ANDY

The PERSONALITY ROBOT

Users Guide

From

AXLON Inc.

Axlon Inc.
1287 Lawrence Station Rd.
Sunnyvale, CA 94086

ANDY
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Your Andy Personality Robot is fully equipped to do the following:

... Travel forward or backward at approximately 2 ft. per second and 1 ft. per second.

... Spin right and left

... Blink his eyes.

... Produce sounds from his built-in sound generator.

... Detect when he hits something while moving forward.

... React to light.

... React to sound.

... Entertain and compete with your friends by giving ANDY tasks to complete in your home.

... Create and develop ANDY's personality with the PERSONALITY EDITOR and sample basic programs for both the ATARI 800 (48K), 800XL and COMMODORE 64 home computers.

... Save and edit different personalities on your disks. AMAZE your family and friends with the differently acting ANDY that you develop (happy, sad, comical, musical etc....).

CONTENTS:

ANDY
Users Guide
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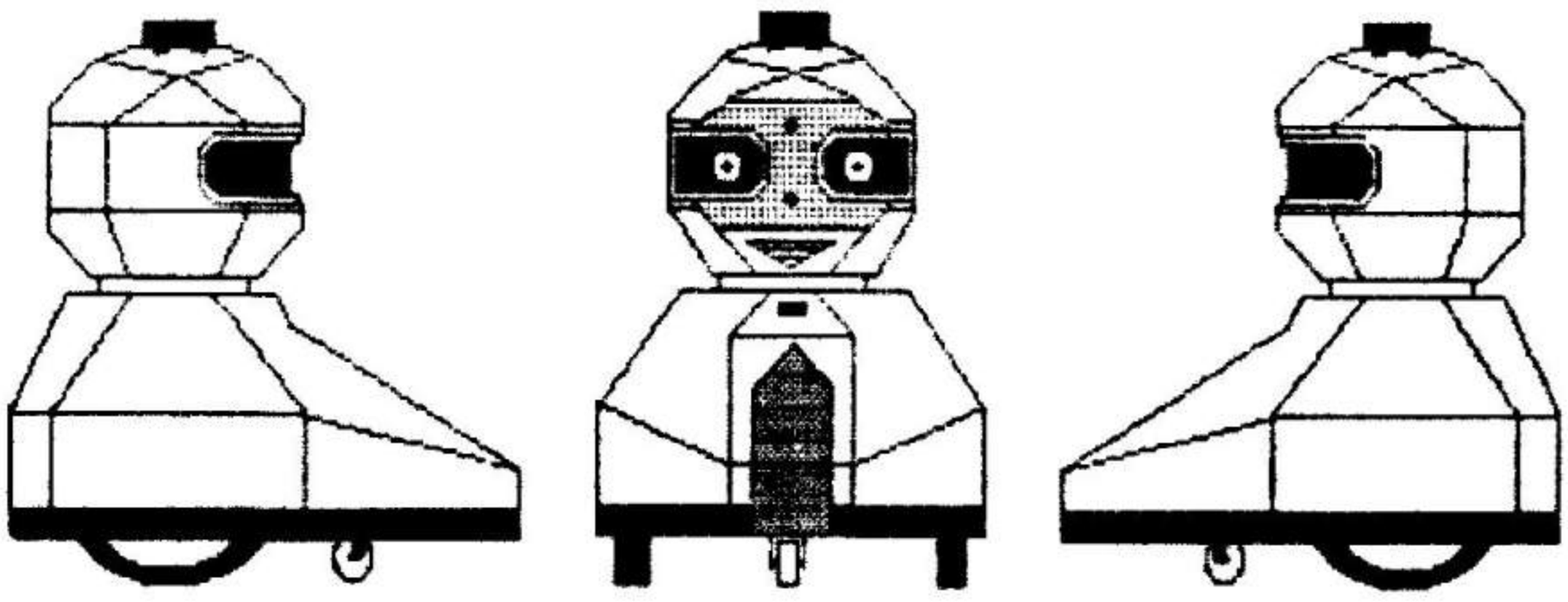
AXLON Inc.

A) How to get Andy started:

1) Installing batteries:



Your Andy robot is fully assembled and ready to go! All you need to do is install the batteries, plug him into your computer, AND AWAY YOU GO!

