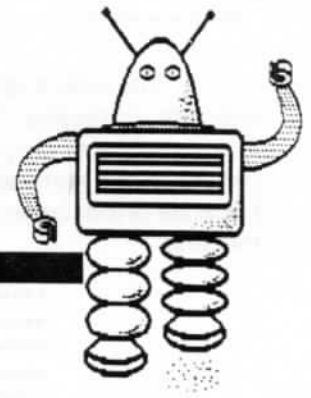


THE ROBOT COMPANION



The Newsletter of the Dallas Personal Robotics Group
February, 1989
Stan Spielbusch, Editor

JANUARY MEETING MINUTES

Club officers were elected for 1989. The new officers are:

President:	Ed Rivers	Vice president:	Brian Vaceluke
Secretary:	David Ratcliff	Treasurer:	Stan Spielbusch

It looks like a good line-up. I hope we do some good stuff this year!

We showed the video that Walter Glod made of his experiments. Good video, Walter! It has given Walter Bryant the incentive to do the same kind of video for our club, so we should be seeing an official club video real soon now. Walter also took some videos of the Infomart, as well as the meeting itself, so our out-of-town members can see where we meet. I suggest we videotape all meetings for the library!

Stan demonstrated his SHOWBOT program, which is a simple slave-type program, allowing an operator (or host computer) to command the robot with simple mnemonics. See the Library column below for more details.

We had a general discussion of projects to do this year (but let's not take all year to do them!). Ideas included:
Checkers program (to be worked on at user's labs).
Turbo C robot routine library.
Multi-tasking environment, with navigation and scheduling at the core.
Demo programs for the lobby and club demos.

Ed Rivers suggested that we participate in KERA (Channel 13, public television) pledge drives. We could get some good exposure, while performing a public service. Maybe even give our robots a chance at show business! I think it's a great idea, but we need some commitment and organization within the club. Well, Ed is president now, so....

Bob Winingham has offered to let us use his BBS again! He has a section for Robotics, just log on and leave him a note that you're with DPRG. I don't know yet if we will have a library area, but at least we can leave E-mail, like articles for the newsletter (hint hint)! The number is:(214) 739-0645. More details later.

Editor's note: Notice that a lot more happened at the meeting than was planned! You never know what you might miss, so don't forget to come to the meetings!

NOTICE: Richard Jolles would like to hear from anyone who can help him with HERO Jr. programming, and also needs to buy a HERO Jr. robot. Contact him at 294 Clevelandtown Rd., Boonsboro, MD 21713.

PRESIDENT'S CORNER

Starting a new year: 1989 by Ed Rivers

For the out of town folks, let me introduce myself. My name is Ed Rivers and I live in Garland, Texas with my wife and daughter. I've had my Hero 1 robot since February 1985. After three years as vice president, I decided to move up. I think that 1989 is going to be a busy year for the Dallas Personal Robotics Group. We have a good group of core members, and I hope we'll be able to expand our membership to 100 by year-end. It looks like Heath has put Robotics on the back burner. We need to get more people interested in Robotics and what they can do.

I've recently run into a few magazine articles that I'd like to share with you: The first is an article on Computers and Robotics in the year 2001. It's the cover story in the November 1988 issue of 'Discover'. The February 1989 issue of PCM Magazine (for Tandy computers) contains an interesting article on Neural Networking.

Hope to see a good turnout at the February 18th meeting at InfoMart. I'll try to make this short column a monthly feature. done

