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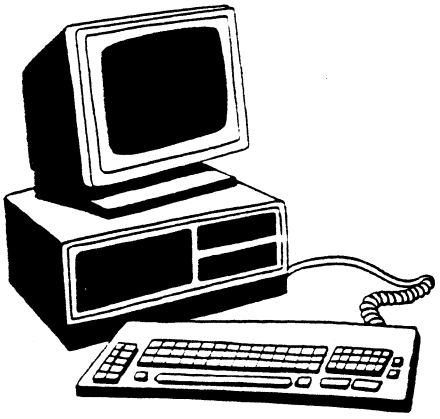
CoCo Clipboard Magazine™

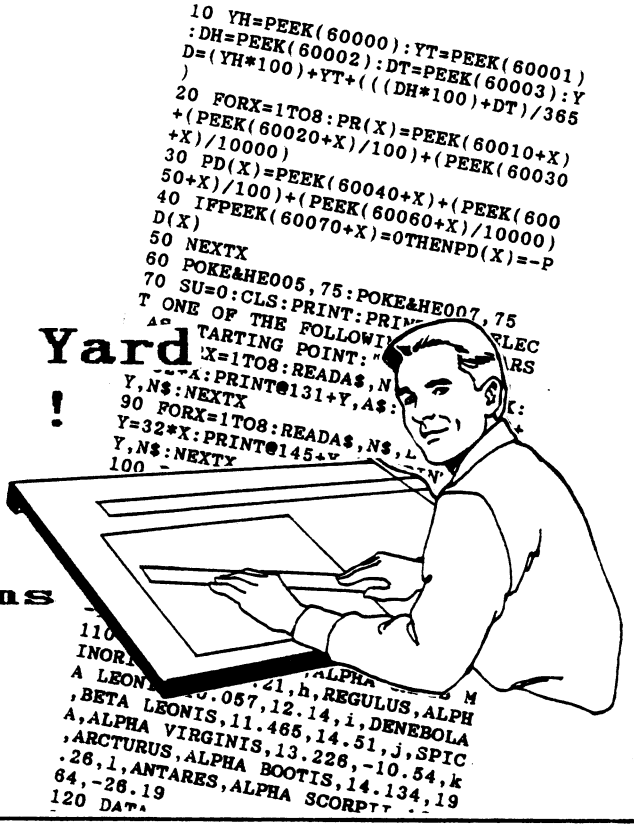
THE NEWEST, MOST INDEPTH MAGAZINE FOR TANDY'S COLOR COMPUTER 2 & 3

Vol. 3 Issue 4 Mar./April 1990



News On The New TC-9 & MM1 Computers !

Claude Giguere's
Initiation Au OS-9 Part One



CoCo Controlled Back Yard Telescope - Part One !

Ron Simpson's Programs

Plans & Diagrams

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CoCo Clipboard Magazine

VOL. 3 ISSUE 3 MAR./APR. 1990

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AS WE GO TO PRESS.... Well we're still trying to catch up, and we've gone to a newsletter style production, using more of our in house capability. Coming up in the next few issues will be Boisy Pitre's ChurchBase (it's here in the office) as well as C.C.B.M.S. We will also have a large comprehensive review on C-III Pages by Coless Computers, and other new products.

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From The Desk Of...

Ted & Darlene Paul

"Survival of the fittest." That's a term which I don't necessarily apply to the natural world but one that certainly applies to the Color Computer Magazine world. We had to make a couple of hard decisions concerning the way we are able to publish *Clipboard*. They were not decisions that were taken lightly or quickly, but WE HAVE TO SURVIVE. These decisions and resulting change in the format and page count were made because there is too much new and exciting developments coming in the CoCo market. Until those changes are complete and while advertising revenues are down we doing what any business should do in order to survive. So much for the bad news let's get excited about what's coming up.

First we are presenting in this issue a terrific summer computer projects for all of you who enjoy star watching or comet finding - astronomy in general. Courtesy of Kalmbach Publications and Telescope Making Magazine, we are printing what we believe is the largest CoCo program and construction project ever. The results will have you operating a computer controlled telescope, driven by a program that will point the telescope to just about any point in the sky and then track it! Because of the length of the program listings, the diagrams and the article itself, we will break it down into three parts. I didn't want to do this but given the circumstances, we have no choice. In any case, the full program listing will be contained on each of the next three *ClipDisks*.

Second, Randy Krippner was going to do a series on PASCAL programming using the TCE Pascal package. That has been changed and will be presented in the late summer, early fall but will be written in BASIC09. We had almost no positive response to the PASCAL idea. Randy's programming project by the way will let you finally catalog all those video tapes you've collected this past year. "Not another video tape cataloger", you say? This will be something much more professional and faster than anything else you've seen. Randy has already written a commercial video store rental program.. he know's what he's doing!

Third, Jim Woodward an associate professor of mathematics at Lock Haven University will be featured in an upcoming issue with a complete Math package for C. Jim has written articles for '68 Micro and has written programs to generate truth tables, change expressions into "Polish" notation and many other projects. Didn't I mention that we weren't going to mess around with recipe converters when you subscribed!

Fourth, As many of you know both Frank Hogg Labs and Kenneth-Leigh Enterprises are working on two new computers for the "upscale" CoCo user. Unless you're an avid BBS user, or were at that CoCo show in Chicago a couple of months ago, you're probably starving for information. Look no further! I've compiled press releases and BBS information on both machines and it's in this issue.

Since I've got to conserve space in this issue I'll wrap this up right now! See you all next issue!

Reader Mail

FIRST CLASS

Dear Ted & Darlene

First of all, let me thank you both for the magazine and ClipDisk. As a CoCo user and amateur radio operator (call sign V01BZ) there is always something of interest in every issue.

In that regard, let me recommend Monty Haley's CoCoPac for using the computer for packet radio. I spoke with him on the telephone before receiving the software package and he is a fine gentlemen.

Also, I enjoyed the Bible Quiz program in the Jan/Feb 90 issue. Having written a similar program myself, I was please to see it.

I look forward to each issue.

Sincerely,

Frank J. Burke
St. John's, NFLD - Canada

Dear Frank

Glad you enjoyed Sebastian LaSpada's article and program. We are also looking for more writers in the Amateur Radio area as this is a growing field. Glad we have been of help to you!

