	-20.0	103.3	.97E-04	.33E 01	18.0	.32E-01	.20E-06	.98E-05	0.0	.00E 00	406.7	.16E-01	
SUBJ 1	STIM 8	-47.2	64.3	.79E 01	.66E 01	168.2	.12E 00	.17E-01	.25E 01	0.0	.00E 00	353.3	.75E-01	
SUBJ 1	STIM 9	60.0	35.0	.10E-06	.10E-06	0.0	.29E-08	.45E-09	.90E-15	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 10	37.5	20.0	.30E 01	.37E 00	40.7	.15E 00	.70E-02	.18E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 11	-110.7	13.1	.24E 01	.28E 00	51.6	.14E 00	.20E-01	.16E 00	0.0	.00E 00	313.3	.43E-01	
SUBJ 1	STIM 12	4.0	28.4	.72E 01	.14E 01	12.3	.85E-01	.39E-01	.11E 01	0.0	.00E 00	320.0	.31E-01	
SUBJ 1	STIM 13	-40.0	24.0	.55E 01	.10E 01	8.1	.14E 00	.30E-01	.74E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 14	-100.9	63.3	.36E-03	.72E-09	180.0	.57E-05	.24E-11	.13E-13	0.0	.00E 00	400.0	.00E 00	
SUBJ 1	STIM 15	-117.0	54.9	.39E 01	.96E 00	57.8	.54E-01	.79E-02	.22E 00	0.0	.00E 00	300.0	.15E-01	
SUBJ 1	STIM 16	188.3	68.3	.44E 01	.18E 01	103.9	.64E-01	.42E-02	.36E 00	0.0	.00E 00	350.0	.00E 00	
SUBJ 1	STIM 17	-106.4	56.1	.59E 01	.14E 01	9.0	.33E-01	.16E-01	.46E 00	0.0	.00E 00	356.7	.19E-01	
SUBJ 1	STIM 18	-52.9	51.1	.87E-04	.57E 01	151.7	.27E-01	.17E-01	.29E-04	0.0	.00E 00	326.7	.44E-01	
SUBJ 1	STIM 19	12.0	8.2	.17E 01	.89E 00	75.6	.20E 00	.18E-01	.57E 00	0.0	.00E 00	316.7	.22E-01	
SUBJ 1	STIM 20	0.5	60.1	.12E-03	.97E 01	95.0	.15E-01	.26E-01	.61E-06	0.0	.00E 00	356.7	.19E-01	
SUBJ 1	STIM 21	20.0	38.3	.17E 01	.21E-04	77.0	.44E-01	.89E-07	.29E-05	0.0	.00E 00	350.0	.00E 00	
SUBJ 1	STIM 22	-76.6	58.2	.32E 01	.14E 01	85.3	.28E-01	.85E-02	.24E 00	0.0	.00E 00	350.0	.00E 00	
SUBJ 1	STIM 23	-87.9	33.2	.19E-04	.24E 01	122.2	.52E-01	.80E-02	.44E-05	0.0	.00E 00	353.3	.94E-02	
SUBJ 1	STIM 24	-176.8	21.7	.12E 02	.58E 00	145.8	.13E 00	.82E-01	.99E 00	0.0	.00E 00	333.3	.50E-01	
SUBJ 1	STIM 25	-74.6	36.3	.83E-05	.10E-06	110.9	.16E-06	.26E-07	.72E-13	0.0	.00E 00	350.0	.00E 00	
SUBJ 1	STIM 26	153.1	57.7	.57E 01	.43E 01	37.6	.82E-01	.17E-01	.15E 01	0.0	.00E 00	326.7	.44E-01	
SUBJ 1	STIM 27	90.9	63.3	.27E-04	.35E 01	99.0	.55E-01	.25E-06	.46E-05	0.0	.00E 00	320.0	.31E-01	
SUBJ 1	STIM 28	180.0	48.3	.43E 01	.25E-04	108.0	.88E-01	.77E-06	.69E-05	0.0	.00E 00	326.7	.44E-01	
SUBJ 1	STIM 29	-113.1	21.6	.18E 01	.83E 00	165.9	.78E-01	.80E-02	.22E 00	0.0	.00E 00	316.7	.28E-01	
SUBJ 1	STIM 30	-140.0	41.7	.77E-04	.33E 01	144.0	.80E-01	.42E-06	.18E-04	0.0	.00E 00	350.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.63E-01   H ERROR=0.11E-01   L ERROR=0.00E 00   B ERROR=0.29E-01

V.C. 22 OBS 3, 5, 7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	7.2	80.2	.51E 01	.22E 01	52.0	.50E-01	.58E-02	.40E 00	0.0	.00E 00	169.0	.70E-01	
STIM 2	186.1	62.1	.29E 01	.21E 01	166.8	.46E-01	.55E-02	.31E 00	0.0	.00E 00	138.1	.27E-01	
STIM 3	0.2	85.2	.41E 01	.25E 01	27.9	.37E-01	.67E-02	.37E 00	0.0	.00E 00	145.0	.43E-01	
STIM 4	107.0	63.8	.50E 01	.18E 01	8.2	.76E-01	.53E-02	.44E 00	0.0	.00E 00	137.3	.27E-01	
STIM 5	70.8	63.2	.56E 01	.38E 01	108.7	.61E-01	.14E-01	.11E 01	0.0	.00E 00	126.7	.50E-01	
STIM 6	4.5	48.5	.40E 01	.13E 01	173.0	.27E-01	.13E-01	.33E 00	0.0	.00E 00	135.3	.28E-01	
STIM 7	-16.5	84.4	.64E 01	.16E 01	124.8	.71E-01	.50E-02	.38E 00	0.0	.00E 00	160.1	.42E-01	
STIM 8	-27.4	61.4	.61E 01	.22E 01	16.3	.38E-01	.16E-01	.67E 00	0.0	.00E 00	142.1	.44E-01	
STIM 9	33.7	26.9	.47E 01	.20E 01	14.7	.14E 00	.23E-01	.16E 01	0.0	.00E 00	131.0	.28E-01	
STIM 10	29.7	20.5	.54E 01	.82E 00	59.7	.26E 00	.68E-02	.67E 00	0.0	.00E 00	131.9	.30E-01	
STIM 11	-100.8	30.4	.43E 01	.13E 01	171.3	.14E 00	.77E-02	.38E 00	0.0	.00E 00	136.5	.22E-01	
STIM 12	-8.5	38.8	.35E 01	.20E 01	154.7	.65E-01	.13E-01	.56E 00	0.0	.00E 00	136.7	.16E-01	
STIM 13	-23.0	34.1	.42E 01	.22E 01	50.2	.82E-01	.18E-01	.85E 00	0.0	.00E 00	131.0	.40E-01	
STIM 14	-100.0	66.0	.42E-03	.67E-09	180.0	.64E-05	.23E-11	.13E-13	0.0	.00E 00	169.6	.40E-01	
STIM 15	-107.0	61.5	.27E 01	.11E 01	112.8	.20E-01	.67E-02	.14E 00	0.0	.00E 00	156.0	.22E-01	
STIM 16	105.7	65.0	.30E 01	.12E 01	135.4	.36E-01	.53E-02	.18E 00	0.0	.00E 00	147.1	.28E-01	
STIM 17	-183.3	55.1	.68E 01	.14E 01	166.2	.25E-01	.20E-01	.53E 00	0.0	.00E 00	153.2	.27E-01	
STIM 18	-40.1	40.9	.73E 01	.24E 01	40.5	.50E-01	.23E-01	.11E 01	0.0	.00E 00	144.7	.24E-01	
STIM 19	3.7	6.1	.18E 01	.14E 01	67.3	.29E 00	.38E-01	.13E 01	0.0	.00E 00	130.5	.21E-01	
STIM 20	-6.7	59.5	.43E 01	.13E 01	14.2	.23E-01	.11E-01	.28E 00	0.0	.00E 00	144.2	.82E-02	
STIM 21	1.1	60.8	.39E 01	.10E 01	171.6	.49E-01	.15E-01	.58E 00	0.0	.00E 00	134.7	.27E-01	
STIM 22	-73.8	52.0	.63E 01	.24E 01	50.5	.56E-01	.10E-01	.92E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-64.8	46.9	.33E 01	.70E 00	16.0	.66E-01	.46E-02	.16E 00	0.0	.00E 00	145.1	.19E-01	
STIM 24	-153.3	32.5	.74E 01	.41E 01	135.3	.13E 00	.36E-01	.29E 01	0.0	.00E 00	136.2	.28E-01	
STIM 25	-43.9	30.0	.33E 01	.23E 01	43.8	.66E-01	.12E-01	.60E 00	0.0	.00E 00	140.7	.28E-01	
STIM 26	163.1	53.6	.73E 01	.18E 01	40.8	.38E-01	.21E-01	.77E 00	0.0	.00E 00	134.7	.17E-01	
STIM 27	64.2	63.2	.37E 01	.15E 01	171.3	.58E-01	.43E-02	.28E 00	0.0	.00E 00	123.7	.58E-01	
STIM 28	137.1	50.2	.28E 01	.15E 01	28.1	.33E-01	.86E-02	.26E 00	0.0	.00E 00	135.4	.28E-01	
STIM 29	-102.2	41.9	.50E 01	.87E 00	167.7	.12E 00	.57E-02	.33E 00	0.0	.00E 00	144.3	.27E-01	
STIM 30	-147.7	43.2	.61E 01	.44E 01	121.3	.10E 00	.22E-01	.19E 01	0.0	.00E 00	144.5	.27E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.73E-01   H ERROR=0.13E-01   L ERROR=0.00E 00   B ERROR=0.31E-01

V.C. 23 OBS 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	6.3	142.9	.82E 01	.14E-03	147.8	.22E-01	.85E-02	.26E-04	0.0	.00E 00	200.0	.35E-05	
SUBJ 1	STIM 2	134.9	76.5	.38E 01	.67E 00	170.3	.21E-01	.73E-02	.10E 00	91.7	.18E-01	0.0	.00E 00	
SUBJ 1	STIM 3	8.3	141.6	.37E-03	.41E 01	50.2	.11E-01	.42E-02	.34E-04	0.0	.00E 00	200.0	.35E-05	
SUBJ 1	STIM 4	156.8	45.8	.62E 01	.20E 01	44.9	.45E-01	.21E-01	.84E 00	58.3	.29E-01	0.0	.00E 00	
SUBJ 1	STIM 5	46.9	75.8	.82E 01	.29E 01	146.9	.41E-01	.17E-01	.99E 00	86.7	.38E-01	0.0	.00E 00	
SUBJ 1	STIM 6	8.4	68.3	.10E-03	.24E 01	117.6	.25E-01	.41E-02	.11E-04	100.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 7	-7.2	137.2	.29E 02	.27E 01	176.7	.41E-01	.34E-01	.18E 01	0.0	.00E 00	200.0	.35E-05	
SUBJ 1	STIM 8	-52.9	74.2	.83E 01	.14E 01	62.5	.34E-01	.17E-01	.50E 00	98.3	.17E-01	0.0	.00E 00	
SUBJ 1	STIM 9	61.7	43.3	.18E 01	.95E 00	8.7	.38E-01	.42E-02	.12E 00	53.3	.31E-01	0.0	.00E 00	
SUBJ 1	STIM 10	53.7	23.7	.63E 01	.20E 00	164.9	.15E 00	.35E-01	.17E 00	53.3	.31E-01	0.0	.00E 00	
SUBJ 1	STIM 11	-106.6	61.6	.18E 01	.84E 00	161.4	.40E-01	.41E-02	.11E 00	56.7	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 12	0.0	47.9	.45E 01	.15E 01	0.0	.30E-01	.15E-01	.43E 00	61.7	.27E-01	0.0	.00E 00	
SUBJ 1	STIM 13	-60.0	46.7	.32E 01	.42E-04	144.0	.69E-01	.14E-06	.91E-05	58.3	.76E-01	0.0	.00E 00	
SUBJ 1	STIM 14	-148.0	93.3	.91E 01	.91E 00	171.5	.94E-01	.45E-02	.28E 00	0.0	.00E 00	143.3	.14E 00	
SUBJ 1	STIM 15	-111.6	81.6	.24E 01	.13E 01	133.6	.21E-01	.41E-02	.12E 00	0.0	.00E 00	116.7	.20E-01	
SUBJ 1	STIM 16	160.0	00.0	.10E-06	.70E-05	00.0	.11E-08	.12E-07	.25E-13	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 17	-180.0	100.0	.55E 01	.52E-04	77.0	.55E-01	.45E-06	.90E-05	0.0	.00E 00	120.0	.48E-01	
SUBJ 1	STIM 18	-52.8	50.3	.60E 01	.14E 01	66.7	.44E-01	.17E-01	.51E 00	70.0	.41E-01	0.0	.00E 00	
SUBJ 1	STIM 19	6.3	5.3	.15E 01	.18E 00	67.3	.28E 00	.12E-01	.16E 00	46.7	.36E-01	0.0	.00E 00	
SUBJ 1	STIM 20	-7.2	73.4	.16E 02	.13E 01	176.9	.40E-01	.34E-01	.91E 00	98.3	.17E-01	0.0	.00E 00	
SUBJ 1	STIM 21	4.7	54.9	.38E 01	.14E 00	117.4	.53E-01	.72E-02	.30E-01	61.7	.27E-01	0.0	.00E 00	
SUBJ 1	STIM 22	-60.0	61.7	.73E-05	.16E 01	72.0	.26E-01	.10E-06	.60E-06	68.3	.24E-01	0.0	.00E 00	
SUBJ 1	STIM 23	-68.3	50.0	.13E 01	.14E-03	87.7	.34E-03	.42E-02	.12E-04	60.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 24	180.0	48.3	.25E-04	.33E 01	9.0	.68E-01	.31E-06	.52E-05	61.7	.72E-01	0.0	.00E 00	
SUBJ 1	STIM 25	-83.2	64.6	.21E 01	.47E-04	127.5	.35E-01	.43E-02	.65E-05	60.0	.48E-01	0.0	.00E 00	
SUBJ 1	STIM 26	175.3	58.2	.42E 01	.96E 00	73.6	.57E-01	.74E-02	.22E 00	61.7	.27E-01	0.0	.00E 00	
SUBJ 1	STIM 27	76.7	54.8	.29E 01	.19E-03	112.5	.14E-02	.83E-02	.32E-04	56.7	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 28	181.5	60.0	.32E 01	.65E 00	132.2	.48E-01	.40E-02	.11E 00	68.3	.49E-01	0.0	.00E 00	
SUBJ 1	STIM 29	-111.7	48.3	.18E 01	.10E 01	41.1	.34E-01	.42E-02	.12E 00	58.3	.29E-01	0.0	.00E 00	
SUBJ 1	STIM 30	-140.0	61.7	.38E-04	.17E 01	162.0	.27E-01	.14E-06	.32E-05	70.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.47E-01 H ERROR=0.01E-02 L ERROR=0.36E-01 B ERROR=0.36E-01

V.C. 23 OBS 1, 6, 7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	2.2	110.2	.52E 01	.33E 01	146.3	.28E-01	.69E-02	.45E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	144.9	84.6	.51E 01	.23E 01	106.5	.60E-01	.43E-02	.43E 00	76.7	.10E 00	0.0	.00E 00	
STIM 3	6.3	107.9	.66E 01	.37E 01	0.5	.37E-01	.05E-02	.72E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	150.8	47.1	.11E 02	.37E 01	78.2	.91E-01	.39E-01	.29E 01	48.3	.62E-01	0.0	.00E 00	
STIM 5	44.6	67.3	.47E 01	.29E 01	52.9	.69E-01	.69E-02	.64E 00	73.3	.11E 00	0.0	.00E 00	
STIM 6	8.6	73.3	.71E 01	.21E 01	141.0	.56E-01	.13E-01	.65E 00	87.2	.79E-01	0.0	.00E 00	
STIM 7	-4.5	00.8	.78E 01	.22E 01	3.1	.26E-01	.12E-01	.55E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-56.5	76.9	.64E 01	.31E 01	40.7	.40E-01	.13E-01	.80E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	56.9	39.6	.47E 01	.21E 01	161.6	.61E-01	.18E-01	.80E 00	47.2	.53E-01	0.0	.00E 00	
STIM 10	76.5	30.6	.48E 01	.22E 01	161.6	.73E-01	.25E-01	.11E 01	46.7	.56E-01	0.0	.00E 00	
STIM 11	-140.6	40.9	.20E 01	.60E 00	39.3	.40E-01	.53E-02	.94E-01	51.7	.76E-01	0.0	.00E 00	
STIM 12	0.8	47.5	.42E 01	.30E 01	153.6	.69E-01	.14E-01	.85E 00	56.1	.74E-01	0.0	.00E 00	
STIM 13	-41.1	40.3	.45E 01	.23E 01	15.5	.66E-01	.17E-01	.79E 00	52.2	.51E-01	0.0	.00E 00	
STIM 14	-112.8	70.4	.64E 01	.18E 01	179.8	.80E-01	.36E-02	.45E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-146.0	75.8	.44E 01	.23E 01	2.1	.61E-01	.51E-02	.44E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	163.0	94.1	.95E 01	.51E 01	105.9	.10E 00	.90E-02	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-132.5	68.6	.19E 02	.28E 01	88.3	.26E 00	.12E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-56.8	57.7	.48E 01	.23E 01	8.4	.64E-01	.11E-01	.60E 00	77.2	.96E-01	0.0	.00E 00	
STIM 19	-51.8	14.8	.29E 01	.14E 01	175.5	.13E 00	.27E-01	.87E 00	33.9	.12E 00	0.0	.00E 00	
STIM 20	1.1	77.1	.80E 01	.37E 01	159.8	.57E-01	.16E-01	.12E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	0.1	54.1	.62E 01	.29E 01	120.4	.95E-01	.13E-01	.10E 01	68.9	.11E 00	0.0	.00E 00	
STIM 22	-73.8	50.7	.35E 01	.19E 01	30.1	.43E-01	.81E-02	.35E 00	71.1	.90E-01	0.0	.00E 00	
STIM 23	-66.7	50.2	.35E 01	.10E 01	163.5	.68E-01	.41E-02	.23E 00	50.6	.53E-01	0.0	.00E 00	
STIM 24	-100.8	38.6	.47E 01	.18E 01	133.3	.85E-01	.16E-01	.71E 00	45.0	.10E 00	0.0	.00E 00	
STIM 25	-75.8	52.6	.33E 01	.99E 00	109.5	.44E-01	.78E-02	.20E 00	53.9	.59E-01	0.0	.00E 00	
STIM 26	171.6	58.7	.36E 01	.34E 01	30.3	.58E-01	.09E-02	.67E 00	47.2	.85E-01	0.0	.00E 00	
STIM 27	46.7	57.3	.59E 01	.18E 01	129.6	.34E-01	.16E-01	.57E 00	48.9	.51E-01	0.0	.00E 00	
STIM 28	170.1	63.2	.33E 01	.26E 01	156.7	.46E-01	.75E-02	.42E 00	[illegible]	.10E 00	0.0	.00E 00	
STIM 29	-108.4	45.0	.22E 01	.15E 01	13.1	.49E-01	.55E-02	.24E 00	44.4	.93E-01	0.0	.00E 00	
STIM 30	-135.0	54.2	.37E 01	.31E 01	122.2	.62E-01	.09E-02	.65E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.60E-01 H ERROR=0.12E-01 L ERROR=0.81E-01 B ERROR=0.00E 00

V.C. 23 OBS 3,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTHESS	SIGL	BTHESS	SIGB	
STIM 1	8.6	105.2	.50E 01	.20E 01	24.0	.30E-01	.66E-02	.30E 00	0.0	.00E 00	83.1	.25E 00	
STIM 2	160.2	76.9	.23E 01	.11E 01	172.2	.16E-01	.46E-02	.99E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	8.9	102.9	.52E 01	.14E 01	22.2	.28E-01	.71E-02	.23E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	178.0	62.2	.89E 01	.21E 01	44.6	.72E-01	.21E-01	.96E 00	61.7	.54E-01	0.0	.00E 00	
STIM 5	35.4	72.8	.67E 01	.15E 01	152.5	.21E-01	.15E-01	.43E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	8.[illegible]	87.9	.49E 01	.26E 01	116.3	.49E-01	.63E-02	.46E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-10.6	89.2	.79E 01	.61E 01	150.9	.77E-01	.13E-01	.17E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-17.1	77.2	.67E 01	.50E 01	18.9	.67E-01	.18E-01	.18E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	34.4	54.9	.66E 01	.18E 01	140.9	.37E-01	.19E-01	.68E 00	68.3	.97E-01	0.0	.00E 00	
STIM 10	19.8	30.2	.59E 01	.10E 01	144.9	.52E-01	.23E-01	.49E 00	52.8	.17E-01	0.0	.00E 00	
STIM 11	-103.8	55.7	.22E 01	.84E 00	168.2	.38E-01	.28E-02	.10E 00	55.6	.44E-01	0.0	.00E 00	
STIM 12	-7.0	57.9	.30E 01	.12E 01	165.8	.27E-01	.7[illegible]E-02	.20E 00	69.4	.82E-01	0.0	.00E 00	
STIM 13	-13.0	54.6	.64E 01	.21E 01	30.8	.39E-01	.19E-01	.79E 00	63.3	.63E-01	0.0	.00E 00	
STIM 14	-107.8	85.4	.23E 01	.10E 01	14.2	.26E-01	.36E-02	.16E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-104.2	75.6	.31E 01	.20E 01	39.6	.37E-01	.52E-02	.26E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	166.1	86.2	.24E 01	.24E 01	16.8	.27E-01	.44E-02	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-170.5	81.3	.83E 01	.28E 01	146.7	.42E-01	.16E-01	.90E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-33.2	63.5	.75E 01	.28E 01	24.3	.45E-01	.19E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	1.5	23.3	.38E 01	.84E 00	99.4	.16E 00	.75E-02	.43E 00	45.0	.19E-01	0.0	.00E 00	
STIM 20	-8.4	75.8	.55E 01	.35E 01	149.3	.57E-01	.10E-01	.79E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	2.8	62.1	.31E 01	.21E 01	4.9	.35E-01	.80E-02	.34E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	-60.9	66.4	.57E 01	.14E 01	71.3	.25E-01	.14E-01	.38E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-67.7	62.6	.11E 01	.80E 00	151.0	.17E-01	.22E-02	.44E-01	64.4	.71E-01	0.0	.00E 00	
STIM 24	-168.4	58.1	.40E 01	.26E 01	141.0	.55E-01	.96E-02	.56E 00	61.7	.72E-01	0.0	.00E 00	
STIM 25	-86.9	61.3	.23E 01	.15E 01	20.7	.34E-01	.46E-02	.18E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	168.2	63.0	.65E 01	.20E 01	51.8	.50E-01	.15E-01	.64E 00	58.9	.31E-01	0.0	.00E 00	
STIM 27	85.9	60.7	.32E 01	.10E 01	130.8	.25E-01	.66E-02	.15E 00	62.2	.82E-01	0.0	.00E 00	
STIM 28	146.4	71.8	.51E 01	.14E 01	21.3	.22E-01	.11E-01	.31E 00	46.1	.43E-01	0.0	.00E 00	
STIM 29	-107.3	55.0	.18E 01	.15E 01	52.1	.30E-01	.48E-02	.15E 00	55.0	.34E-01	0.0	.00E 00	
STIM 30	-178.6	65.6	.76E 01	.13E 01	140.4	.31E-01	.18E-01	.49E 00	70.8	.69E-01	0.0	.00E 00	
STIM 31	-97.3	2.2	.83E 00	.89E-01	2.2	.37E 00	.79E-02	.10E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.53E-01   H ERROR=0.11E-01   L ERROR=0.55E-01   B ERROR=0.25E 00

