Studie 680/4.88

ProduktEntwicklung Roericht Ulm

Burkhard Schmitz, Guido Englich
Berater: Reinhard Ludwig, Istvan Palffy
Ass. Ulli Lindenmann, Michael Mayer

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Einstieg & Übersicht

In der vorliegenden Studie 680/4.88 werden die Forderungen und Möglichkeiten untersucht, die im Produktbereich Multitel an Message/Medium und Endgerät gestellt werden sollen/können, unter dem Aspekt erweiterter Kommunikation und interaktiver Nutzung.

Im folgenden die Kurzfassungen der einzelnen Schritte der Studie.

Einstieg

0 Multitel als... in diesem Einstieg wird die Notwendigkeit aufgezeigt, für ein neues Medium eine angemessene situativ-representative Physiognomie zu finden.

Kapitel-Übersicht

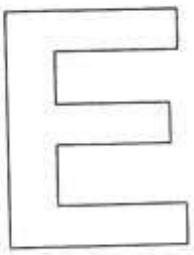
1 New Access... dieses Kapitel bringt einen Vergleich zwischen Bildappeal und Benutzeroberfläche von Btx mit dem state of the art interaktiver Systeme. Es zeigt Vorschläge zur Anhebung des Niveaus durch Softwaremulation und Entwicklung eines Homeprogramms, die sowohl durch visuelle Vermittlung, als auch durch interaktive Steuerung, einen neuen Zugang zum Medium eröffnen können.

2 Logistik...in diesem Kapitel wird untersucht, wie hardwareseitig auf die Nutzungsstruktur reagiert werden kann,
indem die Erscheinung der Bedienungselemente an die jeweilige Nutzung und die zugehörige Komplexität angepasst wird.

3 Peripherie... hier wird in einem Dreiersprung auf die peripheren Möglichkeiten/Forderungen eingegangen,
hardwareseitig auf die notwendige Offenheit gegenüber zusätzlichen Input/Outputdevices,
softwareseitig wird spekuliert,wie Handlungen, die dem Telefonieren situativ-benachbart sind, funktionserweiternd im Multitel integriert werden können...

Unter einem erweiterten Blickwinkel werden Hypothesen zu unsichtbaren Designqualitäten vorgestellt, die in dieser Studie noch nicht weiter ausgeführt sind, uns aber mittelfristig immer stärker beschäftigen werden:
die emotional/psychologischen Bedingungen der Subjekt/Objektbeziehungen...

4 ISDN, networking... ISDN, die neue Voraussetzung der digitalen Datenübertragung kommt einem Evolutionssprung in der Individualkommunikation gleich:
Dieses Kapitel zeigt einige Möglichkeiten im Hinblick auf erweiterte Kommunikation,
und postuliert das Multitel als *die* bequeme Eingangstür ins Netzwerk.



5 Multitel im Kontext... durch die Setzung von Anwendungssituation unter Berücksichtigung des Nutzungsumfeldes zeigt dieses Kapitel Schlüsse auf Hard- und Software.

6 Hardware... dieses Kapitel überführt die Hypothesen in Hardware-interpretationen, zeigt den Entwurfsvorgang in schematisierten Objekt-Darstellungen:
die Entwicklung über Skizzen zu Bildideen,
die Entwicklung von Bildideen zu Vorkonzepten,
die Übertragung der Vorkonzepte in Hardwareauslegungen.
Diese Hardwareauslegungen sind schliesslich in 3D-Modelle übertragen worden.

7 Appendix... bringt "last minute news" und Vorschläge für lohnenswerte Exkurs- und Erkundungstrips.

Literaturliste

Multitel als...

Ein Medium auf der Suche nach seiner Identität

0

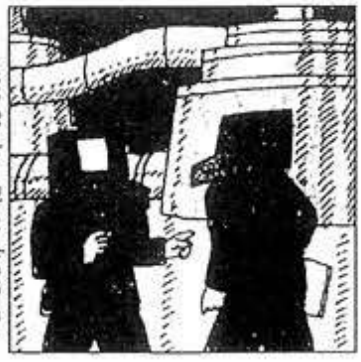
Multitel als...
oder ein Medium sucht seine Identität

Im Gedrängel an den Endpunkten der Kommunikationsnetze sind kaum noch Geräte mit starker Identität zu erkennen.

Das Multitel als Hybrid aus Telefon, Bildschirmarbeitsplatz, Netzwerkstation, Fernsehgerät...?

Medium BTX und Multitel brauchen einen prägnanten Ausdruck, um nicht im Rauschen des Umfeldes unterzugehen.

Das Multitel als kompakte eigenständige Kommunikationsstation, die situative Nachbarschaften sinnvoll als Zusatzfunktionen integriert.



Videotex, Guide Professionell

z.B. Minitel...
das humorvoll, pictograbel, karikaturfähig ist, und dadurch auf doppelt Art "medienwirksam".

Videotex 6.87

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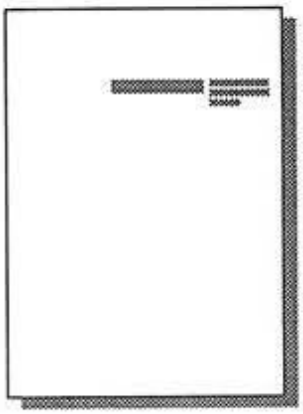

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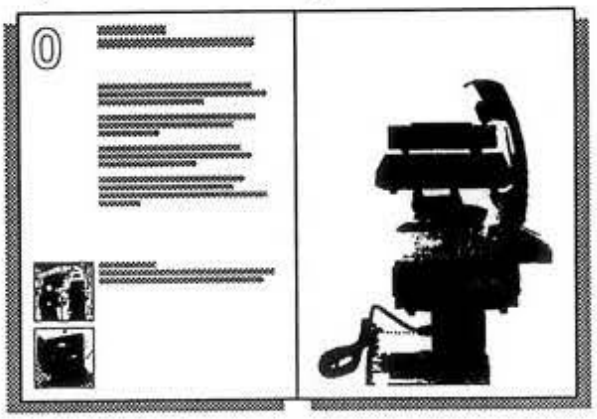

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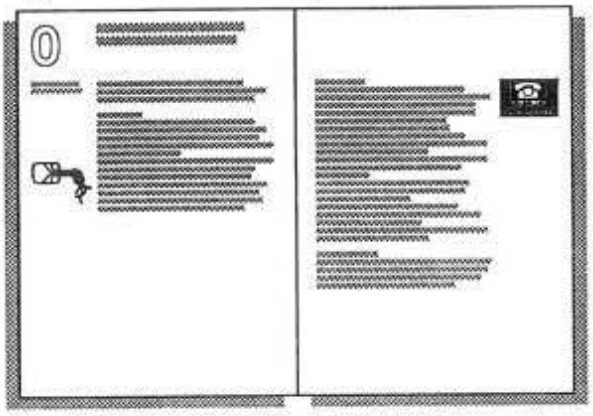
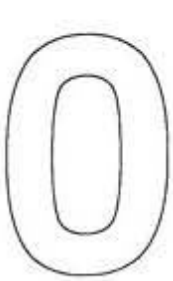




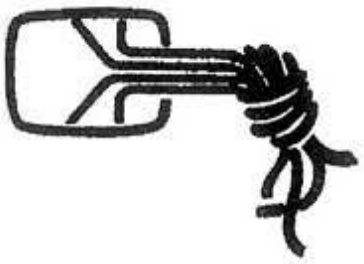
The Medium is the Message?
Wasser in Wein verwandeln

Medium auf der Suche nach seiner Identität

Sind hier neue Artefakte für dezentrale Kommunikation drin: kreativer, das will sagen reicherer Umgang mit dem Medium Telefon...

BTX-heute...

Angesichts der fortgeschrittenen visuellen Ästhetik, die das Gros der Magazine und Zeitschriften, Werbung und Alltag zeigen, nimmt sich Btx - auflösungstechnisch auf Legoniveau - anachronistisch aus...



Eine bis zum Anschlag ausgereizte BTX-Seite mit 1600 bit braucht bis zu dreissig Sekunden, ehe sie auf dem Bildschirm aufgebaut ist. Bedienung und Navigation im Btx-Zirkus ist im Vergleich mit interaktiven Systemen aus der fortgeschrittenen Computerbranche so elegant wie ein Faustkeil neben einem Skalpell.

BTX-morgen...
Lässt sich nicht isoliert vorstellen von Handlungen, die in situativer Nachbarschaft zum Telefonieren liegen, und nur als eine unter vielen Möglichkeiten erweiterter Kommunikations- und Nutzungsansprüche sehen.
Zugang und Navigation bedürfen eines Evolutionssprungs, der durch raffinierte gegenseitige Beeinflussung von Soft- und Hardware erreicht werden könnte...
Einfache Eingabeprozeduren durch Inputdevices, die über die Grenzen des Tastendrückens hinausgehen...
Steigende Übertragungsraten und Speicherkapazitäten lassen auf eine Anhebung des visuellen Niveaus hoffen.
Die parallele Übertragungsfähigkeit in digitalen Netzen kann eine echte Erweiterung der Kommunikation bringen...
und die Anwendung des Multitels in dezentraler Strategie als Netzwerkstation.

...übermorgen...
Was jetzt noch ein Notizbuch, ein Telefon, eine Scheckkarte...leisten, im Hinblick auf Grösse, Portabilität, Leistungsfähigkeit...übernimmt ein smartes electronisches Device,...

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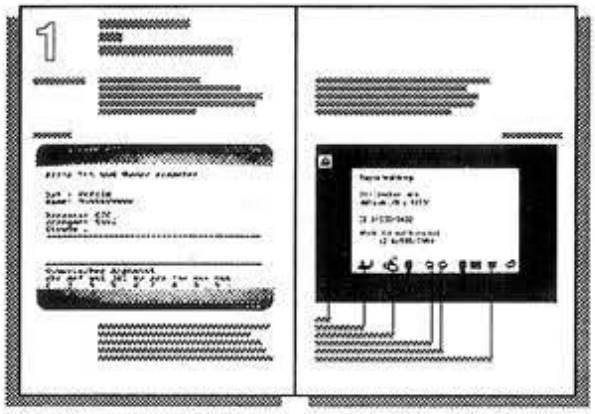

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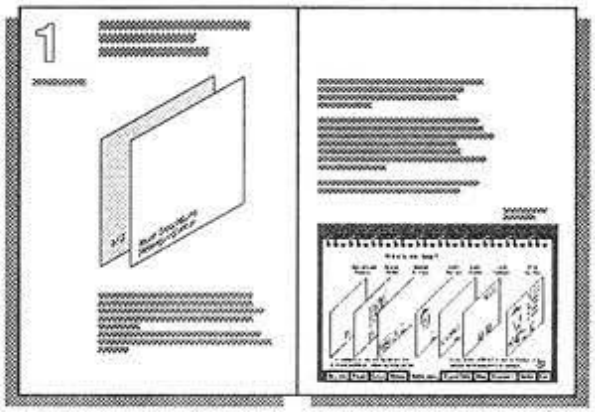

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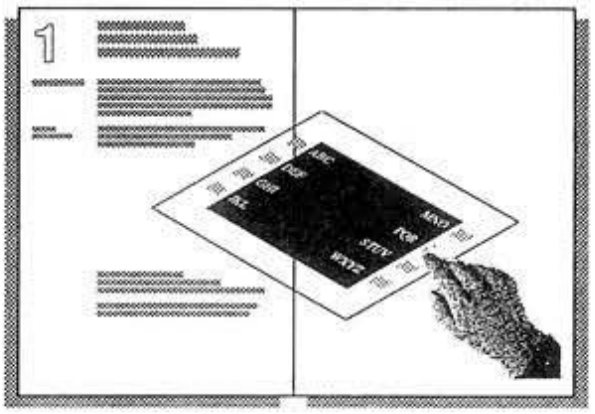

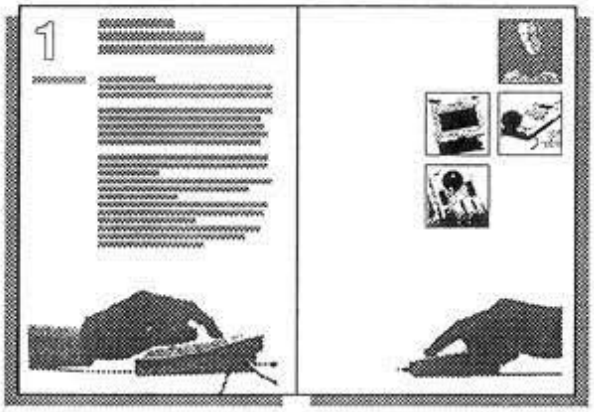

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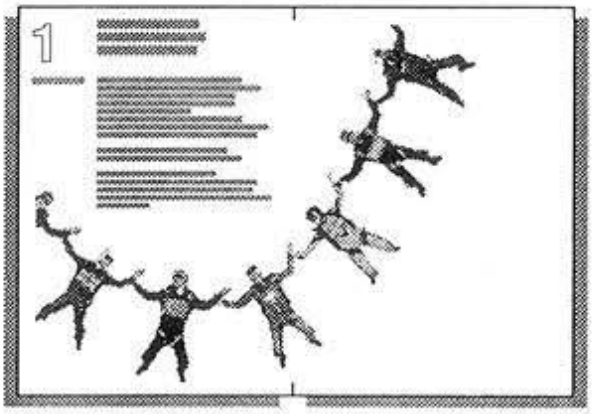

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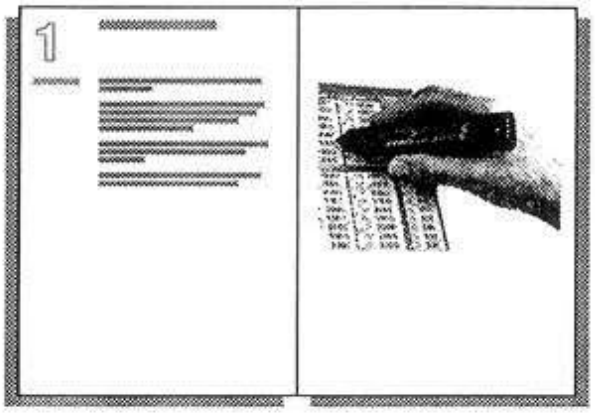


New Access...

Ist der Zugang zu BTX evolutionsfähig?

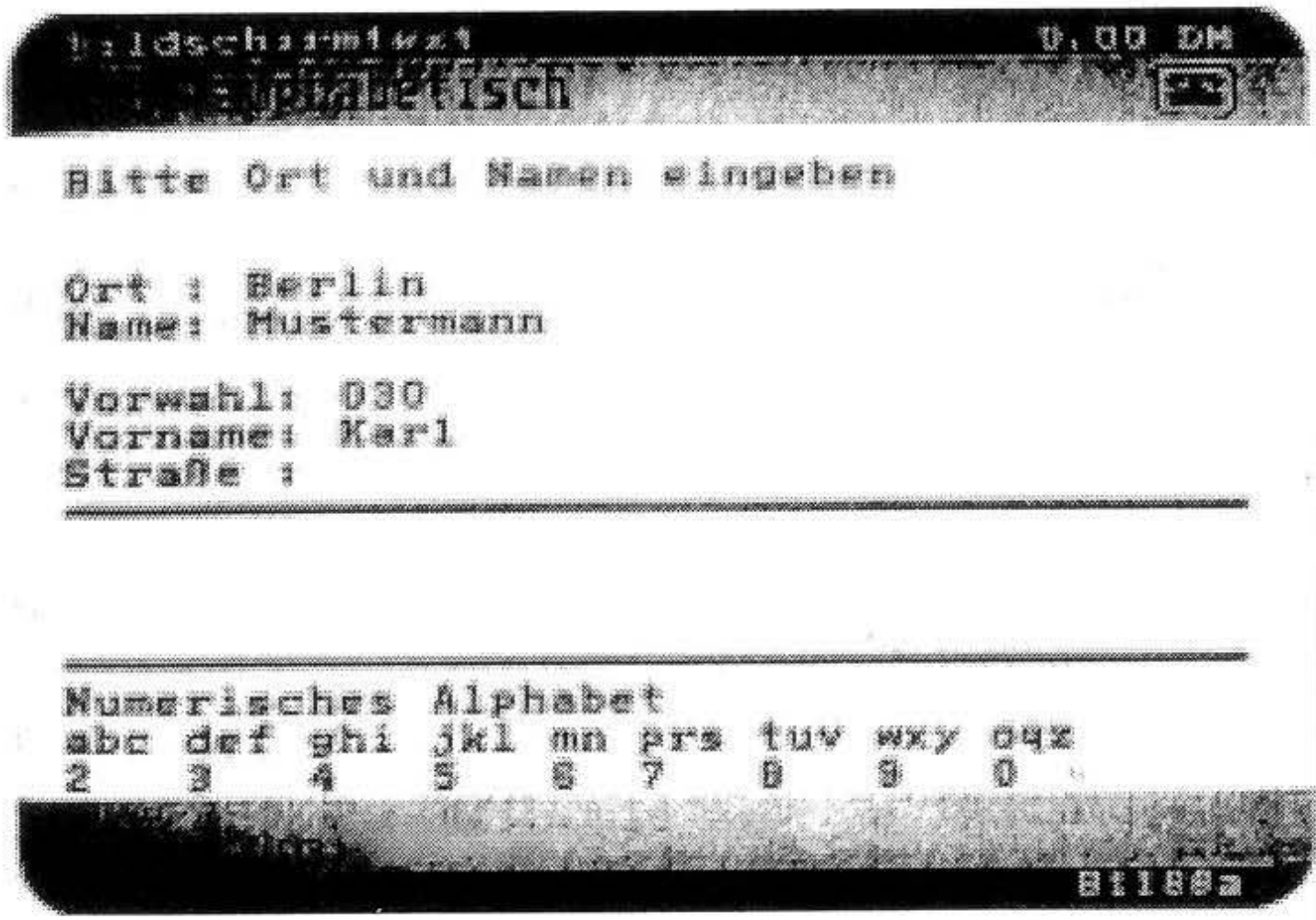
1

Visuell + interaktiv
oder
Sehen, verstehen, handeln

New Access...

Wie kommt man rein ins BTX?
Die Benutzeroberfläche ist zu stark an überholten PC-Konzepten orientiert und steht sicher einer Attraktivität des Mediums für Nicht-PC-Benutzer im Wege.

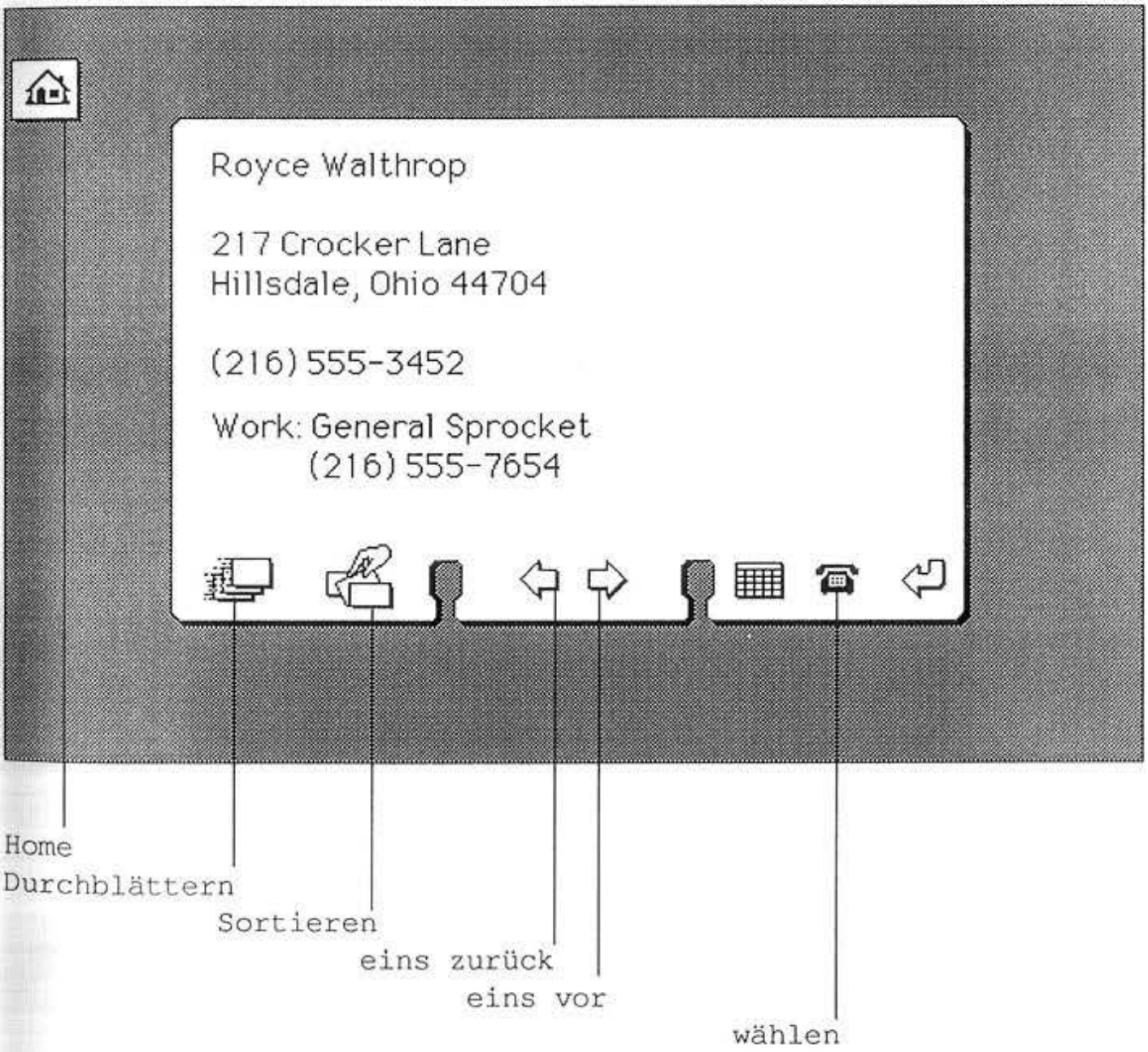
Bildschirm BTX



Jedes Manöver, das ich im BTX-System vornehmen will, erfolgt über Befehlseingabe auf der Tastatur. Die Manöverschritte werden auf dem Bildschirm in eine Chiffre übersetzt, die auf der Tastatur gesucht und ausgelöst werden muss.

Visuell unterstütztes interaktives Manövrieren heisst, auf dem Bildschirm wird mir eine Auswahl von Möglichkeiten durch Symbole zur Verfügung gestellt, die ich direkt auf dem Bildschirm aktivieren/auslösen kann.

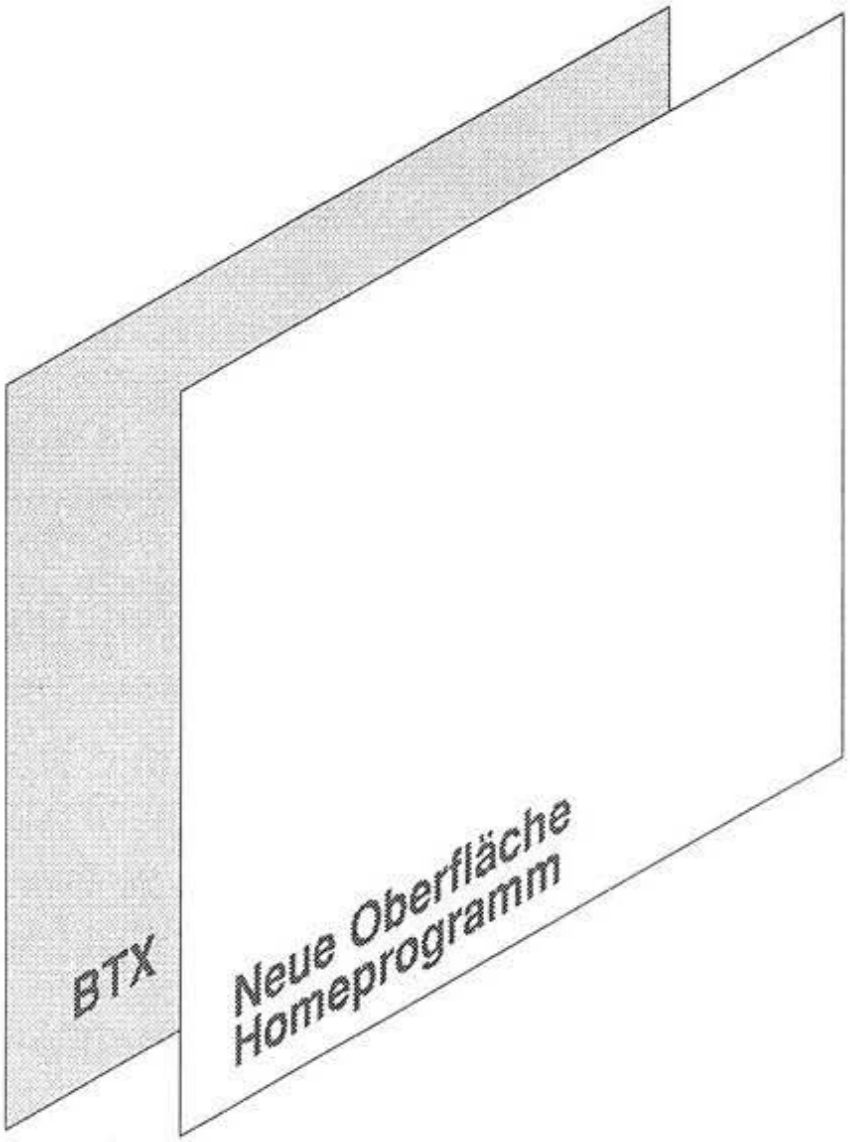
Bildschirm Hypercard™



1 Die BTX-Oberfläche bekommt einen neuen Anzug

Das Home-Programm

New Access...



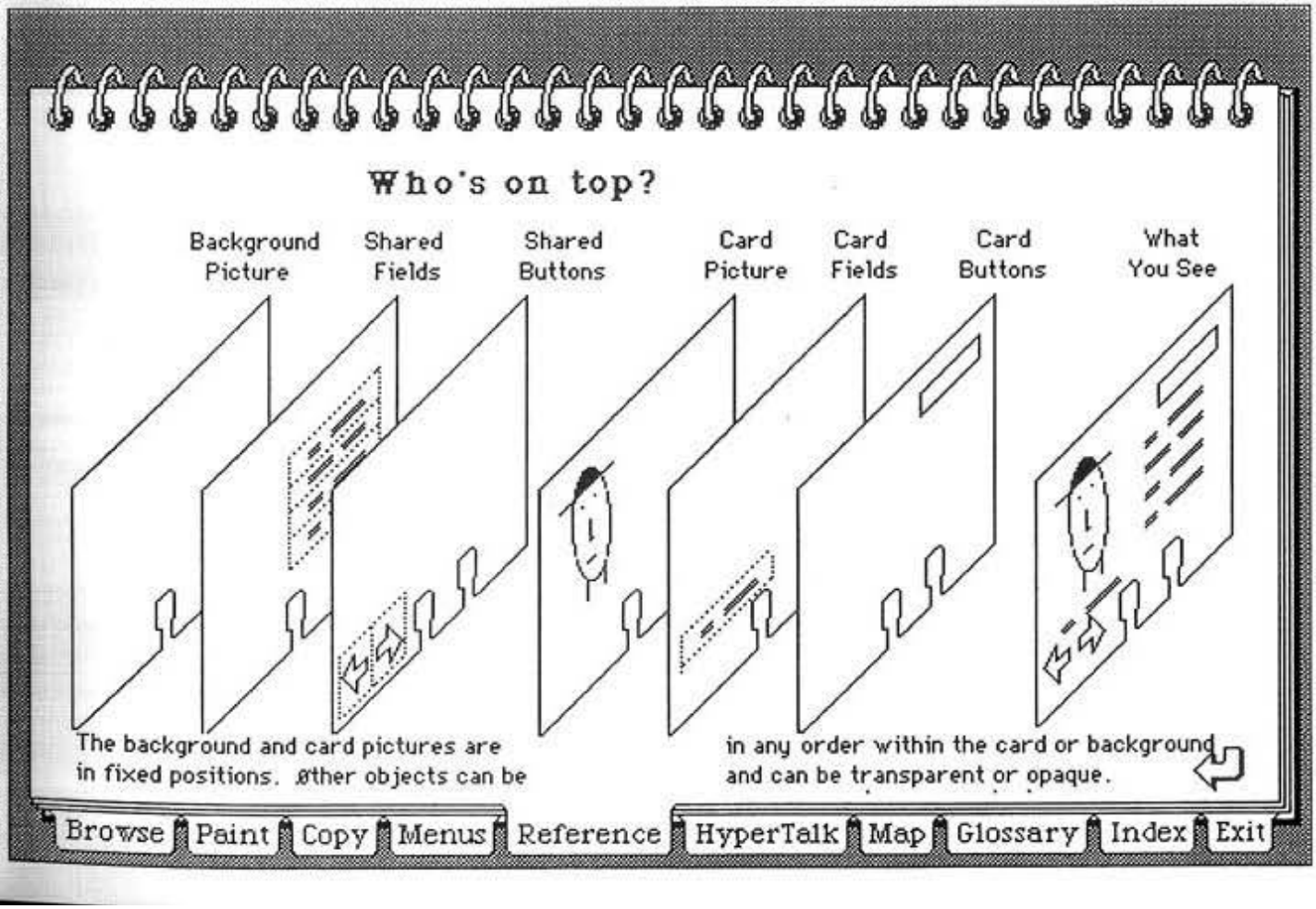
Über die BTX-Oberfläche die in sich wenig evolutionsfähig erscheint, eine Software-Oberfläche legen, die sich an dem inzwischen erreichten Stand des interaktiven Dialogs orientiert.
Das Home-Programm verwaltet das persönliche Register und bietet einen erleichterten Zugang zum BTX.

Vermittlung der Programmschritte über Symbol
und Grafik, selbsterklärendes Programm,
Sichtbarmachung des Programmabblaufs,
Windowtechnik.

Man startet mit dem "hauseigenen" Programm,
das raffiniert einfache Finder-Optionen hat,
die sowohl für das persönliche Register gelten,
als auch für das BTX-System, und hier
vergleichbar einer transparenten Folie
drüberliegt, und die empfangenen Befehle nach
hinten weitergibt.

Das Programm lässt sich abschalten, und man
kann wie gewohnt mit dem BTX arbeiten.

Programmaufbau
Hypercard™



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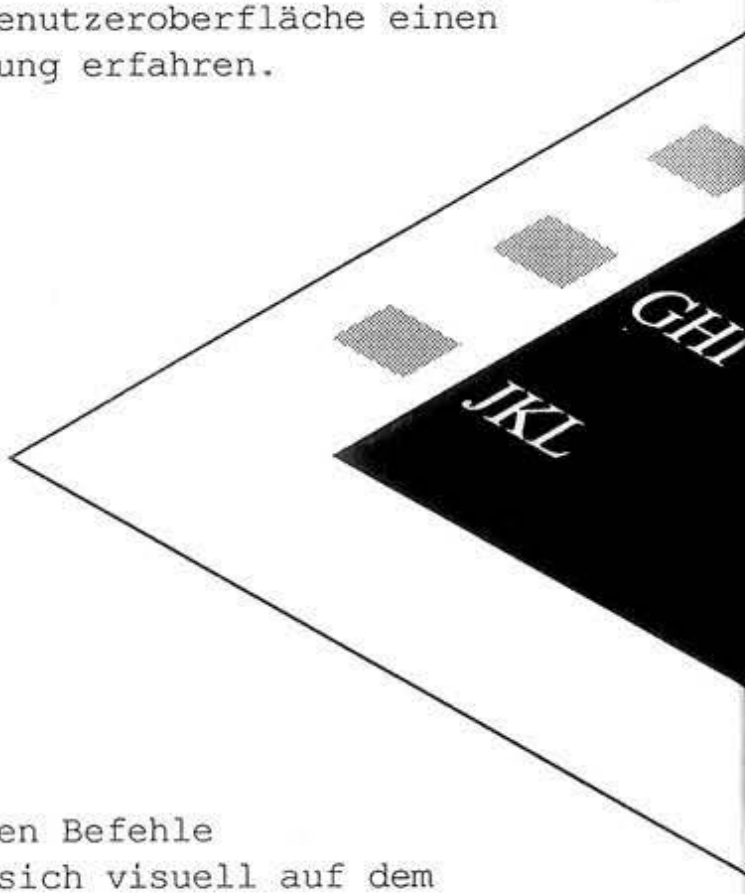
See, what to do...
Einfache Navigation durch BesideScreen-Buttons

New Access...

Neben dem Bildschirm sind Tasten angeordnet, deren Funktionen auf dem Bildschirm angezeigt werden. Durch diese Zuordnung (Input und Output in einer Handlungsebene) kommt man zu einfacher Bedienung und Navigation.

Hardware follows Software

Soft- und Hardware bedingen sich gegenseitig, so kann die Benutzeroberfläche einen Evolutionssprung erfahren.



Die notwendigen Befehle erschliessen sich visuell auf dem Bildschirm, das Programm ist selbsterklärend.

Die Tasten können je nach "Stand der Dinge" belegt und vom Display bezeichnet werden.

ABC
MNO
PQR
STUV
WXYZ

1

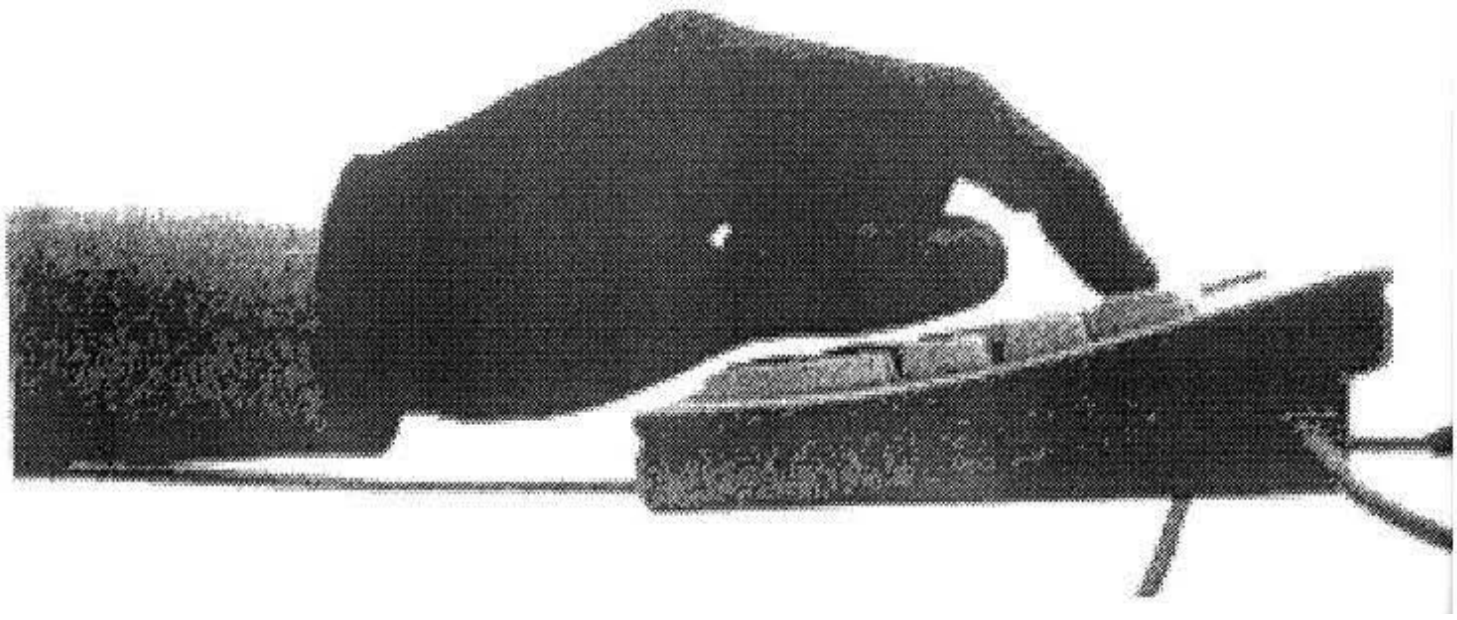
New Access...
tippen, klicken, rollen
auf der Suche nach der Eingebung

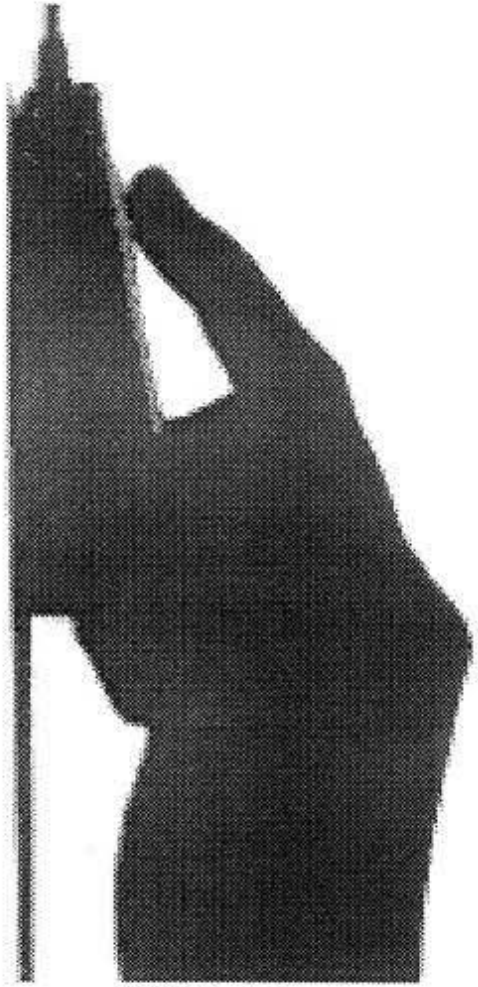
New Access...

Hardwareseitig:
Eingaben über Tastatur haben immer das Problem der "Übersetzung" des Befehls in eine Chiffre.

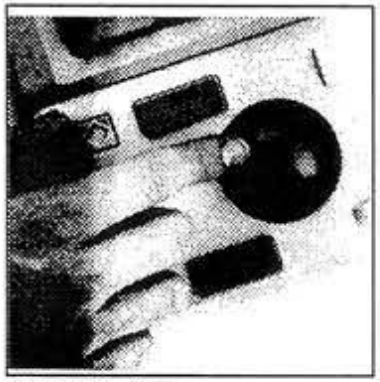
Wie käme man zu direktem, interaktivem Dialog? Visuell unterstützt durch Screen-Icons (als Symbol, Wort...), die durch einen einfach zu handhabenden Cursor auf dem Bildschirm direkt anzuwählen oder als Befehl auszulösen sind.

Maussteuerung: der Befehl wird direkt auf der Prozessebene gegeben, Aktion und Reaktion erfolgen analog...
Touch Screen: wie bei Maussteuerung, aber ohne zusätzliche Teile, Bildschirminhalt wird zeitweise verdeckt...
Touch Pad: der Finger wird zum Cursor, dieses Inputdevice kann fest mit dem Gerät oder der Tastatur verbunden sein...
Smart Ball: Rollkugel mit gutem Tuning, die Handbewegung wird in die Cursorbewegung übersetzt (auch Joystick)...

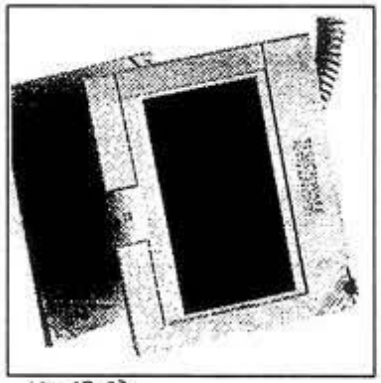




Mac World 2.88



Mac World 8ô7



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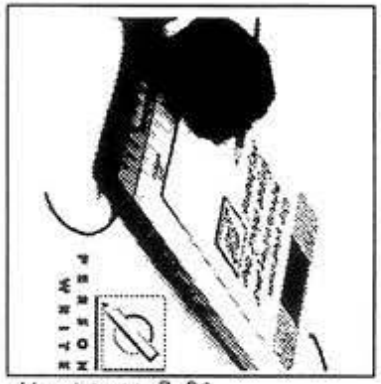

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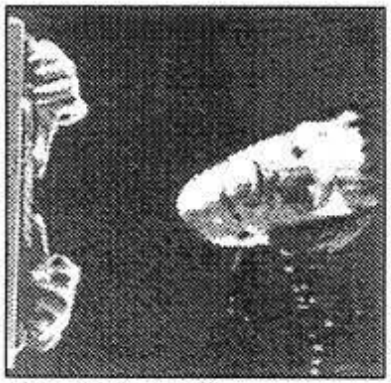


Mac World 11.87

1

Pushing the network
Software is a Service, you can subscribe...

New Access...

Loewe bietet nicht nur die Hardware an, sondern ein Homeprogramm und zu diesem einen Update-Service, zu der die Nutzer des Homeprogramms über die Loewe- mailbox einfachen Zugang haben...
Der Update-Service bietet Kurzwahlen zu Btx-Anbietern, Btx-Anschlüssen, die sofort aus dem Homeprogramm angewählt werden können...

Ausserdem Features und interessante Programm-module für das Homeprogramm...

Langfristige Strategien, die auf Netzwerktätigkeiten zielen, auf Kontakt zum Nutzer, Anregungen, Service, understanding business, postindustrielle Handlungsspielräume, Experiment ...