Dear Ted:

Here are some notes to suppliment the telescope article:

1) I wrote the program on my CoCo I. While no problems have been experienced on my thirty dollar spare CoCo 2, I do anticipate that when running the program on a CoCo 3, there will be problems related to address calls in the machine language subroutines and the peripheral interface adapter.

2) In case is wasn't clear in the article, this system is made for equatorially mounted telescope only.

3) Since writing the article for TM38, I have made an addition to the program; mainly, a planetary position emphemeris program has been added to the initializing program to calculate the positions of all the planets for the night's observing session. The addition made the observing program so long that storage can now be made only on tape, even though a "PCLEAR0" Poke is done in the initializing program (there is no memory available for the disc operating system).

4) In order to make both pushbuttons work on my deluxe Radio Shack joysticks, I had to perform some surgery to the joystick connectors in my CoCo's. Namely, the unused top center pin of each connector must be cut from its grounded point and connected via a jumper wire to pin 4 of the opposite connector. Note that this modification may void the warranty, or worse, that Radio Shack may refuse to service such a modified unit. As an alternative, the deluxe joystick may be modified by adding a connector for routing the unused fore button signal to the left joystick port.

5) Lines 60 and 820 of the second program must be tailored to fit the specific mechanical configuration of the telescope. The POKEs of line 60 control the top speed of the steppers in the auto and manual slewing machine language subroutines. Line 820 converts slewing distances in hours of right ascension (R.A.) and degrees of declination into the number of pulses (divided by 256 for convenient POKEing later) required to move the telescope these distances through its gearing. As an example, the math on my system is as follows:

* 482 tooth R.A. worm gear x (72 tooth/48 tooth) stepper-to-worm gear ratio x 400 half steps per motor rev. = 289,200 pulses per rev. of R.A. shaft.
* 289,200 ppr/24 hrs/rev. = 12,050 pulses / hour angle.
* 12,050 pph/256= 47.0703125 conversion factor.

* 472 tooth dec. worm gear x (72 tooth/ 48tooth) stepper-to-worm gear ration x 400 half steps per motor rev. = 283,200 pulses per rev. of dec. shaft.
* 283,200 ppr/360 geg/rev. = 786 2/3 pulses/deg dec.
* 786 2/3 ppd/256 = 3.072916667 conversion factor.

Best Regards,

Ron Simpson
Charlotte, NC

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See Review November '89 issue!

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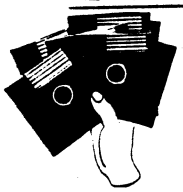
CoCo Controlled Telescope Pt. 1



Ron Simpson

(Editor's Note: As mentioned in my opening column, we had originally planned on running Ron Simpson's entire program and article in one issue. This has become impossible. We will divide up the program, schematics and article into three sections. ClipDisk will have ALL of the program information on each of three corresponding disks. You should also note that Ron's original program is designed to run from a cassette based CoCo I or II. You may have to make some modifications in order to run on the CoCo III and/or with a disk based system. We would be pleased to publish your modifications for these areas.)

Some persons, especially those who are skilled in star hopping, might consider a computer controlled telescope to be the epitome of laziness. But when you build one yourself (out of frustration, perhaps, because can't seem to learn how to star-hop), you put all the work in up front.

My 10" f5.6 newtonian is testament to this fact, having first been constructed in 1976 with a horseshoe mount, which, as my first attempt at telescope making, left a lot to be desired. I had not yet learned that using long, thin wall aluminum channels for the members attached to the horseshoe can result in an instrument better suited as a seismograph.

The tube assembly, however, was a different matter, with the open-trussed tube sections being "scroungineered" from surplus jet aircraft engine components sometimes called "burner cans". These titanium sections were found at an aircraft salvage yard in Miami, where I lived at the time. I have been told that if these parts had not failed magnafluxing tests and had remained in service, they would have been worth about six thousand dollars each. As it was, I only paid six dollars per section.

The Coulter primary mirror, proven to be of excellent figure, is mounted in a nine-point floatation cell. The secondary is held by a spider assembly of three vane construction. I prefer the resulting six thin diffraction spikes over the four heavy spikes (really four pairs) that four vanes produce.

The finder was made from the only remaining objective of a pair of damaged 7x50 german binoculars found at a pawn shop, and an eyepiece from a microscope. For crosshairs I have tried many different things, from hairs snatched from my sleeping (or so I thought) young daughter's head, to spider webs (The hard part is finding the spider after you've placed the first crosshair). But ball fine hair isn't fine enough, and spider webs collect dust and become brittle with time. Finally, I discovered that certain grey multiconductor wires contain a stripping cord composed of extremely fine but durable filaments. Two LED's, mounted at ninety degrees, are used to illuminate them.

A NEW START

I enjoyed the optical performance of my scope for about five years, all the while lamenting its poor stability. When I decided to try my hand at astrophotograpy, I quickly realized that a new mount was a necessity. Since small computers were just coming on the scene, I thought that it would be ideal if I could use one to control the scope to find and photograph objects I may not even be able to see.

But first, I had to embark on a painfully slow journey to acquire the mechanical components for a new, rigid mount. I decided that I first had to have a lathe with which to make parts, and located an ancient belt driven one which could turn fourteen inches and had a six foot bed. With this machine I made two tap cut worm gears of approximately twelve inches diameter. I had decided to build what is known as a torque tube mount, in order to retain a ladderless observing height while elimination pier crash problems. To this end, I also made the taper roller bearing housings for both the declination axis and the right ascension axis (the torque tube). These axes were made to bolt to each other with flanges having push/pull bolts in order to provide adjustment for perpendicularity.

At this point, my company relocated to North Carolina, causing me to interrupt the project for about three years while getting settled. I had also sold my lathe before moving, believing (incorrectly) that I could find a better one in Charlotte. The mechanical portion of the project languished until I changed employ-

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ment to a company with a well equipped machine shop and, fortunately, with minimal concerns about employees using the equipment after hours.

