INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

T.24
(06/98)

SERIES T: TERMINALS FOR TELEMATIC SERVICES

Standardized digitized image set

ITU-T Recommendation T.24

(Previously CCITT Recommendation)

ITU-T RECOMMENDATION T.24

STANDARDIZED DIGITIZED IMAGE SET

Summary

The images in this Recommendation include the original eight "ITU-T images" (referred to for years as the "CCITT images"), two bi-level test charts, a gray-scale test chart, various screened half-tone images, electronically dithered images, computer-generated images, gray-scale images and color images. The purpose of this image set is to provide a consistent baseline for future work; for example, results of compression algorithm experiments and image quality tests can be compared by a broad range of users, knowing that the input image data is identical.

The specimens reproduced inside the Recommendation in the figures are given for illustration purposes and are not suitable for measurements.

Source

ITU-T Recommendation T.24 was revised by ITU-T Study Group 8 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 18th of June 1998.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation the term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration, ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Included electronic files:

CD-ROM 1:

Eight ITU-T reference images, T.22 test chart No. 4, Legibility test chart, Bi-level half tones, T.22 test chart No. 5, Houses, T.23 test chart No. 6.

CD-ROM 2:

CCIR images, CMYK color images, RGB color images, Fingerprint and medical gray-scale images, Line drawing images, Fine arts images, Low-contrast gray-scale images.

Introduction

Test images have played an important role throughout the development of Group 3 and Group 4 facsimile. This Recommendation has been prepared with the goal of providing a standard set of images[1] to facsimile experimenters. The set includes images that have been used over the years plus new images that are applicable for gray scale and color. The standard set of images will provide a consistent baseline for further work; for example, results of compression algorithm experiments and image quality tests can be compared by a broad range of users, knowing that the input image data is identical. The set of images, stored on a Compact Disk Read Only Memory (CD-ROM), is available from the ITU.

[1] The test images reproduced in this Recommendation are not suitable for the tests.

Recommendation T.24

STANDARDIZED DIGITIZED IMAGE SET

(revised in 1998)

Description of the standardized digitized image set[2]

1 Eight ITU-T reference images

This image set is derived from the eight ITU-T reference pages (commonly known as the "CCITT images"). The eight pages were originally digitized by the French Administration as 200 pels per 25.4 mm and were used in the Group 3 Facsimile algorithm selection process, completed in 1980. The digitized images herein were produced from original-quality copies of the eight ITU-T reference pages, made at the time that the Group 3 compression algorithm studies were being conducted. All of the pages are A4 size, that is 210 mm wide by 297 mm long. The resolutions selected for the scanning process (200, 300, 400 and 600 pels per 25.4 mm) were based on those specified in the Group 3 and Group 4 Recommendations (200, 300 and 400 pels per 25.4 mm) plus 600 pels per 25.4 mm.

The number of pels per line is determined from the resolution and the width of the page. For the A4 page width of 210 mm, a 200 pels per 25.4 mm scan gives 1654 pels per line. The 1654 pel width is not a convenient number for computer-based processing (not divisible by 8). To correct this condition, the charts were scanned to produce the nominal pels per line and lines per image shown in the Group 3 and Group 4 Recommendations. This means that the pages were centered and overscanned. (The chart itself is 210 mm wide, but the scan line is 219.46 mm wide.) The total number of bytes required to store each of the images, as a function of resolution (or sampling density), is shown in Table 1. The eight ITU Reference Documents are illustrated in Figures 1 through 8.

[2] The specimens reproduced inside the Recommendation in the figures are given for illustration purposes and are not suitable for measurements.

Table 1/T.24 – ITU Reference Documents

Figure number	Image	Description	Dimensions				Resolution (pixels/inch) (1 bit/pixel)	Size (MBytes)
			Pixels		Inches			
			Width	Height	Width	Height		
Figure 1	Document No. 1	English Letter	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 2	Document No. 2	Circuit Drawing	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 3	Document No. 3	French Invoice	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 4	Document No. 4	French Text	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 5	Document No. 5	French Text Figures	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 6	Document No. 6	French Chart	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 7	Document No. 7	Kanji	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
Figure 8	Document No. 8	Handwritten Memorandum	1728 2592 3456 5184	2339 3508 4677 7016	8.64 8.64 8.64 8.64	11.70 11.69 11.69 11.69	200 300 400 600	0.51 1.14 2.02 4.55
NOTE – The users of the Recommendation may freely reproduce Figures 1 to 8 to check the quality of document facsimile transmission.								

THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH25 8ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC 18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

Yours sincerely,

Phil.

P.J. CROSS
Group Leader - Facsimile Research

Registered in England: No. 2038
Registered Office: 60 Vicara Lane, Ilford, Essex.

Figure 1/T.24 – Document No. 1 – English Letter

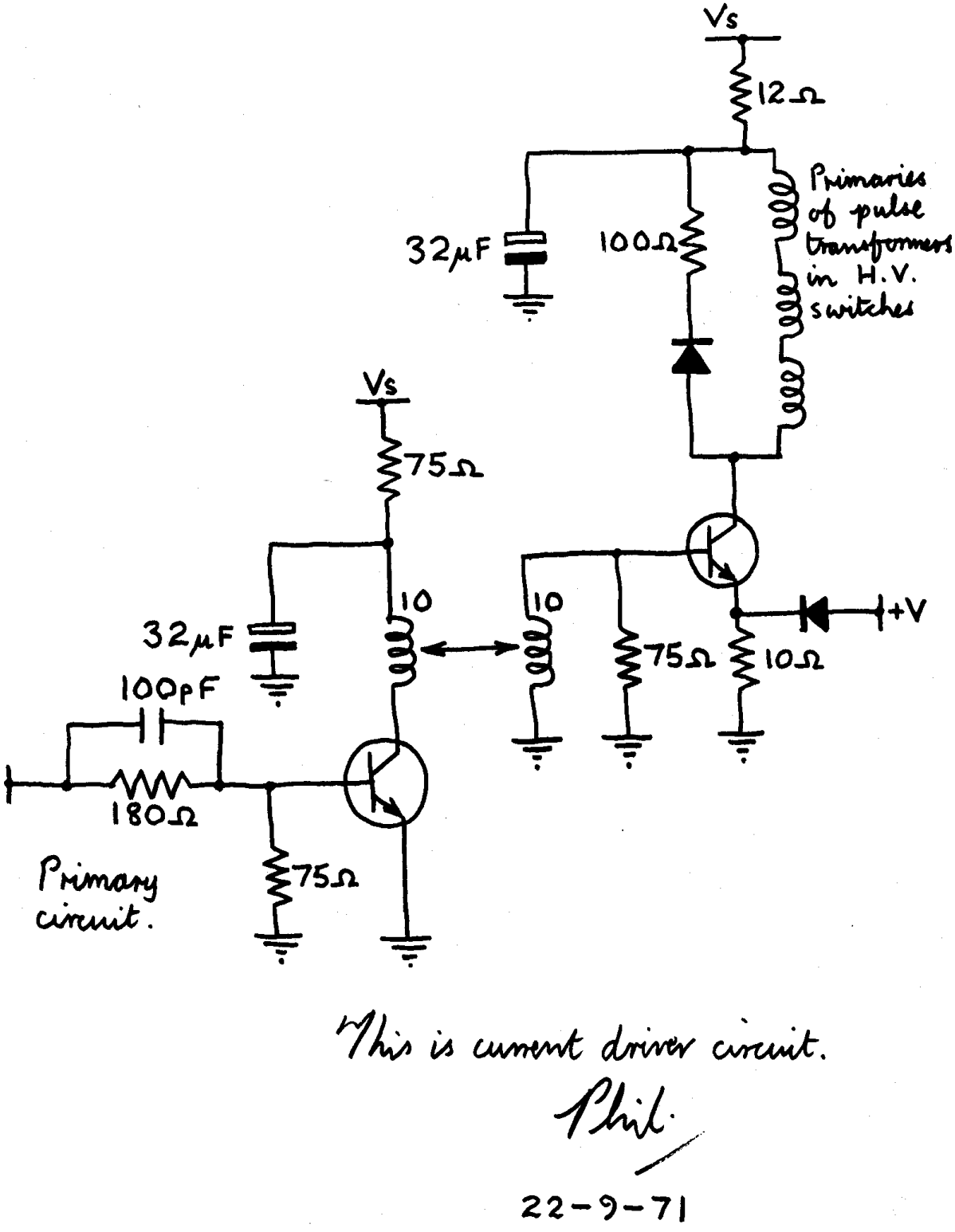


Figure 2/T.24 – Document No. 2 – Circuit Drawing

ÉTABLISSEMENTS ABCDEFG
SOCIÉTÉ ANONYME AU CAPITAL DE 300 000 F
20, RUE DU XVUTRSTBSL F 00000 NTBCLAG
Tél. : (35) 24.46.32 Adr. Tg. : NRVLJROLM
Télex : 31596 F IN : 718490070257
Transporteur (ou Transitaire)
M. M. DUPONT Frères
8 quai des bicdfsh F 0000 NTBCLAG

Mot directeur

CLASSEMENT	FACTURE INVOICE	Exemplaire 15	
CODE CLIENT Z 04399	DATE 7-7-74	NUMÉRO 06	FEUILLET 01

Votre commande du 74-2-2 numéro 438
Notre offre AZ/B7 du 74-1-1 numéro 12

LIVRAISON
5, rue XYZ
99000 VILLE

FACTURATION
12, rue ABCD BP 15
99000 VILLE

DOMICILIATION BANCAIRE DU VENDEUR

CODE BANQUE | CODE GUICHET | COMPTE CLIENT

PAYS D'ORIGINE | PAYS DE DESTINATION

CONDITIONS DE LIVRAISON | DATE 74-03-03

LICENCE D'EXPORTATION | NATURE DU CONTRAT (monnaie)

CONDITIONS DE PAIEMENT FAB (échéance, %...)

TRANSPORTS ORIGINE	TRANSPORTS DESTINATION	MODE
Pays 1	Etat 2	Air

MARQUES ET NUMÉROS MARKS AND NUMBERS	NOMBRE ET NATURE DES COLIS : DÉNOMINATION DE LA MARCHANDISE NUMBER AND KING OF PACKAGES: DESCRIPTION OF GOODS	NOMENCLATURE STATISTICAL No.	MASSE NETTE NET WEIGHT / MASSE BRUTE GROSS WEIGHT	VALEUR VALUE / DIMENSIONS MEASUREMENTS
74.21.456.44.2 A	1 Composants	U 123/4	5 kg 8 kg	1400 X 13x10x6

QUANTITÉ COMMANDÉE ET UNITÉ QUANTITY ORDERED AND UNIT	N° ET RÉF. DE L'ARTICLE	DÉSIGNATION	QUANTITÉ LIVRÉE ET UNITÉ QUANTITY DELIVERED AND UNIT	PRIX UNITAIRE UNIT PRICE	MONTANT TOTAL TOTAL AMOUNT
2	AF-809	Circuit intégré	2	104,33 F	208,66 F
10	S8-T4	Connecteur	10	83,10 F	831,00 F
25	ZI07	Composant indéterminé	20	15,00 F	300,00 F

Costs	Débours	Inclus	Non inclus
Packing	Emballages		92,14
Freight	Transport		
Insurance	Assurances		
Total invoice amount	Montant total de la facture		1431,80
Installment	Acomptes		
NET TO BE PAID	NET A RÉGLER		1431,80

Figure 3/T.24 – Document No. 3 – French Invoice

L'ordre de lancement et de réalisation des applications fait l'objet de décisions au plus haut niveau de la Direction Générale des Télécommunications. Il n'est certes pas question de construire ce système intégré "en bloc" mais bien au contraire de procéder par étapes, par paliers successifs. Certaines applications, dont la rentabilité ne pourra être assurée, ne seront pas entreprises. Actuellement, sur trente applications qui ont pu être globalement définies, six en sont au stade de l'exploitation, six autres se sont vu donner la priorité pour leur réalisation.
Chaque application est confiée à un "chef de projet", responsable successivement de sa conception, de son analyse-programmation et de sa mise en oeuvre dans une région-pilote. La généralisation ultérieure de l'application réalisée dans cette région-pilote dépend des résultats obtenus et fait l'objet d'une décision de la Direction Générale. Néanmoins, le chef de projet doit dès le départ considérer que son activité a une vocation nationale donc refuser tout particularisme régional. Il est aidé d'une équipe d'analystes-programmeurs et entouré d'un "groupe de conception" chargé de rédiger le document de "définition des objectifs globaux" puis le "cahier des charges" de l'application, qui sont adressés pour avis à tous les services utilisateurs potentiels et aux chefs de projet des autres applications. Le groupe de conception comprend 6 à 10 personnes représentant les services les plus divers concernés par le projet, et comporte obligatoirement un bon analyste attaché à l'application.

II - L'IMPLANTATION GEOGRAPHIQUE D'UN RESEAU INFORMATIQUE PERFORMANT

L'organisation de l'entreprise française des télécommunications repose sur l'existence de 20 régions. Des calculateurs ont été implantés dans le passé au moins dans toutes les plus importantes. On trouve ainsi des machines Bull Gamma 30 à Lyon et Marseille, des GE 425 à Lille, Bordeaux, Toulouse et Montpellier, un GE 437 à Massy, enfin quelques machines Bull 300 TI à programmes câblés étaient récemment ou sont encore en service dans les régions de Nancy, Nantes, Limoges, Poitiers et Rouen ; ce parc est essentiellement utilisé pour la comptabilité téléphonique.
A l'avenir, si la plupart des fichiers nécessaires aux applications décrites plus haut peuvent être gérés en temps différé, un certain nombre d'entre eux devront nécessairement être accessibles, voire mis à jour en temps réel : parmi ces derniers le fichier commercial des abonnés, le fichier des renseignements, le fichier des circuits, le fichier technique des abonnés contiendront des quantités considérables d'informations.
Le volume total de caractères à gérer en phase finale sur un ordinateur ayant en charge quelques 500 000 abonnés a été estimé à un milliard de caractères au moins. Au moins le tiers des données seront concernées par des traitements en temps réel.
Aucun des calculateurs énumérés plus haut ne permettait d'envisager de tels traitements.
L'intégration progressive de toutes les applications suppose la création d'un support commun pour toutes les informations, une véritable "Banque de données", répartie sur des moyens de traitement nationaux et régionaux, et qui devra rester alimentée, mise à jour en permanence, à partir de la base de l'entreprise, c'est-à-dire les chantiers, les magasins, les guichets des services d'abonnement, les services de personnel etc.
L'étude des différents fichiers à constituer a donc permis de définir les principales caractéristiques du réseau d'ordinateurs nouveaux à mettre en place pour aborder la réalisation du système informatif. L'obligation de faire appel à des ordinateurs de troisième génération, très puissants et dotés de volumineuses mémoires de masse, a conduit à en réduire substantiellement le nombre.
L'implantation de sept centres de calcul interrégionaux constituera un compromis entre : d'une part le désir de réduire le coût économique de l'ensemble, de faciliter la coordination des équipes d'informaticiens; et d'autre part le refus de créer des centres trop importants difficiles à gérer et à diriger, et posant des problèmes délicats de sécurité. Le regroupement des traitements relatifs à plusieurs régions sur chacun de ces sept centres permettra de leur donner une taille relativement homogène. Chaque centre "gèrera" environ un million d'abonnés à la fin du VIème Plan.
La mise en place de ces centres a débuté au début de l'année 1971 : un ordinateur IRIS 50 de la Compagnie Internationale pour l'Informatique a été installé à Toulouse en février ; la même machine vient d'être mise en service au centre de calcul interrégional de Bordeaux.