1 Einlesen statt eintippen

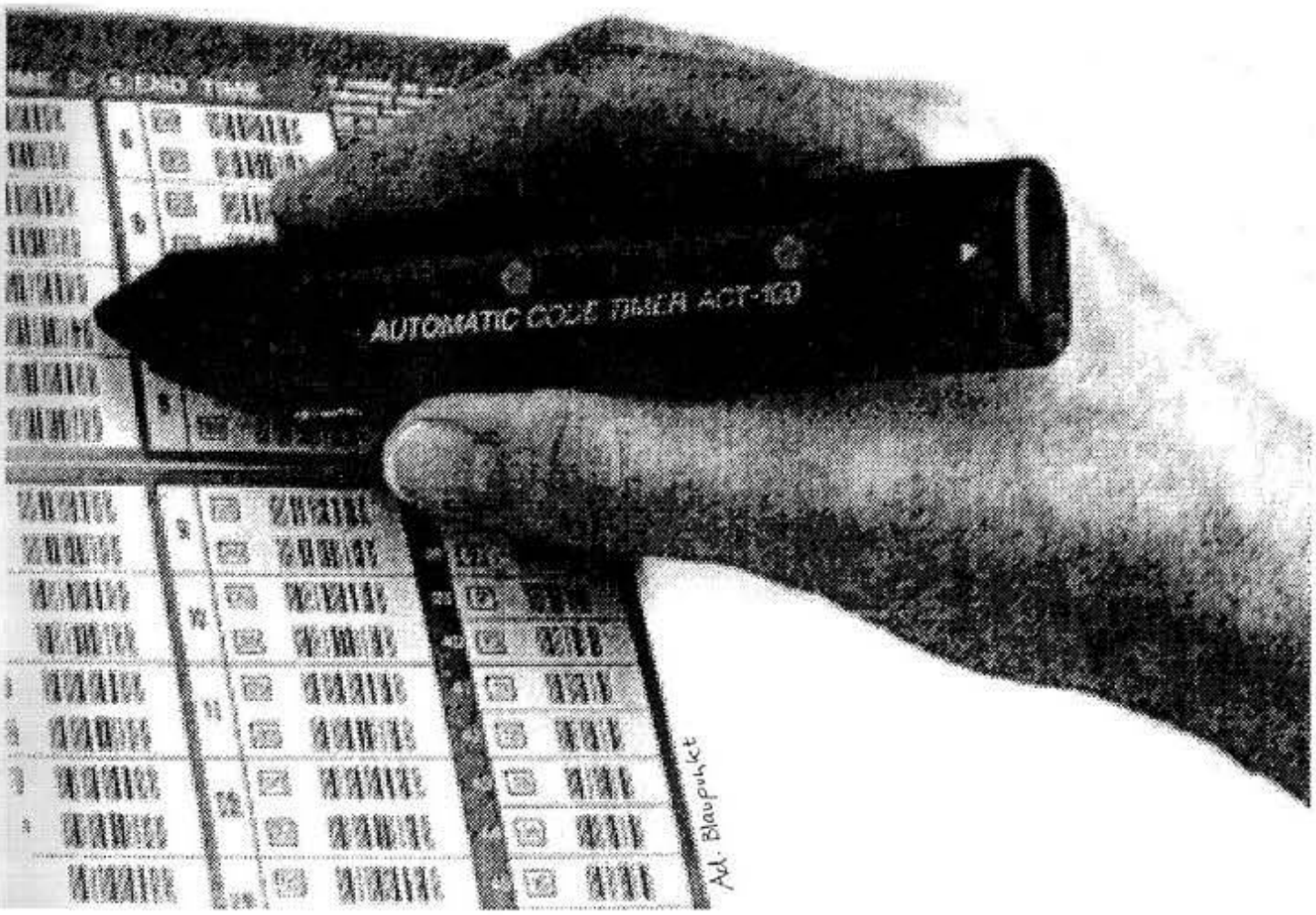
New Access

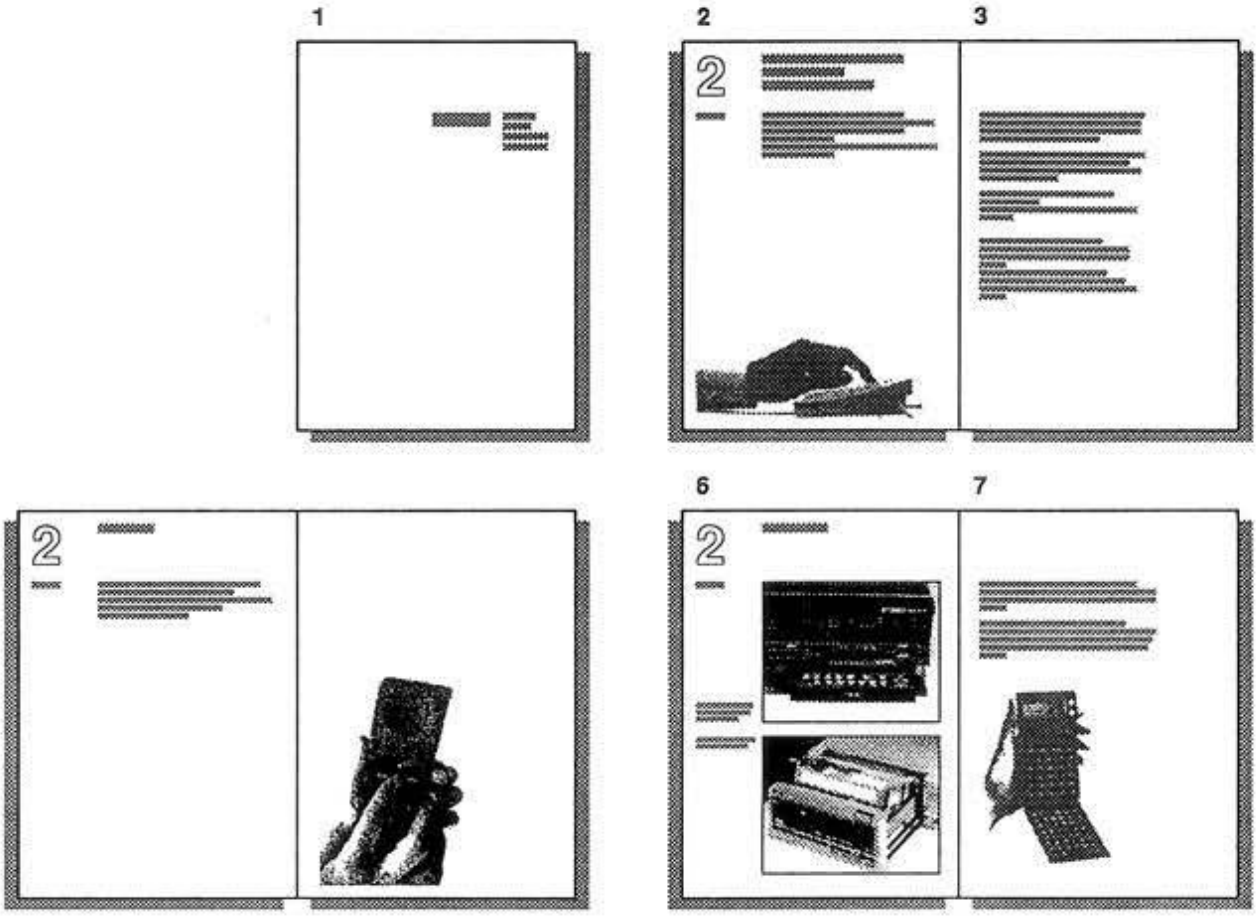
Wenn gedrucktes in digitale Daten überführt werden soll...

z.B. beim electronic shopping, wo lange noch der gedruckte Katalog die Kaufentscheidung bestimmt, kann die Eingabe über einen Barcodereader erfolgen...

...denkbar für alle Vorgänge wo kleine Datenmengen eingegeben werden sollen, Datenupdates,etc.

...oder wo anhand einer Bedienungsanleitung Funtkionen programmiert werden sollen


AUTOMATIC COOK TIMER ACT-100
Art. Blaupunkt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Logistik

Weniger zeigen, um mehr zu verstehen...

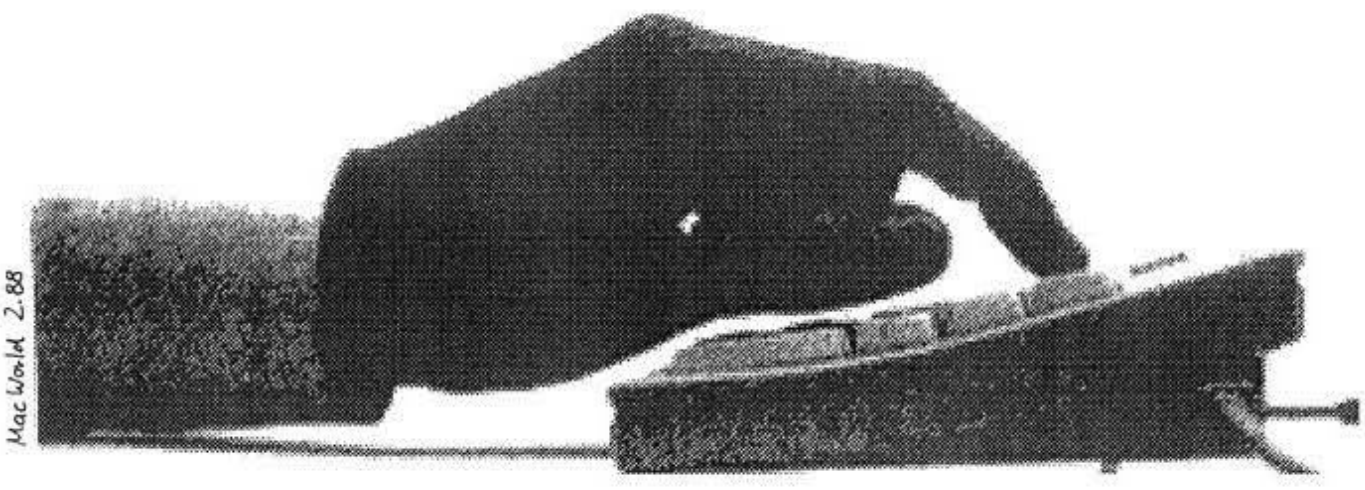
2

Tiefenstaffelung des Zugriffs

Weniger zeigen, um mehr zu verstehen

Logistik

Auch bei jetzigen Rahmenbedingungen im BTX-System wäre eine Verbesserung des Zugriffs vorstellbar durch Hierarchisierung der Bedienungslogistik.
Drei Benutzerebenen, drei Zugriffsstufen lassen sich unterscheiden.



1.bildschirm-unterstütztes **Telefonieren,** mit den Vorzügen der Nummernspeicherung und der Verfügbarkeit/Sichtbarkeit des persönlichen Registers auf dem Bildschirm....

2.die Verfügbarmachung von **BTX-Informationen rein rezeptiv,** das meint "durchblättern/ browsing" über die vorhandene eingerichtete Benutzeroberfläche...

3.**schreiben von eigenen Nachrichten,**
electronic mail,
also schreiben/typing über alphanumerische Tastatur.

Wenn nicht alles zu gleicher Zeit gebraucht wird, lässt sich die jeweilige Komplexität der Zugriffsstufe angemessen halten.
Prozessorientierte Strukturierung:
Die Präsenz der Bedienungselemente kann der Art, der Dauer ihrer Nutzung angepasst werden.

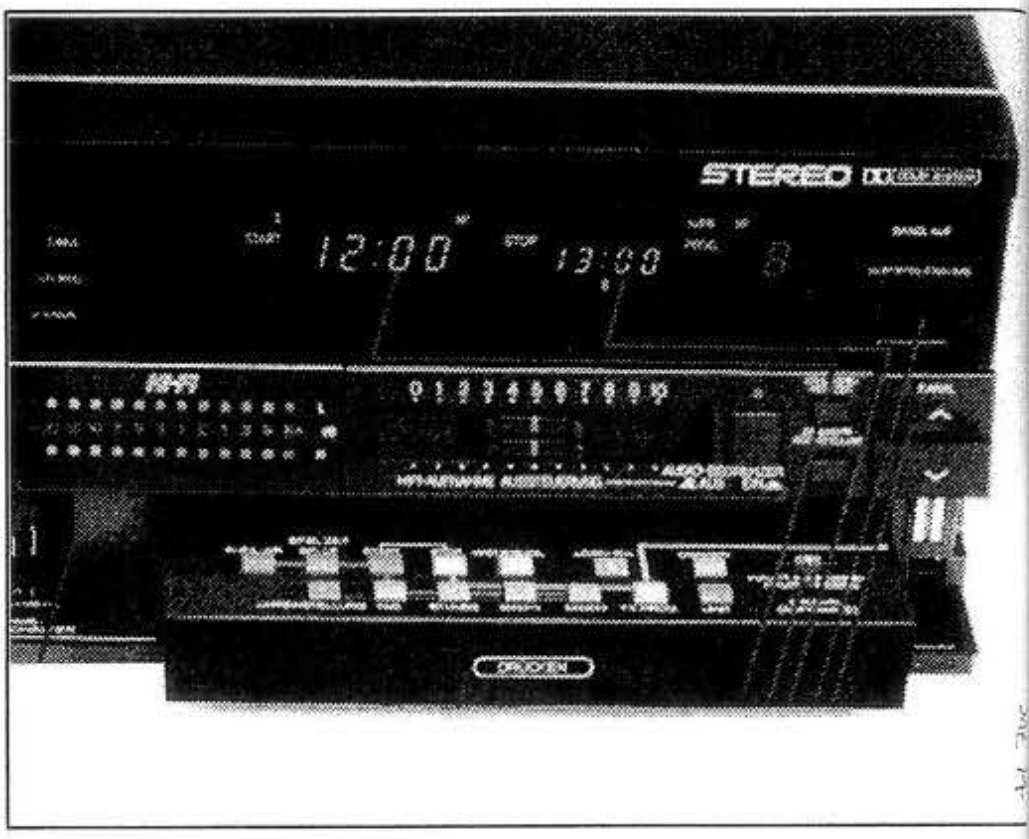
2 Browsing...

Logistik

Browsingsteuerung für BTX-Abfragen über die numerische Wahltastatur erledigen...
Die Wahltastatur ist auf dem Hörer angebracht, so daß dieser als **Remote-control** verwendet werden kann...

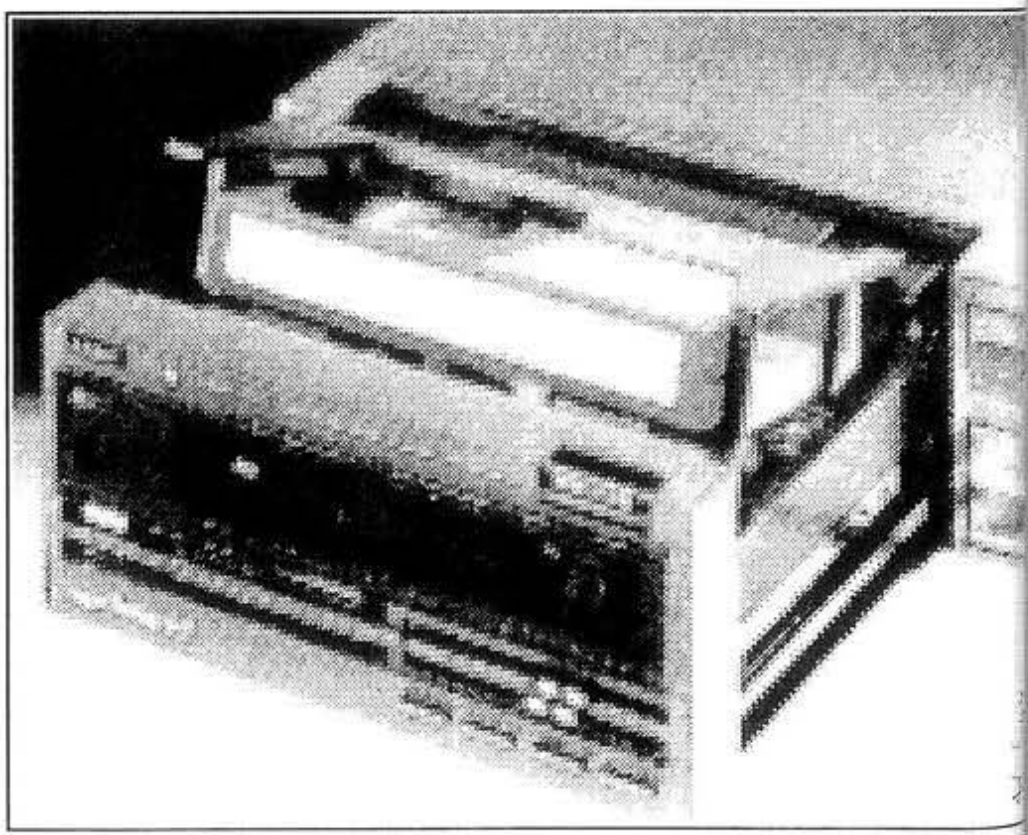
2 ... und Typing

Logistik



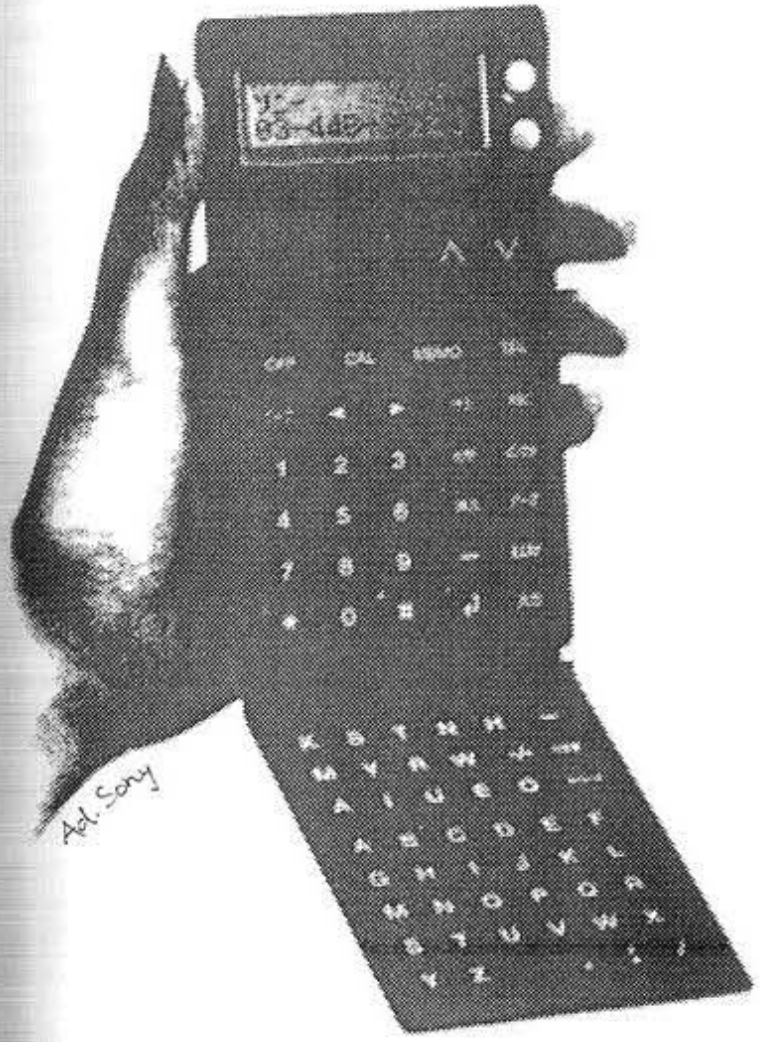
Wie man es schon von vielen Videorecordern und TV´s kennt...

...oder die Tastatur fährt raus auf Knopfdruck.



Die Tastatur wird erst herausgeklappt oder unter dem Bildschirm herausgezogen, wenn alphanumerische Eingaben ins BTX-Netz gemacht werden sollen.

So kann für die Browsinganwendungen die Komplexität relativ gering gehalten werden, die Bedienungselemente für das Typing erschliessen sich erst in dem Moment, in dem sie gebraucht werden.



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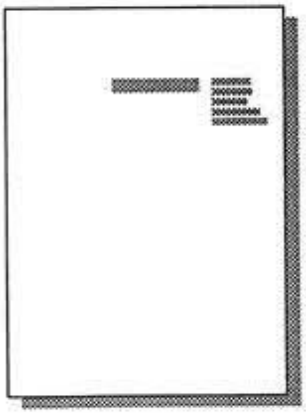

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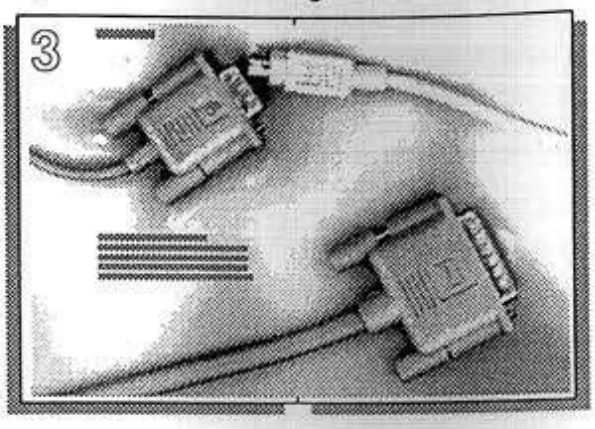

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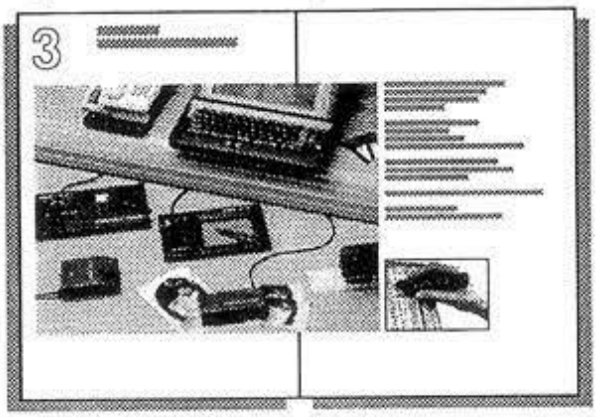

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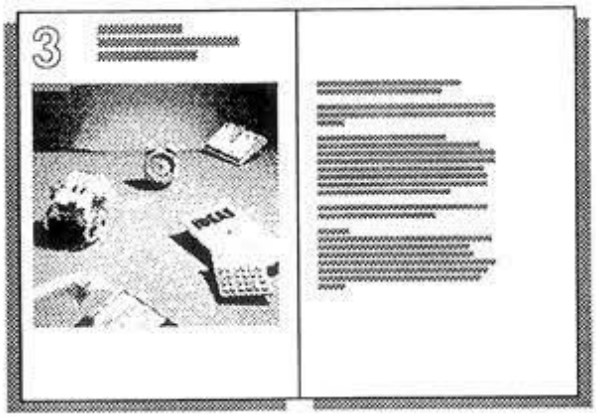
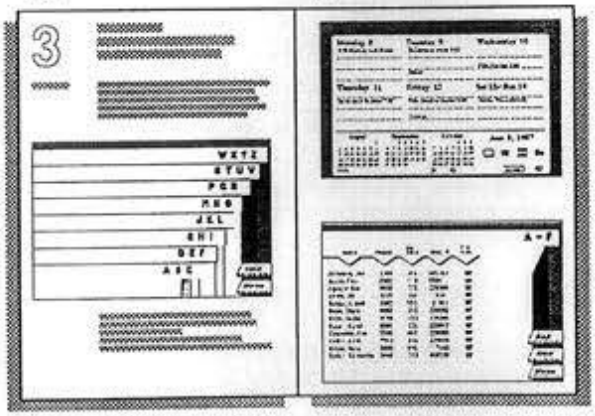


10 11



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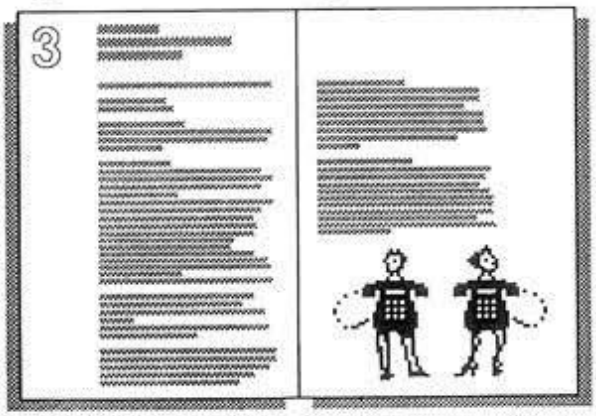
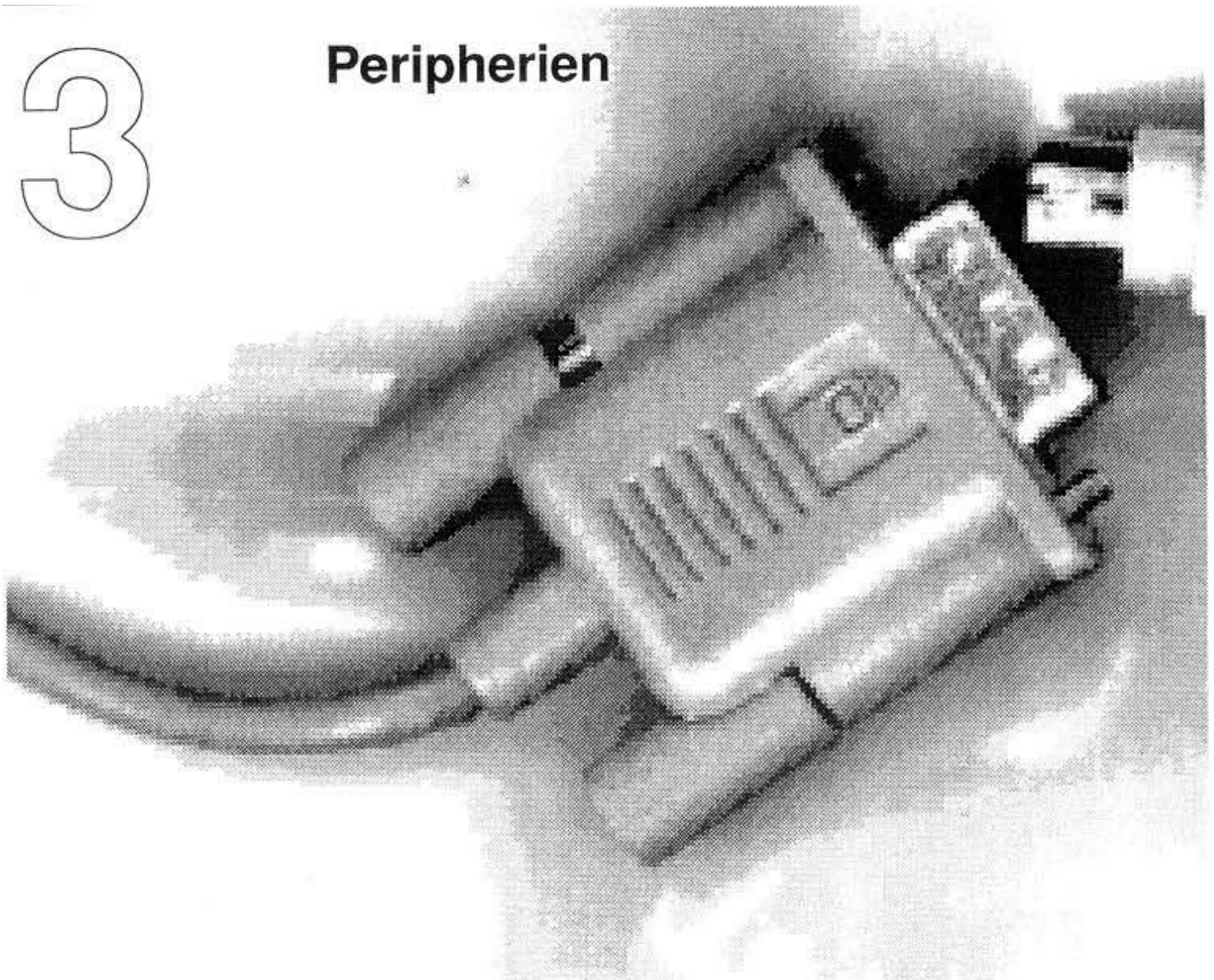


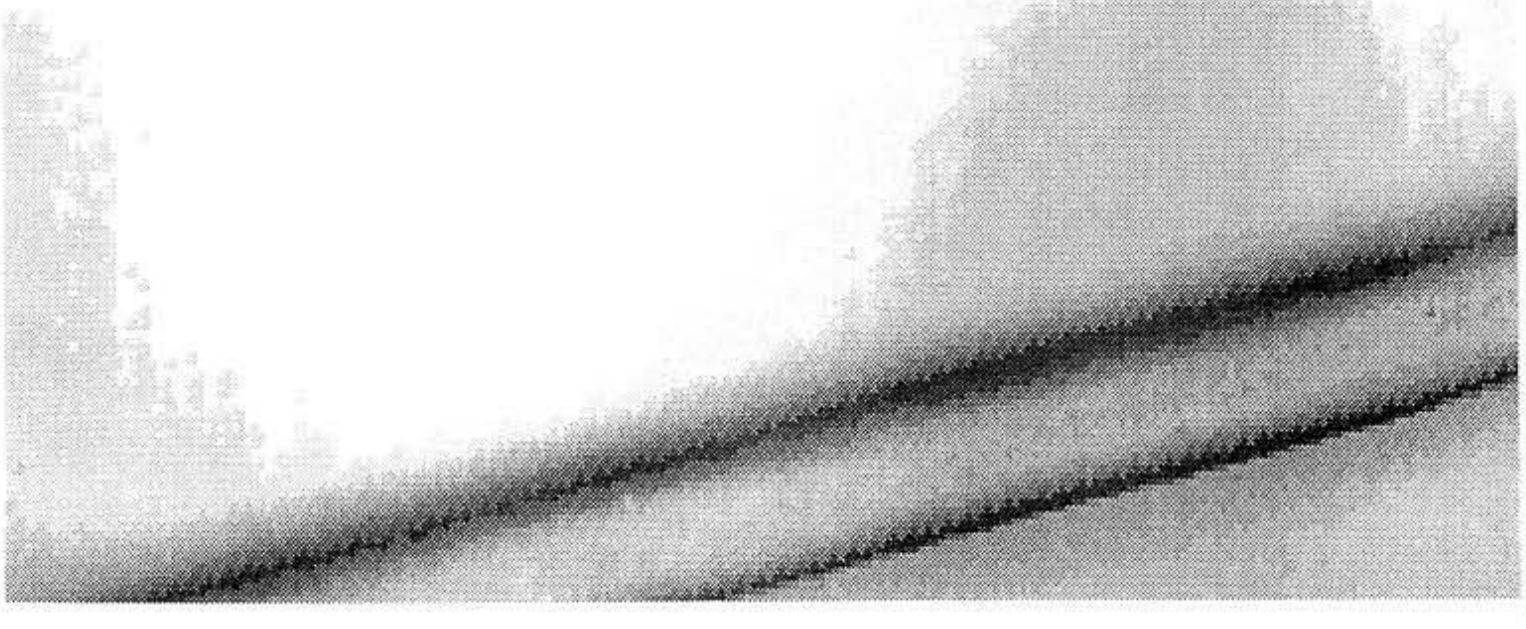
Peripherien

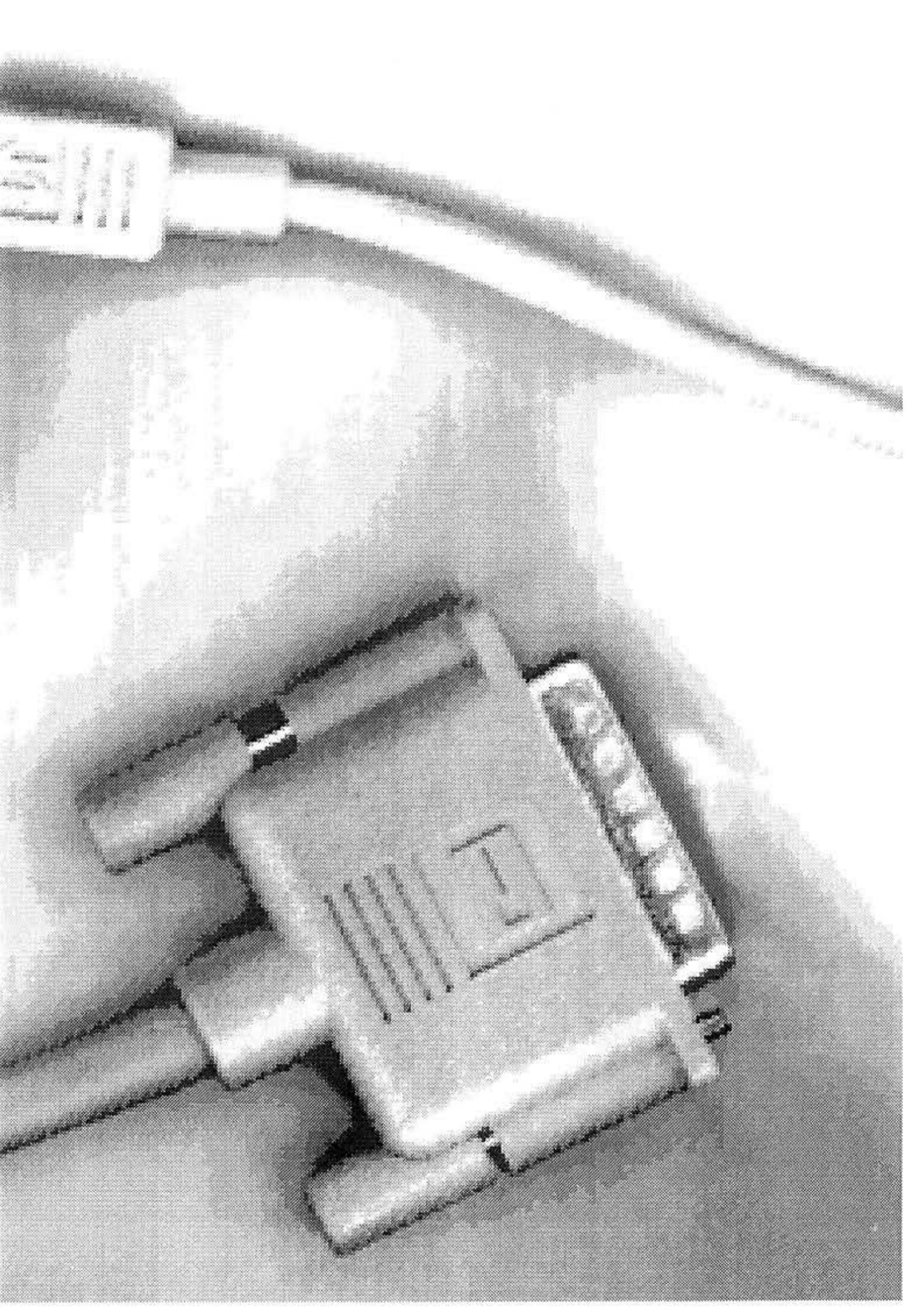
Hardware,
Software...
Nachbar-
schaften und
Funktionsehen

3 Peripherien



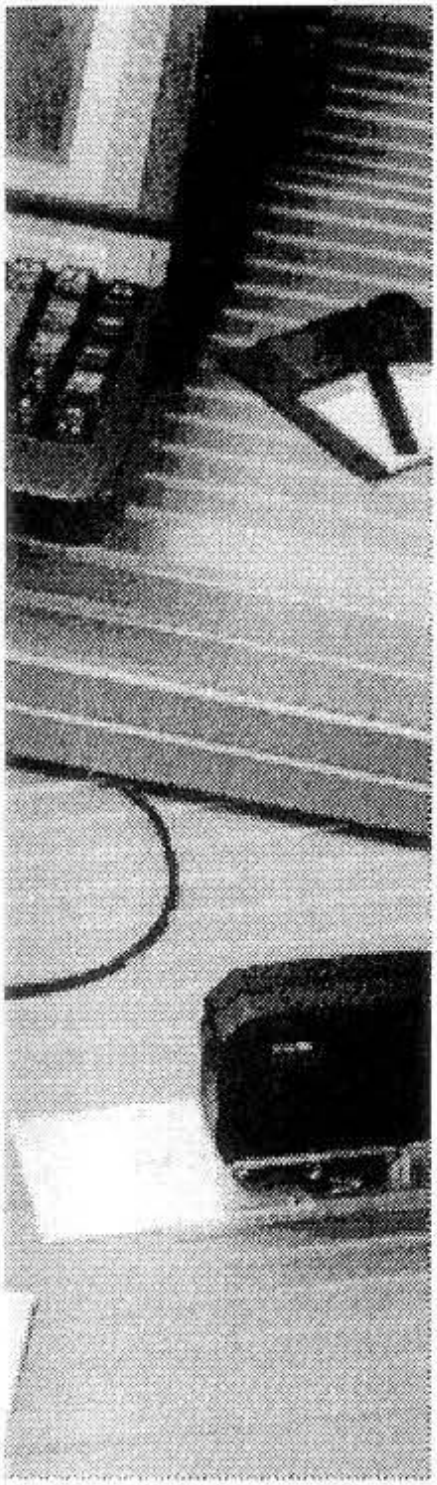
Das **Peripheriekonzept**
benutzerfreundlich gestalten:
was passt, das spielt auch...
Ein serielles Signal wird als
Peripheriebus durchgeschleift.





3

Peripherien:
Hilfe aus der Nachbarschaft



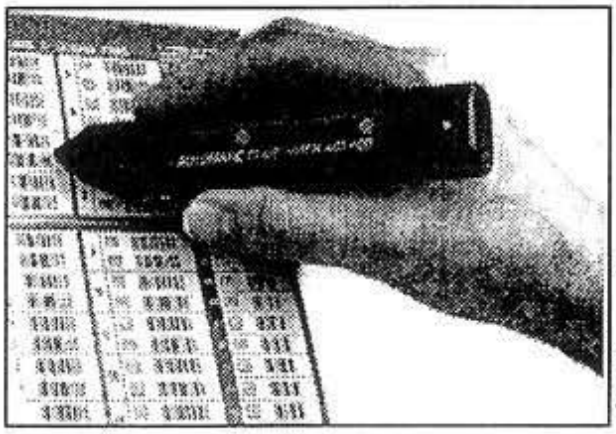
Informationen verfügbarmachen...
1.Stufe: hören/Lautsprecher
2.Stufe: sehen/Bildschirm
3.Stufe: drucken

Informationen eingeben...
1.Stufe: Sprechen
2.Stufe: einschreiben
3.Stufe: einlesen, scannen, Kamera...

Information portable machen...
über electronische Speichermedien:
Diskette, Chipkarte...

In der Peripherie offen und flexibel sein:

Basismodell und ...
anbauen, ausbauen, erweitern...



3 Take-away memorys
oder der Pocketspeicher

Peripherie

Nicht das Gerät ist portable, sondern die Information...
über electronische Speichermedien:
Diskette, Chipkarte...

Die Chipkarte kann sowohl zum Steuern der Abläufe verwendet werden:
- personal Chipcard, man erstellt sich einmal sein eigenes System, bestimmte redundante Schritte werden automatisch erledigt...,
- dient als Identifikation... bei nicht-heimischen Operationen wird man ortsunabhängig...,
- trägt das Programm für zusätzliche Funktionen wie Termin-kalender, Karteisystem...,

als auch zum Speichern, Transportieren, Weiterverarbeiten von abgefragten Informationen.

CHASE
24 Hour Bank
219 920 914
01/88
07/89 CHB
EXPRESS

3

Hybridisierungen
oder die Situationsnachbarn in der Funktionsehe

Situationsnachbarn rund ums Telefon...
Terminkalender, Uhr, Notizbuch...

Die vorhandene Hardware (Multitel mit Speicher) lässt sich durch zusätzliche Software erweitert nutzen.

Hier lassen sich Funktionsbereiche erschliessen, die weit über die Nutzung des Multitels als Btx-Empfänger hinausgehen..., und dennoch eine andere Qualität als ein PC hätten. Ich könnte z.B. bestimmte BTX- Seiten, deren Inhalte über längere Zeiträume konstant sind, in meinem Notizbuch speichern, und müsste sie fortan nicht mehr online abrufen...

Einkommende Anrufe werden gespeichert und auf dem Display sichtbar gemacht...

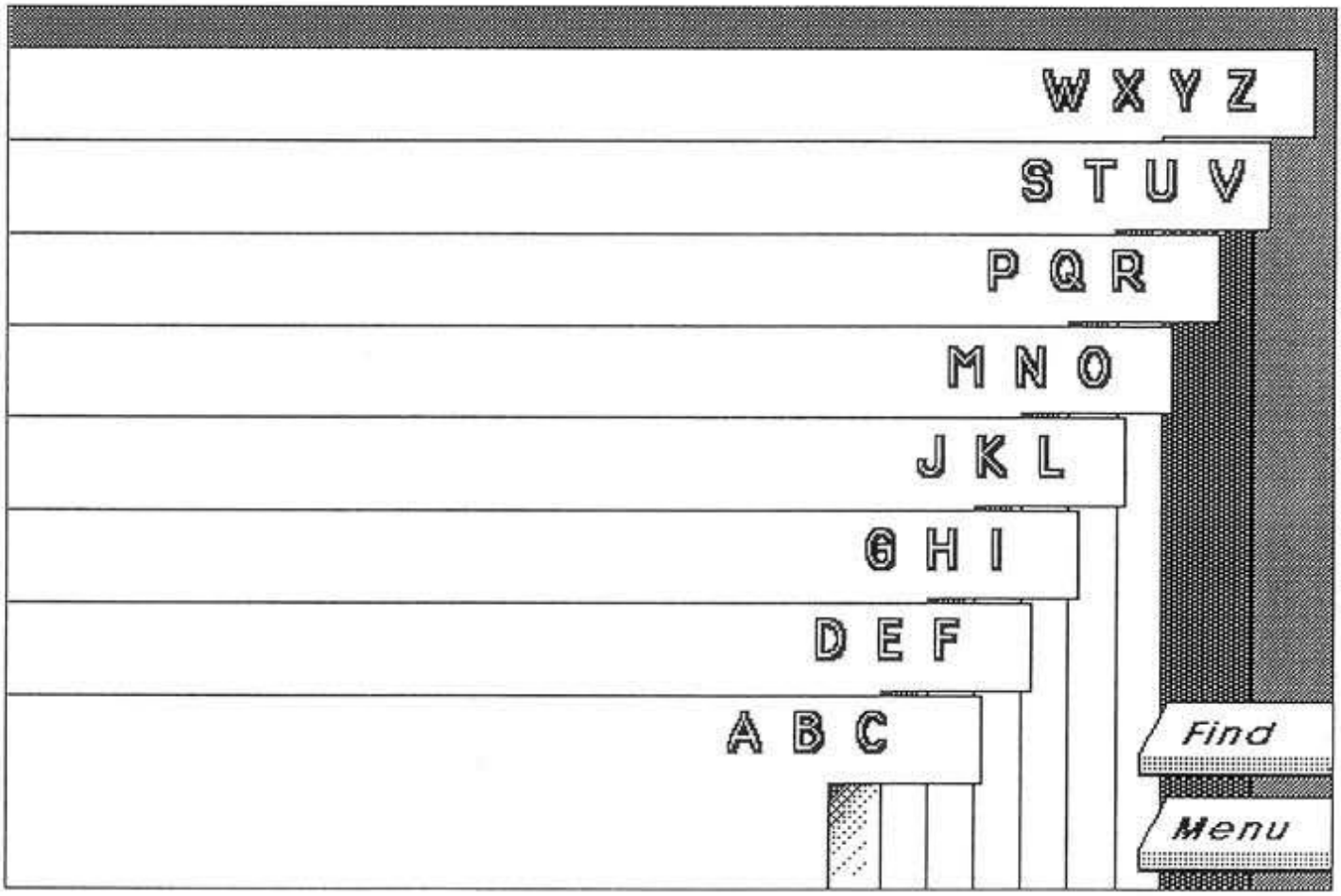
Mailing:
Nachrichten, die in der Form gleichbleiben und nur im Inhalt variieren, können in einer vorhandenen Matrix (Briefkopf, Ansprache, Anlass, etc...ist Bestandzteil des persönlichen Notizbuchs) offline erstellt werden und dann: "go to Btx..." in andere Mailboxen gesendet werden.

