

# HERO-GRAM

VOL. 1

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## NEWSLETTER OF THE HERO RESOURCE EXCHANGE

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### <<< LETTERS RECEIVED >>>

J.P. Weichert, Jr. of Cypress, Texas has written a program in Basic for the Compaq to successfully communicate the Arctec System MEMCOM board with his computer. He comments that he is very pleased with the 2500AD Software 6800 Cross Assembler with Macro facilities.

Jeff Thistle of Delray Beach, Florida is interested in hearing about anyone who has developed a software/hardware means of allowing HERO to connect itself for recharging, when the battery voltage gets low.

Richard B. McGarry of E.Hampstead, New Hampshire is building a display for the head unit just above the display and keyboard. This display will show the status of the voltages located on the power board and the eight LEDs located on the sense board. A similar arrangement is available on HERO Jr..

### <<< BOOKS ON HERO >>>

Heath's "HERO 1: ADVANCED PROGRAMMING EXPERIMENTS" #EB-1802 is an enhanced version of the Howard Boyet book, that is Revised and edited by: Ron Johnson of Heathkit. Mr. Johnson takes an already good book and makes it even more readable by clearly leading you through Course Objectives and Outlines in the traditional HeathKit Educational Systems style.

### <<< HERO-1 BASIC >>>

Probably the most important product to arrive for HERO is the Heath ET-18-9 BASIC LANGUAGE. Although Basic is not the most ideal language for Robot control, it certainly is well known and easy to use. The ROM requires that you have the ET-18-6 Memory Expansion Accessory, at least one 6264 CMOS RAM chip, the ETW-18-10 Serial Interface Accessory with 1.3 or 1.U firmware, and a Terminal or a computer with a terminal emulation program. The BASIC is an adaptation by Wintek Corporation of Micro Basic by Technical Systems Consultants. The program is Integer with enhancements for motor control, sensing, and the voice synthesizer.

Some of what the program can handle includes:

Variables up to two dimensions and standard arithmetic expressions.

Relations (such as A=B, A<B, A<=B, etc.)

Punch and load for data transfers to computer for storage.

Remark, For/Next, Gosub, Goto, Input, Data, If/Then, Peek, Poke, RND, ..etc.

Special Robot functions include:

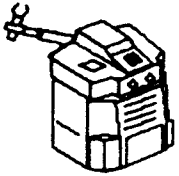
SPEAK <Expr> and SPEAK <phoneme string> for voice control.

EXTEND, SHOULDER, ROTATE, PIVOT, GRIPPER, and HEAD are Variables that can be read or written to.

EYE, EAR, SONAR, and MOTION are sensor variables that may be addressed.

DPRINT prints to the display.

KEYIN returns the value of a key on the Robot's keyboard.



HERO-1  
TAPE GUIDING SYSTEM

by  
Richard Logan

Hero may be house trained, but I have other problems with him.

The biggest problem I have had is making him behave long enough to go from point A to point B and have him wind up at the exact same place each time.

I needed to show him the way to go. "This is not an easy undertaking." I thought of Sonar, Radar, Infrared, Infraray, Internal Guidance, Gyros, and Seeing Eye Dogs. But this had to be simple, inexpensive, and easy to build. So I went with the "Tape Guiding System."

Being able to have Hero go from point A to B has opened up a whole new horizon of Hero applications.

Let me say at the onset that I am not a programmer. You can use this program as a beginning point.

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T.G.S Hardware List:

- 1 Ea. Dual-Row Barrier Strip  
6 Position  
Radio Shack #274-659
- 5 Ft. Ribbon Cable  
Radio Shack #278-772
- 1 Set Miniture C-clamps  
Radio Shack #64-2096
- 1 Role Burglar alarm window tape.  
Radio Shack #49-502
- 6 ea. Paper Clips  
5 ea. Std. size  
1 ea. Large size

\* \* \*

TAPE GUIDING SYSTEM

The "TGS" is constructed of parts available from Radio Shack.

The Barrier Strip is clamped to the front lower panel just in front of the steering wheel. Install C-clamps with tightening screws inside, being careful not to interfere with steering wheel.

The paper clips are installed on the lower row of screws on the barrier strip. The clip on Heros' right is used for Ground. A large size clip is recommended. It should run across the front of the other clips in an "L" shape slanted back toward the wheel in a position to make contact with tape when the clips are in contact.

The remaining clips are of standard size and should be curled at the ends, and slanting straight back.

Connect six wires from barrier strip to experimental board. From Heros' right to Heros' left;  
1st. connection to GND.  
2nd.....to DI0  
3rd.....to DI1  
4th.....to DI2  
5th.....to DI3  
6th.....to DI4

The wires should be routed thru the body with existing bundle to the head, and wired directly to the experimental board. No electronic components are needed.

About a two foot radial curve is the sharpest I've used. You can experiment with the "turn position" values in the program.

Put a short "Cross tape" at the place you wish Hero to stop. Two or three tapes wide and 8" long is recommended for the "Cross tape" to insure proper contact with all the contacts.