We suggest you use four ALKALINE TYPE "D" BATTERIES. We especially recommend the heavy-duty alkalines, such as "The Energizer™" or "DuraCell™" batteries. Recharable cells will work in ANDY; you will require four "D" cell equivalents and a recharging unit.

Place Andy head down in your lap. Make sure Andy's on/off switch is in the off position. Use a screwdriver to remove the eight screws (turning counter-clockwise) around the outer edge of Andy's base plate. DO NOT REMOVE ANY OTHER SCREWS ON THE BASE PLATE.

Note: Your Andy may arrive with only some of the screws installed to make first battery installation simpler. The remaining screws can be found in a small bag in ANDY's box.

With the screws removed and while holding the base to the body, turn Andy right-side-up again. Gently pull Andy's body away from the bottom plate, BUT PLEASE NOTE that wires connect the body to the base. DO NOT PUT PULL ON THESE WIRES as you may disconnect a sensor.

Carefully install the batteries with the + and - ends exactly as shown in the diagram on the battery holder. Replace the screws, BEING CAREFUL NOT TO OVERTIGHTEN !

ii) Connection to computer:

Insert the molded plug on the end of Andy's cord in joystick PORT 2 (both on the ATARI and the COMMODORE 64). If your computer is already running (with either the PERSONALITY EDITOR or the demonstration BASIC program), just switch ANDY's on-off switch (on the top of his "chest") to the ON position and ANDY's eyes will light up to show that the power is on and that ANDY is being controlled by the computer. A joystick can also be plugged into joystick PORT 1 to control ANDY when required.

iii) The BASIC Demonstration programs:

Atari 800 (48K) & 800XL:

Insert the Andy Disk, with the ATARI label facing upwards and turn on the computer.

Type *RUN "D:DEMO.BAS"* and press return. (If you would like to LIST or PRINT the program and use portions of it for your own programs, you may do so as there as there are no protection routines and the programs have been documented for ease of use)

Commodore 64:

Place the Axlon command Disk into the disk drive with the Commdore 64 label face up.

Type In *LOAD "ANDYDEMO",8* and press return. Once "ready" appears on your TV screen, type *RUN* and then return. (See LIST and PRINT above).

BOTH THE ATARI AND COMMODORE COMPUTERS:

The software will present you with a list of commands to control Andy.

For each command, enter the first letter of the command you want ("F" for Forward) and then a number for the amount of time units that the command is to be in effect (on the COMMODORE the time will be preset but can be changed with option "O").
Pressing the return key (ATARI) will start ANDY carrying out your command.

For Forward and Backward, each time unit corresponds to about one centimeter (1/3") on the ATARI and 1 foot on the COMMODORE (default time).
For Left and Right units are harder to quantify because they depend greatly on the type of surface Andy is on (and the level of battery charge).

For Eyesoff, each unit is 1/10 of a second that Andy's eyes will be OFF (ATARI only).
eYes on the COMMODORE will turn the eyes ON for 1 second (default time).

Note that you should be able to use the same numbers in BASIC programs you develop to pilot Andy around, so use the basic program as a basis for developing your own programs!

iv) Game suggestions:

Andy is a lot of fun to pilot through an obstacle course ! Once you get the hang of it, try typing in a whole string of commands and see if Andy can make it the whole way without touching any obstacles, or play ANDY golf by placing a card on the floor and programing ANDY to touch it in the least number of entries.

Use the PERSONALITY EDITOR (described fully in the next portion of this manual) to create different reactions as ANDY travels around trying to perform tasks that you have given him.

B) Troubleshooting hints:

i) What happens as the batteries wear out:

If ANDY begins to slow down when moving forwards and backwards or does not turn as far as he used to for a specific command (e.g. R 90), the batteries need replacing. ANDY will continue to function with low batteries, but his movements will not reflect your original intent if specific tasks are being performed (e.g. maneuvering through a maze where your 90 degree turns will reduce to 40 degrees etc....). The volume of the voice will also reduce with battery drain but the pitch will remain the same.

ii) Maybe the computer's broken:

If ANDY stops responding to your program, first check that his eyes are lit up (ATARI), and press "I" for sing on the COMMODORE and hear the tone. If he does not respond turn him off and back on again with the switch on his chest and re-test. If control has not been regained, save your program to disk, turn your computer system and ANDY off, and reload and run the program.