3

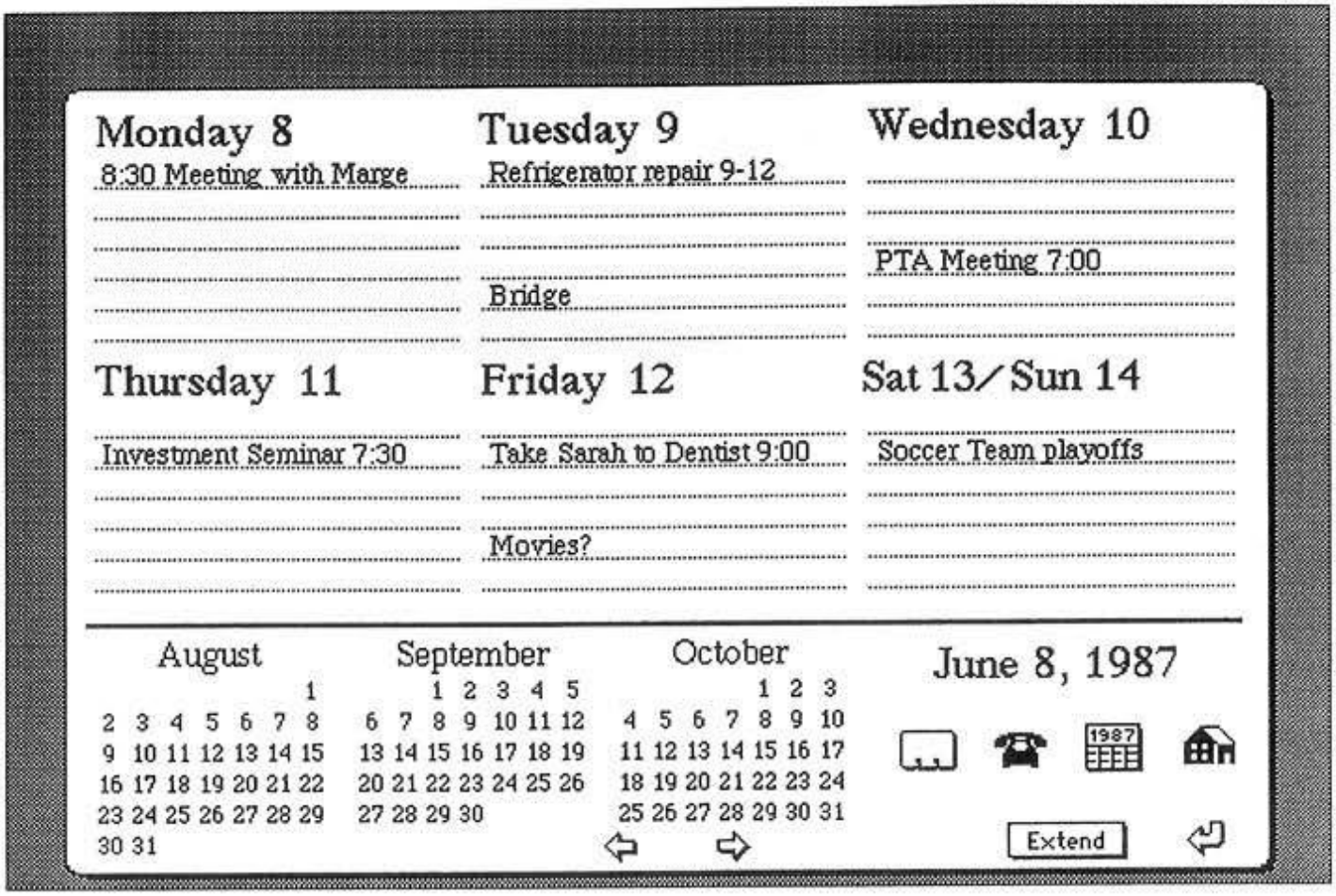
CleverPhone
Notizbuch, Terminkalender, persönliche Datenbank...

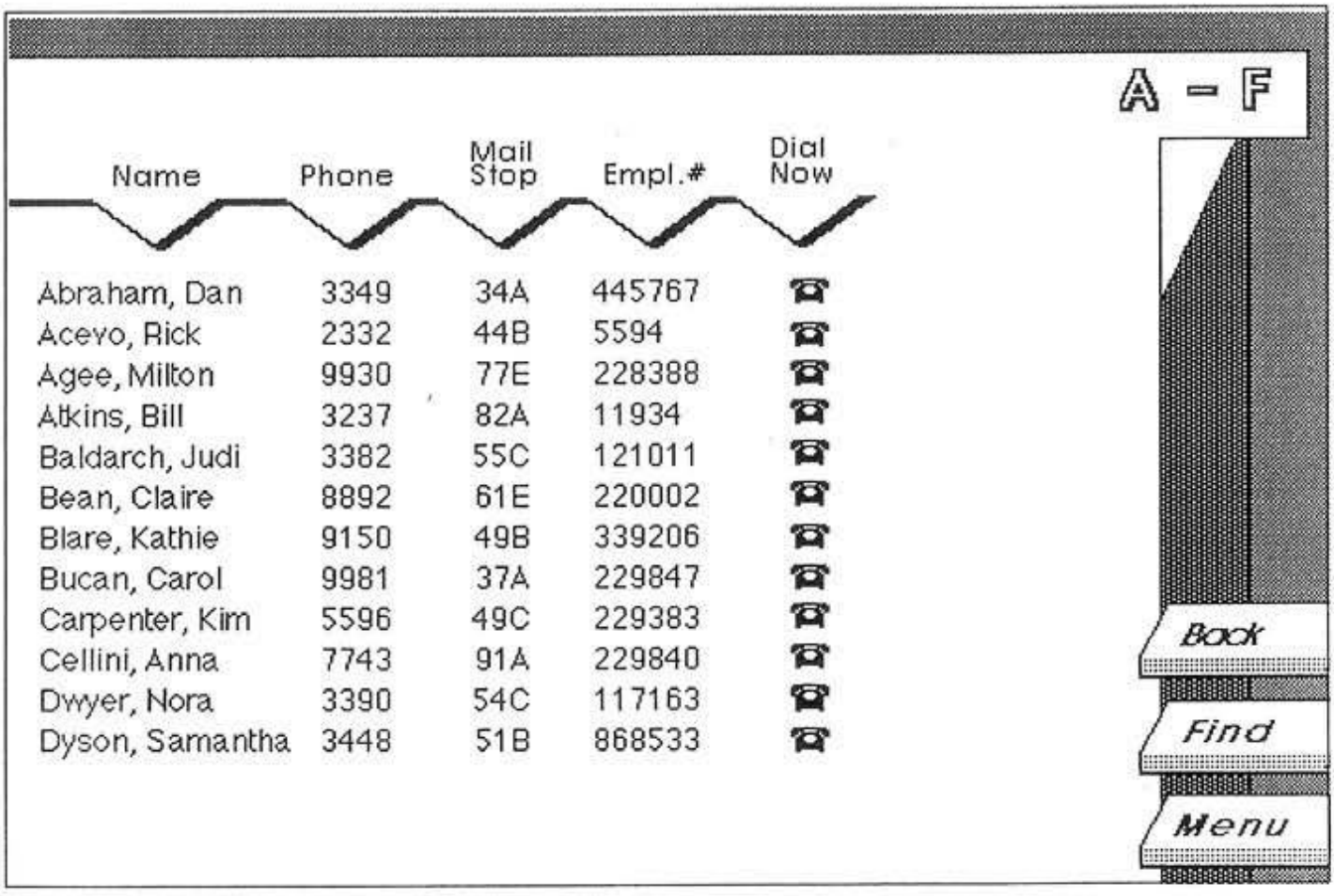
Peripherie

Das Programm wird über Chipkarte gestartet und kann unabhängig von den übrigen Funktionen offline benutzt werden. Nummernwahl, Daten, Bilder etc. können direkt über "paste to BTX" ins Netz gegeben werden (mail-function).



Beispiele aus Apple´s Hypercard™ zeigen, wie die Oberfläche eines solchen Programms aufgebaut sein könnte:
Befehlseingabe über "Screenbuttons"...
(die hier durch Mausklick ausgelöst werden...)


Monday 8
8:30 Meeting with Marge
Tuesday 9
Refrigerator repair 9-12
Bridge
Wednesday 10
PTA Meeting 7:00
Thursday 11
Investment Seminar 7:30
Friday 12
Take Sarah to Dentist 9:00
Movies?
Sat 13/Sun 14
Soccer Team playoffs
August
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
September
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
October
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
June 8, 1987
1987
Extend


A - F
Name
Phone
Mail Stop
Empl.#
Dial Now
Abraham, Dan 3349 34A 445767
Acevo, Rick 2332 44B 5594
Agee, Milton 9930 77E 228388
Atkins, Bill 3237 82A 11934
Baldarch, Judi 3382 55C 121011
Bean, Claire 8892 61E 220002
Blare, Kathie 9150 49B 339206
Bucan, Carol 9981 37A 229847
Carpenter, Kim 5596 49C 229383
Cellini, Anna 7743 91A 229840
Dwyer, Nora 3390 54C 117163
Dyson, Samantha 3448 51B 868533
Back
Find
Menu

3 Peripherien:
Umfelder unter erweiterten Gesichtspunkten

Vervollständigungsübung zum Begriff Peripherie

1. Hardware/Physis
Input-/Outputdevices

2. Software/Intelligenz
Periphere Handlungen, die in der Nachbarschaft zum Telefonieren liegen, durch Software integrabel machen....

3. Biosware/Emotion
Hier sollen/wollen die Smell-Bell...Effekte berücksichtigt werden, d.h. die psychologisch, physiologischen Wirkungen eines Objekts auf Subjekt und Umfeld...
auch Fragestellungen über Beziehungen zwischen Nutzer und Objekt, wie sie sich herstellen, worauf sie beruhen, wie sie beeinflussbar sind...(z.B. auch die Frage, warum BTX über das Fernsehgerät einfach keine Chance haben kann... fernsehen steht in sehr anderen rituellen Zusammenhängen, als z.B. Telefonieren... und man denke nur an die vielen Schwarzseher... Fernsehen ist eben auch behaftet mit ein wenig mehr Staat im Wohnzimmer, und so recht glauben tut´s auch niemand, was da läuft...)
über Form, Farbe, Gewicht, Geräusch, Geruch...

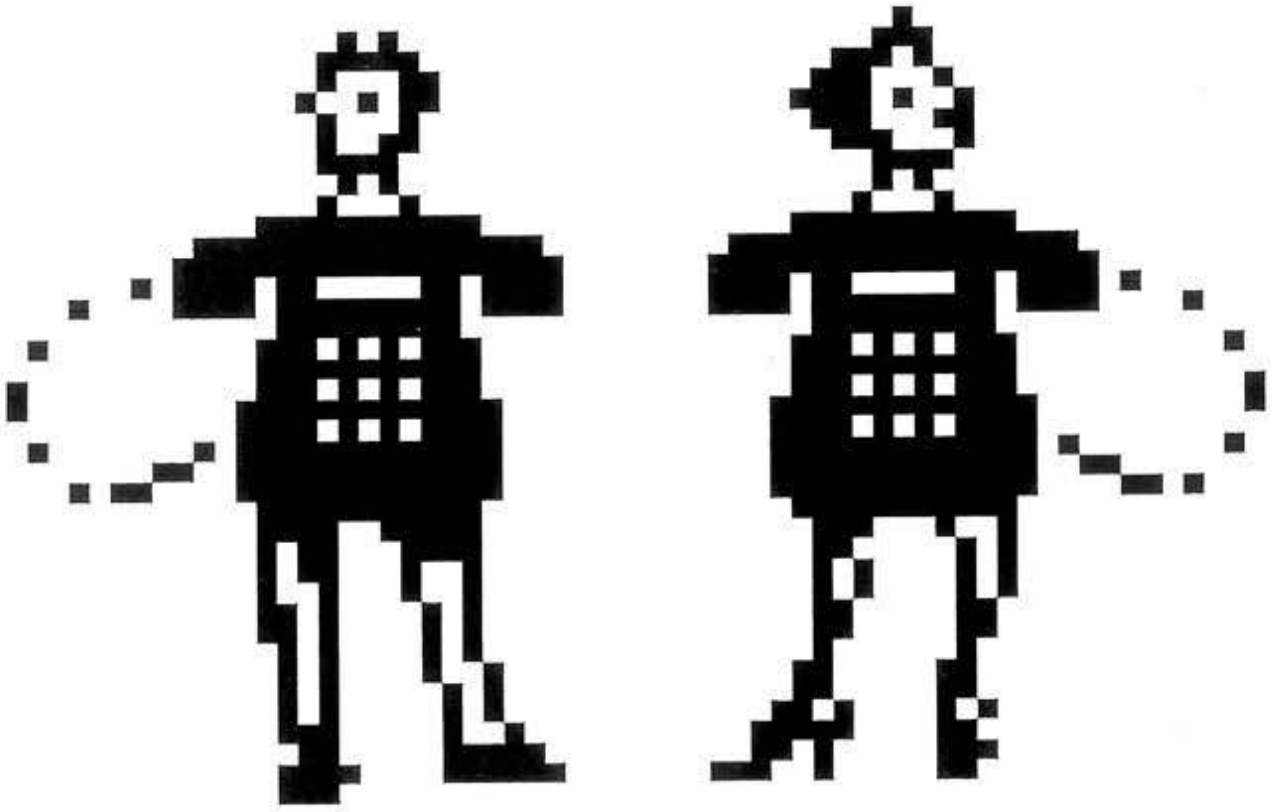
Erlebbarkeit, z.B. berührbare, bewegliche Teile, ihre Grösse, Textur/Oberfläche, Geräusch-Qualitäten beim einrasten, klappen, tippen...
lässt sich ein Objekt als Zeichen lesen, sein Zustand, seine Funktion...

Ist die Gegenwart eines Objektes beeinflussbar, wird es als Störung wahrgenommen, wenn es nicht im Gebrauch ist, lässt sich eine Balance herstellen zwischen Dasein und Verschwinden, ist es in diesem Sinne veränderbar...

Objekt als Chamäleon...
meint wandelbare Objekte, auch den Gegebenheiten anpassbar, z.b. ein Objekt erscheint erst, wenn man es braucht, so Displays, Bedienungselemente erscheinen bei Berührung, beim Einschalten und treten zurück, wenn das Gerät nicht in Betrieb ist, Komplexitäten erschliessen sich gemäss den Stufen des Zugriffs...

4. Mindsware...and follow

Die höheren Schaltkreis der Ritualisierung von Objekt und Gebrauch (Maskierung und Demaskierung von Bedürfnissen..., das Fortschrittspiel..., Wer glaubt, daß Kommunikation nicht zum Kult, zum Ritual um seiner selbst willen werden kann..., der wird auch nicht glauben wollen, daß es sie jetzt schon gibt die telecommunication junkies, die sich die feinen tricks einfallen lassen, wie man kostenlos ..., oder in fremden Konten stöbert...wir empfehlen die Hackerbibel des ChaosComputerClub)



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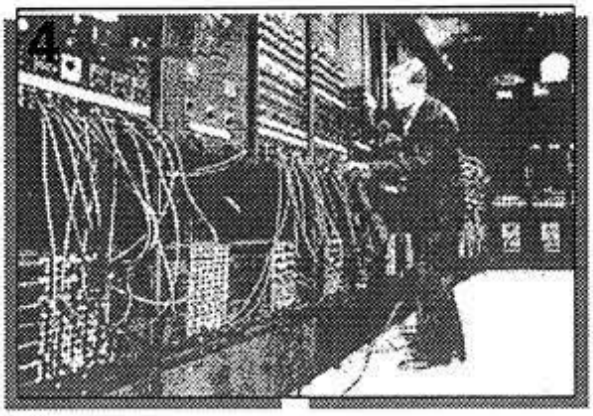

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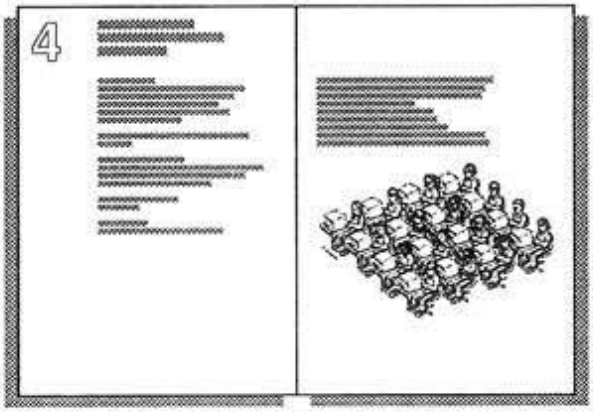

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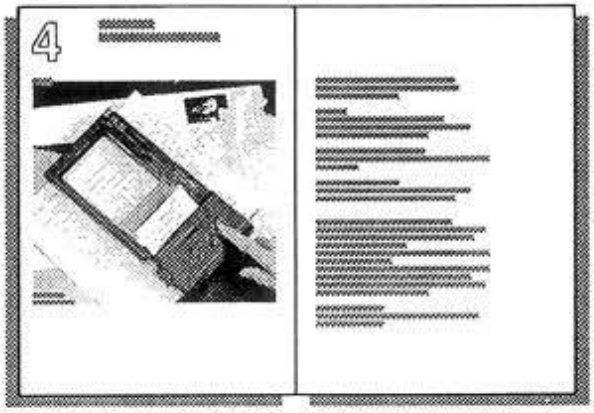

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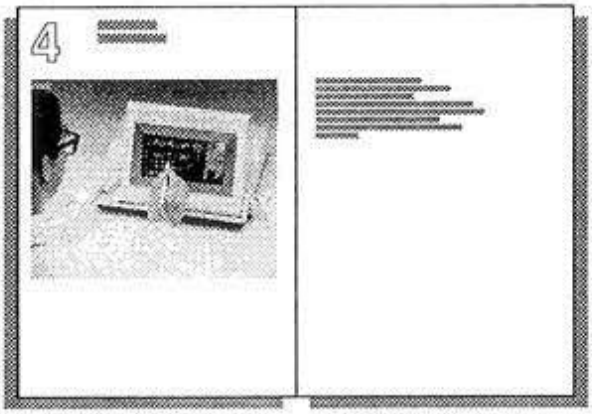
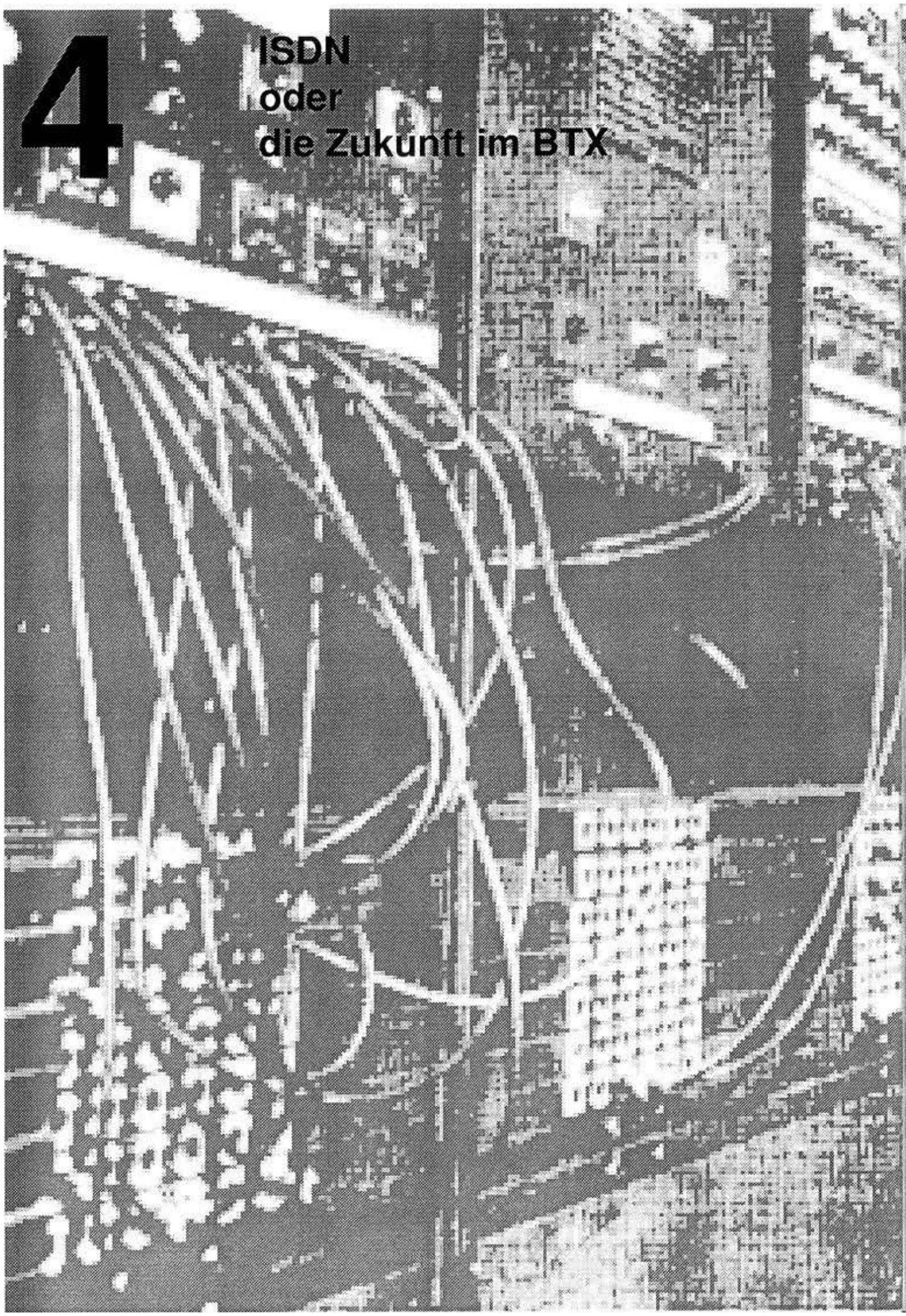
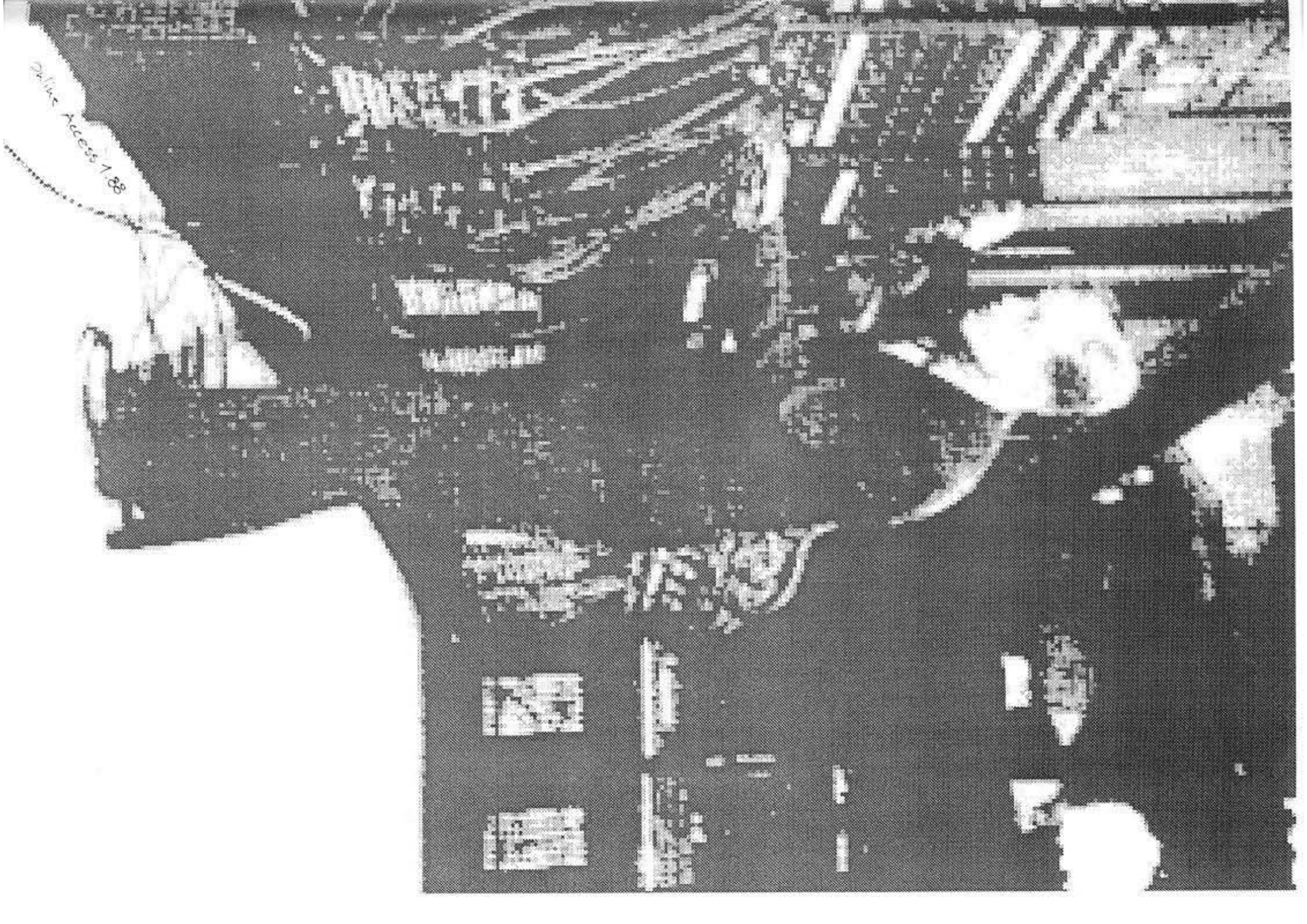


ISDN

FuturePhone im Netzwerk

4 ISDN oder die Zukunft im BTX




Online Access 1.88

4

ISDN FuturePhone
Was ist dran, was ist drin im Netzwerk?

Netzwerkstation
Das Multitel als kompakte eigenständige Netzwerkstation, verstanden im Sinne umfangreicherer Kommunikation...
parallele Übermittlung von Sprache, Bildern, Texten, Daten

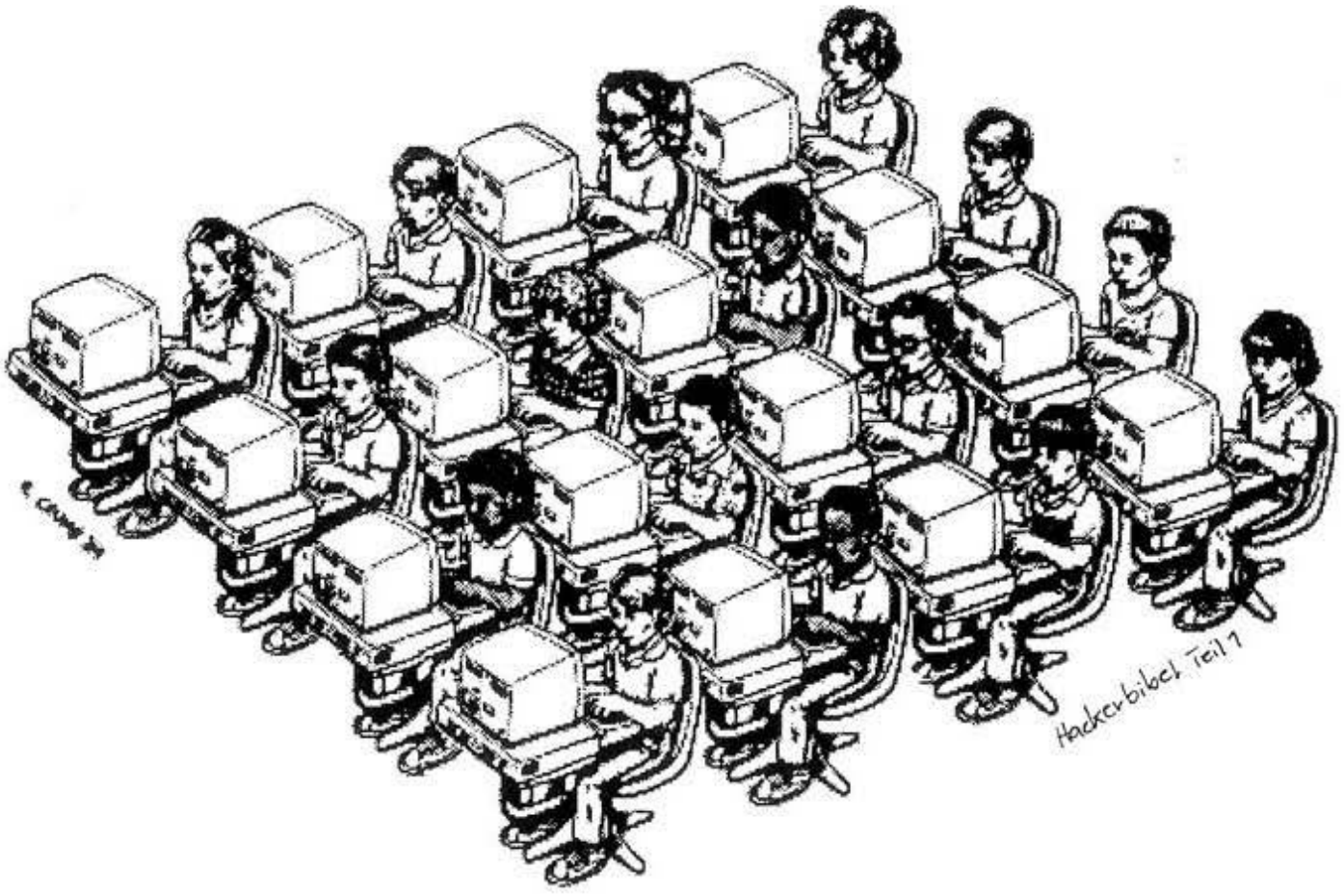
Das Multitel als bequeme Eingangstür ins Netzwerk.

Parallele Kommunikation
Nicht mehr nur über Dinge reden, sondern sie zeigen können:der Bildschirminhalt kann Gegenstand des Gesprächs sein.

Erweiterte Peripherie
Bildtelefon

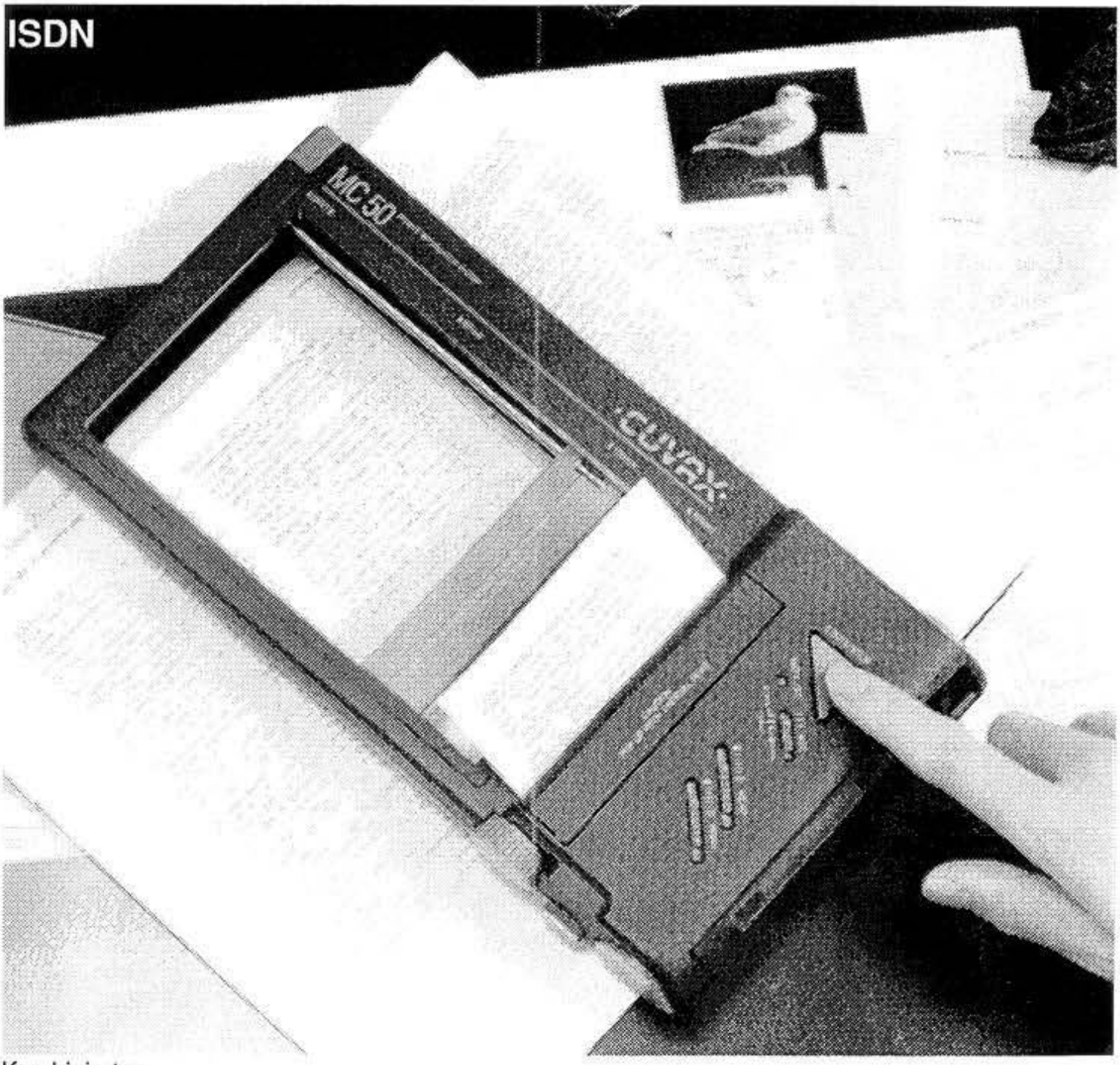
Ringschaltung
Telekonferenzen, Videokonferenzen

Seitenblick nach Frankreich zeigt, wie sich Benutzer dort etwas ganz anderes aus dem Medium herausgeholt/gemacht haben, als von den Einrichtern impliziert war...
das reicht von Kontaktanzeigen,
über Gesellschaftsspiele bis zum
Interessenaustausch, mailing etc...
was ist drin für networker im BTX, wie würden sie es sich wünschen, was braucht man dafür...



4

PrintPhone
Ferndrucken statt Faxen



Kombinierter
Scanner/Drucker

1.Drucker kann fester Bestandteil des Multitels sein, oder dem Gerät modular hinzugefügt werden ...

Mailing:
Texterfassung geschieht offline...
was nicht auf eine Bildschirmseite passt, wird vom Programm verknüpft...

Wenn es das System zulässt...
die Mailbox wird automatisch (oder auf Befehl) ausgedruckt

Die Nähe zum Faxen ...
das Multitel kann einen Eingang für einen kombinierten Scanner/Drucker haben...

2.Ein Multitel-kompatibles Faxgerät,
das den Bildschirm und die Bedienungselemente des Multitel nutzt und das Zugriff auf den Nuzmmernspeicher hat...,
das auch als Eingabegerät (Scanner) für Bilder benutzt werden kann.
Die Vorlagen können auf dem Bildschirm offline nachbearbeitet (bechriftet, etc.) werden.
Als Fax oder unter Auflösungsverlust auf Btx-Wege versenden oder speichern.

Die nächste Stufe:
Telefax, Scanner, Digital-Kopierer in einem portablen Gerät...

4

PaintPhone
Fernzeichnen

Business Week 7.87

Zeigen, worüber man redet...
Komplexere Zusammenhänge lassen sich anschaulich beschreiben...
Auf einem Zeichentableau lassen sich handschriftliche Skizzen und Zeichnungen parallel zum Telefongespräch übertragen...
oder beim Gesprächspartner über Printer ausdrucken.

1

2 3

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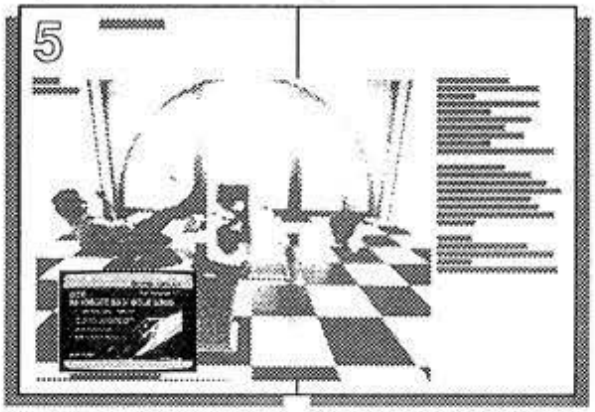

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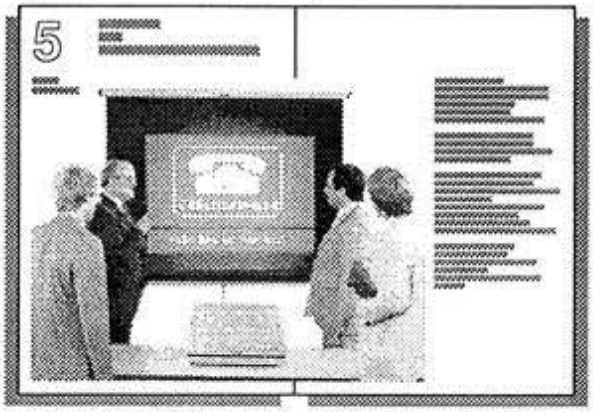

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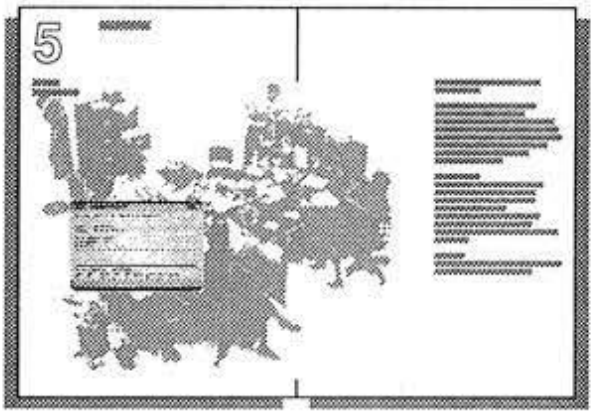

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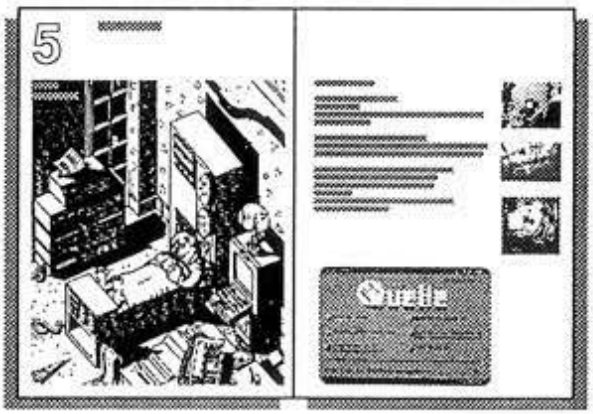


Multitel im Kontext...

Wer macht was und in welchem Umfeld?

5

Multitel im Kontext...