THE ELECTRICAL HARDWARE

In the meantime, I decided to learn whether or not I could make a computer drive stepping motors. This was no small task, since not only did I not have a computer, but I didn't have the slightest idea how they worked. Even basic wasn't basic to me

I purchased a Radio Shack Color Computer (CoCo), of 64K memory, ostensibly for my children's Christmas present. Fortunately, they wouldn't have a thing to do with it. An entire year was spent in developing the program and designing and building an electrical interface unit that would drive the stepper motors.

(While a purist might turn up his nose at the thought of using the lowly (?) CoCo for such a purpose, there are some advantages, foremost of which is the fact that I can inexpensively replace the computer if it is damaged at a star party. I even bought a spare for thirty dollars at the swap table of our club's SOUTHERN STAR convention last year. Try that, Big Blue users!)

The interface unit connects to the CoCo through its game cartridge port, right on the data bus. A game cartridge was gutted for its case, and a gold plated card edge connector board and ribbon cable were added to connect the data bus to the interface unit housing a 6821 PIA (peripheral interface adapter). This device is programmed from basic to configure an eight bit group of data lines as outputs, which in turn light the LED portions of eight opto-isolators.

The power for the PIA and the LED's is derived from the CoCo game port, with the remaining power for the interface being

PARTS LISTING, INTERFACE UNIT

C1	Capacitor, Electrolytic, 20K uF, 20VDC
C2	Capacitor, Electrolytic, 1 uF, 35VDC
C3	Capacitor, Ceramic Dipped, .33 uF, 50VDC
C4-C6	Capacitor, Ceramic Dipped, .01 uF, 50VDC
C7	Capacitor, Polyester Film, 1 uF, 600V
D1	LED, Power Indicator (*)
D2-D13	Diode, 1N4002
F1	Fuse, 1-1/2 Amp
L1,L2	Relay, Cornell Dubilier #603-12V
M1	Gearmotor, 12VDC (*)
M2	Gearmotor, Synchronous (*)
M3,M4	Motor, Stepper, 12VDC, Oriental Vexta #PH268-22
OSC1	Oscillator, 20 MHZ, Vectron #C0238
P1	Connector, Game Port (Ref.)
Q1-Q8	Opto-Isolator, #4N30
Q9-Q18	Transistor, Power, 2N3055
R1-R9	Resistor, 1K, 1/8 Watt
R10	Resistor, 6 Ohm, 25 Watt
R11-R26	Resistor, 470 Ohm, 1/8 Watt
R27-R32	Resistor, 100 Ohm, 1/8 Watt
R33-R42	Resistor, 270 Ohm, 1/4 Watt
REC1	Bridge Rectifier, General Electric #KBPC25-02
S1	Power Switch (*)
S2-S5	Switch, BCD Thumbwheel (*)
T1	Transformer, Stancor #P-8660
T2	Transformer, Signal #241-6-20
U1	PIA, #MC6821
U2,U3	Hex Inverter, Open Collector, #7405
U4	Voltage Regulator, #LM323
U5	Decade Counter, #74LS90
U6	Data Selector, #74LS157
U7-U11	Up/Down Counter, #74LS192
U12	J-K Flip/Flop, #74LS73
U13-U17	Dual Peripheral Driver, #75451

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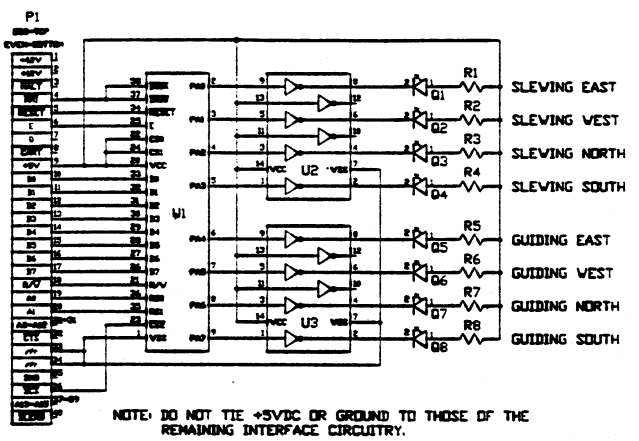

FIG. 1 - ELECTRICALLY ISOLATED SECTION

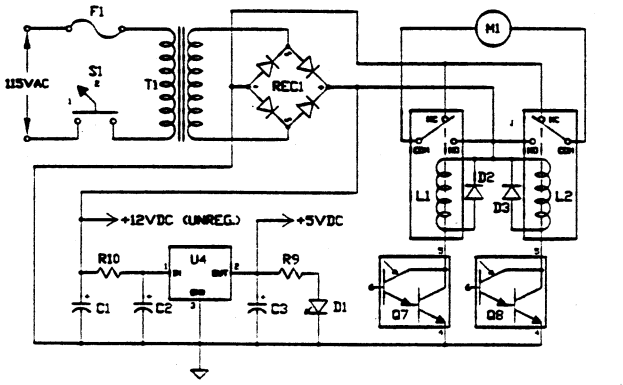

FIG. 2 - POWER SUPPLY & DECLINATION GUIDING

U18	Hex Schmitt Trigger Inverter, #7414
U19	Quad 2-Input Positive-Nand Gate, #7400
U20,U21	Up/Down Counter, #74LS193
U22,U23	BCD-to-Decimal Decoder, #74LS42
U24,U25	Quad 2-Input Positive-And Gate, #74LS08

(*) = User's Option

derived from its own power supply. The opto-isolators serve to provide electrical isolation between the two power systems.

The power supply generates an unregulated 12VDC for the two stepper motors, the two declination motor relays, and the clock drive inverter transformer. This raw 12VDC also provides input power for the regulated 5VDC supply which powers the integrated circuitry.

For slow motion right ascension control, a crystal controlled oscillator drive corrector is employed similar to one first described by John B. West and Robert S. Bradford, Jr. in 'Sky and Telescope' magazine in August of 1975. Differences are that I used a monolithic 20MHZ crystal oscillator rather than the discrete components described in the article which generated 2 MHZ. A 74LS90 decade counter was added to perform the required additional divide-by-ten operation. Also, the fast and slow push button switches were replaced with the aforementioned opto-isolators driving schmitt trigger inverters to allow use of the computer's joystick for guiding.

Slow motion declination control is performed by using two of the opto-isolators to energize either of two miniature relays to power the declination guiding motor. The relays and the motor are 12VDC units.