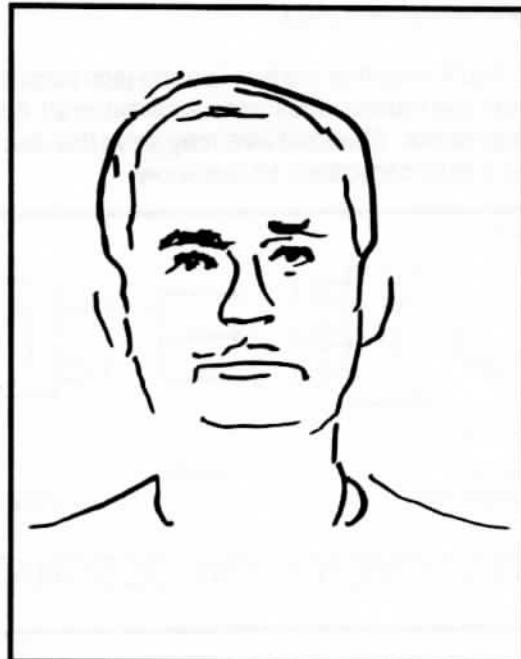
WALTER AND BEV VISIT THE EPCOT ROBOTS

By Walter Bryant

Bev and I visited the EPCOT/DISNEY center in Florida during January (well...Somebody had to do it!), and we used our new VCR cam-corder to record the most impressive "Robot Vision Demo" I have ever seen!

A TV camera was used to "photograph" me and Bev. The image was stored in a computer which performed an "edge detection" process on the black and white two dimensional image. Then a large robot arm with a Japanese style brush "plotted" the sketch in not two, but three dimensions, on a large sheet of paper (see the two sketches below). A narrow line was drawn by just touching the tip of the long tapered brush to the paper, and wider lines were made by pushing the tapered brush in closer to the paper to leave a wider mark.

As you can see, it still needs a little work (unless you ask Bev, then EPCOT needs to be sued!), but it is all done by computer/robot! We have the VCR tape of this and other neat stuff, so come to the meeting and see the whole show!



HERO 2000 VOLUME CONTROL AND HEADPHONE JACK

By Stan Spielbusch

This was my first real "hardware" project for Herbie. I had actually planned to do this while I was putting him together originally, but my impatience to see him completed won out. Anyway, the complete project, including disassembly and reassembly of the head, took about 2 hours. An evening well spent.

The standard HERO 2000 volume control is inaccessible without removing the head, and even then you need a small screwdriver to adjust it. Not something you want to do very often. At home, I want the volume low, especially when testing a program over and over. At the Infomart lobby or meetings, it needs to be loud so people can hear it.

The external volume control is one step. The headphone jack is another solution that's handy. My wife doesn't like to hear the robot over and over either, so now I can use headphones. The jack can also be used as an output to an external amplifier for shows. Anyway, on with the details.

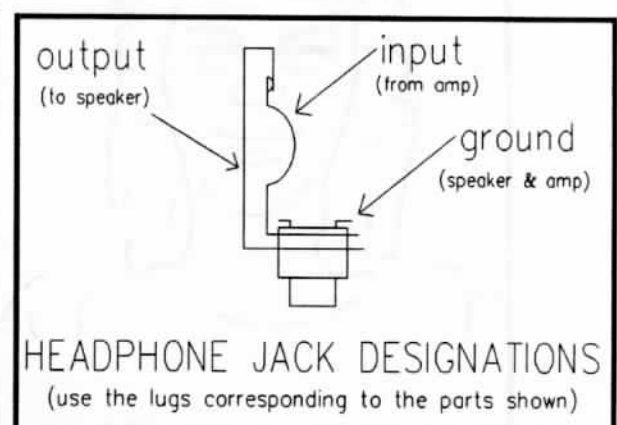
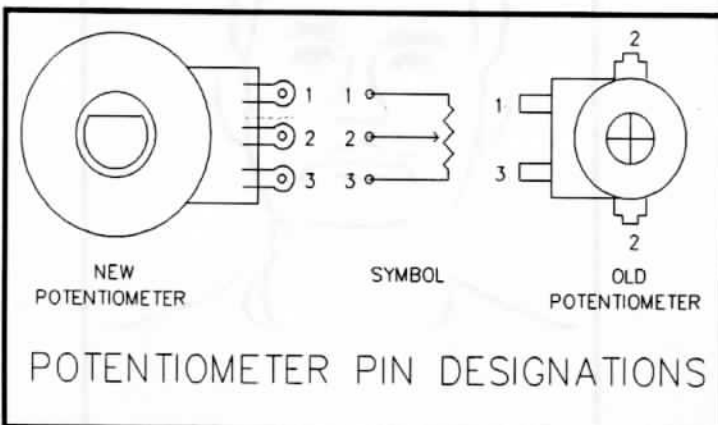
The volume control addition is simply a matter of removing the existing volume potentiometer, and replacing it with 3 wires running to a panel-mounted potentiometer. The pot is 10K-ohms, so be sure to use the same value. I used the average Radio Shack type, with the shaft cut off at about 3/4", and a small black knob (any color knob will work). I mounted it on the aluminum head bottom plate, facing down, right above the disk drive opening on the side of the robot. This makes it very inconspicuous, but easy to get to.