Photo n° 1 - Document très dense lettre 1,5mm de haut -
Restitution photo n° 9

Figure 4/T.24 – Document No. 4 – French Text

Cela est d'autant plus valable que $T\Delta f$ est plus grand. A cet égard la figure 2 représente la vraie courbe donnant $|\phi(f)|$ en fonction de f pour les valeurs numériques indiquées page précédente.

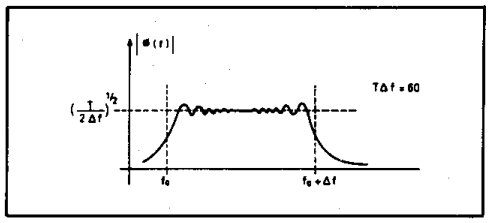


FIG. 2

Dans ce cas, le filtre adapté pourra être constitué, conformément à la figure 3, par la cascade :

— d'un filtre passe-bande de transfert unité pour $f_0 \leqslant f \leqslant f_0+\Delta f$ et de transfert quasi nul pour $f < f_0$ et $f > f_0+\Delta f$, filtre ne modifiant pas la phase des composants le traversant ;

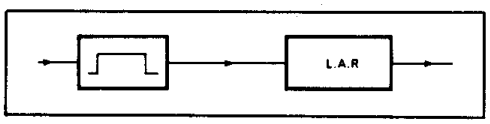


FIG. 3

— filtre suivi d'une ligne à retard (LAR) dispersive ayant un temps de propagation de groupe T_R décroissant linéairement avec la fréquence f suivant l'expression :

$$T_R = T_0+(f_0-f)\frac{T}{\Delta f} \quad \text{(avec } T_0 > T\text{)}$$

(voir fig. 4).

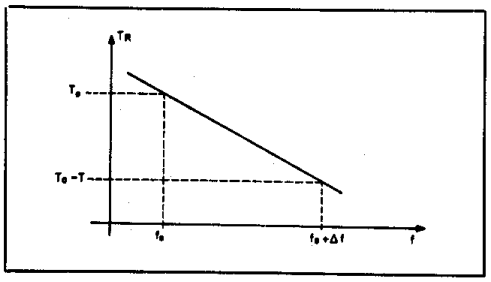


FIG. 4

telle ligne à retard est donnée par :

$$\varphi = -2\pi \int_0^f T_R \, df$$

$$\varphi = -2\pi \left[T_0+\frac{f_0 T}{\Delta f}\right] f + \pi \frac{T}{\Delta f} f^2$$

Et cette phase est bien l'opposé de $/\phi(f)$, à un déphasage constant près (sans importance) et à un retard T_0 près (inévitable).

Un signal utile $S(t)$ traversant un tel filtre adapté donne à la sortie (à un retard T_0 près et à un déphasage près de la porteuse) un signal dont la transformée de Fourier est réelle, constante entre f_0 et $f_0+\Delta f$, et nulle de part et d'autre de f_0 et de $f_0+\Delta f$, c'est-à-dire un signal de fréquence porteuse $f_0+\Delta f/2$ et dont l'enveloppe a la forme indiquée à la figure 5, où l'on a représenté simultanément le signal $S(t)$ et le signal $S_1(t)$ correspondant obtenu à la sortie du filtre adapté. On comprend le nom de récepteur à compression d'impulsion donné à ce genre de filtre adapté : la « largeur » (à 3 dB) du signal comprimé étant égale à $1/\Delta f$, le rapport de compression est de $\dfrac{T}{1/\Delta f} = T\Delta f$

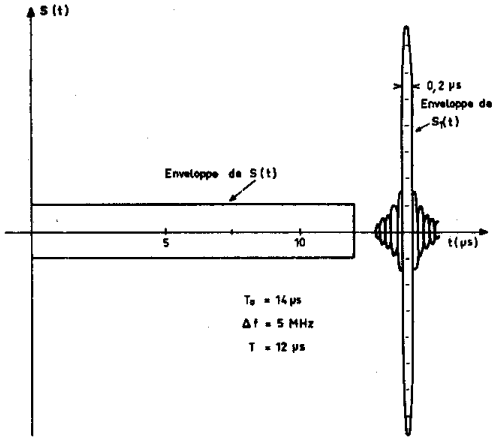
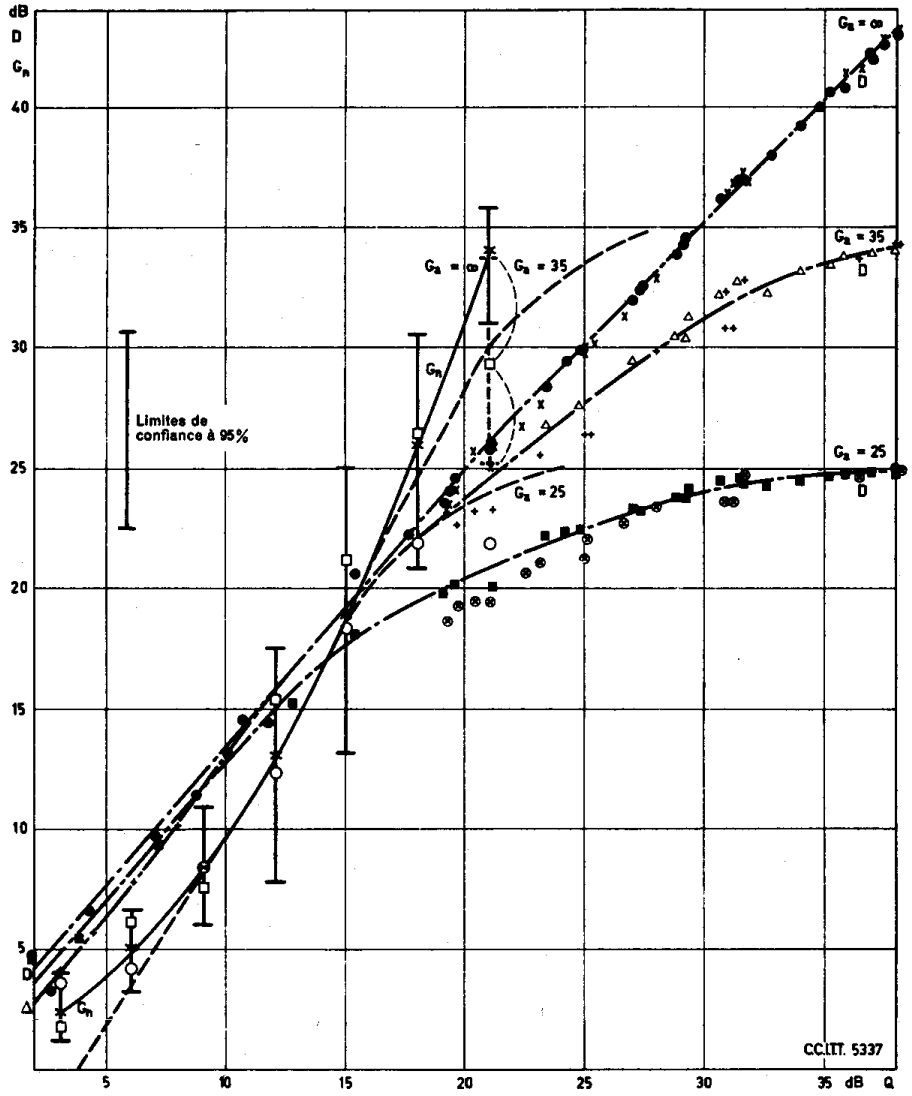


FIG. 5

On saisit physiquement le phénomène de compression en réalisant que lorsque le signal $S(t)$ entre dans la ligne à retard (LAR) la fréquence qui entre la première à l'instant 0 est la fréquence basse f_0, qui met un temps T_0 pour traverser. La fréquence f entre à l'instant $t = (f-f_0)\dfrac{T}{\Delta f}$ et elle met un temps $T_0-(f-f_0)\dfrac{T}{\Delta f}$ pour traverser, ce qui la fait ressortir à l'instant T_0 également. Ainsi donc, le signal $S(t)$

Figure 5/T.24 – Document No. 5 – French Text Figures



Courbes adaptées G_a (essais subjectifs) pour
$G_a = \infty$ $G_a = 35$dB $G_a = 25$dB
[10] ——— × □ ○
[23] — — — —

Points calculés $D\ (Q, G_a)$ pour
$G_a = \infty$ $G_a = 25$ $G_a = 35$ dB
● ■ △ – dans la partie montante
× ⊕ + – dans la partie descendante

Courbes ——— — — ——— — — $D\ (Q, G_a)$

FIGURE 3

TOME V — Question 18/XII, Annexe 6

Figure 6/T.24 – Document No. 6 – French Chart

ＣＣＩＴＴの概要

沿革

ＣＣＩＴＴは、国際電気通信連合（ＩＴＵ）の四つの常設機関（事務総局、国際周波数登録委員会、ＣＣＩＲ、ＣＣＩＴＴ）の一つとして、ＩＴＵの中でも、世界の国際通信上の諸問題を真先に取上げ、その解決方法を見出して行く重要な機関である。日本名は、国際電信電話諮問委員会と称する。

ＣＣＩＴＴの前身は、ＣＣＩＦ（国際電話諮問委員会）とＣＣＩＴ（国際電信諮問委員会）である。ＣＣＩＦは、１９２４年にヨーロッパに「国際長距離電話通信諮問委員会」が設置され、これが１９２５年のパリ電信電話会議のとき、正式に、「国際電話諮問委員会」として万国電信連合の公式機関となったものである。ＣＣＩＴは、同じく１９２５年の会議のとき、ＣＣＩＦと併立するものとして設置された。

そして、ＣＣＩＦは、１９５６年の12月に第18回総会が開催されたのち、ＣＣＩＴは、同年同月に第８回総会が開催されたのち、併合されて現在のＣＣＩＴＴとなった。このＣＣＩＴＴは、ＣＣＩＦとＣＣＩＴが解散した直後、第１回総会を開催し、第２回総会は、１９６０年にニューデリーで、第３回総会は、１９６４年、ジュネーブで、第４回総会は、１９６８年、アルゼンチンで開催された。

ＣＣＩＦとＣＣＩＴが合併したのは、有線電気通信の分野、とくに伝送路について電信回線と電話回線とを技術的に分ける意味がなくなってきたこと、各国とも大体において、電信部門と電話部門は同一組織内にあること、ＣＣＩＦの事務局とＣＣＩＴの事務局の合併による能率増進等がおもな理由であった。

ＣＣＩＴＴは、上述のように、ヨーロッパ内の国ぐにによって、ヨーロッパ内の電信・電話の技術・運用・料金の基準を定め、あるいは統一をはかってきたので、現在でも、その影響を受け、会合参加国は、ヨーロッパの国が多く、ヨーロッパで生起する問題の研究が多い。たとえば、１９６０年のＣＣＩＴＴ勧告の中で、技術上配慮する距離は約２，５００㎞であったが、これはヨーロッパ内領域を想定したものである。

しかしながら、１９５６年９月に敷設された大西洋横断電話ケーブルは、大陸間電話通信の自動化および半自動化への技術的可能性を与え、ＣＣＩＴＴがこの問題を取り上げるに及び、ＣＣＩＴＴの性格は漸次、汎世界的色彩を実質的に帯びるに至った。この汎世界的性格は第２次世界大戦後目ざましくなったアジア・アフリカ植民地の独立に伴ってＩＴＵの構成員の中にこれらの国が加わり、ＩＴＵの中に新しい意見が導入されたことにも起因して、技術面、政治面の双方から導入されてきた。ＣＣＩＴＴの汎世界化は、１９６０年の第２回総会がニューデリーで開催されたことにもあらわれている。この総会までは、ＣＣＩＴ、ＣＣＩＦのいずれにしろ、アメリカやアジアで総会が開催されたことがなく、ＣＣＩＴＴ委員長も、ニューデリー総会の準備文書で、この点には注目すべきであるとのべている。

任務

ＩＴＵは、全権委員会議、主管庁会議を始めとして、七つの機関をもち、それぞれの機関の権限と任務は国際電気通信条約に明記されている。そこで条約を参照してみるならば、ＣＣＩＴＴの任務は、つぎのとおりとなっている。

「国際電信電話諮問委員会（ＣＣＩＴＴ）は、電信および電話に関する技術、運用および料金の問題について研究し、および意見を表明することを任務とする。」（１９６５年モントルー条約第１８７号）

「各国際諮問委員会は、その任務の遂行に当たって、新しい国または発展の途上にある国における地域的および国際的分野にわたる電気通信の創設、発達および改善に直接関連のある問題について研究し、および意見を作成するように妥当な注意を払わなければならない。」（同第１８８号）

「各国際諮問委員会は、また、関係国の要請に基づき、その国内電気通信の問題について研究し、かつ、勧告を行なうことができる。」（同第１８９号）

上記第１８７号と第１８８号にいわれる「意見」とは、フランス語の Avis から訳したもので、英語では、「勧告（Recommendation）」となっている。ＣＣＩＴＴの表明する意見は、国際法的には強制力をもたないものであって、この点が、条約、電信規則、電話規則等各国を拘束する力をもっているものと異なる。もっとも意見とは称しても、技術的分野では、電信規則のごとき、各国政府が承認してその内容を実施する強制規則をもたないので、実際にある機器の仕様を定める場合には、多くの国の意見が統一されたこの「意見」に従わなければ、円滑な国際通信を行なうことができない場合が多い。この意見（または勧告）は、国際通信を行なう場合各国が直面する問題について、具体的意見を表明するもので、たとえば、大陸間ケーブルで大陸間通話を半自動化しようとする場合、その信号方式や取り扱う通話の種類および料金は、どのようにするかを研究して意見を表明する。したがって、ＣＣＩＴＴの活動は、つねに時代の最先端を行くもので、ＣＣＩＴＴの活動方向は、そのまま世界の国際通信の活動方向であるともいえる。

この意見は、また、電信規則以下のその他の規則のごとく、数年以上の間隔をもって開催される主管庁会議というような大会議の決定をまたなくても表明することができ、また、その改正も容易であるので、現在のように進歩の早い国際通信界では、関係国の意見を統一した国際的見解としては非常に便利である。