**** END OF STREAM PGGX520   162

V.C. 23 OBS 1,2,3,4,5,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTHESS	SIGL	BTHESS	SIGB	
STIM 1	9.8	107.2	.37E 01	.21E 01	42.9	.30E-01	.42E-02	.23E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	166.4	84.9	.36E 01	.18E 01	130.1	.40E-01	.43E-02	.24E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	8.9	100.9	.37E 01	.26E 01	13.0	.28E-01	.57E-02	.30E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	106.1	57.0	.61E 01	.30E 01	69.8	.57E-01	.16E-01	.10E 01	57.4	.54E-01	0.0	.00E 00	
STIM 5	40.2	71.9	.32E 01	.23E 01	169.3	.35E-01	.68E-02	.32E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	7.1	80.8	.35E 01	.23E 01	154.5	.30E-01	.66E-02	.30E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-12.9	80.9	.41E 01	.30E 01	138.6	.41E-01	.60E-02	.42E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-17.1	73.7	.58E 01	.25E 01	29.1	.34E-01	.12E-01	.61E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	32.8	47.7	.30E 01	.17E 01	150.3	.36E-01	.10E-01	.34E 00	60.5	.65E-01	0.0	.00E 00	
STIM 10	23.5	38.0	.30E 01	.14E 01	159.9	.37E-01	.13E-01	.35E 00	52.6	.51E-01	0.0	.00E 00	
STIM 11	-102.0	46.4	.25E 01	.98E 00	18.0	.52E-01	.40E-02	.17E 00	54.0	.41E-01	0.0	.00E 00	
STIM 12	-4.2	52.4	.26E 01	.16E 01	150.2	.37E-01	.70E-02	.24E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	-27.8	48.2	.31E 01	.19E 01	23.8	.39E-01	.10E-01	.38E 00	62.9	.51E-01	0.0	.00E 00	
STIM 14	-101.2	80.7	.24E 01	.85E 00	179.5	.29E-01	.17E-02	.78E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-103.1	73.4	.21E 01	.14E 01	1.8	.28E-01	.30E-02	.12E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	104.4	61.9	.40E 01	.23E 01	114.9	.47E-01	.44E-02	.31E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-163.4	74.3	.82E 01	.32E 01	63.3	.11E 00	.85E-02	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-46.8	50.8	.43E 01	.23E 01	24.9	.42E-01	.11E-01	.53E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	-16.4	22.3	.22E 01	.16E 01	52.2	.82E-01	.14E-01	.48E 00	44.8	.76E-01	0.0	.00E 00	
STIM 20	-6.7	76.3	.44E 01	.26E 01	153.5	.42E-01	.82E-02	.47E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	7.7	57.3	.28E 01	.19E 01	136.4	.40E-01	.70E-02	.29E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	-64.5	63.6	.33E 01	.20E 01	60.6	.31E-01	.82E-02	.32E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-93.5	53.0	.24E 01	.16E 01	5.4	.44E-01	.48E-02	.22E 00	59.5	.56E-01	0.0	.00E 00	
STIM 24	-100.2	46.3	.29E 01	.16E 01	123.0	.53E-01	.79E-02	.32E 00	55.0	.61E-01	0.0	.00E 00	
STIM 25	-76.5	56.1	.25E 01	.16E 01	70.4	.29E-01	.71E-02	.23E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	148.6	63.3	.32E 01	.18E 01	57.4	.33E-01	.75E-02	.29E 00	53.8	.43E-01	0.0	.00E 00	
STIM 27	71.2	63.7	.43E 01	.12E 01	121.4	.20E-01	.11E-01	.25E 00	60.0	.65E-01	0.0	.00E 00	
STIM 28	164.8	71.6	.30E 01	.23E 01	20.2	.32E-01	.67E-02	.30E 00	59.0	.50E-01	0.0	.00E 00	
STIM 29	-107.5	47.2	.19E 01	.93E 00	3.3	.40E-01	.31E-02	.12E 00	57.4	.60E-01	0.0	.00E 00	
STIM 30	-161.1	50.5	.38E 01	.22E 01	143.8	.40E-01	.98E-02	.44E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-1[illegible]8.7	0.4	.77E 00	.96E-01	176.0	.20E 01	.12E 00	.66E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.11E 00   H ERROR=0.11E-01   L ERROR=0.56E-01   B ERROR=0.00E 00

UNIT: 0 OPP212 DATE: 26/06/78 TIME: 14/35/19

V.C. 24 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	5.0	181.7	.17E 01	.15E-03	76.5	.92E-02	.13E-06	.44E-05	0.0	.00E 00	203.3	.43E-01	
SUBJ 1 STIM 2	145.0	95.0	.85E-04	.29E 01	13.5	.30E-01	.19E-06	.79E-05	0.0	.00E 00	106.7	.31E-01	
SUBJ 1 STIM 3	3.6	164.5	.12E 02	.12E 01	27.2	.45E-01	.87E-02	.26E 00	0.0	.00E 00	103.3	.34E-01	
SUBJ 1 STIM 4	133.5	84.9	.24E-03	.22E 01	168.7	.34E-03	.42E-02	.20E-06	0.0	.00E 00	91.7	.18E-01	
SUBJ 1 STIM 5	70.0	100.8	.90E 01	.21E 01	117.0	.21E-01	.14E-01	.58E 00	0.0	.00E 00	120.0	.48E-01	
SUBJ 1 STIM 6	0.5	81.5	.98E 01	.21E 01	92.7	.11E 00	.74E-02	.79E 00	0.0	.00E 00	100.0	.76E-01	
SUBJ 1 STIM 7	-3.7	158.2	.17E 02	.54E 00	114.2	.11E 00	.36E-02	.19E 00	0.0	.00E 00	180.0	.64E-01	
SUBJ 1 STIM 8	-40.0	103.3	.14E-03	.44E 01	36.0	.43E-01	.27E-06	.19E-06	0.0	.00E 00	100.0	.12E 00	
SUBJ 1 STIM 9	36.8	41.6	.24E 01	.12E 01	0.5	.41E-01	.82E-02	.23E 00	0.0	.00E 00	70.0	.61E-01	
SUBJ 1 STIM 10	25.0	26.4	.50E 01	.12E 01	92.4	.17E 00	.14E-01	.71E 00	0.0	.00E 00	81.7	.76E-01	
SUBJ 1 STIM 11	-68.6	33.3	.62E 01	.44E 00	12.8	.18E 00	.74E-02	.26E 00	0.0	.00E 00	88.3	.75E-01	
SUBJ 1 STIM 12	-6.1	42.9	.97E-04	.47E 01	128.4	.45E-01	.16E-01	.33E-06	0.0	.00E 00	71.7	.62E-01	
SUBJ 1 STIM 13	-50.8	44.2	.65E 01	.14E 01	65.5	.58E-01	.22E-01	.65E 00	0.0	.00E 00	81.7	.80E-01	
SUBJ 1 STIM 14	-100.0	90.0	.19E-02	.32E-08	180.0	.21E-06	.78E-11	.21E-12	0.0	.00E 00	100.0	.35E-05	
SUBJ 1 STIM 15	-104.3	85.0	.42E-04	.53E 01	83.2	.61E-01	.18E-02	.82E-05	0.0	.00E 00	98.3	.45E-01	
SUBJ 1 STIM 16	128.5	108.0	.68E 01	.26E 01	43.7	.40E-01	.86E-02	.50E 00	0.0	.00E 00	115.0	.43E-01	
SUBJ 1 STIM 17	-141.7	83.3	.24E 01	.13E 01	134.4	.20E-01	.42E-02	.12E 00	0.0	.00E 00	88.3	.68E-01	
SUBJ 1 STIM 18	-56.6	76.8	.11E 02	.99E 00	50.4	.13E-01	.23E-01	.44E 00	0.0	.00E 00	96.7	.34E-01	
SUBJ 1 STIM 19	0.5	4.7	.12E 01	.76E-01	176.8	.31E-01	.39E-01	.59E-01	0.0	.00E 00	75.0	.38E-01	
SUBJ 1 STIM 20	-8.1	106.4	.63E-04	.63E 01	130.2	.32E-01	.80E-02	.12E-06	0.0	.00E 00	110.0	.44E-01	
SUBJ 1 STIM 21	4.0	63.1	.92E 01	.32E 01	64.3	.14E 00	.64E-02	.14E 01	0.0	.00E 00	95.0	.11E 00	
SUBJ 1 STIM 22	-80.0	71.7	.36E-04	.76E 01	72.0	.11E 00	.43E-06	.12E-04	0.0	.00E 00	60.0	.64E-01	
SUBJ 1 STIM 23	-64.2	48.3	.23E 01	.85E 00	128.0	.35E-01	.58E-02	.13E 00	0.0	.00E 00	83.3	.40E-01	
SUBJ 1 STIM 24	-103.2	41.3	.38E 01	.17E 01	5.7	.44E-01	.15E-01	.49E 00	0.0	.00E 00	76.7	.22E-01	
SUBJ 1 STIM 25	-31.6	48.3	.10E-03	.21E 01	37.5	.35E-01	.40E-02	.14E-06	0.0	.00E 00	80.0	.62E-01	
SUBJ 1 STIM 26	100.0	90.0	.83E-04	.20E 01	18.0	.32E-01	.20E-06	.84E-05	0.0	.00E 00	96.7	.69E-01	
SUBJ 1 STIM 27	48.3	80.9	.29E 01	.24E 01	4.6	.32E-01	.42E-02	.24E 00	0.0	.00E 00	106.7	.56E-01	
SUBJ 1 STIM 28	135.1	78.2	.47E 01	.32E 01	69.9	.55E-01	.76E-02	.61E 00	0.0	.00E 00	88.3	.19E-01	
SUBJ 1 STIM 29	-100.0	30.0	.14E-08	.88E-03	90.0	.29E-06	.12E-09	.13E-12	0.0	.00E 00	76.7	.58E-01	
SUBJ 1 STIM 30	-172.6	64.8	.82E 01	.46E 00	44.8	.12E 00	.72E-02	.18E 00	0.0	.00E 00	96.7	.62E-01	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.54E-01 H ERROR=0.78E-02 L ERROR=0.00E 00 B ERROR=0.54E-01

**** END OF STREAM OPP212 57

V.C. 24 OBS 3,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	7.1	112.1	.59E 01	.30E 01	48.5	.46E-01	.60E-02	.50E 00	0.0	.00E 00	107.3	.48E-01	
STIM 2	104.6	73.2	.29E 01	.12E 01	23.9	.20E-01	.60E-02	.15E 00	0.0	.00E 00	59.3	.24E-01	
STIM 3	6.4	106.7	.50E 01	.32E 01	44.5	.41E-01	.61E-02	.48E 00	0.0	.00E 00	102.9	.34E-01	
STIM 4	105.6	73.2	.64E 01	.13E 01	14.0	.84E-01	.53E-02	.35E 00	0.0	.00E 00	49.3	.33E-01	
STIM 5	50.7	68.5	.11E 02	.14E 01	133.6	.21E-01	.26E-01	.72E 00	0.0	.00E 00	59.6	.58E-01	
STIM 6	11.9	63.4	.36E 01	.27E 01	106.0	.54E-01	.73E-02	.48E 00	0.0	.00E 00	55.5	.34E-01	
STIM 7	-14.1	98.0	.56E 01	.19E 01	109.5	.57E-01	.32E-02	.34E 00	0.0	.00E 00	89.7	.89E-01	
STIM 8	-35.0	72.4	.41E 01	.21E 01	29.8	.28E-01	.90E-02	.37E 00	0.0	.00E 00	61.7	.61E-01	
STIM 9	30.3	29.7	.43E 01	.12E 01	147.3	.44E-01	.23E-01	.36E 00	0.0	.00E 00	43.4	.41E-01	
STIM 10	10.1	20.2	.34E 01	.81E 00	118.2	.12E 00	.20E-01	.43E 00	0.0	.00E 00	42.6	.53E-01	
STIM 11	-100.8	29.1	.18E 01	.53E 00	15.2	.61E-01	.38E-02	.10E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	-12.1	37.4	.34E 01	.15E 01	40.8	.57E-01	.13E-01	.43E 00	0.0	.00E 00	44.4	.42E-01	
STIM 13	-28.9	31.9	.39E 01	.15E 01	24.2	.47E-01	.19E-01	.57E 00	0.0	.00E 00	44.0	.43E-01	
STIM 14	-100.0	76.0	.17E-08	.12E-02	90.0	.16E-06	.63E-10	.85E-13	0.0	.00E 00	61.4	.45E-01	
STIM 15	-101.3	70.0	.27E 01	.53E 00	169.4	.38E-01	.17E-02	.65E-01	0.0	.00E 00	55.3	.36E-01	
STIM 16	106.1	78.5	.27E 01	.19E 01	14.8	.25E-01	.54E-02	.20E 00	0.0	.00E 00	60.1	.27E-01	
STIM 17	-176.7	64.3	.83E 01	.94E 00	155.6	.17E-01	.20E-01	.38E 00	0.0	.00E 00	51.4	.28E-01	
STIM 18	-34.8	56.9	.63E 01	.25E 01	44.0	.49E-01	.17E-01	.86E 00	0.0	.00E 00	53.3	.44E-01	
STIM 19	4.0	3.8	.11E 01	.33E 00	89.4	.30E 00	.14E-01	.31E 00	0.0	.00E 00	40.0	.28E-01	
STIM 20	-9.9	79.6	.20E 01	.14E 01	45.0	.21E-01	.37E-02	.12E 00	0.0	.00E 00	65.5	.40E-01	
STIM 21	7.0	44.5	.25E 01	.18E 01	42.9	.48E-01	.74E-02	.31E 00	0.0	.00E 00	49.9	.53E-01	
STIM 22	-73.9	52.4	.29E 01	.21E 01	157.4	.55E-01	.63E-02	.36E 00	0.0	.00E 00	52.6	.31E-01	
STIM 23	-68.3	41.6	.34E 01	.60E 00	2.5	.81E-01	.28E-02	.18E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	-168.2	33.7	.52E 01	.26E 01	7.0	.86E-01	.24E-01	.12E 01	0.0	.00E 00	43.7	.47E-01	
STIM 25	-88.4	32.7	.19E 01	.82E 00	138.8	.51E-01	.58E-02	.15E 00	0.0	.00E 00	44.1	.63E-01	
STIM 26	164.0	50.3	.95E 01	.42E 01	40.6	.87E-01	.30E-01	.25E 01	0.0	.00E 00	47.8	.49E-01	
STIM 27	94.8	75.3	.65E 01	.18E 01	175.2	.84E-01	.43E-02	.48E 00	0.0	.00E 00	51.4	.62E-01	
STIM 28	165.8	53.9	.41E 01	.28E 01	98.8	.75E-01	.83E-02	.66E 00	0.0	.00E 00	45.6	.36E-01	
STIM 29	-100.0	30.4	.55E-09	.59E-03	90.0	.20E-06	.77E-10	.34E-13	0.0	.00E 00	42.9	.46E-01	
STIM 30	-161.4	43.4	.94E 01	.33E 01	159.7	.81E-01	.23E-01	.15E 01	0.0	.00E 00	47.9	.39E-01	
STIM 31	-100.0	0.5	.93E-05	.10E-10	180.0	.20E-06	.63E-11	.65E-15	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.57E-01 H ERROR=0.10E-01 L ERROR=0.00E 00 B ERROR=0.44E-01

**** END OF STREAM OPP212 162

V.C. 25 OBS 7

VIEWING CONDITION 3

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AX1S1	AX1S2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	6.0	100.9	75E 01	19E 01	124.7	.29E-01	.41E-02	.23E 00	60.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 2	185.2	121.4	84E 01	38E 01	67.9	.59E-01	.76E-02	.83E 00	35.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 3	1.7	171.5	62E 01	11E 01	37.8	.25E-01	.43E-02	.12E 00	48.3	.91E-01	0.0	.00E 00	
SUBJ 1	STIM 4	160.1	72.8	15E 02	32E 01	124.1	.20E 00	.12E-01	.33E 01	26.7	.13E 00	0.0	.00E 00	
SUBJ 1	STIM 5	56.0	94.8	14E 02	25E 01	128.6	.26E-01	.23E-01	.11E 01	38.3	.16E 00	0.0	.00E 00	
SUBJ 1	STIM 6	25.4	106.0	19E 02	84E 01	126.1	.11E 00	.25E-01	.46E 01	41.7	.11E 00	0.0	.00E 00	
SUBJ 1	STIM 7	-33.2	180.5	10E 02	41E 01	49.3	.27E-01	.82E-02	.69E 00	56.7	.11E 00	0.0	.00E 00	
SUBJ 1	STIM 8	-44.9	117.6	21E 02	80E 00	74.8	.10E 00	.24E-01	.45E 00	35.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 9	63.3	64.8	34E 01	29E 01	110.6	.44E-01	.84E-02	.47E 00	33.3	.13E 00	0.0	.00E 00	
SUBJ 1	STIM 10	26.2	40.3	96E 01	31E 00	104.6	.15E 00	.19E-01	.19E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 11	-107.8	48.0	11E 02	31E 01	16.3	.23E 00	.12E-01	.23E 01	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 12	-11.4	78.0	61E 01	17E 01	30.1	.43E-01	.11E-01	.42E 00	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 13	-60.0	65.0	89E-04	29E 01	54.0	.44E-01	.28E-06	.12E-04	26.7	.62E-01	0.0	.00E 00	
SUBJ 1	STIM 14	-102.8	141.6	54E 01	69E 00	38.3	.31E-01	.36E-02	.83E-01	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 15	-1?1.7	134.6	87E 01	70E 01	21.9	.64E-01	.84E-02	.14E 01	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 16	1?1.8	140.9	11E 02	29E 01	81.0	.69E-01	.44E-02	.65E 00	48.3	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 17	-184.7	157.4	13E 02	30E 01	10.1	.40E-01	.12E-01	.10E 01	35.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 18	-73.3	94.9	17E-03	25E 01	155.2	.34E-03	.42E-02	.14E-04	35.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 19	100.0	3.3	40E-10	30E-03	90.0	.12E-03	.53E-09	.15E-13	15.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 20	-60.0	135.0	10E-06	10E-06	0.0	.74E-09	.12E-09	.23E-15	41.7	.40E-01	0.0	.00E 00	
SUBJ 1	STIM 21	30.1	37.2	59E 02	43E 01	85.1	.15E 01	.94E-01	.21E 02	33.3	.50E-01	0.0	.00E 00	
SUBJ 1	STIM 22	-73.3	106.6	60E 01	28E 01	148.5	.56E-01	.42E-02	.49E 00	33.3	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 23	-65.0	76.7	16E 01	18E-04	175.5	.21E-01	.38E-07	.12E-05	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 24	200.0	60.6	55E 01	29E 01	175.2	.41E-01	.13E-01	.71E 00	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 25	-80.0	58.3	34E-04	43E 01	77.0	.74E-01	.31E-06	.78E-05	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 26	168.9	92.6	17E 02	35E 00	161.9	.95E-01	.15E-01	.14E 00	23.3	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 27	80.6	77.7	89E 01	30E 01	143.6	.75E-01	.15E-01	.11E 01	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 28	165.2	108.4	20E 02	66E 01	158.9	.10E 00	.28E-01	.40E 01	30.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 29	-100.7	58.2	73E 01	26E 01	177.3	.12E 00	.80E-02	.10E 01	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 30	-185.0	163.1	84E 01	43E 01	76.5	.82E-01	.66E-02	.11E 01	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.11E 00 H ERROR=0.12E-01 L ERROR=0.82E-01 B ERROR=0.00E 00

**** END OF STREAM 000212 0RG

V.C. 25 OBS 1,6,7

	HUE	SATN	AX1S1	AX1S2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	7.5	112.5	68E 01	40E 01	98.3	.59E-01	.60E-02	.76E 00	68.9	.11E 00	0.0	.00E 00	
STIM 2	186.1	92.7	60E 01	26E 01	32.4	.34E-01	.98E-02	.53E 00	38.3	.14E 00	0.0	.00E 00	
STIM 3	11.4	102.8	56E 01	47E 01	123.9	.50E-01	.80E-02	.81E 00	56.7	.15E 00	0.0	.00E 00	
STIM 4	158.3	58.3	56E 01	37E 01	70.2	.75E-01	.14E-01	.11E 01	31.7	.11E 00	0.0	.00E 00	
STIM 5	44.2	72.7	78E 01	32E 01	123.4	.53E-01	.17E-01	.11E 01	37.8	.11E 00	0.0	.00E 00	
STIM 6	8.3	77.3	54E 01	50E 01	25.0	.67E-01	.11E-01	.11E 01	45.6	.15E 00	0.0	.00E 00	
STIM 7	-34.3	90.8	99E 01	68E 01	120.0	.99E-01	.11E-01	.21E 01	57.8	.17E 00	0.0	.00E 00	
STIM 8	-48.5	78.4	84E 01	42E 01	80.9	.78E-01	.15E-01	.14E 01	48.9	.20E 00	0.0	.00E 00	
STIM 9	52.0	51.4	80E 01	48E 01	77.1	.14E 00	.18E-01	.23E 01	29.4	.17E 00	0.0	.00E 00	
STIM 10	13.3	33.3	58E 01	31E 01	160.4	.98E-01	.27E-01	.17E 01	25.8	.15E 00	0.0	.00E 00	
STIM 11	-63.4	51.6	52E 01	38E 01	158.7	.98E-01	.12E-01	.12E 01	24.1	.14E 00	0.0	.00E 00	
STIM 12	-3.3	50.6	37E 01	26E 01	111.3	.73E-01	.82E-02	.59E 00	34.4	.13E 00	0.0	.00E 00	
STIM 13	-53.4	55.1	27E 01	23E 01	161.0	.48E-01	.68E-02	.35E 00	33.3	.14E 00	0.0	.00E 00	
STIM 14	-68.9	103.4	35E 01	18E 01	40.3	.28E-01	.41E-02	.18E 00	48.9	.21E 00	0.0	.00E 00	
STIM 15	-106.8	95.0	62E 01	32E 01	172.5	.64E-01	.56E-02	.65E 00	37.8	.16E 00	0.0	.00E 00	
STIM 16	-106.1	94.8	67E 01	42E 01	170.8	.44E-01	.11E-01	.93E 00	43.1	.15E 00	0.0	.00E 00	
STIM 17	-141.7	105.5	37E 01	26E 01	161.5	.25E-01	.56E-02	.29E 00	37.2	.18E 00	0.0	.00E 00	
STIM 18	-60.8	65.2	46E 01	24E 01	64.4	.38E-01	.11E-01	.53E 00	40.0	.13E 00	0.0	.00E 00	
STIM 19	100.0	1.1	11E-10	66E-05	90.0	.61E-05	.27E-10	.21E-15	21.4	.22E 00	0.0	.00E 00	
STIM 20	-27.?	80.3	73E 01	35E 01	169.0	.63E-01	.12E-01	.99E 00	45.0	.14E 00	0.0	.00E 00	
STIM 21	0.2	46.8	14E 02	41E 01	81.2	.30E 00	.15E-01	.39E 01	36.7	.12E 00	0.0	.00E 00	
STIM 22	-62.3	78.7	65E 01	33E 01	185.5	.69E-01	.10E-01	.86E 00	42.2	.16E 00	0.0	.00E 00	
STIM 23	-65.7	67.8	34E 01	11E 01	156.9	.51E-01	.38E-02	.18E 00	37.8	.22E 00	0.0	.00E 00	
STIM 24	-104.3	60.8	52E 01	30E 01	179.8	.50E-01	.13E-01	.81E 00	24.8	.14E 00	0.0	.00E 00	
STIM 25	-71.3	50.9	47E 01	27E 01	135.0	.76E-01	.80E-02	.67E 00	30.6	.14E 00	0.0	.00E 00	
STIM 26	178.7	67.7	54E 01	17E 01	11.8	.28E-01	.13E-01	.44E 00	28.3	.14E 00	0.0	.00E 00	
STIM 27	152.9	47.4	15E 02	30E 01	75.1	.10E 00	.47E-01	.38E 01	31.1	.84E-01	0.0	.00E 00	
STIM 28	148.5	82.5	77E 01	21E 01	166.2	.45E-01	.14E-01	.62E 00	33.9	.11E 00	0.0	.00E 00	
STIM 29	-64.6	52.4	41E 01	26E 01	119.4	.59E-01	.11E-01	.63E 00	30.0	.19E 00	0.0	.00E 00	
STIM 30	-171.7	73.5	75E 01	35E 01	146.3	.49E-01	.16E-01	.11E 01	31.7	.16E 00	0.0	.00E 00	
STIM 31	-100.0	2.0	51E-10	93E-04	90.0	.45E-06	.18E-09	.72E-14	0.0	.90E 00	0.0	.00E 00	XXXX