When you wire it up, be sure to get the wiper connection in the right place. The two large side prongs on the original pot should correspond to the middle lug on the new pot. The other two connections may be in either order, depending on which way you want to turn the pot for increased volume. (Since the control is mounted downward, this is a matter of personal taste.)

The headphone jack is also simple. Remove the wires from the speaker, and connect these two to the "ground" and "input" of the jack (see diagram). The violet wire is ground. Leave the 2-pin connector on the other end to connect to the circuit board. Then run two wires to the speaker from the "ground" and "output" of the jack. Be sure to connect the "output" wire to the "+" terminal of the speaker (it's marked).

I mounted the jack near the volume control (on the same panel), in the corner next to the card cage, so the headphone wires don't block the disk drive. Be sure to get the jack close enough to the edge to be able insert a straight headphone plug.

You'll note that the headphone jack output is the same as the speaker output, so turn the volume real low when you use headphones or an external amp! Also, I noticed a lot of noise from the head stepper motor through the headphones. Shielded wire may solve this, but I didn't try it. If any analog-types out there know an easy solution (such as a filter capacitor), let me know.



HERO 2000 CMOS CHIP REPLACEMENT

by Stan Spielbusch

The HERO 2000 has many, many 74LSxx TTL chips in it, which are low power by yesterday's standards, but not today's. (Throughout this article, the "xx" refers to the 2 or 3 digit part number, such as the "04" in 74LS04.) Since the robot is battery-powered, we should make every effort to reduce its power consumption so the battery lasts longer on a single charge, and thus longer overall (replacement batteries aren't cheap).

There has recently been a rapid growth in CMOS TTL chips which are directly pin and function equivalents to the 74LSxx series. They are getting cheaper all the time, and are just slightly more expensive now than the standard TTL versions, but they consume about 1/100th to 1/1000th the power! I haven't calculated the total current difference, but I have estimated a savings of 2 to 3 amps in my HERO. The normal power drain, assuming that the robot will last 6 hours like they say it will, is about 4 amps. If we reduce that by 2 amps, that doubles its battery time!

The cost of replacing all of the 74LSxx chips with the CMOS equivalents (74HCTxx or 74HCTLSxx) is around \$30.00 to \$60.00, depending on whether you have the arm, disk drive, expansion RAM, and experimenter's card. I bought mine through mail-order suppliers like JDR Microdevices and Jameco. Be sure to get their latest prices. Don't go by the ads in the magazine, because those prices could be 6 months old or more (and thus higher). If you can, try to get them through a wholesale distributor, like Quality Components in Dallas. Samsung, Hitachi, and Zytex are a few of the major 74HCTLSxx makers. Also, get 74HCTLSxx chips whenever possible, since these are closer replacements. I have used 74HCTxx (no LS) several places with no problems (yet), but I don't recommend it.

The procedure is simply a matter of carefully removing the old 74LSxx chips and replacing them with their counterparts. I suggest replacing chips in one board (or maybe even just some of them in a board) at a time, then testing all of the associated functions before continuing. If you get a bad chip, it will be much easier to find this way.

EXCEPTIONS:

1. Note that some of the chips are variants, such as 74Sxx, 74xx, or 74ALSxx. Do NOT replace these with 74HCTxx/74HCTLSxx chips! You might be able to replace 74ALSxx with 74AHCTxx chips, since the chip speed is the major factor, but I didn't have these available to try it.
2. Some chips in the HERO are 74HCxx chips. These are already low-power CMOS, and should not be replaced.
3. Do not replace U436 on the I/O board. The low power CMOS chip is too sensitive to the RESET line, and the robot won't go to sleep!
4. The disk controller board has a 96LS02 chip on it. This is NOT a variation of a 74LS02, but an entirely different chip family. Don't replace it!