Figure 7/T.24 – Document No. 7 – Kanji

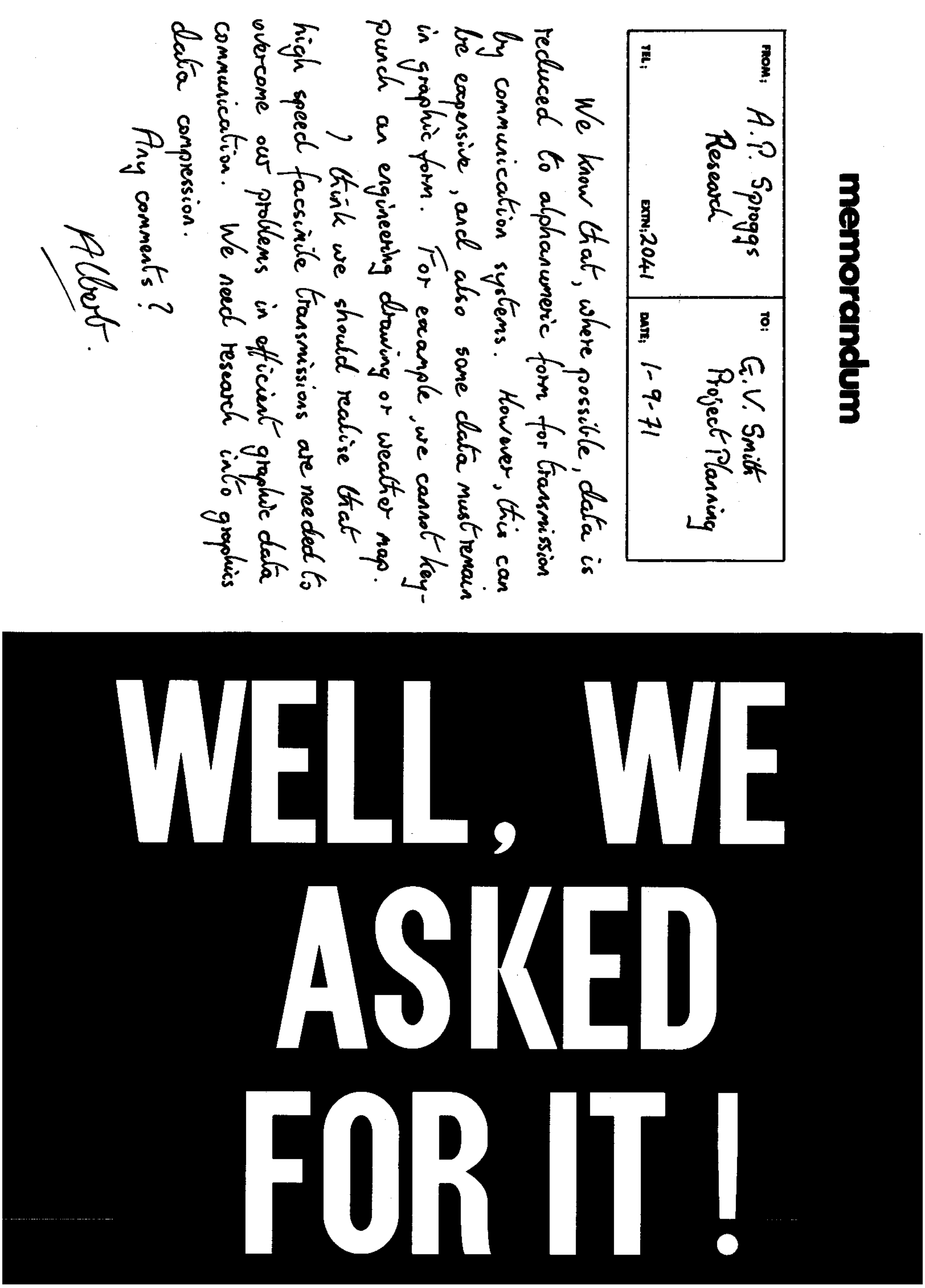


Figure 8/T.24 – Document No. 8 – Handwritten Memorandum

2 T.22 Test Chart No. 4 – Black-White Facsimile Test Chart BW01

This bi-level image is the digitization (at 400 pels per inch) of the high-contrast black/white chart that is one of two charts that make up T.22 (see Figure 9 and Table 2). Figure 9 contains text in a variety of languages, fonts and pitches, and various test patterns.

Table 2/T.24 – High-Contrast Test Chart Image

Figure number	Image	Description	Dimensions				Resolution (pixels/inch) (1 bit/pixel)	Size (MBytes)
			Pixels		Inches			
			Width	Height	Width	Height		
Figure 9	T.22 Test Chart No. 4	Facsimile Test Chart	3504	4750	8.76	11.88	400	2.09

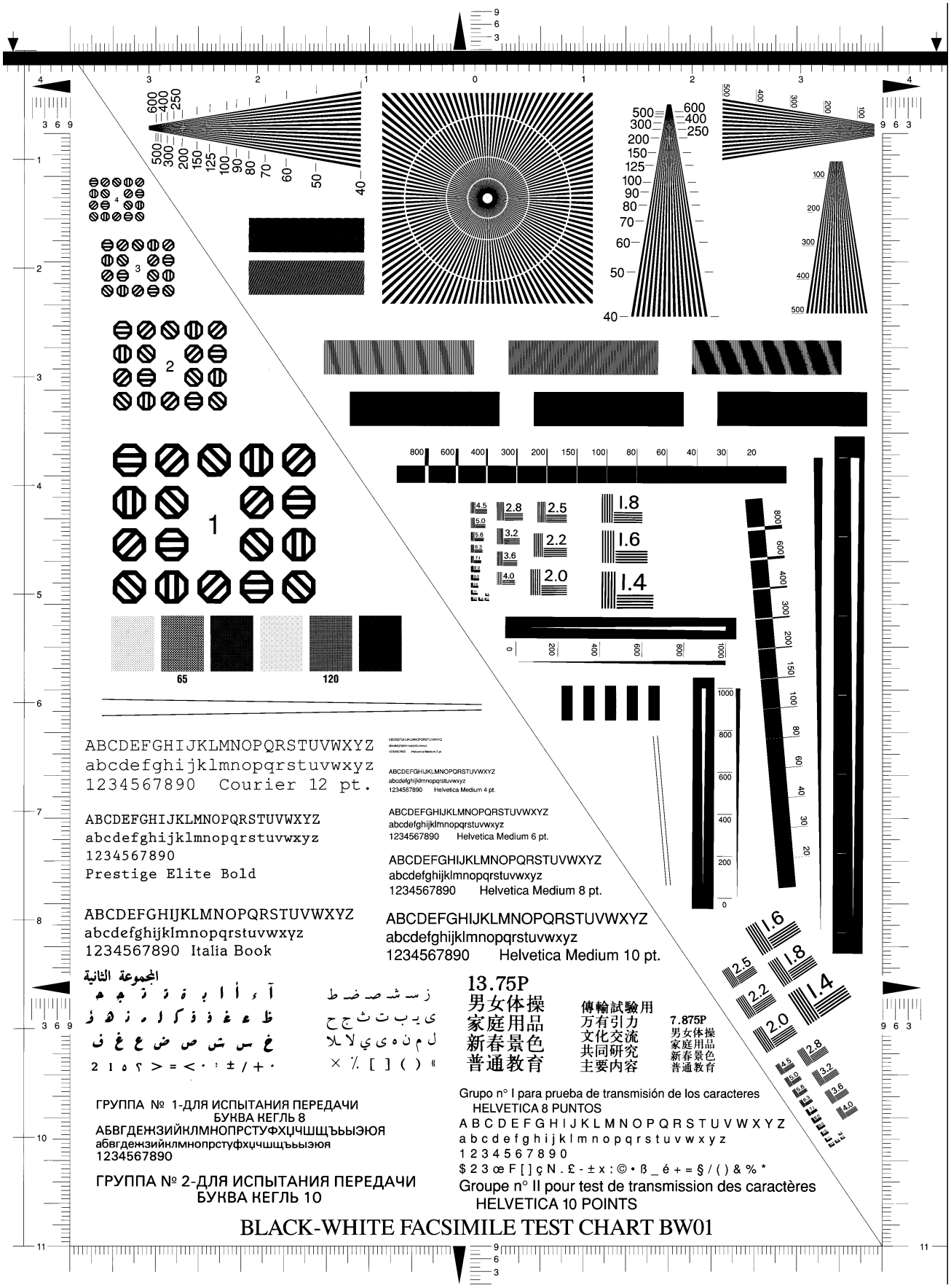


Figure 9/T.24 – Test Pattern Facsimile Test Chart BW01

3 Legibility Test Chart

This digitized image (see Figure 10 and Table 3) contains random text in four different fonts with six different point sizes. Plus, its lower half includes half-tone imagery that uses five different screen densities (65, 85, 120, 133 and 150 lines/inch).

Table 3/T.24 – Legibility Test Chart Image

Figure number	Image	Description	Dimensions				Resolution (pixels/inch) (1 bit/pixel)	Size (MBytes)
			Pixels		Inches			
			Width	Height	Width	Height		
Figure 10	Half-tone Chart	Text for legibility testing, half-tones	1728 2048 2560 3456 4096	2336 2800 3500 4672 5600	8.64 8.53 8.53 8.64 8.53	11.68 11.67 11.68 11.67 11.67	200 240 300 400 480	0.51 0.72 1.13 2.02 2.87

10 Point

dKfje giewo s1weo xcaqp cNvbm xiuyt rEdv2 dkfJe giewo slW3o xcaQp c9vbm xiuy dKfje giewo s1weo xcaqp cNvbm xiuyt rEdv2 dkfJe rEdvj dkfj5 giewo sLweo xca4G cnvbm x8uyt redVJ dkfje Gie6o slwXo xcaqp dKfje giewo s1weo xcaqp cNvbm xiuyt rEdv2 dkfJe Cnvbm xiuyt redvJ d45je giewo slBUo xc2Fp cnvbm xiWyt red0j dkfje **giEwo slweo xCa7p cnvbm xi26t redvj KJfje giewo Slweo xc5Tp cnvbm xiuyt Redvj dkfje gVew dKfje giewo s1weo xcaqp**

8 Point

dKfje giewo s1weo xcaqp cNvbm xiuyt rEdv2 dkfJe giewo slW3o xcaQp c9vbm xiuy eikjf kjK56 defge 83fdKfje giewo s1weo xcaqp cNvbm xiuyt rEdv2 dkfJe rEdvj dkfj5 giewo sLweo xca4G cnvbm x8uyt redVJ dkfje Gie6o slwXo xcaqp KL3er keich 3ks0d dKfje giewo s1weo xcaqp Cnvbm xiuyt redvJ d45je giewo slBUo xc2Fp cnvbm xiWyt red0j dkfje gIEwo 3kdoc kdKod 34Ker cNvbm xiuyt rEdv2 dkfJe cNvbm xiuyt **slweo xCa7p cnvbm xi26t redvj KJfje giewo Slweo xc5Tp cnvbm xiuyt Redvj dkfje gVew 3pajc kwmcJ el cNvbm xiuyt rEdv2 dkfJe cNvbm xiuyt**

6 Point

dKfje giewo s1weo xcaqp cNvbm xiuyt rEdv2 dkfJe giewo slW3o xcaQp c9vbm xiuy eikjk kjK56 defge 83fek pwkch Kwlci hev03 dKfje giewo s1weo xcaqp cNvbm xiuyt rE dKfje giewo rEdvj dkfj5 giewo sLweo xca4G cnvbm x8uyt redVJ dkfje Gie6o slwXo xcaqp KL3er keich 3ks0d hckGH 2301s 3kchL Paroh alihc dKfje giewo s1weo xcaqp cNvbm xiuyt rE keich Cnvbm xiuyt redvJ d45je giewo slBUo xc2Fp cnvbm xiWyt red0j dkfje gIEwo 3kdoc kdKod 34Ker opucu 36cgZ qtxvp du0oh lzobn dKfje giewo s1weo xcaqp cNvbm xiuyt rE kdKod **slweo xCa7p cnvbm xi26t redvj KJfje giewo Slweo xc5Tp cnvbm xiuyt Redvj dkfje gVew 3pajc kwmcJ slqmn ba-1u 3hkej ahn3o ioch2 plnak dKfje giewo s1weo xcaqp cNvbm xiuyt rE kwmcJ ba-1**

4 Point

3 Point

2 Point

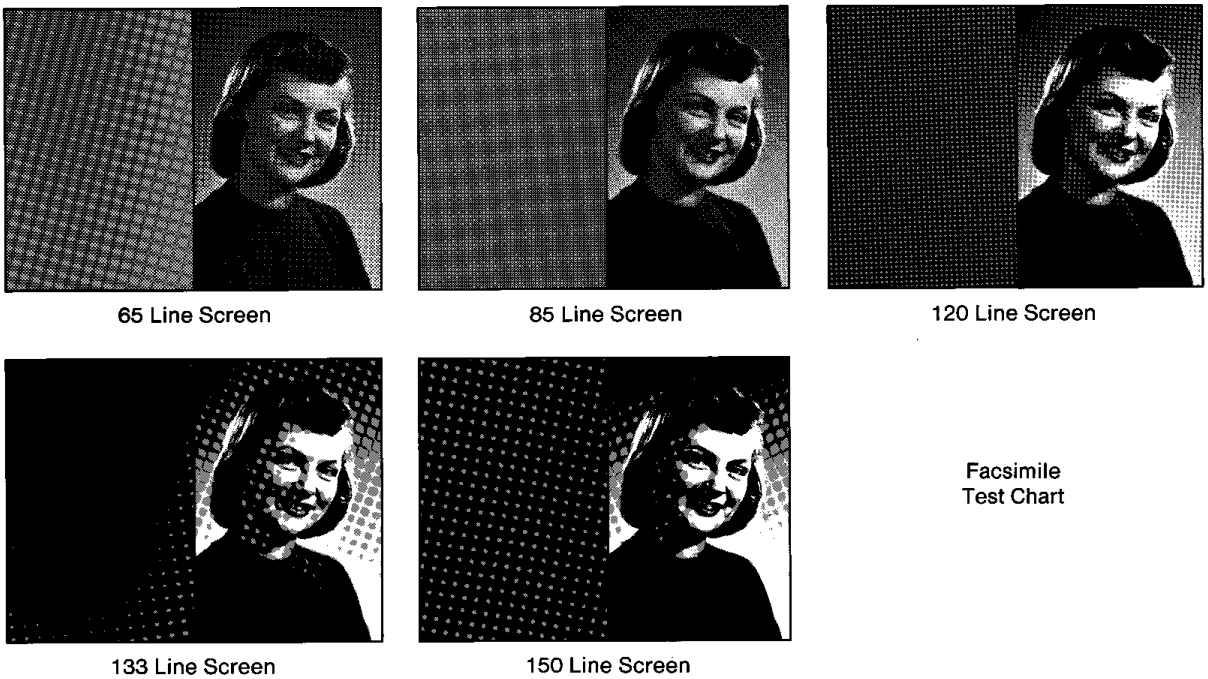


Figure 10/T.24 – Half-tone Facsimile Test Chart

4 Bi-level Half-tones

Figure 11 through Figure 17 display bi-level half-tone images (see Table 4). Figures 11, 12, 13 and 14 show dithered sailboat images. The four sailboat images were made by processing a gray-scale sailboat image with four different algorithms: The processing included 8 × 8 dithering for Figure 11, error diffusion for Figure 12, 4 × 4 dithering for Figure 13 and 3 × 3 dithering for Figure 14.

Figure 15 is a composite of the house with sky image. Starting in clockwise order from the upper left, the dither patterns are ordered 4 × 4, random dithering, ordered 8 × 8 and clump dithering.

Figure 16 combines a screened half-tone image and an electronically scanned text that has been inverted. Both the text and the image portion of the document were extracted from a magazine. Figure 17 is a composite of electronically scanned segments of magazine pages. It includes a half-tone, text and inverted text.