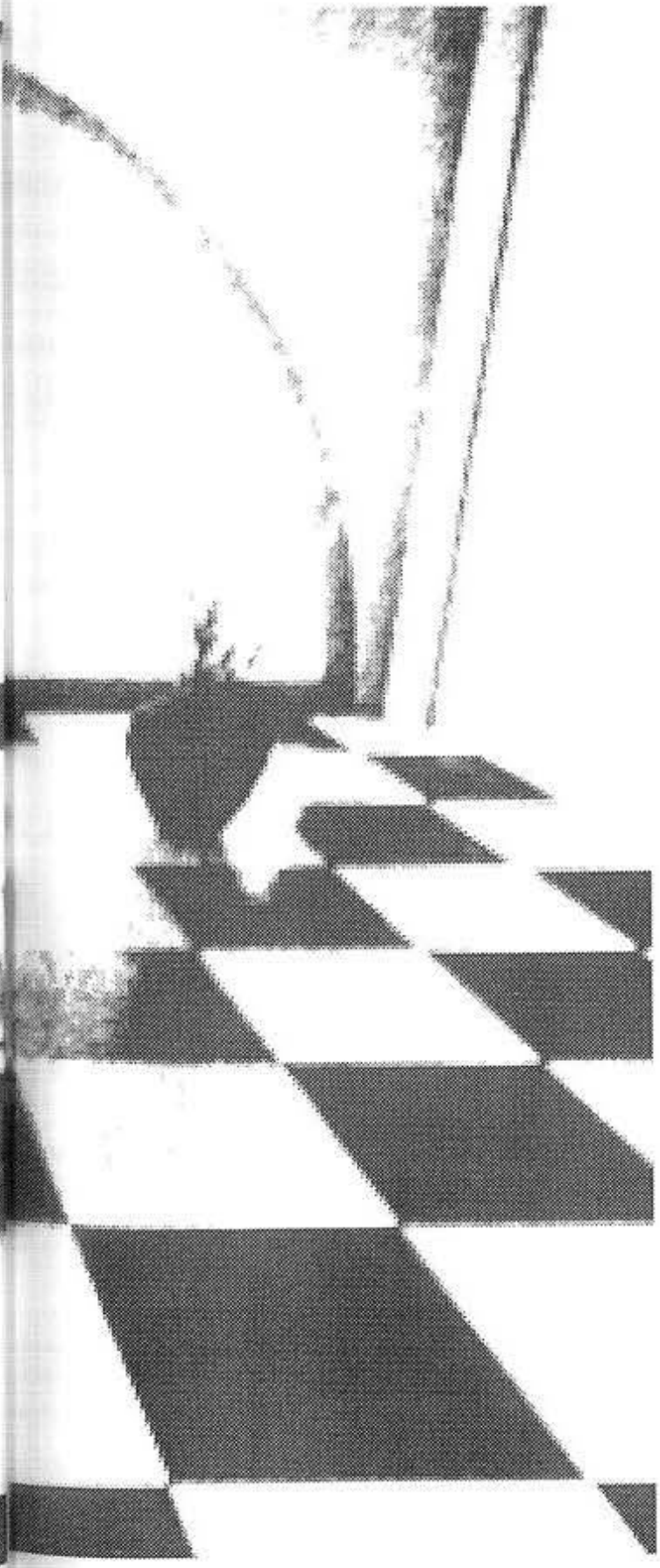
Setzung von Anwendungssituationen

Wo wird das Multitel eingesetzt...?
Wer benutzt es...?
Wie wird es benutzt und unter welchen Gesichtspunkten...?

Welche Forderungen für Hardwareausprägungen und Funktionserweiterungen lassen sich aus den Kontextüberlegungen folgern?

5 PowerPhone

Multitel im Kontext...



In der Chefetage...
Image für High-tech, Power,
Überblick,
Anschluss, Kommunikation...
(Powertelefon,
als Ersatz für den PC...,
muss telefonseitig
Anlagenkompatibel sein,
netzwerkfähig:
über Gateways in Computernetze)

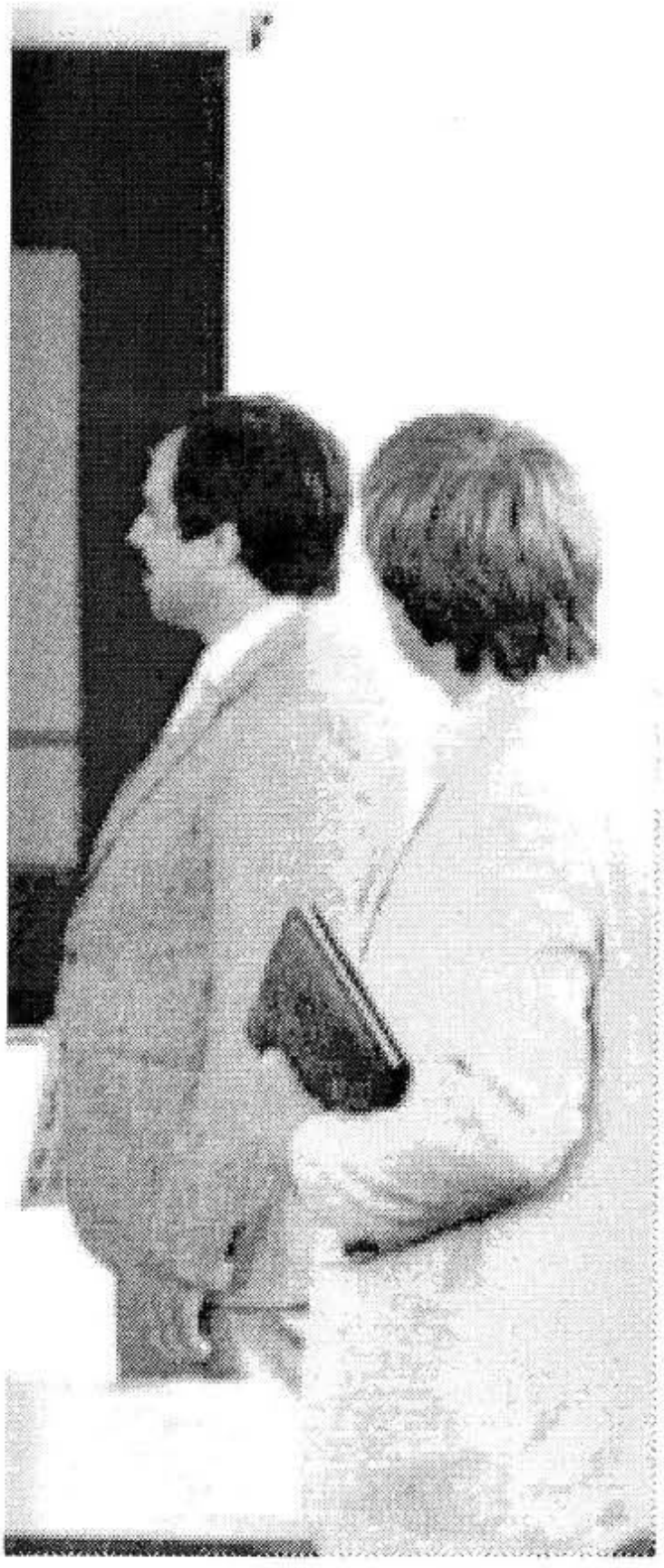
(PowerPhone meint:
Einsatz als Displayphone,
komfortabler Einsatz des Num-
mernspeichers und echte Zielwahl,
Phonememo (speichert nicht
angenommene Telefonate) und
Terminkalender über Bildschirm,
Mailbox...

Hardware:
Gleichberechtigung aller
Komponenten: Hörer, Bildschirm,
Tastatur,
bei Mailboxbetrieb auch Drucker)

5

ShowPhone
oder
if you can´t talk about, point on it

Multitel
im Kontext...



Zwischenhändler...
Hier soll Information sichtbar gemacht, dem Kunden vermittelt oder als "Drucksache" ausgehändigt werden.
(zeigen statt beschreiben...)

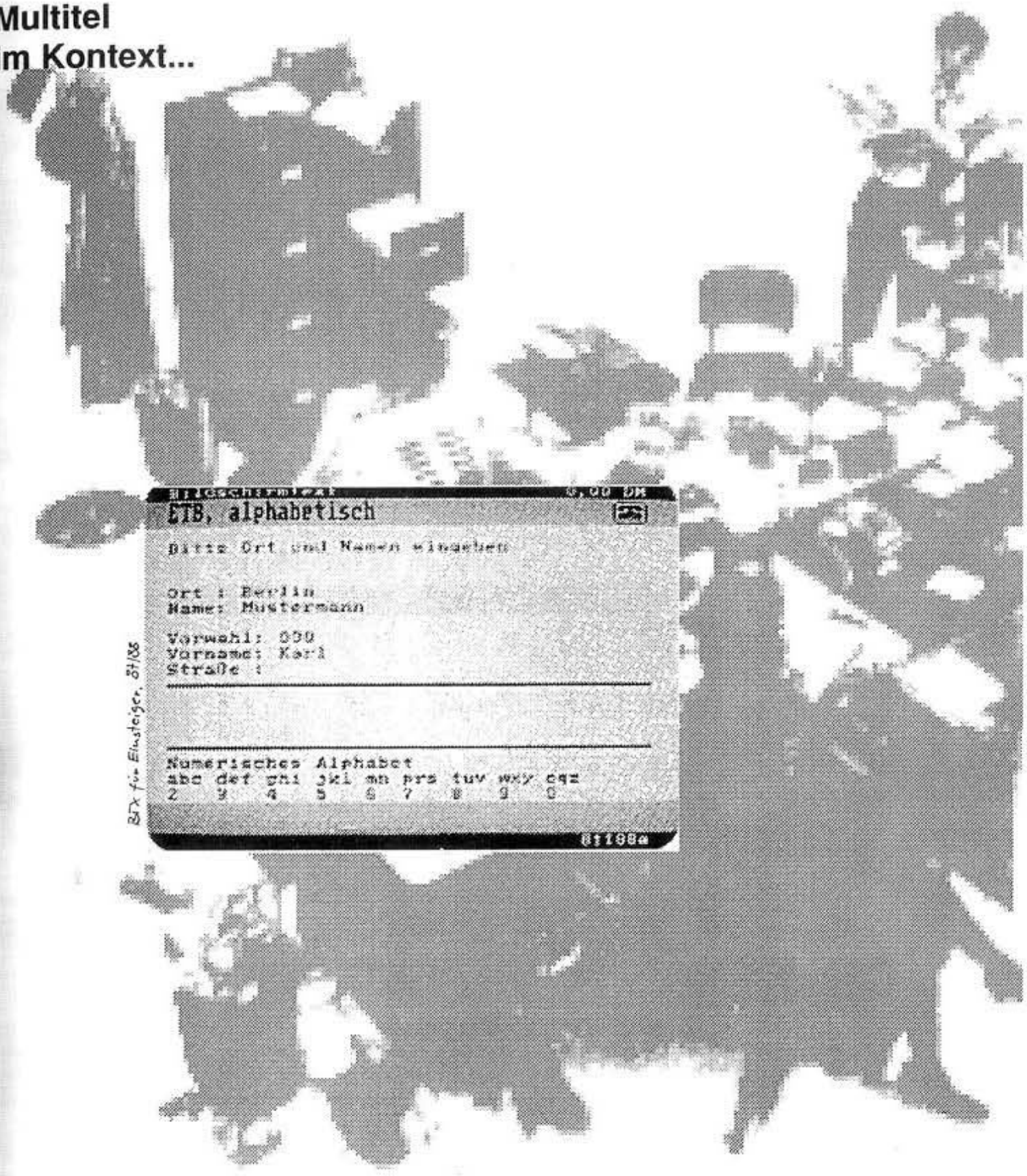
...oder dezentrale Aussen-stationen haben Zugang zur Zentrale: Ersatzteilbestellung, Mailbox, Information

(wichtigstes Element ist der Bildschirm und intelligent einfache Durchblätter-funktionen, nicht unbedingt umfangreiche alpha-numerische Tastatur erforderlich, kein Einsatz als Telefon, aber gegebenenfalls mit Drucker)

Fliegender Händler...
portables Multitel,
über Akustikkoppler überall dort ins Netz,
wo ein Telefon zur Verfügung steht...

5 NetPhone

Multitel im Kontext...



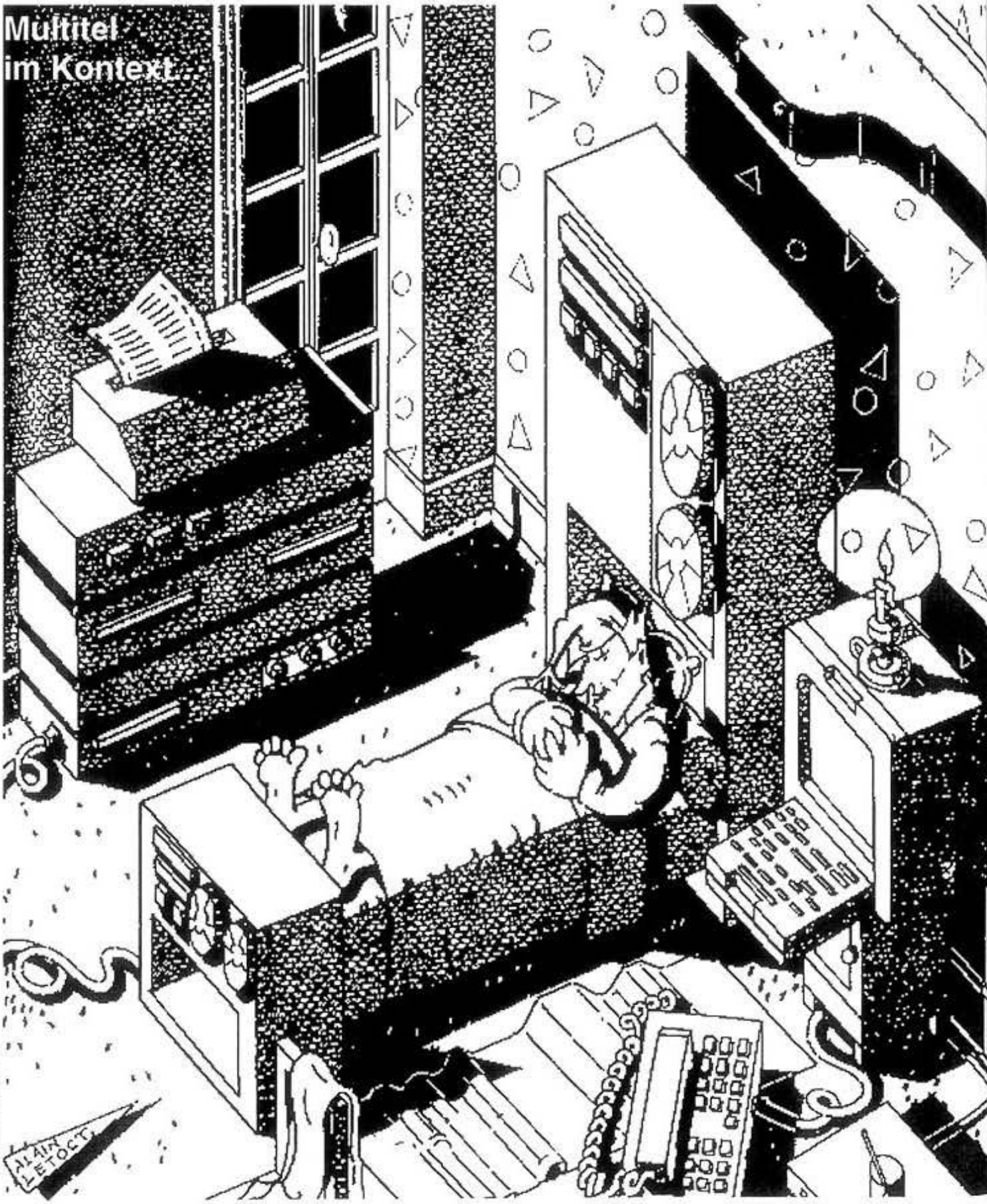
Selbstständige, Freiberufler
Journalisten

Umfangreiche Kommunikation,
sinnvoll mit erweiterter
Peripherie und Zusatzfunktionen:
drucken, faxen, Anrufbeantworter,
Wahlwiederholung, netzwerkfähig...
Hier muss Multitel wirklich im
Sinne von multifunktional
verstanden werden.

Anwendungen:
Nummernspeicher und Zielwahl,
Teleinformation, electronic
mailing,Gesprächsumleitung,
Anrufbeantworter...
Telefonieren, ohne den Bild-
schirminhalt zu verändern,
weil der Gegenstand des Gesprächs
sein kann

modular:
im Sinne von Peripheriekompatibel,
erweiterbar; netzwerkfähig

5 SmartPhone



Multitel at home

so kompakt wie möglich
Anwendungen:
Tele-information, elektronisches Telefonbuch,
Teleshopping...

Solange das Medium jung ist...
(und es noch ausgereizt werden kann und will):
Message pour Message, Unterhaltung, Spiele...

(Hier eher als hochintegriertes Gerät
vorstellbar:so klein wie möglich,
so wenig lose Teile wie möglich:
ein Gerät,
verdeckbar, verschliessbar, portable,
einfach zu bedienen)

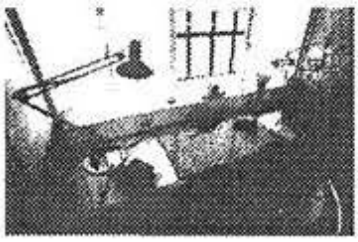


Bild für Einsteiger 87/88

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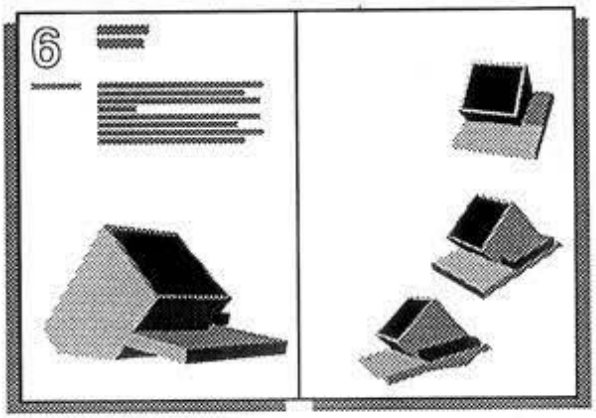

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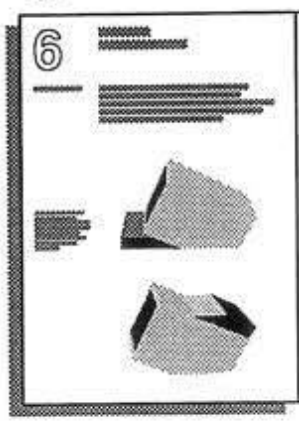

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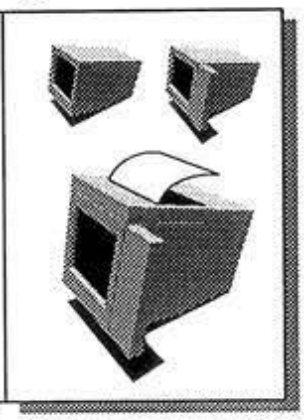

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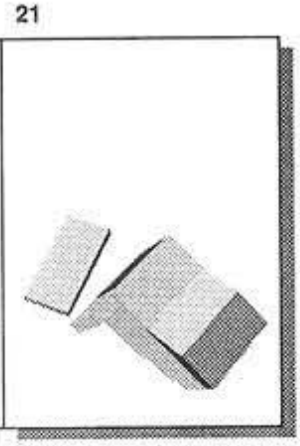

Hardware

Skizzen und Konzepte

6 Hardwarekonzepte Übersicht

Erste Skizzen

Bildidee: Durchdringende Körper
... die unterschiedlichen Funktions-Ebenen schneiden bzw. durchdringen sich - sie bleiben erhalten - bilden eine Landschaft, eine Architektur...

Bildidee: Kragen
... umlaufender Kragen um den Bildschirm nimmt Chipkarten-Leser auf und gibt dem Drucker Halt, er schafft ein paar Zentimeter beruhgte Zone um den Bilschirm - lindert Adaptios-Beschwerden...

Bildidee: Miniraum
...durch die Perspektiv-Wirkung Bildschirmkragens steht das Display nicht nur im Vordergrund, sondern im Zentrum... arbeiten in den Raum hinein...

Vorkonzepte

Vorkonzept:
Kompakt, primärgeometrisch, raumbildent
Raumecke mit integrierte Tastatur...
Miniraumsituation: space and place , arbeiten ins Multitel hinein - nicht dagegen. Einseitig offen, nicht beengent oder klaustrophobisch...

Vorkonzept:
Kompakt, primärgeometrisch, tektonisch
... ein Stück >**Desk Top Architecture**< - ein System aus klar identifizierbaren Einzelteilen, keine Auflösung im Ganzen.
Trotzdem kompakt und prägnant...

Konzepte

Konzept 1
Kompakt portabel
Peripherien wie Drucker, Telefon und Tastatur haben ihren festen Platz am Basisgerät. Das benötigt wenig Platz - ist überall zuhause - ist nicht sesshaft.

Konzept 2
Miniraum
...überall da wünschenswert, wo im Team gearbeitet wird, und das Multitel vorübergehend als Workstation benutzt wird.
Ausprägung: vorgezogener Kragen, Blendschutz, tiefliegender geneigter Bildschirm...

Konzept 3
Stand By
...Bildschirm, Tastatur und Telefon in einem kompakten Gehäuse in **Stand By** Position.
Geringer Footprint... schneller Ortswechsel möglich...
Die beiden Funtions-Ebenen **Input** und **Output** durchdringen einander - bleiben dabei eigenständige Gestalt-elemente, sind identifizierbar - semantisch wie syntaktisch.

Konzept 4
Kompakt modular
... wo Peripherie wie Drucker, Speicherlaufwerke (für Chipkarten, Disketten), Anrufbeantworter, Telefax zum Einsatz kommen... oder wo auf Features verzichtet werden kann.
Vom Grundmodell auf- und anbauen.

6 Erste Skizzen

Bildidee: Durchdringende Körper

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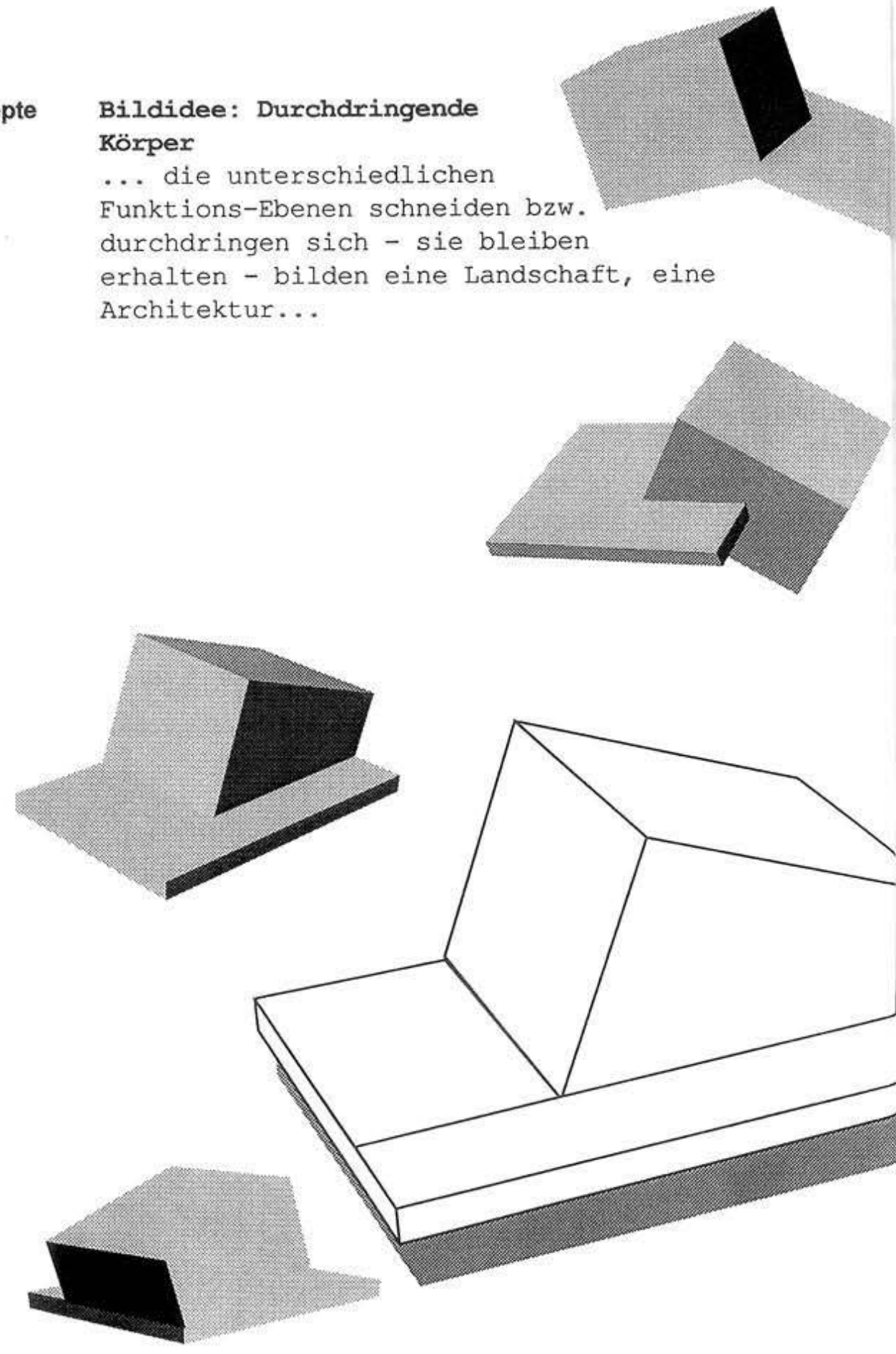
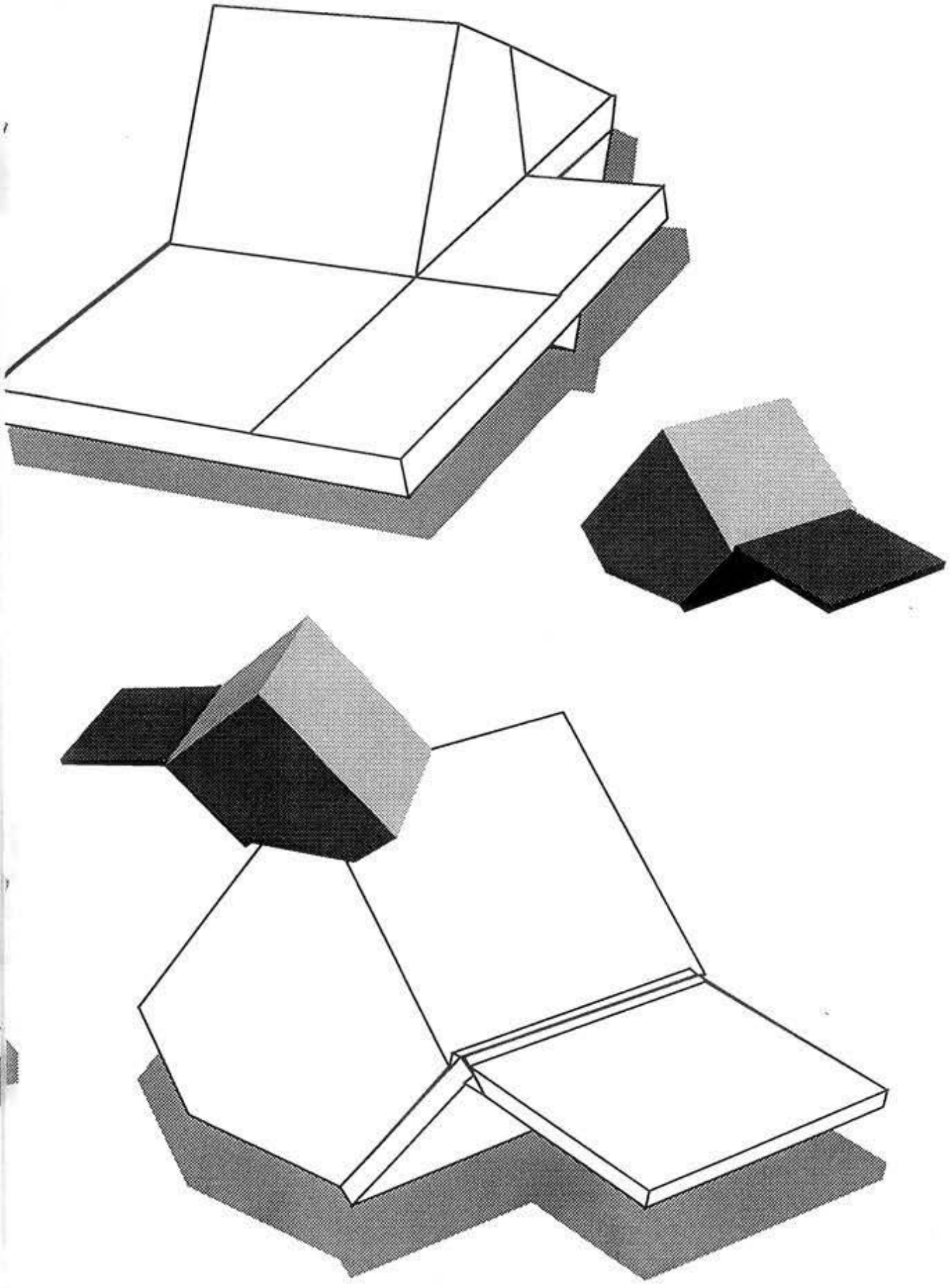
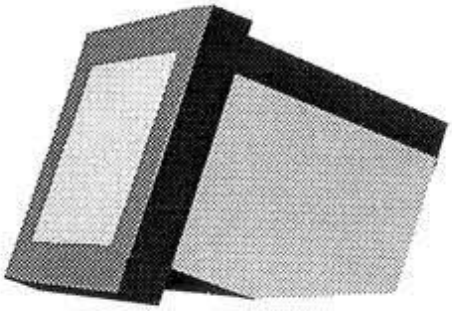
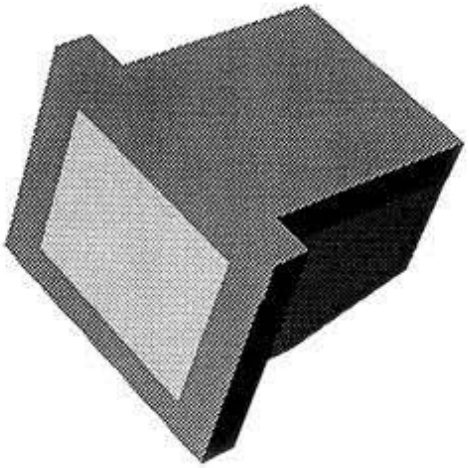


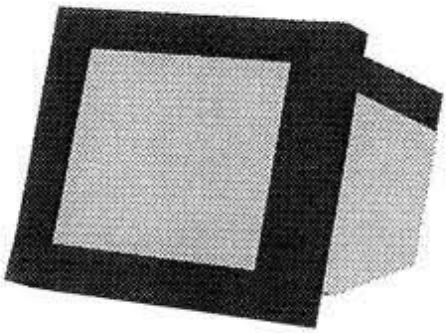


6 Erste Skizzen

Hardware Konzepte







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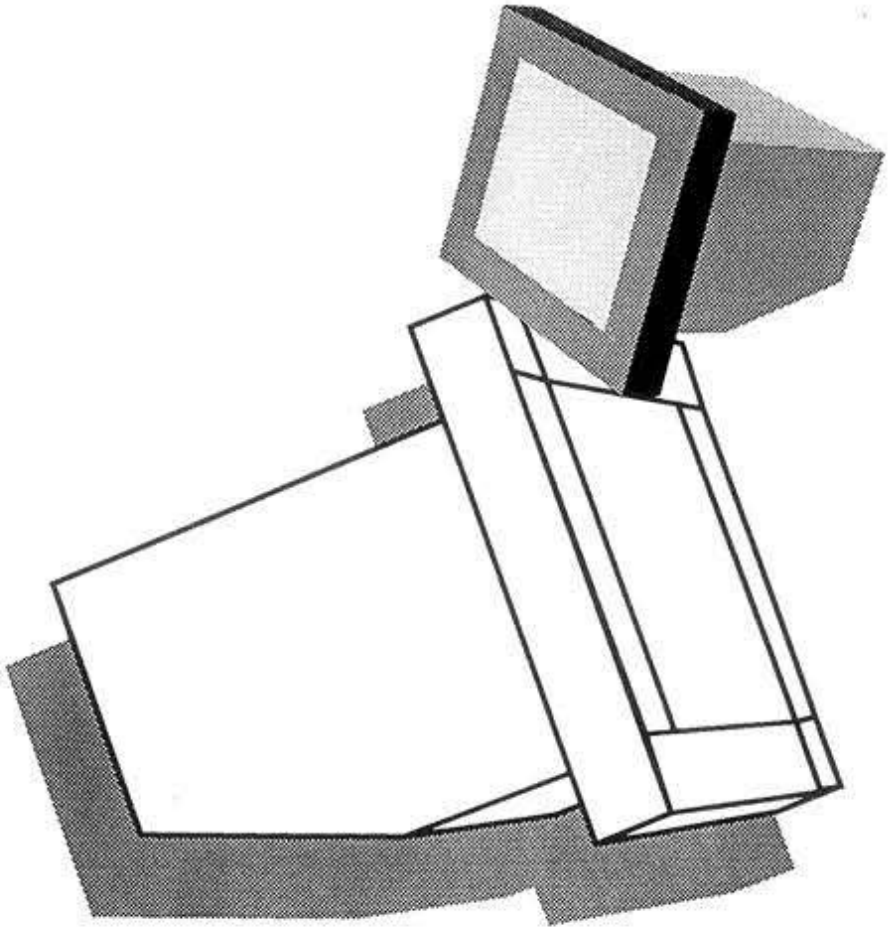

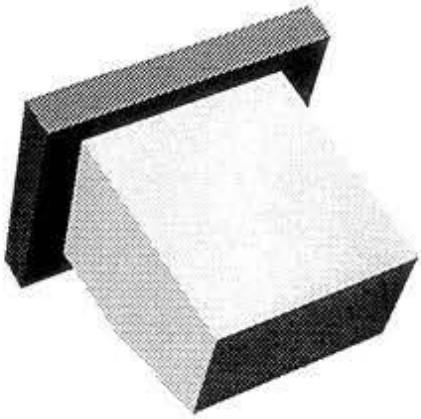

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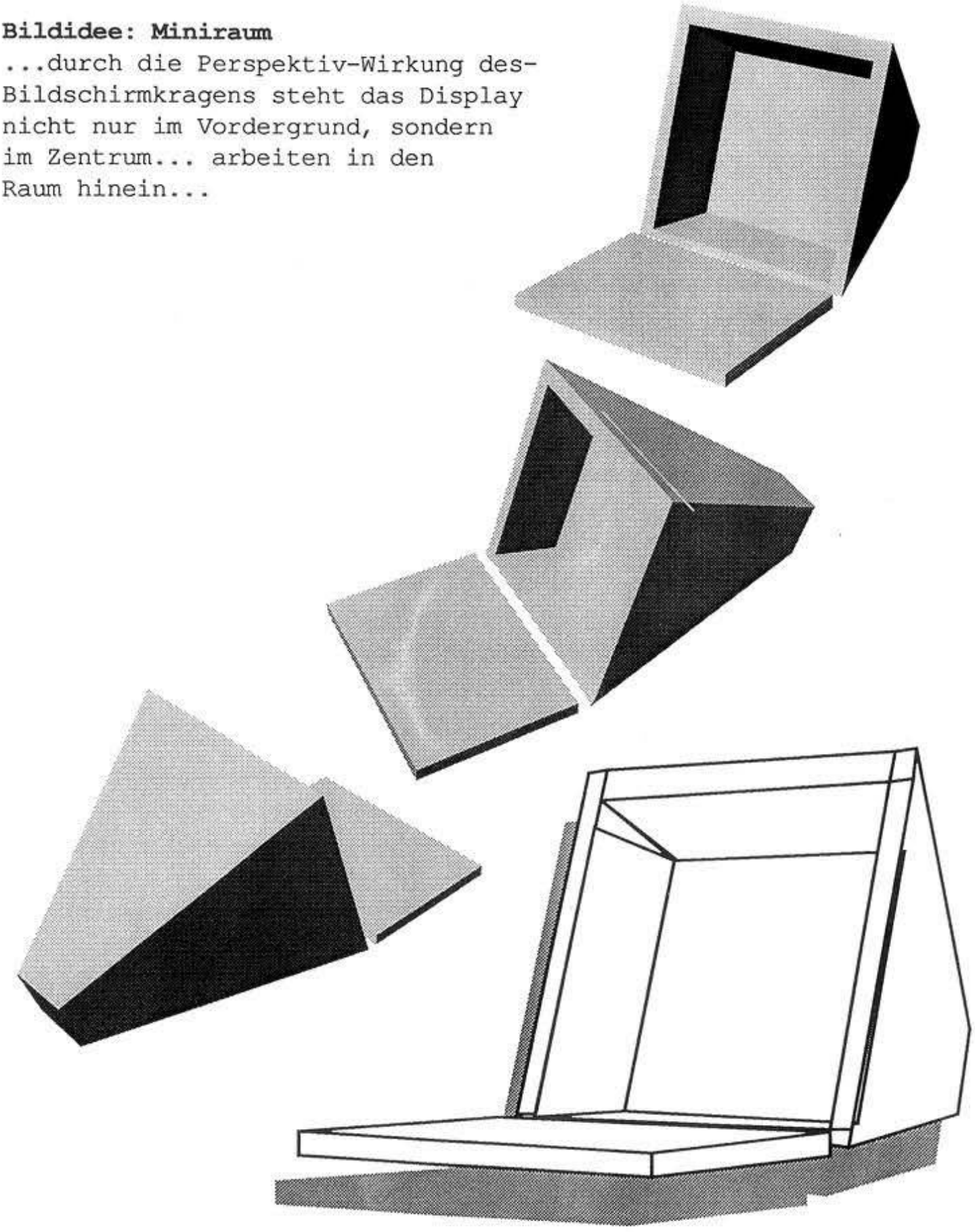

6 Vorkonzept: Kompakt, primärgeometrisch, raumbildent

Hardware Konzepte

Raumecke mit integrierte Tastatur...
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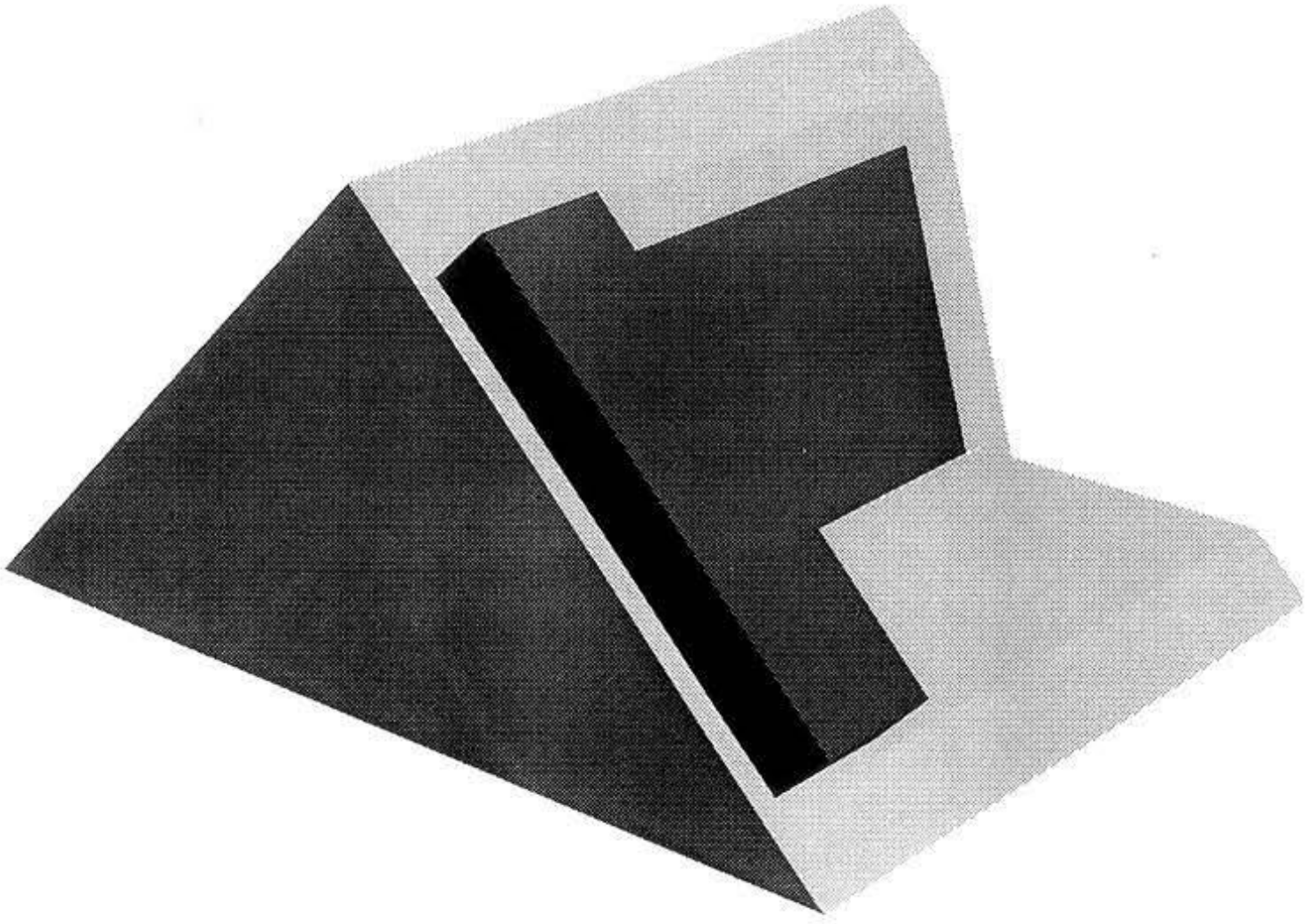