## Tape Guiding System

By Richard Logan

```
3F  ROBOT LANG.
C3  FWD DRIVE (wait)
08  SLOW
01  ONE UNIT

83  MACH. LANG.
B6  LDAA WITH BYTE
C2  FROM LOCATION
A0  C2A0

81  COMP A
FB  WITH FB -CENTER CONTACT
27  IF SAME BRANCH AHEAD
34  52 STEPS

81  COMP A
FD  WITH FD -LEFT CONTACT
27  IF SAME BRANCH AHEAD
12  18 STEPS

81  COMP A
FE  WITH FE -EXTREME LEFT
27  IF SAME BRANCH AHEAD
18  21 STEPS

81  COMP A
F7  WITH F7 -RIGHT CONTACT
27  IF SAME BRANCH AHEAD
18  24 STEPS

81  COMP A
EF  WITH EF -EXTREME RIGHT
27  IF SAME BRANCH AHEAD
18  27 STEPS

81  COMP A
E0  WITH E0 -ALL CONTACTS
27  IF SAME BRANCH AHEAD
1E  30 STEPS

20  BRANCH BACK
DE  TO BEGINNING (32 STEPS)
```

```
3F  ROBOT LANG
CC  MOVE TURN MOTOR (CONT)
F0  MED. LEFT
40  TO POSITION 40
83  MACH LANG
20  BRANCH BACK
D7  TO BEGINNING (39 STEPS)
```

```
3F  ROBOT LANG
CC  MOVE TURN MOTOR (CONT)
F0  MED. LEFT-EXTREME
33  TO POSITION 33
83  MACH. LANG
20  BRANCH BACK
D0  TO BEGINNING (46 STEPS)
```

```
3F  ROBOT LANG
CC  MOVE TURN MOTOR (CONT)
F4  MED. RIGHT
51  TO POSITION 51
83  MACH LANG
20  BRANCH BACK
C9  TO BEGINNING (53 STEPS)
```

```
3F  ROBOT LANG
CC  MOVE TURN MOTOR (CONT)
F4  MED. RIGHT-EXTREME
58  TO POSITION 58
83  MACH LANG
20  BRANCH BACK
C2  TO BEGINNING (60 STEPS)
```

>\*Change these two lines

```
3F  ROBOT LANG<* 27 & add ** at end
3A  RTS (END) <* 07 of prog. Will jump
to another prog.
of your choice.
```

```
3F  ROBOT LANG
CC  MOVE TURN MOTOR (CONT)
EC  SLOW
49  TO CENTER
83  MACH LANG
20  BRANCH BACK
B9  TO BEGINNING (69 STEPS)
```

```
** 3F  ROBOT LANG
** 7E  JUMP TO-
** 01 <Put whatever prog. you wish to
** 00 <go to here. Such as one from a
'Learn Mode' program.
```

# A PROGRAM TO MAKE HERO RESPOND AT A PARTICULAR TIME

by Ted J. Poulos

Hero's sense of date and time is one of its most useful attributes. The following routine provides a convenient means of inputting the time you want Hero to carry out some action. Although the program only reads the time to the nearest minute, it could be expanded to sense seconds or the date and year. The program may be located anywhere in memory but does use locations \$0050 to \$0055 for storage of the set time. A three byte jump instruction to your own action routine may be inserted beginning at \$0142. In the listing below, the code for speaking "Ready" is there.

Run the program in Machine Language. After the prompt "≡", the set time must be entered as follows:

09050 for 9:05 PM  
0905A for 9:05 AM

## INPUT SET TIME

```
0100 8649 LDAA $49, TIME PROMPT " ≡ "  
0102 BDF7C8 JSR OUTCH  
0105 C605 LDAB $05, DIGIT CNTR  
0107 CE0050 LDX $0050, ADDR POINTER TO SET TIME  
010A DF55 STX $0055, STORE X TEMP  
010A DF55 STX $0055, STORE X TEMP  
010C 37 PSHB STORE B TEMP  
010D 8D3F BSR SETIME  
010F FE0055 LDX LOAD ADDR POINTER  
0112 A700 STAA, X  
0114 08 INX NEXT DIGIT  
0115 DF55 STX  
0117 33 PULB  
0118 5A DECB  
0119 37 PSHB  
011A C100 CMPB DIGIT CNTR = 0?  
011C 26EF BNE NO, GET NEXT DIGIT
```

## READ CLOCK

```
011E CE0150 LDX  
0121 09 DELAY RTN  
0122 26FD BNE  
0124 BDF65B BSR CLRDIS  
0127 CE0050 LDX  
012A C605 LDAB  
012C B60054 LDAA GET AM OR PM DIGIT  
012F 810A CMPA AM?  
0131 2602 BNE NO, GO TO ADD PM CODE  
0133 2008 BRA RDCLK
```

```

0135 B60050 LDAA HRS(10)
0138 B804 ADD ADD 4 TO HRS(10), PM
013A B70050 STAA $0050
013D 8D16 BSR RDCLK, HRS(10)
013F 08 INX
0140 5A DECB
0141 8D12 BSR RDCLK, HRS(1)
0143 08 INX
0144 5A DECB
0145 8DOE BSR RDCLK, MIN(10)
0147 08 INX
0148 5A DECB
0149 8DOA BSR RDCLK, MIN(1)
014B 3F TO ROBOT LANGUAGE
014C 3A SPEAK "READY"
014D 01 NOP