S ERROR=0.67E-01 H ERROR=0.12E-01 L ERROR=0.15E 00 B ERROR=0.00E 00

U.C. 25 OBS 3,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	5.3	132.2	.67E 01	.24E 01	70.8	.50E-01	.34E-02	.38E 00	75.6	.64E-01	0.0	.00E 00	
STIM 2	149.6	99.1	.45E 01	.15E 01	21.9	.18E-01	.71E-02	.21E 00	48.9	.81E-01	0.0	.00E 00	
STIM 3	5.9	126.1	.48E 01	.13E 01	39.2	.28E-01	.44E-02	.16E 00	70.6	.83E-01	0.0	.00E 00	
STIM 4	140.3	51.7	.11E 02	.37E 01	67.1	.12E 00	.28E-01	.24E 01	31.7	.91E-01	0.0	.00E 00	
STIM 5	44.6	75.1	.97E 01	.30E 01	133.6	.53E-01	.20E-01	.16E 01	47.8	.66E-01	0.0	.00E 00	
STIM 6	9.1	96.3	.92E 01	.45E 01	118.6	.82E-01	.11E-01	.14E 01	60.6	.95E-01	0.0	.00E 00	
STIM 7	-21.3	112.3	.13E 02	.51E 01	133.7	.11E 00	.10E-01	.19E 01	71.1	.79E-01	0.0	.00E 00	
STIM 8	-39.6	91.0	.87E 01	.76E 01	148.4	.93E-01	.14E-01	.23E 01	56.1	.10E 00	0.0	.00E 00	
STIM 9	35.2	53.0	.67E 01	.34E 01	135.1	.68E-01	.20E-01	.13E 01	36.7	.64E-01	0.0	.00E 00	
STIM 10	39.7	41.6	.57E 01	.30E 01	38.4	.13E 00	.12E-01	.13E 01	27.2	.76E-01	0.0	.00E 00	
STIM 11	-104.1	40.4	.58E 01	.15E 01	179.1	.12E 00	.51E-02	.56E 00	28.9	.11E 00	0.0	.00E 00	
STIM 12	-8.1	68.9	.35E 01	.19E 01	75.7	.48E-01	.50E-02	.30E 00	40.6	.72E-01	0.0	.00E 00	
STIM 13	-28.6	60.9	.75E 01	.20E 01	54.6	.60E-01	.17E-01	.75E 00	39.4	.86E-01	0.0	.00E 00	
STIM 14	-101.1	94.7	.12E 02	.11E 01	1.7	.13E 00	.18E-02	.43E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-105.0	102.7	.30E 01	.33E 01	21.0	.35E-01	.51E-02	.36E 00	52.8	.12E 00	0.0	.00E 00	
STIM 16	103.9	105.7	.42E 01	.26E 01	65.5	.40E-01	.39E-02	.33E 00	54.4	.52E-01	0.0	.00E 00	
STIM 17	-148.5	108.5	.66E 01	.45E 01	174.1	.41E-01	.97E-02	.86E 00	48.3	.77E-01	0.0	.00E 00	
STIM 18	-36.9	75.3	.11E 02	.30E 01	43.2	.48E-01	.23E-01	.14E 01	47.2	.73E-01	0.0	.00E 00	
STIM 19	100.0	1.1	.16E-10	.10E-04	90.0	.90E-05	.40E-10	.47E-15	21.7	.86E-01	0.0	.00E 00	
STIM 20	-22.2	98.2	.82E 01	.63E 01	173.1	.69E-01	.13E-01	.17E 01	59.4	.86E-01	0.0	.00E 00	
STIM 21	3.5	55.0	.16E 02	.38E 01	90.1	.29E 00	.11E-01	.34E 01	43.9	.73E-01	0.0	.00E 00	
STIM 22	-87.2	82.2	.46E 01	.24E 01	116.4	.43E-01	.73E-02	.42E 00	46.7	.80E-01	0.0	.00E 00	
STIM 23	-141.2	76.0	.48E 01	.21E 01	2.5	.62E-01	.43E-02	.42E 00	37.8	.11E 00	0.0	.00E 00	
STIM 24	-108.0	68.4	.55E 01	.18E 01	92.8	.80E-01	.44E-02	.46E 00	35.0	.10E 00	0.0	.00E 00	
STIM 25	-88.1	62.9	.47E 01	.20E 01	11.0	.70E-01	.64E-02	.46E 00	37.8	.11E 00	0.0	.00E 00	
STIM 26	175.8	76.3	.57E 01	.30E 01	14.7	.40E-01	.12E-01	.70E 00	36.1	.10E 00	0.0	.00E 00	
STIM 27	72.7	60.5	.62E 01	.34E 01	105.3	.57E-01	.16E-01	.11E 01	37.2	.68E-01	0.0	.00E 00	
STIM 28	103.0	35.3	.49E 01	.23E 01	164.0	.33E-01	.86E-02	.42E 00	41.1	.78E-01	0.0	.00E 00	
STIM 29	-105.9	61.7	.44E 01	.13E 01	166.0	.67E-01	.48E-02	.28E 00	33.9	.11E 00	0.0	.00E 00	
STIM 30	-182.9	85.5	.67E 01	.30E 01	158.3	.36E-01	.12E-01	.73E 00	38.9	.11E 00	0.0	.00E 00	
STIM 31	-100.0	0.1	.10E-06	.10E-06	0.0	.89E-06	.14E-06	.28E-12	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.68E-01 H ERROR=0.08E-02 L ERROR=0.87E-01 B ERROR=0.00E 00

**** END OF STREAM PGGX520 162

U.C. 25 OBS 1,2,3,4,5,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	5.9	108.8	.32E 01	.22E 01	64.5	.29E-01	.32E-02	.20E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	135.4	60.0	.39E 01	.18E 01	38.1	.26E-01	.63E-02	.24E 00	44.4	.67E-01	0.0	.00E 00	
STIM 3	7.4	105.3	.32E 01	.21E 01	137.2	.24E-01	.43E-02	.20E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	142.3	40.3	.75E 01	.25E 01	63.9	.58E-01	.24E-01	.12E 01	32.4	.61E-01	0.0	.00E 00	
STIM 5	43.0	72.4	.52E 01	.28E 01	121.7	.44E-01	.11E-01	.63E 00	43.8	.57E-01	0.0	.00E 00	
STIM 6	10.6	84.3	.44E 01	.27E 01	111.0	.47E-01	.61E-02	.44E 00	57.4	.90E-01	0.0	.00E 00	
STIM 7	-16.5	95.3	.58E 01	.38E 01	112.6	.60E-01	.65E-02	.73E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-32.0	80.0	.54E 01	.41E 01	61.9	.57E-01	.10E-01	.87E 00	60.0	.98E-01	0.0	.00E 00	
STIM 9	46.1	51.1	.40E 01	.37E 01	56.3	.77E-01	.11E-01	.89E 00	33.9	.56E-01	0.0	.00E 00	
STIM 10	44.8	34.9	.40E 01	.26E 01	26.0	.11E 00	.13E-01	.92E 00	28.9	.66E-01	0.0	.00E 00	
STIM 11	-107.8	49.5	.29E 01	.24E 01	164.0	.57E-01	.80E-02	.44E 00	28.0	.72E-01	0.0	.00E 00	
STIM 12	-6.4	52.1	.28E 01	.24E 01	104.8	.53E-01	.74E-02	.41E 00	41.0	.70E-01	0.0	.00E 00	
STIM 13	-14.9	53.4	.37E 01	.15E 01	44.3	.31E-01	.11E-01	.32E 00	37.1	.69E-01	0.0	.00E 00	
STIM 14	-60.5	66.8	.57E 01	.11E 01	1.0	.59E-01	.18E-02	.20E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-134.0	88.3	.42E 01	.15E 01	175.6	.48E-01	.29E-02	.23E 00	50.5	.81E-01	0.0	.00E 00	
STIM 16	108.1	65.0	.35E 01	.25E 01	172.9	.27E-01	.58E-02	.29E 00	47.9	.71E-01	0.0	.00E 00	
STIM 17	-142.5	53.0	.52E 01	.36E 01	161.2	.39E-01	.89E-02	.63E 00	44.0	.82E-01	0.0	.00E 00	
STIM 18	-10.5	67.8	.49E 01	.23E 01	50.4	.38E-01	.11E-01	.53E 00	45.7	.63E-01	0.0	.00E 00	
STIM 19	57.3	4.5	.23E 01	.85E 00	46.3	.52E 00	.32E-01	.14E 01	24.7	.93E-01	0.0	.00E 00	
STIM 20	-15.4	84.2	.44E 01	.35E 01	29.6	.42E-01	.81E-02	.56E 00	59.5	.84E-01	0.0	.00E 00	
STIM 21	[illegible]	53.6	.04E 01	.20E 01	84.1	.12E 00	.86E-02	.11E 01	42.6	.67E-01	0.0	.00E 00	
STIM 22	-46.3	71.7	.48E 01	.27E 01	98.6	.50E-01	.89E-02	.56E 00	47.1	.68E-01	0.0	.00E 00	
STIM 23	-67.8	62.2	.28E 01	.13E 01	174.3	.44E-01	.34E-02	.19E 00	41.2	.91E-01	0.0	.00E 00	
STIM 24	-105.3	61.0	.29E 01	.23E 01	132.8	.43E-01	.69E-02	.35E 00	32.8	.77E-01	0.0	.00E 00	
STIM 25	-98.1	57.2	.25E 01	.22E 01	66.0	.39E-01	.65E-02	.28E 00	38.1	.79E-01	0.0	.00E 00	
STIM 26	170.1	66.4	.49E 01	.21E 01	33.4	.32E-01	.12E-01	.48E 00	35.5	.80E-01	0.0	.00E 00	
STIM 27	81.4	49.8	.69E 01	.27E 01	76.8	.81E-01	.20E-01	.12E 01	35.0	.46E-01	0.0	.00E 00	
STIM 28	147.3	78.5	.34E 01	.25E 01	173.3	.34E-01	.67E-02	.34E 00	40.2	.63E-01	0.0	.00E 00	
STIM 29	-160.9	51.8	.23E 01	.17E 01	153.2	.43E-01	.56E-02	.24E 00	35.7	.94E-01	0.0	.00E 00	
STIM 30	-172.4	71.8	.52E 01	.21E 01	144.6	.32E-01	.11E-01	.49E 00	39.0	.75E-01	0.0	.00E 00	
STIM 31	-100.0	0.0	.61E 05	.17E-05	180.0	.64E 00	.39E-06	.35E-05	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.84E-01 H ERROR=0.61E-02 L ERROR=0.74E-01 B ERROR=0.00E 00

**** END OF STREAM [illegible]

UNIT: 0 OPA024 DATE: 25/06/78 TIME: 12/17/13

V.C. 26 OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	10.0	240.0	58E 01	56E-04	81.0	.24E-01	38E-07	.43E-05	0.0	.00E 00	78.3	56E-01	
SUBJ 1 STIM 2	183.5	130.9	36E-03	37E 01	105.7	.34E-03	42E-02	29E-04	66.7	23E-01	0.0	00E 00	
SUBJ 1 STIM 3	11.7	180.9	50E 01	24E-03	168.7	.34E-03	42E-02	20E-04	0.0	.00E 00	63.3	53E-01	
SUBJ 1 STIM 4	100.2	96.1	78E 01	29E 01	100.8	.33E-01	13E-01	73E 00	51.7	32E-01	0.0	00E 00	
SUBJ 1 STIM 5	46.5	141.8	15E 02	28E 01	128.1	.27E-01	17E-01	92E 00	75.0	.38E-01	0.0	00E 00	
SUBJ 1 STIM 6	16.7	168.2	47E 01	41E 01	28.7	26E-01	42E-02	36E 00	0.0	00E 00	0.0	00E 00	XXXX
SUBJ 1 STIM 7	-21.7	189.9	50E 01	68E-03	20.2	.34E-03	42E-02	56E-04	0.0	.00E 00	61.7	27E-01	
SUBJ 1 STIM 8	-41.5	154.9	11E 02	92E 00	108.0	.68E-01	39E-02	21E 00	0.0	.00E 00	0.0	00E 00	XXXX
SUBJ 1 STIM 9	26.1	64.3	83E 01	73E 00	100.3	.71E-01	10E-01	22E 00	58.3	29E-01	0.0	00E 00	
SUBJ 1 STIM 10	2.6	58.2	44E-04	72E 01	9.9	.11E 00	71E-02	17E-04	50.0	.00E 00	0.0	00E 00	
SUBJ 1 STIM 11	-66.5	56.6	67E 01	11E 01	160.7	.12E 00	39E-02	42E 00	40.0	.00E 00	0.0	00E 00	
SUBJ 1 STIM 12	-11.5	80.9	61E 01	99E 00	81.2	.64E-01	39E-02	21E 00	61.7	.72E-01	0.0	00E 00	
SUBJ 1 STIM 13	-40.0	76.7	11E-03	60E 01	36.0	.78E-01	38E-06	.26E-04	68.3	.34E-01	0.0	00E 00	
SUBJ 1 STIM 14	-102.6	151.6	73E 01	18E 01	27.6	.44E-01	37E-02	27E 00	80.0	72E-01	0.0	00E 00	
SUBJ 1 STIM 15	-116.8	129.9	65E 01	16E 01	44.8	.44E-01	43E-02	26E 00	78.3	11E 00	0.0	00E 00	
SUBJ 1 STIM 16	186.7	169.9	40E-03	44E 01	101.2	.34E-03	42E-02	38E-04	78.3	.85E-01	0.0	00E 00	
SUBJ 1 STIM 17	-181.5	173.2	64E 01	14E 01	43.6	.42E-01	40E-02	22E 00	75.0	.77E-01	0.0	00E 00	
SUBJ 1 STIM 18	-46.5	127.5	18E 02	16E 01	48.6	.21E-01	22E-01	72E 00	71.7	47E-01	0.0	00E 00	
SUBJ 1 STIM 19	-27.3	24.9	51E 01	89E 00	123.2	.20E 00	74E-02	57E 00	38.3	.43E-01	0.0	00E 00	
SUBJ 1 STIM 20	-15.9	165.0	12E-03	76E 01	13.5	.46E-01	22E-06	18E-04	33.3	.47E-01	0.0	00E 00	
SUBJ 1 STIM 21	6.0	113.3	10E 02	51E-04	81.0	.89E-01	75E-07	14E-04	66.7	25E-01	0.0	00E 00	
SUBJ 1 STIM 22	-73.9	110.6	12E-03	12E 02	100.8	.85E-01	92E-02	39E-04	53.3	.70E-01	0.0	00E 00	
SUBJ 1 STIM 23	-60.9	83.3	36E-04	33E 01	81.0	.40E-01	17E-06	46E-05	51.7	32E-01	0.0	00E 00	
SUBJ 1 STIM 24	-169.4	85.0	83E-04	17E 02	131.3	.13E 00	23E-01	.51E-04	50.0	.58E-01	0.0	00E 00	
SUBJ 1 STIM 25	-66.8	71.0	66E 01	18E 01	53.3	.27E-01	15E-01	.52E 00	55.0	.14E 00	0.0	00E 00	
SUBJ 1 STIM 26	178.4	87.9	60E 01	34E 01	30.8	.40E-01	11E-01	.72E 00	56.7	59E-01	0.0	00E 00	
SUBJ 1 STIM 27	76.5	94.7	56E 01	13E 01	84.8	.29E-01	86E-02	25E 00	60.0	.48E-01	0.0	00E 00	
SUBJ 1 STIM 28	186.6	106.6	50E 01	15E 01	130.2	.42E-01	40E-02	22E 00	55.0	.52E-01	0.0	00E 00	
SUBJ 1 STIM 29	-180.1	71.2	57E 01	14E 01	78.3	.25E-01	12E-01	35E 00	45.0	.64E-01	0.0	00E 00	
SUBJ 1 STIM 30	-181.0	124.9	54E 01	25E 01	48.9	.40E-01	41E-02	.34E 00	55.0	.52E-01	0.0	00E 00	
SUBJ 1 STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	00E 00	.00E 00	0.0	.00E 00	0.0	00E 00	XXXX

S ERROR=0.51E-01 H ERROR=0.67E-02 L ERROR=0.52E-01 B ERROR=0.45E-01

V.C. 26 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	10.1	144.2	82E 01	50E 01	76.6	.56E-01	65E-02	10E 01	0.0	.00E 00	56.7	25E 00	
STIM 2	188.5	109.0	64E 01	19E 01	41.0	.34E-01	82E-02	36E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 3	9.2	135.4	58E 01	28E 01	153.9	.23E-01	65E-02	.37E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 4	144.1	76.2	14E 02	.43E 01	73.0	.87E-01	27E-01	25E 01	52.8	.69E-01	0.0	00E 00	
STIM 5	44.0	98.7	59E 01	34E 01	178.3	.45E-01	82E-02	63E 00	70.0	.62E-01	0.0	00E 00	
STIM 6	19.2	97.8	96E 01	48E 01	83.1	.97E-01	82E-02	.15E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 7	-20.0	117.4	84E 01	56E 01	121.2	.71E-01	78E-02	.17E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 8	-45.3	107.6	86E 01	57E 01	37.2	.56E-01	13E-01	.15E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 9	30.1	71.7	45E 01	31E 01	169.4	.48E-01	65E-02	62E 00	55.0	.68E-01	0.0	00E 00	
STIM 10	22.1	58.4	64E 01	27E 01	17.4	.71E-01	15E-01	94E 00	48.3	.10E 00	0.0	00E 00	
STIM 11	-08.0	50.8	48E 01	21E 01	171.1	.93E-01	.68E-02	62E 00	45.0	.74E-01	0.0	00E 00	
STIM 12	-7.5	60.3	52E 01	27E 01	165.6	.66E-01	.11E-01	.73E 00	60.0	75E-01	0.0	00E 00	
STIM 13	-35.0	61.2	47E 01	18E 01	173.7	.53E-01	10E-01	.43E 00	50.6	.69E-01	0.0	00E 00	
STIM 14	-100.9	126.1	62E 01	12E 01	178.3	.49E-01	15E-02	18E 00	0.0	00E 00	0.0	00E 00	XXXX
STIM 15	-109.6	117.5	60E 01	38E 01	137.3	.40E-01	71E-02	.60E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 16	163.5	130.7	59E 01	37E 01	26.2	.31E-01	69E-02	.52E 00	80.0	.51E-01	0.0	00E 00	
STIM 17	-180.6	121.7	40E 01	11E 01	77.6	.33E-01	14E-02	.11E 00	66.7	91E-01	0.0	00E 00	
STIM 18	-47.7	91.8	69E 01	38E 01	13.9	.51E-01	11E-01	.89E 00	72.8	.79E-01	0.0	00E 00	
STIM 19	2.9	21.6	74E 01	48E 01	57.2	.31E 00	43E-01	52E 01	38.3	.78E-01	0.0	00E 00	
STIM 20	-14.1	106.4	78E 01	.52E 01	121.4	71E-01	83E-02	.12E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 21	10.7	75.7	54E 01	27E 01	60.5	.68E-01	66E-02	60E 00	65.6	.56E-01	0.0	00E 00	
STIM 22	-63.0	94.1	61E 01	40E 01	77.0	.46E-01	10E-01	82E 00	45.6	.65E-01	0.0	00E 00	
STIM 23	-96.0	84.1	57E 01	20E 01	9.1	.66E-01	43E-02	42E 00	57.8	.74E-01	0.0	00E 00	
STIM 24	-161.4	74.7	64E 01	57E 01	57.2	84E-01	12E-01	15E 01	47.2	66E-01	0.0	00E 00	
STIM 25	-60.4	78.6	61E 01	30E 01	122.5	.74E-01	86E-02	.94E 00	60.0	.84E-01	0.0	00E 00	
STIM 26	143.5	86.4	65E 01	40E 01	165.9	.62E-01	11E-01	12E 01	58.3	.53E-01	0.0	00E 00	
STIM 27	50.1	87.2	93E 01	18E 01	166.2	.54E-01	15E-01	.61E 00	61.1	.57E-01	0.0	00E 00	
STIM 28	100.2	106.1	59E 01	40E 01	74.4	.54E-01	76E-02	86E 00	54.4	.39E-01	0.0	00E 00	
STIM 29	-101.0	72.2	53E 01	17E 01	177.4	.73E-01	38E-02	.39E 00	50.0	.44E-01	0.0	00E 00	
STIM 30	-174.8	97.0	10E 02	32E 01	130.4	.56E-01	15E-01	.11E 01	57.8	.92E-01	0.0	00E 00	
STIM 31	0.0	0.3	10E-06	10E-06	0.0	.29E-06	46E-07	.92E-13	0.0	.00E 00	0.0	00E 00	XXXX

S ERROR=0.65E-01 H ERROR=0.10E-01 L ERROR=0.66E-01 B ERROR=0.25E 00

**** END OF STREAM OPA024 507

U.C.26 OBS 3,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	RTNESS	SIGR	
STIM 1	8.0	130.5	.48E 01	.26E 01	35.6	.29E-01	.49E-02	.31E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	101.2	93.9	.41E 01	.32E 01	67.1	.41E-01	.59E-02	.44E 00	71.7	.74E-01	0.0	.00E 00	
STIM 3	6.8	121.8	.38E 01	.17E 01	20.4	.19E-01	.46E-02	.17E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	109.5	76.0	.61E 01	.54E 01	37.2	.76E-01	.12E-01	.14E 01	52.2	.60E-01	0.0	.00E 00	
STIM 5	39.3	91.7	.84E 01	.35E 01	155.8	.38E-01	.15E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	7.0	117.2	.47E 01	.16E 01	154.1	.19E-01	.61E-02	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-17.4	107.7	.78E 01	.28E 01	137.5	.63E-01	.70E-02	.64E 00	0.0	.00E 00	40.8	.25E 00	
STIM 8	-33.2	99.2	.11E 02	.25E 01	161.8	.86E-01	.12E-01	.88E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	33.5	65.3	.10E 02	.34E 01	130.2	.72E-01	.23E-01	.17E 01	60.0	.75E-01	0.0	.00E 00	
STIM 10	6.2	48.8	.49E 01	.16E 01	92.1	.10E 00	.55E-02	.50E 00	47.8	.31E-01	0.0	.00E 00	
STIM 11	-99.5	51.6	.40E 01	.88E 00	1.5	.77E-01	.27E-02	.21E 00	47.8	.39E-01	0.0	.00E 00	
STIM 12	-9.9	67.8	.37E 01	.17E 01	46.2	.38E-01	.73E-02	.29E 00	60.0	.81E-01	0.0	.00E 00	
STIM 13	-28.6	66.2	.59E 01	.18E 01	39.0	.33E-01	.14E-01	.49E 00	53.3	.47E-01	0.0	.00E 00	
STIM 14	-100.9	107.7	.29E 01	.10E 01	178.0	.27E-01	.15E-02	.88E-01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-106.8	98.2	.54E 01	.31E 01	139.3	.44E-01	.73E-02	.53E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	101.2	105.7	.53E 01	.20E 01	123.1	.46E-01	.43E-02	.31E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-100.6	99.6	.99E 01	.37E 01	145.5	.46E-01	.15E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-42.0	81.1	.75E 01	.64E 01	30.6	.79E-01	.15E-01	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	-7.0	35.1	.63E 01	.20E 01	83.7	.18E 00	.11E-01	.11E 01	38.3	.49E-01	0.0	.00E 00	
STIM 20	-11.2	110.5	.33E 01	.16E 01	170.1	.17E-01	.46E-02	.15E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	6.2	88.4	.47E 01	.22E 01	80.5	.53E-01	.40E-02	.36E 00	80.6	.63E-01	0.0	.00E 00	
STIM 22	-48.6	77.9	.10E 02	.20E 01	32.9	.35E-01	.20E-01	.82E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	-96.8	72.6	.30E 01	.24E 01	17.0	.41E-01	.55E-02	.32E 00	60.0	.11E 00	0.0	.00E 00	
STIM 24	-103.4	72.4	.53E 01	.22E 01	28.0	.48E-01	.10E-01	.50E 00	57.8	.61E-01	0.0	.00E 00	
STIM 25	-74.9	63.7	.62E 01	.42E 01	44.0	.71E-01	.15E-01	.13E 01	56.7	.76E-01	0.0	.00E 00	
STIM 26	178.1	68.9	.51E 01	.28E 01	174.7	.48E-01	.11E-01	.64E 00	52.2	.32E-01	0.0	.00E 00	
STIM 27	47.3	74.6	.10E 02	.20E 01	135.9	.46E-01	.21E-01	.87E 00	57.2	.53E-01	0.0	.00E 00	
STIM 28	101.8	85.4	.27E 01	.15E 01	38.1	.22E-01	.46E-02	.15E 00	60.0	.71E-01	0.0	.00E 00	
STIM 29	-102.3	61.2	.39E 01	.21E 01	2.6	.64E-01	.55E-02	.42E 00	49.4	.30E-01	0.0	.00E 00	
STIM 30	-100.6	86.4	.92E 01	.26E 01	147.7	.40E-01	.16E-01	.87E 00	56.1	.74E-01	0.0	.00E 00	
STIM 31	-100.0	3.0	.10E-06	.10E-06	0.0	.34E-07	.53E-08	.11E-13	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.51E-01 H ERROR=0.94E-02 L ERROR=0.61E-01 R ERROR=0.25E 00

**** END OF STREAM P08X520 162

U.C. 26 OBS 1,2,3,4,5,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	RTNESS	SIGR	
STIM 1	8.2	121.7	.39E+01	.26E+01	55.3	.30E-01	.30E-02	.27E+00	0.00.		0.00.		XXXX
STIM 2	187.7	95.0	.35E+01	.27E+01	177.7	.29E-01	.57E-02	.31E+00	0.00.		0.00.		XXXX
STIM 3	8.9	115.5	.26E+01	.19E+01	164.6	.17E-01	.36E-02	.14E+00	0.00.		0.00.		XXXX
STIM 4	124.7	62.2	.72E+01	.30E+01	64.9	.63E-01	.18E-01	.14E+01	53.8	.42E-01	0.00.		
STIM 5	38.3	87.0	.40E+01	.26E+01	157.0	.31E-01	.83E-02	.43E+00	0.00.		0.00.		XXXX
STIM 6	11.8	95.2	.49E+01	.31E+01	104.2	.40E-01	.50E-02	.51E+00	0.00.		0.00.		XXXX
STIM 7	-15.9	101.5	.42E+01	.31E+01	110.2	.41E-01	.50E-02	.40E+00	0.00.		0.00.		XXXX
STIM 8	-32.8	90.3	.59E+01	.44E+01	23.6	.48E-01	.18E-01	.00E+00	0.00.		0.00.		XXXX
STIM 9	48.1	50.8	.43E+01	.23E+01	132.5	.41E-01	.12E-01	.53E+00	57.6	.48E-01	0.00.		
STIM 10	21.3	45.9	.35E+01	.26E+01	178.2	.50E-01	.12E-01	.61E+00	48.0	.58E-01	0.00.		
STIM 11	-102.1	46.6	.25E+01	.90E+00	176.4	.54E-01	.34E-02	.17E+00	47.0	.50E-01	0.00.		
STIM 12	-6.9	53.8	.26E+01	.22E+01	136.1	.46E-01	.71E-02	.33E+00	60.3	.50E-01	0.00.		
STIM 13	-27.8	53.0	.28E+01	.25E+01	17.7	.47E-01	.84E-02	.42E+00	53.1	.36E-01	0.00.		
STIM 14	-182.5	137.3	.30E+01	.53E+00	176.4	.28E-01	.83E-03	.47E-01	0.00.		0.00.		XXXX
STIM 15	-120.0	97.7	.42E+01	.27E+01	80.0	.29E-01	.64E-02	.36E+00	0.00.		0.00.		XXXX
STIM 16	103.7	107.0	.33E+01	.27E+01	108.2	.31E-01	.41E-02	.27E+00	0.00.		0.00.		XXXX
STIM 17	-182.5	98.8	.51E+01	.24E+01	140.5	.27E-01	.80E-02	.40E+00	0.00.		0.00.		XXXX
STIM 18	-37.7	75.5	.50E+01	.30E+01	30.9	.40E-01	.18E-01	.63E+00	0.00.		0.00.		XXXX
STIM 19	4.7	24.0	.49E+01	.31E+01	80.0	.16E+00	.21E-01	.16E+01	41.7	.54E-01	0.00.		
STIM 20	-11.1	98.5	.02E+01	.25E+01	95.3	.12E+00	.46E-02	.81E+00	0.00.		0.00.		XXXX
STIM 21	18.3	72.0	.31E+01	.21E+01	86.0	.42E-01	.46E-02	.78E+00	0.00.		0.00.		XXXX
STIM 22	-52.1	75.5	.43E+01	.28E+01	35.8	.18E-01	.80E-02	.49E+00	0.00.		0.00.		XXXX
STIM 23	-95.8	70.7	.24E+01	.14E+01	2.8	.14E-01	.32E-02	.15E+00	62.8	.56E-01	0.00.		
STIM 24	-180.8	60.3	.31E+01	.24E+01	29.0	.42E-01	.48E-02	.36E+00	51.4	.47E-01	0.00.		
STIM 25	-60.4	63.5	.34E+01	.28E+01	74.5	.45E-01	.84E-02	.48E+00	50.0	.56E-01	0.00.		
STIM 26	174.1	71.9	.43E+01	.23E+01	6.0	.36E-01	.02E-02	.43E+00	56.0	.36E-01	0.00.		
STIM 27	56.7	75.1	.51E+01	.30E+01	123.8	.47E-01	.11E-01	.64E+00	58.8	.52E-01	0.00.		
STIM 28	189.5	88.8	.25E+01	.23E+01	169.0	.26E-01	.44E-02	.20E+00	56.0	.44E-01	0.00.		
STIM 29	-181.6	57.8	.30E+01	.11E+01	170.8	.53E-01	.20E-02	.18E+00	52.7	.36E-01	0.00.		
STIM 30	-175.9	81.8	.47E+01	.21E+01	137.3	.34E-01	.10E-01	.47E+00	63.1	.62E-01	0.00.		
STIM 31	-116.8	[illegible].8	.81E+00	.24E+00	163.5	.85E+00	.87E-01	.76E+00	0.00.		0.00.		XXXX

S ERROR= .71E-01 H ERROR= .12E-01 L ERROR= .40E-01 R ERROR=0.