Table 4/T.24 – Half-Tone Images

Figure number	Image	Description	Dimensions				Resolution (pixels/inch) (1 bit/pixel)	Size (MBytes)
			Pixels		Inches			
			Width	Height	Width	Height		
Figure 11	Sailboat No. 1	8 × 8 dithering	3072	2048	7.68	5.12	400	0.79
Figure 12	Sailboat No. 2	Error diffusion	3072	2048	7.68	5.12	400	0.79
Figure 13	Sailboat No. 3	4 × 4 dithering	3072	2048	7.68	5.12	400	0.79
Figure 14	Sailboat No. 4	3 × 3 dithering	3072	2048	7.68	5.12	400	0.79
Figure 15	House with Trees	Dithered Composite	1904	1488	9.52	7.44	200	0.36
Figure 16	Magazine Text, Half-tone	Screened half-tone and inverted text	3456	4416	4.32	5.52	800	1.91
Figure 17	Magazine Page, Composite	Contains half-tone, text and inverted text	3072	4352	7.68	10.88	400	1.68

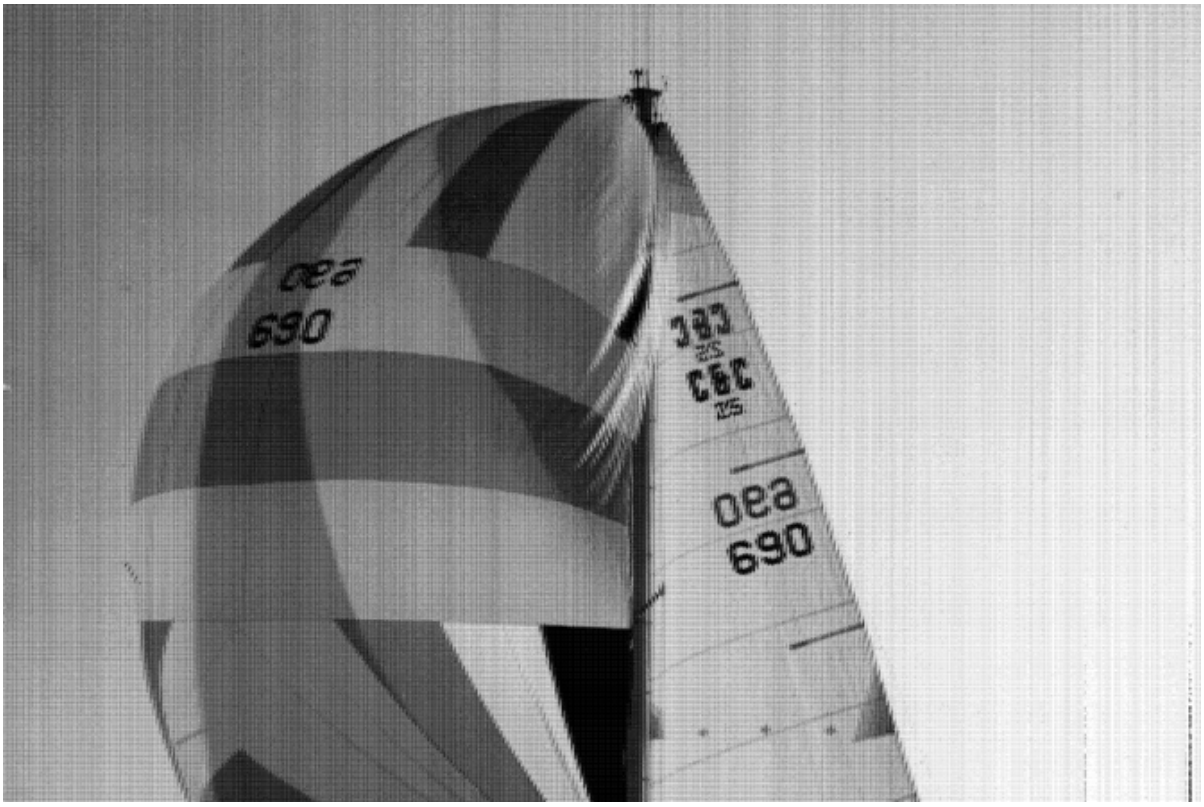


Figure 11/T.24 – Sailboat No. 1 (8 × 8 Dither)

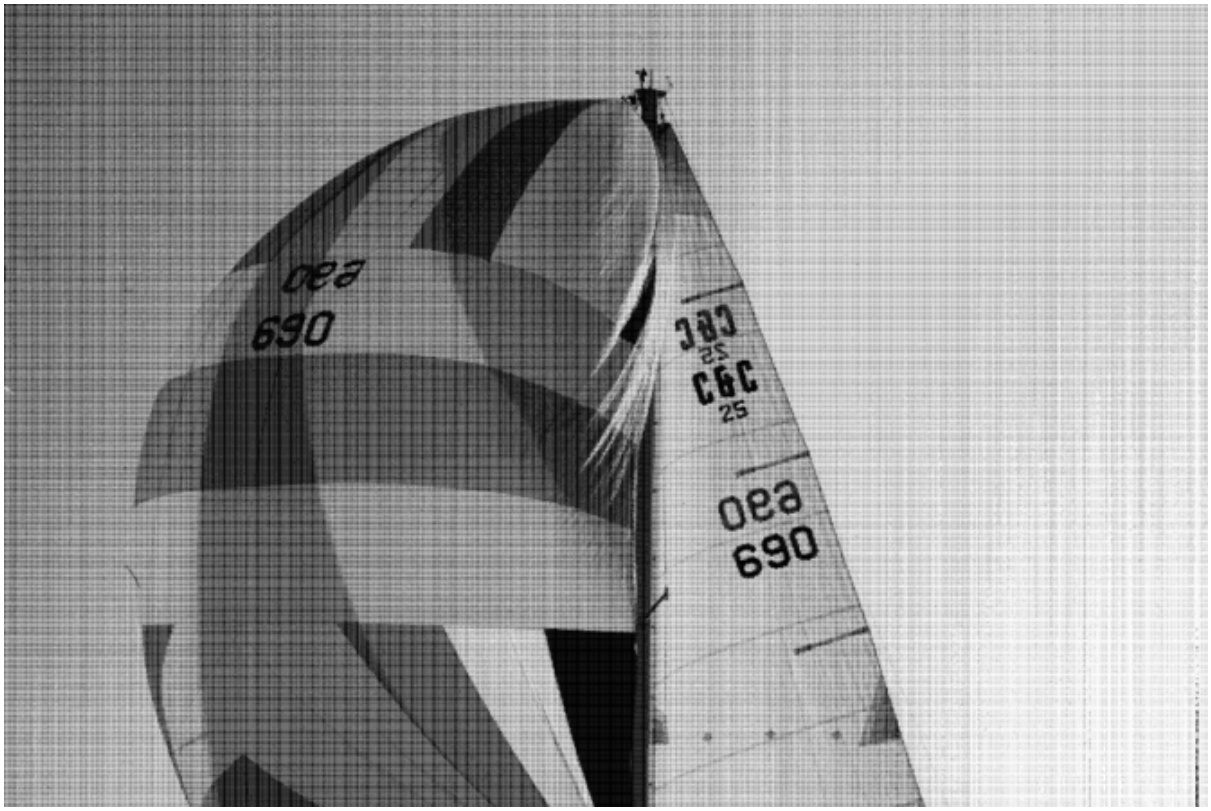


Figure 12/T.24 – Sailboat No. 2 (Error Diffusion)

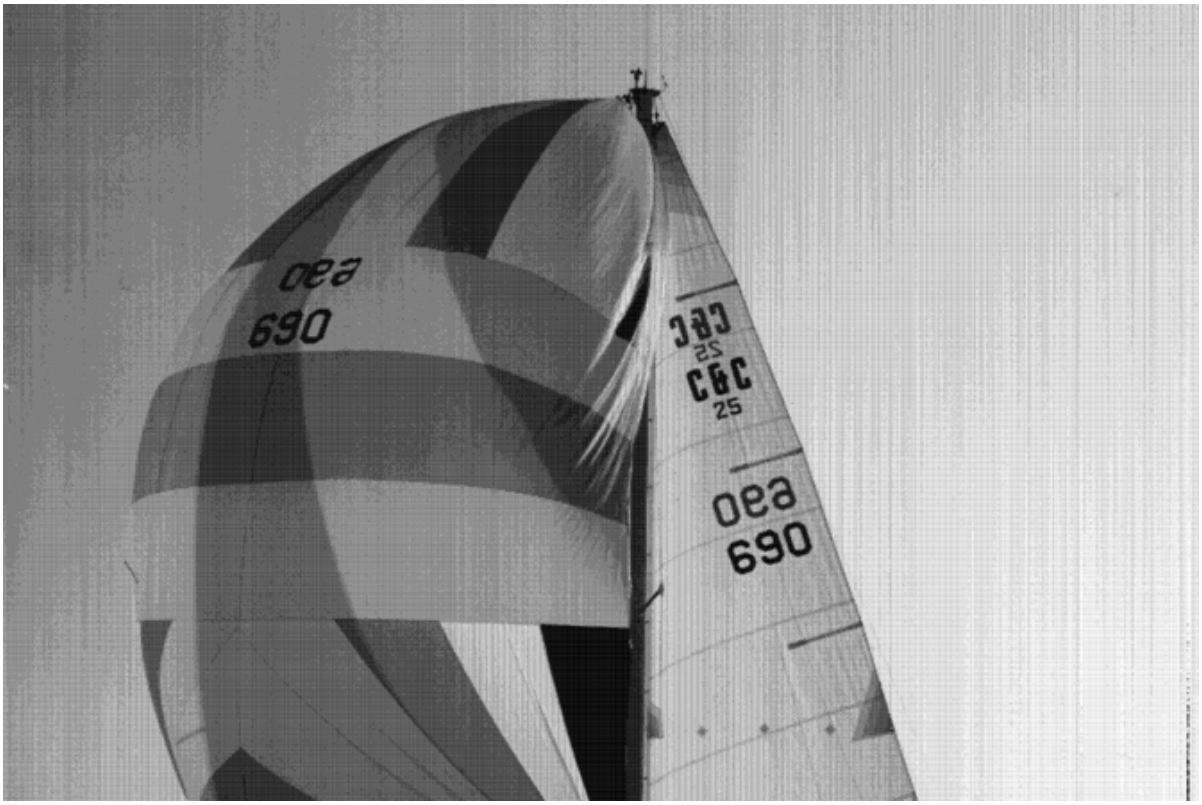


Figure 13/T.24 – Sailboat No. 3 (4 × 4 Dither)

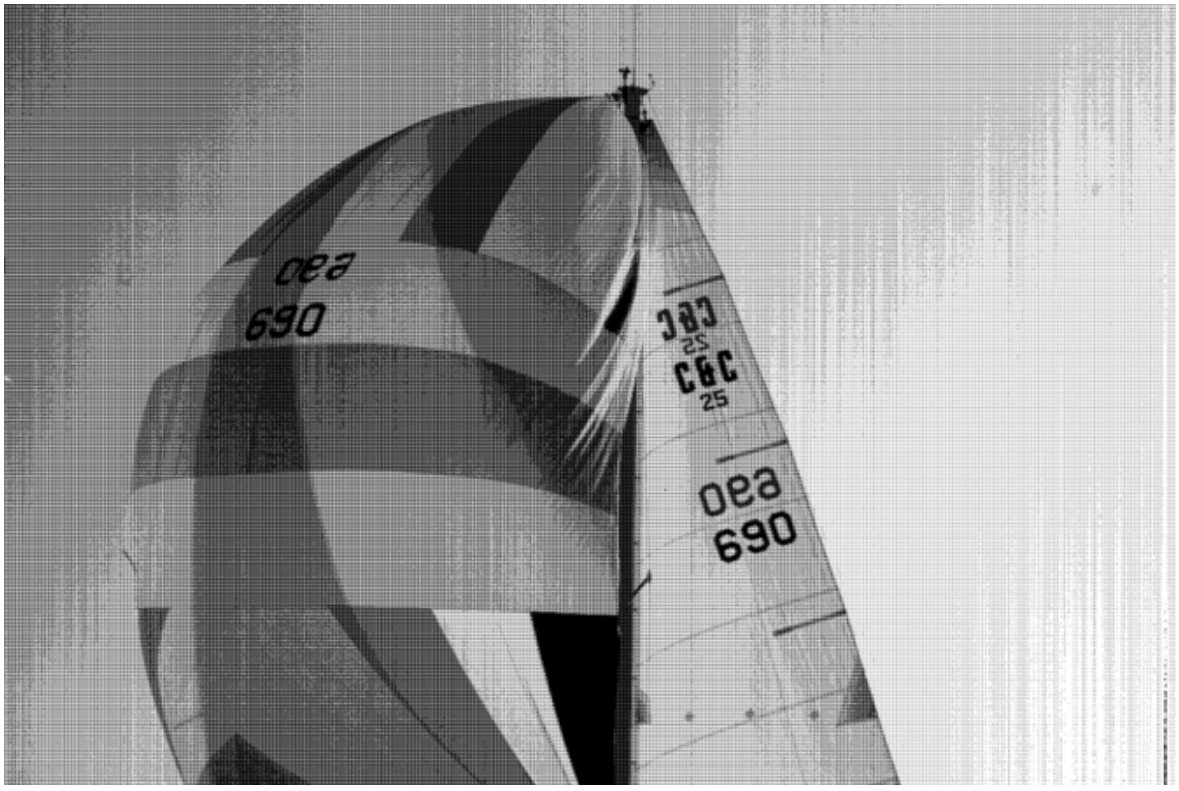


Figure 14/T.24 – Sailboat No. 4 (3 × 3 Dither)

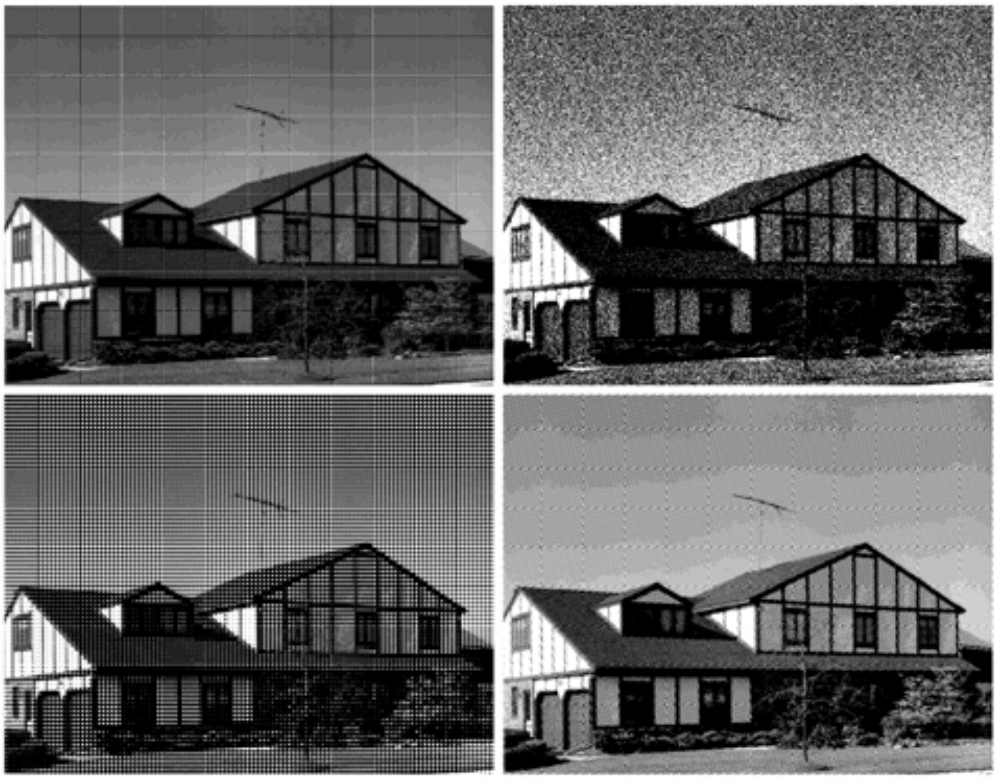


Figure 15/T.24 – House with Trees (Dithered Composite)