For slewing in right ascension and declination, two identical circuits were constructed to convert pulse trains generated by the computer into the required four wire sequence for stepping the two motors in half step mode. The selection of axis and direction of rotation is determined by which data line is being pulsed (via the four remaining opto-isolators), and the distance slewed is controlled by the number of pulses sent.

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THE SOFTWARE

The computer program is loaded in via a tape recorder. Once again, the purist might question why a disc drive isn't used. The answer lies in the fact that, on the CoCo, the disc controller plugs into the game cartridge port already dedicated to the telescope interface connector. A 'Y' cable could be used to connect both devices, but the time required to load the program from tape is not excessive, and a disc drive would be more subject to damage in transport, since I use a trailer to carry both the scope and the computer control system.

The program currently consists of two parts; a polar alignment program, and an observing program. Both are reproduced herein, with the bulk of the data in the observing program being omitted for brevity. Apologies are made for the absence of remarks, but this was done intentionally in order to leave as much room as possible for data.

```
10 YH=PEEK(60000):YT=PEEK(60001)
:DH=PEEK(60002):DT=PEEK(60003):Y
D=(YH*100)+YT+(((DH*100)+DT)/365
)
20 FORX=1TO8:PR(X)=PEEK(60010+X)
+(PEEK(60020+X)/100)+(PEEK(60030
+X)/10000)
30 PD(X)=PEEK(60040+X)+(PEEK(600
50+X)/100)+(PEEK(60060+X)/10000)
40 IFPEEK(60070+X)=0THENPD(X)=-P
D(X)
50 NEXTX
60 POKE&HE005,75:POKE&HE007,75
70 SU=0:CLS:PRINT:PRINT"   SELEC
T ONE OF THE FOLLOWING     STARS
 AS STARTING POINT:"
80 FORX=1TO8:READA$,N$,L$,RX,DX:
Y=32*X:PRINT@131+Y,A$:PRINT@133+
Y,N$:NEXTX
90 FORX=1TO8:READA$,N$,L$,RX,DX:
Y=32*X:PRINT@145+Y,A$:PRINT@147+
Y,N$:NEXTX
100 DATA a,ALPHERATZ,ALPHA ANDRO
MEDAE,.058,28.49,b,HAMAL,ALPHA A
RIETIS,2.043,23.14,c,ALDEBARAN,A
LPHA TAURI,4.33,16.25,d,RIGEL,BE
TA ORIONIS,5.122,-8.15,e,BETELGE
USE,ALPHA ORIONIS,5.525,7.24,f,S
IRIUS,ALPHA CANIS MAJORIS,6.429,
-16.39
110 DATA g,PROCYON,ALPHA CANIS M
INORIS,7.367,5.21,h,REGULUS,ALPH
A LEONIS,10.057,12.14,i,DENEBOLA
,BETA LEONIS,11.465,14.51,j,SPIC
A,ALPHA VIRGINIS,13.226,-10.54,k
,ARCTURUS,ALPHA BOOTIS,14.134,19
.26,l,ANTARES,ALPHA SCORPII,16.2
64,-26.19
120 DATA m,VEGA,ALPHA LYRAE,18.3
52,38.44,n,ALTAIR,ALPHA AQUILAE,
19.483,8.44,o,DENEB,ALPHA CYGNI,
20.397,45.06,p,FOMALHAUT,ALPHA P
ISCIS AUSTRINI,22.549,-29.53
130 X$=INKEY$:IFX$=""THEN130
140 IFX$<CHR$(65) OR X$>CHR$(80)
THEN130
150 I$="ABCDEFGHIJKLMNOP":FX=INS
TR(1,I$,X$)
160 RESTORE:FORX=1TOFX:READA$,N$
,L$,RX,DX:NEXTX
170 CLS:PRINT:PRINT:PRINT"   195
0 COORDINATES OF":PRINT"   "L$"
ARE:":PRINT"   R.A. (HH.MMM) ";:
PRINTUSING"##.###";RX:PRINT"   D
EC. (DD.MM)  ";:PRINTUSING"+##.#
#";DX:EP=1950
180 GOSUB620:IFX$="R"THEN70
190 SU=1:AC=0:KO=0:CLS:PRINT@35,
"OBJECTS CAN BE LOCATED BY:":PRI
NT@135,"cOORDINATE ENTRY":PRINT@
199,"oBJECT DESIGNATION":PRINT@2
63,"sEMI-AUTOMATIC SLEWING":PRIN
T@327,"aUTOMATIC SLEWING":PRINT@
457,"WHICH METHOD?"
200 CP$=INKEY$:IFCP$="C"THENL$="
CURRENT":GOTO250
210 IFCP$="O"THEN260
220 IFCP$="S"THEN410
230 IFCP$="A"THEN AC=1:GOTO410
240 GOTO200
250 CLS:PRINT@99,"ENTER COORDINA
TES AND EPOCH     OF DESIRED OBJ
ECT:":INPUT"   R.A. (HH.MMM)";RX
:INPUT"   DEC. (DD.MM) ";DX:INPU
T"   EPOCH (YYYY) ";EP:GOTO580
260 CLS:PRINT@3,"ENTER DESIGNATI
ON OF OBJECT     (MXXX, NGCXXX):
";:INPUTO$
270 Z$="S":IFO$="MERCURY"THENRC=
PR(1):DC=PD(1):GOTO580
280 IFO$="VENUS"THENRC=PR(2):DC=
PD(2):GOTO580
290 IFO$="MARS"THENRC=PR(3):DC=P
D(3):GOTO580
300 IFO$="JUPITER"THENRC=PR(4):D
C=PD(4):GOTO580
310 IFO$="SATURN"THENRC=PR(5):DC
=PD(5):GOTO580
320 IFO$="URANUS"THENRC=PR(6):DC
=PD(6):GOTO580
330 IFO$="NEPTUNE"THENRC=PR(7):D
C=PD(7):GOTO580
340 IFO$="PLUTO"THENRC=PR(8):DC=
PD(8):GOTO580
350 PRINT@233,"scanning files":R
ESTORE:GOSUB570:POKE65495,0:FORX
=1TO1000:READL$,RX,DX,Z$
360 IFZ$="END"THEN400
370 IFZ$="CN"THENCN$=L$
380 IFL$=O$THEN500
390 NEXTX
400 POKE65494,0:RESTORE:GOSUB570
:PRINT@227,"this object not on f
ile":SOUND1,40:GOTO190
410 CLS:PRINT@34,"ENTER OBJECT C
LASS DESIRED":PRINT@103,"aLL OBJ
ECTS ON FILE":PRINT@167,"mESSIER
 OBJECTS ONLY":PRINT@231,"dIFFUS
E NEBULAE":PRINT@295,"gALAXIES":
PRINT@359,"cLUSTERS, GLOBULAR":P
RINT@423,"oPEN CLUSTERS":PRINT@4
87,"pLANETARY NEBULAE";
420 T$=INKEY$:IFT$="A"ORT$="D"OR
T$="G"ORT$="C"ORT$="O"ORT$="P"OR
T$="M"THEN430ELSE420
430 READL$,RX,DX,Z$
440 IFZ$="END" THEN RESTORE:GOSU
B570:GOTO430
450 IFZ$="CN"THENCN$=L$:GOTO430
460 IFT$="M"ANDLEFT$(L$,1)="M"TH
EN490
470 IFT$="A"THEN490
480 IFT$><Z$THEN430
490 CLS:PRINT@3,"NEXT OBJECT ON
FILE IS":PRINT@35,L$
500 IFZ$="G"THENY$="GALAXY"
510 IFZ$="C"THENY$="GLOBULAR CLU
STER"
520 IFZ$="O"THENY$="OPEN CLUSTER
"
530 IFZ$="P"THENY$="PLANETARY"
540 IFZ$="D"THENY$="DIFFUSE NEBU
LA"
550 IFZ$="CN"THENY$="CONSTELLATI
ON"
560 PRINT@99,"1950 COORDINATES O
F THIS":PRINT@131,Y$" LOCATED IN
":PRINT@163,CN$" ARE:":PRINT@195
,"R.A. (HH.MMM) ";:PRINTUSING"##
.###";RX:PRINT@227,"DEC. (DD.MM)
  ";:PRINTUSING"+##.##";DX:EP=19
50:GOTO580
570 FORX=1TO80:READJU$:NEXTX:RET
URN
580 GOSUB610
590 IFKO=1THENKO=0:GOTO430
600 GOTO190
610 IFZ$="S"THENPRINT@163,"CURRE
NT COORDINATES FOR":PRINT@195,O$
" ARE:":L$=O$:RM=(((RC-INT(RC))*
.6)+INT(RC)):DY=ABS(DC):DM=(((DY
-INT(DY))*.6)+INT(DY))*SGN(DC):G
OTO720
```