If, when you turn ANDY back on the eyes do not light up on the ATARI or no sounds are heard on the COMMODORE (after pressing "I"), then no signal is being received from the computer. If the trouble persists, the fault either lies in the cabling to ANDY or in the computer itself. The cable can easily be tested by reading the bump switch from your basic demonstation program. If the bump switch is working, then the fault could lie within ANDY and he will need a "check-up" at you local dealer.

If the bump sensor does not seem to work, put a standard joystick into port 2 and press the joystick button with your program running. This will look the same to the computer as ANDY's bump switch being activated, and will register the fact on the screen (use the basic DEMO.BAS program for this test, as the words BUMP DETECTED, and BUMP on the COMMODORE, will appear). If the joystick "test" does not work, then the problem probably lies in the computer and it should be taken back to your local service center for testing.

C) ANDY'S specifications:

HEIGHT	13.50 inches
WIDTH	9.25 inches
FRONT TO BACK	13.00 inches
BODY GROUND CLEARANCE	1.25 inches
WEIGHT (Excl batteries)	3.50 lbs
CABLE SUPPLIED	9.00 ft (can be extended to 40 ft)
POWER (NOT supplied)	4 - "D" cells
SENSORS (internal-supplied)	Bump (front), Sound and Light
EYES	2 - LEDs
MOTOR/GEARBOX	2 - 6 volt dc brush motors and magnetic coupled clutch.
PACKAGE CONTENTS	1- assembled ANDY 1- Users' Guide (including PERSONALITY EDITOR manual) 1- AXLON command disk* (COMMODORE side 1: ATARI side 2)

* Command disk includes PERSONALITY EDITOR and sample basic programs for COMMODORE 64 and ATARI 800 (48K) and 800XL called DEMO.BAS.

The Personality Editor

From

AXLON Inc.

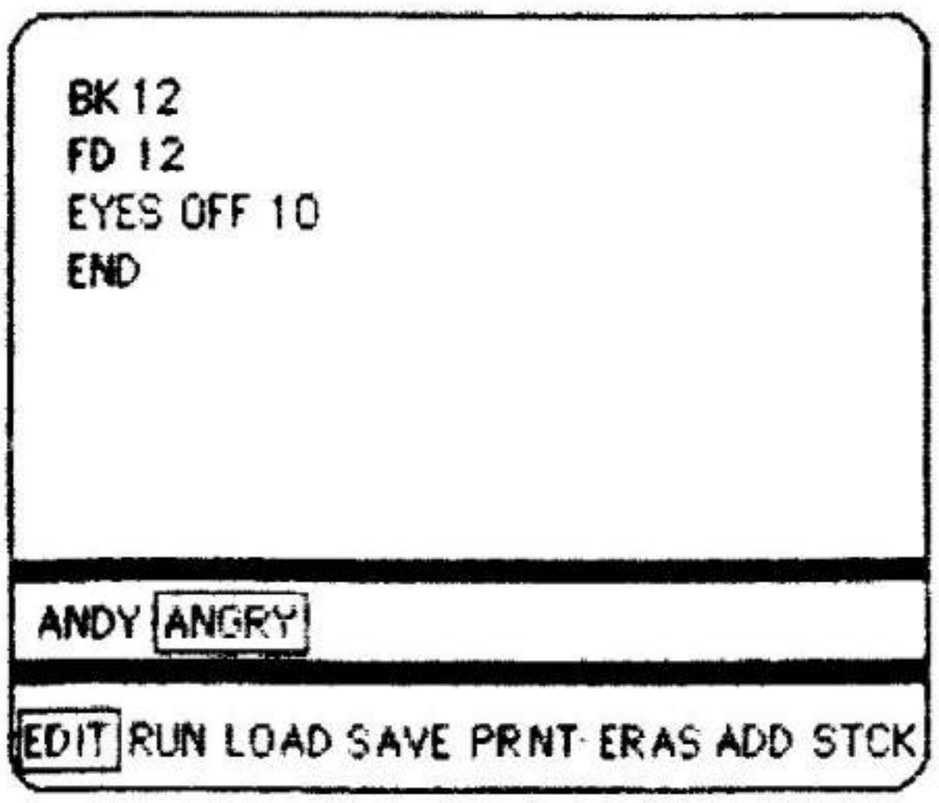
The PERSONALITY EDITOR is a disk-based program allowing the user to create, edit, review and test ANDY'S personality in a simple, easy-to understand way. To start the PERSONALITY EDITOR on the ATARI simply hold the OPTION key down and turn on the computer. The DOS menu will then appear. Type "L" and then "EDITOR" in response to the file name. Press return to load and run the editor. To run the EDITOR on the COMMODORE type (at "READY") LOAD "EDITOR",8 and press return, then type RUN and return. The program will then load and run. The opening graphic screen will stay for approximately 30 seconds or until the space bar is pressed.