V.C. 27 OBS 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	16.5	154.6	97E 01	26E 01	133.1	.36E-01	86E-02	50E 00	0.0	.00E 00	333.3	36E-01	
SUBJ 1	STIM 2	161.0	83.3	56E 01	17E 01	131.1	.40E-01	41E-02	23E 00	0.0	.00E 00	248.3	79E-01	
SUBJ 1	STIM 3	13.4	153.2	46E 01	25E 01	24.2	.22E-01	41E-02	23E 00	0.0	.00E 00	0.0	00E 00	XXXX
SUBJ 1	STIM 4	106.1	76.6	30E 01	35E 00	116.8	.21E-01	53E-02	43E-01	0.0	.00E 00	223.3	98E-01	
SUBJ 1	STIM 5	66.8	108.0	59E 01	25E-03	138.0	.17E-01	82E-02	43E-04	0.0	.00E 00	263.3	67E-01	
SUBJ 1	STIM 6	22.5	93.1	13E 02	82E 00	88.2	.13E 00	70E-02	36E 00	0.0	.00E 00	241.7	53E-01	
SUBJ 1	STIM 7	-23.3	167.9	87E 01	28E 01	35.4	.21E-01	83E-02	46E 00	0.0	.00E 00	350.0	00E 00	
SUBJ 1	STIM 8	-45.9	165.6	13E 02	34E 01	76.6	.73E-01	16E-01	13E 01	0.0	.00E 00	200.0	74E-01	
SUBJ 1	STIM 9	55.8	43.4	99E 01	28E 01	162.3	.12E 00	32E-01	20E 01	0.0	.00E 00	213.3	31E-01	
SUBJ 1	STIM 10	21.0	17.4	48E 01	25E 00	47.4	.25E 00	18E-01	22E 00	0.0	.00E 00	168.3	30E-01	
SUBJ 1	STIM 11	-101.0	18.3	60E 01	11E 00	4.4	.33E 00	28E-02	12E 00	0.0	.00E 00	233.3	33E-01	
SUBJ 1	STIM 12	0.1	60.7	86E 01	18E 01	146.7	.66E-01	20E-01	79E 00	0.0	.00E 00	220.0	52E-01	
SUBJ 1	STIM 13	-23.4	55.1	10E 02	94E 00	43.7	.73E-01	27E-01	55E 00	0.0	.00E 00	215.0	70E-01	
SUBJ 1	STIM 14	-103.0	80.0	87E-05	30E 01	97.7	.48E-01	19E-06	13E-05	0.0	.00E 00	253.3	13E-01	
SUBJ 1	STIM 15	-141.2	57.3	40E 02	73E 00	131.5	.56E-01	11E 00	16E 01	0.0	.00E 00	235.0	21E-01	
SUBJ 1	STIM 16	107.1	85.9	15E 02	20E 00	161.1	.65E-01	26E-01	11E 00	0.0	.00E 00	256.7	47E-01	
SUBJ 1	STIM 17	-157.0	70.0	32E 02	22E 01	130.7	.94E-01	70E-01	32E 01	0.0	.00E 00	263.3	25E-01	
SUBJ 1	STIM 18	-66.4	60.8	45E 01	12E 01	64.9	.40E-01	86E-02	25E 00	0.0	.00E 00	245.0	54E-01	
SUBJ 1	STIM 19	-3.9	8.6	10E 01	48E 00	157.8	.80E-01	16E-01	17E 00	0.0	.00E 00	183.3	48E-01	
SUBJ 1	STIM 20	-31.5	127.7	91E 01	53E 01	56.1	.49E-01	11E-01	12E 01	0.0	.00E 00	263.3	42E-01	
SUBJ 1	STIM 21	20.0	75.0	10E-06	10E-06	0.0	.13E-08	21E-09	42E-15	0.0	.00E 00	231.7	88E-01	
SUBJ 1	STIM 22	-70.0	73.3	44E 01	49E-04	153.0	.60E-01	11E-06	93E-05	0.0	.00E 00	230.0	50E-01	
SUBJ 1	STIM 23	-60.0	45.0	93E-05	20E 01	81.0	.65E-01	26E-06	19E-05	0.0	.00E 00	276.7	15E-01	
SUBJ 1	STIM 24	165.4	46.6	38E 01	10E 01	74.5	.72E-01	69E-02	26E 00	0.0	.00E 00	224.7	55E-01	
SUBJ 1	STIM 25	-70.0	43.3	97E-05	28E 01	63.0	.65E-01	26E-06	20E-05	0.0	.00E 00	166.7	68E-01	
SUBJ 1	STIM 26	180.0	75.0	10E-06	10E-06	0.0	.13E-08	21E-09	42E-15	0.0	.00E 00	233.3	94E-01	
SUBJ 1	STIM 27	91.7	88.3	25E 01	13E 01	124.1	.19E-01	42E-02	12E 00	0.0	.00E 00	233.3	52E-01	
SUBJ 1	STIM 28	163.5	64.8	13E-03	34E 01	103.5	.14E-02	83E-02	21E-04	0.0	.00E 00	234.7	61E-01	
SUBJ 1	STIM 29	-101.7	33.3	46E 01	68E 00	16.3	.13E 00	64E-02	29E 00	0.0	.00E 00	103.3	34E-01	
SUBJ 1	STIM 30	-177.4	58.2	77E 01	87E 00	88.4	.13E 00	72E-02	37E 00	0.0	.00E 00	0.0	00E 00	XXXX
SUBJ 1	STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	00E 00	XXXX

S ERROR=0.70E-01 H ERROR=0.14E-01 L ERROR=0.00E 00 B ERROR=0.50E-01

**** END OF STREAM OPA024 770

V.C.27 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	2.8	120.4	85E 01	35E 01	145.5	.36E-01	98E-02	73E 00	0.0	.00E 00	158.2	40E-01	
STIM 2	145.5	61.5	37E 01	15E 01	34.0	.32E-01	89E-02	29E 00	0.0	.00E 00	109.9	40E-01	
STIM 3	12.9	123.0	70E 01	24E 01	148.7	.26E-01	65E-02	42E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 4	108.2	53.9	41E 01	22E 01	15.0	.72E-01	75E-02	52E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 5	65.8	70.5	49E 01	30E 01	120.6	.44E-01	11E-01	66E 00	0.0	.00E 00	110.5	25E-01	
STIM 6	9.8	65.7	40E 01	30E 01	41.3	.58E-01	80E-02	58E 00	0.0	.00E 00	125.1	62E-01	
STIM 7	-18.6	119.4	62E 01	44E 01	81.7	.50E-01	64E-02	73E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 8	-46.9	80.3	60E 01	45E 01	143.8	.74E-01	91E-02	11E 01	0.0	.00E 00	124.7	46E-01	
STIM 9	37.9	37.2	47E 01	38E 01	24.0	.14E 00	20E-01	17E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 10	35.4	12.4	28E 01	12E 01	8.8	.16E 00	29E-01	83E 00	0.0	.00E 00	97.8	48E-01	
STIM 11	-62.2	12.8	15E 01	92E 00	164.5	.12E 00	12E-01	34E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 12	-7.2	34.9	11E 02	48E 01	57.0	.26E 00	36E-01	47E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 13	-25.7	37.3	49E 01	41E 01	35.2	.11E 00	21E-01	17E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 14	-100.9	62.4	24E 01	40E 00	174.8	.39E-01	12E-02	49E-01	0.0	.00E 00	110.7	29E-01	
STIM 15	-110.9	49.7	10E 02	17E 01	133.1	.12E 00	28E-01	11E 01	0.0	.00E 00	107.6	14E-01	
STIM 16	164.4	70.4	48E 01	37E 01	91.2	.69E-01	84E-02	80E 00	0.0	.00E 00	113.1	45E-01	
STIM 17	-164.4	50.9	74E 01	24E 01	136.0	.55E-01	23E-01	11E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 18	-64.7	53.2	45E 01	15E 01	18.9	.58E-01	11E-01	40E 00	0.0	.00E 00	104.1	43E-01	
STIM 19	-8.7	4.4	12E 01	33E 00	160.8	.14E 00	40E-01	29E 00	0.0	.00E 00	88.0	41E-01	
STIM 20	-22.1	84.1	73E 01	52E 01	165.8	.71E-01	13E-01	14E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 21	4.2	47.9	43E 01	34E 01	5.4	.76E-01	14E-01	97E 00	0.0	.00E 00	98.0	34E-01	
STIM 22	-61.2	50.8	25E 01	17E 01	47.3	.35E-01	79E-02	27E 00	0.0	.00E 00	104.8	39E-01	
STIM 23	-92.4	27.1	24E 01	98E 00	160.8	.88E-01	64E-02	28E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 24	-167.1	21.4	40E 01	27E 01	145.7	.14E 00	28E-01	16E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 25	-82.7	32.0	44E 01	28E 01	114.7	.11E 00	19E-01	12E 01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 26	167.7	51.4	47E 01	19E 01	175.3	.57E-01	12E-01	53E 00	0.0	.00E 00	98.5	40E-01	
STIM 27	92.5	65.0	27E 01	19E 01	50.4	.34E-01	59E-02	24E 00	0.0	.00E 00	101.4	28E-01	
STIM 28	161.2	45.6	31E 01	96E 00	14.7	.21E-01	11E-01	21E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 29	-102.4	21.7	42E 01	30E 00	15.3	.99E-01	43E-02	97E-01	0.0	.00E 00	0.0	00E 00	XXXX
STIM 30	-158.7	36.7	37E 01	16E 01	124.6	.50E-01	16E-01	50E 00	0.0	.00E 00	0.0	00E 00	XXXX
STIM 31	-52.1	1.4	73E 00	45E-01	135.8	.53E 00	54E-02	74E-01	0.0	.00E 00	0.0	00E 00	XXXX

S ERROR=0.05E-01 H ERROR=0.14E-01 L ERROR=0.00E 00 B ERROR=0.38E-01

**** END OF STREAM OPA024 680

V.C. 27 OBS 3,5,7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	RTNESS	SIGR	
STIM	1	5.8	109.8	.58E 01	.36E 01	129.7	.44E-01	.70E-02	.60E 00	0.0	.00E 00	128.8	.39E-01	
STIM	2	185.9	64.2	.56E 01	.13E 01	24.8	.27E-01	.14E-01	.35E 00	0.0	.00E 00	78.2	.36E-01	
STIM	3	6.1	103.5	.57E 01	.33E 01	119.8	.49E-01	.65E-02	.57E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	4	104.7	60.8	.39E 01	.88E 00	15.6	.69E-01	.41E-02	.18E 00	0.0	.00E 00	72.8	.48E-01	
STIM	5	45.7	64.5	.11E 02	.20E 01	145.4	.36E-01	.26E-01	.10E 01	0.0	.00E 00	74.7	.92E-01	
STIM	6	12.8	70.0	.34E 01	.20E 01	120.6	.41E-01	.62E-02	.31E 00	0.0	.00E 00	103.7	.44E-01	
STIM	7	-17.4	92.6	.63E 01	.26E 01	128.7	.63E-01	.59E-02	.55E 00	0.0	.00E 00	127.9	.52E-01	
STIM	8	-31.8	73.9	.62E 01	.18E 01	38.0	.28E-01	.13E-01	.46E 00	0.0	.00E 00	111.8	.49E-01	
STIM	9	41.6	28.1	.45E 01	.30E 01	114.0	.12E 00	.24E-01	.15E 01	0.0	.00E 00	70.0	.66E-01	
STIM	10	12.1	17.0	.18E 01	.13E 01	169.8	.75E-01	.17E-01	.44E 00	0.0	.00E 00	59.6	.62E-01	
STIM	11	-160.4	18.3	.27E 01	.12E 00	0.7	.15E 00	.11E-02	.55E-01	0.0	.00E 00	51.2	.51E-01	
STIM	12	5.8	37.8	.34E 01	.24E 01	105.5	.87E-01	.11E-01	.69E 00	0.0	.00E 00	70.7	.59E-01	
STIM	13	-14.9	36.6	.29E 01	.24E 01	69.7	.74E-01	.11E-01	.58E 00	0.0	.00E 00	72.7	.52E-01	
STIM	14	-100.8	76.1	.40E 01	.32E 00	175.3	.57E-01	.11E-02	.58E-01	0.0	.00E 00	55.6	.54E-01	
STIM	15	-100.8	54.4	.11E 02	.22E 01	137.3	.13E 00	.25E-01	.14E 01	0.0	.00E 00	86.6	.80E-01	
STIM	16	106.1	60.1	.52E 01	.23E 01	170.2	.37E-01	.12E-01	.55E 00	0.0	.00E 00	86.2	.60E-01	
STIM	17	-156.5	52.9	.10E 02	.21E 01	138.7	.40E-01	.30E-01	.13E 01	0.0	.00E 00	78.7	.56E-01	
STIM	18	-30.6	55.9	.83E 01	.95E 00	51.1	.61E-01	.22E-01	.44E 00	0.0	.00E 00	82.3	.62E-01	
STIM	19	-6.3	5.5	.12E 01	.34E 00	97.0	.21E 00	.98E-02	.22E 00	0.0	.00E 00	59.6	.67E-01	
STIM	20	-19.8	70.5	.58E 01	.17E 01	173.0	.37E-01	.11E-01	.40E 00	0.0	.00E 00	101.2	.57E-01	
STIM	21	13.2	50.7	.43E 01	.19E 01	77.1	.84E-01	.61E-02	.51E 00	0.0	.00E 00	76.1	.49E-01	
STIM	22	-41.8	50.1	.70E 01	.19E 01	37.9	.37E-01	.22E-01	.82E 00	0.0	.00E 00	85.2	.45E-01	
STIM	23	-67.1	46.2	.38E 01	.84E 00	5.3	.94E-01	.39E-02	.25E 00	0.0	.00E 00	72.0	.45E-01	
STIM	24	-106.2	32.3	.41E 01	.29E 01	75.4	.13E 00	.15E-01	.12E 01	0.0	.00E 00	69.5	.63E-01	
STIM	25	-73.7	28.9	.33E 01	.15E 01	21.3	.89E-01	.14E-01	.53E 00	0.0	.00E 00	66.6	.42E-01	
STIM	26	168.1	51.8	.69E 01	.13E 01	43.8	.42E-01	.21E-01	.54E 00	0.0	.00E 00	71.8	.45E-01	
STIM	27	64.8	64.9	.41E 01	.11E 01	171.5	.61E-01	.35E-02	.21E 00	0.0	.00E 00	74.6	.59E-01	
STIM	28	185.4	52.4	.36E 01	.26E 01	23.5	.51E-01	.11E-01	.57E 00	0.0	.00E 00	72.6	.63E-01	
STIM	29	-106.5	28.9	.20E 01	.34E 00	3.0	.68E-01	.19E-02	.72E-01	0.0	.00E 00	78.2	.95E-01	
STIM	30	-164.9	43.9	.49E 01	.38E 01	159.6	.88E-01	.17E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM	31	-58.5	1.3	.81E 00	.56E 00	71.6	.46E 00	.94E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.85E-01 H ERROR=0.15E-01 L ERROR=0.00E 00 R ERROR=0.57E-01

**** END OF STREAM 00A024 028

V.C. 27 OBS 1,2,3,4,5,6,7

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	RTNESS	SIGR	
STIM	1	9.2	111.3	.42E+01	.37E+01	126.2	.36E-01	.57E-02	.44E+00	0.00		162.8	.35E-01	
STIM	2	185.8	44.5	.29E+01	.21E+01	30.5	.35E-01	.67E-02	.28E+00	0.00		100.2	.24E-01	
STIM	3	11.7	103.9	.44E+01	.32E+01	151.6	.32E-01	.65E-02	.42E+00	0.00		0.00		XXXX
STIM	4	106.7	56.6	.28E+01	.23E+01	42.3	.45E-01	.73E-02	.36E+00	0.00		0.00		XXXX
STIM	5	56.1	62.7	.52E+01	.18E+01	142.8	.34E-01	.13E-01	.47E+00	0.00		105.5	.40E-01	
STIM	6	16.3	61.8	.33E+01	.17E+01	153.0	.27E-01	.58E-02	.19E+00	0.00		132.8	.36E-01	
STIM	7	-19.2	94.3	.39E+01	.21E+01	107.0	.41E-01	.36E-02	.26E+00	0.00		0.00		XXXX
STIM	8	-34.6	71.1	.48E+01	.28E+01	17.2	.40E-01	.80E-02	.40E+00	0.00		137.8	.38E-01	
STIM	9	40.8	26.9	.93E+01	.21E+01	82.2	.87E-01	.13E-01	.58E+00	0.00		0.00		XXXX
STIM	10	27.3	15.3	.17E+01	.16E+01	30.0	.11E+00	.17E-01	.56E+00	0.00		91.5	.42E-01	
STIM	11	-97.2	15.1	.13E+01	.83E+00	170.6	.86E-01	.87E-02	.23E+00	0.00		0.00		XXXX
STIM	12	-.6	33.1	.44E+01	.23E+01	56.7	.12E+00	.15E-01	.95E+00	0.00		0.00		XXXX
STIM	13	-18.3	31.6	.29E+01	.21E+01	33.0	.68E-01	.12E-01	.53E+00	0.00		0.00		XXXX
STIM	14	-188.0	64.0	.29E+01	.56E+00	.3	.31E-01	.14E-02	.53E-01	0.00		121.6	.34E-01	
STIM	15	-145.2	53.2	.44E+01	.13E+01	139.7	.61E-01	.07E-02	.34E+00	0.00		113.4	.39E-01	
STIM	16	194.1	76.5	.27E+01	.23E+01	134.7	.36E-01	.56E-02	.28E+00	0.00		115.7	.34E-01	
STIM	17	-165.7	51.8	.46E+01	.17E+01	136.5	.36E-01	.14E-01	.48E+00	0.00		0.00		XXXX
STIM	18	-39.8	49.7	.45E+01	.14E+01	43.1	.31E-01	.14E-01	.42E+00	0.00		[illegible]	.33E-01	
STIM	19	-6.1	4.4	.73E+00	.53E+00	1.3	.12E+00	.26E-01	.28E+00	0.00		[illegible]	.48E-01	
STIM	20	-18.9	71.2	.35E+01	.24E+01	160.7	.37E-01	.74E-02	.36E+00	0.00		0.00		XXXX
STIM	21	18.9	44.5	.25E+01	.20E+01	61.1	.88E-01	.72E-02	.35E+00	0.00		103.5	.27E-01	
STIM	22	-49.1	45.5	.30E+01	.13E+01	35.8	.31E-01	.19E-01	.28E+00	0.00		112.3	.29E-01	
STIM	23	-95.2	31.2	.22E+01	.67E+00	1.8	.69E-01	.36E-02	.15E+00	0.00		0.00		XXXX
STIM	24	-198.1	24.1	.25E+01	.18E+01	76.8	.18E+00	.12E-01	.61E+00	0.00		0.00		XXXX
STIM	25	-77.8	27.0	.21E+01	.18E+01	175.7	.77E-01	.11E-01	.45E+00	0.00		0.00		XXXX
STIM	26	158.6	58.3	.39E+01	.27E+01	47.1	.54E-01	.12E-01	.66E+00	0.00		98.3	.27E-01	
STIM	27	95.9	63.8	.25E+01	.17E+01	157.6	.37E-01	.48E-02	.21E+00	0.00		101.8	.29E-01	
STIM	28	184.6	47.9	.21E+01	.16E+01	29.0	.34E-01	.78E-02	.22E+00	0.00		0.00		XXXX
STIM	29	-140.2	23.5	.13E+01	.47E+00	3.9	.67E-01	.32E-02	.85E-01	0.00		0.00		XXXX
STIM	30	-167.2	37.4	.31E+01	.17E+01	144.2	.46E-01	.13E-01	.45E+00	0.00		0.00		XXXX
STIM	31	-57.3	1.1	.41E+00	.25E+00	133.9	.36E+00	.36E-01	.29E+00	0.00		0.00		XXXX

S ERROR= .88E-01 H ERROR= .12E-01 L ERROR=0. R ERROR= .34E-01

UNIT: 0   OPP212   DATE: 26/06/78   TIME: 15/00.12

V.C. 28   OBS 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	8.4	163.2	.48E 01	.25E 01	25.6	.21E-01	.41E-02	.23E 00	0.0	.00E 00	156.7	.77E-01	
SUBJ 1 STIM 2	186.5	91.6	.48E 01	.13E 01	126.1	.48E-01	.40E-02	.22E 00	0.0	.00E 00	146.7	.82E-01	
SUBJ 1 STIM 3	11.7	154.9	.41E 01	.29E 01	166.5	.19E-01	.42E-02	.24E 00	0.0	.00E 00	156.7	.21E-01	
SUBJ 1 STIM 4	98.8	73.0	.62E 01	.23E 01	134.7	.63E-01	.10E-01	.61E 00	0.0	.00E 00	155.0	.81E-01	
SUBJ 1 STIM 5	81.6	116.6	.73E 01	.30E 01	21.7	.62E-01	.41E-02	.58E 00	0.0	.00E 00	146.7	.16E 00	
SUBJ 1 STIM 6	8.2	96.6	.50E 01	.79E 00	103.9	.45E-01	.43E-02	.13E 00	0.0	.00E 00	156.7	.21E-01	
SUBJ 1 STIM 7	-20.0	116.7	.86E 01	.55E-06	108.0	.73E-01	.77E-07	.13E-06	0.0	.00E 00	156.7	.21E-01	
SUBJ 1 STIM 8	-55.2	108.0	.15E 02	.35E 01	43.8	.35E-01	.21E-01	.15E 01	0.0	.00E 00	165.0	.46E-01	
SUBJ 1 STIM 9	26.8	41.1	.65E 01	.24E 00	114.0	.11E 00	.19E-01	.12E 00	0.0	.00E 00	146.7	.23E-01	
SUBJ 1 STIM 10	-11.0	15.1	.52E 01	.34E 01	112.0	.34E 00	.37E-01	.37E 01	0.0	.00E 00	151.7	.48E-01	
SUBJ 1 STIM 11	-85.5	10.6	.23E 01	.37E 00	169.1	.22E 00	.57E-02	.26E 00	0.0	.00E 00	160.0	.18E-01	
SUBJ 1 STIM 12	-10.0	43.3	.16E-06	.17E 01	9.0	.39E-01	.16E-06	.19E-05	0.0	.00E 00	153.3	.22E-01	
SUBJ 1 STIM 13	-53.7	30.9	.12E 02	.14E 01	45.4	.48E-01	.60E-01	.17E 01	0.0	.00E 00	155.0	.49E-01	
SUBJ 1 STIM 14	-140.0	93.3	.12E-02	.53E-09	180.0	.13E-04	.36E-11	.22E-13	0.0	.00E 00	210.0	.48E-01	
SUBJ 1 STIM 15	-117.3	85.7	.10E 02	.42E 01	80.9	.66E-01	.18E-01	.16E 01	0.0	.00E 00	103.3	.34E-01	
SUBJ 1 STIM 16	100.3	91.5	.68E 01	.26E 01	70.4	.66E-01	.69E-02	.61E 00	0.0	.00E 00	158.3	.11E-01	
SUBJ 1 STIM 17	-176.1	94.7	.92E 01	.90E 00	33.6	.79E-01	.89E-02	.27E 00	0.0	.00E 00	160.0	.53E-01	
SUBJ 1 STIM 18	-35.3	70.5	.71E 01	.36E 01	174.9	.64E-01	.12E-01	.10E 01	0.0	.00E 00	158.3	.11E-01	
SUBJ 1 STIM 19	-46.1	2.7	.12E 01	.65E 00	145.8	.41E 00	.40E-01	.86E 00	0.0	.00E 00	156.7	.21E-01	
SUBJ 1 STIM 20	-13.2	101.6	.51E 01	.81E 00	70.3	.43E-01	.43E-02	.13E 00	0.0	.00E 00	153.3	.43E-01	
SUBJ 1 STIM 21	4.3	58.2	.77E 01	.61E 00	96.0	.13E 00	.70E-02	.25E 00	0.0	.00E 00	163.3	.27E-01	
SUBJ 1 STIM 22	-76.9	81.5	.57E 01	.20E 01	20.8	.55E-01	.80E-02	.44E 00	0.0	.00E 00	163.3	.20E-01	
SUBJ 1 STIM 23	-86.7	20.0	.29E 01	.52E 00	166.4	.14E 00	.42E-02	.24E 00	0.0	.00E 00	163.3	.54E-01	
SUBJ 1 STIM 24	-108.8	34.7	.58E 01	.31E 01	91.0	.17E 00	.14E-01	.16E 01	0.0	.00E 00	158.3	.38E-01	
SUBJ 1 STIM 25	-80.0	43.3	.32E 01	.28E-06	162.0	.73E-01	.11E-06	.66E-05	0.0	.00E 00	176.7	.50E-01	
SUBJ 1 STIM 26	133.1	70.8	.79E 01	.36E 01	121.1	.96E-01	.81E-02	.11E 01	0.0	.00E 00	178.3	.16E 00	
SUBJ 1 STIM 27	110.0	91.5	.43E 01	.32E 01	81.0	.35E-01	.75E-02	.48E 00	0.0	.00E 00	155.0	.49E-01	
SUBJ 1 STIM 28	180.6	68.2	.78E 01	.65E 00	85.4	.11E 00	.70E-02	.24E 00	0.0	.00E 00	155.0	.32E-01	
SUBJ 1 STIM 29	-81.9	4.3	.67E 00	.11E 00	167.7	.15E 00	.45E-02	.55E-01	0.0	.00E 00	160.0	.54E-01	
SUBJ 1 STIM 30	-180.1	66.1	.12E 02	.58E 01	59.7	.18E 00	.14E-01	.33E 01	0.0	.00E 00	100.0	.30E-01	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.06E-01   H ERROR=0.11E-01   L ERROR=0.00E 00   B ERROR=0.47E-01