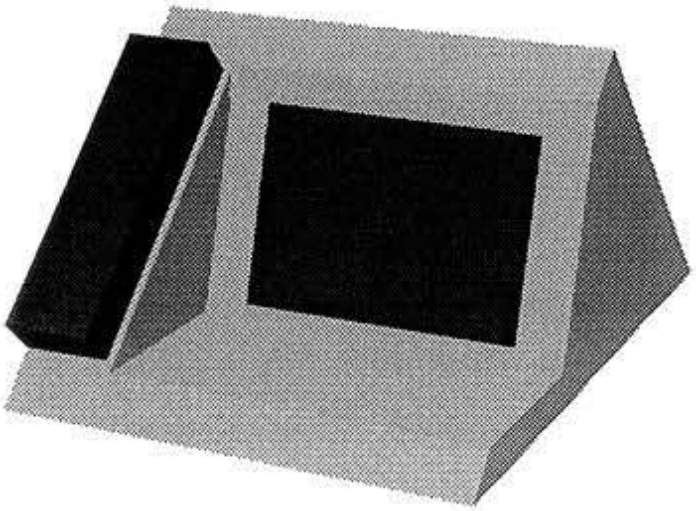

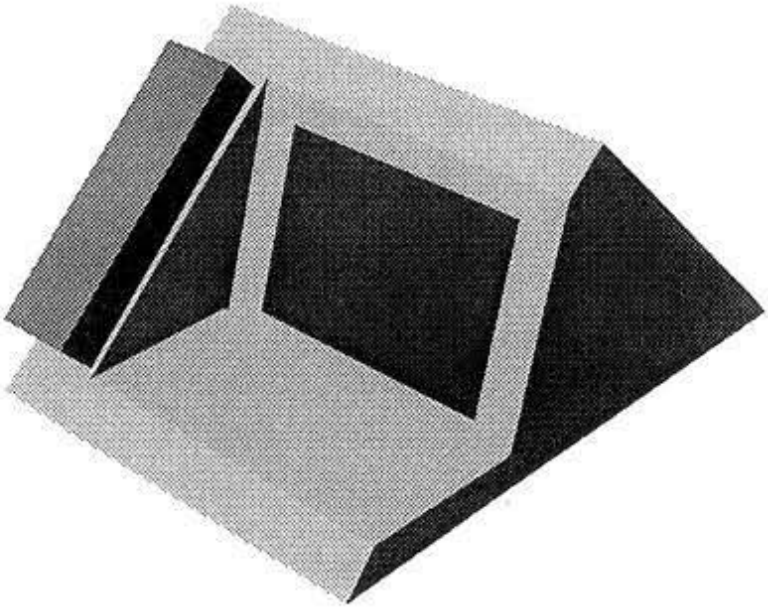

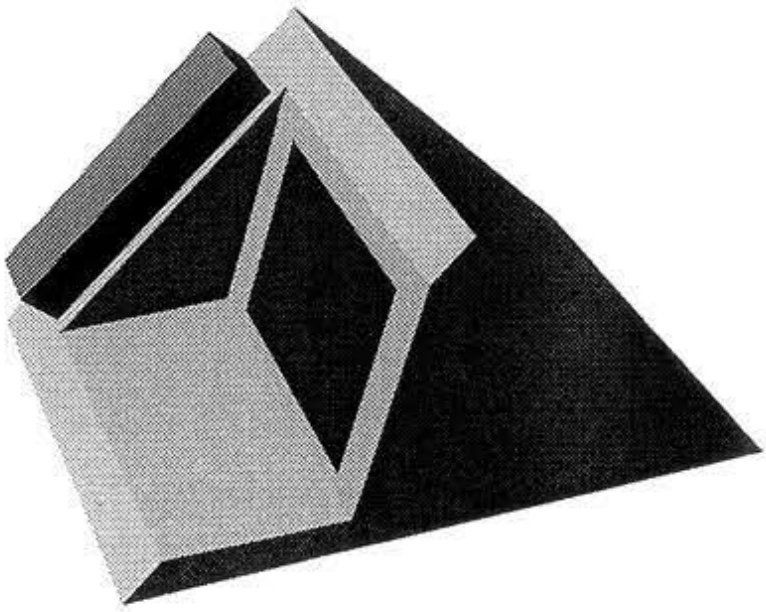

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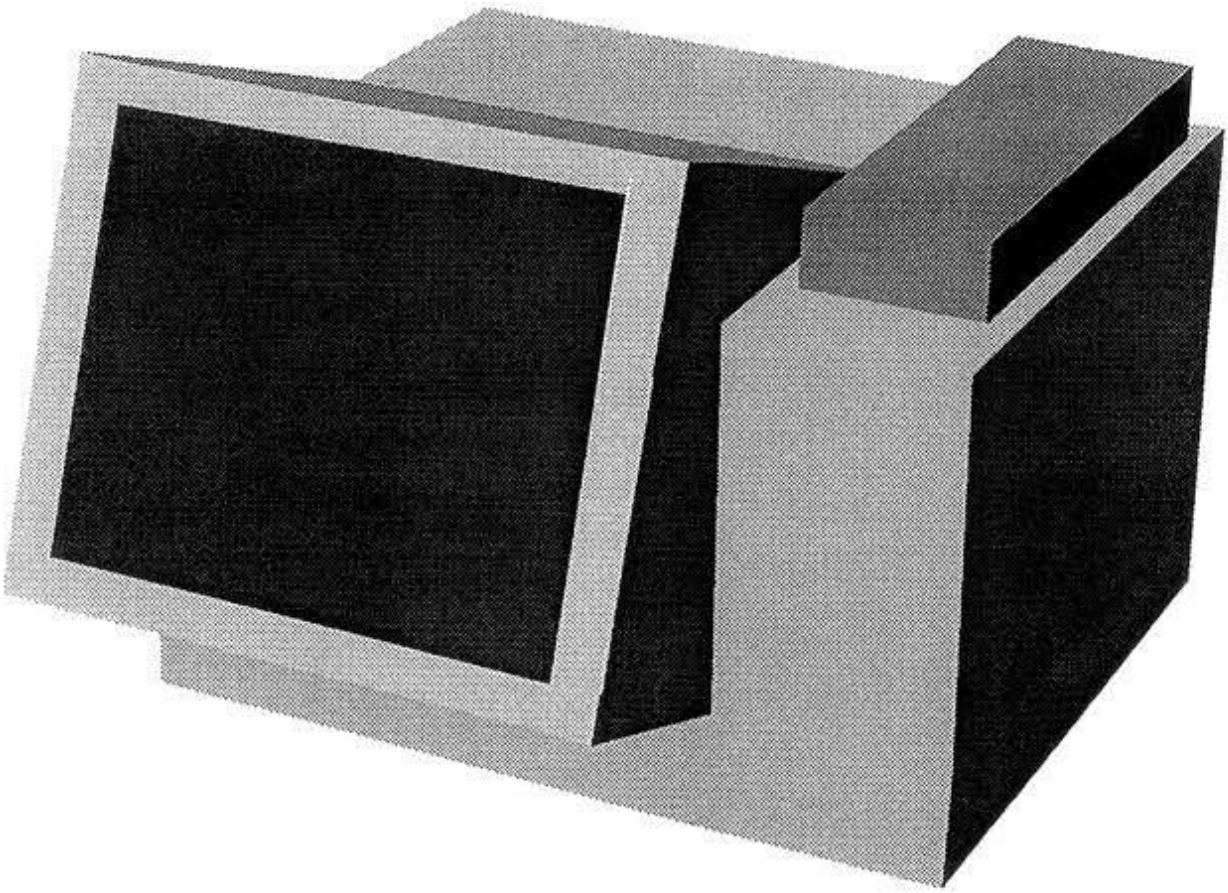

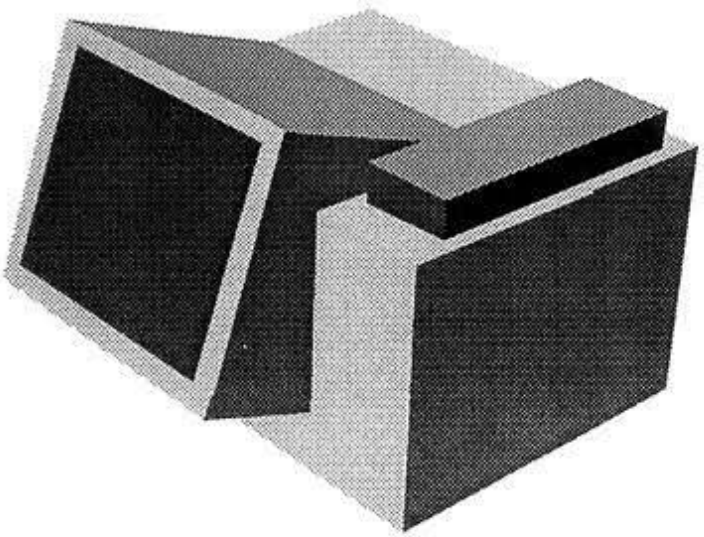

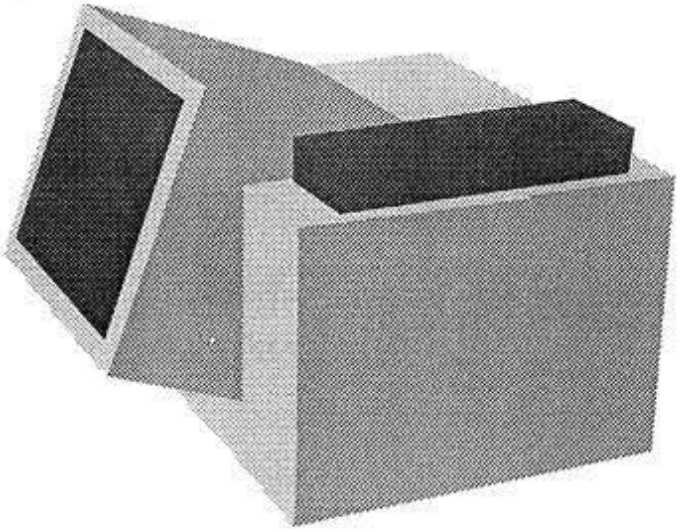

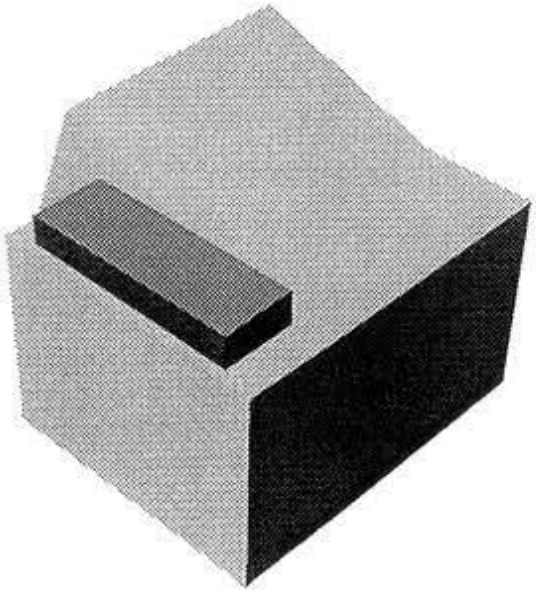

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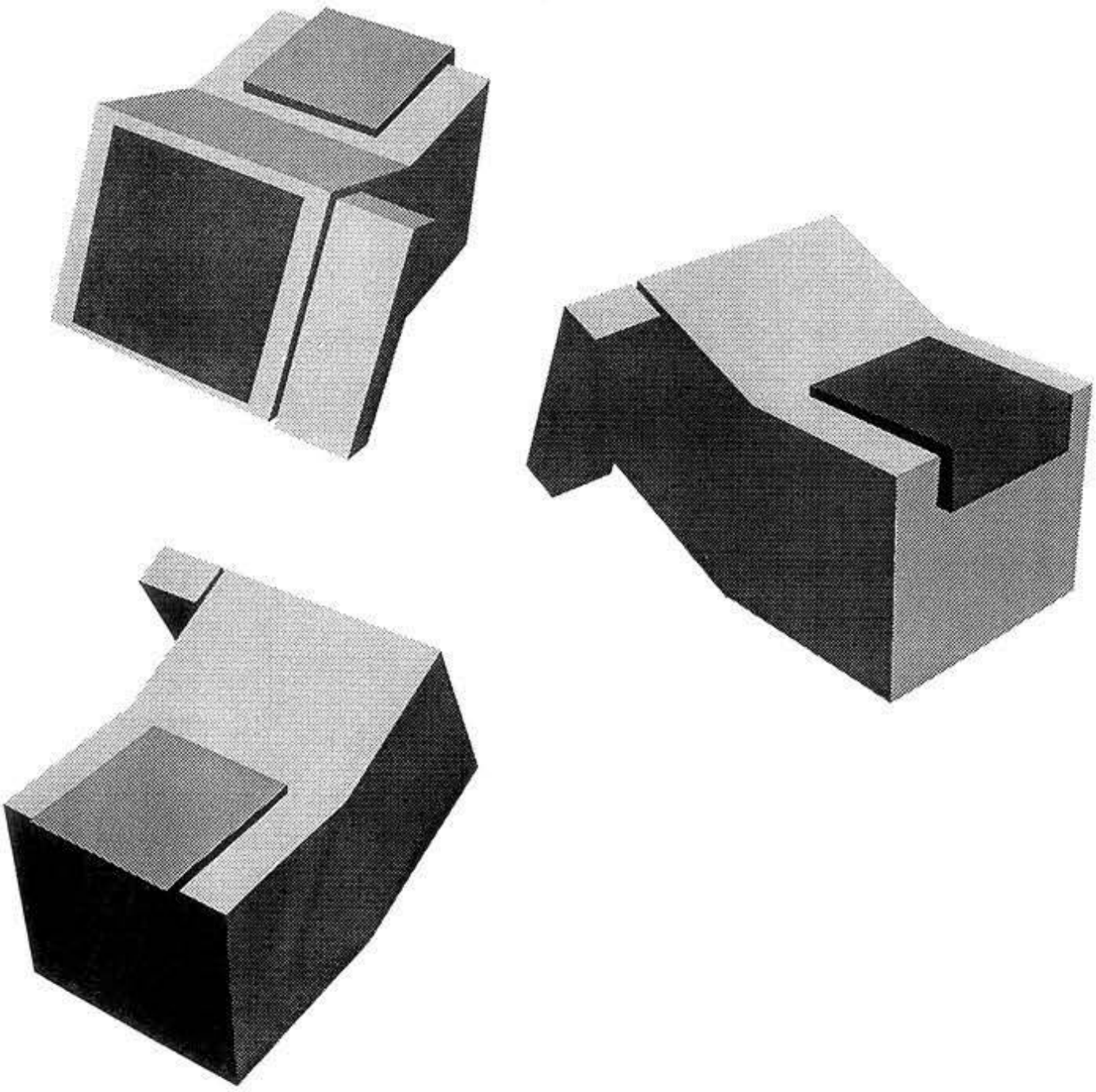

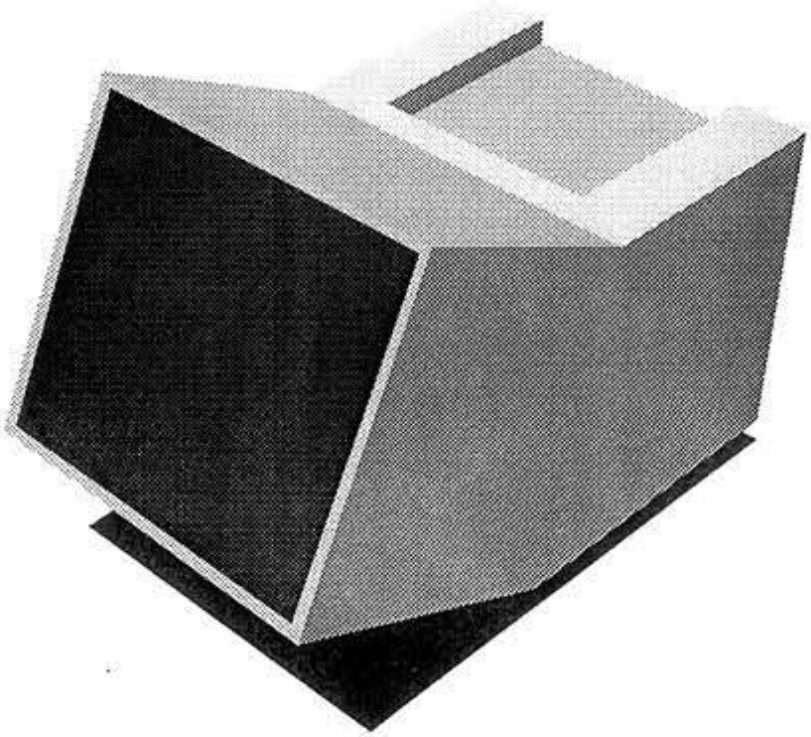

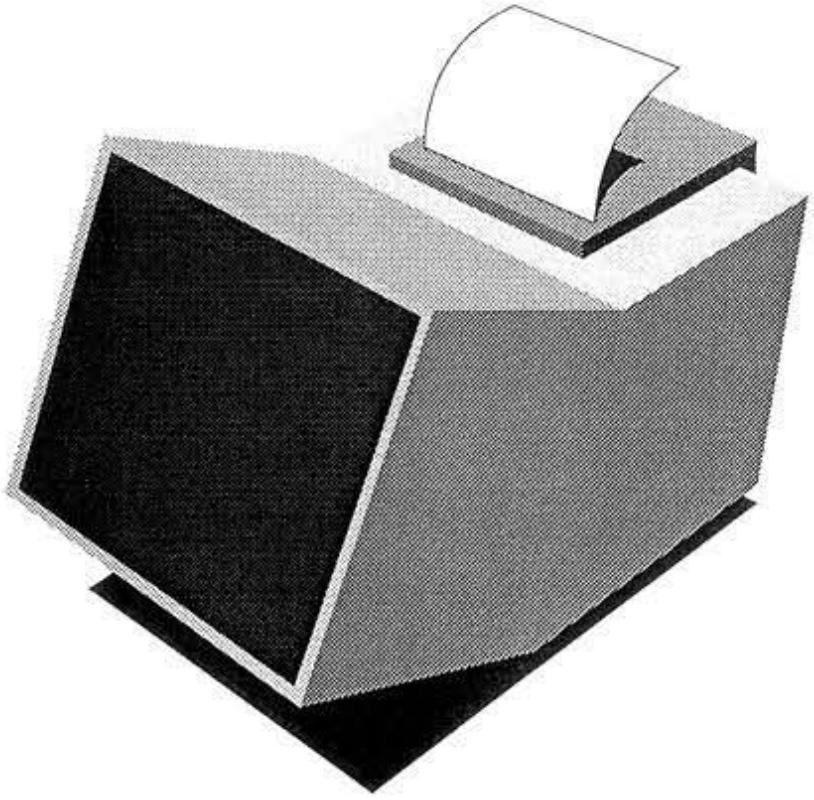

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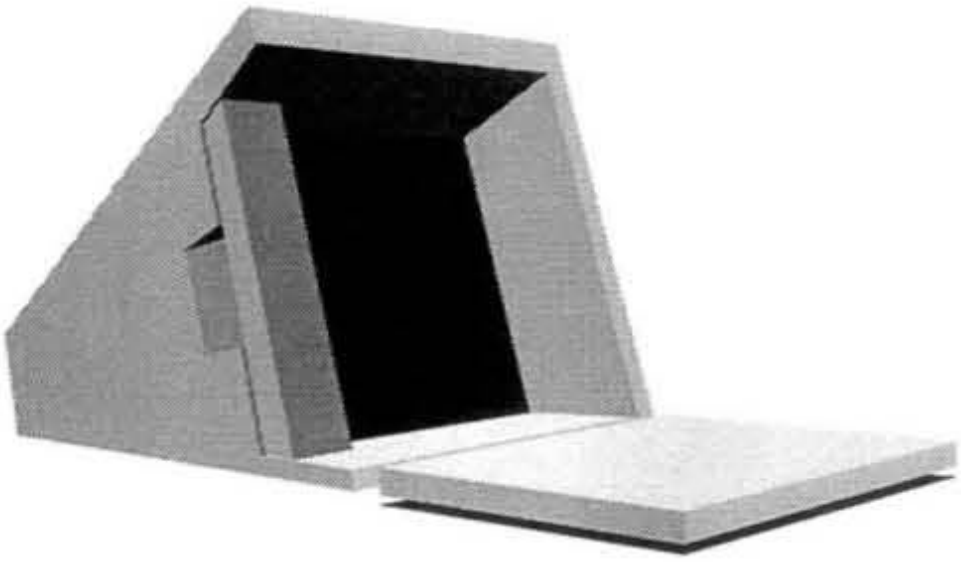

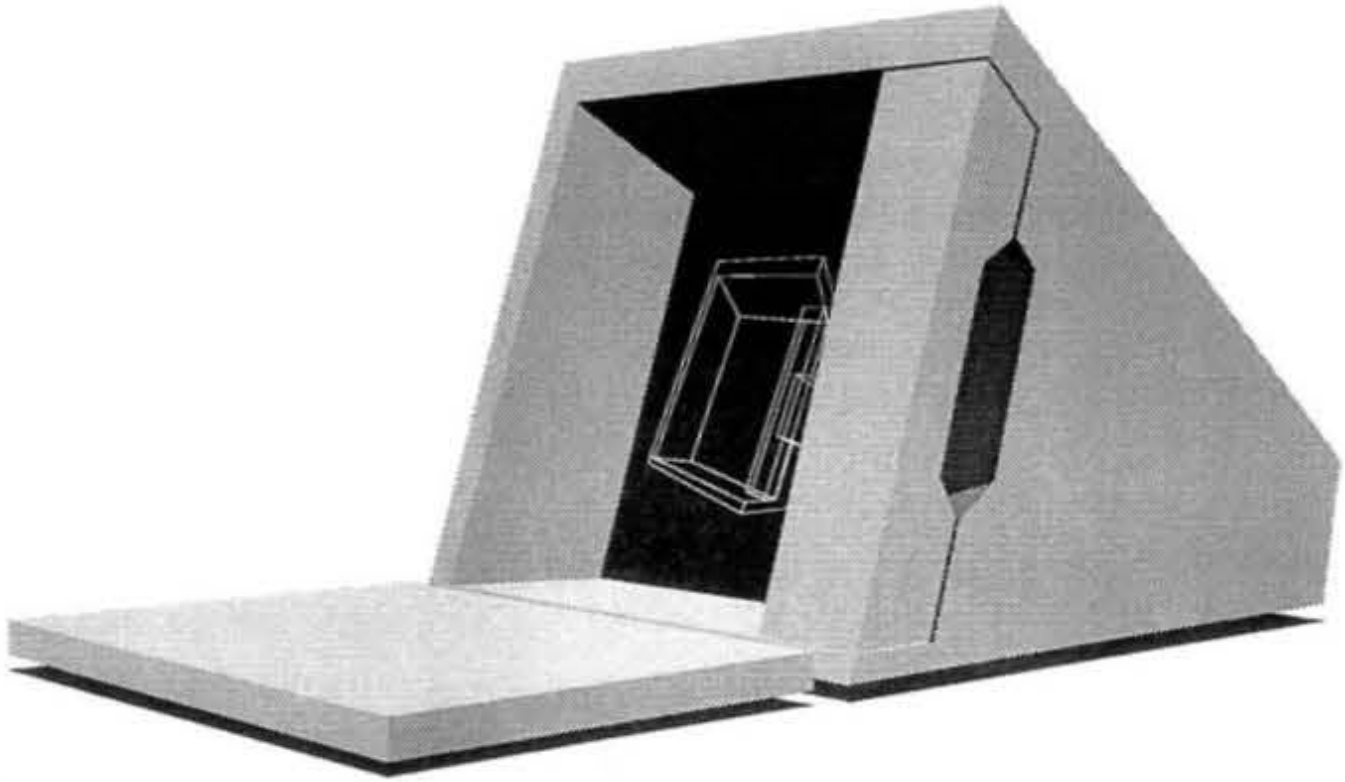

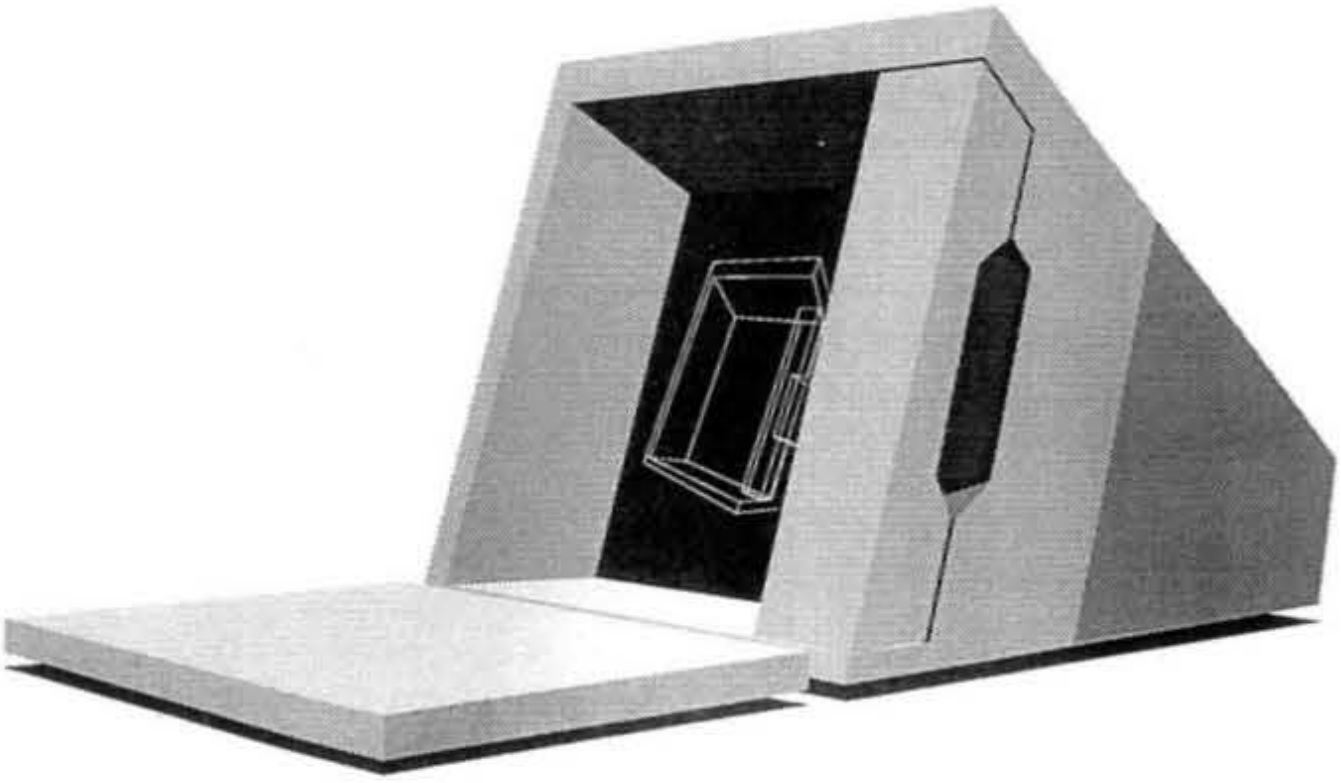

6 Konzept 3
Stand By

Hardware Konzepte

...Bildschirm, Tastatur und Telefon in einem kompakten Gehäuse in **Stand By** Position. Geringer Footprint... schneller Ortswechsel möglich...
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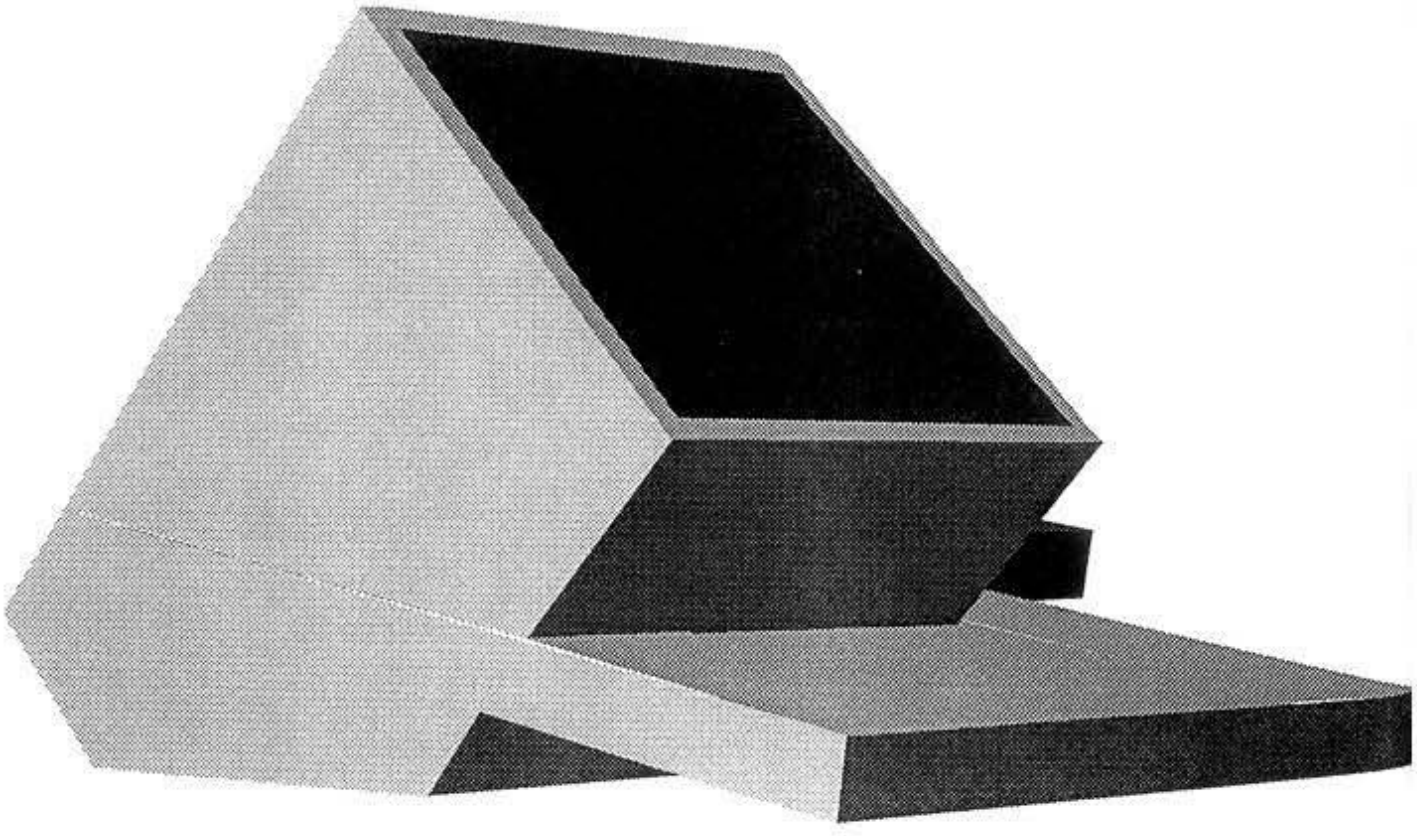

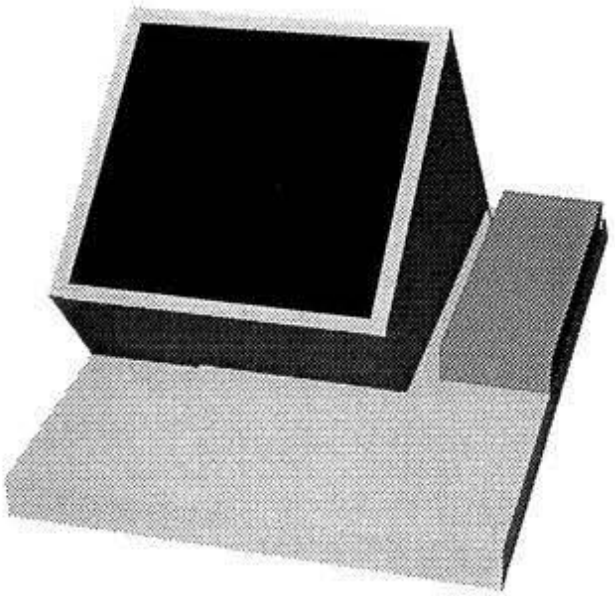

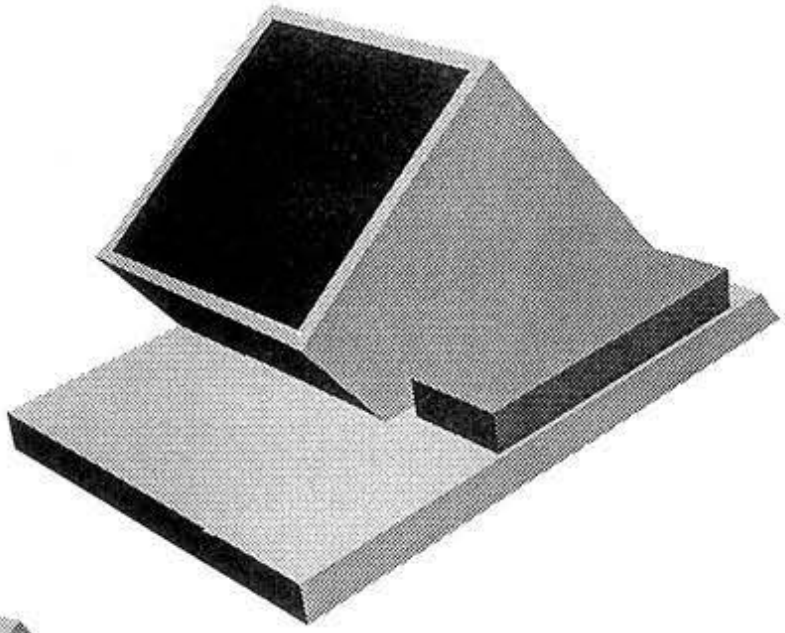

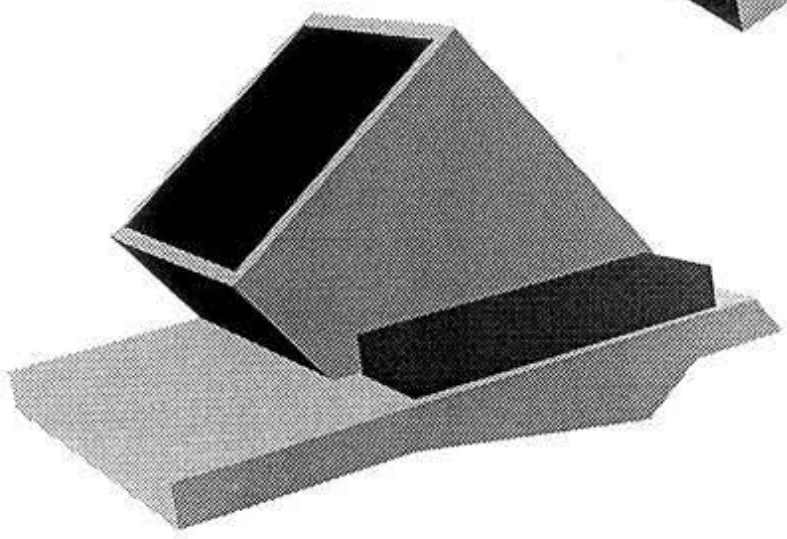

6

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Kompakt modular

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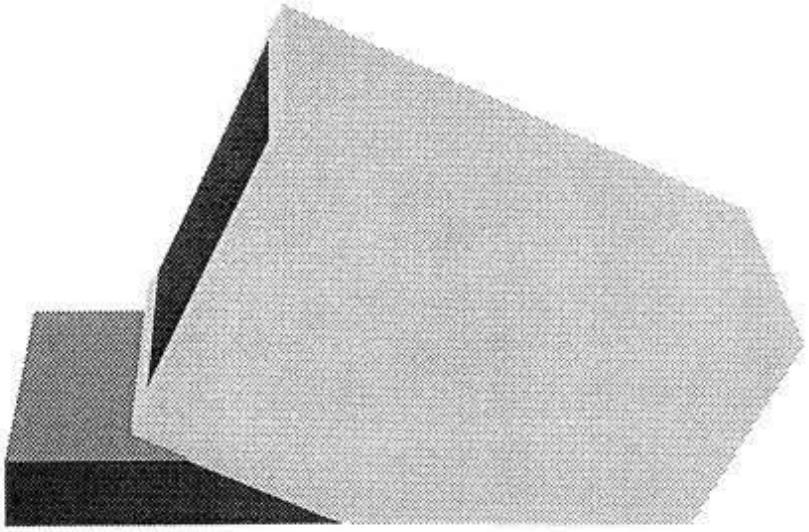
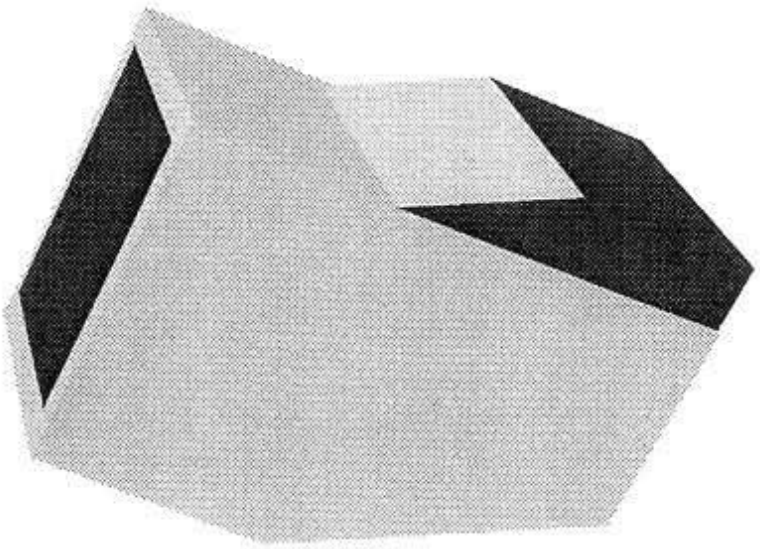
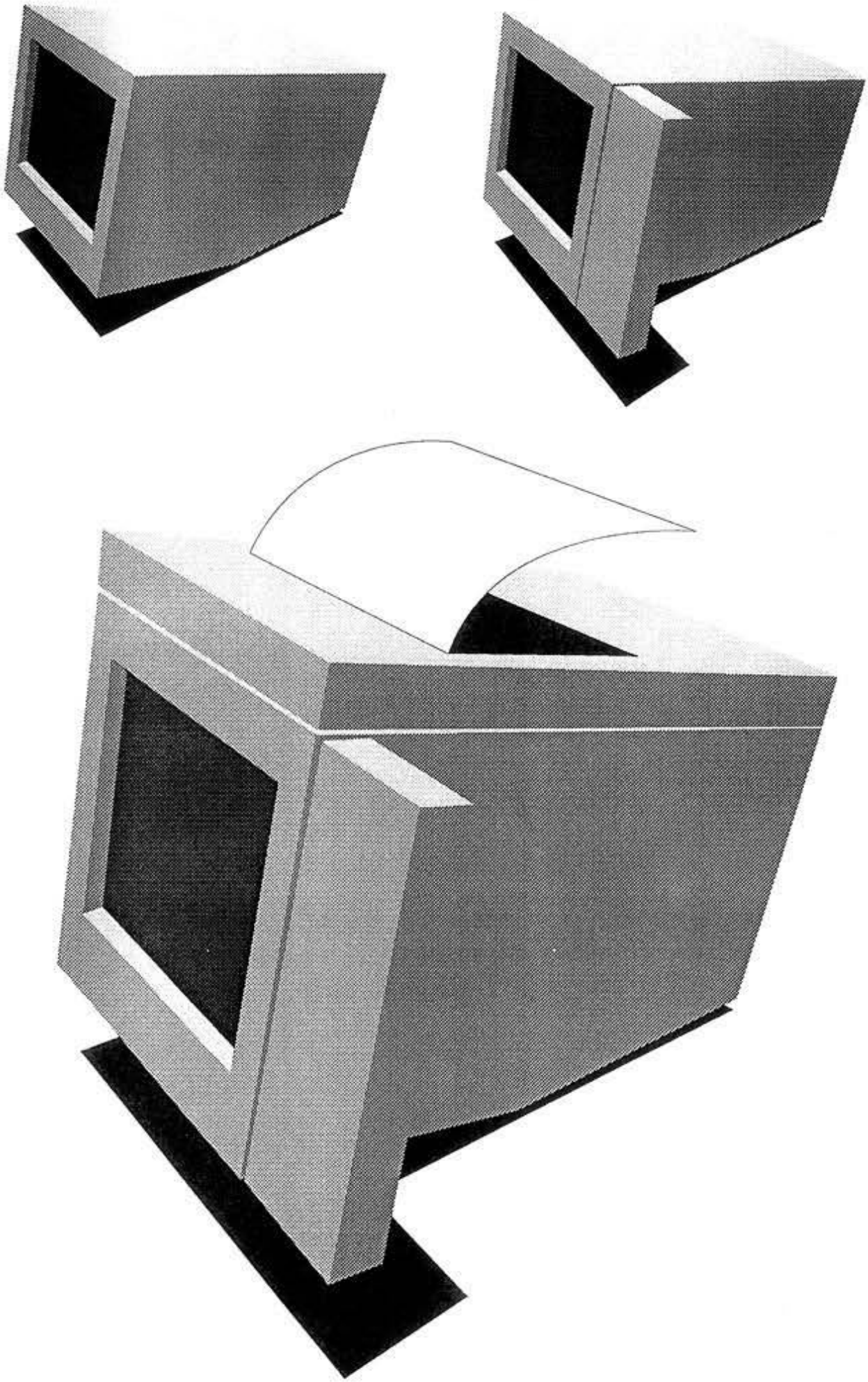


Kompakt-Modular - d.h. die Elemente haben >freie Platzwahl< - je nach Nutzung: drunter, drüber oder nebenan. Die Elemente sind daher primärgeometrische Körper, sind addierbar in vielen Richtungen...