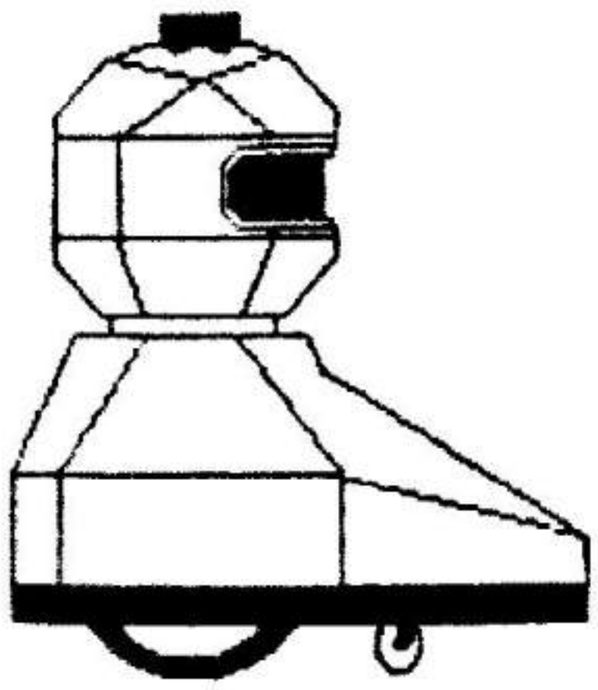
Your command disk has the ATARI version on one side and COMMODORE on the other. The EDITOR opening screen has a "control" line across the bottom with a cursor lighting up the word EDIT, with a subroutine named ANDY in the line above the command line. ANDY is the "default" name for your first subroutine. The cursor can be moved along the line to the other selections by pressing the SELECT (ATARI), and F3 on the COMMODORE. ADD allows you to create a new subroutine name, subroutine names can be selected with the OPTION key (F1 on the COMMODORE); select EDIT to change an selected subroutine. When you have highlighted your choice, press the START on the ATARI (F5 on the COMMODORE) and your choice will be selected.

Move the cursor along the control line to the ADD choice and press start (F5). The computer will ask you for the name of this subroutine. Type in *ANGRY* and press return. Using the SELECT key (F3) select EDIT and press start (F5). The cursor is now in the top blank section of the screen awaiting your instructions.

The line above the control line now contains the new word ANGRY (to the right of ANDY), which confirms that the ANGRY subroutine exists and can be selected for changing later if desired.

1. Type *BK 12* The command BK tells ANDY to move backwards, and the 12 means that he will continue for 12 units of time. Then press return to complete this line.
2. Next type in *FD 12* (forwards for 12 units of time), and press return.
3. Now type *EYES OFF 10* (*EYES ON 10* on the COMMODORE) on the next line. (This will make ANDY stop and blink his eyes for 10 units of time.)
4. Type *END* and return. This tells you and ANDY that the ANGRY subroutine is ended.
5. We have finished creating the new subroutine ANGRY, so exit by pressing the ESC key (or arrow-left <top left key> on the COMMODORE), which returns the cursor to the control line at the bottom of the screen from edit.