V.C. 28   OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	6.9	123.0	.72E 01	.53E 01	114.0	.55E-01	.75E-02	.97E 00	0.0	.00E 00	102.1	.48E-01	
STIM 2	180.8	64.6	.43E 01	.27E 01	111.5	.65E-01	.69E-02	.56E 00	0.0	.00E 00	80.4	.41E-01	
STIM 3	2.9	119.3	.86E 01	.67E 01	123.3	.65E-01	.10E-01	.15E 01	0.0	.00E 00	103.8	.51E-01	
STIM 4	108.6	40.1	.70E 01	.43E 01	62.1	.12E 00	.27E-01	.24E 01	0.0	.00E 00	91.5	.18E-01	
STIM 5	59.3	65.1	.66E 01	.28E 01	130.1	.48E-01	.16E-01	.91E 00	0.0	.00E 00	88.6	.48E-01	
STIM 6	24.9	64.9	.66E 01	.30E 01	16.8	.74E-01	.13E-01	.96E 00	0.0	.00E 00	84.6	.34E-01	
STIM 7	-22.2	98.8	.93E 01	.43E 01	107.8	.94E-01	.70E-02	.13E 01	0.0	.00E 00	107.4	.52E-01	
STIM 8	-45.7	69.0	.60E 01	.38E 01	22.3	.60E-01	.13E-01	.10E 01	0.0	.00E 00	103.1	.28E-01	
STIM 9	41.9	27.0	.59E 01	.28E 01	6.0	.17E 00	.28E-01	.19E 01	0.0	.00E 00	87.8	.21E-01	
STIM 10	5.4	7.1	.44E 01	.17E 01	126.6	.30E 00	.46E-01	.19E 01	0.0	.00E 00	88.6	.23E-01	
STIM 11	-100.8	13.3	.21E 01	.84E 00	17.6	.13E 00	.12E-01	.42E 00	0.0	.00E 00	74.9	.34E-01	
STIM 12	-2.6	28.7	.41E 01	.23E 01	35.7	.10E 00	.20E-01	.10E 01	0.0	.00E 00	86.8	.27E-01	
STIM 13	-52.9	23.3	.34E 01	.12E 01	37.3	.55E-01	.23E-01	.53E 00	0.0	.00E 00	80.1	.22E-01	
STIM 14	-140.0	66.0	.14E-08	.16E-02	90.0	.25E-04	.97E-10	.11E-12	0.0	.00E 00	107.0	.26E-01	
STIM 15	-107.3	51.1	.36E 01	.28E 01	36.3	.65E-01	.95E-02	.63E 00	0.0	.00E 00	98.8	.24E-01	
STIM 16	103.6	73.9	.82E 01	.22E 01	96.3	.11E 00	.47E-02	.75E 00	0.0	.00E 00	97.1	.30E-01	
STIM 17	-168.2	62.3	.78E 01	.17E 01	152.7	.28E-01	.20E-01	.68E 00	0.0	.00E 00	97.2	.25E-01	
STIM 18	-42.8	50.4	.34E 01	.23E 01	30.6	.46E-01	.11E-01	.48E 00	0.0	.00E 00	91.7	.18E-01	
STIM 19	-67.1	2.8	.16E 01	.64E 00	3.8	.48E 00	.57E-01	.11E 01	0.0	.00E 00	94.6	.35E-01	
STIM 20	-7.9	67.1	.46E 01	.31E 01	172.7	.50E-01	.11E-01	.66E 00	0.0	.00E 00	90.4	.31E-01	
STIM 21	6.8	37.9	.34E 01	.27E 01	14.3	.73E-01	.14E-01	.76E 00	0.0	.00E 00	92.1	.13E-01	
STIM 22	-48.1	49.4	.56E 01	.21E 01	45.8	.45E-01	.18E-01	.76E 00	0.0	.00E 00	93.6	.16E-01	
STIM 23	-90.3	26.8	.37E 01	.12E 01	11.3	.13E 00	.99E-02	.50E 00	0.0	.00E 00	91.8	.20E-01	
STIM 24	-165.2	23.9	.43E 01	.26E 01	162.8	.11E 00	.28E-01	.15E 01	0.0	.00E 00	87.4	.35E-01	
STIM 25	-70.2	22.7	.37E 01	.15E 01	5.5	.14E 00	.17E-01	.80E 00	0.0	.00E 00	89.6	.34E-01	
STIM 26	181.3	49.4	.23E 01	.14E 01	95.3	.47E-01	.47E-02	.21E 00	0.0	.00E 00	84.1	.35E-01	
STIM 27	89.1	58.3	.63E 01	.42E 01	79.9	.77E-01	.17E-01	.14E 01	0.0	.00E 00	88.8	.19E-01	
STIM 28	180.3	42.6	.31E 01	.12E 01	115.4	.72E-01	.48E-02	.28E 00	0.0	.00E 00	86.8	.28E-01	
STIM 29	-60.4	12.9	.35E 01	.83E 00	166.1	.24E 00	.11E-01	.63E 00	0.0	.00E 00	90.6	.16E-01	
STIM 30	-155.7	46.3	.42E 01	.35E 01	100.5	.82E-01	.14E-01	.99E 00	0.0	.00E 00	90.8	.36E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.10E 00   H ERROR=0.15E-01   L ERROR=0.00E 00   B ERROR=0.30E-01

V.C.28 OBS 3.5.7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB
STIM 1	5.1	91.9	.21E 01	.12E 01	37.7	.18E-01	.30E-02	.84E-01	0.0	.00E 00	83.7	.38E-01
STIM 2	161.0	63.3	.18E 01	.74E 00	163.2	.16E-01	.42E-02	.66E-01	0.0	.00E 00	80.1	.27E-01
STIM 3	4.1	89.3	.31E 01	.16E 01	22.2	.22E-01	.52E-02	.17E 00	0.0	.00E 00	90.3	.41E-01
STIM 4	103.3	64.1	.56E 01	.22E 01	11.0	.82E-01	.61E-02	.59E 00	0.0	.00E 00	85.6	.36E-01
STIM 5	87.0	72.1	.40E 01	.17E 01	10.8	.55E-01	.39E-02	.29E 00	0.0	.00E 00	83.8	.41E-01
STIM 6	14.3	61.7	.27E 01	.12E 01	35.4	.35E-01	.52E-02	.16E 00	0.0	.00E 00	87.5	.15E-01
STIM 7	-5.4	76.6	.36E 01	.28E 01	69.3	.48E-01	.58E-02	.41E 00	0.0	.00E 00	90.6	.29E-01
STIM 8	-36.8	65.1	.72E 01	.19E 01	26.4	.32E-01	.17E-01	.65E 00	0.0	.00E 00	91.8	.17E-01
STIM 9	22.6	26.2	.48E 01	.29E 01	90.4	.17E 00	.19E-01	.17E 01	0.0	.00E 00	86.2	.15E-01
STIM 10	0.1	12.3	.26E 01	.21E 01	152.5	.18E 00	.33E-01	.14E 01	0.0	.00E 00	83.5	.20E-01
STIM 11	-106.9	35.4	.54E 01	.32E 01	19.7	.15E 00	.15E-01	.16E 01	0.0	.00E 00	80.0	.32E-01
STIM 12	-3.0	40.1	.29E 01	.20E 01	73.6	.67E-01	.89E-02	.46E 00	0.0	.00E 00	85.9	.14E-01
STIM 13	-92.1	21.8	.44E 01	.35E 01	45.3	.16E 00	.32E-01	.22E 01	0.0	.00E 00	84.3	.22E-01
STIM 14	-100.0	66.4	.11E-03	.14E-09	180.0	.17E-05	.55E-12	.72E-15	0.0	.00E 00	105.6	.17E-01
STIM 15	-108.3	64.1	.33E 01	.18E 01	104.2	.29E-01	.81E-02	.29E 00	0.0	.00E 00	102.0	.14E-01
STIM 16	105.6	64.5	.18E 01	.13E 01	17.1	.20E-01	.42E-02	.11E 00	0.0	.00E 00	92.2	.24E-01
STIM 17	-180.4	62.2	.51E 01	.21E 01	179.0	.40E-01	.13E-01	.53E 00	0.0	.00E 00	98.7	.16E-01
STIM 18	-20.7	58.2	.39E 01	.12E 01	31.6	.22E-01	.11E-01	.26E 00	0.0	.00E 00	80.1	.85E-02
STIM 19	-81.0	4.0	.15E 01	.77E 00	17.0	.22E 00	.28E-01	.59E 00	0.0	.00E 00	88.8	.10E-01
STIM 20	-14.8	65.3	.33E 01	.18E 01	31.2	.30E-01	.78E-02	.28E 00	0.0	.00E 00	87.7	.17E-01
STIM 21	3.1	43.6	.35E 01	.23E 01	30.1	.61E-01	.12E-01	.57E 00	0.0	.00E 00	83.8	.26E-01
STIM 22	-60.2	55.8	.76E 01	.77E 00	43.6	.29E-01	.21E-01	.33E 00	0.0	.00E 00	93.5	.17E-01
STIM 23	-64.8	44.6	.55E 01	.11E 01	2.2	.12E 00	.45E-02	.41E 00	0.0	.00E 00	92.1	.18E-01
STIM 24	-175.8	30.4	.33E 01	.33E 01	16.8	.14E 00	.24E-01	.18E 01	0.0	.00E 00	88.7	.18E-01
STIM 25	-70.3	39.8	.34E 01	.22E 01	59.4	.57E-01	.13E-01	.59E 00	0.0	.00E 00	87.4	.38E-01
STIM 26	185.4	60.4	.32E 01	.16E 01	81.2	.51E-01	.51E-02	.28E 00	0.0	.00E 00	83.5	.45E-01
STIM 27	184.0	70.6	.54E 01	.19E 01	9.4	.75E-01	.50E-02	.46E 00	0.0	.00E 00	86.1	.17E-01
STIM 28	104.2	52.6	.37E 01	.22E 01	12.0	.43E-01	.11E-01	.49E 00	0.0	.00E 00	87.5	.16E-01
STIM 29	-113.0	27.1	.60E 01	.24E 01	30.0	.21E 00	.17E-01	.17E 01	0.0	.00E 00	90.1	.25E-01
STIM 30	-156.4	49.6	.70E 01	.24E 01	127.0	.57E-01	.22E-01	.11E 01	0.0	.00E 00	94.9	.26E-01
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00 XXXX

S ERROR=0.72E-01   H ERROR=0.12E-01   L ERROR=0.00E 00   B ERROR=0.23E-01

**** END OF STREAM 0P0212   1214

V.C.28 OBS 1,2,3,4,5,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB
STIM 1	5.8	67.6	.40E 01	.23E 01	84.1	.41E-01	.38E-02	.31E 00	0.0	.00E 00	91.0	.20E-01
STIM 2	184.8	61.7	.27E 01	.14E 01	145.9	.35E-01	.55E-02	.19E 00	0.0	.00E 00	90.2	.14E-01
STIM 3	9.1	64.4	.45E 01	.33E 01	56.6	.46E-01	.60E-02	.50E 00	0.0	.00E 00	89.7	.21E-01
STIM 4	108.2	46.2	.44E 01	.25E 01	26.0	.85E-01	.11E-01	.74E 00	0.0	.00E 00	88.9	.11E-01
STIM 5	67.3	64.2	.45E 01	.27E 01	120.9	.42E-01	.11E-01	.58E 00	0.0	.00E 00	87.2	.17E-01
STIM 6	16.7	57.4	.38E 01	.26E 01	24.3	.54E-01	.92E-02	.53E 00	-0.0	.00E 00	87.8	.12E-01
STIM 7	-18.0	82.9	.43E 01	.23E 01	116.3	.51E-01	.45E-02	.37E 00	0.0	.00E 00	95.3	.16E-01
STIM 8	-34.9	60.7	.36E 01	.20E 01	20.3	.35E-01	.93E-02	.38E 00	0.0	.00E 00	93.9	.10E-01
STIM 9	37.4	21.2	.28E 01	.21E 01	3.2	.10E 00	.18E-01	.80E 00	0.0	.00E 00	86.7	.89E-02
STIM 10	26.6	8.2	.14E 01	.12E 01	140.0	.15E 00	.26E-01	.65E 00	0.0	.00E 00	87.5	.89E-02
STIM 11	-103.2	24.1	.27E 01	.13E 01	15.3	.11E 00	.94E-02	.46E 00	0.0	.00E 00	90.4	.17E-01
STIM 12	-11.9	31.9	.23E 01	.20E 01	172.1	.64E-01	.11E-01	.46E 00	0.0	.00E 00	88.4	.94E-02
STIM 13	-92.7	22.8	.21E 01	.16E 01	30.5	.71E-01	.14E-01	.45E 00	0.0	.00E 00	80.3	.80E-02
STIM 14	-100.0	61.0	.86E-03	.11E-08	180.0	.14E-04	.47E-11	.50E-13	0.0	.00E 00	90.7	.11E-01
STIM 15	-109.9	56.2	.27E 01	.19E 01	85.9	.34E-01	.75E-02	.28E 00	0.0	.00E 00	98.9	.11E-01
STIM 16	106.8	69.0	.35E 01	.21E 01	101.9	.50E-01	.49E-02	.33E 00	0.0	.00E 00	97.3	.91E-02
STIM 17	-174.3	57.9	.38E 01	.16E 01	162.3	.29E-01	.10E-01	.34E 00	0.0	.00E 00	94.1	.11E-01
STIM 18	-33.4	40.2	.27E 01	.18E 01	43.4	.38E-01	.85E-02	.31E 00	0.0	.00E 00	90.8	.67E-02
STIM 19	-65.1	4.5	.10E 01	.54E 00	9.2	.19E 00	.28E-01	.39E 00	0.0	.00E 00	90.4	.11E-01
STIM 20	-14.8	63.5	.23E 01	.22E 01	21.9	.34E-01	.58E-02	.25E 00	0.0	.00E 00	92.3	.10E-01
STIM 21	2.4	36.0	.20E 01	.19E 01	71.5	.55E-01	.83E-02	.32E 00	0.0	.00E 00	88.6	.96E-02
STIM 22	-53.4	46.8	.34E 01	.13E 01	44.1	.28E-01	.11E-01	.29E 00	0.0	.00E 00	92.8	.78E-02
STIM 23	-63.3	34.4	.26E 01	.80E 00	4.8	.71E-01	.41E-02	.18E 00	0.0	.00E 00	91.6	.10E-01
STIM 24	-170.2	27.4	.25E 01	.22E 01	6.9	.84E-01	.14E-01	.64E 00	0.0	.00E 00	80.7	.10E-01
STIM 25	-70.6	25.3	.28E 01	.14E 01	7.6	.92E-01	.12E-01	.46E 00	0.0	.00E 00	80.7	.14E-01
STIM 26	172.2	50.5	.37E 01	.21E 01	34.9	.42E-01	.11E-01	.47E 00	0.0	.00E 00	87.5	.17E-01
STIM 27	65.0	63.4	.32E 01	.31E 01	83.7	.48E-01	.80E-02	.49E 00	0.0	.00E 00	88.4	.72E-02
STIM 28	162.9	43.5	.21E 01	.16E 01	1.7	.37E-01	.77E-02	.24E 00	0.0	.00E 00	80.1	.11E-01
STIM 29	-153.5	21.3	.26E 01	.13E 01	24.0	.12E 00	.12E-01	.51E 00	0.0	.00E 00	90.4	.10E-01
STIM 30	-158.1	43.9	.35E 01	.10E 01	122.5	.48E-01	.12E-01	.46E 00	0.0	.00E 00	93.4	.12E-01
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00 XXXX

S ERROR=0.61E-01   H ERROR=0.08E-02   L ERROR=0.00E 00   B ERROR=0.12E-01

V.C. 29 OBS 2

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	18.4	123.2	.40E 01	.22E 01	31.3	.27E-01	.41E-02	.23E 00	0.0	.00E 00	164.7	.23E-01	
SUBJ 1 STIM 2	184.9	61.5	.32E 01	.65E 00	165.0	.27E-01	.73E-02	.11E 00	71.7	.23E-01	0.0	.00E 00	
SUBJ 1 STIM 3	8.6	114.6	.93E 01	.82E 00	65.4	.76E-01	.38E-02	.20E 00	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 4	156.9	42.9	.46E 01	.14E 01	55.4	.36E-01	.17E-01	.49E 00	60.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 5	43.1	62.1	.92E 01	.37E 01	132.8	.63E-01	.23E-01	.17E 01	71.7	.84E-01	0.0	.00E 00	
SUBJ 1 STIM 6	5.5	70.1	.18E 02	.29E 01	170.6	.41E-01	.36E-01	.21E 01	91.7	.18E-01	0.0	.00E 00	
SUBJ 1 STIM 7	-8.3	106.6	.88E 01	.28E 01	104.3	.83E-01	.42E-02	.73E 00	0.0	.00E 00	131.7	.10E 00	
SUBJ 1 STIM 8	-76.4	55.5	.38E 02	.23E 01	74.0	.75E-01	.10E 00	.49E 01	70.0	.82E-01	0.0	.00E 00	
SUBJ 1 STIM 9	41.9	35.9	.13E 02	.14E 01	144.9	.42E-01	.56E-01	.15E 01	66.7	.36E-01	0.0	.00E 00	
SUBJ 1 STIM 10	51.8	23.1	.16E 02	.42E 01	170.5	.45E 00	.90E-01	.95E 01	31.7	.14E 00	0.0	.00E 00	
SUBJ 1 STIM 11	-147.2	33.7	.15E 02	.20E 01	133.5	.61E-01	.71E-01	.29E 01	45.0	.64E-01	0.0	.00E 00	
SUBJ 1 STIM 12	5.1	33.3	.28E 02	.26E 01	165.0	.17E 00	.13E 00	.68E 01	56.7	.59E-01	0.0	.00E 00	
SUBJ 1 STIM 13	-32.6	39.9	.86E 01	.13E 01	41.9	.57E-01	.33E-01	.89E 00	68.3	.34E-01	0.0	.00E 00	
SUBJ 1 STIM 14	-101.7	70.8	.29E-03	.42E 01	180.0	.14E-02	.83E-02	.47E-06	90.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 15	-110.0	71.5	.32E 01	.17E 01	90.0	.24E-01	.71E-02	.24E 00	81.7	.20E-01	0.0	.00E 00	
SUBJ 1 STIM 16	138.4	75.0	.34E 01	.78E 00	68.8	.39E-01	.40E-02	.11E 00	86.7	.38E-01	0.0	.00E 00	
SUBJ 1 STIM 17	-173.2	77.5	.83E 01	.14E 01	158.6	.19E-01	.17E-01	.48E 00	81.7	.74E-01	0.0	.00E 00	
SUBJ 1 STIM 18	-56.0	52.3	.75E 01	.12E 01	51.1	.23E-01	.23E-01	.54E 00	60.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 19	80.3	10.2	.84E 01	.15E 01	17.4	.83E 00	.27E-01	.40E 01	21.7	.77E-01	0.0	.00E 00	
SUBJ 1 STIM 20	-8.3	80.6	.96E 01	.28E 01	8.6	.35E-01	.19E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1 STIM 21	33.2	61.5	.33E 01	.13E 01	130.0	.28E-01	.82E-02	.23E 00	66.7	.50E-01	0.0	.00E 00	
SUBJ 1 STIM 22	-63.3	40.9	.66E-04	.26E 01	148.5	.14E-02	.84E-02	.11E-06	50.0	.12E 00	0.0	.00E 00	
SUBJ 1 STIM 23	-133.1	41.2	.20E 02	.10E 01	143.0	.20E 00	.71E-01	.16E 01	46.7	.36E-01	0.0	.00E 00	
SUBJ 1 STIM 24	178.2	47.6	.73E 01	.10E 01	60.1	.10E 00	.19E-01	.49E 00	53.3	.62E-01	0.0	.00E 00	
SUBJ 1 STIM 25	-85.4	34.7	.43E 01	.99E 00	120.4	.88E-01	.15E-01	.38E 00	40.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 26	175.5	36.4	.79E 01	.14E 01	91.9	.20E 00	.13E-01	.96E 00	43.3	.19E 00	0.0	.00E 00	
SUBJ 1 STIM 27	82.1	47.9	.47E 01	.53E 00	128.4	.39E-01	.15E-01	.16E 00	50.0	.10E 00	0.0	.00E 00	
SUBJ 1 STIM 28	131.6	61.6	.20E 01	.11E 01	148.7	.27E-01	.41E-02	.32E 00	55.0	.52E-01	0.0	.00E 00	
SUBJ 1 STIM 29	-114.8	43.1	.44E 01	.35E 01	8.1	.10E 00	.13E-01	.11E 01	43.3	.77E-01	0.0	.00E 00	
SUBJ 1 STIM 30	-134.3	57.3	.13E 02	.10E 01	171.4	.28E-01	.35E-01	.74E 00	68.3	.24E-01	0.0	.00E 00	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.97E-01   H ERROR=0.28E-01   L ERROR=0.56E-01   B ERROR=0.63E-01

