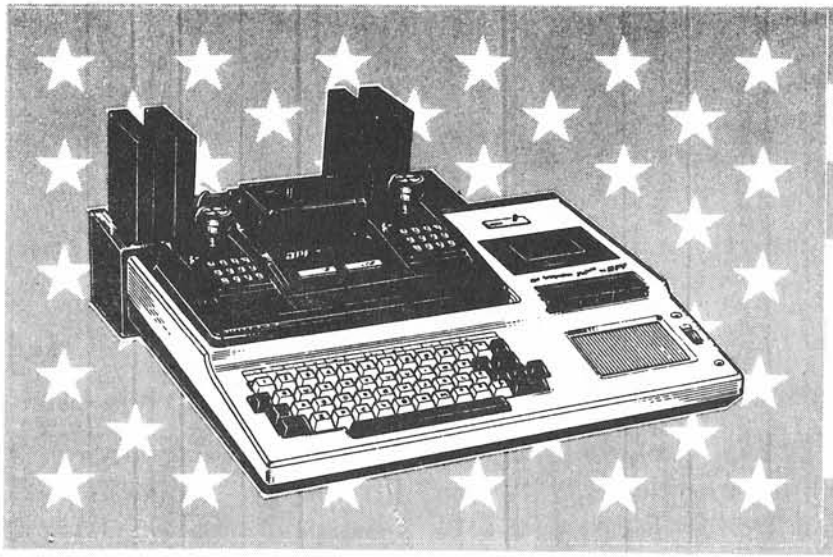


MARCH '84

I-M 1 IN A MILLION CLUB

NATIONAL NEWSLETTER

INSIDE...

GEO*GRAFIX LIMITED
P.O. Box 54 • Arrowsmith, Illinois 61722

hex Mart Software

1048 Alpine N.W., Grand Rapids, MI. 49504

HEXMART is dedicated to providing the APF computer owner with a collection of quality utility programs. We are not a game company, we prefer to think of ourselves as a company which provides the 'tools' to assist you with your programming needs.

SOFTWARE

SUPER BASNUM : The BASIC line renumbering program.
$14.95 on cassette - loads in 8K, runs using no program RAM

Have you ever programmed yourself into a corner? You need a ten line subroutine but have space for only five lines. Don't worry, BASNUM is here! Renumber your entire program from the beginning OR renumber starting from ANY line. You specify the starting point, load your program and CALL BASNUM. It does the rest, including changes to all line references. It's loaded with error checking which makes it easy to use.

SUPER SORT : A machine language string sorting routine.
$14.95 on cassette - loads in 8K, requires less then 1/2 K

If you have ever tried to sort a lengthy list of strings in BASIC, then you know how slow APF can be. No more! SUPER SORT is a machine language sorting routine which can be included in your programs to speed string sorts by over 100 times. A few simple POKEs followed by a CALL is all that's needed. You can include SUPER SORT in your existing programs (it is supplied with an APPEND routine allowing your program to be loaded 'behind' the machine code), or you can write a new program behind SUPER SORT. A truly powerful routine.

TAPE ASSEMBLER : A cassette based assembler for APF's Motorola 6800.
$14.95 on cassette - loads in 8K, expandable to 16K

No, you don't need a disk system to write Assembly Language programs. Hexmart's TAPE ASSEMBLER allows you to write those programs using 6800 code. Buy now and receive the following: 1) two programs - screen only and line printer versions, 2) instructions - including how to use and incorporate Assembly code in the APF, 3) 6800 Assembly Language work sheets, and 4) a brief introduction to Assembly Language programming. Learn to make the APF fly!

DISK DIR : A master disk directory filing system.
$12.95 on cassette - loads in 8K, transferable to diskette.

You say you have a house full of diskettes and your not sure which one contains that needed program? DISK DIR to the rescue! Creates a master file of up to 200 titles from the directories of all your diskettes. You name each disk with any three character code and DISK DIR automatically reads all program names on the disk, sorts them into alphabetical order, and stores them in the master file. Editing allows the master file to be updated as your collection of programs change.

DISK MOD / INIT40 : A two program set. For all serious disk users.
$12.95 on cassette - both load in 8K, transferable to disk

DISK MOD - Numerous features allow the user to read any track and sector from an APF disk, display it on the screen, place it in RAM, modify it, or write it back to disk. Automatic stepping allows work on contiguous or separate sectors. READ/EXAMINE/MODIFY/WRITE. You can even read disks from other popular computers including Radio Shack and TI.

INIT40 - Tired of 34 tracks of 8 sectors? How about 40 tracks of 10 sectors! Yes, you can now INITialize your diskettes beyond APF. These INITialized disks are still compatible with APF's DOS. However when used with DISK MOD, you get an additional 32K of storage. These two programs are a must for any serious disk owner.

SUPERFILE : A Data base management system.
$19.95 on cassette - loads in 16K, Requires single DISK drive.

The first fully flexible data base management system for the APF has arrived! No longer write your own custom programs for mailing lists, major league batting averages, parts inventory, etc. SUPERFILE handles these and many more by allowing full data format flexibility. Allows ten fields per record, up to 250 records per file. Field titles and field sizes are user specified. Sort on any field, create custom printer outputs using any or all fields.

DISK BACKUP : New from HEXMART, a disk file backup program.
$12.95 on cassette - loads in 8K, transferable to disk.

Not to be confused with other backup programs! DISK BACKUP copies any type of APF file from one disk to another. Copied files are added to existing directory on backup disk. Copy single files or complete disk. Supports single and dual drive systems. Adjusts to use full computer memory with no program modification - runs in 8, 16, or 24K systems. Extremely useful for backing up data files.

****

All programs are supplied on quality cassette tape and are transferable to diskette. All (except SUPERFILE) will load and run in an 8K computer. Prices include all shipping and handling. Each program is sold with a 60 day replacement guarantee - if it fails, return the original copy to HEXMART for a free replacement.

****

Send NAME, ADDRESS, and CHECK or MONEYORDER to:

HEXMART SOFTWARE
1048 Alpine N.W.
Grand Rapids, MI 49504

GENERAL NEWS

CLUB LIBRARY

With more than 80 programs in the club library there are some that are very simple and somewhat limited in content. These are usually DISPLAY type programs that merely generate LO RES displays or musical notes. Some contain REM instructions in their lists in order to explain techniques or functions of the commands used. Other programs are expertly done with fascinating displays and programming techniques.

We have cataloged as many as possible in this issue in order to give you a good selection of working programs to choose from. Each program was loaded and tested to insure that it would work before entering it in the catalog.

Choose any 3 programs by their designation; D1BREAKDN, D7UTILPRO, and mail your selection to us along with $5.00 to cover duplication and mailing costs. We will put your selections on tape and mail it to you promptly.

We encourage you to try some of these programs. You are sure to find some that will prove to be useful and entertaining. Some may contain a routine or two that will help you to get YOUR PROGRAM up and running, or running better! Some of the games are cleverly done and quite challenging!

Our thanks go to those of you who have contributed programs to the club over the years. For those of you who would like to add YOUR programs to the list, please do so by sending a copy in.

Each program appearing in the catalog includes the PROGRAM DESIGNATION, WRITER, and a BRIEF DESCRIPTION. If you see any that YOU wrote but the writer is listed UNKNOWN, please let us know so corrections can be made. Also, for those of you who would like your programs withdrawn from the list, let us know as soon as possible.