I haven't replaced a few of the chips because the mail-order houses didn't stock them, such as the '09. Some of the chips aren't available (that I know of) in CMOS, such as the '12 and '37. The complete list of chips I replaced is on the next page, and I haven't had any problems.

HERO 2000 CMOS-REPLACABLE 74LSxx PARTS LIST

<u>74LSxx</u>	<u>QTY</u>	<u>74LSxx</u>	<u>QTY</u>	<u>7LSxx</u>	<u>QTY</u>
ARM CTLR		DISK CTLR		I/O BOARD	
14	5	00	1	273	3
04	1	74	3	244	4
02	1	175	1	30	1
00	1	04	1	04	2
138	1	02	1	00	2
244	4	244	3	32	1
		20	1	74	2
		27	1		
EXPER. BOARD		273	1		
		374	1	MOTOR CTLR	
125	1	32	1	14	3
245	6	241	1	04	1
		138	3	02	1
RAM BOARD		365	1	00	1
138	3	CPU BOARD		138	1
244	5	74	1	244	4
02	1	240	1	DISPLAY (HEAD)	
		125	1	138	2
		373	4		
		244	7		
		32	1		

FROM THE LIBRARY

by Stan Spielbusch

HERO 2000

My SHOWBOT program that was used at the last meeting is in the library now. It's usable, but crude and just begging for enhancements. One intended enhancement is converting it back into one half of a robot-to-PC link (that's how it started). A similar project for the HERO 1 might be interesting.

Not much activity with the library lately. Now that the holidays are over, let's get cracking!

If you have a program to submit, put it on an MS-DOS format disk (double sided, double-density standard format) and bring it to the meeting or send to:

Stan Spielbusch, 2404 Via Barcelona, Carrollton, TX 75006

***** Please ***** include a description of the program, either as comments in the program or as a separate .DOC file. I don't have the time to study each program to figure out what it does!

When you submit a disk, you receive credit for 1 disk in return. Let us know which one(s) you want, or if you just want your original disk back.

We currently have 3 disks in the library -- a HERO-1 BASIC disk, a HERO-2000 BASIC disk, and a HERO-1 Assembler disk.

If you want a copy of a disk, the best way is to bring a blank, formatted PC-DOS/MS-DOS disk to the meeting and trade with me there. If you forget to bring a disk, we will have to collect \$2.00 per disk. Mail-order -- \$3.00 per

CLUB INFORMATION

The Dallas Personal Robotics Group is a non-profit organization of individuals interested in learning about personal robots, sharing ideas, working on projects, and informing the public about the world of personal robotics. We are open to anyone who has an interest in personal robotics, whether or not they currently have a robot, and whether or not they have any knowledge of robotics.

To become a member and receive the newsletter, have access to program library, and be involved in our monthly clubs and user's labs, simply fill out the form below, and send it with \$10.00 to Walter Bryant, Treasurer (address below).

If you are interested, but not sure you want to be a member, feel free to visit our meetings. If you like, we can send you a sample issue of the newsletter.

Tentative Meeting Schedule (1989):

Feb 18 Mar 11 April 8 May 13

Meeting times and location: 2:00 P.M. at the Dallas Infomart.

Club officers:

President: Ed Rivers
Treasurer: Stan Spielbusch

Vice-president: Brian Vaceluke
Secretary: David Ratcliff

Back Issues

Back issues are now available in three sets. Each set is \$5.00, plus \$2.00 postage and handling if ordering by mail. Set 1: From the formation of the club in 1984 through 1986. Set 2: 1987. Set 3: 1988. Issues from 1989 are available for \$.50 each, plus \$.25 each p&h. Contact Stan Spielbusch, Editor, 2404 Via Barcelona, Carrollton, TX 75006.

MEMBERSHIP APPLICATION

Dallas Personal Robotics Group
c/o Walter Bryant, 814 Mockingbird Circle, Lewisville, TX 75067

Check one: () Renewal () New Member () Info Change () Sample issue request

NAME (please print) _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

HOME PHONE (____) _____ - _____ WORK PHONE (____) _____ - _____

TYPE OF ROBOT (if any) _____

TYPE OF COMPUTER (if any) _____ MODEM? _____ BAUD _____

Do you want the above information available to other members? _____