**** END OF STREAM 00P212 847

U.C. 29 OBS 1,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	2.8	108.0	.81E 01	.36E 01	51.9	.68E-01	.71E-02	.85E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	-168.4	60.7	.94E 01	.30E 01	156.3	.59E-01	.24E-01	.14E 01	67.2	.11E 00	0.0	.00E 00	
STIM 3	7.4	161.9	.65E 01	.29E 01	73.8	.63E-01	.48E-02	.59E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	102.9	40.4	.11E 02	.41E 01	86.7	.10E 00	.42E-01	.34E 01	43.9	.78E-01	0.0	.00E 00	
STIM 5	90.9	64.8	.50E 01	.35E 01	158.9	.54E-01	.12E-01	.84E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	13.7	82.7	.67E 01	.37E 01	9.2	.51E-01	.12E-01	.93E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-1.4	101.6	.89E 01	.60E 01	8.0	.59E-01	.14E-01	.16E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-30.7	56.7	.15E 02	.72E 01	61.8	.18E 00	.37E-01	.60E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	37.5	47.2	.52E 01	.26E 01	135.7	.58E-01	.17E-01	.92E 00	50.0	.53E-01	0.0	.00E 00	
STIM 10	51.0	42.0	.70E 01	.57E 01	147.2	.14E 00	.26E-01	.30E 01	42.2	.74E-01	0.0	.00E 00	
STIM 11	-113.7	38.4	.68E 01	.12E 01	129.0	.85E-01	.25E-01	.68E 00	48.9	.14E 00	0.0	.00E 00	
STIM 12	8.0	45.4	.97E 01	.45E 01	172.6	.10E 00	.34E-01	.30E 01	61.7	.94E-01	0.0	.00E 00	
STIM 13	0.3	42.9	.98E 01	.28E 01	6.2	.70E-01	.36E-01	.20E 01	55.0	.12E 00	0.0	.00E 00	
STIM 14	-100.6	83.2	.34E 01	.13E 01	0.2	.41E-01	.25E-02	.17E 00	79.4	.78E-01	0.0	.00E 00	
STIM 15	-106.6	77.2	.31E 01	.19E 01	103.5	.25E-01	.64E-02	.24E 00	71.7	.84E-01	0.0	.00E 00	
STIM 16	-162.9	71.3	.10E 02	.23E 01	147.6	.69E-01	.21E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-109.7	68.9	.11E 02	.20E 01	134.7	.63E-01	.23E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-45.4	53.1	.60E 01	.18E 01	25.8	.44E-01	.17E-01	.63E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	8.1	13.6	.72E 01	.45E 01	13.4	.39E 00	.76E-01	.75E 01	32.2	.93E-01	0.0	.00E 00	
STIM 20	-5.2	83.1	.47E 01	.27E 01	174.0	.33E-01	.90E-02	.48E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	24.9	57.6	.55E 01	.15E 01	174.1	.37E-01	.15E-01	.44E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	-56.2	53.9	.32E 01	.23E 01	60.7	.44E-01	.94E-02	.44E 00	56.1	.10E 00	0.0	.00E 00	
STIM 23	-108.9	46.6	.76E 01	.22E 01	136.3	.11E 00	.21E-01	.11E 01	52.2	.13E 00	0.0	.00E 00	
STIM 24	-163.3	42.0	.98E 01	.46E 01	164.7	.13E 00	.36E-01	.34E 01	53.9	.82E-01	0.0	.00E 00	
STIM 25	-64.9	44.4	.63E 01	.17E 01	111.7	.12E 00	.14E-01	.77E 00	40.6	.13E 00	0.0	.00E 00	
STIM 26	165.1	46.8	.60E 01	.22E 01	71.1	.11E 00	.13E-01	.88E 00	44.4	.12E 00	0.0	.00E 00	
STIM 27	52.6	51.3	.66E 01	.13E 01	121.6	.36E-01	.21E-01	.54E 00	52.2	.80E-01	0.0	.00E 00	
STIM 28	-106.7	58.2	.78E 01	.34E 01	148.3	.83E-01	.19E-01	.14E 01	56.7	.12E 00	0.0	.00E 00	
STIM 29	-106.1	46.0	.22E 01	.20E 01	158.3	.47E-01	.72E-02	.31E 00	46.7	.99E-01	0.0	.00E 00	
STIM 30	-169.2	56.5	.14E 02	.33E 01	140.3	.75E-01	.37E-01	.25E 01	66.1	.10E 00	0.0	.00E 00	
STIM 31	-100.0	0.4	.10E-06	.10E-06	0.0	.24E-06	.39E-07	.76E-13	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.82E-01   H ERROR=0.21E-01   L ERROR=0.97E-01   B ERROR=0.00E 00

**** END OF STREAM 00P212 1062

V.C. 29 OBS 3.5.7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	6.3	87.9	.65E 01	.12E 01	33.1	.48E-01	.93E-02	.28E 00	0.0	.00E 00	87.9	.43E-01	
STIM 2	-164.2	53.7	.59E 01	.25E 01	3.9	.49E-01	.17E-01	.86E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	1.2	87.7	.48E 01	.12E 01	47.3	.42E-01	.60E-02	.21E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	103.5	29.8	.79E 01	.39E 01	136.9	.26E 00	.36E-01	.49E 01	47.8	.55E-01	0.0	.00E 00	
STIM 5	15.9	54.1	.68E 01	.20E 01	155.6	.44E-01	.20E-01	.79E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	1.5	67.9	.60E 01	.27E 01	173.8	.40E-01	.14E-01	.75E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-10.9	83.8	.39E 01	.20E 01	138.6	.39E-01	.55E-02	.29E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-26.8	55.2	.14E 02	.27E 01	64.2	.17E 00	.31E-01	.21E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	25.6	41.4	.47E 01	.32E 01	140.1	.80E-01	.17E-01	.11E 01	53.9	.43E-01	0.0	.00E 00	
STIM 10	26.3	20.2	.59E 01	.37E 01	153.2	.13E 00	.32E-01	.23E 01	47.2	.88E-01	0.0	.00E 00	
STIM 11	-146.1	30.9	.87E 01	.23E 01	132.4	.77E-01	.45E-01	.21E 01	49.4	.49E-01	0.0	.00E 00	
STIM 12	4.4	44.3	.76E 01	.45E 01	165.5	.10E 00	.27E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	-11.0	42.4	.47E 01	.27E 01	27.6	.69E-01	.17E-01	.93E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-110.2	61.0	.12E 02	.16E 01	130.3	.10E 00	.26E-01	.99E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-125.6	56.8	.13E 02	.26E 01	128.4	.73E-01	.34E-01	.18E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-186.9	50.0	.85E 01	.23E 01	152.1	.55E-01	.22E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-150.7	55.8	.12E 02	.40E 01	129.0	.75E-01	.33E-01	.26E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-32.9	49.3	.51E 01	.27E 01	42.2	.57E-01	.16E-01	.86E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	31.5	11.3	.46E 01	.22E 01	148.6	.19E 00	.64E-01	.28E 01	37.2	.11E 00	0.0	.00E 00	
STIM 20	-7.7	75.2	.34E 01	.11E 01	12.9	.16E-01	.74E-02	.16E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	0.9	50.2	.53E 01	.15E 01	173.3	.30E-01	.17E-01	.49E 00	57.2	.57E-01	0.0	.00E 00	
STIM 22	-37.7	41.8	.54E 01	.21E 01	37.0	.53E-01	.20E-01	.66E 00	50.0	.44E-01	0.0	.00E 00	
STIM 23	-121.8	30.5	.77E 01	.29E 01	138.7	.15E 00	.36E-01	.23E 01	52.2	.10E 00	0.0	.00E 00	
STIM 24	-165.3	30.7	.10E 02	.43E 01	147.2	.14E 00	.53E-01	.45E 01	55.6	.41E-01	0.0	.00E 00	
STIM 25	-76.4	20.4	.47E 01	.24E 01	171.3	.23E 00	.20E-01	.18E 01	51.1	.10E 00	0.0	.00E 00	
STIM 26	103.0	26.9	.70E 01	.22E 01	129.0	.22E 00	.25E-01	.18E 01	45.6	.98E-01	0.0	.00E 00	
STIM 27	46.8	37.1	.84E 01	.27E 01	151.1	.87E-01	.35E-01	.19E 01	51.1	.32E-01	0.0	.00E 00	
STIM 28	-108.8	49.4	.57E 01	.20E 01	160.9	.52E-01	.18E-01	.71E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 29	-131.2	37.5	.95E 01	.24E 01	132.6	.88E-01	.39E-01	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-149.2	47.6	.10E 02	.28E 01	135.1	.59E-01	.33E-01	.19E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-140.0	2.2	.35E-10	.21E-06	90.0	.97E-05	.38E-10	.11E-16	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.91E-01   H ERROR=0.25E-01   L ERROR=0.60E-01   B ERROR=0.43E-01

**** END OF STREAM PG6X520 302

V.C. 29 OBS 1,2,3,4,5,6,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	7.8	64.0	.38E 01	.23E 01	47.6	.35E-01	.51E-02	.29E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	-161.9	59.9	.45E 01	.24E 01	163.7	.42E-01	.12E-01	.57E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	5.9	61.6	.31E 01	.24E 01	75.9	.33E-01	.42E-02	.25E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	41.3	35.2	.47E 01	.42E 01	109.9	.12E 00	.21E-01	.17E 01	54.0	.61E-01	0.0	.00E 00	
STIM 5	15.7	60.9	.43E 01	.19E 01	157.3	.31E-01	.11E-01	.43E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	16.3	74.8	.42E 01	.23E 01	166.3	.31E-01	.00E-02	.41E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 7	-3.7	91.3	.36E 01	.30E 01	174.2	.33E-01	.63E-02	.37E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	-15.9	63.2	.72E 01	.30E 01	54.3	.87E-01	.15E-01	.14E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	18.5	48.4	.34E 01	.20E 01	160.0	.44E-01	.11E-01	.45E 00	59.8	.30E-01	0.0	.00E 00	
STIM 10	45.6	37.1	.40E 01	.24E 01	153.8	.74E-01	.17E-01	.80E 00	53.3	.60E-01	0.0	.00E 00	
STIM 11	-130.8	32.4	.39E 01	.15E 01	127.4	.55E-01	.29E-01	.86E 00	52.9	.60E-01	0.0	.00E 00	
STIM 12	8.4	48.7	.46E 01	.26E 01	149.7	.55E-01	.15E-01	.78E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	0.6	47.8	.52E 01	.20E 01	171.0	.46E-01	.19E-01	.76E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-116.4	64.2	.92E 01	.18E 01	127.1	.60E-01	.21E-01	.80E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-128.9	67.3	.86E 01	.19E 01	124.6	.40E-01	.22E-01	.81E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-101.2	66.5	.57E 01	.19E 01	151.4	.41E-01	.13E-01	.52E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-146.9	67.3	.78E 01	.23E 01	134.6	.49E-01	.19E-01	.90E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	-26.5	50.9	.47E 01	.18E 01	23.5	.35E-01	.15E-01	.51E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	43.7	13.2	.39E 01	.24E 01	174.7	.22E 00	.42E-01	.22E 01	44.8	.77E-01	0.0	.00E 00	
STIM 20	-2.0	60.4	.30E 01	.10E 01	175.2	.24E-01	.58E-02	.22E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	20.1	51.9	.39E 01	.13E 01	166.1	.24E-01	.12E-01	.29E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	-10.3	44.9	.55E 01	.22E 01	8.0	.61E-01	.19E-01	.84E 00	57.9	.62E-01	0.0	.00E 00	
STIM 23	-117.9	34.8	.57E 01	.16E 01	141.1	.10E 00	.22E-01	.84E 00	56.0	.62E-01	0.0	.00E 00	
STIM 24	-178.7	39.0	.63E 01	.25E 01	141.4	.82E-01	.24E-01	.13E 01	60.2	.48E-01	0.0	.00E 00	
STIM 25	-45.2	29.8	.40E 01	.18E 01	138.1	.13E 00	.10E-01	.74E 00	53.8	.79E-01	0.0	.00E 00	
STIM 26	186.4	40.7	.45E 01	.27E 01	120.1	.11E 00	.11E-01	.92E 00	57.4	.73E-01	0.0	.00E 00	
STIM 27	40.4	44.0	.44E 01	.26E 01	150.8	.62E-01	.15E-01	.80E 00	57.1	.46E-01	0.0	.00E 00	
STIM 28	-116.3	54.6	.38E 01	.24E 01	152.4	.49E-01	.10E-01	.53E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 29	-120.5	36.0	.65E 01	.20E 01	120.3	.51E-01	.26E-01	.10E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-145.9	53.8	.77E 01	.20E 01	136.0	.40E-01	.22E-01	.91E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	-1 8.4	0.9	.69E 00	.27E 00	154.3	.58E 00	.85E-01	.63E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.79E-01   H ERROR=0.18E-01   L ERROR=0.62E-01   B ERROR=0.00E 00

**** END OF STREAM OPP212 084

V.C. 30 OBS 7

VIEWING CONDITION A

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	8.3	40.6	.86E 01	.10E 01	90.9	.16E 00	.13E-01	.10E 01	61.7	.72E-01	0.0	.00E 00	
SUBJ 1	STIM 2	40.0	6.7	.10E 02	.10E-06	18.0	.15E 01	.49E-05	.91E-06	61.7	.11E 00	0.0	.00E 00	
SUBJ 1	STIM 3	10.3	50.3	.12E 02	.87E 00	104.5	.18E 00	.18E-01	.57E 00	65.0	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 4	26.5	33.2	.21E 01	.13E 01	116.5	.49E-01	.86E-02	.25E 00	35.0	.22E 00	0.0	.00E 00	
SUBJ 1	STIM 5	31.8	18.3	.14E 02	.50E 00	63.7	.75E 00	.64E-02	.12E 01	65.0	.17E 00	0.0	.00E 00	
SUBJ 1	STIM 6	40.9	36.0	.81E 01	.20E 01	80.2	.19E 00	.22E-01	.14E 01	55.0	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 7	26.9	47.8	.52E 01	.14E 01	162.2	.32E-01	.17E-01	.49E 00	56.7	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 8	30.4	28.0	.14E 02	.38E 01	65.3	.50E 00	.22E-01	.60E 01	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 9	28.3	10.8	.15E 02	.32E 01	60.9	.75E 00	.26E-01	.74E 01	43.3	.20E 00	0.0	.00E 00	
SUBJ 1	STIM 10	164.8	6.9	.18E 02	.33E 01	47.0	.83E 00	.29E 00	.27E 02	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 11	-40.0	0.0	.10E-06	.10E-06	0.0	.20E-02	.32E-03	.64E-09	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 12	62.6	31.6	.44E 01	.82E 00	40.0	.14E 00	.73E-02	.37E 00	51.7	.85E-01	0.0	.00E 00	
SUBJ 1	STIM 13	31.9	11.6	.14E 02	.50E 01	24.3	.99E 00	.12E 00	.19E 02	33.3	.28E 00	0.0	.00E 00	
SUBJ 1	STIM 14	-130.0	23.3	.25E-06	.23E 02	117.0	.97E 00	.38E-05	.76E-04	20.0	.50E 00	0.0	.00E 00	
SUBJ 1	STIM 15	-133.4	10.8	.12E 02	.21E 01	36.3	.58E 00	.19E-01	.38E 01	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 16	-141.4	23.8	.12E 02	.66E 01	43.0	.50E 00	.44E-01	.10E 02	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 17	-120.0	30.0	.53E 01	.24E-04	18.0	.18E 00	.14E-05	.13E-04	35.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 18	43.6	25.3	.87E 01	.61E 01	50.1	.34E 00	.39E-01	.66E 01	41.7	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 19	20.0	15.0	.40E 01	.13E-04	72.0	.27E 00	.16E-06	.11E-04	33.3	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 20	44.1	38.1	.13E 02	.90E 00	101.6	.22E 00	.43E-01	.10E 01	56.7	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 21	36.1	38.2	.47E 01	.15E 01	78.6	.11E 00	.00E-02	.56E 00	51.7	.65E-01	0.0	.00E 00	
SUBJ 1	STIM 22	48.0	30.1	.13E 02	.30E 01	102.0	.26E 00	.57E-01	.41E 01	43.3	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 23	165.1	6.0	.14E 02	.24E 01	41.0	.14E 01	.24E 00	.18E 02	38.3	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 24	-123.7	26.6	.15E 02	.16E 01	18.7	.55E 00	.10E-01	.27E 01	40.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 25	-131.6	16.5	.18E 02	.12E 01	14.1	.10E 01	.44E-01	.40E 01	33.3	.26E 00	0.0	.00E 00	
SUBJ 1	STIM 26	-125.3	24.9	.78E 01	.39E 00	33.3	.31E 00	.94E-02	.38E 00	46.7	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 27	50.7	17.6	.12E 02	.29E 01	57.3	.66E 00	.35E-01	.60E 01	0.0	.00E 00	0.0	.00E 00	XXXX
SUBJ 1	STIM 28	58.0	8.4	.15E 02	.11E 01	31.4	.18E 01	.37E-01	.59E 01	36.7	.91E-01	0.0	.00E 00	
SUBJ 1	STIM 29	-146.6	20.9	.10E 02	.56E 01	60.2	.44E 00	.51E-01	.84E 01	40.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 30	-141.6	34.1	.10E 02	.53E 01	151.0	.18E 00	.43E-01	.48E 01	30.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.51E 00 H ERROR=0.40E-01 L ERROR=0.14E 00 B ERROR=0.00E 00

V.C. 30 OBS 2,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	20.8	30.3	.64E 01	.21E 01	126.2	.10E 00	.22E-01	.11E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 2	103.1	6.3	.65E 01	.16E 01	12.4	.10E 01	.58E-01	.53E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 3	16.8	45.5	.47E 01	.26E 01	127.0	.78E-01	.14E-01	.84E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 4	50.3	14.4	.49E 01	.34E 01	48.6	.34E 00	.38E-01	.37E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 5	42.9	13.3	.33E 01	.11E 01	53.4	.40E 00	.13E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 6	26.3	20.6	.47E 01	.34E 01	97.6	.15E 00	.20E-01	.17E 01	49.6	.27E 00	0.0	.00E 00	
STIM 7	13.1	42.6	.34E 01	.14E 01	157.7	.36E-01	.13E-01	.36E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 8	18.9	17.7	.65E 01	.20E 01	75.4	.37E 00	.18E-01	.23E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 9	41.9	16.0	.61E 01	.31E 01	59.7	.38E 00	.31E-01	.37E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 10	11.0	6.2	.70E 01	.29E 01	78.1	.11E 01	.73E-01	.10E 02	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 11	-40.0	0.0	.23E 01	.10E-04	34.0	.43E 01	.50E 00	.51E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 12	65.2	10.7	.46E 01	.56E 00	34.0	.43E 00	.90E-02	.76E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 13	42.2	7.9	.56E 01	.17E 01	38.0	.69E 00	.42E-01	.37E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 14	-130.0	4.8	.12E-04	.51E 01	117.0	.75E 00	.30E-05	.27E-04	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 15	-133.2	5.8	.41E 01	.57E 00	33.0	.71E 00	.17E-01	.13E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 16	-132.3	7.8	.60E 01	.26E 01	20.5	.76E 00	.56E-01	.63E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 17	-151.1	0.7	.51E 01	.40E 01	19.7	.51E 00	.69E-01	.67E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 18	30.3	18.9	.61E 01	.24E 01	72.8	.32E 00	.22E-01	.24E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 19	20.0	4.4	.10E-06	.10E-06	0.0	.23E-07	.36E-08	.71E-14	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 20	20.0	20.8	.71E 01	.33E 01	92.2	.23E 00	.21E-01	.25E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	40.5	10.6	.58E 01	.20E 01	60.8	.29E 00	.17E-01	.18E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 22	20.9	13.3	.65E 01	.31E 01	84.2	.46E 00	.44E-01	.48E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 23	108.6	7.2	.59E 01	.24E 01	78.0	.80E 00	.60E-01	.63E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 24	-123.8	7.7	.53E 01	.41E 00	20.2	.69E 00	.88E-02	.88E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 25	-132.4	4.7	.50E 01	.64E 00	17.3	.10E 01	.40E-01	.21E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 26	-118.0	7.0	.42E 01	.78E 00	28.3	.59E 00	.26E-01	.15E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 27	53.6	14.6	.51E 01	.33E 01	37.8	.35E 00	.36E-01	.37E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 28	-166.2	1.2	.55E 01	.68E 00	38.2	.42E 01	.23E 00	.95E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 29	-146.5	6.1	.38E 01	.17E 01	50.2	.62E 00	.45E-01	.33E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 30	-141.7	10.4	.54E 01	.24E 01	33.3	.52E 00	.37E-01	.40E 01	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 31	0.0	2.4	.10E-06	.10E-06	0.0	.42E-07	.67E-08	.13E-13	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.72E 00 H ERROR=0.51E-01 L ERROR=0.27E 00 B ERROR=0.00E 00

V.C. 31 OBS [illegible]

VIEWING CONDITION 4

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	0.0	79.7	.16E 01	.20E-04	81.0	.23E-01	.65E-07	.21E-05	0.0	.00E 00	310.0	.30E-01	
SUBJ 1 STIM 2	-131.2	33.6	.74E 01	.11E 01	146.0	.11E 00	.31E-01	.79E 00	0.0	.00E 00	270.0	.37E-01	
SUBJ 1 STIM 3	3.4	68.1	.57E 01	.14E 01	1.0	.24E-01	.84E-02	.24E 00	0.0	.00E 00	300.0	.38E-01	
SUBJ 1 STIM 4	-3.1	4.8	.89E-05	.10E 01	108.0	.23E-01	.34E-01	.60E-05	0.0	.00E 00	250.0	.60E-01	
SUBJ 1 STIM 5	20.4	37.4	.61E 01	.14E 01	164.8	.30E-01	.26E-01	.73E 00	0.0	.00E 00	266.7	.33E-01	
SUBJ 1 STIM 6	0.7	36.0	.12E 02	.41E 01	176.2	.12E 00	.52E-01	.43E 01	0.0	.00E 00	270.0	.37E-01	
SUBJ 1 STIM 7	-0.3	63.3	.11E 02	.14E 01	17.8	.35E-01	.26E-01	.76E 00	0.0	.00E 00	316.7	.97E-01	
SUBJ 1 STIM 8	1.8	54.0	.86E 01	.10E 01	131.9	.10E 00	.20E-01	.96E 00	0.0	.00E 00	263.3	.23E-01	
SUBJ 1 STIM 9	-0.1	14.7	.63E 01	.30E 01	30.7	.22E 00	.56E-01	.36E 01	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 10	-16.4	18.2	.67E 01	.72E 00	132.9	.33E 00	.11E-01	.77E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 11	-80.8	10.0	.30E 01	.14E 01	178.0	.15E 00	.13E-01	.67E 00	0.0	.00E 00	260.0	.38E-01	
SUBJ 1 STIM 12	0.0	26.7	.67E 01	.17E 01	168.9	.64E-01	.39E-01	.13E 01	0.0	.00E 00	260.0	.38E-01	
SUBJ 1 STIM 13	-28.7	26.4	.48E 01	.17E 01	88.4	.16E 00	.16E-01	.95E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 14	-116.4	56.8	.40E 01	.11E 01	147.7	.51E-01	.87E-02	.26E 00	0.0	.00E 00	256.7	.85E-01	
SUBJ 1 STIM 15	-130.4	53.0	.13E 02	.88E 00	160.4	.17E 00	.28E-01	.67E 00	0.0	.00E 00	256.7	.26E-01	
SUBJ 1 STIM 16	-124.2	53.8	.92E 01	.62E 01	81.6	.13E 00	.25E-01	.33E 01	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 17	[illegible]	60.0	.21E-04	.66E 01	90.0	.11E 00	.44E-06	.74E-05	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 18	2.5	35.7	.61E 01	.20E 00	11.3	.40E-01	.26E-01	.11E 00	0.0	.00E 00	266.7	.33E-01	
SUBJ 1 STIM 19	-54.2	11.4	.35E 01	.13E 01	120.6	.30E 00	.23E-01	.13E 01	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 20	1.8	47.3	.83E 01	.11E 01	25.7	.11E 00	.23E-01	.58E 00	0.0	.00E 00	270.0	.57E-01	
SUBJ 1 STIM 21	3.5	27.8	.41E 01	.14E 01	170.1	.51E-01	.23E-01	.65E 00	0.0	.00E 00	260.0	.22E-01	
SUBJ 1 STIM 22	-46.6	30.6	.42E 01	.28E 01	52.6	.73E-01	.17E-01	.94E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 23	-101.3	24.5	.76E 01	.60E 00	107.8	.92E-01	.47E-01	.59E 00	0.0	.00E 00	233.3	.76E-01	
SUBJ 1 STIM 24	-120.0	11.7	.75E-05	.16E 01	108.0	.14E 00	.55E-06	.33E-05	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 25	-67.0	16.6	.73E 01	.30E 00	140.7	.44E 00	.68E-02	.42E 00	0.0	.00E 00	233.3	.71E-01	
SUBJ 1 STIM 26	-64.9	16.1	.34E 01	.77E 00	112.8	.11E 00	.30E-01	.51E 00	0.0	.00E 00	236.7	.78E-01	
SUBJ 1 STIM 27	-45.0	13.2	.44E-05	.20E 01	6.6	.13E 00	.13E-01	.21E-05	0.0	.00E 00	236.7	.78E-01	
SUBJ 1 STIM 28	-160.3	20.0	.18E 02	.19E 01	147.1	.10E 00	.13E 00	.53E 01	0.0	.00E 00	260.0	.38E-01	
SUBJ 1 STIM 29	-81.7	20.0	.58E 01	.26E 00	157.5	.29E 00	.52E-02	.24E 00	0.0	.00E 00	250.0	.28E-05	
SUBJ 1 STIM 30	-123.8	34.1	.86E 01	.41E 01	46.6	.23E 00	.24E-01	.32E 01	0.0	.00E 00	233.3	.76E-01	
SUBJ 1 STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.13E 00   H ERROR=0.25E-01   L ERROR=0.00E 00   B ERROR=0.46E-01