ENDING FIRST QUARTER

This issue marks the end of the first quarter of the 1984 newsletter and begins a new period of GREAT HAPPENINGS for the IM-1 and their owners. Because of the space consumed by the PROGRAM LIBRARY in this issue, some of the usual categories will be missing. They will return, in force, next month!

GREAT HAPPENINGS?

A new company called A.I.T. (Advanced Interfacing Team) is now producing a new PARALLEL INTERFACE CARD (AIT-IMPIA) for the IM-1, and an EXPERIMENTERS TRAINING BOARD (AIT-IMPIA-S1) for those who want to learn basic interfacing skills with their IM-1. (See their flyer in this issue)

Building blocks (BB-1) are scarce! For those of you who would like to hook a printer to your IM-1 but haven't been able to find a building block, There's finally a solution to your problem thanks to GLENN JONES and his NEW DC-232 Direct Connect Serial Cartridge.

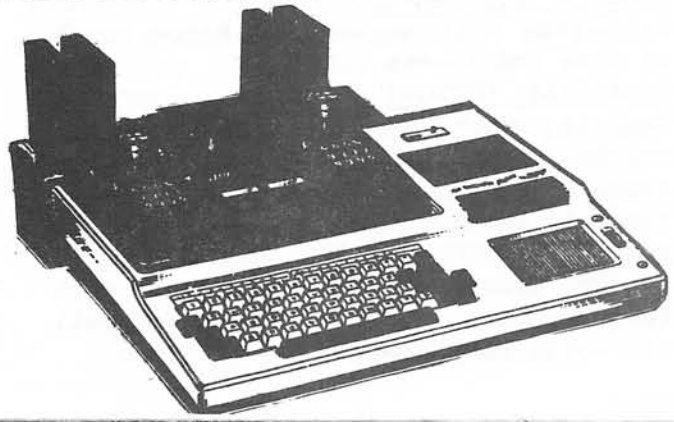
The unit contains the BB-1 circuitry inside and simply plugs into the rear of the IM-1 in the same manner that the BB-1 would. So now the only thing required to interface your IM-1 to a printer is the DC-232, a cable, and the printer. The unit also works fine with a modem.

We've had the opportunity to use the DC-232 in our operation here and will print a review of it's operation in next month's issue.

A LOOK AHEAD

Many new exciting programs have arrived here in the past month and are being reviewed at this time. We will be doing everything possible in the upcoming months to introduce you to some of these programs in the PRODUCT REVIEW section in hopes that all members will be fully informed of each program's content.

The 1984 IM-1 LO RES FRONT SCREEN ART CONTEST will begin soon. Complete information will appear in the ARTSHOP in APRIL. Don't miss it!



IM-1 PROGRAM LIBRARY

GAMES

D1MUNMAN RICK THUES
LO RES game. Eat goodies under joystick control and avoid the KEEPER...8K

D1ARBAN UNKNOWN
Joystick control LO RES one arm bandit. Colorful graphics...8K

D1UTDICE UNKNOWN
Keyboard control LO RES dice game for casino action...8K

D1WATERME J. ALEX DRAUGHON
LO RES graphic game that tests your sales, planning, promotion, and marketing techniques by running a watermelon stand...8K

D1BREAKDN B. SAMANSKY
Joystick control BREAKOUT style game with limited playing field...8K

D1RUSROU K.D. WIRTZ
Multi-player LO RES game of Russian roulette...8K

D2TARGET UNKNOWN
Simple LO RES Alpha/numeric movement and firing...8K

D2ROCPAT CHUCK CLANCY
Moves ROCKET PATROL game to RAM and changes it so RESET will not be needed for next game...8K

D2HANOI UNKNOWN
Towers of Hanoi graphic game that tests your logic...8K

D2MODELN UNKNOWN
Joystick control LO RES space ship landing game. Includes vertical speed, horizontal speed, and simulated inertia during movement...8K

D2WZCRAPS K.D. WIRTZ
Joystick control LO RES graphic crap game with betting and scoring...8K

D2MATH K.D. WIRTZ
Kids math game...mostly non-graphic displays...8K

D2CLUCK K.D. WIRTZ
Crap game with wagers and keeps track of wins and losses...8K

D3MATCHES UNKNOWN
Compete with computer in removing matches displayed in a row. Thinking game. Taker of the last match loses! Tough to beat!...8K

D3SP&SPL CHUCK CLANCY
Record your own audio to run with this program, then let the kids spell the words they hear...8K

D3MAMATH CHUCK CLANCY
Math practice-Alpha/numeric. Add. Subtract, Multiply, and Divide. Also do some fractions...8K

D3MULTTAB CHUCK CLANCY
Math practice-Alpha/numeric...8K

D4BLACKJK J. ALEX DRAUGHON
Non graphic 2 player blackjack with instructions...8K

D4CAPITOL J. ALEX DRAUGHON
Enter State to get the capitol of it displayed...8K

D4FROGGER UNKNOWN
Correct a bug in this basic program and you'll have a slow moving LO RES version of the popular game...8K

D4BATTLE# DON SCHMIDT
Similar to MATCHES where you take away from a given integer and match wits with the computer. Last one to subtract loses!...8K

D5WUMPUS UNKNOWN
Logic adventure game consisting of a cave, rooms, and tunnels. Move and STOP the WUMPUS!...8K

D5FORTUNE HARRY BROWN
Pick 5 cards and the IM-1 will tell you your fortune...8K

D3GUESS# HARRY BROWN
Large LO RES numbers flash on the screen and you are asked to tell what numbers they are...8K

D3#GAME HARRY BROWN
Guess a number and the IM-1 will tell you if it is higher or lower than the number it has randomly chosen..8K

D7BOMBSAW CHUCK CLANCY
LO RES joystick control bombing game with scoring...8K

D7COD-DEC CHUCK CLANCY
Secret LO RES coder and decoder game for kids...8K

D7BATLSHP CHUCK CLANCY
Keyboard entry graphic 2 player game similar in play to the commercial board game...8K

D7FILITIN CHUCK CLANCY
Fill in the blanks multi-player game with nice action...8K

IM-1 PROGRAM LIBRARY

UTILITY/MISC.

D1CRYPT DON SCHMIDT
Encryption (coding) machine program for coding/decoding messages...8K

D1DEC HEX UNKNOWN
Decimal to Hexidecimal conversion program...8K

D1SKPAD CHUCK CLANCY
Enhanced version of SKPAD and uses joypad and keyboard controls LO RES ...8K

D1MILEAGE J. ALEX DRAUGHON
Figures gas mileage for you based on distance traveled and gallons used ...8K

D2LEDG16K MILLY BREWER
16K ledger program with data entry, edit functions, display, print, disk operating, disk files, sorts and tape functions...16K

D2SINCOS UNKNOWN
Sine, cosine, tangent tables for angles ...8K

D31040A&B KEITH PHILLIPS
Income tax information such as wages, gross income, etc., is input into this program and the results are displayed...8K

D3FORCAST UNKNOWN
Economic forcaster..even gives advice! ...8K

D3DATAREC CHUCK CLANCY
Allows you to enter data into files and records. Review and edit features included...8K

D3ALSORT UNKNOWN
Sorts names alphabetically...8K

D3NUSORT UNKNOWN
Sorts numbers numerically...8K

D4METRIC K.D. WIRTZ
Conversion program for linear measurements, squares, cubes, temperatures, and liquid measurements...8K

D4DATATAP UNKNOWN
Uses tape as a true data storage system by saving your data to tape after entry...8K

D5TAXES DAN TAYLOR
Very simple tax program that asks for numeric input and then it displays the results...8K

D5MATH BRYCE MCINTYRE JR.
Has square root, natural log, expoentiation, sine functions, cosine and arc tangent functions...8K

D5ENGLISH J. ALEX DRAUGHON
How to correctly use apostrophes.