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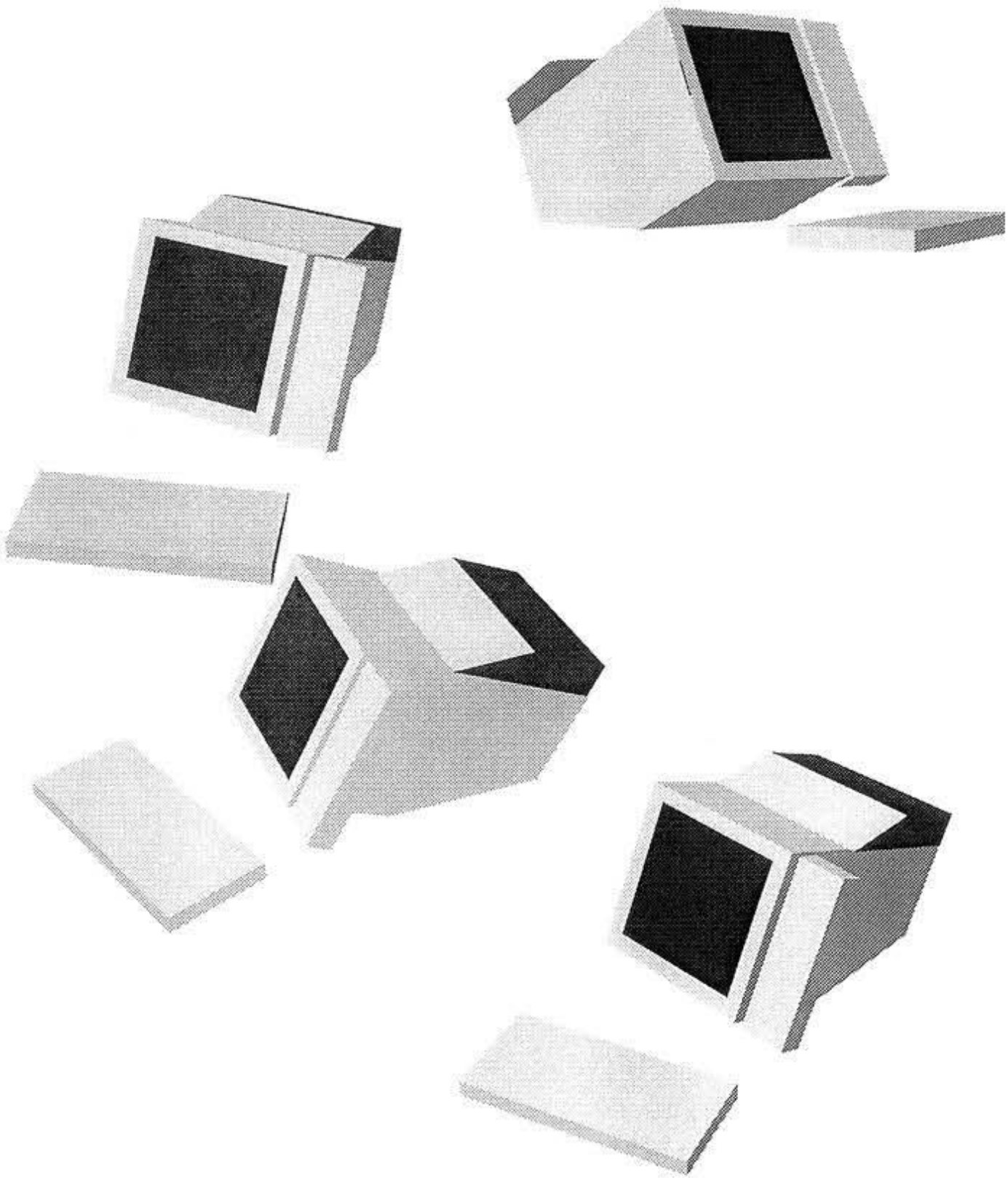
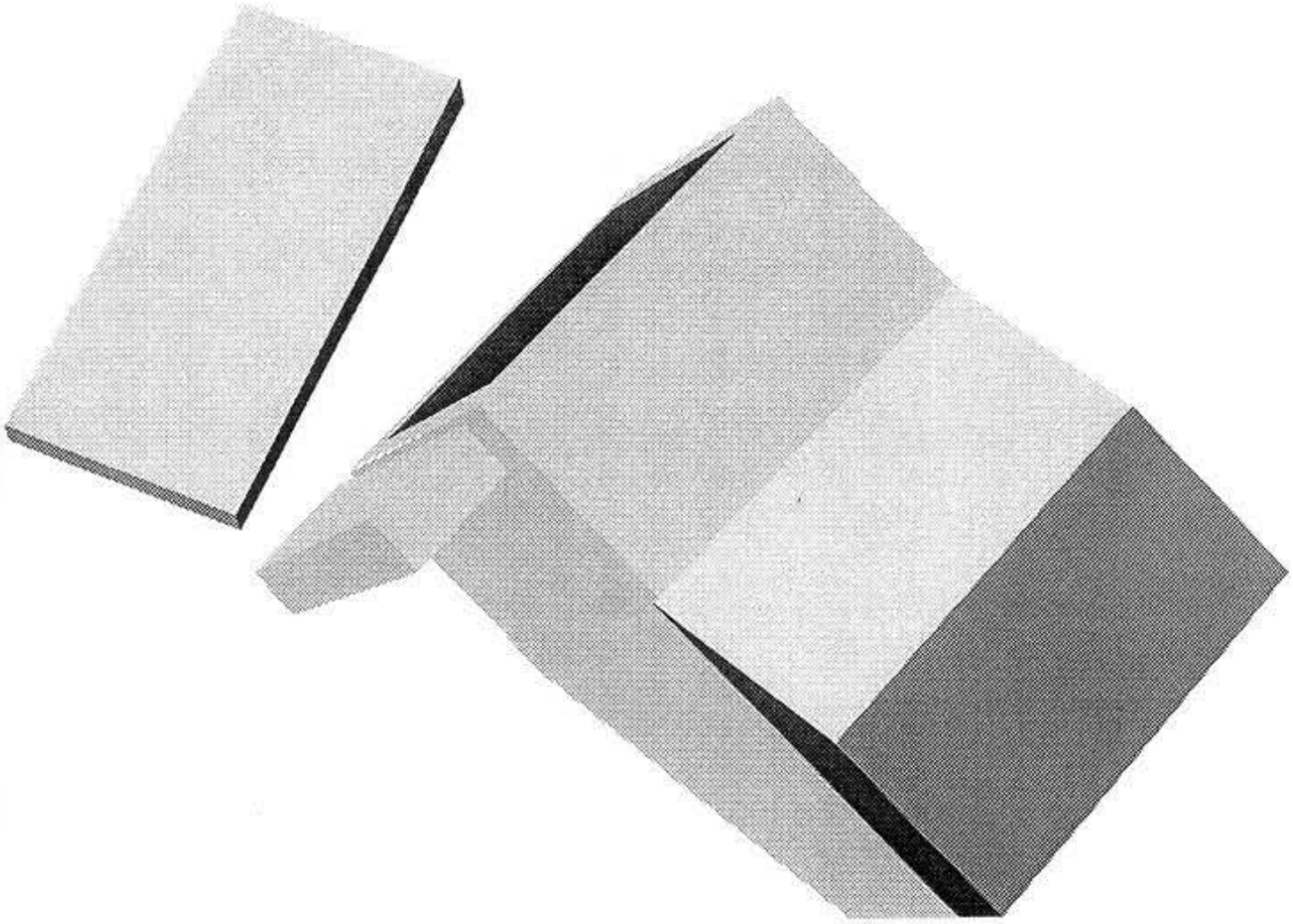
Hardware Konzepte





Literatur

Bücher,
Zeitschriften,
Kataloge

Literaturliste

Bücher

The Media Lab; Stewart Brand; New York 1987
The Network Revolution; Jaques Vallee;
Berkely 1982
Japanese Style; Slesin, Cliff u.a.;
New York 1987
Studie 660/7.86
Studie 660/10.87; PER, Ulm
Zukunft des Design, Dumont 1987
Designstile, Dumont 1988

Zeitschriften

BTX für Einsteiger 87/88
BTX Praxis 1.88
Business Week 7.87, 8.87, 9.87, 4.88
Communication Arts, 1/2.88
Com, Siemens-Magazin für
Computer+Communications 2.87, 5.87
Forbes, April 18, 1988
Fortune, April 25, 1988
Hackerbibel 1.Teil
Hypercard Magazine, 1.88
Industrial Design 12.87
Interior Design 11.87
75 Jahre IBM Deutschland, Stuttgart 1985
MacWorld 3.88, 2.88, 8.87
Minitel Magazine, 7/8.87
Modo 1/2.86
Online Access 1.88
Popular Computing 6.85, 7.85
20. Premio Smau Industrial Design, Milano 1987
Videotex, Guide Professionel
Videotex 6.87

Prospekte, Kataloge

Apple Macintosh
Blaupunkt
Canon
Epson
JVC
Panasonic
Sony

Appendix ...last miutes

A

z.B. Hypercard

...ist hier lesenswert in Zusammenhang
mit den Thesen zur Funktionserweiterung durch Software,
zur Einbeziehung von situativen Nachbarhandlungen
in den Kontext Multitel.

Appendix

TESTBERICHT: TERMIN MANAGER

Zeitmanagement lautet das Gebot der Stunde.

Udo Borkowski hat für uns ein HyperCard-Programm zur Lösung dieses Problems getestet.

Haben Sie sich nicht schon einmal geärgert, weil Sie einen Notizzettel so gut aufgehoben hatten, daß Sie ihn nicht wiederfinden konnten, oder weil Sie einen Geburtstag oder Hochzeitstag vergessen hatten?

Um diese Zettelwirtschaft zu organisieren, gibt es sehr schöne (und teure) Terminkalender. Jedoch sind sie in vielerlei Hinsicht nicht leicht zu handhaben, um nicht zu sagen äußerst unpraktisch. Ich möchte diese Probleme anhand von Beispielen verdeutlichen:

(1) Stellen Sie sich vor, Sie wollen alle Gesprächsnotizen ansehen, in denen ein bestimmtes Stichwort vorkommt. Dies können Sie eigentlich nur dann erreichen, wenn Sie alle Gesprächsnotizen durchlesen. Das aber kostet Zeit und Nerven.

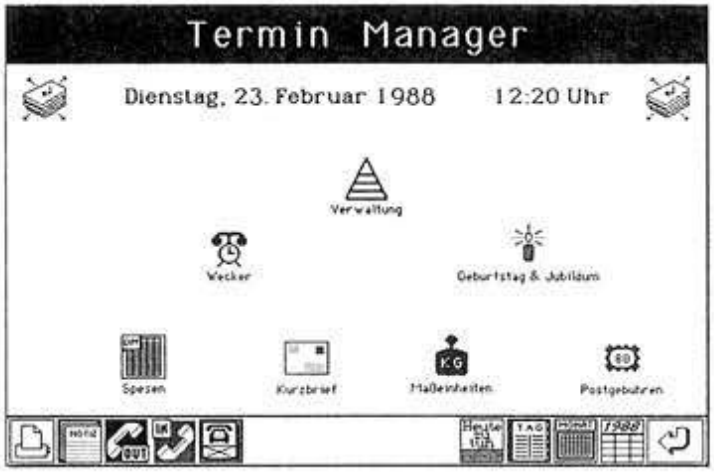
(2) Sie haben in Ihrer Liste der heute zu erledigenden Arbeiten einen Einkauf vorgesehen. Aus bestimmten Gründen können Sie den Einkauf heute nicht mehr erledigen. Dann müssen Sie diesen Eintrag "Einkauf" auf die Liste für den nächsten Tag übertragen, d. h. noch einmal neu schreiben. Wenn der Eintrag lang ist, ist dies eine zeitraubende Tätigkeit. Oder es fängt jetzt wieder eine wilde Zettelwirtschaft an, weil man den Zettel von heute an den von morgen heften muß.

(3) Um Geburtstage oder Jubiläen nicht zu vergessen, müssen Sie eigentlich in jedem neuen Terminkalender alle diese Termine eintragen. Ebenfalls eine sehr lästige und zeitaufwendige Arbeit.

Die Lösung...

Mit Hilfe eines Computers und geeigneter Software kann die Verwaltung von Terminen, Notizen, Telefonnummern und Adressen zu einem Kinderspiel werden. Das Programm "**Termin Manager**" ist mit dieser Zielsetzung entworfen worden.

"Termin Manager" wurde von Format Software, Köln, auf der Basis von Apple's neuem Produkt "HyperCard" entwickelt. Um "Termin Manager" in HyperCard zu installieren, wird zunächst der Stapel "Installation" gestartet. Hier können Sie Ihren Namen und Ihre Adresse eintragen. Nach dem Klicken auf die "Installieren"-Taste wird eine Taste in der Home-Karte des Start-Stapels von HyperCard erzeugt. Ab jetzt können Sie den "Termin Manager" von Ihrer Home-Karte aus sofort starten.



Wenn Sie "Termin Manager" gestartet haben, zeigt sich als erstes eine Menü-Karte. Darin sind die Tasten zu sehen, die zu weiteren Stapeln mit den folgenden Funktionen führen:

- Kalender
- Monatsplan
- Tagesplan
- Zu Tun
- Notizen
- Telefon / Adressen
- Telefongesprächsnotizen für ein- und ausgehende Telefonate
- Geburtstag und Jubiläum

Diese Tasten sind überall und immer vorhanden, so daß diese Stapel ständig alle miteinander verbunden sind. Dabei arbeiten diese Stapel nicht einzeln, sondern sie sind sinnvoll miteinander verknüpft. Wenn Sie beispielsweise den Kalender ansehen, dann können Sie durch Klicken auf einen bestimmten Tag den dazugehörigen Tagesplan sofort erreichen. Weitere Beispiele für die Arbeitsweise des Programms werde ich später noch geben.

Lassen Sie mich erst kurz auf die einzelnen Stapel eingehen. Nachfolgend einige erläuternde Hinweise:

Kalender

Der "Kalender"-Stapel enthält übliche Kalenderblätter, wobei sechs Monate auf einer Karte zu sehen sind. Die Feiertage sind durch Fettschrift deutlich hervorgehoben. Auf einer Karte sind alle Feiertage des Jahres tabellarisch zusammengefaßt. Eine weitere Karte zeigt die Schulferien der einzelnen Bundesländer an.

Monatsplan

Der "Monatsplan"-Stapel eignet sich für langfristigere Planung. Hier haben Sie den gesamten Monat auf einer Karte vor sich. Durch Klicken auf einen Tageseintrag wird die entsprechende Karte aus dem "Tagesplan"-Stapel angezeigt. Jetzt lassen sich die anfallenden Termine detailliert planen.

TESTBERICHT: TERMIN MANAGER

Tagesplan

Der "Tagesplan"-Stapel ist für die aktuelle Terminplanung zuständig. Hier tragen Sie alle Aufgaben ein, die zu einem festen Zeitpunkt beginnen. Auf Wunsch werden Sie durch akustische Signale zu gegebener Zeit an diese Termine erinnert.

Zu Tun

Der "Zu Tun"-Stapel ist für die täglichen Aufgaben zuständig, die zwar an einem Tag erledigt werden sollen, aber nicht termingebunden sind.

Notizen

Der "Notiz"-Stapel nimmt allgemeine Notizen auf. Gut durchdacht ist hier die Möglichkeit, die Notiz-Karten nach "Datum" oder "Thema" zu sortieren.

Telefon + Adresse

Der "Telefon + Adresse"-Stapel simuliert ein Telefonbuch mit 26 Tasten für die 26 Buchstaben des Alphabets. Durch

wiederholtes Klicken auf den Buchstaben "B" werden alle Personen angezeigt, deren Nachname z.B. mit "B" beginnt.

Gesprächsnotiz zu Telefonaten

In den Stapeln "Telefongesprächsnotiz in" und "Telefongesprächsnotiz out" machen Sie sich Notizen zu ein- bzw. ausgehenden Telefonaten. Des weiteren läßt

sich durch ein einfaches Klicken z.B. die Gesprächsdauer feststellen oder eintragen, daß sich niemand gemeldet hat.

Menü

Auf der Menü-Karte sind zusätzliche Icons vorhanden, die zu Stapeln mit weiteren Funktionen führen. Natürlich sind für HyperCard Icons in Wirklichkeit auch Tasten. Die folgenden Stapel können damit aufgerufen werden:

- Verwaltung
- Wecker
- Geburtstag und Jubiläum
- Spesenabrechnung
- Kurzbrief
- Sonstiges wie Maßumrechnungstabellen und Postgebühren

Verwaltung

In dem Stapel "Verwaltung" können Sie neue Karten für die Stapel "Kalender", "Monatsplan", "Tagesplan" und "Zu Tun" erzeugen. Dadurch ist das Programm also nicht nur innerhalb eines begrenzten Zeitraums nutzbar. Das einzige, was nicht automatisch erzeugt werden kann, ist die "Schulferien"-Karte aus dem Stapel "Kalender". Dies liegt daran, daß es keinen Algorithmus gibt, um diese Zeiten zu bestimmen.

Wecker

Der "Wecker" Stapel verwaltet Termine, auf die der Benutzer aufmerksam gemacht werden soll. Im allgemeinen wird dieser Stapel in Zusammenhang mit dem Tagesplan benutzt.

In dem "Geburtstag und Jubiläum"-Stapel können Sie diese Daten verwalten. Hier gibt es auch eine Verbindung zu dem Stapel "Zu Tun". Wenn zum Beispiel am 10.2. Ihr Hochzeitstag ist, kann automatisch der Eintrag "Hochzeitstag" in den Karten des Stapels "Zu Tun" mit dem Datum 10.2.1988, 10.2.1989, usw. eingetragen werden.

Spesenabrechnung

Der "Spesenabrechnung"-Stapel enthält ein kleines Tabellenkalkulationsprogramm, das Ihre Spesenabrechnung vereinfacht. Sehr nützlich für Vielreisende! (Siehe Abbildung)

Kurzbrief

Der "Kurzbrief"-Stapel enhält Formulare für kurze Mitteilungen, in denen Sie vordefinierte Kurztexte einfach ankreuzen und dazu Notizen machen können.

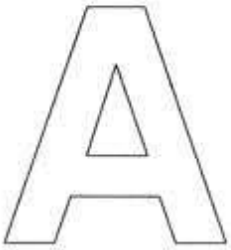
Die oben beschriebenen Anwendungen sind im "Termin Manager" elegant gelöst worden. Darüber hinaus wurden die alltäglichen, organisatorischen Routinearbeiten in einer sehr leicht verständlichen und erlernbaren Weise in das Programm integriert.

Einige Beispiele sollen das erläutern und die Arbeitsweise des Programms demonstrieren:

Beispiel 1:
In Ihrem Tagesplan steht, daß Sie Herrn Schmidt anrufen müssen. Ihre Arbeitsschritte sind folgende:

(1) Sie wählen mit der Maus den Namen "Schmidt" aus, der in dem Tagesplan steht.

(2) Klicken Sie in ein Telefon-Icon, und schon haben Sie ein Telefongesprächsformular vor sich, wobei die wesentlichen Daten, wie der vollständige Name (z.B. Heinz Schmidt), Telefonnummer und das heutige Datum schon für Sie eingetragen worden sind. Nachdem Sie die Nummer gewählt haben (bzw. vom Programm haben wählen lassen, was zur Zeit



Appendix

TESTBERICHT: TERMIN MANAGER

in Deutschland noch nicht zugelassen ist!), stellen Sie fest, daß sich niemand meldet. Dann klicken Sie einfach auf die "Niemand"-Taste. Das Programm protokolliert dies, und Sie können später noch einmal versuchen, Herrn Schmidt zu erreichen. Für an "Telefonitis" Erkrankte eine große Hilfe, denn bei 100 Telefonaten weiß man ohne genaue Notiz oft nicht mehr, hatte er sich gemeldet, ruft er zurück? Sollten wir zurückrufen? Man kennt das ja.

Nehmen wir an, daß Herr Schmidt sich meldet. In diesem Fall tragen Sie durch ein Klicken in die "Gesprächsbeginn"-Taste die Uhrzeit des Gesprächsbeginns in Ihr Formular ein. Noch während Sie telefonieren, machen Sie sich Notizen im Textfeld. Am Ende des Gesprächs klicken Sie auf die "Gesprächsende"-Taste, und es läßt sich automatisch die Gesprächsdauer ablesen. Wirklich eine elegante Möglichkeit und eine große Hilfe im täglichen Notizen-Chaos.

Beispiel 2:
Nehmen wir an, Sie haben in Ihrer "Zu-Tun"-Liste folgende Aufgaben eingetragen:

- Steuerberater anrufen
- mit Zahnarzt Termin vereinbaren
- Karten für das Fußballspiel Deutschland – England besorgen
- Büromöbel ansehen

Bis zum Abend haben Sie nur das Wichtigste erledigen können: Die Karten für das Fußballspiel besorgt. Durch ein Klicken übertragen Sie nun die unerledigten Punkte automatisch in die" Zu Tun"- Liste des nächsten Wochen- bzw. Arbeitstages. Schon ist alles wieder aktualisiert und nichts wird versehentlich vergessen.

Beispiel 3:
Sie wollen nie mehr wieder den Geburtstag Ihrer Frau vergessen. Auch das ist für den Termin Manager keine schwierige Aufgabe; gehen Sie einfach vor wie nachfolgend beschrieben:

(1) In dem Stapel "Geburtstag und Jubiläum" erzeugen Sie durch Klicken eine neue Karte.

(2) Füllen Sie jetzt die Karte aus, z.B.:
Name: "Klara Schmidt"
Datum: "12.3.1953"
Grund: "Geburtstag"

(3) Klicken Sie auf die "-----> Zu Tun" Taste.

Ihr "Zu Tun"-Stapel enthält vielleicht schon Karten für 1988 und 1989. Der Text "Klara Schmidt: Geburtstag" wird auf die Karten mit dem Datum "12.3.1988" und "12.3.1989" geschrieben. Wenn Sie irgendwann einmal den "Zu Tun"-Stapel auf das Jahr 1990 erweitern, so wird dieser Text automatisch in die Karte mit dem Datum "12.3.1990" übertragen.

Ganz nebenbei...

Sicher ist es nicht gerade lebenswichtig, Maß- und sonstige Umrechnungstabellen stets bei der Hand zu haben, aber manchmal braucht man sie eben doch...

Und wenn Sie dank des Termin Managers endlich mal wieder Zeit für den Urlaub haben, läßt sich auch das hervorragend planen.

Ein Programm für...

"Termin Manager" ist ein benutzerfreundliches Programm, wie aus den obigen Beispielen hervorgeht. Das Programm schafft Ordnung in Ihre Terminplanung und entlastet Sie von Routinearbeiten.

Für jeden, der sich seine tägliche Arbeit erleichtern will, lästige Schreibarbeiten vermeiden möchte, eintönige Arbeiten lieber anderen überläßt und sich nicht erlauben kann, Termine zu vergessen, für den ist "Termin Manager" die zeitgemäße und preiswerte Alternative zu einer zuverlässigen Sekretärin.

Programmname:
Termin Manager

Hardware:
Macintosh Plus, Macintosh SE oder Macintosh II mit deutschsprachigem HyperCard

Distributor:
Format Distribution und
Verlag GmbH
Widdersdorfer Str. 236 - 240
5000 Köln 30
Tel.: 0221 / 4 97 20 75

Preis: DM 198,-

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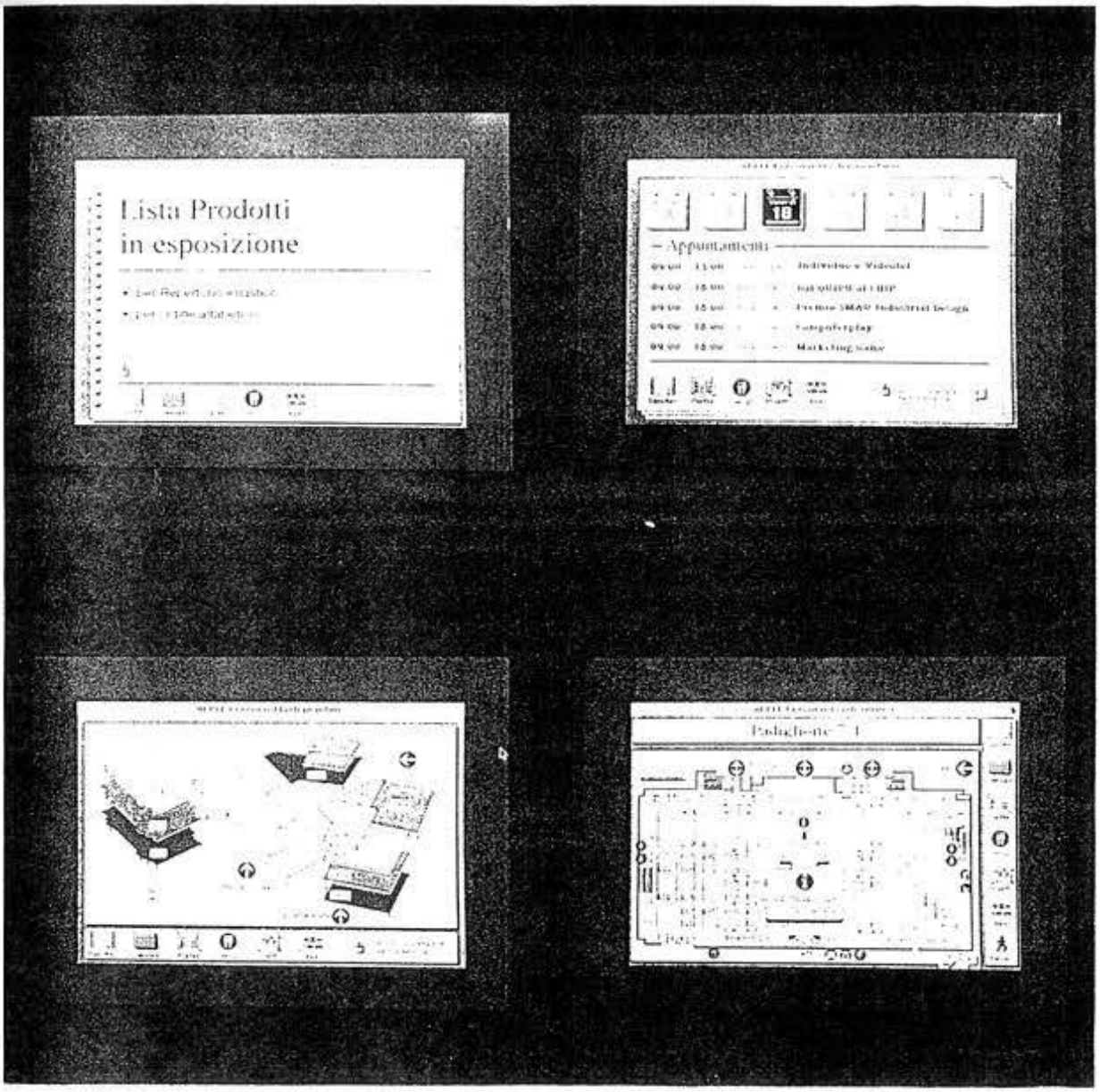
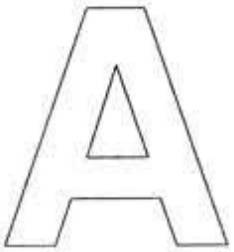
"Per aver realizzato livelli di comunicazione tra l'uomo e la macchina che facilitano ed enfatizzano il ruolo dell'utente nell'impiego delle tecnologie dell'informazione".

"For having realized levels of communication between man and machine which facilitate and stress the role of the user in the application of information technologies".



Nome prodotto Product	Azienda produttrice Manufacturer	Designer	Azienda espositrice Exhibitor
Programma software Hypercard Hypercard software programme	**Apple Computer**	**Bill Atkinson**	**Apple Computer SpA**



Erscheinungsbilder...

Ein Vergleich der graphischen Qualitäten von Prestel, Antiope und Telidon

Appendix

Ian McLaren
Contributor to the typography
of the French Annuaire Electronique project.

aus: Information design journal, Vol.1 154-158

A comparison of the graphic qualities of Prestel, Antiope and Telidon

Ian McLaren
Lanchester Polytechnic

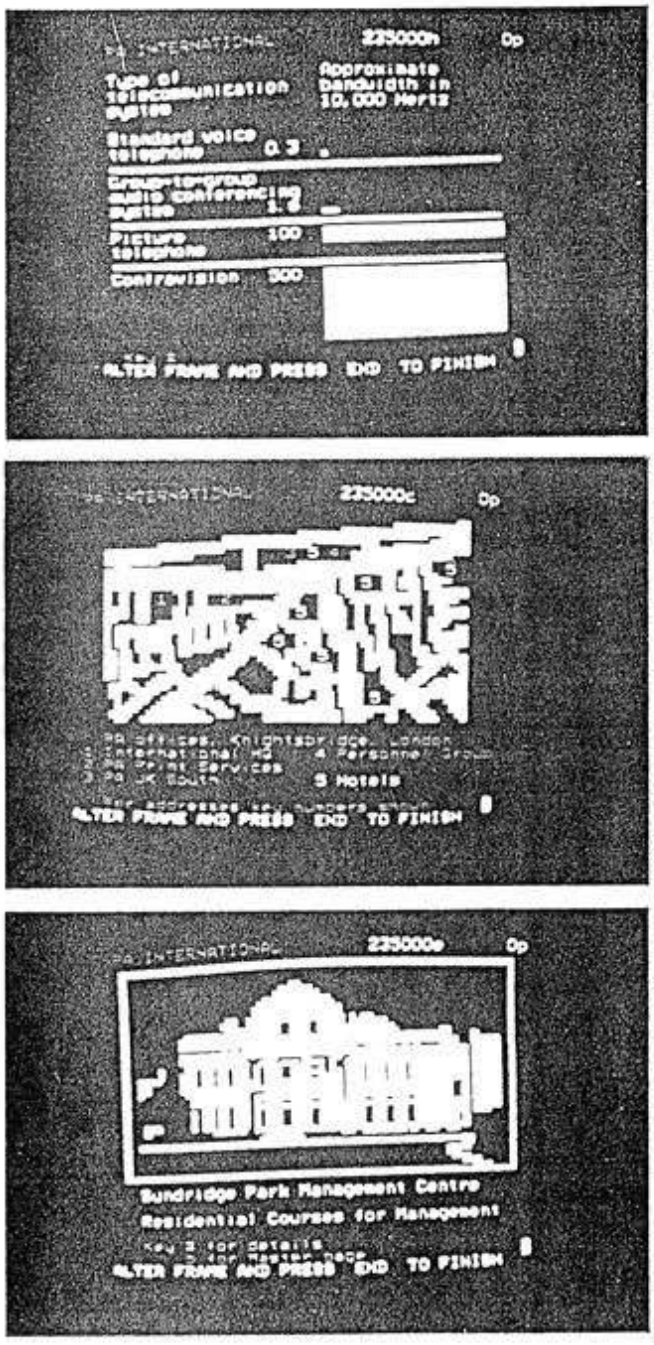
As viewdata systems expand rapidly to meet the estimated huge market demand coming into view, the graphics quality, legibility and display standards that they offer also come under increasingly critical scrutiny. The author reports on an important study carried out for the EEC Commission, focussing on this aspect of the videotex story.

At present a common reaction of those who have encountered videotex is a paradoxical mixture of euphoria and reservation. One explanation for this may be that, although videotex is seen as 'the shape of things to come', the present operational systems are found to be disappointingly primitive from the graphics viewpoint. Indeed, one is tempted to suggest that the majority of the currently available information on the Prestel system would be unacceptable if it were presented in this form in the medium of print. This implies that, despite the novelty of the visual appearance of much of the present videotex information, the reader is drawn to this medium for reasons other than its visual quality.

A study to which the author contributed for the European Commission suggests that viewdata is at the confluence of telecommunications, publishing and television. As such, it is likely to be a major catalyst, which will accelerate the mass domestic market for electronic publishing and related services. In this study ('Videotex market and display study'), undertaken by PA Management Consultants, the likely market for videotex within the EEC is predicted during the next 15 years to be equivalent to half the present telephone market; or the combined present newspaper, magazine and book sales. Over 30 million sets are likely to be installed, with revenues of $12,000M accruing to set suppliers, Post Office service suppliers and publishers. The suggestion is that the present videotex systems (Prestel, Ceefax and Oracle in the UK, Antiope and Télétel in France) will evolve rapidly with other technologies, and are likely to lose their present distinctive identities.

The graphics capability will probably be a significant factor in this evolution. Non-European systems such as the Canadian Telidon, and Captain in Japan, may be seen to be acting as a goad to the present European systems, as the study suggested they might. At the time of the study (spring 1979), rival claims were being made for the French and British systems in an intensely competitive climate of rapid technological development. Comparisons of the visual quality between these systems were difficult to make because of the absence of comparative test materials.

The display aspect of the study was undertaken in the UK, France and Germany using consumer group tests in the local languages. The tests were undertaken using an extended range of the subjects 1.1-2.3 illustrated here. These were all executed in each of the three local languages; and were supplemented by various purely alphanumeric subjects. These were designed by the author and



Figures 1.1, 1.2, 1.3
Prestel

tests structured and results quantified and assessed by Dr Bruce Christie of Pactel, a related PA company specialising in consultancy services for the telecommunications and computer industry.

The test materials were designed principally to determine the relative importance to the viewer of colour and pictorial quality. A taxonomy of increasing graphic complexity was devised which included among the three alphanumeric subjects a simple typographic text; a similar text supplemented by a main heading; and a tabular text containing the same information as Figure 1.3 in alphanumeric form. The graphic materials reproduced here (Figures 1.1-1.3) include a histogram, cartographic example, and simulation of halftone. The full range of subjects was prepared in monochrome and in colour, in the form of slides taken from Prestel screens. To the author's knowledge, these remain the only materials that contain a structured variety of graphic attributes prepared for the purpose of assessing the relative quality of videotex displays. For comparison, equivalent materials were presented in slide form to simulate the audience's expectation of video displays.

Three of the subjects (Figures 3.1-3.3) were prepared in the French Antiope system under the direction of the author. These permitted a slightly more flexible use of colour, which was a refreshing and invigorating experience to manipulate. The principal attribute in user terms was the availability of background colour, permitting an essential transformation of the medium from one where information appears upon a black background. The benefit is more significant that a comparison of Figure 1.1 with 3.1 and 1.3 with 3.3 in monochrome can hope to suggest here. Figure 3.3 demonstrates the availability of text displayed on a coloured background; this facility is employed here to a limited extent to simulate tone. However, this results only in a crude approximation of a line image, albeit in colour – halftone remains unattainable. The strictest test of the graphic capability in our taxonomy is the cartographic example. This presents an acute problem for both

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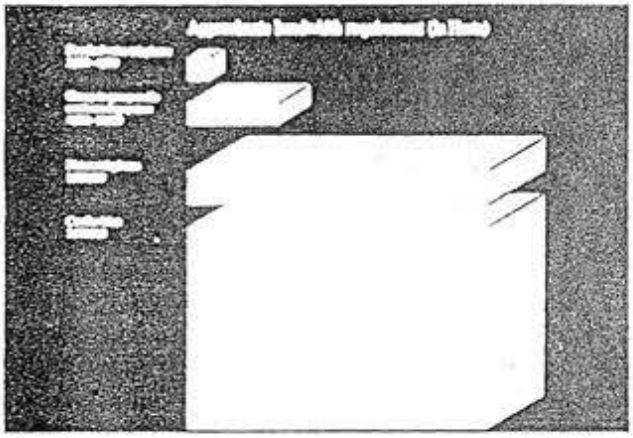
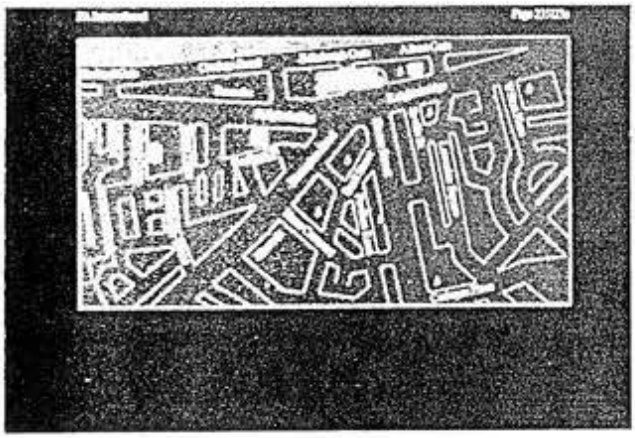
Appendix

Erscheinungsbilder

Ein Vergleich der graphischen Qualitäten
von Prestel, Antiope und Telidon





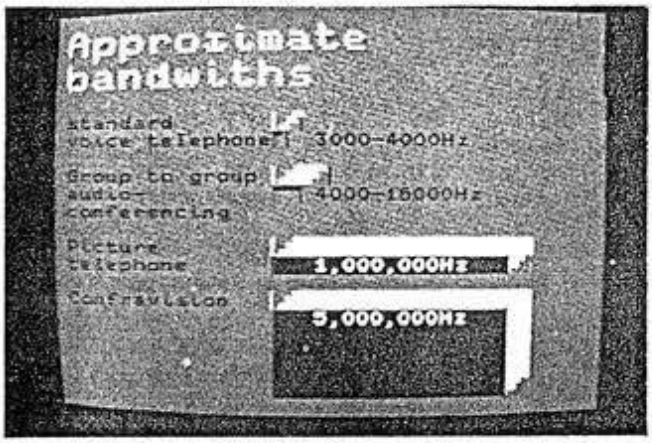
Figures 2.1, 2.2, 2.3
Ideal

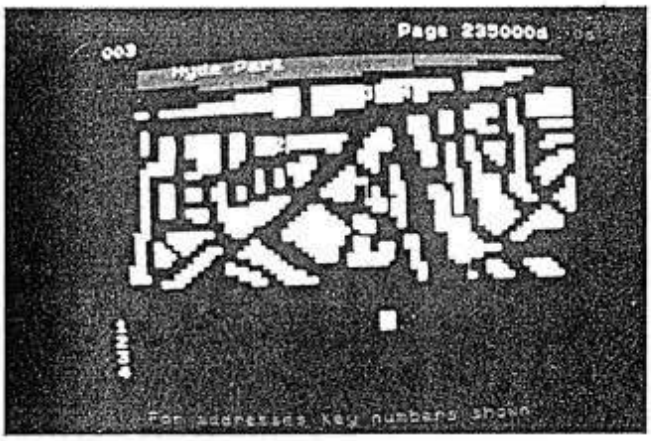
these systems for two reasons: firstly, the comparatively crude mosaic structure of the graphics does not permit a convincing rendering of curves or diagonals; and secondly, neither system permits graphics to be combined adequately with alphanumerics for the purpose of annotation. Here the attributes particular to Antiope do not permit any significant benefit when compared with Prestel.

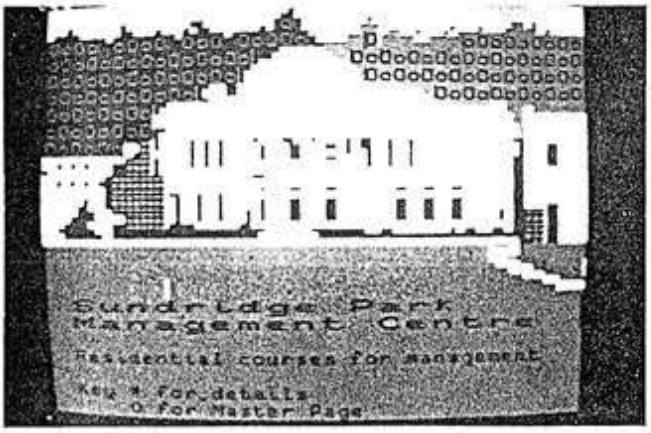
Our test subjects were prepared on the Prestel equipment currently available at that time. However a revised Prestel standard (Post '78) had at that time been introduced which possesses approximation of several of the features available on Antiope. In order to make a true comparison between the technical capabilities of Antiope and Prestel, two graphic examples (Figure 4.1) were prepared on equipment conforming to the revised Prestel standard (Post '78). These demonstrated that with careful manipulation on the part of the graphic designer Post '78 Prestel can match Télétel so closely that the lay user would probably not appreciate the difference.

The comparative examples on the Canadian and Japanese systems (Telidon and Captain respectively) were not available at the time our study went to press and existing material had to be reproduced. However, two months later in June, at the conference in Luxembourg convened by the Commission, the Canadians demonstrated our test materials on Telidon. These are reproduced here for the first time. One may perceive readily that they match the idealised subjects surprisingly closely. Figure 5.3 is unflattering to Telidon, which has in fact the capacity to reproduce colour halftone within at least approximately one sixth the area of the screen. Our reaction on first seeing a preview of these was a mixture of delight at the graphic quality and concern for the future of both European systems.

The Japanese system Captain has a requirement for a considerably extended repertoire of alphanumeric characters, more than 35 times that of either European system. An incidental consequence of this is that the graphics potential is







Figures 3.1, 3.2, 3.3
Antiope

considerably enhanced, with the ability to render a fine line trace.

Although Europe may appear to be in an advanced position, having at least one operational system currently available, other non-European systems permit more sophisticated results from the graphics standpoint. This is because both the principal European systems are derived from text transmission techonology; Telidon on the other hand is derived from computer graphics technology; and facsimile copying technology plays an important part in the conception of Captain.

The study's principal recommendation to the Commission was largely influenced by the graphics aspect. The suggestion was made that if Europe is to retain its lead in this new medium of communication, it is imperative that the present difference in standards between Prestel and Antiope should be reconciled, in order that attention may be focused on a longer term second generation system with a true graphics capability. Other recommendations of particular relevance to graphics included the suggestion that 40 characters per line is too limited and a simple doubling would bring videotex into line with word processing. The present character generators do not permit easy legibility; a radical improvement could be obtained by a limited system of variable character widths. The point was also made that existing character generators seem to have been designed without due regard for the characteristics of emitted light and the particular nature of colour television screens.