**** END OF STREAM 00P212 [illegible] 757

V.C. 31 OBS 2,3,4,5,7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	1.4	77.8	.11E 02	.26E 01	92.5	.14E 00	.55E-02	.11E 01	0.0	.00E 00	91.0	.68E-01	
STIM 2	-136.7	17.5	.43E 01	.21E 01	153.5	.16E 00	.35E-01	.16E 01	0.0	.00E 00	80.6	.32E-01	
STIM 3	4.8	73.0	.11E 02	.21E 01	93.4	.14E 00	.55E-02	.96E 00	0.0	.00E 00	80.6	.59E-01	
STIM 4	62.4	4.9	.33E 01	.13E 01	174.6	.54E 00	.73E-01	.27E 01	0.0	.00E 00	80.1	.20E-01	
STIM 5	31.5	10.9	.34E 01	.25E 01	123.5	.14E 00	.26E-01	.14E 01	0.0	.00E 00	87.2	.34E-01	
STIM 6	10.3	40.4	.34E 01	.26E 01	153.7	.66E-01	.13E-01	.68E 00	0.0	.00E 00	80.0	.43E-01	
STIM 7	-1.9	73.8	.11E 02	.17E 01	88.3	.15E 00	.38E-02	.76E 00	0.0	.00E 00	87.7	.59E-01	
STIM 8	10.9	33.8	.33E 01	.25E 01	4.9	.77E-01	.15E-01	.77E 00	0.0	.00E 00	87.4	.25E-01	
STIM 9	20.7	8.8	.24E 01	.10E 01	95.5	.27E 00	.36E-01	.16E 01	0.0	.00E 00	82.7	.36E-01	
STIM 10	-18.8	6.7	.24E 01	.84E 00	114.9	.36E 00	.21E-01	.95E 00	0.0	.00E 00	83.8	.26E-01	
STIM 11	-102.4	14.7	.26E 01	.11E 01	0.9	.18E 00	.12E-01	.63E 00	0.0	.00E 00	87.1	.19E-01	
STIM 12	3.0	15.0	.40E 01	.34E 01	155.6	.23E 00	.41E-01	.28E 01	0.0	.00E 00	86.5	.28E-01	
STIM 13	-3.1	8.1	.30E 01	.17E 01	112.0	.36E 00	.37E-01	.20E 01	0.0	.00E 00	79.4	.38E-01	
STIM 14	-141.2	34.7	.83E 01	.28E 01	125.2	.81E-01	.38E-01	.21E 01	0.0	.00E 00	82.6	.49E-01	
STIM 15	-151.8	37.8	.79E 01	.17E 01	122.9	.66E-01	.32E-01	.11E 01	0.0	.00E 00	92.9	.47E-01	
STIM 16	-154.3	29.3	.62E 01	.34E 01	132.7	.12E 00	.34E-01	.23E 01	0.0	.00E 00	87.9	.23E-01	
STIM 17	-138.6	30.8	.60E 01	.25E 01	139.8	.92E-01	.30E-01	.15E 01	0.0	.00E 00	88.3	.35E-01	
STIM 18	12.6	15.9	.33E 01	.17E 01	97.2	.20E 00	.19E-01	.11E 01	0.0	.00E 00	87.9	.33E-01	
STIM 19	-68.0	4.6	.23E 01	.61E 00	158.9	.49E 00	.23E-01	.95E 00	0.0	.00E 00	78.9	.30E-01	
STIM 20	8.5	41.8	.47E 01	.26E 01	65.6	.11E 00	.11E-01	.93E 00	0.0	.00E 00	0.0	.00E 00	XXXX
STIM 21	11.0	25.4	.35E 01	.10E 01	92.8	.14E 00	.12E-01	.82E 00	0.0	.00E 00	84.9	.31E-01	
STIM 22	-25.6	14.4	.39E 01	.21E 01	163.6	.27E 00	.24E-01	.18E 01	0.0	.00E 00	80.8	.40E-01	
STIM 23	-108.7	17.4	.27E 01	.20E 01	176.6	.15E 00	.18E-01	.97E 00	0.0	.00E 00	80.0	.48E-01	
STIM 24	-134.1	11.7	.21E 01	.18E 01	32.7	.18E 00	.25E-01	.10E 01	0.0	.00E 00	81.5	.35E-01	
STIM 25	-41.8	7.7	.26E 01	.13E 01	111.9	.33E 00	.30E-01	.14E 01	0.0	.00E 00	80.0	.28E-01	
STIM 26	-111.7	10.5	.32E 01	.80E 00	17.1	.30E 00	.14E-01	.85E 00	0.0	.00E 00	82.6	.30E-01	
STIM 27	25.6	4.1	.21E 01	.10E 01	165.7	.26E 00	.78E-01	.16E 01	0.0	.00E 00	82.6	.25E-01	
STIM 28	-155.9	0.9	.31E 01	.23E 01	138.5	.24E 00	.50E-01	.23E 01	0.0	.00E 00	80.4	.42E-01	
STIM 29	-105.5	13.0	.33E 01	.11E 01	150.5	.23E 00	.21E-01	.89E 00	0.0	.00E 00	81.8	.38E-01	
STIM 30	-131.3	21.9	.35E 01	.24E 01	130.4	.11E 00	.25E-01	.12E 01	0.0	.00E 00	85.4	.41E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.20E 00   H ERROR=0.26E-01   L ERROR=0.00E 00   B ERROR=0.36E-01

V.C.31 OBS 2.5.7

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
STIM 1	3.1	80.3	.39E 01	.18E 01	103.2	.47E-01	.41E-02	.28E 00	0.0	.00E 00	136.3	.39E-01	
STIM 2	-173.6	26.7	.91E 01	.34E 01	147.4	.19E 00	.49E-01	.36E 01	0.0	.00E 00	132.9	.13E-01	
STIM 3	10.8	73.9	.48E 01	.28E 01	32.7	.52E-01	.86E-02	.56E 00	0.0	.00E 00	132.2	.43E-01	
STIM 4	63.3	10.8	.74E 01	.23E 01	172.0	.54E 00	.75E-01	.50E 01	0.0	.00E 00	121.4	.16E-01	
STIM 5	30.0	33.2	.73E 01	.22E 01	135.3	.91E-01	.33E-01	.15E 01	0.0	.00E 00	131.2	.17E-01	
STIM 6	6.4	40.1	.69E 01	.40E 01	176.4	.84E-01	.22E-01	.18E 01	0.0	.00E 00	132.7	.22E-01	
STIM 7	-4.2	74.7	.43E 01	.36E 01	71.5	.56E-01	.79E-02	.66E 00	0.0	.00E 00	131.4	.47E-01	
STIM 8	6.0	52.1	.71E 01	.27E 01	170.3	.53E-01	.21E-01	.11E 01	0.0	.00E 00	131.3	.20E-01	
STIM 9	8.4	-- 17.1	.43E 01	.35E 01	64.9	.25E 00	.33E-01	.27E 01	0.0	.00E 00	122.9	.28E-01	
STIM 10	-27.8	13.6	.46E 01	.14E 01	114.7	.33E 00	.17E-01	.15E 01	0.0	.00E 00	125.1	.17E-01	
STIM 11	-60.8	21.0	.44E 01	.19E 01	7.8	.21E 00	.15E-01	.13E 01	0.0	.00E 00	127.9	.13E-01	
STIM 12	-2.0	21.2	.74E 01	.65E 01	24.8	.31E 00	.55E-01	.71E 01	0.0	.00E 00	126.8	.20E-01	
STIM 13	-8.8	17.0	.54E 01	.20E 01	93.2	.31E 00	.22E-01	.20E 01	0.0	.00E 00	127.2	.22E-01	
STIM 14	-135.6	44.3	.13E 02	.21E 01	138.0	.90E-01	.43E-01	.19E 01	0.0	.00E 00	110.8	.36E-01	
STIM 15	-140.9	51.3	.15E 02	.31E 01	124.4	.80E-01	.46E-01	.29E 01	0.0	.00E 00	131.2	.35E-01	
STIM 16	-143.7	48.6	.14E 02	.38E 01	126.1	.81E-01	.44E-01	.34E 01	0.0	.00E 00	126.6	.14E-01	
STIM 17	-121.4	44.9	.10E 02	.22E 01	150.7	.16E 00	.28E-01	.16E 01	0.0	.00E 00	126.3	.22E-01	
STIM 18	0.6	20.1	.57E 01	.29E 01	111.4	.18E 00	.21E-01	.18E 01	0.0	.00E 00	130.4	.18E-01	
STIM 19	-68.7	0.9	.48E 01	.12E 01	161.3	.48E 00	.23E-01	.19E 01	0.0	.00E 00	120.9	.23E-01	
STIM 20	4.8	56.7	.50E 01	.21E 01	179.4	.39E-01	.15E-01	.61E 00	0.0	.00E 00	136.0	.24E-01	
STIM 21	8.0	36.1	.38E 01	.32E 01	67.3	.10E 00	.14E-01	.10E 01	0.0	.00E 00	128.3	.17E-01	
STIM 22	-22.7	29.2	.68E 01	.46E 01	93.2	.23E 00	.26E-01	.34E 01	0.0	.00E 00	117.2	.22E-01	
STIM 23	-103.9	27.3	.49E 01	.28E 01	164.3	.17E 00	.18E-01	.16E 01	0.0	.00E 00	117.6	.32E-01	
STIM 24	-108.4	14.8	.28E 01	.54E 00	164.9	.18E 00	.12E-01	.32E 00	0.0	.00E 00	110.6	.29E-01	
STIM 25	-36.6	15.9	.49E 01	.27E 01	107.1	.30E 00	.30E-01	.27E 01	0.0	.00E 00	121.7	.22E-01	
STIM 26	-114.0	20.0	.58E 01	.16E 01	22.7	.29E 00	.15E-01	.15E 01	0.0	.00E 00	120.6	.20E-01	
STIM 27	25.9	8.1	.46E 01	.15E 01	167.6	.21E 00	.86E-01	.27E 01	0.0	.00E 00	122.1	.22E-01	
STIM 28	-145.4	17.2	.61E 01	.43E 01	128.0	.26E 00	.54E-01	.48E 01	0.0	.00E 00	123.8	.29E-01	
STIM 29	-64.6	20.9	.54E 01	.16E 01	166.0	.25E 00	.14E-01	.13E 01	0.0	.00E 00	122.6	.24E-01	
STIM 30	-115.2	31.6	.46E 01	.33E 01	173.6	.13E 00	.16E-01	.14E 01	0.0	.00E 00	121.4	.29E-01	
STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.19E 00   H ERROR=0.28E-01   I ERROR=0.00E 00   A ERROR=0.24E-01

**** END OF STREAM 000212   610

V.C.-32 0517

VIEWING CONDITION 4

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	0.0	150.0	.10E-06	.10E-06	0.0	.67E-09	.11E-09	.21E-15	50.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 2	100.0	70.0	.10E-06	.10E-06	0.0	.14E-08	.23E-09	.45E-15	33.3	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 3	3.1	130.6	.90E 01	.22E 01	128.7	.43E-01	.80E-02	.44E 00	46.7	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 4	136.8	46.5	.20E 01	.13E 01	85.7	.36E-01	.82E-02	.23E 00	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 5	36.3	53.2	.32E-04	.44E 01	9.4	.67E-01	.89E-02	.83E-05	33.3	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 6	23.1	50.8	.54E 01	.23E 01	92.5	.84E-01	.80E-02	.65E 00	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 7	-17.4	126.4	.19E-03	.15E 02	38.8	.11E 00	.74E-02	.69E-04	50.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 8	-52.9	74.2	.83E 01	.14E 01	62.5	.34E-01	.17E-01	.50E 00	35.0	.82E-01	0.0	.00E 00	
SUBJ 1	STIM 9	23.5	43.2	.25E 01	.14E 01	4.7	.38E-01	.85E-02	.25E 00	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 10	6.4	26.1	.10E 02	.38E 01	2.7	.16E 00	.61E-01	.47E 01	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 11	-116.7	23.3	.35E 01	.43E 00	26.8	.14E 00	.76E-02	.20E 00	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 12	-3.4	44.5	.47E 01	.28E 01	174.8	.65E-01	.17E-01	.94E 00	26.7	.62E-01	0.0	.00E 00	
SUBJ 1	STIM 13	-32.0	30.9	.86E 01	.13E 01	41.9	.57E-01	.33E-01	.89E 00	28.3	.21E 00	0.0	.00E 00	
SUBJ 1	STIM 14	-100.0	75.0	.21E-08	.11E-02	90.0	.14E-04	.57E-10	.94E-13	36.7	.45E-01	0.0	.00E 00	
SUBJ 1	STIM 15	-120.0	76.7	.41E-06	.33E 01	108.0	.43E-01	.19E-06	.56E-05	35.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 16	187.0	83.1	.69E 01	.24E 01	70.9	.73E-01	.79E-02	.64E 00	38.3	.87E-01	0.0	.00E 00	
SUBJ 1	STIM 17	-133.2	73.1	.41E 01	.15E-03	10.2	.24E-01	.81E-02	.28E-04	30.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 18	-72.2	61.4	.59E 01	.19E 01	27.0	.70E-01	.12E-01	.59E 00	31.7	.53E-01	0.0	.00E 00	
SUBJ 1	STIM 19	6.8	10.8	.31E 01	.15E 01	50.9	.14E 00	.16E-01	.75E 00	15.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 20	-17.4	73.1	.72E 01	.39E 01	102.2	.99E-01	.85E-02	.12E 01	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 21	1.7	48.3	.18E 01	.10E 01	48.9	.34E-01	.42E-02	.12E 00	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 22	-30.0	65.0	.49E 01	.54E-04	162.0	.75E-01	.13E-06	.13E-04	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 23	-110.0	30.8	.31E 01	.54E-04	101.2	.31E-02	.13E-01	.13E-04	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 24	183.2	36.6	.22E 01	.12E 01	155.3	.46E-01	.81E-02	.23E 00	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 25	-80.0	33.3	.20E-04	.17E 01	77.0	.51E-01	.22E-06	.31E-05	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 26	173.3	40.9	.29E 01	.26E 01	134.1	.58E-01	.84E-02	.47E 00	28.3	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 27	68.4	51.0	.89E 01	.22E 01	169.1	.14E 00	.18E-01	.12E 01	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 28	176.0	53.2	.30E 01	.14E 01	2.4	.31E-01	.85E-02	.24E 00	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 29	-117.0	38.2	.36E 01	.15E 01	37.3	.68E-01	.80E-02	.43E 00	25.0	.12E 00	0.0	.00E 00	
SUBJ 1	STIM 30	-169.7	57.9	.50E 01	.10E 01	170.2	.34E-01	.14E-01	.31E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.59E-01 H ERROR=0.10E-01 L ERROR=0.60E-01 B ERROR=0.00E 00

UNIT: 0 ODA024 DATE: 27/06/78 TIME: 11/42/45

0.2.33 0557

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	10.0	135.0	58E-04	75E 01	171.0	.56E-01	26E-06	.10E-04	50.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 2	135.5	60.9	66E 01	.26E 00	74.6	.83E-01	72E-02	.78E-01	30.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 3	20.0	143.3	89E-04	67E 01	162.0	.47E-01	23E-06	.13E-04	41.7	.40E-01	0.0	.00E 00	
SUBJ 1	STIM 4	153.9	47.9	55E-04	47E 01	155.4	.45E-01	16E-01	.19E-04	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 5	37.1	56.5	50E 01	.15E 01	27.7	.79E-01	78E-02	.42E 00	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 6	20.0	61.7	26E-04	43E 01	162.0	.69E-01	32E-06	57E-05	31.7	.53E-01	0.0	00E 00	
SUBJ 1	STIM 7	-15.2	83.2	90E 01	37E 01	112.1	.96E-01	66E-02	.11E 01	40.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 8	-60.0	70.0	72E 01	40E-04	144.0	.10E 00	95E-07	13E-04	35.0	.82E-01	0.0	00E 00	
SUBJ 1	STIM 9	45.0	33.0	66E 01	.17E 01	71.7	.19E 00	14E-01	.11E 01	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 10	53.4	30.6	42E 01	28E 01	142.6	.73E-01	17E-01	94E 00	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 11	-67.5	13.3	18E 01	64E 00	155.7	.13E 00	.11E-01	.27E 00	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 12	7.4	44.5	54E 01	14E 01	19.4	.60E-01	18E-01	.53E 00	26.7	.62E-01	0.0	.00E 00	
SUBJ 1	STIM 13	-13.6	41.5	13E-03	28E 01	66.7	.39E-01	.87E-02	.27E-04	26.7	.62E-01	0.0	00E 00	
SUBJ 1	STIM 14	-105.2	83.2	52E 01	25E 01	40.1	.54E-01	.69E-02	.48E 00	31.7	.53E-01	0.0	.00E 00	
SUBJ 1	STIM 15	-123.2	66.5	36E 01	14E 01	129.2	.26E-01	82E-02	.23E 00	31.7	.53E-01	0.0	00E 00	
SUBJ 1	STIM 16	100.0	100.0	35E-04	28E-03	0.0	.28E-05	.89E-07	.31E-09	28.3	.59E-01	0.0	00E 00	
SUBJ 1	STIM 17	-181.7	79.9	12E-03	21E 01	74.2	.34E-03	42E-02	.99E-05	28.3	.59E-01	0.0	00E 00	
SUBJ 1	STIM 18	-60.0	58.3	71E-04	50E 01	54.0	.10E 00	44E-06	.23E-04	30.0	.96E-01	0.0	00E 00	
SUBJ 1	STIM 19	67.6	13.9	83E 01	23E 01	8.4	.56E 00	.42E-01	44E 01	21.7	77E-01	0.0	00E 00	
SUBJ 1	STIM 20	-1.7	68.3	44E 01	18E 01	103.9	.64E-01	42E-02	.36E 00	31.7	.53E-01	0.0	00E 00	
SUBJ 1	STIM 21	1.7	50.0	13E 01	16E-03	168.7	.34E-03	42E-02	.13E-04	30.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 22	-73.2	67.6	72E 01	43E 01	68.2	.64E-01	17E-01	.15E 01	30.0	.96E-01	0.0	.00E 00	
SUBJ 1	STIM 23	-68.9	31.4	50E 01	19E 01	146.4	.14E 00	16E-01	93E 00	26.7	.62E-01	0.0	.00E 00	
SUBJ 1	STIM 24	162.9	30.9	34E 01	77E 00	128.6	.74E-01	.78E-02	.21E 00	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 25	-80.0	38.3	15E-04	33E 01	72.0	.85E-01	34E-06	.40E-05	23.3	.71E-01	0.0	00E 00	
SUBJ 1	STIM 26	172.3	53.1	56E 01	14E 01	75.3	.83E-01	.11E-01	.46E 00	30.0	.00E 00	0.0	00E 00	
SUBJ 1	STIM 27	73.1	42.9	46E 01	14E 01	106.6	.36E-01	.17E-01	.49E 00	26.7	.62E-01	0.0	00E 00	
SUBJ 1	STIM 28	102.6	51.5	95E 01	16E 01	116.3	.18E 00	.72E-02	.92E 00	28.3	.59E-01	0.0	.00E 00	
SUBJ 1	STIM 29	-118.7	26.7	44E 01	34E 00	23.1	.17E 00	35E-02	.18E 00	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 30	-178.9	50.5	79E 01	55E 00	28.4	.97E-01	14E-01	.23E 00	30.0	.96E-01	0.0	00E 00	
SUBJ 1	STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	00E 00	.00E 00	0.0	.00E 00	0.0	00E 00	XXXX

S ERROR=0,90E-01 H ERROR=0.87E-02 L ERROR=0,40E-01 B ERROR=0.00E 00

J.C. 34 #53 7

VIEWING CONDITION 2

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

		HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1	STIM 1	13.9	180.4	.18E 02	.18E 01	47.6	.79E-01	.89E-02	.55E 00	33.3	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 2	103.1	84.4	.27E-03	.56E 01	66.7	.40E-01	.80E-02	.55E-06	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 3	16.9	160.5	.10E 02	.24E 01	18.4	.35E-01	.81E-02	.45E 00	33.3	.50E-01	0.0	.00E 00	
SUBJ 1	STIM 4	158.5	45.2	.85E 01	.24E 01	16.5	.84E-01	.28E-01	.14E 01	18.3	.91E-01	0.0	.00E 00	
SUBJ 1	STIM 5	33.4	73.1	.40E 01	.14E 01	161.8	.22E-01	.84E-02	.24E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 6	14.6	111.3	.35E 02	.39E 00	87.7	.31E 00	.03E-02	.38E 00	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 7	-15.9	162.8	.24E 02	.62E 01	87.0	.14E 00	.91E-02	.29E 01	26.7	.13E 00	0.0	.00E 00	
SUBJ 1	STIM 8	-27.8	108.2	.35E 02	.13E 02	79.1	.27E 00	.34E-01	.13E 02	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 9	42.5	64.5	.14E 02	.11E 01	113.1	.15E 00	.42E-01	.10E 01	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 10	48.1	23.3	.71E 01	.41E 01	105.5	.22E 00	.44E-01	.40E 01	16.7	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 11	-118.2	18.3	.45E 01	.17E 00	24.3	.24E 00	.56E-02	.13E 00	13.3	.13E 00	0.0	.00E 00	
SUBJ 1	STIM 12	-6.1	60.6	.92E 01	.67E 00	124.5	.11E 00	.11E-01	.28E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 13	-41.6	24.9	.20E 02	.83E 01	70.0	.33E 00	.12E 00	.21E 02	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 14	-100.0	96.5	.45E 01	.32E 01	90.0	.33E-01	.75E-02	.48E 00	25.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 15	-126.4	92.3	.98E 01	.27E 01	128.3	.39E-01	.16E-01	.91E 00	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 16	143.2	93.1	.53E 01	.26E 01	166.3	.36E-01	.82E-02	.46E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 17	-141.6	108.3	.61E 01	.26E 01	62.7	.54E-01	.41E-02	.44E 00	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 18	-61.4	67.8	.13E 02	.37E 01	34.5	.84E-01	.28E-01	.22E 01	23.3	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 19	100.0	5.0	.10E-06	.10E-06	0.0	.20E-07	.32E-08	.63E-14	13.3	.13E 00	0.0	.00E 00	
SUBJ 1	STIM 20	-16.7	80.8	.87E 01	.47E 01	100.9	.96E-01	.84E-02	.14E 01	28.3	.50E-01	0.0	.00E 00	
SUBJ 1	STIM 21	10.0	58.3	.34E-06	.80E 01	171.0	.14E 00	.62E-06	.15E-04	21.7	.77E-01	0.0	.00E 00	
SUBJ 1	STIM 22	-80.0	91.7	.64E-06	.44E 01	77.0	.48E-01	.22E-06	.10E-04	23.3	.71E-01	0.0	.00E 00	
SUBJ 1	STIM 23	-98.3	44.8	.31E 01	.91E-01	87.4	.24E-02	.11E-01	.20E-01	15.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 24	138.6	47.9	.74E 01	.40E 00	136.6	.12E 00	.15E-01	.24E 00	18.3	.91E-01	0.0	.00E 00	
SUBJ 1	STIM 25	-80.0	45.0	.27E-06	.29E 01	77.0	.64E-01	.27E-06	.54E-05	18.3	.18E 00	0.0	.00E 00	
SUBJ 1	STIM 26	141.3	76.6	.17E 02	.14E 01	110.7	.22E 00	.37E-02	.93E 00	20.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 27	76.2	41.2	.47E 01	.16E 01	45.6	.10E 00	.89E-02	.55E 00	20.0	.14E 00	0.0	.00E 00	
SUBJ 1	STIM 28	170.3	67.9	.12E 02	.40E 01	116.7	.18E 00	.12E-01	.27E 01	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 29	-110.5	33.0	.46E 01	.42E 00	63.7	.98E-01	.16E-01	.18E 00	16.7	.10E 00	0.0	.00E 00	
SUBJ 1	STIM 30	-147.6	74.6	.16E 02	.73E 01	156.5	.11E 00	.34E-01	.50E 01	20.0	.00E 00	0.0	.00E 00	
SUBJ 1	STIM 31	0.0	0.0	.10E-06	.10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.11E 00   H ERROR=0.17E-01   L ERROR=0.72E-01   B ERROR=0.00E 00

J.C. 35 DAY 7

VIEWING CONDITION 1

SUBJECT 1 SATURATION EXPONENT 1.000 SATURATION INTERCEPT 0.000 BRIGHTNESS EXPONENT 1.000 BRIGHTNESS INTERCEPT 0.000

	HUE	SATN	AXIS1	AXIS2	INCL	SIGS	SIGH	AREA	LTNESS	SIGL	BTNESS	SIGB	
SUBJ 1 STIM 1	13.4	106.4	59E 01	28E 01	6.6	.31E-01	.85E-02	.49E 00	30.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 2	161.4	40.6	11E 02	23E 01	160.9	.11E 00	.31E-01	.16E 01	15.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 3	16.8	93.1	53E 01	26E 01	13.7	.36E-01	.82E-02	.46E 00	26.7	.62E-01	0.0	.00E 00	
SUBJ 1 STIM 4	88.1	14.5	99E 01	15E 01	137.1	.41E 00	.86E-01	.32E 01	6.0	.35E 00	0.0	.00E 00	
SUBJ 1 STIM 5	20.0	51.7	29E-06	43E 01	162.0	.83E-01	.38E-06	.76E-05	13.3	.13E 00	0.0	.00E 00	
SUBJ 1 STIM 6	7.2	50.0	13E 02	13E 01	7.9	.45E-01	.33E-01	.90E 00	18.3	.91E-01	0.0	.00E 00	
SUBJ 1 STIM 7	20.0	90.0	10E-06	10E-06	0.0	.11E-08	.18E-09	.35E-15	25.0	.12E 00	0.0	.00E 00	
SUBJ 1 STIM 8	1.1	57.9	12E 02	37E 01	15.6	.85E-01	.32E-01	.24E 01	16.7	.10E 00	0.0	.00E 00	
SUBJ 1 STIM 9	13.0	33.3	12E 02	13E 01	154.7	.90E-01	.54E-01	.14E 01	13.3	.13E 00	0.0	.00E 00	
SUBJ 1 STIM 10	13.0	27.8	59E 01	74E 00	41.8	.17E 00	.20E-01	.49E 00	10.0	.20E 00	0.0	.00E 00	
SUBJ 1 STIM 11	-187.2	10.8	65E 01	23E-01	134.5	.34E 00	.78E-01	.43E-01	3.7	.18E 00	0.0	.00E 00	
SUBJ 1 STIM 12	-2.0	51.4	11E 02	93E-01	15.8	.51E-01	.32E-01	.61E-01	13.3	.13E 00	0.0	.00E 00	
SUBJ 1 STIM 13	-36.3	37.3	10E 02	50E-04	40.5	.37E-01	.43E-01	.43E-04	11.7	.14E 00	0.0	.00E 00	
SUBJ 1 STIM 14	-120.0	56.7	44E-04	11E 02	108.0	.20E 00	.81E-06	.28E-04	11.7	.38E 00	0.0	.00E 00	
SUBJ 1 STIM 15	-135.8	53.1	20E 02	13E 01	132.1	.68E-01	.57E-01	.15E 01	8.3	.20E 00	0.0	.00E 00	
SUBJ 1 STIM 16	107.4	64.3	12E 02	32E 01	8.7	.54E-01	.31E-01	.19E 01	10.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 17	-167.9	57.2	20E 02	79E 00	105.3	.25E 00	.38E-01	.86E 00	11.7	.14E 00	0.0	.00E 00	
SUBJ 1 STIM 18	-20.0	50.0	57E 01	37E-04	108.0	.11E 00	.12E-06	.13E-04	10.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 19	14.5	14.1	65E 01	20E 01	130.4	.32E 00	.62E-01	.42E 01	5.0	.09E 00	0.0	.00E 00	
SUBJ 1 STIM 20	16.7	71.5	38E 01	14E 01	1.7	.24E-01	.82E-02	.23E 00	16.7	.10E 00	0.0	.00E 00	
SUBJ 1 STIM 21	20.0	53.3	33E 01	10E-04	72.0	.61E-01	.58E-07	.36E-05	15.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 22	-38.5	37.7	13E 02	37E 01	51.6	.14E 00	.51E-01	.39E 01	11.7	.14E 00	0.0	.00E 00	
SUBJ 1 STIM 23	-170.3	23.3	14E 02	16E 01	144.7	.19E 00	.92E-01	.32E 01	4.3	.15E 00	0.0	.00E 00	
SUBJ 1 STIM 24	182.7	36.6	37E 01	50E-04	132.4	.91E-01	.73E-02	.16E-04	5.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 25	-71.1	20.6	64E 01	10E 01	125.0	.10E 00	.19E-01	.13E 01	5.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 26	180.0	31.7	30E-04	57E 01	18.0	.18E 00	.81E-06	.17E-04	8.3	.20E 00	0.0	.00E 00	
SUBJ 1 STIM 27	27.0	28.0	31E 01	14E 01	170.1	.57E-01	.17E-01	.50E 00	11.7	.14E 00	0.0	.00E 00	
SUBJ 1 STIM 28	103.0	33.2	35E 01	13E 01	123.8	.10E 00	.79E-02	.43E 00	10.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 29	-116.1	10.2	16E 02	27E 01	145.5	.55E 00	.97E-01	.70E 01	5.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 30	103.1	47.8	13E-03	10E 02	90.0	.23E-01	.34E-01	.85E-04	10.0	.00E 00	0.0	.00E 00	
SUBJ 1 STIM 31	0.0	0.0	10E-06	10E-06	0.0	.00E 00	.00E 00	.00E 00	0.0	.00E 00	0.0	.00E 00	XXXX