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CoCo Clipboard Magazine

3742 U.S. 20, Box 3, Fredonia, NY 14063

Initiation au OS-9

Claude Giguere

(Editor's Note: Once again we are pleased to present Claude Giguere's column in French! Because this is an introductory column on OS-9 it will run over the next several edition. We welcome letters to Claude from our French speaking readers. Please feel free to send them to our offices and we will forward them to Claude in Canada.)

Qu'est-ce que le OS9?

Le OS9 a pour lui de multiples avantages. Développé à l'origine sur microprocesseur 6809 (d'où le nom :Operating System 6809), il fut le premier système d'exploitation multitache disponible sur micro 8 bits à présenter une syntaxe très proche de celle d'Unix.La première chose que l'on constate lorsqu'on utilise ce système d'exploitation c'est sa rapidité d'exécution.Celle-ci tient à plusieurs facteurs:compacité du code objet,gestion des entrées/sorties très performante parce qu'écrite en assembleur. Le OS9 s'avère un des rares environnements qui soient entièrement ou partiellement "ROMables",c'est-à-dire intégrables dans des systèmes pour lesquels modularité de l'architecture,d'une part,et robustesse au niveau des conditions extérieures,de l'autre,sont des impératifs.Cette "ROMabilité" est possible parce que tout le code OS9 est réentrant.Par ailleurs,le code objet exécutable est organisé sous forme de modules mémoire largement indépendants les uns des autres,ce qui conduit à adopter une programmation proche de la machine.Enfin,pour clore cette apologie descriptive,la compatibilité Unix n'est pas un vain mot.Elle se situe tant au niveau des sources rédigées en C qu'à celui des fonctions de la bibliothèque C,le mode d'appel de ces fonctions étant lui-même similaire à celui que l'on trouve en C sous Unix.Autrement dit,certaines des fonctions du Shell OS9 possèdent une syntaxe "unixienne",notamment en ce qui concerne la gestion des canaux (pipes),la redirection des entrées/ sorties,l'accès à la multi-programmation et l'utilisation de caractères passe-partout (joker) dans les noms de fichiers,ainsi que dans la gestion d'un environnement de programmation.

Mais entrons plus avant dans l'étude de ce système.A ce stade,il nous faut faire une remarque liminaire:un choix s'imposait en effet.Ou bien nous décrivions son architecture tout en y adjoignant les fonctionnalités correspondantes (ce qui offrait l'avantage d'être simple mais pas forcément clair),ou bien nous éclations cette analyse en deux parties,la première consacrée à l'analyse fonctionnelle du produit,la seconde à son analyse organique.C'est un peu comme lorsque quelqu'un apprend à conduire.Pas besoin de savoir ce qu'il y a sous le capot pour se rendre vite compte qu'une automobile peut aller à diverses vitesses et qu'elle dispose d'un système de freinage.C'est un peu dans cette optique que nous avons composé cette étude.