D5MEMTEST UNKNOWN
Memory test checks for storage of all 256 numbers. It takes 16 seconds to do and you indicate the starting address...8K

D6INTSUM HARRY BROWN
Finds the sum of money at X percent based upon your input...8K

D7SPRDSHE BILL BOWMAN
PASSBOOK RECORDS involving inputs of insurance, auto, taxes, home expenses, passbook balance, and actual savings...1CLOAD GOTO100...8K

D7UTILPRO BILL BOWMAN
UTILITIES involving inputs for electricity, gas, telephone, and water, with total summary in each category... 1CLOAD GOTO20...8K

D7SQRTCON L.A. CORNELL
Quick program for finding and displaying the square root of any numer.8K

D7ORGAN CHUCK CLANCY
Create sharps and flats and SLIDE up or down for unusual musical effects. ...8K

D7AMORT BILL BOWMAN
Complete amortization schedule for the amount of years at your percentage rate. Displays principal and interest. ...8K

D7STRIDIS JIM CLATFELTER
Enter characters, edit or insert, then display the results...16K

T1VIDGRM DON SCHMIDT
A good program for sending messages on tape to be printed or displayed on screen...8K

D7BANRECO UNKNOWN
Asks for financial information to balance your checkbook...8K

D7LIT-GAL MANUEL RIBAO
Converts liters to gallons or visa versa...8K

D7MEMTEST UNKNOWN
Complete pattern memory test for 8K and 16K IM-1 computer. Instructions included in the program. A timed test, if no response after period indicated---memory is GOOD!

IM-1 PROGRAM LIBRARY

DISPLAY

D1CASREG J. ALEX DRAUGHON
Ring up sales on a musical cash register. Figures your change for you. Music and some LO RES graphics...8K

D2BUBSORT UNKNOWN
Displays vertical and horizontal sorting of characters and counts the passes it takes to get them in order...8K

D2WZLORES K.D. WIRTZ
LO RES musical/graphics display...8K

D3SOUNDLP CHUCK CLANCY
Generates incredible sounds with ML loops and timing...8K

D4CE3K UNKNOWN
Musical graphic display from the movie 'Close encounters of the third kind' ...8K

D4HIRES1 KEITH PHILLIPS
HI RES graphical display with joystick control movement...8K

D4HIRES2 KEITH PHILLIPS
Display of HI RES objects for instruction and display only...8K

D4HIRES3 KEITH PHILLIPS
Similar to HIRES 2 with different routines used...8K

D4MUSIC JIM RITTIS
Randomly generated musical notes...8K

D4LETMACH J. ALEX DRAUGHON
Type in characters and they will be displayed on the screen beginning at the top...8K

D4MAGICSQ DON SCHMIDT
Enter a number and this program will display an amount of columns that equals your number. A magic number is also displayed that is equal to the numeric sum of any horizontal, vertical, or diag. column...8K

D5SPIRALS DON SCHMIDT
LO RES colorful display...8K

D5AUDREC UNKNOWN
Fascinating sound effects demo program that is very unique...8K

D5CHRISTM J. ALEX DRAUGHON
LO RES CHRISTMAS screen...8K

D5BIRDAY J. ALEX DRAUGHON
Happy Birthday jingle and LO RES picture (repeats)...8K

D5ALPHAS UNKNOWN
HI RES graphic display of Alpha/numeric characters...8K

D5STROBE DANIEL TAYLOR
LO RES graphic strobe light effect..8K

D5RND#&MU HARRY BROWN
Simple program generates random numbers along with musical notes...8K

D5LEG#&MU HARRY BROWN
Displays large colorful numbers that correspond to the musical keys 1-7 with musical interludes between displays...8K

D3MUACCOM HARRY BROWN
Single notes played with accompaniment immediately afterward...8K

D3ANMINP HARRY BROWN
Displays 1 second numeric increments on the screen...8K

D2COLBOX HARRY BROWN
Displays randomly generated multi colored imploding boxes (repeats).8K

D2COL&NM HARRY BROWN
Displays randomly generated colored bars and prints the color of it...8K

D2LADMATH HARRY BROWN
Displays infinite method for resolving the quadratic of a ladder resting against a wall...8K

D2LUCKNUM HARRY BROWN
LO RES graphic display of momentum effect. After the display, the IM-1 chooses a lucky number for you...8K

D2GIANUM HARRY BROWN
Giant numbers fill the screen and count from 1 to 10 (repeats)...8K

D6MYPIC HARRY BROWN
Colorful LO RES pokes make up a portrait of interesting shapes and colors...8K

D6QUADIS HARRY BROWN
LO RES sectioned graphic form that changes colors (repeats)...8K

D7STARBUS CHUCK CLANCY
A basic program that shows how to set up and place shapes in HI RES...8K

D7GRAPSHS CHUCK CLANCY(GOTO5)
Instructional HI RES machine routine to move shape tables to screen...8K

HELPFUL HINTS

FROM RON STALMA

Ron has experienced a problem with his IM-1, has found a solution, and wrote to us so that we could pass the information along to others. He writes:

"Whenever I would plug in my 8K RAM cartridge, everything would work fine until I tried to CLOAD or CSAVE. As soon as I would push the PLAY/SAVE button on the recorder, the computer would RESET and go back to the APF LOGO. This drove me nuts trying to find the problem. It turned out to be something very simple."

"Evidently my tape motor draws to high of a current on start up. It wasn't noticed without the 8K RAM cartridge, but with the extra current draw with the 8K cartridge plugged in, the motor, upon start up, dragged down the power supply for a split-second. This was enough to RESET the machine. After I figured out the problem, it was easy to solve."

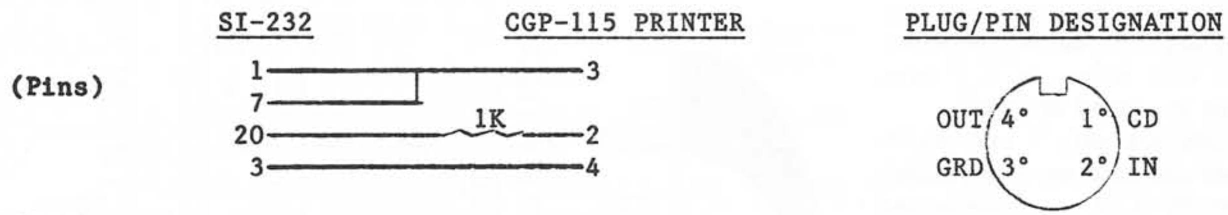
"The FILTER CAPACITOR in the power supply is a 4300 mf cap. I just added another 4300 mf cap in parallel to increase it to 8600 mf. This took up the slack, giving the motor a little extra current to draw from upon start up."

$$

FROM CHARLES WRIGHT

Charles has come up with a way of interfacing and operating a RADIO SHACK CGP-115 printer with his IM-1. He writes:

"I purchased the RADIO SHACK CGP-115 COLOR GRAPHIC PRINTER because of it's low cost. Connecting the printer to the SI-232 was easier than I had expected. Here is the hook-up I used, should anyone else in the club be interested in using this printer."



$$

FROM KEITH PHILLIPS

If you have an older GEMENI 10 printer and are having trouble getting it to work, Keith found his trouble to be with the BUFFER FULL-WAIT signal. Below are DIP SWITCH settings and strapping (harness connections) sent in by Keith for anyone who may be having trouble getting their OLDER GEMENI 10 printers up and running.