Since the publication of this and other studies undertaken for the European Commission, the pace of development has not abated. Obvious difficulties in the preparation of graphics within the constraints of the existing Prestel system, for example, have been considerably improved by the adaptation of input devices employing video cameras capable of converting images to the Prestel standard. Of greater potential significance are the initiatives of the British Post Office exhibited at Viewdata '80, an international venue during March of this year. Here the Post Office

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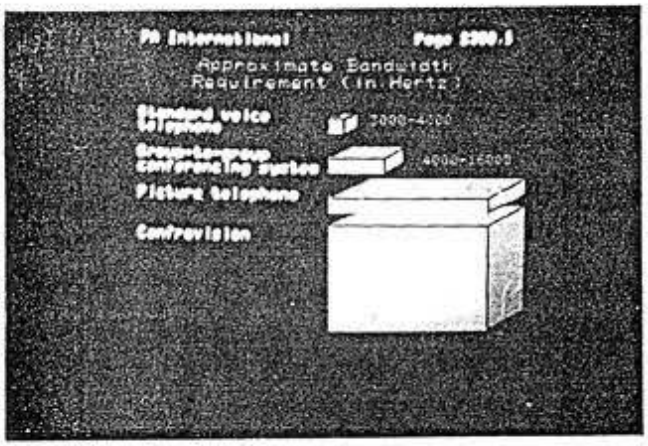
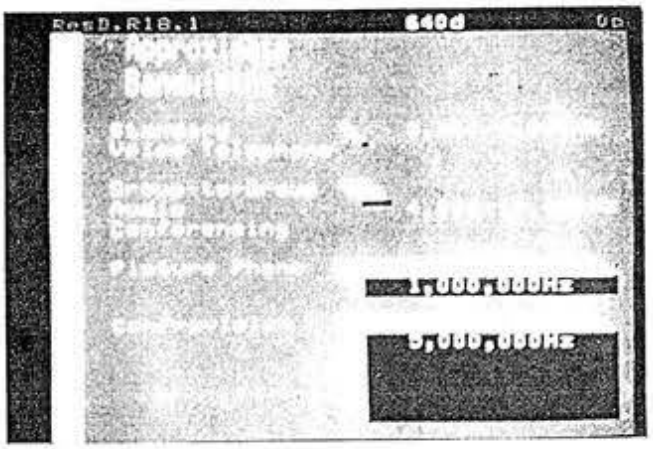
Appendix

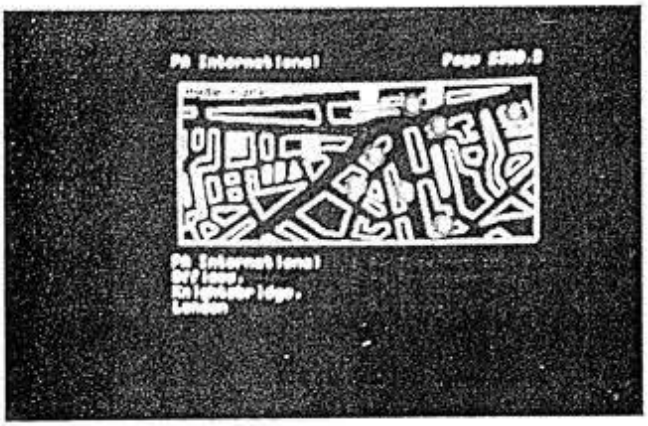
Erscheinungsbilder

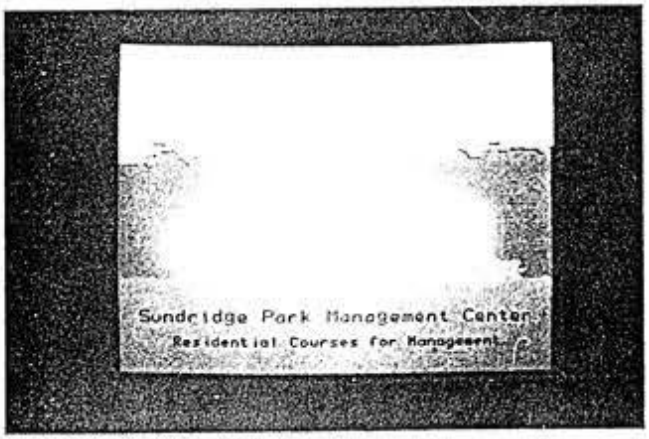
Ein Vergleich der graphischen Qualitäten
von Prestel, Antiope und Telidon





above
Figure 4.1 Prestel post 78





left
Figures 5.1, 5.2, 5.3 Telidon

demonstrated Picture Prestel, a facility to display standard colour halftone still photographs. The results closely approximate to the quality of Telidon; and are said to be more economically engineered.

A second initiative, known as Dynamically Redefinable Character Sets (DRCS), permits an extended range of alphabetic characters to be generated. This facility is essential if sufficient accented characters and non-roman alphabets are to be readily available. It may also be employed to produce line drawings of a quality that is a distinct improvement upon the present limited picture mosaic. This facility will undoubtedly be warmly welcomed by present Prestel users, and is likely to be the envy of foreign competitors. It would be of considerable interest to test these new potential attributes by employing them to format the graphic subjects shown here.

Why does British videotex look nasty?

Ian McLaren

Appendix

Why does British videotex look nasty?

Ian McLaren

During 1978-79 the author took part in a major study for the Commission of the European Communities (1) which suggested amongst other things that the appearance of videotex materials were due partly to the limitations of the technology, and partly to the attitudes to it on the part of those responsible for producing them. Subseqent events can be said to have substantiated this. The limitations of the present technology have been described elsewhere (2). We shall concentrate here upon the second aspect.

One of the apparent constraints of vidootex, is the way by which pages relate one to another (or 'routing structure' as it is called). This can present the designer with an opportunity to improve upon the inadequacies of print which we have come to accept.

For example, when converting railway timetables from print to viewdata one can avoid the numerous abbreviations (both alphanumeric and pictographic) employed in printed timetables to condense the information. These are currently employed to give details of the intermediate stopping points and availability of different types of catering facility. With viewdata it is possible to structure the information in such a way that only that which the user requires is displayed. Instead of overloading the screen with the times of all trains running every day of the week one can offer information of only those trains which are required for a particular journey (figure 1). This can be achieved by displaying a united band of train times of specific interest to the user who wishes to arrive or depart at particular times (figures 2-3). In this way one can give more comprehensive details of those items where abbreviations are employed in print. Obviously viewdata can also give details of topics which are more difficult to achieve in print such as delays in service, and the availability of special offers on particular trains. Indeed when considering whether to present material on videotex, editors would be foolish not to give some thought to which aspects can be dealt with which can not be handled adequately in print. This may sound obvious, but one can cite numerous examples where opportunities for improving the information service have not been acted upon. When one considers that it is not (yet) possible to pocket the full data in videotex form one could say that editors are short sighted not to consider how best to offer services which are not achievable readily in print.

The French PTT (Post Office) have attempted to achieve this with the design of the electronic telephone directory

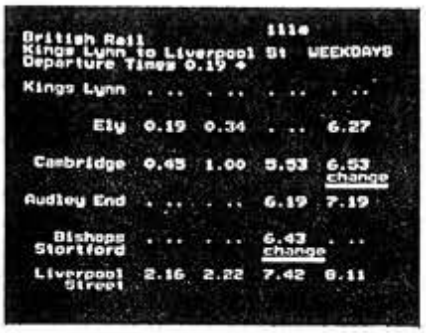


Figure 1 Only those details required for a limited number of specific journeys need by displayed

Figure 2 Initial page of the database - which day of the week do you wish to travel on?

Figure 3 Intermediate page [illegible] day to you wish to travel?

which is currently undergoing tests in northern France. The present printed directories occupy in some cases three volumes, only one of which is updated each year. Clearly a viewdata system inevitably must be more effective as one can update entries 'instantly' – in which case the system should be current permanently. The PTT have been concerned that this should not be achieved at the loss of other attributes which work well because of the subscriber's familiarity with the medium of print.

When the subscriber requests a number of the electronic directory he is offered a number of routes to the required information. He may simply request the required telephone number of a known individual by simply keying the surname and town. If that name has a number of different spellings the system automatically will offer all listed variant spellings. Alternatively the system offers directory enquiry and yellow pages services – by offering the enquirer the choice of interrogating the directory of required professions or services (eg garages, graphic designers, etc.). So one can request a list of restaurants or any other service within a predetermined geographic radius.

The PTT were particularly concerned at the lay user's unfamiliarity with viewdata (and computers in general) and made a considerable investment in developing an interrogation dialogue which is user friendly. In this connection it is of interest to note that the French language seems to adapt less readily than does English to the constraints of videotex. The prompts which the system responds with seem to consume considerably more precious space on the screen than is the case in English. Perhaps this is due to the fact that a compact version of English has been developed on the fringes of the computing domain by incorporating numerous Americanisms and abbreviations. There has been some pressure in France to avoid this in colloquial speech; this purist approach now may be a cause of some frustration.

The PTT's sensitivity (or their subcontractor's Office d'Annonces) to the user's verbal interaction with the system was matched by their concern with the system's legibility and readability. A number of studies of the legibility of videotex character founts have been conducted by Morin and Sallio of the CCETT (Centre Commun d'Etudes de Television et Telecommunications) in Rennes (figure 3). These have not yet, to the writer's knowledge produced graphic arts quality videotex founts. When in 1980 the author was consulted on the typographic design of the subscriber lists, proposals were invited for presentation of the information in as readable a form as the present technology permitted. In the event two alternatives went forward. The first resembles a conventional printed directory, with as much information as possible condensed into each 'page'. This permitted each subscriber's entry to occupy a single line (figure 4). The second proposal capitalised on the capacity of the system to store information off the screen (figure 5). In this case each subscriber is allocated three lines, one of which is blank and used purely to increase legibility. Here only 7 subscribers can be accommodated per page – but happily it is this version which is currently being field tested. The PTT are to be congratulated for opting for the design which is likely to best suit the user (figure 4).

The Annuaire Electronique is a good example of the innovative potential for interaction between the reader and the text which the late Christopher Evans in 'The Mighty Micro' (figure 5) characterised as the 'dynamic' book. A quotation may demonstrate this concept. Though his estimation of the timescale may prove to be a little optimistic the basic tenet is well founded. If the publishers and editors of videotex materials recognised this, then much of the material currently available on videotex would be improved radically.

'The book as we know it is an essentially passive device, merely transferring information from one mind, that of the

Figure 4 French electronic telephone directory – preliminary proposal

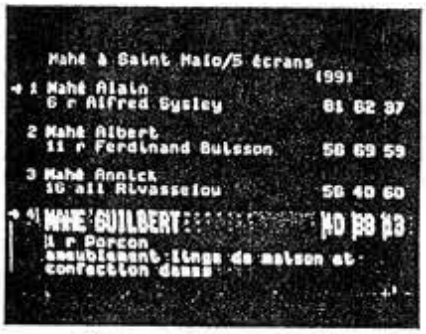


Figure 5 French electronic telephone directory – tested design The horizontal band of tone is the equivalent of a 'small ad'

Figure 6 Ceefax – proposed format for sub-indexes

Appendix

author, to another mind, that of the reader. But the book of the 1980s will no longer be passive, for it will be a sifter and interpreter as well as a purveyor of information.

Dictionaires, to give the most simple example, will offer packages of relevant information on command. You will type into the chipreader a word or phrase describing the problem area and the computer will respond, probably with one or two questions probing the nature of your interest, and finally generating a balanced summary with appropriate background information. Many encyclopaedias and 'study courses' attempt to provide such guides at the moment but they are static, severely limited frameworks which rely on the user's motivation and basic research skills. The 'smart' encylopaedias of the late '80s will do their own research, acting literally as study partners to anyone who needs to access any of the complex patterns of information contained within them.

This.... will be the first application of intelligence in what we would once have called a book'.

The originators of the majority of the present materials on videotex do not appear to have appreciated the significance of this distinguishing characteristic of the medium. One suspects that most members of the graphics profession are likely to be more sensitive in this respect. As a graphic designer one is vexed by the trivial perception of the potential of graphics typified by the majority of videotex material. For example if one is seeking advice on graphic presentation on Prestel and uses the indexes, there under the heading 'Graphics' (on page 13888 at the time of writing) one finds a set of illegible cartoons by a well known cartoonist. It is to be hoped that any competent graphic designer if presented with the opportunities inherent in videotex, instead of offering mere trivial embellishments to a publisher's material, will make a significant contribution to restructuring that material so that it corresponds better with the user's needs

Let us hope that some perceptive publishers will create such opportunities. It should be noted in this connection that in Canada, which employs a system which is technologically superior to the European equivalents, because one requires some graphics competence to use the system effectively, a far larger number of graphic arts personnel are employed than in Britain.

Perhaps, as a profession, designers should be encouraged by the potential for this blend of traditional skills and new technologies.

Postscript

The BBC has recently commissioned the Department of Graphic Design at Coventry Lanchester to assist with the visual presentation of Ceefax. This work was undertaken by the author and a brief account is included here to complement what has been said above regarding viewdata.

The most significant aspect of the work, for the author, has been a greater appreciation of the differences between viewdata and teletext which are not apparent until one is confronted with the realities of production. Despite the identical visual characteristics, teletext is a considerably more condensed and compact medium. In essence the need to compress information, which is general to videotex, is particularly acute in the case of teletext. Indeed a cynic would be tempted to suggest that the scope is confined to devising attractive illustrations which will fit within three or four lines of text. It is rare in the extreme for one to be able to afford the comparative luxury of a full page illustration. Indeed if the designer is to include any form of illustration it is frequently necessary to make modifications to the text to eliminate any trace of redundancy or repetition. It is not infrequent that the inclusion of any form of pictorial imagery can necessitate a

Figure 7. Ceefax - one of a number of Character fonts for titling.

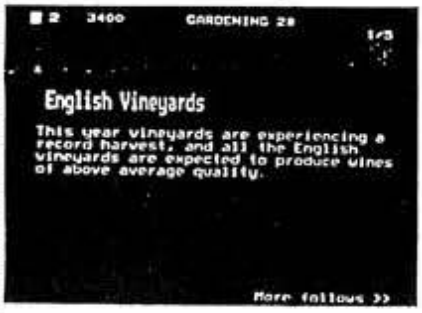


Figure 8. A typical Ceefax page, incorporating a degree of 'animation' (which cannot be illustrated readily in print).

radical reorganisation to the text. Obviously this is not unique to videotex – but what is novel is the degree to which the designer is required to think editorially. This can be a stimulating discipline.

Another constraint which is acute in the case of British videotex is the degree to which the technology imposes upon illustrative material. Whereas one is accustomed in print to being able to introduce a pictogram as a visual clue – in alpha.mosaic videotex systems it may be necessary to be quite inventive if one is to be able to devise an effective symbol, which would be a simple matter in any other medium. In fact because of the inability to draw diagonals and curves adequately it is frequently necessary to rely upon other attributes of videotex such as flashing and derivative applications of the 'flash' facility, which enable one to introduce a crude form of animation.

Regrettably it has not been possible to influence the appearance of the most frequently accessed pages. However, the most significant contribution arising from the department's work is likely to be the recommendation that the various sub-indexes be grouped together in a coherent pattern. A feature of the typography of the proposed sub-indexes is the diagonal arrangment of some of the listings (figure 6). This came about after a considerable number of alternatives were proposed (One feature of any computer based graphic medium is the facility when designing with which one may make a number of different variants in order to arrive at an optimum solution).

As a contributory element of the department's work a number of character fonts have been designed for titling purposes. It is to be noted that these will be applied in a number of different parts of Ceefax; and it is to be hoped that it will be possible in the near future to write programs which will permit these to be called up directly from the keyboard, instead of having to be 'drawn' letter by letter as at present (figure 7). In conclusion it may be worth noting that the work was executed on a micro-computer made available for the purpose. It is ironic to reflect that this equipment, which costs less than £ 1,000 complete, enables a designer to work from home on a project where the results occupy more 'air time' than all of the output of the BBC's Design Department.

Notes

(1) PA Management Consultants GmbH
Videotex market and display study
Commission of the European Communities, Luxembourg, 1979 see also: Vernimb C, 1980 Videotex in Europe.

(2) McLaren 1980
'A comparison of the graphic qualities of Prestel, Antiope and Telidon', Information Design Journal, 1/3, 154-158.

(3) Morin C & Sallio P 1980
Resultats de mesures d'identification sur ecran de stimulus composes en Alphabet Antiope Laboratories du Centre National d'Etudes des Telecommunications, Rennes, France.

(4) A full account of the editorial and visual presentation of the Annuaire Electronique and other electronic directories conceived by Offices d'Annonce may be found in:
ODA Telematique-Havas, 1982
Conviviel 1: Mixware 1
Edition Satellite, Paris, France.

A

...mobile Kommunikation

Wirtschaftliche Entwicklung,
Veränderungen in Arbeit und Freizeit...

aus: Forbes, April 18, 1988

Appendix

Practically everyone agrees that the cellular telephone business will change the way we work and play. But it may be late for investors to get in on this good thing.

Great expectations

By Howard Rudnitsky

ANALYST Dennis Leibowitz, of Donaldson, Lufkin & Jenrette, is nobody's fool, and when he calls the cellular telephone franchise business "one of the very few [businesses] with open-ended growth potential," you can't dismiss his optimism out of hand.

Especially so when some smart people are putting big money into the business of making it possible for Americans to talk by telephone in their cars. Last month BellSouth Enterprises President William O. McCoy offered $710 million in BellSouth stock for Mobile Communications Corp. of America, a cellular telephone and paging company based in Jackson, Miss. Mobile has franchises owned in partnership with BellSouth in Los Angeles and Houston. The offering price, which excludes some of Mobile Communications' paging assets, works out to 7½ times revenues, 30 times this year's projected cash flow and 100 times earnings.

For another rich little deal, consider American Cellular Network. Comcast Corp., a tightfisted cable TV operator based in Philadelphia, is paying $230 million—or 10 times revenues and 20 times projected 1988 operating cash flow—for AmCell.

Impressive personal net worths are abuilding. Mobile Communications' founder John Palmer, 52, and his associates will walk away with $70 million in BellSouth stock (plus some radio-paging assets) on a minuscule investment in cellular made five years ago. AmCell founders Sidney Azeez and John Scarpa will realize about $55 million on the roughly $7 million they put into the company five years ago. In Seattle, McCaw Cellular's 39-year-old Craig McCaw has created a $1 billion fortune for his family and a second fortune for the Taylor and Jordan families, who control Boston's Affiliated Publications (*see box, p. 59*). And there are more such tales.

So big are the numbers getting, it's only fair to ask: Has cellular gotten ahead of itself? Are prices reaching

William McCoy, BellSouth Enterprises president
Betting $710 million more on a cellular future.

Cellular plays

In each market, cellular telephone franchises have been awarded to the local telephone company and an independent. But the telephone companies have begun buying up independent franchises in other markets, which probably makes sense given their financial might and staying power in the face of a recession.

Company/major markets	Market value ($mil)	Shares outstanding[1] (mil)	Total net population[2] (mil)	Net population per share	Subscribers (000)	Long-term debt ($mil)	Cash flow[3] ($mil)	Price recent	Price 52-week high low
Telephone companies									
PacTel/CA, MI, GA	$12,423	432	28	0.07	155	5,321	2,657	28¾	33⅛–22½
BellSouth/GA, FL, TX	18,769	481	27[4]	0.06	74	6,320	4,163	39	43½–29¼
SWBell/IL, DC, TX	11,030	300	27	0.09	150	5,649	2,697	36¾	45½–28½
Nynex/NY, MA, RI	13,458	204	22	0.11	75	6,076	3,307	66	78⅛–58
GTE/TX, CA, FL	12,456	330	21	0.06	66	9,587	3,556	37¾	44⅜–29⅛
Ameritech/IL, MI, OH	12,515	139	20	0.14	90	4,389	2,981	90¼	99⅞–74
Bell Atl/PA, DC, MD	13,748	198	19	0.10	64	5,199	3,357	69⅛	79½–60½
US West/AZ, CA, MN	10,093	190	14	0.07	50	4,949	2,647	53⅛	60¼–42½
Centel/NV, VA, NC	2,153	44	6	0.14	15	883	358	49½	50¼–32¼
Independents									
McCaw/FL, TX, CA[5]	2,494	112	47	0.42	132	1,038	–64	22¼	26 –11
Lin Broadcasting/NY, PA, TX	2,792	52	18	0.35	150	48	106	53⅛	57⅛–21½
Metro Mobile/CT, AZ	849	26	10	0.38	22	76	–9	32¼	33½–12¾
Cellular Comm/OH, TX	471	20	7	0.35	25	134	–3	23	23⅜– 7
Mobile Comm Amer/TX, CA[6]	621	24	6	0.25	40	124	24[7]	26⅛	33½–12¾
Vanguard/PA, FL	210	10	5	0.50	9	30	–8	21	22 –20

[1]As of Dec. 31, 1987. [2]Population within franchise area. [3]For independents, cash flow is operating income plus depreciation and amortization. For telephone companies, cash flow is net income plus depreciation and amortization. [4]Includes 50-50 joint partnership with Mobile Communications. [5]43% owned by Affiliate. [6]Acquisition by BellSouth pending. [7]Cellular losses are absorbed by BellSouth.

Sources: RCR Publications, company reports and Forbes estimates.

tulip bulb proportions?

There is no question that cellular is an important breakthrough in telecommunications. A local cellular franchisee divides an area into cells 5 miles to 10 miles in radius. The franchisee installs low-power transmitters and receivers in each cell; these in turn are connected by microwave transmitters or land lines to mobile switching stations. As a car leaves one cell, the switching station automatically transfers the call to the next cell, and so on. The switching station also connects the mobile telephone to the local, long distance and international telephone phone lines.

With today's newer portable phones, you can walk down Fifth Avenue in Manhattan while talking to your spouse in Boise, or your partner in Tokyo. Pretty soon the gear will be cheap enough that teenagers can take a phone with them on dates. No more, "Gee, Mom, I would've called but I didn't have a quarter." In the U.S. the car facsimile machine is just around the corner. So cellular communications is no gadgety gimmick: It is a service that fills a real need for a society on the go.

But in the real world of business, there's many a slip twixt cup and lip. With little in the way of earnings or cash flow, cellular franchises today sell on the basis of two expectations: (1) the number of potential customers in the area covered by their franchise, and (2) how much each of those customers is likely to spend. The first expectation is the population that lives in the cellular franchisee's area—the so-called pops figure. If a franchise area has a population of, say, 2 million, and a company owns 60% of the franchise (partners accounting for the rest), then the company would have 1.2 million pops.

What's a pop worth? BellSouth is paying some $80 to $85 a pop for Mobile Communications. McCaw, which about 18 months ago was paying only about $20 per pop for franchises, a few months ago paid $80 a pop for the Washington Post Co.'s Florida cellular business. McCaw itself is being valued in the stock market at $75 to $80 a pop.

These prices are assuming a great deal. They assume that a significant percentage of the pops will sign up for the services and that, once signed, they will use the expensive service on a big scale.

When the Federal Communications Commission started to divvy up the cellular industry in the early 1980s it awarded two franchises for each market, to make sure there was competition. The "wireline" franchise went to the local Bell operating company. The independent or "nonwireline" franchise was at first chosen by the FCC in some markets. Later markets were awarded by lottery.

Let's crunch a few numbers. What "per pop" amounts to is an assumption that a given independent company will have about half the cellular market, and the local phone company will have the other half. Let's say cellular's penetration will be 4% five years from now. Then the independent franchisee's penetration will likely be 2%.

Let's go on with the numbers. If the franchise covers 1 million pops and ultimately signs 2% of them, it will have 20,000 customers. Paying $80 a pop is the same as paying $4,000 today for tomorrow's projected customer. By contrast, cable TV systems can currently be purchased for around

A

Appendix

$2,000 per existing subscriber.

Is $4,000 per potential subscriber too much? That depends on how much the subscriber, if he materializes, spends. Donaldson, Lufkin & Jenrette's Dennis Leibowitz, like most cellular analysts, believes cellular operators' gross margins will be around 50%. Five years from now, he projects, "the average cellular subscriber will generate $460 per year in cash flow, and be worth $6,000 each." Leibowitz goes on to predict that in 1993, "cellular could well achieve 5% penetration levels, which would translate into 9 million customers, or nine times 1987's 1 million cellular customers."

Optimists like Leibowitz argue that costs will drop and the convenience will rise, making cellular phone service more irresistible than it is today. New portable cellular phone models can be carried around in a briefcase or large pocketbook. Prices, typically $4,000 a year and a half ago, are expected to drop from today's $1,495 to below $500 in 1993. More automakers—especially the Japanese—will follow BMW's lead and make cellular phones standard equipment on top-of-the-line models.

Fredrick Moran is president of Greenwich, Conn. money manager Moran Asset Management. He has made a lot of money for his clients in American Cellular (he controlled 9%) and other cellular plays. Moran says: "With 5% penetration, cash flow per subscriber will be over $550 and each one will be worth $9,000."

Impressive numbers, but remember this: All this is simply playing with numbers. Nobody really knows what percentage of a given pop will sign up nor how much each will use the service. To create the cash flow of $450 to $550 per customer that the analysts predict would require that the average customer run up annual bills of $900 to $1,100. When added to the home phone bill, that's a lot of money for the average person.

In the real world, new customers are costly to attract. Last year McCaw Cellular, with franchises covering 47 million pops, spent $61 million on marketing, but added only 100,000 customers. That's a lot to pay per customer, any of whom can cancel at any moment. Indeed, the industry's "churn," as cancelations are known, sometimes reaches as high as 3% per month. Even at the more typical 1% per month cancelation rate, a cellular operator must add 12% more subscribers annually just to stay even.

In this growth industry, as in any growth industry in its early stages, things that can go wrong often do.

Older investors may remember that, beginning in the late 1960s, lots of smart folks thought cable TV would become a huge industry. Much capital was raised to buy franchises, string cable and sign up customers. True to expectations, cable today is indeed a big and profitable business. But a number of cable operators nearly went under in the 1973-74 recession. Investors who missed the first cable stock runup had a second chance to buy in cheap.

There's upside leverage in adding customers to a fixed-cost system. But leverage works both ways. The typical user now spends over $100 a month for the service. But as marginal customers are added, the average bill could drop. It could drop, too, in a recession. If usage dropped to $75 a month from $100, profit margins woud fall even faster because of the industry's relatively high fixed costs.

Cellular is growing so rapidly, and from such a small base, that extrapolations are hazardous. Up to now, cellular has been so expensive that it has attracted primarily business users not overly concerned about price. Price competition is mainly in the form of the basic charge. But the fact that price wars between the wireline and nonwireline franchisees have not yet broken out does not mean they won't break out. Cellular phone rates are not regulated by the FCC. Come a recession and there will come a recession, cellular operators with sizable fixed costs to support could be in trouble. In such an environment, the deep-pocketed Bell operating company franchisees would seem the likely victors.

Considering all this, more than one old hand has considered the future, and decided to hedge it with a little cash. Well-managed Lin Broadcasting, which has $214 million in cash and very little debt, has 18 million pops in key markets like New York, Los Angeles, Philadelphia and Houston and wants more. But not at current prices.

John Palmer, Module Communications of America chairman
BellSouth's offer was too good to refuse.

Eastern money, western brass

Fifteen years ago McCaw Communications consisted of some radio station assets and a tiny cable TV operation. Today McCaw, of Kirkland, Wash., near Seattle, is the biggest cellular telephone company in the country. It has 127 franchises covering a total population of 47 million. It also has $1 billion in debt. Market capitalization: $2.5 billion.

McCaw Cellular's Craig McCaw
A bountiful partnership.

The company is the product of Craig McCaw, now 39, who, after his father's death in 1969 was forced to run the business while still an undergraduate at Stanford. By 1981 McCaw needed money to expand in cable. Enter Boston's Affiliated Publications, publisher of the *Boston Globe* and controlled (51%) by Boston's Taylor and Jordan families. Bill Daniels, a leading cable broker, brought them together, and they entered into what turned out to be one of the decade's more bountiful partnerships.

Starting with an initial $12 million from Affiliated (its total investment has come to $82 million) McCaw was able to expand rapidly. He borrowed liberally to buy cable systems just before their cash flows and prices rose.

By 1984, the new cellular telephone franchises were up for grabs. But that required McCaw's full-time attention and lots more money. In the spring of 1987 McCaw sold its cable TV business to Jack Kent Cooke for $755 million. McCaw received $165 million or so after taxes and debt repayments. Now Craig McCaw is betting the roll on cellular.

Affiliated's management swallowed hard but agreed to bet again on young McCaw. To raise more money to buy franchises McCaw established a public market for its shares. It sold a 13% stake to the public in a newly created company called McCaw Cellular Communications for $309 million ($21.75 a share) last August, and sold $600 million of debt. At year-end McCaw's net working capital was down to $387 million. Operating cash flow last year ran at minus $64 million. McCaw Cellular President Wayne Perry says losses will continue at least through 1988.

When will McCaw Cellular's cash flow turn positive? An Affiliated Publications executive suggests that it may happen in 18 months or so—if, he says, Craig McCaw doesn't make additional acquisitions.

McCaw is a master at negotiating for franchises but has yet to show that he can operate a huge system efficiently. Meanwhile, system construction and marketing costs continue to be onerous. To help ease the debt-service burden (around $10 million a month), McCaw and Affiliated recently agreed to put $165 million of cash and their profitable radio-paging business into the company in return for shares of McCaw Cellular stock.

Whatever lies ahead, the principals right now have few complaints. Craig McCaw holds voting control through a trust agreement with his family and Affiliated. After pending transactions are consummated, the McCaw family will own some 64 million shares with a market value (at current prices) of $1.4 billion. Affiliated Publications owns 61 million shares worth $1.3 billion—more than the mature *Boston Globe*. That's not a bad return on $82 million.—H.R.

Lin offered to buy American Cellular, but wouldn't go near Comcast's successful $230 million offer.

Within the last year or so, the Washington Post Co. has sold all its cellular operations. The Post sold its Florida cellular business to McCaw Cellular in January for $240 million, almost twice its cost. Shrewd media entrepreneur John Kluge sold his Metromedia cellular and paging holdings late last summer to Southwestern Bell for $1.35 billion.

Are these smart folks saying cellular is about to collapse? Not necessarily. They're simply saying that current prices are high, and that there are other, more profitable things to do with their money.

Okay. You understand the risks. You appreciate that some knowledgeable players have already left the table. You still think cellular is the wave of the future, and you want a piece of the action.

Unfortunately, only a few publicly traded independent cellular companies remain *(see table, p. 57)*. Their market prices already reflect most of the good things—and few of the bad things—that could befall the industry.

As Wall Street will, Drexel Burnham and Merrill Lynch moved to fill demand last month when they brought a small startup company, Vanguard Cellular System, public. Operating mainly what it calls a "Pennsylvania supersystem," Vanguard has a market value of $210 million, or 4 times its current equity. The stock is a rank speculation at these prices but sold well because the demand for such stocks currently exceeds the supply. But this situation is unlikely to continue. Some telephone operating companies can be expected to spin off part of their cellular operations, in order to take advantage of today's high cellular stock prices. Contel and USWest, in particular, may well go this route.

Cellular probably will be a big business in the years ahead. But it will not travel from here to there along an ascending straight line. Better safe than sorry. ■

Fax-letters
...neues von drüben.

Apr. 21 '88 14:25 0815 PER NEW YORK TEL 212-9419084 P. 1

Appendix
fax letter ProductDevelopment Roerich 72 spring street, new york, new york, 10012, tel 212 941 9285, fax. 212 941 9084

■ HIGH TECHNOLOGY BUSINESS ■

New Developments

Issues, products and advances that help create new opportunities for high-tech businesses

- Decision-makers feel upbeat about U.S. technology
- Software companies lead the computer industry
- Plastic electrical

Answering Machines Abandon Cassettes

ANSWERING machines with solid state memory [illegible] mance than that of traditional machines that use audio cassette tapes.

Cassettes and cassette drives were never designed to handle all the shuttling back and forth an answering machine must do every time it takes a call. New machines from Sharp Electronics and Code-A-Phone replace tapes with solid-state memory, making them easier to use, more flexible, and more reliable than today's devices.

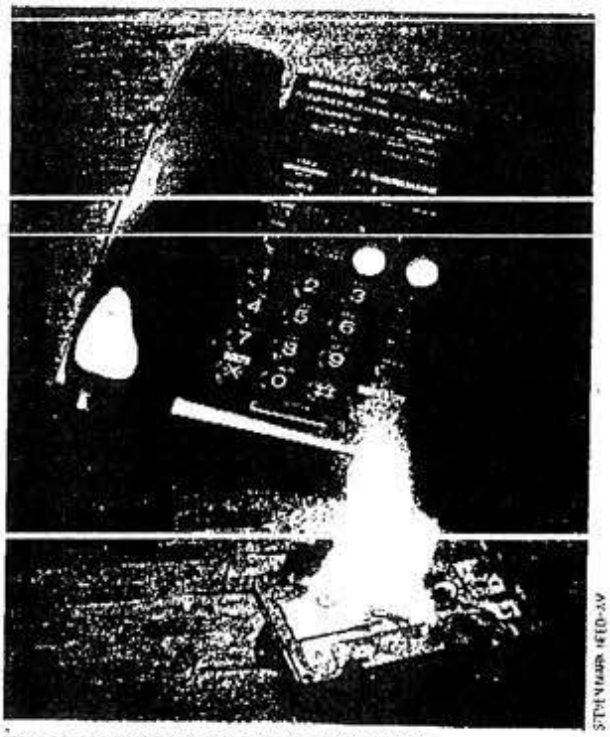
Sharp's FP-M62, already in stores for $249, holds 80 seconds' worth of incoming messages, enough for five [illegible] 10-second messages. Tony Bernardo, national sales and marketing manager for Sharp's telephone products, says that 80 seconds is long enough for most users, but admits that "psychologically, it's a problem." The FP-M62 can also send a preprogrammed message to a number and notify a pager that it has received an anticipated call.

[illegible] of Cincinnamas, Ore., showed the first prototype tapeless machine two years ago and will begin selling its Models 6200 and 6250 late this year. Both machines handle as many as seven incoming messages, [illegible] how long each message will be. The devices will cost about $100 to $150, according to Paul Newman, vice president of marketing.

[illegible] and limited message time, these machines will not revolutionize the market overnight. But as the cost of memory drops, solid-state units will become cheaper than mechanical systems. The companies predict that solid-state answering machines will take over the market in the next 5 to 10 years.

Evidence Points to Stealth Spy Plane

LOCKHEED'S Aeronautical Systems Group is reportedly developing a $10-billion spy plane. The aircraft, designed to replace the aging fleet of nine SR-71 spy planes, will fly as fast as Mach 5—3,800 miles per hour—at altitudes higher than 100,000 feet. The plane will probably use technology created for "stealth" bombers and fighters that will render it invisible to radar.



STEVENSON-KEYS-IV

Sharp's electronic answering machine shows the cassette connection.

THE FUTURE OF PAGING

The first page was supposedly received by a doctor on a golf course in 1950.

Whether this industry legend is true or not, doctors remain prime subscribers to paging services. Other major users include salespeople, real-estate agents, construction workers, repair technicians, couriers, police officers, and firefighters. Dentists with offices in shopping malls give pagers to waiting patients so they can shop until called by the beep. Worried fathers-to-be lease pagers so their wives can tell them it's time to rush to the hospital. Patients awaiting transplants may carry pagers for months, longing for the tone that means a donor organ is available. Pagers have even entered the seamier side of the "business world," where prostitutes and drug dealers are frequent subscribers.

Since that first page on the links, the paging industry has grown to include more than 6.5 million units in service over systems owned by telephone companies, private carriers, and radio common-carriers, according to the consulting firm Arthur D. Little. Based on an average $20 per month charge to consumers for equipment leasing and service, radio paging has become a $1.56 billion industry.

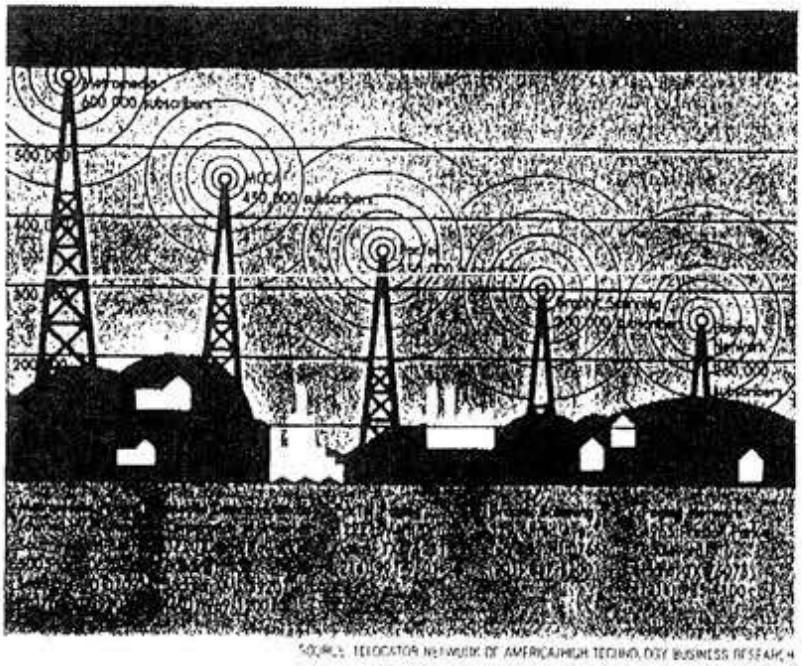
U.S. paging companies have established offices in more than 1,300 locations serving more than 4,900 cities and towns, according to Telocator Network of America, a paging and cellular-telephone trade association in Washington. But as paging use has grown, the number of paging companies has shrunk. Once the province of small outfits, the Bell operating companies and other telephone-industry giants have been snapping up local paging operations left and right. Observers say this consolidation will probably continue, because the top five paging-service companies still hold only about a third of the total market.

Prices have also been falling, prompting paging companies to offer more advanced services to maintain profit margins. In one common strategy, local and regional vendors work together to extend paging service across wider areas.

The industry's future may depend on its ability to integrate pagers with other communication technologies such as voice mail, electronic mail, and facsimile machines. Among the companies developing systems to do just that is Washington's National Satellite Paging, which has signed an agreement with GeoNet Mailbox Systems of Alexandria, Va., to offer electronic mail to National's subscribers. Also, Metriplex Systems has teamed with Stratus Computer of Marlboro, Mass., to develop a paging switch to integrate mobile and fixed voice and data services.

When integration is complete, subscribers will be able to receive messages in several ways. For example, personal-computer users could send a text message to the subscriber's general-purpose mailbox, which would store it both as text and as a digitized voice. The mailbox would automatically transmit the text version to the subscriber's alpha pager. Subscribers without their pagers could phone the mailbox and hear the voice-synthesized version. The message could also be accessed with another personal computer or sent to a fax machine.

On the consumer side, later this year AT&E Corp. of San Francisco and Japanese watchmaker Hattori Seiko plan to unveil a long-delayed prototype of an inexpensive numeric pager built into a wristwatch. AT&E has been working with radio stations across the country to develop a paging system that would exploit unused parts of the station's radio frequency to deliver messages.



SOURCE: TELOCATOR NETWORK OF AMERICA/HIGH TECHNOLOGY BUSINESS RESEARCH

plications for alpha paging, market growth has been relatively slow. Until potential users recognize that the devices do not work the way traditional pagers do, few will be convinced that alpha pagers are worth the extra expense. Worse, many paging companies do not realize they are dealing with a totally different market, and have become disillusioned with the slow growth in alpha pagers.

But as understanding grows, alpha pagers will find acceptance tapping databases and acting as mobile message systems for both executives and technicians. Executives can't be bothered calling back; they need information they can use immediately. Technicians need an easy, flexible way to get detailed information in the field. Only alphanumeric paging can provide that information at a reasonable price. ■

Alan A. Reiter is a journalist who specializes in mobile telecommunications.

Fax-letters

...neues von drüben.

Appendix

Apple's Corporate Image

MACINTOSH'S NEW POPULARITY CHANGES COMPUTING

■ By Andrew M. Seybold

APPLE COMPUTER is rapidly becoming a presence to be reckoned with in the fight for the corporate desktop. In the last year alone, the company's share of the personal-computer market has grown from 9 percent to 15 percent.

The factors driving this increase in market share are the desktop-publishing revolution, the demand for business presentations created on a personal computer, and, most recently, the availability of top-notch business and communications software for the company's Macintosh products.

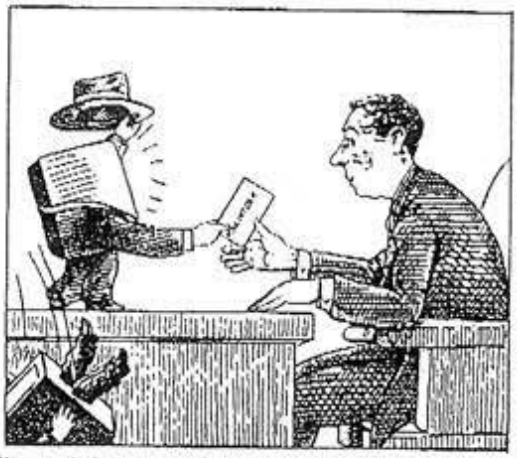
Hughes Aircraft typifies companies that have opted to buy large quantities of Macintoshes, first for the graphics department, then for engineering, and finally for the desktops of the general work force. At last count, Hughes owned more than 10,000 IBM PCs and more than 2,000 Macintoshes. The company says it does not regret its move toward Apple. According to management, the training department has had to run repeated classes for people who use IBM PCs, but most employees need only one session to become productive on a Macintosh.

Further enhancing Apple's position in the corporate world is its recent alliance with Digital Equipment Corporation—an alliance forged at least in part because Apple had the foresight to seek out a company with strong ties to the management-information-services community and then provide communications paths between that company's equipment and its own.

Apple's success with the Macintosh can be attributed to that foresight, plus several other factors, among them a powerful central processing unit, a simpler user interface, and persistence.

The Macintosh is based on the Motorola 68000 (a 68020 in the Macintosh II), a high-end processor with more power than the Intel 80286/386 chips used in IBM's desktop computers.

Because the Macintosh's operating system is proprietary, and because Apple designed the interface, all software written to run on Macintoshes must conform to the same standards and use the same type of pull-down menus.