Analyse fonctionnelle de la gestion du multi-tache

En premier lieu,il est bon de rappeler ce qu'est un système multitache.Un processeur n'est capable de faire qu'une seule chose à la fois.Aussi,pour créer la sensation de besognes multiples s'exécutant simultanément,se sert-on de l'horloge interne du CPU pour séquencer des interruptions.Celles-ci surviennent au bout d'un délai très court. Ce délai est également appelé 'tick',l'interruption va déclencher un programme qui appellera le fameux séquenceur.Que va faire ce dernier?Tout simplement sauvegarder l'état de la machine,c'est-à-dire le contenu de tous les registres dans une structure de type pile FIFO (First In First Out ou premier entré,premier sortie),et ce dans le contexte d'exécution de chaque fonction. C'est particulièrement facile pour le 6809 puisque l'un de ses registres pointe en permanence sur le contexte de la tache en cours d'exécution.Au niveau du système,on dispose de plus d'une liste des besognes actives à un moment donné.Une fois la précédente sauvegarde effcetuée,le séquenceur n'aura plus qu'à prendre la fonction active suivante,à charger dans le processeur les registres de celui-ci avec les valeurs concernant ladite commande,puis à relancer l'exécution de celle-ci au point où elle s'était arrêtée lors de sa précédente interruption,et ce jusqu'à l'interruption suivante qui déclenche à nouveau le processus d'archivage du contenu des registres ou encore jusqu'à ce que la commande signale qu'elle est arrivée à sa fin.Il existe d'ailleurs une primitive OS9 spécialement prévue à cet effet.Prenons,pour illustrer notre propos,le cas du retour-chariot tapé au clavier.La console l'enverra à l'unité

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centrale sous forme de paquet,ce qui engendrera une interruption qui,à son tour,permettra de prendre ledit paquet de données et de le positionner correctement pour être pris en compte par le processus en cours de fonctionnement sur le terminal émetteur. Ainsi quand une tache se met en attente d'une entrée,elle se met automatiquement en sommeil et ne sera réveillée que sur interruption engendrée par le dispositif sur lequel elle s'est mise en attente.

La mise en sommeil

Qu'entend-on au juste par mise en sommeil? Le OS9 dispose pour ce faire de plusieurs listes.La première est constituée de la liste des taches actives et liste des taches passives pour lesquelles à un moment donné le processeur divise son temps.Quand une de ces taches se met en sommeil soit pour un temps donné,soit dans l'attente d'une entrée spécifique,elle demeure "engourdie" jusqu'à ce qu'elle reçoive un message d'acquittement lui signalant qu'elle peut continuer ou plus exactement reprendre son activité.Cela signifie concrètement que la tache considérée,présente au départ dans la liste des taches actives,va passer dans une autre liste,baptisée à juste titre liste des fonctions en sommeil.En fait,le OS9 va même jusqu'à gérer plusieurs listes de ce type.C'est ainsi que l'on dispose d'une liste des taches sommeillant pour une durée fixée et une liste de celles attendant une entrée concernant le dispositif sur lequel elles tournent (ceci au niveau d'un 'device driver').Prenons le cas d'une imprimante. Ici,le programme qui gère ce type de périphérique procède comme suit:il commence par envoyer les caractères en provenance du clavier,d'un fichier ou de la mémoire centrale dans un tampon spécifique à l'imprimante.Quand ce tampon s'avère plein,le processus se met en sommeil jusqu'à ce qu'il reçoive un message lui signalant que le tampon est désormais vide.Cette entrée réactivera le processus qui remplira à nouveau le tampon,et ainsi de suite.Il faut noter ici que le spooler (tampon) du OS9 fait partie des tâches automatiquement activées dès que l'on met un caractère dans le tampon de l'imprimante,le processus étant géré par le biais d'une file d'attente.Mais,ainsi que nous le disions plus haut une tache active peut également être mise en sommeil pour une durée déterminée.Ici,à chaque fois que l'horloge du système s'incrémente d'un tick,le séquenceur regardera s'il n'y a pas des processus dans la file d'attente d'événements horloge.Si la tache examinée s'avère en tête de cette file,elle sera alors placée en queue de la file d'attente des taches actives.Mais de la même manière,une tache peut se mettre en sommeil dans l'attente d'un événement qui sera activé par une autre tache.C'est ce que l'on appelle le principe des sémaphores!Ceux-ci sont gérés de la manière suivante.Tout d'abord,qu'est-ce qu'un sémaphore?C'est une structure système qui possède sa propre liste des commandes en attente le concernant.Donc,à une fonction se mettant en attente d'un sémaphore correspond une primitive système qui,si elle est activée,retirera la tache de la liste des actives et la transbordera sur la liste de celles en attente dudit sémaphore.Lorsqu'une autre tache activera ce dernier,il remettra celle qui était en attente dans la liste des taches actives..Il existe d'ailleurs un certain nombre de primitives de gestion qui permettent de faire le va-et-vient entre les listes.Le nombre des taches n'est pas limité,sauf par la capacité mémoire du système.Mais comment éviter qu'un nombre trop important de taches ne ralentissent par trop le système?Pour ce faire,on dispose d'un système de priorité des besognes. Qu'est-ce à dire concrètement?

De la priorité des taches

En OS9,chaque tache reçoit lors de sa création un age initial.En pratique,lorsqu'une tache vient juste d'être exécutée,on lui affecte automatiquement une priorité qui correspond à cet age initial.Puis,on par-

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court la liste des taches actives en sens inverse (en remontant) dans les ages) et on place ladite tache juste avant celle qui s'avère moins agée qu'elle (une sorte de droit d'ainesse en somme!).C'est surtout au moment de l'insertion de la tache dans la liste des taches en attente qu'intervient cette notion de priorité.De ce fait,si la tache est extrêmement prioritaire,elle sera placée immédiatement en tête de liste et sera exécutée automatiquement.En revanche, la tache la moins prioritaire sera mise en queue de liste et ne sera exécutée que beaucoup plus tard.Il faut bien,tout de même,faire vieillir les taches;sans cela,ce serait toujours les mêmes qui s'exécuteraient et,en fin de compte,on se retrouverait avec un système monotache,ce qui n'est vraiment pas le but du OS9.Chaque fois que le séquenceur active une tache de la liste de celles en attente,il en profite pour incrémenter de 1 l'age de toutes les autres.De ce fait,celles-ci vont remonter lentement mais sûrement "le cours des ages" Prenons le cas de trois taches qui,au même moment,ont toutes la priorité (ou l'age, comme vous voulez) 127,et qui,de plus,figurent toutes dans la liste.La tache placée en tête de la liste sera prise la première. Pendant qu'elle s'exécutera,le séquenceur aura fait vieillir les deux autres taches qui,ainsi,se retrouveront toutes deux avec la priorité 128.Une fois exécutée,la première tache est replacée en queue de liste. C'est alors au tour de la tache la plus avant dans la file et possédant une priorité 128 d'être éxécutée.Et ainsi de suite...
C'est là un des aspects les plus importants du OS9,à savoir cette capacité de gérer le timing des taches,qu'elles soient actives ou en attente.Abordons maintenant un autre aspect de ce système d'exploitation:la façon dont il gère la mémoire adressable.L'unité conceptionnelle mémoire sous OS9 est constituée par ce ce que l'on appelle un module,structure mémoire ayant une taille donnée.Les modules peuvent se situer soit en mémoire vive ou morte,soit sur disque. Lorsqu'on demande le chargement d'un module,le OS9 se sert d'une liste de ceux qui sont présents en mémoire vive;s'il trouve les modules cherchés dans cette liste,il crée ce que l'on appelle un "process-control-block" qui contiendra les registres d'exécution de la tache.C'est ce qui permettra de déposer un pointeur dans la liste des taches en attente.Systématiquement,tous les programmes doivent être conçus de manière à être relogeables.