DIP SWITCH

N/A	ON	ON			ON	ON	ON
1	2	3	4	5	6	7	8
			OFF	OFF			

REAR DIP SWITCH

		ON	
1	2	3	4
OFF	OFF		OFF

JUMPERS

ON		ON	
J1	J2	J3	J4 (Others N/A)
	OFF		OFF

HARNESS	APF232	GEMENI 10
1 1	1	8
2 2	20	11
3 3		
4 4		
5 5		
6 6		
7 7		

OUR THANKS TO RON, CHARLES, AND KEITH FOR PROVIDING THIS USEFUL INFORMATION.

THE ARCADE

OP CODES AND ADDRESSING MODES EXPLAINED

Reduced type this month because of the amount of space needed and for the inclusion of a portion of the MC6800 INSTRUCTION SET SUMMARY pictured below. The ARROW indicates the OP CODE that we will be explaining in this issue. REVIEW - In February we became more knowledgeable of DECIMAL TO HEXIDECIMAL (HEX) and HEX to DECIMAL conversions. You should know how to convert from one numbering system to another, or have access to a conversion program that will do this job for you. Check out the LIBRARY for these programs. You should also be familiar by now with the term BYTE, ADDRESS, OP CODE, and WORD. You may want to review previous issues before continuing with this months instruction. This month brings us closer to actual programming, so READ everything carefully. If you have any questions, write them down and send them in. We'll do our best to answer them for you promptly. Remember the S.A.S.E.! TAKE IT AWAY ERIC!

The only time you will have to do any converting from one numbering system to another is when doing HI-RES graphics, when using CALL commands, or calculating a SCREEN ADDRESS. Example--512 in DECIMAL is a screen address which is converted to 0200 in HEX.

The micro in your computer (6800) is a very complicated piece of circuitry, but not all that difficult to control in machine language. People write books on what goes on inside. Because of space limitations of the newsletter, I'll just explain enough about it so that we can use it. Getting a good book on the 6800 micro would be a very good idea!

As mentioned, the micro is really busy inside. Think of these registers as ELECTRONIC MAILBOXES which we use to send things around the computer. The REGISTERS that we will cover are the 1 byte registers called ACCUMULATORS (A & B). We will also use a 2 byte register called the INDEX REGISTER.

The ACCUMULATORS are only 1 byte which means that they can hold any hexidecimal number between 00 & FF which converted to decimal would be 0 to 255. When you want to deal with a number GREATER THAN FF (255), for example SCREEN MEMORY LOCATIONS, you will want to use the INDEX REGISTER which is 2 bytes long and will hold any number between 0000 and FFFF.

ADDRESSING MODES

To use the ACCUMULATORS, either A or B, you have to use an OP code or command to load the information into them. This part might seem pretty tricky. It's perhaps the hardest part of understanding machine language, but once you understand it, the rest should come easy! Keep in mind that the 6800 is only a small 40 pin chip that will only do what it's told to do, when it's told to do it! It's up to you to learn how it goes about doing its tasks and the instructions (OP CODES) it needs in order to do them.

ADDRESSING MODES

ACCUMULATOR AND MEMORY OPERATIONS	MNEMONIC	IMMED OP	IMMED ~	IMMED #	DIRECT OP	DIRECT ~	DIRECT #	INDEX OP	INDEX ~	INDEX #	EXTND OP	EXTND ~	EXTND #	INHER OP	INHER ~	INHER #	BOOLEAN/ARITHMETIC OPERATION (All register labels refer to contents)
Add	ADDA	8B	2	2	9B	3	2	AB	5	2	BB	4	3				A + M → A
	ADDB	CB	2	2	DB	3	2	EB	5	2	FB	4	3				B + M → B
Add Acmltrs	ABA													1B	2	1	A + B → A
Add with Carry	ADCA	89	2	2	99	3	2	A9	5	2	B9	4	3				A + M + C → A
	ADCB	C9	2	2	D9	3	2	E9	5	2	F9	4	3				B + M + C → B
And	ANDA	84	2	2	94	3	2	A4	5	2	B4	4	3				A • M → A
	ANDB	C4	2	2	D4	3	2	E4	5	2	F4	4	3				B • M → B
Bit Test	BITA	85	2	2	95	3	2	A5	5	2	B5	4	3				A • M
	BITB	C5	2	2	D5	3	2	E5	5	2	F5	4	3				B • M
Clear	CLR							6F	7	2	7F	6	3				00 → M
	CLRA													4F	2	1	00 → A
	CLRB													5F	2	1	00 → B
Compare	CMPA	81	2	2	91	3	2	A1	5	2	B1	4	3				A − M
	CMPB	C1	2	2	D1	3	2	E1	5	2	F1	4	3				B − M
Compare Acmltrs	CBA													11	2	1	A − B
Complement, 1's	COM							63	7	2	73	6	3				M → M
	COMA													43	2	1	A → A
	COMB													53	2	1	B → B
Complement, 2's (Negate)	NEG							60	7	2	70	6	3				00 − M → M
	NEGA													40	2	1	00 − A → A
	NEGB													50	2	1	00 − B → B
Decimal Adjust, A	DAA													19	2	1	Converts Binary Add. of BCD Characters into BCD Format
Decrement	DEC							6A	7	2	7A	6	3				M − 1 → M
	DECA													4A	2	1	A − 1 → A
	DECB													5A	2	1	B − 1 → B
Exclusive OR	EORA	88	2	2	98	3	2	A8	5	2	B8	4	3				A ⊕ M → A
	EORB	C8	2	2	D8	3	2	E8	5	2	F8	4	3				B ⊕ M → B
Increment	INC							6C	7	2	7C	6	3				M + 1 → M
	INCA													4C	2	1	A + 1 → A
	INCB													5C	2	1	B + 1 → B
Load Acmltr	LDAA	86	2	2	96	3	2	A6	5	2	B6	4	3				M → A
	LDAB	C6	2	2	D6	3	2	E6	5	2	F6	4	3				M → B
Or, Inclusive	ORAA	8A	2	2	9A	3	2	AA	5	2	BA	4	3				A + M → A
	ORAB	CA	2	2	DA	3	2	EA	5	2	FA	4	3				B + M → B
Push Data	PSHA													36	4	1	A → Msp, SP − 1 → SP
	PSHB													37	4	1	B → Msp, SP − 1 → SP
ull Data	PULA													32	4	1	SP + 1 → SP, Msp → A
	PULB													33	4	1	SP + 1 → SP, Msp → B
Rotate Left	ROL							69	7	2	79	6	3				M
	ROLA													49	2	1	A
	ROLB													59	2	1	B
Rotate Right	ROR							66	7	2	76	6	3				M
	RORA													46	2	1	A
	RORB													56	2	1	B
Shift Left, Arithmetic	ASL							68	7	2	78	6	3				M
	ASLA													48	2	1	A
	ASLB													58	2	1	B
Shift Right, Arithmetic	ASR							67	7	2	77	6	3				M
	ASRA													47	2	1	A
	ASRB													57	2	1	B
Shift Right, Logic.	LSR							64	7	2	74	6	3				M
	LSRA													44	2	1	A
	LSRB													54	2	1	B
Store Acmltr.	STAA				97	4	2	A7	6	2	B7	5	3				A → M
	STAB				D7	4	2	E7	6	2	F7	5	3				B → M
Subtract	SUBA	80	2	2	90	3	2	A0	5	2	B0	4	3				A − M → A
	SUBB	C0	2	2	D0	3	2	E0	5	2	F0	4	3				B − M → B
Subract Acmltrs.	SBA													10	2	1	A − B → A
Subtr. with Carry	SBCA	82	2	2	92	3	2	A2	5	2	B2	4	3				A − M − C → A
	SBCB	C2	2	2	D2	3	2	E2	5	2	F2	4	3				B − M − C → B
Transfer Acmltrs	TAB													16	2	1	A → B
	TBA													17	2	1	B → A
Test, Zero or Minus	TST							6D	7	2	7D	6	3				M − 00
	TSTA													4D	2	1	A − 00
	TSTB													5D	2	1	B − 00