Sample program 1

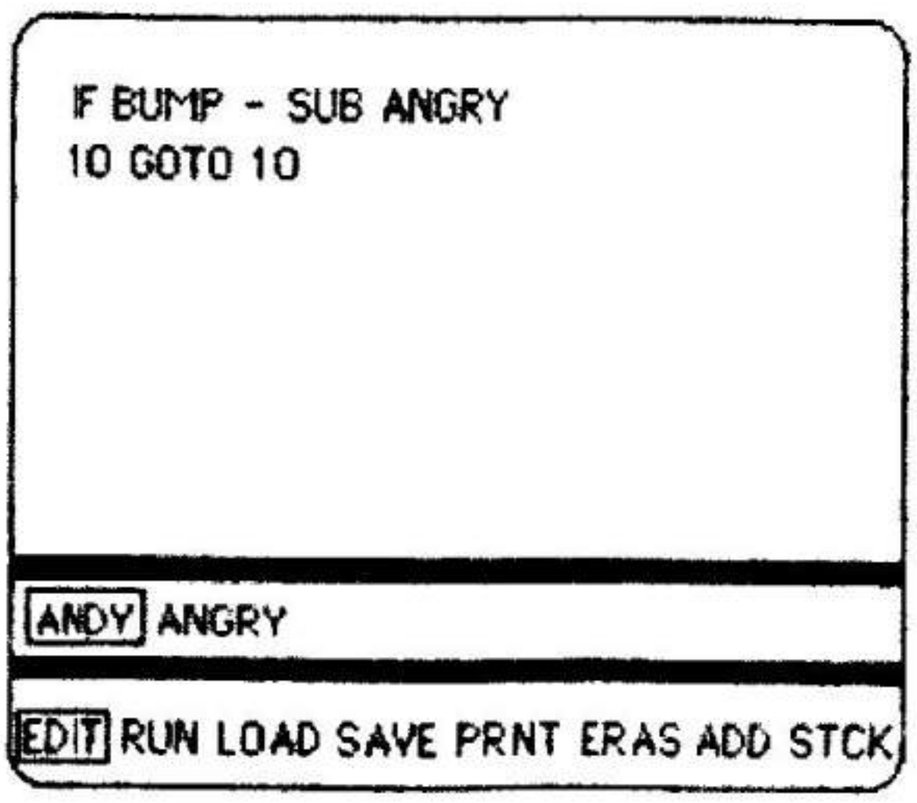
Now move the cursor with the SELECT key (or F3 on the COMMODORE) to the command EDIT, and with the OPTION key (F1 on the COMMODORE) move the cursor along the subroutine line. As we are going to create a "main" program and not a subroutine, place the cursor over the word ANDY and press start (F5). The top of the screen where you were typing is now empty and the cursor is waiting for instructions to be entered (or for editing later). As we have not yet typed in an ANDY program, let's start by typing *FD 20* and pressing return. Press the ESC (arrow-left) key to return the cursor to the control line, select RUN and press START (F5). ANDY will move forward for 20 units of time and then stop. If ANDY did not move, check that the power switch on ANDY'S chest is in the ON position (towards the red dot). ANDY will wait for a command with his eyes lit up (except in STCK mode) but they will go off when another command is being executed.

If STCK is selected on the command line and START is pressed, ANDY can be "driven" back to you using the joystick. If the joystick button is pressed, the cursor will return to the control line.

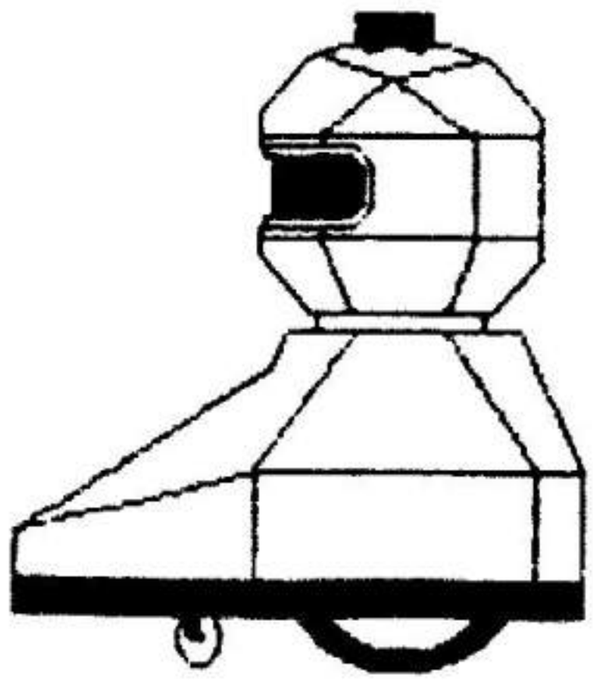
Let's check out ANGRY from the main program (ANDY). Use the SELECT (F3) key to choose the EDIT command and press START. Just type the words *SUB ANGRY* over the previous program (FD 20) and press return. Press the ESC key (arrow-left), select RUN from the control line and press START. ANDY will move backwards, forwards and then blink his eyes. Please note that using the OPTION key (F1) to select ANGRY and then SELECTing RUN and pressing START (F5) with ANDY selected would have had the same effect on ANDY (i.e., running the ANGRY routine).