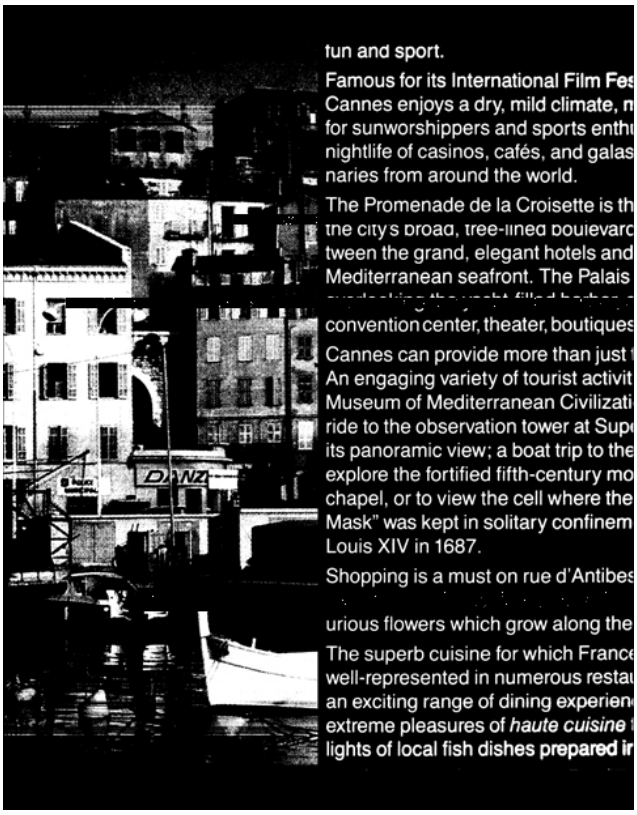
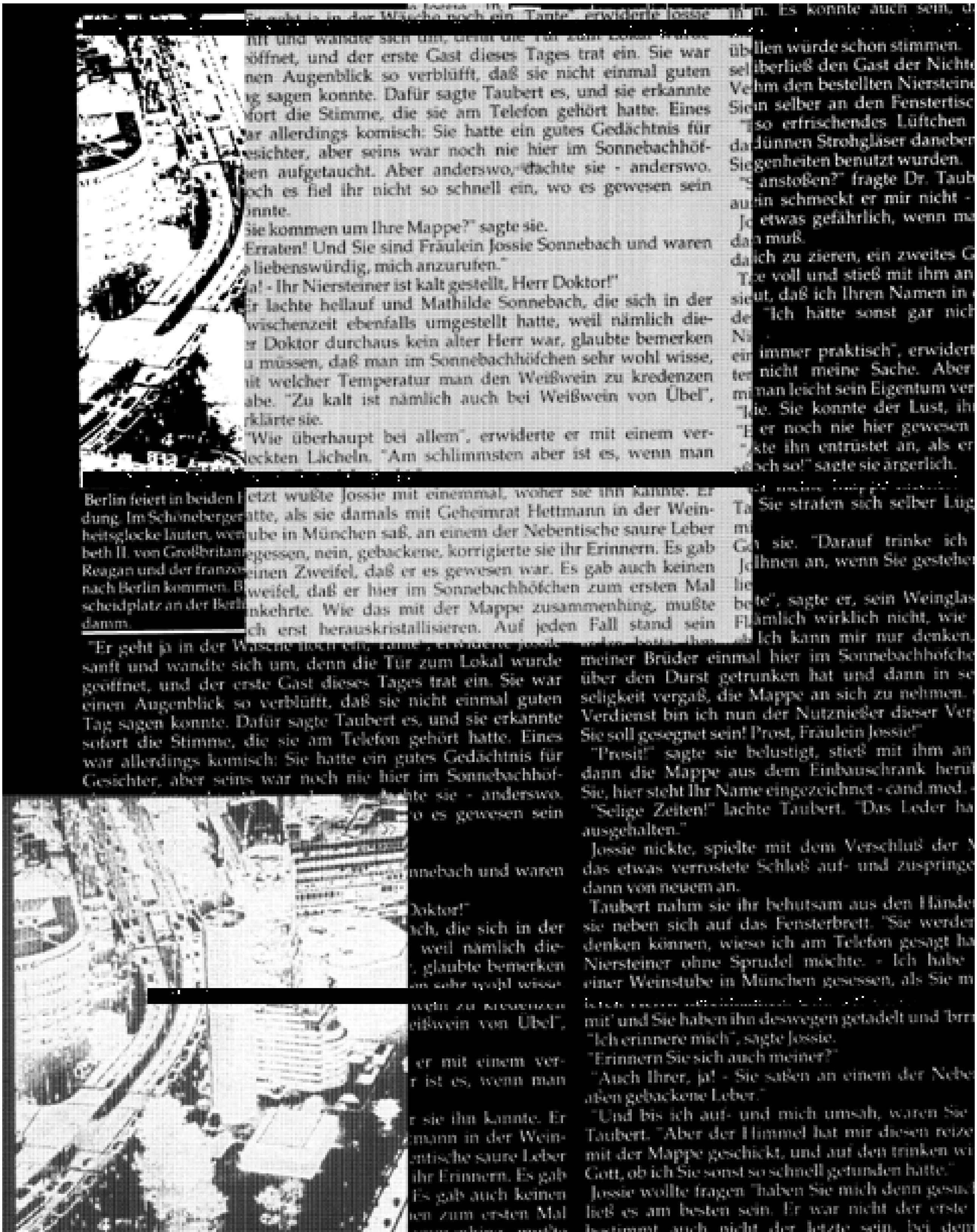


Figure 16/T.24 – Magazine text (Half-Tone)



Er geht ja in der Wäsche noch ein "Tante", erwiderte Jossie
öffnet, und der erste Gast dieses Tages trat ein. Sie war
nen Augenblick so verblüfft, daß sie nicht einmal guten
g sagen konnte. Dafür sagte Taubert es, und sie erkannte
fort die Stimme, die sie am Telefon gehört hatte. Eines
ar allerdings komisch: Sie hatte ein gutes Gedächtnis für
esichter, aber seins war noch nie hier im Sonnebachhöf-
en aufgetaucht. Aber anderswo, dachte sie - anderswo.
och es fiel ihr nicht so schnell ein, wo es gewesen sein
önnte.
Sie kommen um Ihre Mappe?" sagte sie.
Erraten! Und Sie sind Fräulein Jossie Sonnebach und waren
o liebenswürdig, mich anzurufen."
a! - Ihr Niersteiner ist kalt gestellt, Herr Doktor!"
Er lachte hellauf und Mathilde Sonnebach, die sich in der
wischenzeit ebenfalls umgestellt hatte, weil nämlich die-
er Doktor durchaus kein alter Herr war, glaubte bemerken
u müssen, daß man im Sonnebachhöfchen sehr wohl wisse,
it welcher Temperatur man den Weißwein zu kredenzen
abe. "Zu kalt ist nämlich auch bei Weißwein von Übel",
rklärte sie.
"Wie überhaupt bei allem", erwiderte er mit einem ver-
eckten Lächeln. "Am schlimmsten aber ist es, wenn man

Berlin feiert in beiden
dung. Im Schöneberger
heitsglocke läuten, wen
beth II. von Großbritann
Reagan und der franzö
nach Berlin kommen. E
scheidplatz an der Berli
damm.

etzt wußte Jossie mit einemmal, woher sie ihn kannte. Er
atte, als sie damals mit Geheimrat Hettmann in der Wein-
ube in München saß, an einem der Nebentische saure Leber
egessen, nein, gebackene, korrigierte sie ihr Erinnern. Es gab
einen Zweifel, daß er es gewesen war. Es gab auch keinen
weifel, daß er hier im Sonnebachhöfchen zum ersten Mal
nkehrte. Wie das mit der Mappe zusammenhing, mußte
ch erst herauskristallisieren. Auf jeden Fall stand sein

"Er geht ja in der Wäsche noch ein
sanft und wandte sich um, denn die Tür zum Lokal wurde
geöffnet, und der erste Gast dieses Tages trat ein. Sie war
einen Augenblick so verblüfft, daß sie nicht einmal guten
Tag sagen konnte. Dafür sagte Taubert es, und sie erkannte
sofort die Stimme, die sie am Telefon gehört hatte. Eines
war allerdings komisch: Sie hatte ein gutes Gedächtnis für
Gesichter, aber seins war noch nie hier im Sonnebachhöf-
sich erst herauskristallisieren. Auf jeden Fall stand sein
Name darin. Demnach gehörte sie ihm oder hatte ihm
gehört, war ihm entwendet oder von ihm selber verschenkt

28 Juni 1987

n. Es konnte auch sein, d
llen würde schon stimmen.
berließ den Gast der Nichte
hm den bestellten Niersteine
n selber an den Fenstertisc
so erfrischendes Lüftchen
dünnen Strohgläser daneben
genheiten benutzt wurden.
anstoßen?" fragte Dr. Taub
in schmeckt er mir nicht -
etwas gefährlich, wenn ma
muß.
ich zu zieren, ein zweites G
e voll und stieß mit ihm an
ut, daß ich Ihren Namen in
"Ich hätte sonst gar nich
immer praktisch", erwidert
nicht meine Sache. Aber
nan leicht sein Eigentum ver
ie. Sie konnte der Lust, ih
er noch nie hier gewesen
ste ihn entrüstet an, als er
och so!" sagte sie ärgerlich.
Sie strafen sich selber Lüg
sie. "Darauf trinke ich
Ihnen an, wenn Sie gestehe
te", sagte er, sein Weinglas
ämlich wirklich nicht, wie
Ich kann mir nur denken,
meiner Brüder einmal hier im Sonnebachhöfche
über den Durst getrunken hat und dann in se
seligkeit vergaß, die Mappe an sich zu nehmen.
Verdienst bin ich nun der Nutznießer dieser Ver
Sie soll gesegnet sein! Prost, Fräulein Jossie!"
"Prosit!" sagte sie belustigt, stieß mit ihm an
dann die Mappe aus dem Einbauschrank heru
Sie, hier steht Ihr Name eingezeichnet - cand.med.
"Selige Zeiten!" lachte Taubert. "Das Leder ha
ausgehalten."
Jossie nickte, spielte mit dem Verschluß der
das etwas verrostete Schloß auf- und zuspringe
dann von neuem an.
Taubert nahm sie ihr behutsam aus den Hände
sie neben sich auf das Fensterbrett. "Sie werden
denken können, wieso ich am Telefon gesagt ha
Niersteiner ohne Sprudel möchte. - Ich habe
einer Weinstube in München gesessen, als Sie m
mit' und Sie haben ihn deswegen getadelt und 'brr
"Ich erinnere mich", sagte Jossie.
"Erinnern Sie sich auch meiner?"
"Auch Ihrer, ja! - Sie saßen an einem der Nebe
aßen gebackene Leber."
"Und bis ich auf- und mich umsah, waren Sie
Taubert. "Aber der Himmel hat mir diesen reize
mit der Mappe geschickt, und auf den trinken wi
Gott, ob ich Sie sonst so schnell gefunden hätte."
Jossie wollte fragen "haben Sie mich denn gesuc
ließ es am besten sein. Er war nicht der erste
bestimmt auch nicht der letzte sein, bei dem
Flämmchen der Zuneigung aufglimmen sah. Es b
ebenso schnell wieder herunter und erlosch, ehe e
geben vermochte. Das war weder etwas Neues,

Figure 17/T.24 – Magazine Page Composite

5 T.22 Test Chart No. 5 – Continuous Tone Test Chart CT01

Figure 18 is a test chart designed specifically for facsimile. It consists of several strips and patches of various gray-scale levels and two photographs, an architectural photograph and a portrait. It is part of Recommendation T.22.

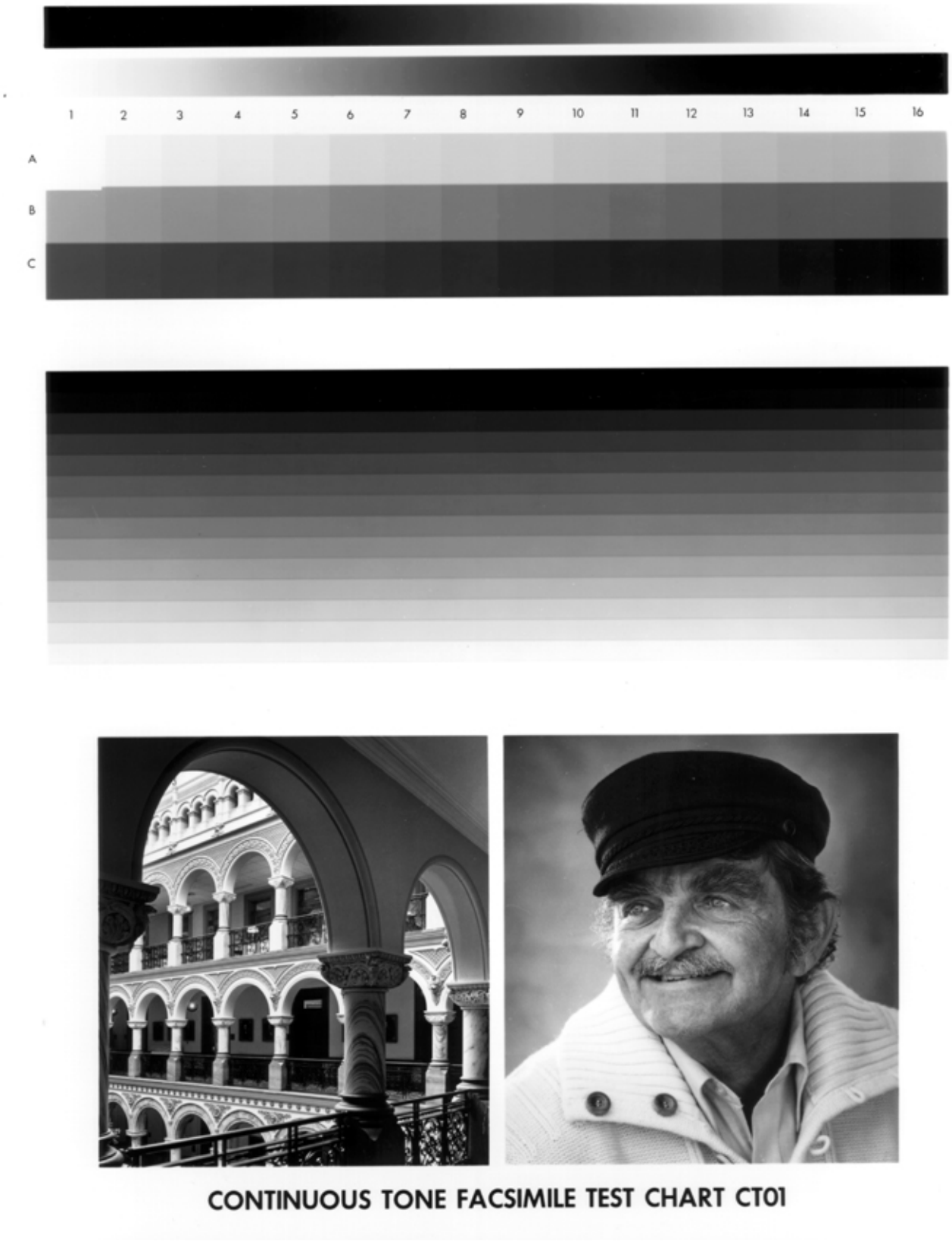


Figure 18/T.24 – Continuous Tone Test Chart CT01

6 House with Trees and House with Sky

This set of gray-scale images includes a house with sky photograph and a house with trees photograph (see Figures 19 and 20). The images have been digitized as shown in Table 5.