THE ARCADE

ADDRESSING MODES (Cont)

When you want to put data into one of the registers, there are several ways or ADDRESSING MODES that can be used. It's important to learn ALL of the modes because each one is different from the others, and we will be using ALL of them sooner or later in this instruction. Most of the ADDRESSING MODES can be used with most of the OP CODES. To give you an example of this, the following section will explain how to load ACCUMULATOR A with some data by using the various ADDRESSING MODES.

LOADING THE ACCUMULATOR

Accumulator A simply holds data until it's time to do something with it. Data is continiously loaded into it, and almost instantly processed in one way or another, is cleared, and new data is fed in.
Accumulator A is loaded in several different ways, and each way or ADDRESSING MODE has it's own different OP CODE. Refer to the INSTRUCTION SET SUMMARY on the preceding page. Notice in the first column the heading OPERATION. The arrow is pointing at the operation LDAA. This line contains the OPERATION NAME (LDAA) as mentioned, and OP CODES needed for each ADDRESSING MODE. These ADDRESSING MODES appear as column headings and consist of IMMEDIATE, DIRECT, INDEXED, EXTENDED, AND INHERENT MODE. Notice that directly below these headings appear small boxes in each column marked OP. By tracing across our LDAA line, we can see the OP CODE, which is in HEX, for **each of our ADDRESSING MODES. The column to the far right displays boolean arithmetic operations pertaining to the functions on the same line, thus providing you with a symbolic expression of each op. Each ADDRESSING MODE has it's own OP CODE, and they all go about doing their tasks a little differently from one another.**
We'll go over the ADDRESSING MODES using the LDAA or or LOAD ACCUMULATOR A operation, but remember, ALL the operations use DIFFERENT ADDRESSING MODES.
Starting with ADDRESSING MODE LDAA IMMEDIATE, or LDAA IM, or, as the OP CODE desiginates, HEX 86, we see by our summary that this operation requires 2 BYTES (Move to the right of the OP CODE and you will see a 2 in the # column). The FIRST BYTE will be the OP CODE 86. At this point you are telling the processor to load accumulator A in the IMMEDIATE ADDRESSING MODE. IMMEDIATE? IMMEDIATE WHAT? It's just a term used to separate one form of addressing from another and tells the processor that the next byte of data will be stored into ACCUMULATOR A. This next byte is our second byte that is required by this OP CODE. The next byte can be ANY VALUE you want. So, whenever the processor sees the OP CODE 86, it will immediately fill ACCUMULATOR A with the NEXT byte of data in the program.
An example of this operation would be as follows:

```
0000 86   Address 0000 contains OP CODE 86 LDAA IM
0001 E7   The NEXT BYTE is E7 which goes into ACCA
```

If we wanted to load the ACCUMULATOR B, we could do the same operation by replacing the 86 in our example with the OP CODE for LDAB (C6) which is the IMMEDIATE ADDRESSING MODE for LDAB.

DIRECT

Load accumulator DIRECT (LDAA DIR), which, according to our summary line is OP CODE 96.
This is also a 2 byte operation where 96 is the first byte and the second byte is an ADDRESS in MEMORY where the data to be put in ACCUMULATOR A is located. Here's another example:

```
0000 96   Address 0000 contains OP CODE 96 LDAA DIR
0001 87   The contents of address 0087 will be loaded
          into Accumulator A directly.
.
.
.
.
0087 44   Address 0087 contains hex data of 44 which
          will be placed in Accumulator A when the
          above OP CODE is used.
```

Using this DIRECT ADDRESSING MODE, you can load accumulator A or B with data from any address between HEX 00 and FF (Decimal 0 to 255). Loading Accumulator B in the direct mode operates exactly as loading A, except the OP CODE used is D6. Refer to our summary line.

WHY DON'T WE CALL IT A DAY!

A lot of information has been given here. We have covered a lot of ground. It would be advisable to let this information rest awhile. Pick it up in a few days and go over it again. You may want to try some of the examples by entering the MONITOR MODE (CALL28672) and practice loading in a few OP CODES yourself. EXPERIMENT! Get aquainted with your machine in this mode! You may want to pick up a book that explains machine language programming for the 6800 in more detail. There are some good ones to be found in just about any bookstore carrying COMPUTER REFERENCE MATERIAL. We'll review a little more next month.....see you then!

SHORT PROGRAM

PRELUDE

The following program was submitted to us by DON SCHMIDT, Neptune New Jersey. The program, originally written by RINALDO PRISCO was published in the JUNE issue of BYTE magazine and re-written for the APF machine.
The original name of the program is BAZERIES CRYPTOSYSTEM and allows one the ability to encode or decode words and/or phrases.
Explanations of the individual areas appear below to give you a better understanding of the program. In spite of the length, those of you who are interested in CODING/DECODING techniques, the time required to enter this program should prove to be worthwhile. This program is also available from the PROGRAM LIBRARY.

Here is a breakdown of the line numbers and the functions they perform:

100-115 Establish variables and arrays, initialize disks. The word DISK, as it is used herein refers to a portion of the program and NOT a disk drive.
125-155 Get users key, compress it, save first character of the key for later use, restrict key length with a maximum of 20 to match number of disks.
170-220 Bubble sort of key to permutate sequence of disks on the cylinder.
235-265 Get users text, instruction (Encode or Decode), compress text, also set flag.
290-330 Rotate each disk to align to text, save position when found on disk.
340-350 Generate additive for ENCODE/DECODE row.
360-375 Apply additive to get new row number.
395-435 Print new text from disks based on new row number. This may be plaintext or cypher-text.
455-475 Shift unprocessed text left and continue....OR:
485-495 Query user for additional input of either process....OR STOP.
505-540 Blank removal and compression routine.
545-565 Initiate rotor with disks. (DATA STATEMENTS)

When asked to input a KEY, enter an ALPHA character or words. Program flow is top to bottom with two subroutines; the first to initialize the disks from the data statements, and second to remove blanks from the input strings with a branch at the bottom if the text is greater than 20 characters in length.
The sort routine would not alter the positions of the disks for a key of "ABCDEF", but for "FEDCBA" would reverse the first six disks.
Of possible note is the method developed to "un string" and "re-string" a string (S$, k$, etc.) and string array (D$()), to overcome unwanted concatenation. This method is applied in the key sort, alignment and print routines.
Suggested reading: THE CODEBREAKERS by DAVID KAHN.