```

#### SETIME ROUTINE

```

014E BDF777 JSR INCH
0151 BDF7B5 JSR OUTHEX
0154 39 RTS

```

#### RDCLK ROUTINE

```

0155 B6A0 LDAA
0157 B7C300 STAA SELECT READ
015A B7C2C0 STAB SELECT DIGIT ADDR
015D B6C300 LDAA READ DIGIT
0160 A100 CMPA, X TO SAME SET TIME DIGIT
0162 26F1 BNE NOT EQUAL, TRY AGAIN
0164 39 RTS

```

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#### <<< HERO HINT >>>

If your robot has trouble getting started off of pile carpet, try constructing a HERO Launch Pad. Use a piece of clear plexiglass from your hardware store slightly wider than the base of HERO. Drill holes at all four corners and use wood screws to pull it down into the carpet. Trace out the bottom of your robot onto the clear plastic with either an indelible marker or drafting tape. By having a permanent outlined area for HERO to start off from, you will get a far more predictable path in your program and prevent the robot from spinning it's wheel on startup after compressing the pile in your carpet.

<<< PROGRAMS FOR HERO >>>

HERO BUTLER allows HERO to perform a variety of household chores easily addressable from his keyboard. Amuses your guests. He will deliver announcements, serve food and drinks, and tend the door. \$25

HERO PET makes HERO a amicable pet. Described as "Fully house broken" and "As user friendly as a Cairn Terrier". HERO mills around, mutters appropriate comments, likes people, and sleeps a lot. \$25

HERO PATROL is a home or office security program for HERO. The robot will patrol halls or in a room on guard and alert to intrusion. Upon encountering an intrusion he will either stand quietly and try not to be noticed, raise a ruckus, or take evasive action (whichever you select). The program is adaptive and self correcting. It provides easy verbal prompts for inputs. HERO reports the nature of the disturbance to you later. \$25

VOICE CONTROL is a rudimentary voice recognition algorithm that allows you to direct HERO through a maze while HERO keeps track of your time. \$15

HOP-TO-IT will have HERO give you a distance and tell you to hop-to-it. Distances given in feet/inches and meters/centimeters. \$15

MATH QUIZ has HERO pose arithmetic problems and wait for a verbal response. Score based on speed and accuracy. \$15

VOICE CONTROL, HOP-TO-IT, and MATH QUIZ on a single tape \$35

All of the above programs are available on cassette from Robotronix, Inc., Box 1125, Los Alamos, NM 87544.

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HEROBICS is a Sing and Dance program for HERO. Allow 4 feet in all directions for this one.

ROBABOUTLER makes HERO a Robot Servant. He will wake you and carry on with his Butler duties.

ROBATUTOR engages HERO in Hand Clapping, Alphabet, and Number games.

HEROBICS, ROBABOUTLER, and ROBATUTOR are separate programs available on cassette tape from: CYBOSOFT, INC., 4923 Fairview Road, Hollister, Calif. 95023 (408) 637-2195

<<< HERO HARDWARE >>>

ROBI is a HERO/APPLE Handshake package. Easy hookup 8 screws on HERO, 1 card slot on APPLE // or //e computer. User Friendly software for Data transfers stores and retrieves files to and from APPLE Disk. \$199. from: BERSEARCH Information Services, 26160 Edelweiss Circle, Evergreen, CO 80439.

HERO PARALLEL I/O KIT has 16 memory-mapped inputs or outputs for the HERO 1. It contains programmable I/O for 8 or 16 lines, full interrupt handling and contains four interrupt lines. Fully documented. \$39. Dayco Enterprises, Box 3374, Clearwater, BC V0E 1N0 CANADA (604) 587-6415

SUPERFOX2 is a Versatile A/D Board for the HERO 1. It includes easy-to-use firmware and comes equipped with two temperature sensors that enables the robot to measure temperatures from -40 F to +215 F. Celsius and Kelvin scales are also supported by the firmware. SUPERFOX2 has 8 A/D channels (2 of which are used by the temperature sensing circuits). There are 8 additional LOGIC (yes/no) TTL inputs included. It comes with 2K ROM, 2K RAM and a socket for an additional "user" 4K ROM. Wires to HERO in 5 minutes and is mounted inside the door out of the way. Most IC'S used are low power consuming CMOS. Compatible with most memory expansion boards on the market. \$168. (includes shipping) Tom Fox, MAGICLAND, 4380 S. Gordon, Fremont, Michigan 49337 (616) 652-2368