Now let's try to create a small main program and use the subroutine ANGRY. At the main EDIT window, delete the line SUB ANGRY that we typed in above, or just type over it with *IF BUMP - SUB ANGRY* and press return then type *10 GOTO 10* and press return. Let's try it. Place ANDY so that he can move around a bit. Make sure that his power is on, press ESC (arrow-left), select RUN from the control line and press START (F5) key. ANDY will not move, BUT now press the small area at the lower front of his body and ANDY will jump backwards, then forwards and blink his eyes.

Well, that was your first ANDY program with a subroutine started from a sensor. 10 GOTO 10 was entered so that the program would continue to run (and not end). Running this program will leave ANDY'S bump switch working with your subroutine called ANGRY every time it is pushed, until the program is stopped by pushing the esc key (ATARI) NOTE: COMMODORE OWNERS NEED TO PRESS THE "Z" KEY TO STOP ANDY'S PROGRAM THEN THE ARROW-LEFT KEY WILL FUNCTION.



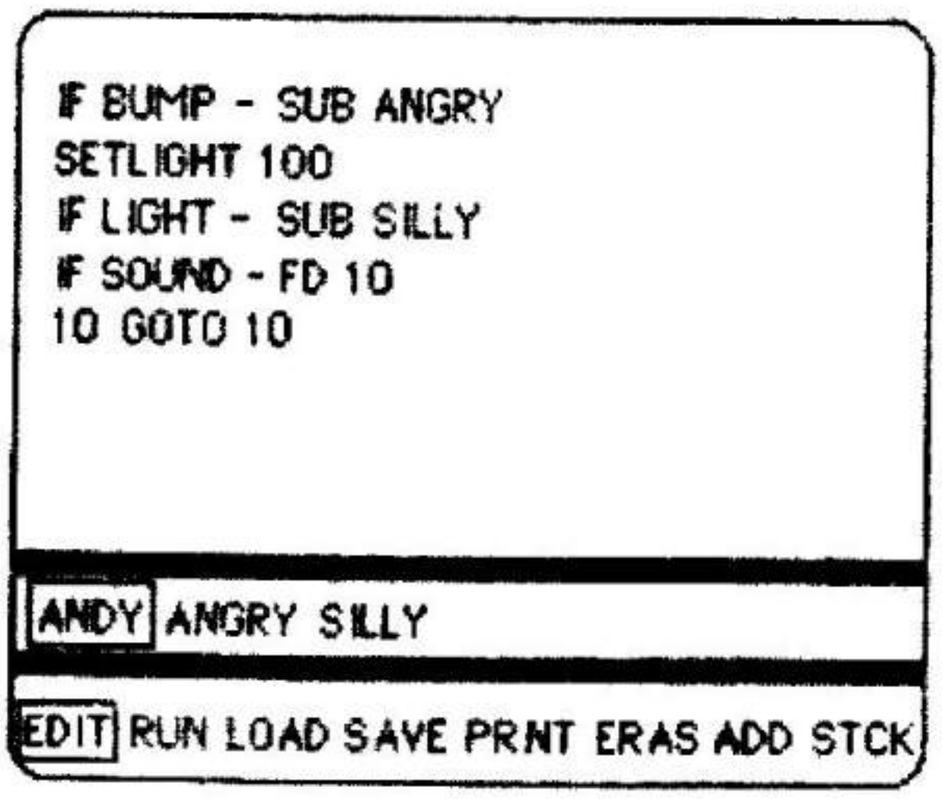
Sample program 2



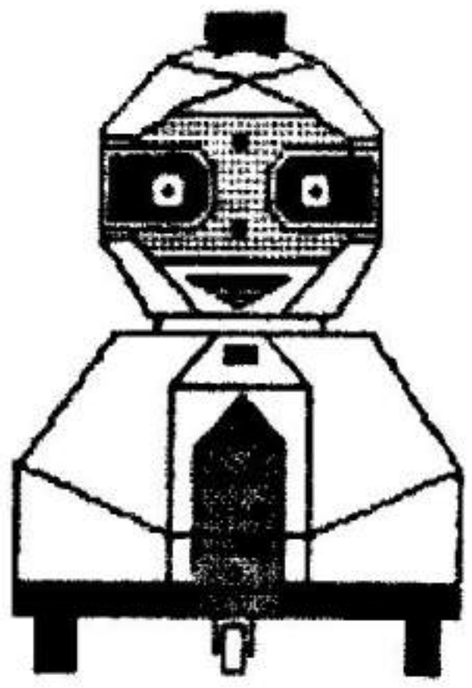
Now you can explore different ways to use ANDY. Why not have him "ANGRY" after a bump and "SILLY" if he sees a light. Just create a subroutine called SILLY and command ANDY to do whatever you want. Type in a program that has the same line 10 as in the previous program, and type a new line that says *IF LIGHT - SUB SILLY*. The last line should be *10 GOTO 10*.

Selecting RUN now will make ANDY "ANGRY" when a bump is detected, but will make him "SILLY" whenever a flashlight is shone in his face. This program can now be expanded to contain movement commands (RT=right turn, LT=Left turn, BK and FD). Don't forget to type in a number of units for each command.

If ANDY appears "SILLY" when you do not expect it, he is probably seeing light through a window or from a lamp. The amount of light that triggers the sensor is determined by the *SETLIGHT NUMBER* in your program. The setlight number can be anything from 1 to 255; "1" will only work with very bright light, and "255" will probably be on all of the time in a day-lit room.



Sample program 3



The control line (along the bottom of your screen) contains other functions in addition to those already covered (e.g. LOAD, SAVE, PRNT & ERASE). These commands, when selected and enabled with the START key, will act on the subroutine chosen with the OPTION (F1) key. The PRNT command will print the selected subroutine on a standard ATARI or COMMODORE serial printer.

The other two sensors (sound detection and light detection) are used in the same way, using the words with SETSOUND & SETLIGHT respectively to set the sensitivity of the sensors (sample 3).