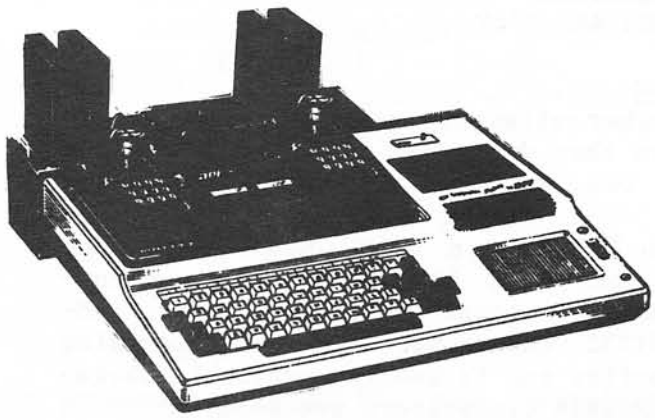
THE PROGRAM

```
10 :   BAZERIES CRYPTOSYSTEM
15 :
20 : ORIGINAL PROGRAM WRITTTEN
25 : BY RINALDO PRISCO AND
30 : PUBLISHED IN "BYTE" 6-83.
35 :
40 : RE-WRITTEN FOR THE APF
45 :   BY DON SCHMIDT 12-83.
50 :
55 :  BASICALLY, THIS IS A 20
60 :  ROTOR ENCRYPTION MACHINE
65 :  THAT LOADS THE DISKS ON
70 :  ON THE CYLINDER BASED ON
75 :  SORT SEQUENCE OF THE KEY
80 :  AMD THEN USES A NUMERIC
85 :  FACTOR FOR ENCODE AND DE-
90 :  CODE OF TEXT.
95 :
100  CALL 17046: POKE 24578,38
105  DIM T$(1),X$(1),P$(20),NULL$(96)
110  DIM K$(30),S$(96),P(20),D$(20,26)
115  GOSUB 545: REM   INIT ROTORS
120 : GET KEY
125  PRINT " ENTER KEY": PRINT
130  INPUT K$:S$=K$
135 :ELIMINATE BLANKS
140  GOSUB 505:K$=S$:KL= LEN (K$):K= ASC (K$(0)
145 :
150  IF KL>20 THEN K$(20)=""
155 K= ASC (K$):KL= LEN (K$)
160 : USE SORT TO PERMUTE DISKS
165  PRINT "LOADING DISKS, READY SHORTLY .."
170  FOR J=KL-1 TO 2 STEP -1
175 FLAG=0
180  FOR I=0 TO J:L=I+1
185  IF K$(I)<=K$(L) THEN 210
190 T$(0)=K$(I):T$(1)=K$(L)
195 K$(L)=T$(0):K$(I)=T$(1)
200 D$(0,1)=D$(I,1):D$(I,1)=D$(L,1):D$(L,1)=D$(0,1)
205 FLAG=1: REM    SWAPPED
210  NEXT I
215  IF FLAG=0 THEN J=2
```

SHORT PROGRAM

CRYPTO

```
220  NEXT J
225  :
230  PRINT : PRINT "CYLINDER IS NOW LOADED": PRINT
235  PRINT : PRINT " ENTER TEXT"
240  PRINT : INPUT S$(1): PRINT
245  INPUT "<E>NCODE OR <D>ECODE",T$
250 F=0: IF T$(0)="D" THEN F=1
255 N=K-65
260 : RMV BLNKS FM S$
265  GOSUB 505
270 : PROCESS 20 CHARS AT A TIME
275 L= LEN (S$(1)): IF L>20 THEN L=20
280 : CHECK POINT FOR TEXT S$
285 : ORIENT DISKS TO TEXT
290  FOR I=1 TO L
295 X=0:T$(1)=S$(I)
300  FOR J=1 TO 25
305 X$(1)=D$(I,J)
310  IF X$(1)=T$(1) THEN X=J:J=25
315  NEXT J
320  IF X=0 THEN X=J
325 P(I)=X
330  NEXT I
335 : SET R TPO PROPER ROW #
340 N=N+1:R=N-20* INT (N/20)
345  IF R=0 THEN R=1
350  IF F=1 THEN R=26-R: REM    DECODE
355 : SET PTRS TO ROW R
360  FOR I=1 TO L
365 P(I)=P(I)+R
370  IF P(I)>26 THEN P(I)=P(I)-26
375  NEXT I
380 :
385 : PRINT NEW TEXT
390 B=0
395  FOR I=1 TO L
400 B=B+1
405 X$(1)=D$(I,P(I))
410  PRINT X$(1);
415  IF F=1 THEN 435
420  IF B<5 THEN 435
425  PRINT " ";
430 B=0
435  NEXT I
440 :
445 : MORE TEXT TO PROCESS?
450 :
455  IF  LEN (S$(1))=L THEN 480
460 P$=NULL$
465 S$(1)=S$(L+1)
470  :PRINTS$(1)
475  GOTO 275
480  PRINT
485  INPUT " FURTHER TEXT ",T$
490  IF T$(0)="Y" THEN 235
495  STOP
500 :
505 : REMOVE BLANKS FROM STRING
510 :
515 SL= LEN (S$)
520  FOR B=1 TO SL
525  IF S$(B)<>" " THEN 535
530 S$(B)=S$(B+1):SL=SL-1:B=B-1
535  NEXT
540  RETURN
545 : LOAD DISKS FROM DATA
550 :
555  FOR I=1 TO 20
560  READ D$(I,1)
565  NEXT I: RETURN
570 :
575  DATA FNWALZJKMQSCXHVPTGIBOEYRU
580  DATA ETXQPVJCBNRADSKHIYOGULMZFW
585  DATA LEVQXYGCDOZWTPJRHIBKAMSUNF
590  DATA XYCVQWEITHNPLKSAOGRJBUZDFM
595  DATA ODTZCRFHENBYUMQXAWVGLJSIKP
600  DATA VKUNYEWFMICOJLHGAPTZRXSVQD
605  DATA JMPHVOXRIFKBECUQDZTALGNSWY
610  DATA RGJYZBNQHCFAMTILOWVEPUXSKD
615  DATA ZQJKOIBRMFHVTNWXEGSCUPYADL
620  DATA UAXTORVWKHPZNLIMBQCJFGEYSD
625  DATA MGHXLETYFKZSRABNOUPCQWDIJV
630  DATA PGNBRTFVOWSCZXDLMIKUJAHYEQ
635  DATA ZEDIPGOUSMFBRXJCYWNVQKTALH
640  DATA FDPSMLYKXZWJONCBUVEIRTHAQG
645  DATA MIGHUOSLYCDJVQXBTREFKWNPAZ
650  DATA GPZLTABUNEJSFVKRWMIECXDQYO
655  DATA XIDLETVZYHUBQNWAGMSKCROJPF
660  DATA WHMFSGUZEYXRVICOLQKPBDANJT
665  DATA IKLMATHNCZXWUOGSVYBQFPJDER
670  DATA JVOHKYZCLUXESFWTRPQDBMAGNI
675  END
```



PRODUCT REVIEW

ELECTRONIC TYPEWRITERS

The purpose of this article is to give you a few names of companies who make interfaces for electronic typewriters that will work with the IM-1.