Un compteur et des gestionnaires

Pour pouvoir faire tourner de très grosses applications tenant sur le volume d'un disque et non sur le volume mémoire,on dispose

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d'un compteur décomptant le nombre d'utilisateurs sur un programme. Ainsi, chaque fois que l'on demande à un programme de s'exécuter, le compteur s'incrémente de 1. Lorsque le compteur revient à zéro (absence d'appels pendant une période plus ou moins longue), le programme se 'délie' tout seul, ce qui permet de libérer de la place mémoire pour faire des overlays (surimpressions). Si l'on veut qu'un programme demeure résident en RAM, on effectue alors un chargement manuel qui place le compteur à 1 dès le départ. Lorsque les processus libèrent leur PCB, à chaque fois le compteur est décrémenté mais il demeurera toujours au moins à 1. Signalons maintenant un désagrément inhérent à la structure même du OS9; chaque fois que l'on affecte un module en mémoire, celui-ci ne peut plus être bougé par la suite, tant et si bien qu'au bout d'un certain temps on risque fort de se retrouver en possession d'un véritable patchwork (bouche-trou) mémoriel. Le OS9 repose sur une vaste panoplie d'utilitaires: les managers. Ceux-ci sont définis pour toutes les entrées/sorties séquentielles: console, imprimante, port série, disque, etc... On dispose à ce niveau de fonctions spécifiques permettant de tirer la meilleure part possible du gestionnaire de fichiers. Ces appels système se décomposent en block-file-manager, sequential-file-manager et pipe-file manager, ce dernier offrant la possibilité, au lieu d'utiliser des fichiers séquentiels comme son prédécesseur, d'avoir un fichier sous forme de file, ce qui permet de désynchroniser deux tâches. On obtient de la sorte une tache productive envoyant des données dans un pipe-line et une tache 'ouvrante' qui ouvrira celui-ci à l'autre bout de la 'canalisation'. On crée de ce fait des tampons et donc une séparation entre les diverses taches. Chaque fois que l'on dispose d'entrées/sorties au niveau d'une tache, l'intéret du pipe-line réside dans le fait que, si les taches n'ont pas des vitesses d'exécution identiques, la bufferisation permet de profiter du temps CPU pour commencer à vider les pipes. Question: Comment une tache se libère-t'-elle d'un pipe vide? Tout simplement la tache se met en sommeil et ne sera remise dans la file des taches actives que lorsque la tache productrice enverra à nouveau quelque chose dans le pipe. C'est notamment le cas du spooler dont nous parlions au début de cette étude.

(Editor's Note: The second part of Claudes "Initiation au OS-9" will be printed in the next issue.)

The NEW CoCo's??

We've tried over the last two plus years to be first with as much "news" as possible here at *Clipboard* and this time is no expectation. Most of our readers have heard that there will be two new computers introduced to the CoCo market this coming fall. Both of these machines were shown, at least in prototype form, in April at the Rainbow-Fest in Chicago. Since not all of us could be in Chicago we have edited press releases about these two new computers and are presenting them here, side by side.

It is important to remember that this article is not a side by side comparison of two in hand running machines, but rather a compilation of reports and press releases we have obtained.

TC9 - Tomcat (tm)

Manufacturer: Frank Hogg Labs / FHL
204 Windemere Road
Syracuse, NY 13000
(315) 469-7364

Price: Varies based on items selected

Operating System: Not announced at press time

Information from press releases obtained primarily from Hayes BBS.

The TC9 Tomcat (TM) is a major improvement over the CoCo 3.

- The TC9 is over 25% faster
- The TC9 uses a PC compatible keyboard
- The TC9 has two "real" serial ports
- The TC9 supports a serial mouse
- The TC9 has a parallel printer port
- The TC9 has provisions for 512K on board RAM or it can use a CoCo 3 512K memory upgrade
- The TC9 can be upgraded to 1 megabyte with the Disto 1 Meg. upgrade with no soldering, just plug it in.
- The TC9 has 8 bit D to A and A to D. Eight bit provides better sound and a high resolution joystick, 256 vs 64.
- The TC9 supports an internal speaker
- The TC9 has the standard CoCo bus so that CoCo cartridges can be used.
- The TC9 board can be powered by any standard PC power supply. This also allows installing the board in most PC clone cases.
- The TC9 will work with most if not all OS9 software.
- The TC9 will have RSDOS compatibility through 3rd party vendors
- The TC9 is K-Bus compatible

K-Bus compatibility is important because it allows interfacing the TC9 to the 68000 and even the 68030 cpu! By installing the TC9 in a K-Bus 68K system, the Tomcat becomes a dual processing system! When in OS9 Level II mode the 68000 becomes a co-processor to the TC9, like a accelerator to Level II. We can expect a 2 or 3 fold improvement in performance! When the 68000 is the master under OS9/68K, the TC9 acts as a co-processor to 68K. Switching back and forth between systems will be easy and will allow a smooth transition from OS9 to OSK. It is not necessary to jump to OSK to get the benefits of the 68000, but it provides a smooth transition when and if you decide to make the move. You go at your own pace, upgrading as you desire, and at each point you get a significant improvement in performance, for a very slight cost.