Table 5/T.24 – Gray-Scale Images

Figure number	Image	Description	Dimensions				Resolution (pixels/inch) (8 bit/pixel)	Size (MBytes)
			Pixels		Inches			
			Width	Height	Width	Height		
Figure 19	House with Trees	Photo of a house surrounded by trees	940 1128 1410 1880	820 984 1230 1640	4.70 4.70 4.70 4.70	4.10 4.10 4.10 4.10	200 240 300 400	0.78 1.12 1.74 3.09
Figure 20	House with Sky	Photo of a house; decorative plantings only	940 1128 1410 1880	830 996 1245 1660	4.70 4.70 4.70 4.70	4.15 4.15 4.15 4.15	200 240 300 400	0.79 1.13 1.76 3.13

Figure 19/T.24 – House with Trees

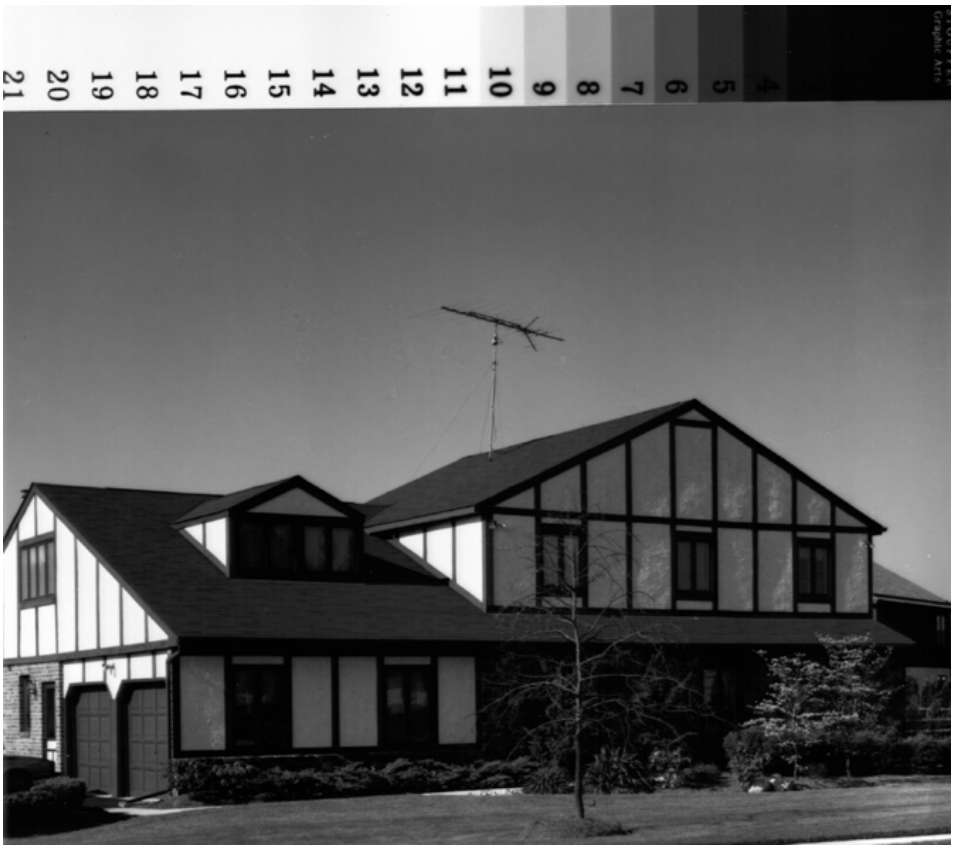


Figure 20/T.24 – House with Sky

7 T.23 Test Chart No. 6 – 4-Color Printing Facsimile Test Chart 4CP01

This set of images comes from the facsimile color test chart (see Figure 21 and Table 6).

The toys photo shows higher sharpness for fine detail in the stuffed animals and the faces, and provides a range of textures and patterns. The presence of both bright and pastel colors provide widespread variations in luminance, hue and saturation. In addition, the image is rich in slowly varying color textures mixed with sharp color boundaries.

The computer-generated simulation of spheres image exhibits shadings for a 3-dimensional effect. It shows various-sized differently-colored spheres on a black background. It provides a wide range of color shadings with distinct edges. In general, each sphere is one color, shaded to give a 3-dimensional appearance. The gradual transition in color of each sphere's shading provides an excellent medium for discerning possible contouring effects. If contouring is present, it will usually manifest itself as a series of concentric circles with slightly different colors. The spheres' edges also provide sharp boundaries against both the background and other spheres.

The graphics image is from a magazine cover and exhibits a 3-dimensional effect. It uses pastel colors to denote surfaces and fine black lines to enhance details. It contains a number of repetitive patterns coupled with sharp boundaries between various colors.

Table 6/T.24 – Color Images

Figure number	Image	Color space (8 bits/comp.)	Dimensions				Resolution (pixels/inch) (24 bits/pixel)	Size (MBytes)
			Pixels		Inches			
			Width	Height	Width	Height		
Figure 21	Scanned color chart	CIELAB	1688	2347	8.44	11.74	200	11.89
Figure 21	Scanned color chart	CIELAB	3399	4752	8.50	11.88	400	48.46
Figure 21	Computer-generated color chart	CIELAB	1752	2375	8.76	11.88	200	12.49
Figure 21	Computer-generated color chart	CIELAB	3504	4750	8.76	11.88	400	49.94
Figure 21	Kids with toys	CIELAB	3242	3656	8.11	9.14	400	35.56
Figure 21	Computer-generated spheres	CIELAB	1024	512	2.56	1.28	400	1.58
Figure 21	Graphics art	CIELAB	2644	3046	6.61	7.62	400	24.17

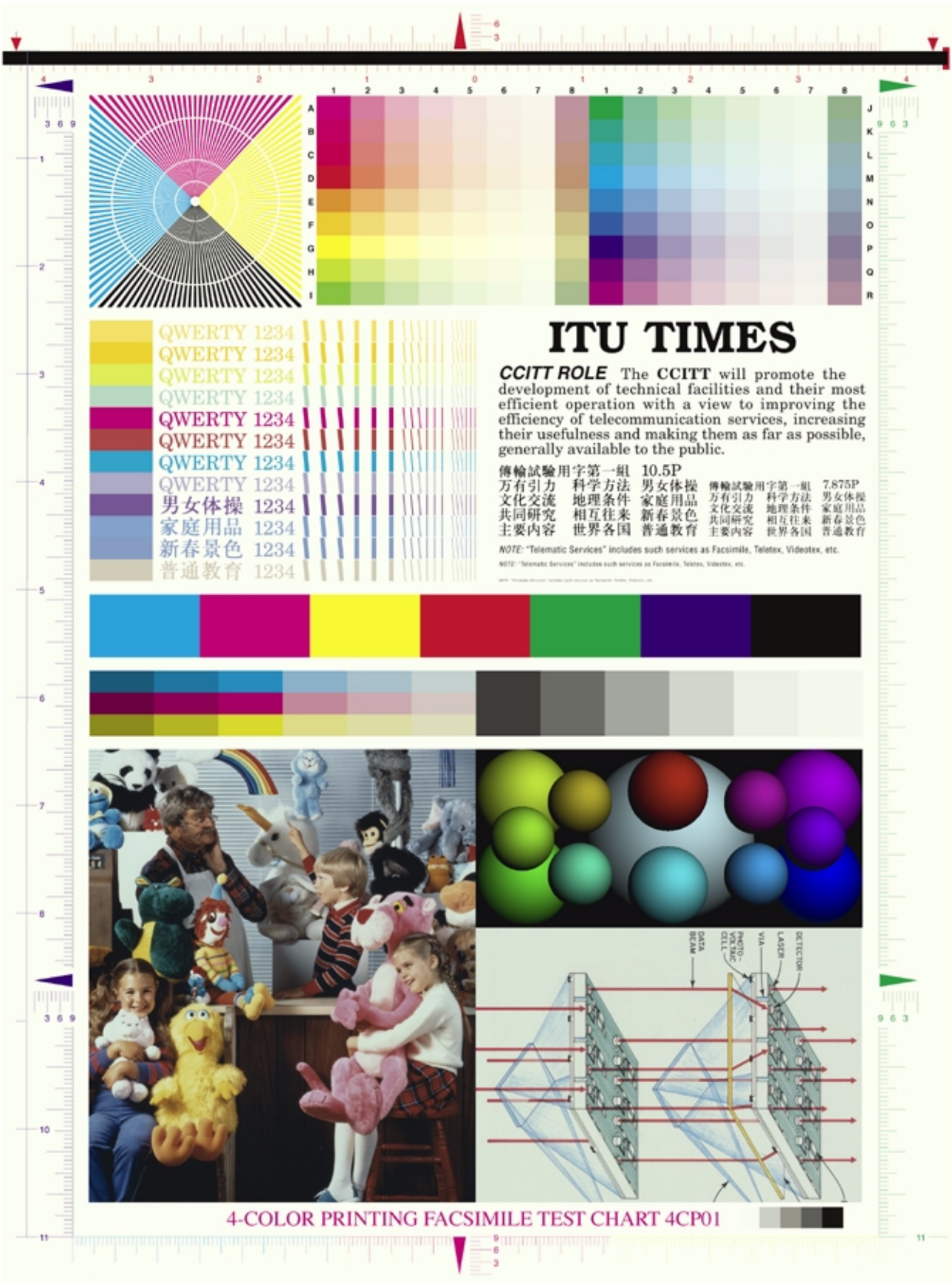


Figure 21/T.24 – Color Test Chart 4CP01

8 CCIR Images

This set includes two images that were used in the original JPEG experiments prior to its adoption as an international standard (see Figures 22 and 23 and Table 7). They are in the YUV color space.

Table 7/T.24 – CCIR Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions Pixels (W × H)	File size (Bytes)
HOTEL	CCIR 601	Hotel	YUV	8	720 × 576	830 932
GOLD	CCIR 601	Gold	YUV	8	720 × 576	830 932

Figure 22/T.24 – CCIR 601 YUV color image: Hotel*

Figure 23/T.24 – CCIR 601 YUV color image: Gold*

* Due to technical reasons, Figures 22 and 23 could not be reproduced with their exact colours.

9 Color Images (CMYK color space)

This set is made up of four color images in the CMYK color space (see Figures 24, 25, 26 and 27 and Table 8).

Table 8/T.24 – CMYK Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions Pixels (W × H)	File size (Bytes)
BIKE	SCID	N5 "Bike"	CMYK	8	2048 × 2560	20 972 544
WOMAN	SCID	N1 "Portrait"	CMYK	8	2048 × 2560	20 972 544
CAFE	SCID	N2 "Cafe"	CMYK	8	2048 × 2560	20 972 544
TOOLS	Crosfield drum scan	Tools	CMYK	8	1524 × 1200	7 315 854

Figure 24/T.24 – CMYK Image: Bike

Figure 25/T.24 – CMYK Image: Portrait

Figure 26/T.24 – CMYK Image: Café

Figure 27/T.24 – CMYK Image: Tools

10 Color Images (RGB color space)

This set includes three images created with digital camera and two compound images, all in the RGB color space (see Figures 28, 29, 30, 31 and 32 and Table 9). The compound images consist of text with an embedded photograph.

Table 9/T.24 – RGB Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions pixels (W × H)	File size (Bytes)
BIKE3	Crosfield digital camera	Motorcycle	RGB	8	781 × 919	2 153 821
WATER	PhotoCD	Water	RGB	8	2048 × 3072	18 899 574
CATS	PhotoCD	Cats	RGB	8	2048 × 3072	18 899 568
CMPND1	Computer generated	Text on photo	RGB	8	512 × 768	1 179 892
CMPND2	Computer generated	Text and photo	RGB	8	1024 × 1400	4 301 404

Figure 28/T.24 – RGB Image: Motorcycle

Figure 29/T.24 – RGB Image: Water

Figure 30/T.24 – RGB Image: Cats

Dear Pam,

I was delighted to hear from you last week. Patti and I had a wonderful time during our week-long summer vacation. The weather was excellent, and the food was absolutely exquisite. I hope that we can repeat this next year and that you will join us too.

We came back with a lot of fantastic memories, which we would like to share with you through some snapshots that we took.

Our favorite is this picture of us aboard the "Top Hat", which I have pasted into this letter using some really neat advanced digital imaging technology on my home computer. We will ship the rest to you on a CD-ROM soon. Wishing you the best.

Love,

Susan

Figure 31/T.24 – RGB Image: Text on photo

January 31, 2001

Dear Mom and Dad,

How are both of you doing? I thought I would drop a line to say hi. Fanny, little Danny, and I are doing well. As you can see by the picture, little Danny isn't quite so little! Isn't this letter really great! I took a picture of Danny that was on a Kodak PhotoCD, and I merged it onto this letter using my computer. I then printed the letter using a color inkjet printer I just bought...

Danny's wearing the gorgeous BLUE sweater you gave him last time you were visiting. It just brings out the RED in his lips and cheeks. He definitely gets his good looks from his mother!

Take care of yourselves and write soon.

Love,

Michael

Figure 32/T.24 – RGB Image: Text and photo

11 Fingerprint and Medical Images (Gray scale)

This set includes a scanned fingerprint at eight bits per component, and five medical images at various pixel depths from eight to twelve bits per components (see Figures 33, 34, 35, 36, 37 and 38 and Table 10).

Table 10/T.24 – Gray-scale Medical Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions pixels (W × H)	File size (Bytes)
FINGER	Fingerprint	l1010092	mono	8	512 × 512	262 482
X-Ray	Medical X-ray	X-ray - "XR1.1"	mono	12	2048 × 1680	6 881 312
CR	Computer radiology	CR "CR-ABDM"	mono	10	1744 × 2048	4 465 286
CT	Computer tomography	CT "CT.1"	mono	12	512 × 512	524 320
US	Ultrasound	Ultrasound "US1.DCM"	mono	8	512 × 488	229 808
MRI	Magnetic resonance	MRI "MRI.1"	mono	11	256 × 256	92 160

Figure 33/T.24 – Fingerprint

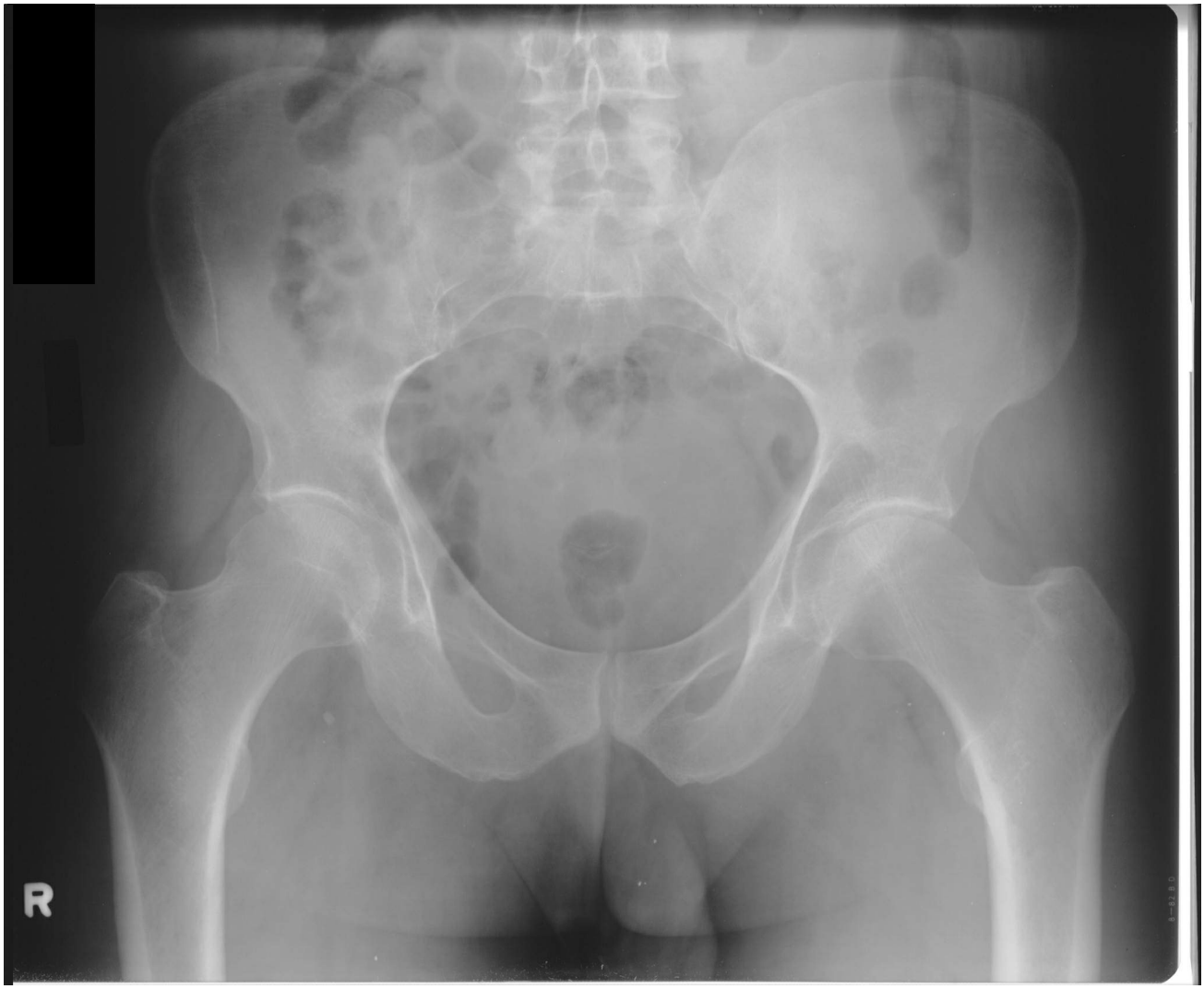


Figure 34/T.24 – Medical X-ray

[The printed representation of this image is not available.]