Some makes and models of typewriters will be mentioned, but because of space limitations, we won't be able to go into as much detail as we'd like. There are so many different models available today and the list of functions and features of each model goes on and on and on!

We hope that this article will possibly help those of you who have written.

MASIS

This company makes electronic typewriter interfaces for the SHARP ZX-400, ROYAL 2001 & 2002, and the BROTHER EM-1 & EM-2.

These interfaces are installed INSIDE the typewriters, usually by a dealer, but simply plug into a slot within the unit. Some other manufacturers of interfaces require modifications and wiring changes in order to install their units. The MASIS unit installation will not VOID your warranty if you decide to do the job yourself.

According to Mike Gharibian, president of MASIS, their interface will run the typewriter at it's TOP SPEED, compared to others that slow the typing down considerably. The unit contains a small buffer and takes a few minutes to install. Mr. Gharibian also stated that these units will work very well with the IM-1.

MASIS usually supplies to DEALERS ONLY, but will sell directly to the public as well. If interested, give them a call for current prices.

MIKE GHARIBIAN
Tel. 201-445-7743

BROTHER

Brother offers several electronic typewriters that will work with the IM-1 using their OWN brand of interface; the IF-50.

The IF-50 is a STAND ALONE unit that sells for about $200.00 and can be configured to accept inputs from the IM-1's SI232 cartridge. The unit contains a 2K buffer and is usually available whereever BROTHER typewriters are sold.

The BROTHER line of electronic typewriters include the CE-50, CE-60, CE-65, EM-1, and the newest SUPER COMPACT EP22.

The EP22 has a built in interface, dot matrix element, and a 16 character display window. Model CE-65 is a large office model and the CE-50 & CE-60 are considered to be portables. The CE models have 3 keyboard modes which are, Standard, International, and symbolic type. Like CANON, BROTHER has it's own line of printwheels and will not accept printwheels made by other companies.

CORD LIMITED

This company requires you to send your RS232 PINOUTS and VOLTAGE LEVELS to them before ordering one of their interfaces. They claim that this information is needed for them to evaluate your interface requirements properly. They carry several interfaces for several typewriters and are probably one of the larger companies in the interface business. They make interfaces for ADLER, BROTHER, HERMES, ROYAL, SILVER-REED, and SMITH CORONA. Their units are also the PLUG-IN type.

CORD LIMITED
2815 Junipero Ave.
Signal Hill, CA 90806 ATTN: RICK

IMPORTANT TIPS

If you are seriously considering an electronic typewriter, make sure that it can produce -LESS THAN-AND-GREATER THAN-SYMBOLS! You will need these symbols in order to print your BASIC statements. Also, ask the dealer if the typewriter can use printwheels made by other companies or if they can be converted to do so. Some of the more popular brands of printwheels are QUME and DIABLO.

Make sure that the interface parameters on the interface can be CHANGED (ASCII WORD LENGTH, PARITY, BAUD RATE) and that it IS a SERIAL INTERFACE! Some are PARALLEL ONLY! BE CAREFUL!

More information regarding electronic typewriters/interfaces will be printed in future issues pending response from other companies that we have written.

PRODUCT REVIEW

BROTHER---HERE IT IS!

The following is a culmination of data regarding the BROTHER CE-50 ELECTRONIC TYPEWRITER. Our thanks to JIM RITTIS, JOHN LANCEY, GEORGE WYATT, and TOM PETRAITIS for supplying this information to the club. The following has been copied from a letter sent to us by JIM RITTIS which sums up all of material we have received.

"The CE-50 can do all the operations that the CE-60 can do even though the CE-50 is missing some buttons."
"The numbers of the operations such as TAB SET=27+9 can be used two ways. POKE25601,27: POKE25601,9 and PRINTCHR$(27):PRINTCHR$(9). The POKE when RUN with PRINT=0 will cause the IF-50 (interface) to respond and the typewriter will actually DO IT! The PRINTUSING statement causes a carriage return, but this is in BASIC SOFTWARE and by using the REV LINE FEEDS and some TABS, the position on the page is retained."

"LISTing the program is slow. I use the AUTO MODE with 12 CPI and 1 line feed with CARBON MANIFOLD paper after removing the ribbon cassette. The printer EATS a lot of ribbon but practically none of the correction ribbon."

Listed below is the control set for the BROTHER CE-50 as printed by the typewriter.

ESC = 27		RS = 30		US = 31	
= 32	0 = 48	@ = 64	P = 80	° = 96	p = 112
! = 33	1 = 49	A = 65	Q = 81	a = 97	q = 113
" = 34	2 = 50	B = 66	R = 82	b = 98	r = 114
# = 35	3 = 51	C = 67	S = 83	c = 99	s = 115
$ = 36	4 = 52	D = 68	T = 84	d = 100	t = 116
% = 37	5 = 53	E = 69	U = 85	e = 101	u = 117
& = 38	6 = 54	F = 70	V = 86	f = 102	v = 118
' = 39	7 = 55	G = 71	W = 87	g = 103	w = 119
(= 40	8 = 56	H = 72	X = 88	h = 104	x = 120
) = 41	9 = 57	I = 73	Y = 89	i = 105	y = 121
* = 42	: = 58	J = 74	Z = 90	j = 106	z = 122
+ = 43	; = 59	K = 75	[= 91	k = 107	¼ = 123
, = 44	< = 60	L = 76	± = 92	l = 108	½ = 124
- = 45	= = 61	M = 77	] = 93	m = 109	¶ = 125
. = 46	> = 62	N = 78	² = 94	n = 110	§ = 126
/ = 47	? = 63	O = 79	_ = 95	o = 111	= 127

TAB = 9
CLEAR ALL TABS = 27+50
TAB CLEAR = 27+56
TAB SET = 27+49
DECIMAL TAB SET = 27+9
LINE INDENT = 27+59
PARAGRAPH INDENT = 27+58
REPEAT CODE FOR PARAGRAPH IDENT OFF
SPACE = 32
RAPID TO RIGHT MARGIN = 27+64
BACK-SPACE = 8
HALF-BACK-SPACE = 27+8
CARRIAGE RETURN = 13
MARGIN CLEAR = 27+67
SET LEFT MARGIN = 27+57
SET RIGHT MARGIN = 27+48
CENTER BETWEEN MARGINS = 27+61

AUTO MODE SET = 27+34
REPEAT CODE FOR AUTO MODE OFF
LINE FEED = 10
1/2 FWD FEED = 27+85
1/2 REV FEED = 27+68
AUTO UNDER-LINE = 27+69
CLEAR AUTO UNDER-LINE = 27+82
SET LINE FEED @ 1 = 27+30+9
SET LINE FEED @ 1 1/2 = 27+30+13
SET LINE FEED @ 2 = 27+30+17
SET PICA PITCH = 27+81
SET 10 CPI PITCH = 27+31+13
SET 12 CPI PITCH = 27+31+11
SET 15 CPI PITCH = 27+31+9
SELECT IF-50 =17
DESELECT IF-50 = 19
BELL = 7

For those of you who would like a short list program that will POKE the decimal values to the typewriter, drop us a line.