E X P A N S I O N

Once a K-Bus backplane is added, (it is not required for TC9 operation) the world of 68K is open to you. The logical first step is to add a 68000 CPU which will immediately speed up Level II operations by several factors and opens the door to running OSK. No other additions are needed to run OSK, as OSK will run in the TC9 memory and use TC9 I/O. For further performance increases additional boards, memory, I/O etc. can be added to the K-Bus. It is even possible to have several TC9's in the K-Bus for a multiprocessing system! Memory limits are 16 Megabytes of which more than 14 Megabytes can be RAM!

They are backplane sizes from 4 to 16 slots and a 20 slot bus is under consideration. The backplane itself is inexpen-

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sive so that if you outgrew your first bus you could transfer all your cards to a bigger backplane for little cost. Because of the bus concept upgrades to future CPU's only requires adding that CPU to accomplish it. For example, you could start with a 68000 and later replace that with a 68030 and still use ALL of your other cards.

When new cards such as the 68040 become available, you could add those too. Even capabilities, not thought of today can be added by just adding a card!

This is upgrading without having to throw anything away. Even if you eventually switched over to 68K completely the TC9 still functions as a multi-function graphics co-processor. Our Hi-Res graphics board, now in design, will have its own keyboard interface and video memory so that it can be used with the TC9. Several of either cards can be used in the same system, making for the first multi-processor, multi-user, multi-graphics system for OS9 and OSK! Because of the wide variety of K-Bus boards available and those under development, the possibilities for the future are unlimited.

SHOULD YOU GET ONE?

If you currently own a CoCo 3 and use it for both RSDOS and OS9 Level II the TC9 Tomcat is your road to the future. It will run your current software faster and give you powerful new features and performance at modest cost. You get the ability to expand at your own pace, at low cost, the way you want to do it, for your future.

THE FUTURE.

The Tomcat is the computer for the 90's. We have put all of our knowledge and experience into the creation of the Tomcat. We believe it is the best choice for you and for us. We create computers because we like to use them, not because we like to sell them. Every computer we've made has been one we've wanted for ourselves. The Tomcat is the best we've done... so far.

MM1
Manufacturer: Kenneth-Leigh Enterprises
1840 Biltmore Ave. NW
Washington, DC 20009
(202) 232-4246

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Price:	Not Available at Press time
Operating System:	Not Available at Press time

Thank you for giving Kenneth-Leigh Enterprises an opportunity to tell you about our community's new computer. We created this computer to bring you into the future -- without the shock of high prices, incompatibility, or difficulty of use. Our system offers exceptional speed, crisp natural graphics, stereo digital sound that outperforms Compact Disk -- all affordably. In many ways, you designed this computer. Kenneth-Leigh Enterprises has surveyed hundreds of Color Computer users from across the United States and Canada to find out exactly what they wanted in their next computer.

You requested a system in the tradition of the Color Computer but updated for the Nineties and beyond. Amazing graphics, high performance,and multitasking windows. In 1990 we will introduce such a computer.

-- Compatibility: --

The vast majority (over 80%) of survey respondents did not require that the new computer be compatible with Disk Extended Color Basic ("RSDOS"). But it is important to us to provide easy ways to protect users' existing software skills.

Our first solution -- the OS Gateway -- (will debut at the Chicago RAINBOWFest.) The OS/Gateway integrates OS-9 Level 2 with the new computers resources. By joining these two computer systems with the OS/Gateway you can run favorite programs with ease when you need to.

Another hardware solution will be introduced late this summer. RS-DOSers will get RS-DOS compatibility and access to many of the great new programs too!

Kenneth-Leigh Enterprises will also be announcing a series of software answers to RS-DOS users request for ease of use and familiarity. Our software will add power to the RS-DOS skills of our customers.

-- Designed for the next millennium - and your pocket book. --

We created the new computer with two design goals from which we never wavered:

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Respect your current investment in software, hardware, and learning; and provide you with the latest technology at a low price.

The new computer offers a modern multitasking, multimedia environment that outperforms PCs, Amigas, Ataris, MACS and even some work stations. Its features make it the last computer you will ever need. It is easier to use than a MAC and easier to program than IBM PC-compatibles. And its multimedia capabilities are included by Philips BV and Sony Corporation in state of the art consumer electronics.

-- Software support like you've never seen. --

Kenneth-Leigh Enterprises has been working hard on software support. Our software commitment translates into satisfied customer and a permanent place for our products in your home or office. Scores of CoCo vendors from around the world have been working to bring databases, telecommunications and games to the new computer. Also, look for hundreds of UNIX and UNIX style applications to be available on the new computer, many of them free!

Even more importantly since multimedia technology will be the rave of the 1990's the new computer will have a long life. Amiga and Compact Disk Interactive software developers are already attracted to it.

And thanks to our hard work at Kenneth-Leigh Enterprises, in late 1990 you will be able to run thousands of programs developed under MS-DOS!

That's not all -- we are including free software with the new computer that is sure to please everyone.

The following are technical Specs supplied by KLE

The basic system includes case, power supply, operating system, cables and one CPU board. The CPU board contains everything you need to start enjoying this computer right away, with high powered, simple to use professional features:

* Signetics 68070 CPU (Motorola 68000 compatible) running at 12.5 or 15 mhz. The CPU is designed expressly for multimedia computing.

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* Graphics resolution from 320 x 200 to 720 x 480 (interlaced) with intermediate modes.

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* Two serial ports, one DB-9 one DB 25 for your mouse, joystick printer - one is factory configured for MIDI.

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* Two parallel ports for parallel printer and OS/Gateway support.

* One CoCo joystick port with 8 bit resolution.

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* RTC, battery backed with 56 bytes of non volatile memory.

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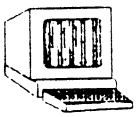

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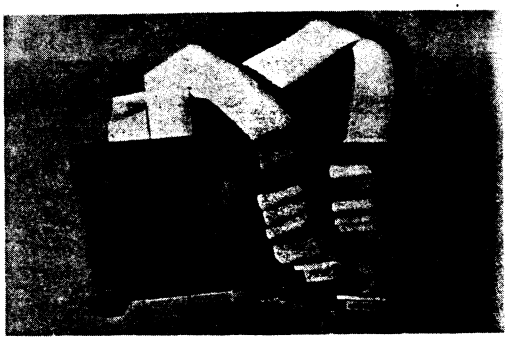

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