Figure 35/T.24 – Computer Radiology

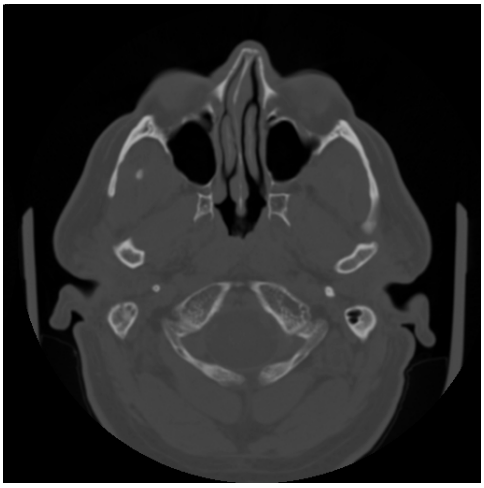


Figure 36/T.24 – Computer Tomography

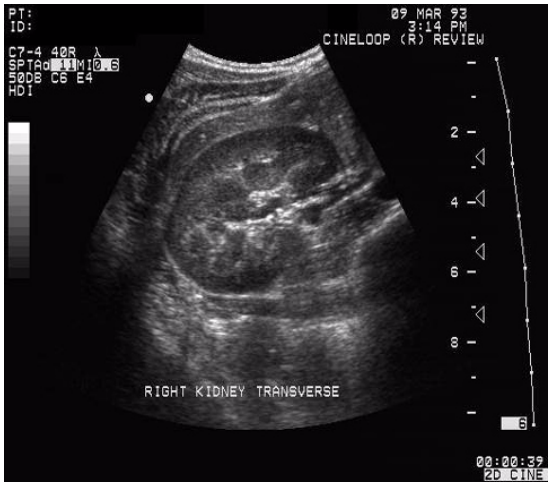


Figure 37/T.24 – Ultrasound

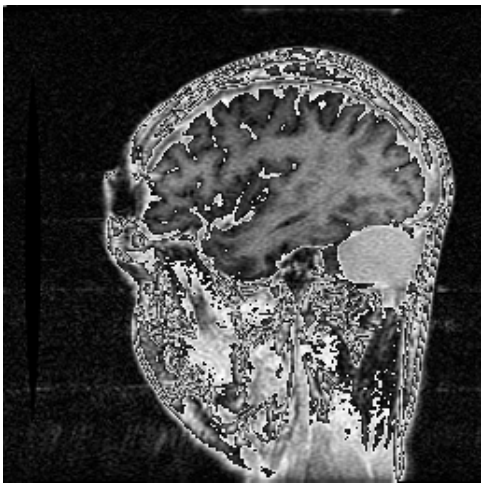


Figure 38/T.24 – Magnetic Resonance

12 Line Drawing Images

This set includes a computer generated line drawing in color (CIELAB color space), and a scan of a fine arts engraving (gray scale). See Figures 39 and 40 and Table 11.

Table 11/T.24 – Line Drawing Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions pixels (W × H)	File size (Bytes)
PC	Computer generated	Printed Circuit Board Layout	CIELAB	8	1575 × 2185	10 324 620
EDUC	Scan	Fine Arts 1, engraving	mono	8	2850 × 4096	11 676 100

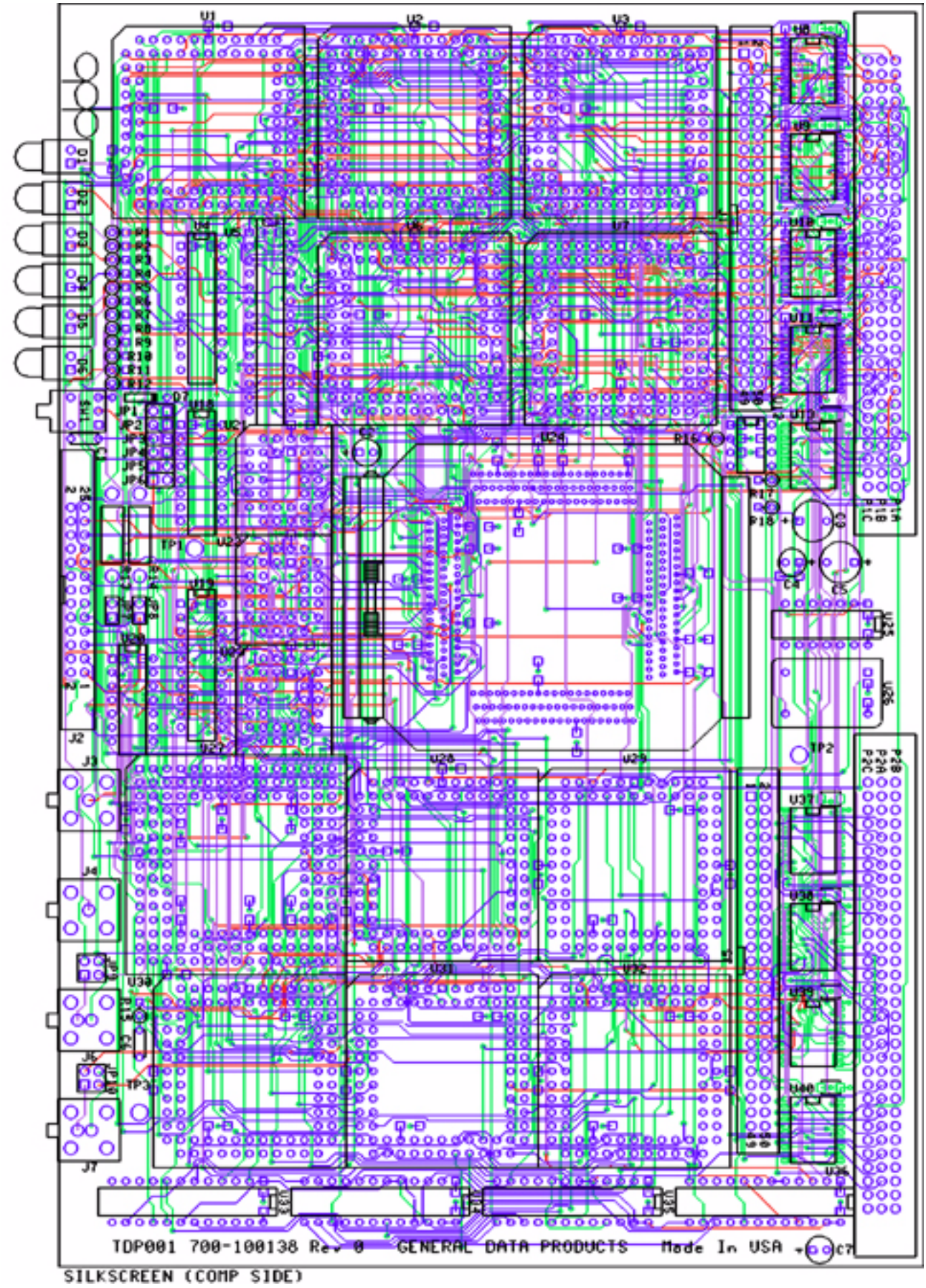


Figure 39/T.24 – Printed Circuit Board Layout

Figure 40/T.24 – Engraving

13 Fine Arts Images

These images are two scans of the same fine arts painting at eight bits per component and twelve bits per component (see Figure 41 and Table 12)

Table 12/T.124 – Scanned Fine Arts Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions pixels (W × H)	File size (Bytes)
INGRES8	Scan	Fine Arts 2, painting	RGB	8	4088 × 4608	56 512 700
INGRES16	Scan	Fine Arts 3, painting	RGB	12	4088 × 4608	113 025 212

Figure 41/T.24 – Painting (Ingres 8 and Ingres 16)

14 Low-contrast Gray-scale Images

This set consists of generally low-contrast, eight bits per component gray-scale images (see Figures 42, 43, 44, 45, 46, 47, 48 and 49 and Table 13). Included are four aerial photographs, a scenic view, and two low-contrast charts.

Table 13/T.24 – Low-contrast Gray-scale Images

Filename	Source	Image description	Color space	Bits per component	Image dimensions pixels (W × H)	File size (Bytes)
AERIAL1	Remote sensing	Aerial view 1	Luminance	8	14 565 × 14 680	213 843 694
AERIAL2	Remote sensing	Aerial view 2	Luminance	8	2 048 × 2 048	4 194 774
CMPND3	Compound	Graphics	Luminance	8	5 120 × 6 624	33 915 328
MAT	Digital camera	Mountains	Luminance	8	1 528 × 1 146	175 153
SEISMIC	Remote sensing	Texture	Luminance	8	512 × 512	262 592
TARGET	Graphics	Patterns	Luminance	8	512 × 512	262 592
TXTUR1	MPEG-4 test image 1	Aerial view	Luminance	8	1 024 × 1 024	1 048 854
TXTUR2	MPEG-4 test image 2	Aerial view	Luminance	8	1 024 × 1 024	1 055 036