S ERROR=0.13E 00 H ERROR=0.31E-01 L ERROR=0.11E 00 B ERROR=0.00E 00

```
      SHORT LIST (LP)
      PROGRAM (SCAL)
      INPUT 1=CR0
      OUTPUT 2=LP0
      COMPACT
      COMPRESS INTEGER AND LOGICAL
      TRACE 2
      END
      MASTER SCAL
      INTEGER NS(35),RN,GN,BN,YN,SN,LBN,X(7,3,31),XX,
     1N(7),NN(7),NNN(7)
      REAL LE(7,3,31),B(7,3,31),S(7,3,31),TH(7,3,31),
     1PRODS(7,31),SUML(7,31),SUML2(7,31),PRODB(7,31),
     2SAT(7,31),BRI(7,31),LIT(7,31),SATU(31),
     3BRIT(31),MSAT(31),SMSAT(7),SMBRI(7),SSAT(7),SBRI(7),
     4SSS(7),SSB(7),RSAT(7),RBRI(7),S1(7),S2(7),B1(7),
     5B2(7),A(7,3,31),AB(7,3,31),LB,MBRI(31)
      READ(1,101)NVC,NREP,NSTIM
  101 FORMAT(3I0)
      DO 1 I=1,NVC
      READ(1,102) NS(I)
    1 CONTINUE
  102 FORMAT(I0)
      DO 2 I=1,NVC
      WRITE(2,210)I
  210 FORMAT(///,40X,'VIEWING CONDITION',I2,/)
      DO 222 J=1,NS(I)
      DO 333 L=1,NSTIM
      PRODS(J,L)=1.0
      SUML(J,L)=0.0
      PRODB(J,L)=1.0
      SUML2(J,L)=0.0
      DO 444 K=1,NREP
      LE(J,K,L)=0.0
      B(J,K,L)=0.0
  444 CONTINUE
  333 CONTINUE
  222 CONTINUE
      DO 3 J=1,NS(I)
      DO 4 K=1,NREP
      DO 5 L=1,NSTIM
      READ(1,103)RN,GN,BN,YN,SN,LBN,X(J,K,L)
  103 FORMAT(9X,I3,1X,I3,1X,I3,1X,I3,I4,I4,I1)
      R=FLOAT(RN)
      G=FLOAT(GN)
      BL=FLOAT(BN)
      Y=FLOAT(YN)
      S(J,K,L)=FLOAT(SN)
      LB=FLOAT(LBN)
      IF(SN.LT.0)S(J,K,L)=0.0
      IF(BN.EQ.0)TH(J,K,L)=100.0-G+B
      IF(YN.EQ.0)TH(J,K,L)=300.0+R-B
      IF(YN.EQ.0.AND.BN.EQ.0.AND.RN.EQ.0.AND.GN.EQ.0)TH(J,K,L)=0.0
      IF(TH(J,K,L).EQ.400.0)TH(J,K,L)=0.0
      PRODS(J,L)=PRODS(J,L)*S(J,K,L)
      IF(X(J,K,L).EQ.0)PRODB(J,L)=0.0
      IF(X(J,K,L).EQ.0)GOTO 34
      B(J,K,L)=LB
      PRODB(J,L)=PRODB(J,L)*B(J,K,L)
   34 CONTINUE
      IF(X(J,K,L).EQ.1) GOTO 33
      LE(J,K,L)=LB
      SUML(J,L)=SUML(J,L)+LB
      SUML2(J,L)=SUML2(J,L)+LB**2
   33 CONTINUE
    5 CONTINUE
    4 CONTINUE
    3 CONTINUE
      DO 443 L=1,NSTIM
      DO 442 J=1,NS(I)
      XX=0
      DO 441 K=1,NREP
      XX=XX+X(J,K,L)
  441 CONTINUE
      IF(XX.GT.0)SUML(J,L)=0.0
      IF(XX.GT.0)SUML2(J,L)=0.0
  442 CONTINUE
  443 CONTINUE
      DO 449 J=1,NS(I)
      N(J)=0
      NN(J)=0
      NNN(J)=0
  449 CONTINUE
      REP=FLOAT(NREP)
      DO 6 L=1,NSTIM
      DO 7 J=1,NS(I)
      RM=1.0/REP
      SAT(J,L)=PRODS(J,L)**RM
      BRI(J,L)=PRODB(J,L)**RM
      LIT(J,L)=SUML(J,L)/REP
      IF(SAT(J,L).GT.0.0)N(J)=N(J)+1
      IF(BRI(J,L).GT.0.0)NN(J)=NN(J)+1
      IF(LIT(J,L).GT.0.0)NNN(J)=NNN(J)+1
    7 CONTINUE
    6 CONTINUE
      DO 888 L=1,NSTIM
      SATU(L)=1.0
      BRIT(L)=1.0
  888 CONTINUE
      DO 8 J=1,NS(I)
```

```
      IF(SAT(J,L).GT.0.0)N(J)=N(J)+1 [illegible]
      IF(BRI(J,L).GT.0.0)NN(J)=NN(J)+1
      IF(LIT(J,L).GT.0.0)NNN(J)=NNN(J)+1
    7 CONTINUE
    6 CONTINUE
      DO 888 L=1,NSTIM
      SATU(L)=1.0
      BRIT(L)=1.0
  888 CONTINUE
      DO 8 J=1,NS(I)
      DO 9 L=1,NSTIM
      SATU(L)=SATU(L)*SAT(J,L)
      BRIT(L)=BRIT(L)*BRI(J,L)
    9 CONTINUE
    8 CONTINUE
      DO 10 L=1,NSTIM
      RMM=1.0/FLOAT(NS(I))
      HSAT(L)=SATU(L)**RMM
      HBRI(L)=BRIT(L)**RMM
   10 CONTINUE
      DO 111 J=1,NS(I)
      SMSAT(J)=0.0
      SMBRI(J)=0.0
      SSAT(J)=0.0
      SBRI(J)=0.0
      SSS(J)=0.0
      SSB(J)=0.0
      RSAT(J)=0.0
      RBRI(J)=0.0
  111 CONTINUE
      DO 11 J=1,NS(I)
      DO 12 L=1,NSTIM
      IF(HSAT(L).LE.0.0) GOTO 77
      SMSAT(J)=SMSAT(J)+ALOG10(HSAT(L))
      SSAT(J)=SSAT(J)+ALOG10(SAT(J,L))
      RSAT(J)=RSAT(J)+ALOG10(SAT(J,L))**2
      SSS(J)=SSS(J)+ALOG10(HSAT(L))*ALOG10(SAT(J,L))
   77 CONTINUE
      IF(HBRI(L).LE.0.0) GOTO 76
      SMBRI(J)=SMBRI(J)+ALOG10(HBRI(L))
      RBRI(J)=RBRI(J)+ALOG10(BRI(J,L))**2
      SBRI(J)=SBRI(J)+ALOG10(BRI(J,L))
      SSB(J)=SSB(J)+ALOG10(HBRI(L))*ALOG10(BRI(J,L))
   76 CONTINUE
   12 CONTINUE
   11 CONTINUE
      DO 54 J=1,NS(I)
      S1(J)=0.0
      S2(J)=0.0
      B1(J)=0.0
      B2(J)=0.0
   54 CONTINUE
      DO 13 J=1,NS(I)
      FN=FLOAT(N(J))
      FNN=FLOAT(NN(J))
      IF(N(J).EQ.0.OR.SMSAT(J).EQ.0.0)GOTO 53
      DENSS1=RSAT(J)-SSAT(J)**2/FN
      DENSS2=FN*RSAT(J)-SSAT(J)**2
      IF(DENSS1.EQ.0.0.OR.DENSS2.EQ.0.0) GOTO 53
      S1(J)=(SSS(J)-SSAT(J)*SMSAT(J)/FN)/(RSAT(J)-SSAT(J)**2/FN)
      S2(J)=(SMSAT(J)*RSAT(J)-SSS(J)*SSAT(J))/(FN*RSAT(J)-SSAT(J)**2)
   53 IF(NN(J).EQ.0.OR.SMBRI(J).EQ.0.0) GOTO 52
      DENBB1=RBRI(J)-SBRI(J)**2/FNN
      DENBB2=FNN*RBRI(J)-SBRI(J)**2
      IF(DENBB1.EQ.0.0.OR.DENBB2.EQ.0.0) GOTO 52
      B1(J)=(SSB(J)-SBRI(J)*SMBRI(J)/FNN)/(RBRI(J)-SBRI(J)**2/FNN)
      B2(J)=(SMBRI(J)*RBRI(J)-SSB(J)*SBRI(J))/(FNN*RBRI(J)-SBRI(J)**2)
   52 CONTINUE
   13 CONTINUE
      IF(NS(I).GT.1) GOTO 51
      S1(1)=1.0
      S2(1)=0.0
      B1(1)=1.0
      B2(1)=0.0
   51 CONTINUE
  204 FORMAT(1H ,'SUBJECT',I2,2X,'SATURATION EXPONENT',F6.3,
     12X,'SATURATION INTERCEPT',F6.3,2X,'BRIGHTNESS EXPONENT',F6.3,
     22X,'BRIGHTNESS INTERCEPT',F6.3)
      DO 14 J=1,NS(I)
      WRITE(2,204)J,S1(J),S2(J),B1(J),B2(J)
      DO 15 K=1,NREP
      DO 16 L=1,NSTIM
      IF(S(J,K,L).EQ.0.0) GOTO 64
      CN=S1(J)*ALOG10(S(J,K,L))+S2(J)
      A(J,K,L)=10.0**CN
   64 IF(B(J,K,L).EQ.0.0) GOTO 63
      DN=B1(J)*ALOG10(B(J,K,L))+B2(J)
      BB(J,K,L)=10.0**DN
   63 CONTINUE
      IF(S(J,K,L).EQ.0.0)A(J,K,L)=0.0
      IF(B(J,K,L).EQ.0.0)BB(J,K,L)=0.0
   16 CONTINUE
   15 CONTINUE
   14 CONTINUE
      WRITE(2,203)
  203 FORMAT(///,23X,'HUE',4X,'SATN',3X,'AXIS1',3X,'AXIS2',4X,'INCL',
     14X,'SIGS',4X,'SIGH',4X,'AREA',2X,'LINES',4X,'SIGL',2X,'BTNESS',
     24X,'SIGB')
      DO 121 J=1,NS(I)
      NNNL=0
      NNND=0
      APOSL=0.0
      APOSN=0.0
      [illegible]
```

```
      NNNL=0
      NNNB=0
      ADDSL=0.0
      ADDSB=0.0
      ADDSH=0.0
      ADDSS=0.0
      DO 122 L=1,NSTIM
      SU=0.0
      SV=0.0
      SUZ=0.0
      SVZ=0.0
      SUV=0.0
      KKL=0
      KKB=0
      XLIT=0.0
      XBRIT=0.0
      XLIT2=0.0
      XBRIT2=0.0
      DO 123 K=1,NREP
      IF(LB(J,K,L).GT.0.0)KKL=KKL+1
      XLIT=XLIT+LB(J,K,L)
      IF(BR(J,K,L).GT.0.0)KKB=KKB+1
      XBRIT=XBRIT+BR(J,K,L)
      XLIT2=XLIT2+LB(J,K,L)**2
      XBRIT2=XBRIT2+BR(J,K,L)**2
      ANG=TH(J,K,L)*0.017708
      U=A(J,K,L)*SIN(ANG)
      V=A(J,K,L)*COS(ANG)
      SU=SU+U
      SV=SV+V
      SUZ=SUZ+U**2
      SVZ=SVZ+V**2
      SUV=SUV+U*V
  123 CONTINUE
      SIGB=0.0
      SIGL=0.0
      XLBAR=0.0
      BBAR=0.0
      IF(KKL.LT.NREP) GOTO 718
      XLBAR=XLIT/REP
      IF(XLBAR.NE.0.0)SIGL=SQRT(ABS((XLIT2/REP-XLBAR**2)/(REP-1.0)))
     1/XLBAR
      NNNL=NNNL+1
      ADDSL=ADDSL+SIGL
  718 IF(KKB.LT.NREP) GOTO 719
      BBAR=XBRIT/REP
      IF(BBAR.NE.0.0)SIGB=SQRT(ABS((XBRIT2/REP-BBAR**2)/(REP-1.0)))
     1/BBAR
      NNNB=NNNB+1
      ADDSB=ADDSB+SIGB
  719 CONTINUE
      KKK=1
      IF(KKL.LT.NREP.AND.KKB.LT.NREP)KKK=2
      UBAR=SU/REP
      VBAR=SV/REP
      W=REP-1.0
      VARU=(SUZ-REP*UBAR**2)/W
      VARV=(SVZ-REP*VBAR**2)/W
      VARUV=(SUV-(SU*SV)/REP)/W
      DET=VARU*VARV-VARUV**2
      A1=0.0
      B11=0.0
      B1=0.0
      TH1=0.0
      IF(DET.EQ.0.0) GOTO 742
      A1=VARV/DET
      B11=-1.0*VARUV/DET
      B1=VARU/DET
  742 A11=REP*A1
      A12=2.0*REP*B11
      A13=REP*B1
      A14=1.0
      DA1=-1.0*A14
      IF(A12.NE.0.0.AND.(A11-A13).NE.0.0)TH1=0.5*ATAN2
     1(A12,A11-A13)+1.570795
      TH2=57.2957795*TH1
      RR=(A11-A13)**2+A12**2
      R=SQRT(RR)
      R1=0.0000001
      R2=0.0000001
      IF((A11+A13+R).EQ.0.0) GOTO 576
      R1=SQRT(ABS(-2.0*DA1/(A11+A13+R)))
  576 IF((A11+A13-R).EQ.0.0) GOTO 577
      R2=SQRT(ABS(-2.0*DA1/(A11+A13-R)))
  577 COL=SQRT(UBAR**2+VBAR**2)
      HUE=0.0
      IF(UBAR.NE.0.0.AND.VBAR.NE.0.0)HUE=63.661977*ATAN2(UBAR,VBAR)
      CALL ELLI(R1,R2,HUE,TH2,COL,RRS,RRH,ARE)
      ADDSS=ADDSS+RRS
      ADDSH=ADDSH+RRH
      IF(KKK.EQ.1)WRITE(2,291)J,L,HUE,COL,R2,R1,TH2,RRS,RRH,ARE,
     1XLBAR,SIGL,BBAR,SIGB
  291 FORMAT(1H ,'SUBJ',I2,2X,'STIM',I3,2X,2F6.1,2(1X,E7.2),F6.1,
     13(1X,E7.2),F6.1,1X,E7.2,F6.1,1X,E7.2)
      IF(KKK.EQ.2)WRITE(2,290)J,L,HUE,COL,R2,R1,TH2,RRS,RRH,ARE,
     1XLBAR,SIGL,BBAR,SIGB
  290 FORMAT(1H ,'SUBJ',I2,2X,'STIM',I3,2X,2F6.1,2(1X,E7.2),F6.1,
     13(1X,E7.2),F6.1,1X,E7.2,F6.1,1X,E7.2,3X,'XXXX')
→ 122 CONTINUE
      FARB=0.0
      FARL=0.0
      IF(NNNL.GT.0)FARL=ADDSL/FLOAT(NNNL)
      [illegible]
```

```
      [illegible]
  122 CONTINUE
      FARB=0.0
      FARL=0.0
      IF(NNNL.GT.0)FARL=ADDSL/FLOAT(NNNL)
      IF(NNNB.GT.0)FARB=ADDSB/FLOAT(NNNB)
      FARH=ADDSH/FLOAT(NSTIM)
      FARS=ADDSS/FLOAT(NSTIM)
      WRITE(2,870)FARS,FARH,FARL,FARB
  870 FORMAT(1H ,'S ERROR=',E8.2,3X,'H ERROR=',E8.2,3X,'L ERROR=',
     1E8.2,3X,'B ERROR=',E8.2,/)
  121 CONTINUE
      IF(NS(I).EQ.1) GOTO 2
      NNNL=0
      NNNB=0
      ADDSL=0.0
      ADDSB=0.0
      ADDSH=0.0
      ADDSS=0.0
      WRITE(2,203)
      DO 313 L=1,NSTIM
      SU=0.0
      SV=0.0
      SU2=0.0
      SV2=0.0
      SUV=0.0
      KKL=0
      KKB=0
      XLIT=0.0
      XBRIT=0.0
      XLIT2=0.0
      XBRIT2=0.0
      DO 312 J=1,NS(I)
      DO 314 K=1,NREP
      IF(LE(J,K,L).GT.0.0)KKL=KKL+1
      IF(BR(J,K,L).GT.0.0)KKB=KKB+1
      XLIT=XLIT+LE(J,K,L)
      XBRIT=XBRIT+BR(J,K,L)
      XLIT2=XLIT2+LE(J,K,L)**2
      XBRIT2=XBRIT2+BR(J,K,L)**2
      ANG=TH(J,K,L)*0.017453
      U=A(J,K,L)*SIN(ANG)
      V=A(J,K,L)*COS(ANG)
      SU=SU+U
      SV=SV+V
      SU2=SU2+U**2
      SV2=SV2+V**2
      SUV=SUV+U*V
  314 CONTINUE
  312 CONTINUE
      BER=REP*FLOAT(NS(I))
      NER=NS(I)*NREP
      SIGB=0.0
      SIGL=0.0
      XLBAR=0.0
      BBAR=0.0
      IF(KKL.LT.NER) GOTO 618
      XLBAR=XLIT/BER
      IF(XLBAR.NE.0.0)SIGL=SQRT(ABS((XLIT2/BER-XLBAR**2)/(BER-1.0)))
     1/XLBAR
      NNNL=NNNL+1
      ADDSL=ADDSL+SIGL
  618 IF(KKB.LT.NER) GOTO 619
      BBAR=XBRIT/BER
      IF(BBAR.NE.0.0)SIGB=SQRT(ABS((XBRIT2/BER-BBAR**2)/(BER-1.0)))
     1/BBAR
      NNNB=NNNB+1
      ADDSB=ADDSB+SIGB
  619 CONTINUE
      KKK=1
      IF(KKL.LT.NER.AND.KKB.LT.NER) KKK=2
      UBAR=SU/BER
      VBAR=SV/BER
      W=BER-1.0
      VARU=(SU2-BER*UBAR**2)/W
      VARV=(SV2-BER*VBAR**2)/W
      VARUV=(SUV-(SU*SV)/BER)/W
      DET=VARU*VARV-VARUV**2
      A1=0.0
      B11=0.0
      D1=0.0
      IF(DET.EQ.0.0) GOTO 432
      A1=VARV/DET
      B11=-1.0*VARUV/DET
      D1=VARU/DET
  432 A11=BER*A1
      A12=2.0*BER*B11
      A13=BER*D1
      A14=1.0
      DA1=-1.0*A14
      TH1=0.0
      IF(A12.NE.0.0.AND.(A11-A13).NE.0.0)TH1=0.5*ATAN2
     1(A12,A11-A13)+1.570795
      TH2=TH1*57.2957795
      RR=(A11-A13)**2+A12**2
      R=SQRT(RR)
      B1=0.000001
      B2=0.000001
      IF((A11+A13+R).EQ.0.0) GOTO 805
      B1=SQRT(ABS(-2.0*DA1/(A11+A13+R)))
  805 IF((A11+A13-R).EQ.0.0) GOTO 806
      B2=SQRT(ABS(-2.0*DA1/(A11+A13-R)))
  806 COL=SQRT(UBAR**2+VBAR**2)
      [illegible]
```

```
      B11=-1.0*VARU/DET
      D1=VARU/DET
  432 A11=RER*A1
      A12=2.0*RER*B11
      A13=RER*D1
      A14=1.0
      DA1=-1.0*A14
      TH1=0.0
      IF(A12.NE.0.0.AND.(A11-A13).NE.0.0)TH1=0.5*ATAN2
     1(A12,A11-A13)+1.570795
      TH2=TH1*57.2957795
      RR=(A11-A13)**2+A12**2
      R=SQRT(RR)
      R1=0.000000
      R2=0.000000
      IF((A11+A13+R).EQ.0.0) GOTO 805
      R1=SQRT(ABS(-2.0*DA1/(A11+A13+R)))
→ 805 IF((A11+A13-R).EQ.0.0) GOTO 806
      R2=SQRT(ABS(-2.0*DA1/(A11+A13-R)))
  806 COL=SQRT(UBAR**2+VBAR**2)
      HUE=0.0
      IF(UBAR.NE.0.0.AND.VBAR.NE.0.0)HUE=63.661977*ATAN2(UBAR,VBAR)
      CALL ELLI(R1,R2,HUE,TH2,COL,RRS,RRH,ARE)
      ADDSS=ADDSS+RRS
      ADDSH=ADDSH+RRH
      IF(KKK.EQ.1)WRITE(2,292)L,HUE,COL,R2,R1,TH2,RRS,RRH,ARE
     1,XLBAR,SIGL,BBAR,SIGB
  292 FORMAT(1H ,8X,'STIM',I3,2X,2F8.1,2(1X,E7.2),F8.1,3(1X,E7.2),
     1F8.1,1X,E7.2,F8.1,1X,E7.2)
      IF(KKK.EQ.2)WRITE(2,293)L,HUE,COL,R2,R1,TH2,RRS,RRH,ARE
     1,XLBAR,SIGL,BBAR,SIGB
  293 FORMAT(1H ,8X,'STIM',I3,2X,2F8.1,2(1X,E7.2),F8.1,3(1X,E7.2),
     1F8.1,1X,E7.2,F8.1,1X,E7.2,3X,'XXXX')
  3 3 CONTINUE
      FARB=0.0
      FARL=0.0
      IF(NNNL.GT.0)FARL=ADDSL/FLOAT(NNNL)
      IF(NNNB.GT.0)FARB=ADDSB/FLOAT(NNNB)
      FARH=ADDSH/FLOAT(NSTIM)
      FARS=ADDSS/FLOAT(NSTIM)
      WRITE(2,879)FARS,FARH,FARL,FARB
    2 CONTINUE
      STOP
      END
      SUBROUTINE ELLI(R1,R2,HUE,TH2,COL,RRS,RRH,ARE)
      HU=0.9*HUE
      ALP=HU+TH2-90.0
      ALP=0.017453*ALP
      ALPY=ALP+1.570796
      RAR1=SQRT(R2**2*COS(ALP)**2+R1**2*SIN(ALP)**2)
      RAR2=SQRT(R2**2*COS(ALPY)**2+R1**2*SIN(ALPY)**2)
      RRS=0.0
      RRH=0.0
      ARE=0.0
      IF(COL.EQ.0.0) GOTO 752
      RRS=RAR1/COL
      RAR22=0.5*RAR2
      RRH=0.31831*ATAN2(RAR22,COL)
      ARE=3.14159*R1*R2/COL
  752 CONTINUE
      RETURN
      END
      FINISH

**** END OF STREAM  PGGX?20       446
```