Greg M. Ching
121 Emerson St.
Palo Alto, CA 94301

A senior, double majoring in Electrical Engineering (Computers), and Philosophy (Formal Systems) at Stanford University.
"I am very interested in working to extend the capabilities of my IM-1, especially in the area of MAIN FRAME communications."

R. Bruce Hosken
70 Darwin Ave.
Merritt Island, FL 32953 (305) 452-3015

Space Shuttle Systems Engineer/Programmer at Kennedy Space Center, Florida. President of Space Coast Microcomputer Club and Computers-for-Kids (C4K) project in local school system. Now writing APF IM-1 educational software for school labs with more than 50 APFs in daily use.

THE NATIONAL MAILBOX

Steven G. Liberatore
7 Richard Circle
Woburn, MA 01801

"I own an IM-1 with dual disk drive, RS232 interface, printer, and a modem. I am an Electrical Engineer at U-MASS and hope to use my machine for more uses other than playing and programming games."

John Pierce
1731 N. 1575W. #4
Layton, UT 84041

"Please put my name in the "LONELY COMPUTER" section. I'm an electronics technician with the U.S. AIR FORCE."

Michael Russell
Box 2084 CS
Pullman, WA 99163

"Have massive software for the APF. Have expanded the machine to control any outside electrical device. Will help or trade with interested APF owners."

Andrew B. Maul
2538 Everglade Dr.
Lake Havasu City, AZ 86403 (602) 855-8963

"I know how to program in BASIC very well. I plan to go to one of the Arizona universities next year. Major: Chem Engineering. I would like to know how to program in other languages."

Dwight E. Morris
2324 Bimini Dr.
W. Palm Beach, FL 33406

"APF computer, RS232, R8-K, Epson Printer, Modem. Interested in flying, ham radio, machine programming, real estate, gardening, beer!"

Douglas L. Smith
3952 Persimmon Dr., Apt. T2
Fairfax, VA 22031

"Have system with 2 disk drives and a printer & modem. Am interested in finding adventure for the IM-1. Am professional computer programmer. Like to trade programs and write programs."

THE NATIONAL MAILBOX

Jerrol A. Mesenbrink
1520 Dun Lo Ave.
Arlington Heights, Il 60004

"Running APF with disc and Xerox 1340 printer. 16K. Six months ago I purchased a DRAFT INSTRUMENTATION (Pressure Gauge) Manufacturing Corporation called ACCUREAD GAGES INC. I need bookeeping software. Will trade or what. I'm using the APF for inventory and mailing lists now."

CLASSIFIED

*****24K MEMORY EXPANSION*****

Detailed Instructions and Illustrations ONLY; Requires Building Block & R8-K RAM. Expands your computer's memory to 24K of user-available RAM. Some parts will be included while supply lasts!

G.R. JONES
419 S. 105 E. Pl.
Tulsa, OK 74128
$14.95

*****FOR SALE*****

24K APF COMPUTER with BB-1 and SI-232 with much software. Any reasonable price. Must get rid of.

David Murrills
554 Donham Rd.
Fairbanks, AK 99701

*****WANTED*****

FI-100 DISC CONTROLLER and/or DISC DRIVE UNIT--NEW OR USED.
CALL 502-737-3711 AFTER 6PM

*****WANTED*****

Complete IM-1 computer with BB-1 and interface cards. Would prefer that the IM-1 has 16K RAM or more. Must be clean and in good working condition.

Gary Shelton
410 E. Market
Bloomington, Il 61701

SALE

Last month I combined the twelve most popular games into three large groups and deducted forty percent off the regular price. By putting all four games on one tape these great savings are possible. So for one more month I am going to continue this sale. Prices will never be this low again, so order now. These groups may not be mixed under any circumstances! If there isn't a group that interests you, you may purchase individual games for five (5) dollars each, plus $1.00 shipping per game. When bought seperatly they are put on seperate cassettes. All orders must be postmarked by April 7, 1984. After this date all games go back to regular price. Current price lists are always avaliable upon request!

PACKAGE 1:
1) Death Tank
2) Allien Defender
3) Asteroids
4) Space Shuttle

FOR ONLY $11.00

PACKAGE 2:
1) Alpine Skiing
2) Frogger
3) Sailing
4) Sky Diver

FOR ONLY $9.80

PACKAGE 3:
1) Turbo
2) Baja
3) Chopper Interceptor
4) Bi-Plane Rescue

FOR ONLY $10.20

* Please add $1.00 shipping per package bought!

Send check or money order to: Eddie Bednar
11804 Brookwood Rd.
Austin, Texas 78750

* Note: All programs have high resolution graphics and many sounds!

SPECIAL Introductory offer from **A.I.T.**, the Advanced Interfacing Team.

..FLASH ..... GREAT NEWS FOR THE IM-1 OWNERS.....NOW AVAILABLE.....

.. A PARALLEL PORT FOR YOUR IM-1....A true extension into the world of interfacing...

AIT, the Advanced Interfacing Team, has just developed exclusively for the IM-1, the AIT-IMPIA parallel port card. Once the AIT-IMPIA is plugged into the BB-1 it's interfacing capabilities are limited only by your "IMAGINATION". Imagine sixteen parallel data lines and four control lines, from the power of Motorola's M6821 peripheral interface adapter, out to the end of a ribbon cable, and controlled by the Imagination Machine. With some imagination and a little skill it will be no time at all before you are turning lights on and off, monitoring room temperatures, running your model railroad, doing A/D and D/A conversions of all types. Whatever you might imagine, all under the software control of the IM-1, a powerful Motorola M6800 based microcomputer. ORDER YOURS NOW.

If you have reservations about your hardware skills in interfacing with a parallel port, AIT has thought of you too. With the addition of our AIT-IMPIA-S1 experimenters attachment, you will in a short time learn the basic interfacing skills and technical finesse. The AIT-IMPIA-S1 is a simple trainer board designed to help you learn how to use the AIT-IMPIA parallel port card. Lessons are included in the purchase price of the AIT-IMPIA-S1. Don't delay ORDER NOW.

*Special Introductory prices are good until April 30,1984. Allow four to six weeks for delivery.

(tear off here)

Qty.		Regular Price	Special offer	Price extended
____	AIT-IMPIA..Parallel interface card with ribbon cable and technical data	$84.95	79.95	$_____.___
____	AIT-IMPIA-S1..Experimenters Training board with connector and training program.	49.95	44.95	_____.___
	Shipping and Handling +$3.00 for each item ordered.....			_____.___
	Pennsylvania Sales tax- Residents only.....6%.			_____.___
			Total...$	_____.___

Date ___/___/___

Name_____

Address_____

City_____State_____Zip_____

Phone( )-____-_____

Amount of MONEY ORDER enclosed _____

*Sorry no C.O.D. or Personal Checks.

Money Order Payable to:
Advanced Interfacing Team

Mail order to: Advanced Interfacing Team
2029 Margaret St.
Philadelphia, PA. 19124

In the interest of helping the IM-1 owners with their hardware needs we are asking that you might take the time to respond to our questionnaire. This survey in no way obligates you to any purchases. It is strictly for our records and consideration for future items.

Are you interested in the following support Hardware?

Yes	NO	
☐	☐	Floppy Disc Interface Card FI-100 Compatable
☐	☐	10 Card Expansion card, replaces the BB-1
☐	☐	EPROM/PROM Burner Card.
☐	☐	EPROM/ROM cartridge