Software vendors are still free to innovate, but the Macintosh standards ensure that all programs work in essentially the same way.

Apple's persistence—its decisions to stay with the concept of the Macintosh and build on it, to listen to what users say they want and need, and to provide more power and more speed within the same framework—has paid off. So has the company's decision to provide (and encourage others to provide) software and hardware that permits easy transfer of files from the IBM desktop world to the Macintosh world and back again (as well as to and from minicomputers and mainframes).

In the short term, this means that Macintosh users can take advantage of a larger selection of software than ever before available. In addition, connecting to other computing environments is becoming easier, and users are assured that they will be able to upgrade their systems as new and faster machines enter the marketplace.

Apple faces sizable challenges. It must continue its efforts to penetrate corporations, and it must stay abreast of the technology that is driving the entire computer industry. The company's recent agreement with Digital Equipment Corporation and its work with local-area networks and connectivity convincingly demonstrate Apple's understanding that desktop computers are no longer isolated boxes sitting on desks, but an important part of a total computerized office environment.

It will be 18 months or so before the work being done on the IBM side of the industry will be able to compete with the Macintosh operating environment. For Apple, this represents a window of opportunity. Its most important task right now is to convince corporations that it will use this time well and be able to provide what's been promised, but not yet delivered, by the other side of the house.

The new level of acceptability being enjoyed by the "computer for the rest of us" company is certain to have profound consequences. Apple's rise will ensure that its vision—and pronounced desktop mentality—will permeate corporate America's thinking to an increasing extent. The number of people willing to spend large amounts of time and energy learning how to make machines do their bidding is diminishing. Apple is the leader of the next wave, the provider of what desktop workstations are becoming, and a player that no one concerned with the desktop-computer marketplace can afford to ignore. ■

Andrew M. Seybold is editor-in-chief of Andrew Seybold's Outlook on Professional Computing, *a California-based newsletter.*

BUSINESS TECHNOLOGY

Baby Bells Moving Into the Lab

By CALVIN SIMS

RESEARCHERS at the Nynex Corporation, the parent company of New York Telephone and New England Telephone, are developing a telephone that dials a number at when someone speaks to it. They are also writing software that expands the calling range of cellular radio phones.

Their work reflects the move by the Baby Bells, as the regional telephone companies are known, into research and development as they attempt to further position themselves in the telecommunications industry.

High-tech projects like these were once the domain of such research titans as Bell Laboratories Inc., the renowned research and development arm of the American Telephone and Telegraph Company. More recently, they also have been the domain of Bell Communications Research Inc., founded at the 1984 breakup of A.T.&T. to provide advanced technology to the regional Bell phone companies.

But the Baby Bells have announced plans to finance independent research activities to develop proprietary communications products and services. The move is likely to dilute the efforts of Bell Laboratories and Bell Communications Research, known as Bellcore.

Reflecting this, Nynex last week opened its new research and development facility in White Plains. It cost $70 million and employs 200 scientists, engineers and support staff.

The New York Times/Alan Zale

An electronic note pad under development will allow a caller to leave a written message.

> Nynex's research center is the first to be opened by an A.T.&T. spinoff.

The company exhibited examples of its high-tech research, including the telephone that responds to a user's voice commands and an electronic note pad system connected to a telephone. With this system a caller can leave a written message.

Nynex's Science and Technology Center is the first of the new research arms. Company officials said they expected to spend about $30 million annually on research.

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The phone companies are diversifying into competitive industries outside of basic phone service. These include real estate, computer repair, financial services and the publishing of Yellow Pages, as well as the more traditional communications-related fields like cellular phone service and data transmission networks.

The Baby Bells have said that independent research facilities are essential to developing such new business.

The Nynex dedication ceremonies last week underscored a trend in the industry's research and development in which more and smaller laboratories in the future will compete with Bell Labs. That facility had a major impact in recent decades on the evolution of electronics and communications. In its heyday, Bell Labs invented, among other things, the transistor and the laser and developed the field of radio astronomy.

Bell Labs is still an important force in research and development, with an annual budget of about $2 billion and a staff that includes many of the world's premier scientists, including Nobel laureates.

But as the effects of A.T.&T.'s breakup four years ago continue to be felt, industry analysts said it remained to be seen whether a changing Bell Labs and the proliferation of Baby Bell research facilities would generate additional innovation in communications or fragment research and resulting innovation.

Analysts have speculated that the Baby Bell research facilities are likely to be highly applications-oriented, focusing on near-term products rather than pure research.

Since the breakup of A.T.&T., Bell Labs has been concentrating more on translating technology into marketable products. "We are implementing a much stronger approach to product development that is geared toward the end user," Ian M. Ross, Bell Labs president, said in an interview last spring.

The move to establish private research facilities also raises questions about the future of Bell Communications Research, which is jointly financed by the seven Baby Bells.

Bellcore, as it is known, undertakes research projects on an individual and collective basis for its seven owners, each of which has access to the results. The lab, based in Livingston, N.J., conducts market research for the companies, evaluates communications equipment and designs more efficient networks, among many other activities.

The Baby Bells have been putting pressure on Bellcore to undertake proprietary projects on an individual basis. U S West Inc., based in Denver, has told Bellcore that it may withdraw from the consortium because of the group's focus on joint research.

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Bellcore officials said last week that they had reached an agreement with the regional phone companies that would allow the lab to conduct individual research projects. Under the accord, a regional company would have exclusive rights to certain findings for a one- to two-year period, after which other regional companies could purchase the results.

Still, officials of Bellcore and the phone companies agree that the re-

N.Y. TIMES 20.4.88

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Fax-Phones

...die letzten Modelle,
da wünscht man sich noch ein komfortables Display...

Appendix

THE MODEL 3300
Facsimile

TOSHIBA

THE MODEL 3010

facsimile

TOSHIBA

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Appendix

Fax-Phones

...die letzten Modelle,
da wünscht man sich noch ein komfortables Display...

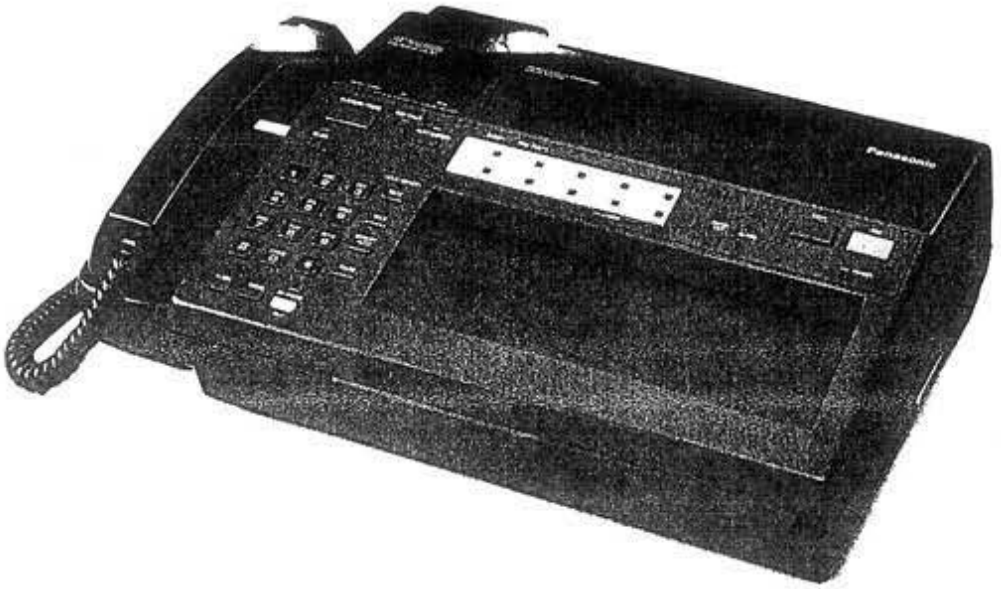
Panasonic

Preliminary

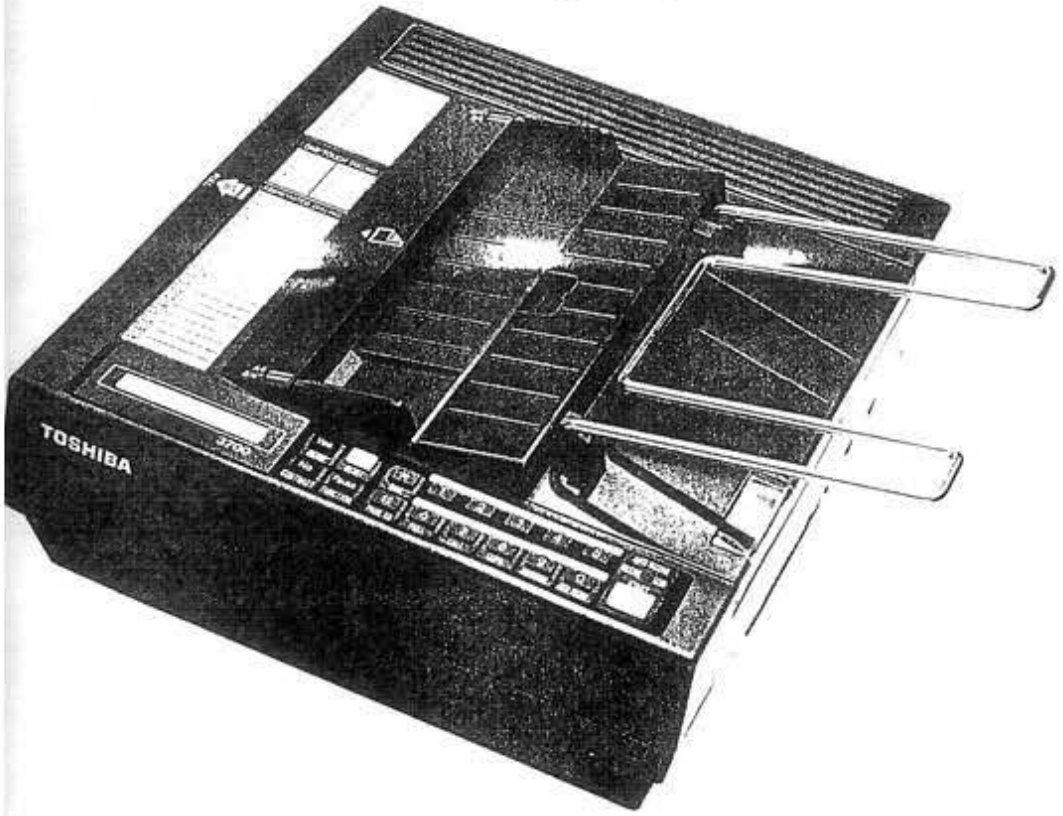
KX-F115

iTs Answering System with Facsimile

- Automatic Voice/Data Switching
- Facsimile Functions
- Copier Functions
- Auto-Logic Answering System
- Answer-Back Speakerphone
- Automatic/Speed Dialing



Automatically Interprets Voice and Data Signals
Over Single Telephone Line



TOSHIBA

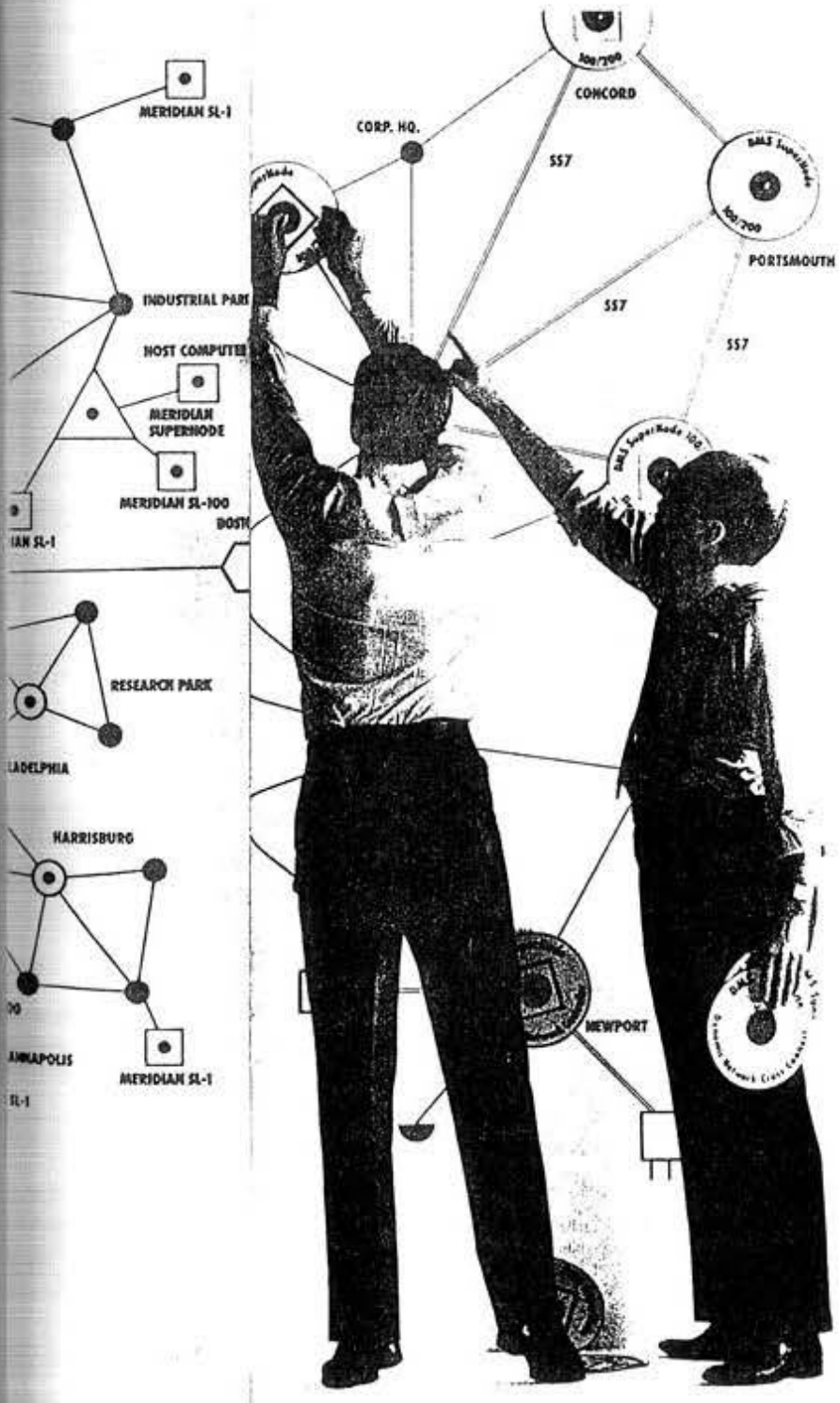
A

Communication business

Auszüge aus einer advertising-serie von Nothern Telecom..
... zeigt eine handvoll Services,
gibt einen Überblick über den State of the art
und macht an durch Präsentation und Argumentation

aus: Fortune, April 25, 1988

Appendix



GREATER STRATEGIC ADVANTAGE

Northern Telecom's networking products and services let you deploy your information resources strategically. They let you control the flow of information essential to high-speed decision making, teamwork, innovation and responsive customer service. They let you map out an open path for the future. The result is a network that puts you ahead of your competition.

Telephone companies are making their enormous resources available to you in new ways with Northern Telecom's DMS* SuperNode.* Now they can bring you powerful services they could never before offer including many custom-designed for you.

With Northern Telecom's Meridian* Customer Defined Networking,* you can combine these telephone company services with information management systems and your own communications resources—any way you want—into a strategic corporate-wide network. For the first time ever, you can have a network that you control to meet your day-to-day and future needs.

DMS SuperNode and Meridian Customer Defined Networking are fully compatible with over 27,000 Northern Telecom Meridian SL-1* and SL-100* integrated services networks, DPN* packet switching systems and 3,700 DMS digital switching systems with over two million Centrex lines nationwide.

Northern Telecom products confirm our leadership in delivering ISDN. And they reflect our commitment to providing increased connectivity and preserving your investment in communications. All part of a greater commitment to work with you to make sharing information, anywhere, anytime and in any form, as easy as using a phone.

To deploy your information resources like any other corporate asset—for maximum competitive advantage—contact Northern Telecom.

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NETWORKING

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Appendix

Communication business

Auszüge aus einer advertising-serie von Nothern Telecom...

FASTER START-UPS

Your company is constantly on the move, taking advantage of new opportunities for growth and expansion. And Northern Telecom networking products and services available from your telephone company give you all the tools you need to keep pace with change—no matter how rapid.

With Meridian* Digital Centrex voice and data services you can link a single person or an entire office easily with your corporate network. So people in a new branch office can be a working part of your corporate network before they're unpacked. And your telephone company can give you control of moves and changes, reassigning services based on individual needs and setting up links to remote facilities.

For networking that moves with you, contact Northern Telecom.

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Communication business

Auszüge aus einer advertising-serie von Nothern Telecom...

Appendix

QUICKER TURNAROUND

Northern Telecom networking products and services link your company more closely with key suppliers. So they can respond just-in-time with the parts and materials you need.

A Meridian* SL-1* or SL-100* PBX connected with a DEC VAX minicomputer and a Displayphone 220* terminal, for example, will find a supplier's ordering information and display it for you as you're dialing them. Order processing, confirmation, invoicing and payment are all done electronically through the most efficient combination of telephone company or private lines.

For networking that's made to order, contact Northern Telecom.

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Appendix

Communication business

Auszüge aus einer advertising-serie von Nothern Telecom...

FASTER NEW PRODUCT INTRODUCTIONS

New products roll out the door faster when you connect your computers and terminals through Northern Telecom data networking products and services.

For example, an R&D lab in one location can share information promptly with marketing and manufacturing offices anywhere in the world. Cooperative efforts with major computer makers let us offer you many ways to connect and manage your data resources, no matter how many different kinds of computers you need to network. From Meridian* LANSTAR* PC local area networks to high-volume/high-speed DPN* packet switching systems, our wide variety of data networking products and services makes information glide effortlessly from one end of your network to the other.

For networking that helps you spin out new products in less time, contact Northern Telecom.

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EARLIER DECISIONS

Northern Telecom is bringing ISDN home. Soon the power of your corporate network will be yours wherever and whenever you need it.

Together with a leading telephone company, a Northern Telecom DMS* digital switch will deliver powerful Integrated Services Digital Network voice and data services to the doorstep over Northern Telecom fiber optic transmission systems. You'll be able to extend your working hours without extending your hours at work, and synchronize your business with customers and partners in other time zones. After work, ISDN will broaden your home communications into new entertainment services, access to databases, videotex, home banking and shopping, and more.

For networking that opens up new possibilities, contact Northern Telecom.

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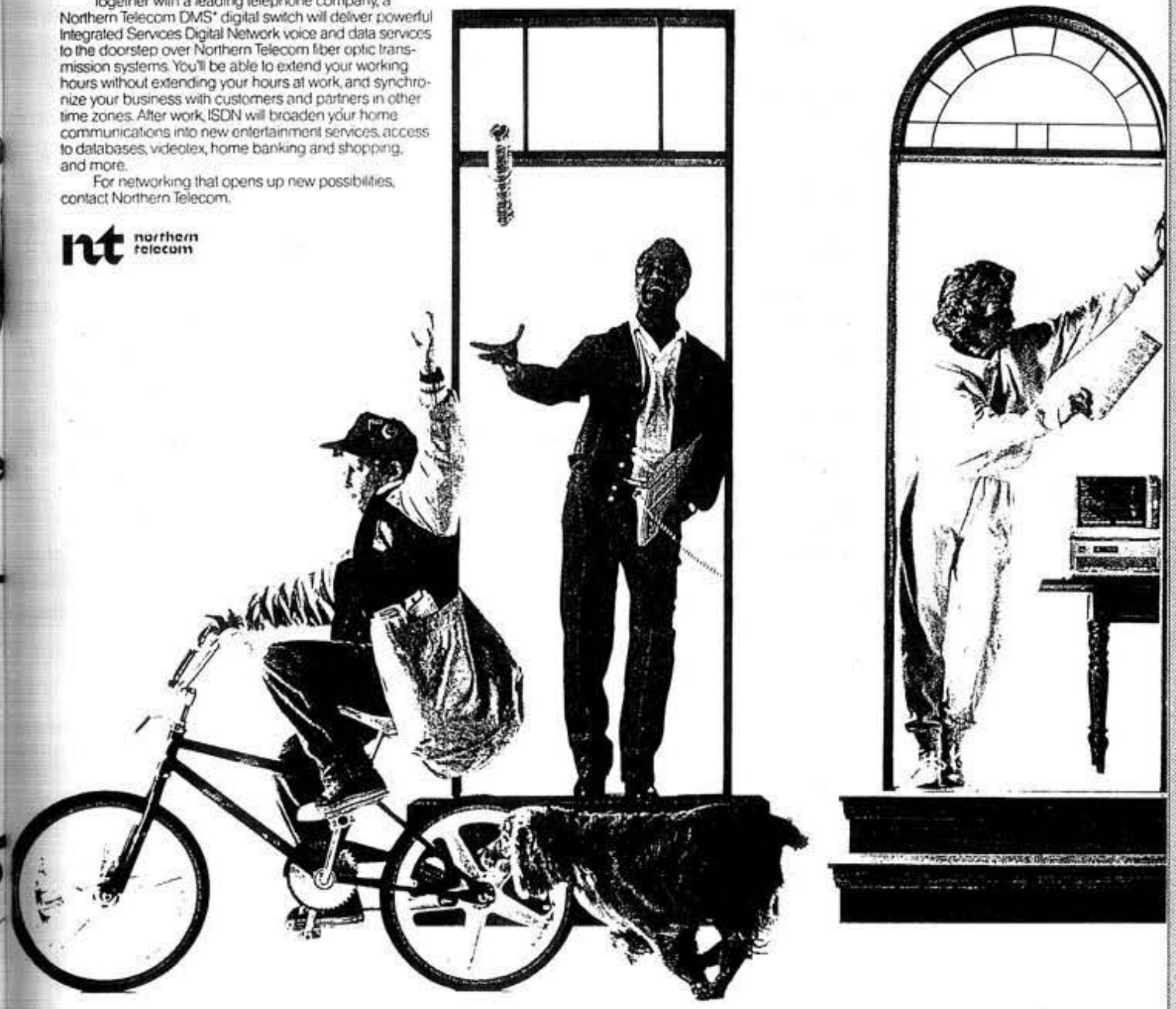
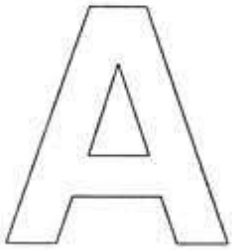




Touch-screens

Neue Technologien, die in der Frage nach dem Touchscreen neue Antworten herausfördern könnten....

Appendix

aus: Computer Design, March 15, 1988

Acoustic touch technology adds a new input dimension

Most touch-input technologies force designers to sacrifice transparency, ruggedness or easy integration. The surface acoustic wave approach, however, lets them have all three—and adds a Z axis as well.

As touch screens have become more popular, the need for transparency, ruggedness and easy integration has become more acute. But the familiar infrared, capacitive, and resistive-membrane touch-input technologies have individually been unable to meet all three requirements. The surface acoustic wave (SAW) touch-input technique, however, does meet all three. Furthermore, by including a pressure-sensing capability, SAW lets system developers take advantage of software developed for other input devices, such as mice, light pens, and digitizer tablets.

Several aspects of today's touch-screen market are dictating specific needs. Touch screens are increasingly used in point-of-sale, public-information and factory-control applications, which are the most demanding in terms of user friendliness, so ruggedness is an essential requirement. The development of high-resolution CRT display graphics, which figure prominently in configuring a complete touch-input subsystem, is driving the need for image clarity and brightness. The proliferation of portable computers with less readable liquid-crystal flat-panel displays has intensified the need for transparency. Glass is the most rugged screen surface, and also the most transparent, so touch screens that use clear glass alone have a decided advantage over screens that use a coated glass panel or glass with a film overlay.

Mark Platshon

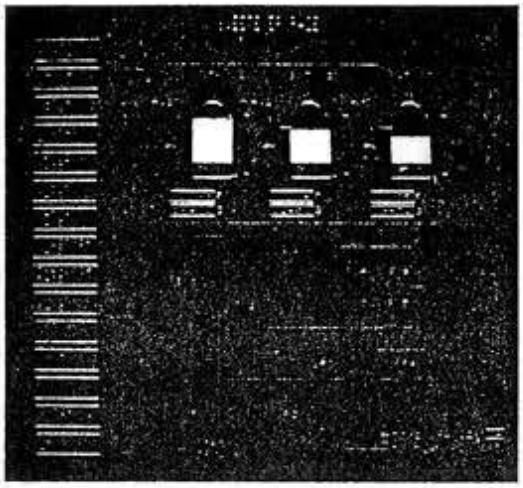
Platshon is president and director of research and development at Elographics (Oak Ridge, TN).

Infrared screens offer complete transparency

One common touch-input alternative is the infrared touch screen, which uses light emitting diodes (LEDs) to beam infrared signals across the surface of a monitor screen—just in front of the display—to a set of photodetectors. Resolution is limited by the number and density of LEDs and photodetectors that can be physically—and cost effectively—installed along the edge of the screen. Typically, the LEDs are 1/4 in. apart, but software modifications can create an effective spacing resolution of 1/8 in. Since infrared touch screens don't require a coating or film on the display surface, they're completely transparent.

With infrared technology screens, touch activation occurs when a pointing device, such as a finger or stylus, interrupts an intersection of infrared signals, rather than when the screen surface is touched. This lack of tactile feedback can confuse the user, potentially causing high error rates, or "mis-hits." The experienced user, who often touches several touch zones in rapid succession, can become even more confused than a novice. Since the finger never leaves the light-beam plane as the choices are made, more errors can occur.

Infrared technology does afford ruggedness and transparency, but these touch panels are the most mechanically difficult to install, since a custom bezel must be added to the display to provide a path through which the infrared beams can travel. This installation difficulty has hindered the widespread acceptance of infrared screens, as have the touch-activation problem and the high parts count that's required for high resolution.



The Coca-Cola bottling plant in San Diego uses a resistive-membrane touch screen display with animated graphics to depict its entire ingredient mixing process. Developed by Control Process (Davenport, IA), the system helped cut operator training time from 18 months to several weeks.

The capacitive route

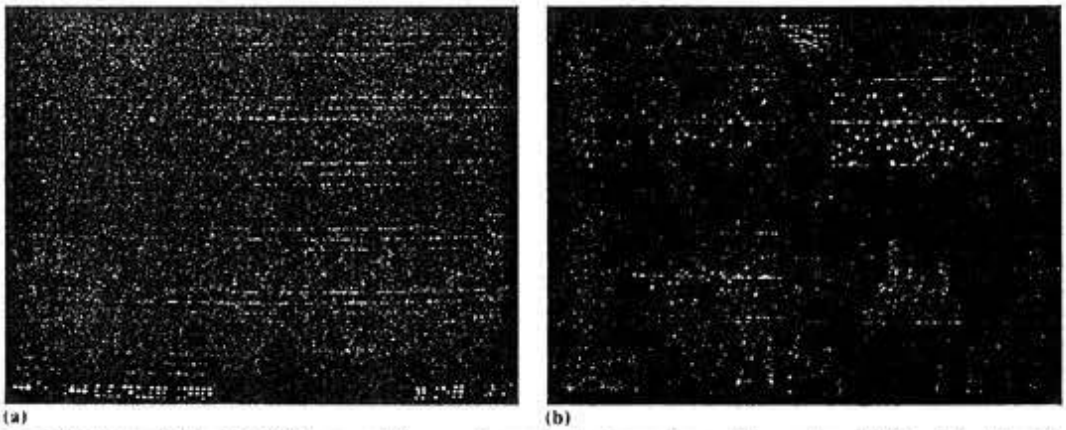
Capacitive touch screens have a transparent coating of indium tin oxide (ITO) on the inside and outside surfaces of a glass panel. Some manufacturers also coat the outside surface with tin antimony oxide (TAO) to improve wear resistance. In operation, a low current flows across the capacitive panel and establishes the frequencies of four oscillator circuits at the panel's corners. When the screen is touched, the operator's body impedance alters the frequency of the four oscillators, and the touch location is calculated from the differential frequency changes of the four oscillators.

Capacitive touch screens are very easy to mechanically install, a feature that they share with SAW panels. Most capacitive screens use 8-bit controllers to obtain a resolution of 256 × 256 possible touch points.

Because capacitive touch screens use very low signal levels, the screen must be shielded from noise from both internal display electronics and external electromechanical interference found in the working environment. Plasma displays run at such high noise levels, in fact, that they can't be used with capacitive touch screens. Generally, none of the other touch screens requires these special electrical considerations.

A different touch

Analog resistive-membrane screens, now the most popular type of touch-screen technology, are a high-resolution version of proven membrane-switch technology. Resistive-membrane technology costs the least of the touch-input alternatives. Screen installation is fairly straightforward, although the bezel can't be allowed to clamp directly on the screen's active area. Resistive-membrane screens have the highest resolution of all the available technologies, with up to 4,096 × 4,096 possible touch points on the screen, regardless of the size of the screen. This gives the designer extensive control



(a) (b)

Texas Instruments (Austin, TX) uses resistive-membrane touch screens to monitor and control its printed circuit board copper plating line, which includes about 34 chemical bath vats. A single screen (a) displays 54 process variables; a red PROB message below a vat icon alerts the operator to a problem. Pressing the icon calls up historical data on the vat in question (b), informing the operator of developing trends. The system helps TI anticipate and correct process problems before they affect the quality of the plating process.

Appendix

Touch-screens

Making a touch screen work

Applications that continue to be best served by a mouse or keyboard include desktop activities such as word processing, spreadsheets and data entry, and digitizers have proven to be an excellent input device for CAD/CAM applications. But touch screens provide the most natural user interface between computers and users in a number of environments.

For laptops, the touch screen can provide the same interface capabilities as a mouse, without the need for the additional external peripheral. In public kiosks, the touch screen offers a fully integrated interface that doesn't invite mischief. In the factory, touch screens give the user a way to gain controlled yet comprehensive access to factory-control processes.

To make optimum use of the interactive characteristics of touch screens, however, several factors must be taken into account. Successful touch-input applications will organize information effectively so that users are guided to the right set of choices for a given situation. For example, a system status screen can flash a warning message that, when pressed, will display a set of instructions on how to handle the crisis.

It's critical for a touch-input application to take the intended user's knowledge level into account. Users tend to fall into three categories: the naive, the trained and the very proficient. Well-designed touch-screen programs should be able to convert the novice into a trained user very quickly by presenting him with simple sequences of choices. Programs that are designed for use in public-information kiosks should feature large, obvious touch zones, with only a few choices presented at any given time.

For trained users, the screen can be densely packed. Some touch-screen applications in the factory, for example, have as many as 100 touch zones on a single screen. The trained user quickly becomes proficient as the system becomes more familiar, and this level of system familiarity creates a need for high-speed program response. Without it, the operator can easily get ahead of the system as commands are executed in a quick series. This is particularly true in the military and in factories, where procedures are continually repeated.

In addition to organizing information efficiently, successful touch-screen applications should make effective use of audio and video indicators to provide operator feedback. Audible signals, for example, can be used to indicate touch, liftoff, or an invalid entry.

Color plays an important role in screen design and should be used to enhance a touch-input application, with a color change signaling a touch activation, for example. Lettering and individual touch zones must appear in colors that contrast well with the background. Certain colors are most appropriate for specific functions; red, for example, is a good warning or "flag" color. The Z-axis capability of surface acoustic wave technology also allows the creation of special "critical" zones that vary color according to touch pressure.

over touch-zone configuration.

The resistive-membrane touch panel consists of a clear conductive film over the surface of a clear glass or plastic panel, separated by an array of tiny, transparent elastic dots. The film overlay consists of either polycarbonate (Lexan) or oriented polyester (Mylar). The facing surfaces of the film and clear panel are coated with a conductive material such as ITO.

With resistive-membrane technology, voltage travels alternately along the X and Y axes across the touch screen, while the opposite edges are alternately grounded, thus creating a uniform voltage gradient across the screen. When the screen is touched, the conductive film layer—acting as a voltage probe—touches the bottom layer, causing electrical contact to be made and a voltage measurement to be sent to the controller, registering the touch location.

Regardless of the size of the finger or stylus, the resistive screens communicate only a single point to the computer at the center of the area touched, which is also true of capacitive screens. This feature—plus the fact that the resistive screen's resolution matches or exceeds the resolution of most monitors—has made these screens popular for drawing and handwriting applications. Both features also contribute to accurate visual feedback, with operators getting the same type of response they receive when using pencil and paper.

High-resolution applications

If menus can communicate the choices available in a touch-input application, a high-resolution screen isn't required. However, for video-based applications, such as those used extensively for interactive training, a high-resolution technology such as resistive-membrane is essential because it lets the designer place active touch zones over any image—or portion of an image—produced by the video camera.

In addition, other new high-resolution applications are increasing the demand for resistive-membrane touch technology. Microfiche files of auto parts, for example, are being converted to CD-ROM data bases, requiring touch screens that can accommodate large numbers of touch zones. High resolution is also important for certain graphics

applications, such as the simulation of the slide switches used to control audio characteristics in stereo equalizers, fluid levels in process control, and darkness level in photocopiers. The closer scale-line spacing that higher resolution permits gives the user better control over the adjustment being made with the switch.

Using sound waves to determine touch location

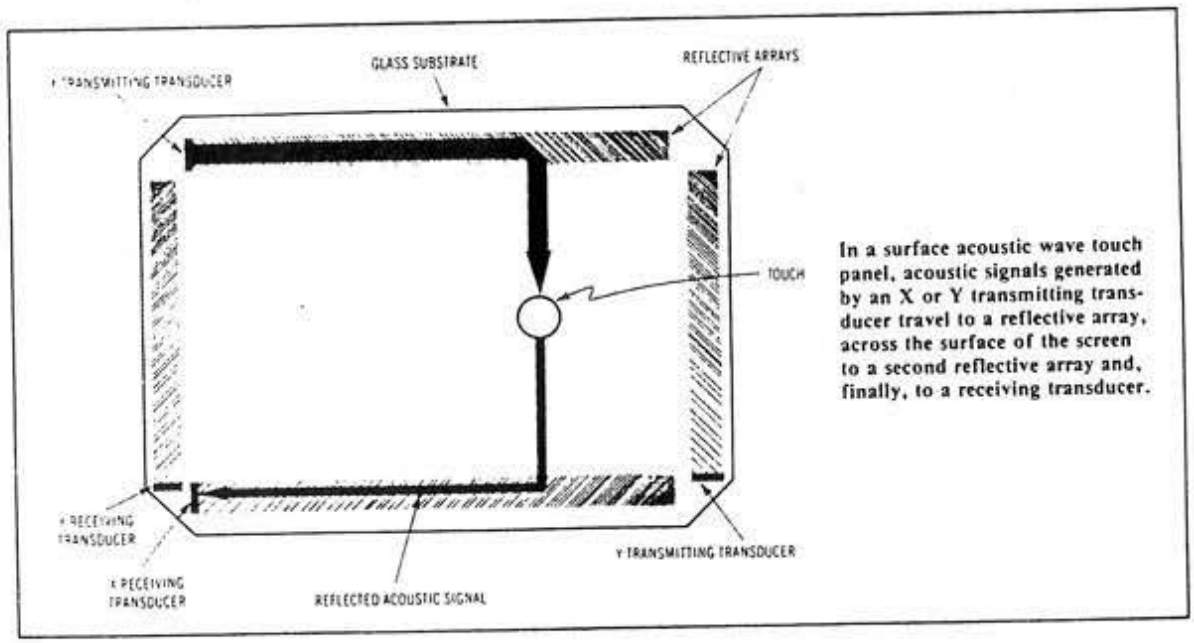
SAW represents a fourth type of touch-screen technology. Recent controller improvements have made SAW practical for real-world applications requiring a combination of transparency, ruggedness and ease of installation. Although a SAW panel is easily installed on a monitor, the active elements of the screen can also be affixed directly to the surface of a display, eliminating the need for a separate touch panel. But whether implemented on a separate panel or directly on the display glass, all of the active elements can be concealed behind the normal bezel of a CRT or flat-panel display.

SAW touch technology takes advantage of the ability of inaudible, high-frequency acoustic waves to travel over the surface of glass at very precise speeds in very straight lines. The wavelength of the signal used in these touch screens is about 0.02 in. The technology has a high signal-to-noise ratio, which lets the controller determine the center of each touch within ±0.5 wavelength (±1/32 in.), regardless of the screen's dimensions. Surface acoustic screens have the second highest resolution of the touch-input alternatives, with up to 100 touch points per inch, which is more than sufficient for most applications. Most pointers are larger than 1/32-in. wide, and "dead zones" of 1/32 in. are large enough to separate touch zones effectively.

In SAW operation, a pair of piezoelectric transducers convert a 5.53-MHz electrical signal generated by the controller into surface acoustic waves. The X-axis transducer is located in the upper left-hand corner of the screen; the Y-axis transducer, in the lower right-hand corner. Each transducer-generated signal travels along the edge of the screen, encountering a reflective array printed directly along the edge of a glass panel. The array consists of a series of 0.2-mil-thick and ½-in.-wide diagonal parallel lines made of powdered glass.

Each array element reflects a small part of the acoustic signal (0.2 percent) over the screen surface. The remainder of the signal travels on to the next array element, where it's similarly reflected. By the time the original signal reaches the opposite corner of the touch screen, almost all of its energy has been reflected out over the display surface. To compensate for the diminution of the original signal as it travels over—and is reflected away from—the edge of the screen, the reflective array elements are placed progressively closer together, ensuring consistency in the strength of the waves traveling across the screen.

The reflected portions of each signal are met by mirror-image reflective arrays on the bottom and left side of the touch screen. These second arrays reflect the signals to two receiving transducers, one



In a surface acoustic wave touch panel, acoustic signals generated by an X or Y transmitting transducer travel to a reflective array, across the surface of the screen to a second reflective array and, finally, to a receiving transducer.

Touch-screens

Appendix

each for the X and Y signals. When a touch occurs, the pointing device absorbs a portion of the energy flowing in both the X and Y directions, attenuating the signal. By comparing the speed of the received signal and the known speed of sound waves in glass, the controller calculates the touch location.

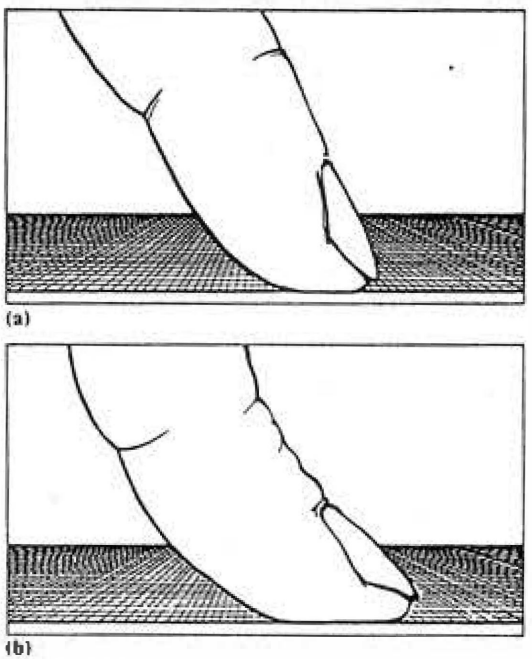
What's the pointer?

Though all the touch-input technologies work well with an ungloved finger, all except resistive membrane limit the types of pointing devices that can be used, thus limiting application flexibility. Capacitive screens require a conductive stylus, such as an ungloved finger or metal pointer; gloved fingers, pencils, or plastic pointers generally won't work. Anything large enough to cast a shadow works on an infrared touch screen, but a stylus that's too thin may cause problems. Resistive-membrane touch screens can accept hard or soft pointers, such as a fingernail, stylus or gloved finger. The resolution of resistive-membrane touch screens offers the best response to stylus pointers. A SAW touch screen can be activated with any soft object such as a gloved finger or pencil eraser.

SAW takes advantage of the fact that a pliable pointing device such as a finger can deliver various degrees of contact area and pressure, absorbing more or less energy. SAW's ability to sense pressure as well as location adds a Z-axis dimension to touch input, offering some interesting application possibilities. Pressure sensing lets SAW touch, for example, emulate other input devices, such as a mouse. A light touch can be used to "drag" the cursor across active touch zones without activation, for example, while a heavy touch can be used to "click," or activate, a command.

Pressure sensing can also be used with pull-down menus, with a light touch to pull the menu down and a heavy touch to activate a menu choice. With other two-axis methods of handling pull-down menus, finger liftoff activates the menu choice. The drawback of this method, of course, is that users can't lift their finger from the display without activating a touch zone. The Z axis can also be used to control scrolling speed, robotic movement, or material flow. Several levels of Z-axis differentiation are possible and current screens support 16 levels, but most applications are best served with no more than two or three.

Like the other touch-input alternatives, SAW hasn't been free of problems, however. Before the technology could be used in actual applications, for example, developers had to deal with the fact that foreign matter on the screen, such as heavy grease or water drops, can absorb a portion of the acoustic signal and register as a touch. Anything smaller than a single acoustic wavelength, however, such as normal environmental residue, won't register.



Surface acoustic wave (SAW) touch-screen technology lets users work with pliable pointers that can deliver varying amounts of pressure and contact area to the screen. A pliable pointer such as a finger flattens somewhat when it presses the screen. A light touch (a) causes less deformation—thus producing a smaller contact area and absorbing less energy—than a heavy touch (b). SAW's ability to sense pressure allows the pointing device to emulate other input devices, such as a mouse. A light touch could be used to "drag" the cursor, for example, and a heavy touch could act as a "click" to activate a command.

The solution to this problem was to digitize the base amplitude level and continually compare it to touch-screen signals. If the touch-screen signal amplitude is lower than the base trace, a touch has occurred. If the signal continues to be attenuated for a longer time than a normal touch would take, the controller assumes that the "touch" is an "artifact" and ignores it. **CD**

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