Figure 42/T.24 – Aerial view 1 Remote Sensing

Figure 43/T.24 – Aerial view 2 Remote Sensing

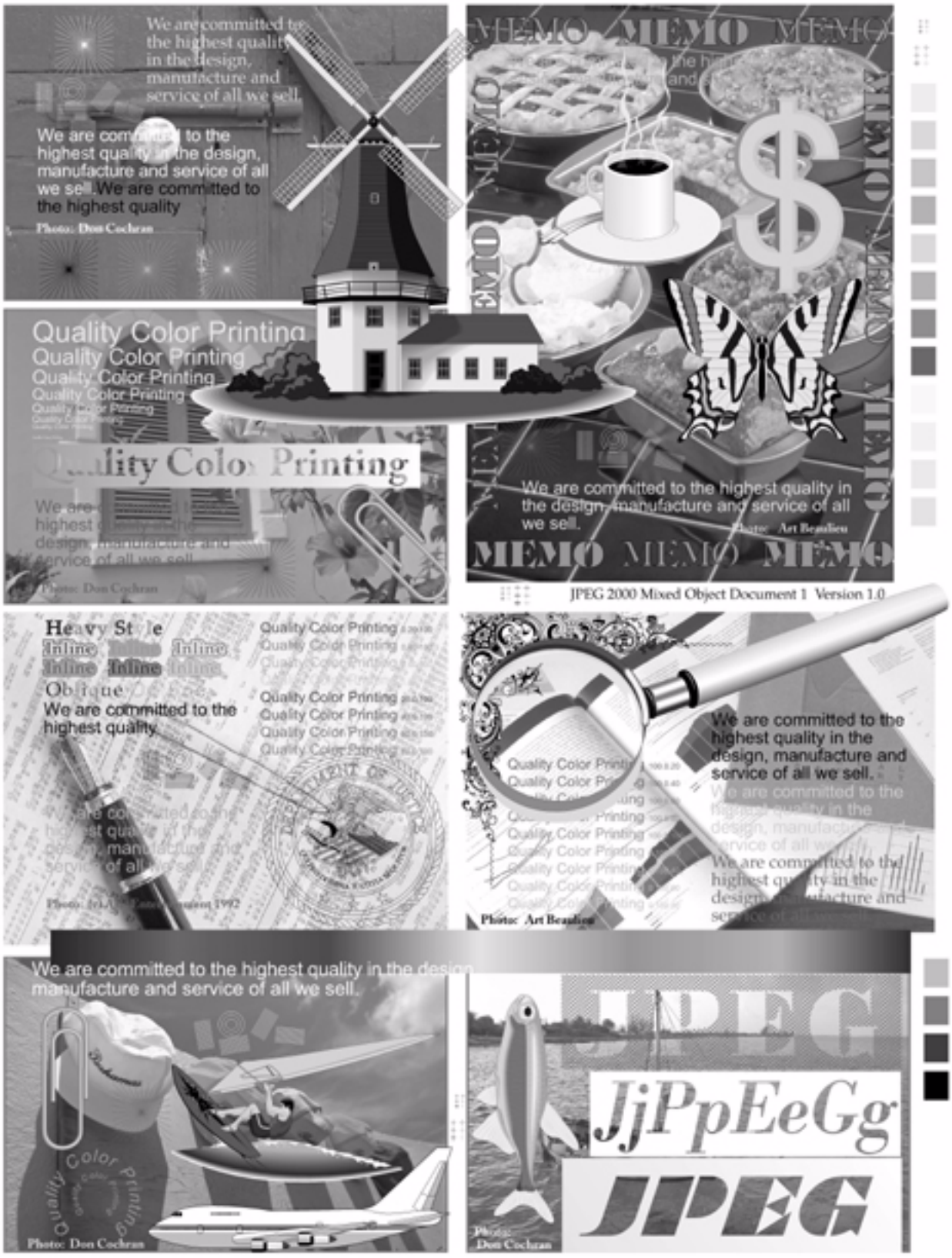


Figure 44/T.24 – Compound Graphics

Figure 45/T.24 – Digital Camera

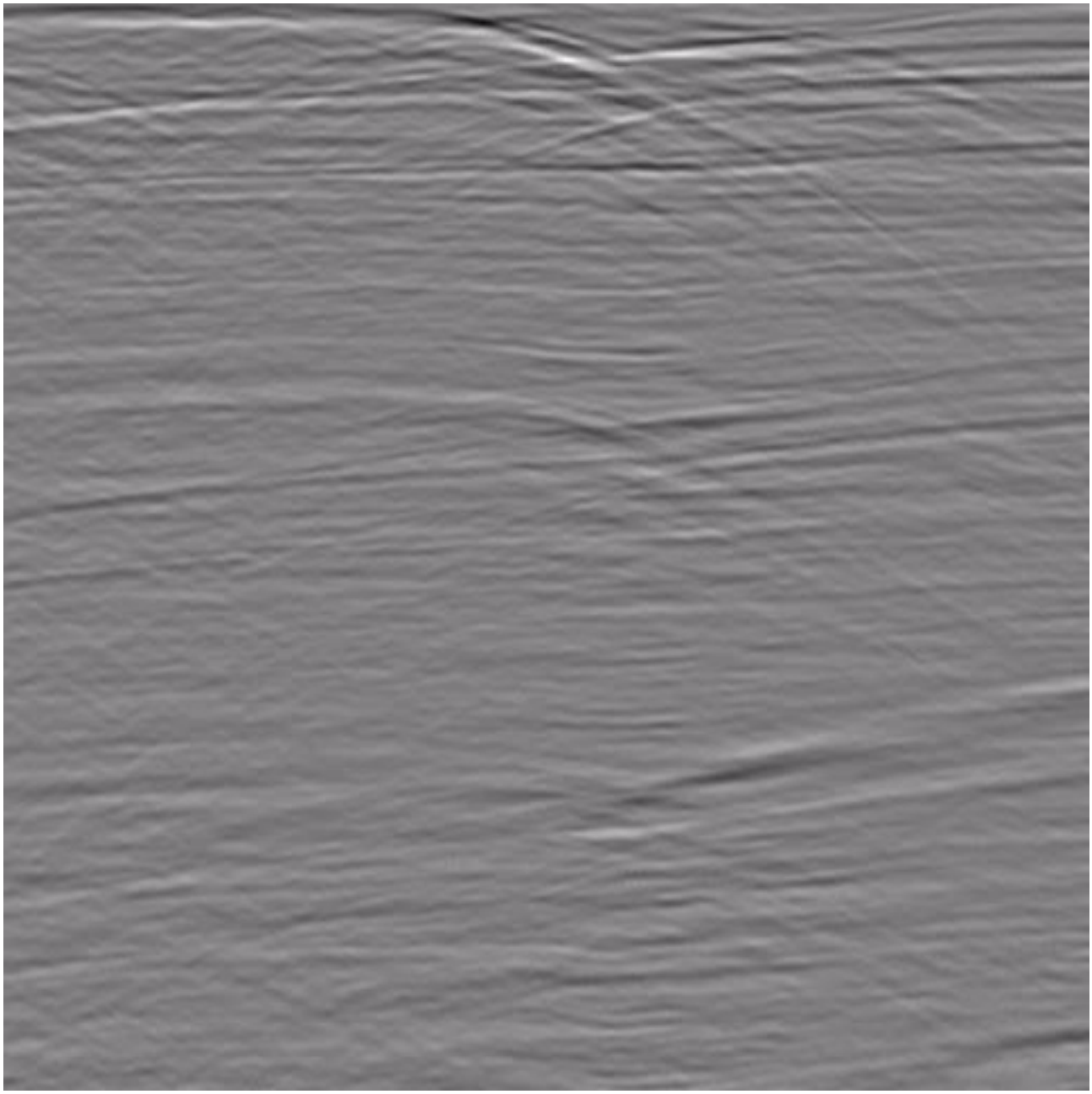


Figure 46/T.24 – Texture Remote Sensing

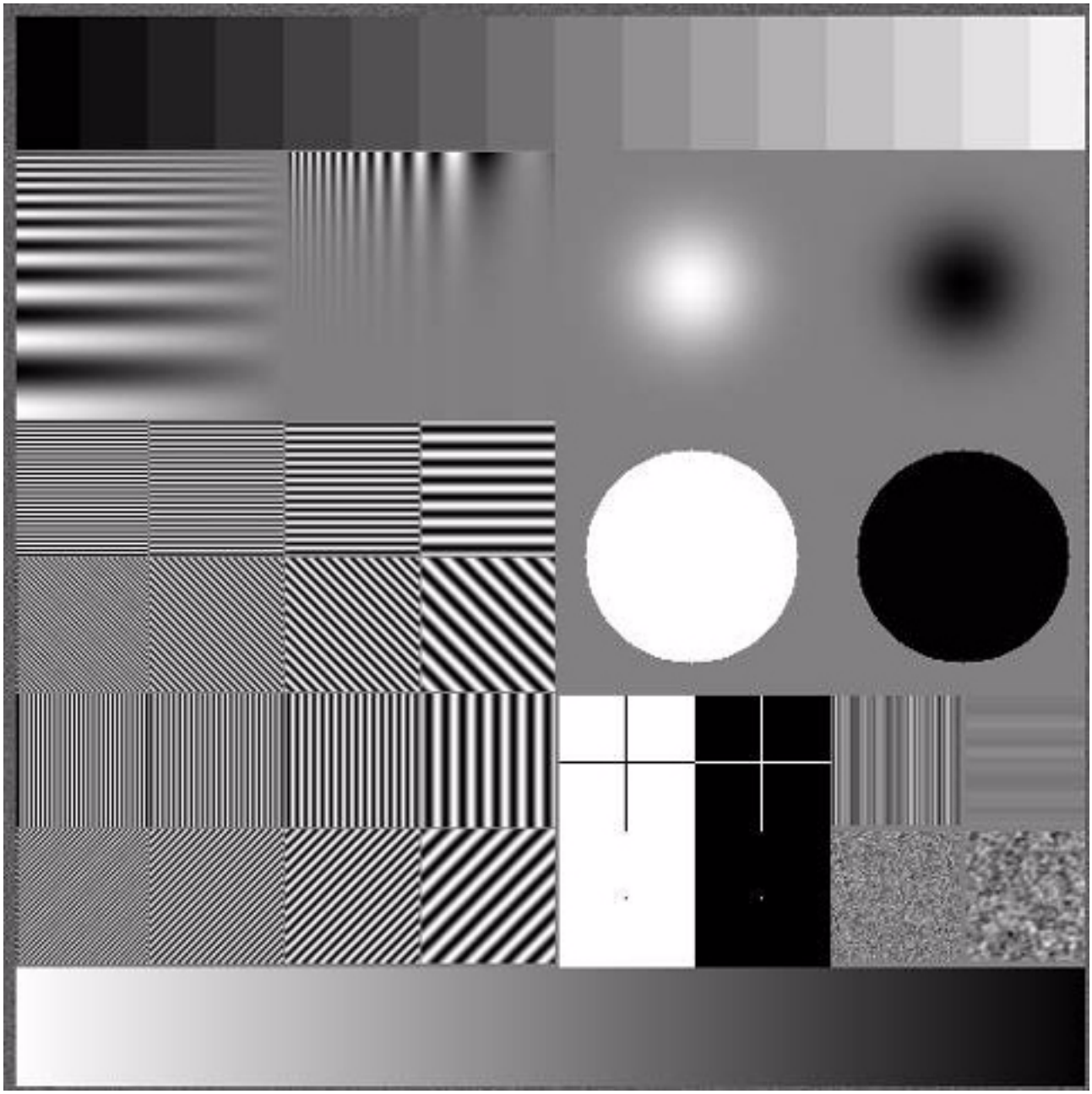


Figure 47/T.24 – Pattern Graphics

Figure 48/T.24 – MPEG-4 Test Image 1

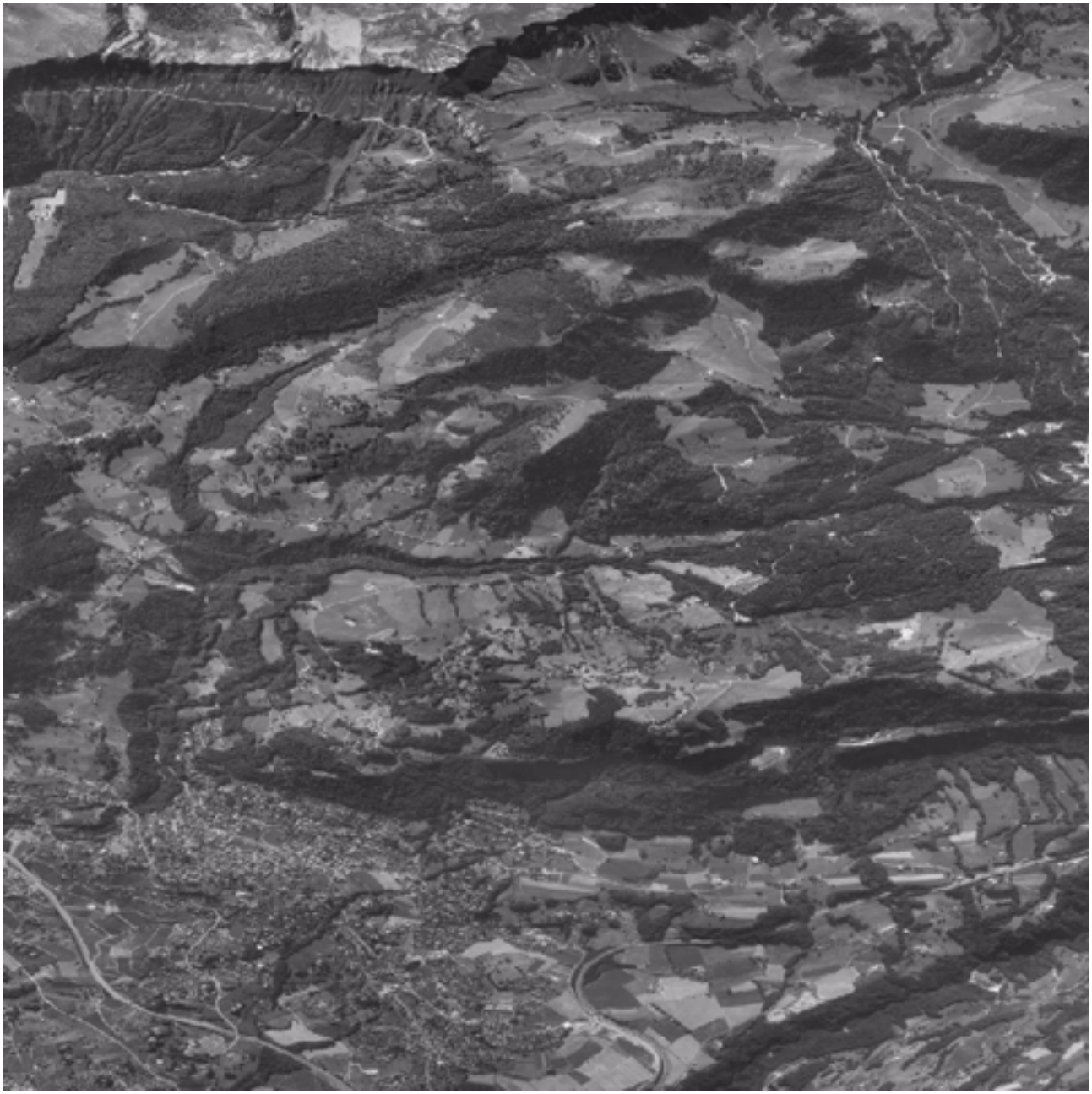


Figure 49/T.24 – MPEG-4 Test Image 2

APPENDIX I

Black/White Pixel Counts

The black/white pixel counts for all of the bi-level images in Recommendation T.24 are summarized in Table I.1. For each bi-level image and its corresponding resolution(s), information is included on the image dimensions (in pixel units), the size of the raw image data (in bytes), the black and white pixel counts, and the percentage of the image which is colored black and white

Table I.1/T.24 – Black/White Pixel Counts

File name	Image name	Res.	Size			Pixel counts		Percent	
		(pix./in)	Width	Height	(bytes)	Black	White	Black	White
F01_200	Document No. 1	200	1728	2339	505224	104990	3936802	2.60%	97.40%
F01_300	(English Letter)	300	2592	3508	1136592	236943	8855793	2.61%	97.39%
F01_400		400	3456	4677	2020464	426637	15737075	2.64%	97.36%
F01_600		600	5184	7016	4546368	980552	35390392	2.70%	97.30%
F02_200	Document No. 2	200	1728	2339	505224	158713	3883079	3.93%	96.07%
F02_300	(Circuit Drawing)	300	2592	3508	1136592	350335	8742401	3.85%	96.15%
F02_400		400	3456	4677	2020464	643328	15520384	3.98%	96.02%
F02_600		600	5184	7016	4546368	1446165	34924779	3.98%	96.02%
F03_200	Document No. 3	200	1728	2339	505224	222697	3819095	5.51%	94.49%
F03_300	(French Invoice)	300	2592	3508	1136592	498319	8594417	5.48%	94.52%
F03_400		400	3456	4677	2020464	905106	15258606	5.60%	94.40%
F03_600		600	5184	7016	4546368	2004822	34366122	5.51%	94.49%
F04_200	Document No. 4	200	1728	2339	505224	371671	3670121	9.20%	90.80%
F04_300	(French Text)	300	2592	3508	1136592	837842	8254894	9.21%	90.79%
F04_400		400	3456	4677	2020464	1539573	14624139	9.52%	90.48%
F04_600		600	5184	7016	4546368	3587602	32783342	9.86%	90.14%
F05_200	Document No. 5	200	1728	2339	505224	222306	3819486	5.50%	94.50%
F05_300	(French Text Figures)	300	2592	3508	1136592	490419	8602317	5.39%	94.61%
F05_400		400	3456	4677	2020464	892675	15271037	5.52%	94.48%
F05_600		600	5184	7016	4546368	1987057	34383887	5.46%	94.54%
F06_200	Document No. 6	200	1728	2339	505224	154711	3887081	3.83%	96.17%
F06_300	(French Chart)	300	2592	3508	1136592	341837	8750899	3.76%	96.24%
F06_400		400	3456	4677	2020464	622225	15541487	3.85%	96.15%
F06_600		600	5184	7016	4546368	1387214	34983730	3.81%	96.19%
F07_200	Document No. 7	200	1728	2339	505224	310743	3731049	7.69%	92.31%
F07_300	(Kanji)	300	2592	3508	1136592	690828	8401908	7.60%	92.40%
F07_400		400	3456	4677	2020464	1239891	14923821	7.67%	92.33%
F07_600		600	5184	3035	1966680	1184951	14548489	7.53%	92.47%
F08_200	Document No. 8	200	1728	2339	505224	1603283	2438509	39.67%	60.33%
F08_300	(Memorandum)	300	2592	3508	1136592	3613143	5479593	39.74%	60.26%
F08_400		400	3456	4677	2020464	6337111	9826601	39.21%	60.79%
F08_600		600	5184	7016	4546368	14259312	22111632	39.21%	60.79%
F09_400	T.22 Test Chart 4	400	3504	4750	2080500	2852132	13791868	17.14%	82.86%
F10_200	Half-tone Chart	200	1728	2336	504576	997022	3039586	24.70%	75.30%
F10_240		240	2048	2800	716800	1292813	4441587	22.54%	77.46%
F10_300		300	2560	3500	1120000	2052939	6907061	22.91%	77.09%
F11_400	Sailboat No. 1	400	3072	2048	786432	2500099	3791357	39.74%	60.26%
F12_400	Sailboat No. 2	400	3072	2048	786432	2551623	3739833	40.56%	59.44%
F13_400	Sailboat No. 3	400	3072	2048	786432	2558326	3733130	40.66%	59.34%
F14_400	Sailboat No. 4	400	3072	2048	786432	2515962	3775494	39.99%	60.01%
F15_200	House with Trees	200	1904	1488	354144	1672859	1160293	59.05%	40.95%
F16_800	Magazine text	800	3456	4416	1907712	12337334	2924362	80.84%	19.16%
F17_400	Magazine page	400	3072	4352	1671168	8617274	4752070	64.46%	35.54%

APPENDIX II

Sun Raster Image Format

The Sun Raster image file format is the native bitmap format of the Sun Microsystems UNIX platforms that use the SunOs operation system. This format can store black/white, gray-scale and color bitmapped images of any pixel depth. Optionally the use of color maps and simple run-length compression are also supported. Most UNIX imaging applications support this format.

The Sun Raster file is organized as a header, followed by an optional color map, and then by the bitmapped image data. The header is 32 bytes long and has the following format:

```
typedef struct SunRaster
{
    DWORD MagicNumber          /*Magic number */
    DWORD Width;               /*Width of the image in pixels*/
        DWORD Height;              /*Height of the image in pixels*/
        DWORD Depth;               /*Number of bits per pixel*/
        DWORD Length;              /* Size of image in bytes */
        DWORD Type                 /* Type of raster file */
        DWORD ColorMapType;    /*Type of color map*/
        DWORD ColorMapLength   /*Size of the color map in bytes*/
};
```

Magic number identifies the file as a Sun Raster image, and always contains the value 59A66A95h (hexadecimal). Besides identifying the format, the magic number provides a check that the bytes in the file are being read in the proper order.

Width and height specify the size of the image in pixels. The width of a scan line is always a multiple of 16 bits, padded when necessary.

Depth is the number of bits per pixel of the image data.

Length is the size of the bitmapped image data in the bitmap file in bytes, (not including the color map and header).

Type is the version of the bitmapped file.

ColorMapType indicates the type of color map included in the file if any, and ColorMapLength contains the number of bytes stored in the color map

For further information contact:

Sun Microsystems Inc.
2550 Garcia Avenue
Mountain View, CA 94043

There are also a number of publicly available UNIX-based image file viewers that support the Sun Raster format.

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	**Terminals for telematic services**
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure
Series Z	Languages and general software aspects for telecommunication systems

Geneva, 1999