PLEASE REMEMBER TO SAVE YOUR PERSONALITY PROGRAMS AND ALL YOUR ROUTINES BEFORE TURNING OFF YOUR COMPUTER OR ALL WORK WILL BE LOST!

LOAD allows you to reload personality programs and all the routines that you have previously created and saved. Select the name of the routine to be loaded using the OPTION (F1) key, or ADD the name required to the subroutine line. Pressing START with LOAD selected will then prompt you with the name selected (with .PER after it). If the name is correct, press return to load it into the computer (and see it on the screen). If not, the name can be edited. The SAVE selection has the same name prompts and puts .PER after your entered name. Pressing return will save the program showing on the screen when save is SELECTed and START is pressed.

The ERASE command will clear out a selected subroutine and remove its name from the subroutine line. ERASE also allows you to clear the main program, BUT AT LEAST ONE NAME MUST BE LEFT ON THE SUBROUTINE LINE (the last one CANNOT be erased). The ERASE command would be used after you have saved a program and want to create a new personality for ANDY.

As you progress there will be times when other commands would be useful to enhance your programming abilities. Additional commands are available in the editor. These include:

COUNT LIGHT, COUNT SOUND & COUNT BUMP. These 3 commands set up counters for the number of times that the respective sensors have been triggered.

LIGHT COUNT, SOUND COUNT & BUMP COUNT. These commands are paired with those above and are used when, for example, you want to send ANDY off driving around a room and have him do something different after he has bumped an object 3 times.

1. In your program you would first tell the computer to *COUNT BUMP* (this starts the count for BUMPS from zero).

2. Type the command *IF BUMP COUNT = 3 - SUB ANGRY*

This command will make ANDY do whatever you have previously told him to do when he detects the first two bumps (e.g. *IF BUMP - SUB SILLY*), but on the third bump he would do the subroutine ANGRY instead, and then return to your main program.

The other two sensors (sound detection and light detection) are used in the same way, using the words with sound and light respectively.

Mathematical signs can be used with the lightcount, soundcount and bumpcount commands. For example, *IF BUMP COUNT > 5 - SUB ANGRY* (if the bump detector has been triggered more than 5 times then he will always do the subroutine ANGRY). This enables ANDY to appear to have more personality than always doing the same thing when a sensor is triggered.

Perhaps the most powerful capability is your being able to program random numbers into ANDY so that he becomes truly unpredictable EVEN TO YOU. This is achieved with a simple question mark followed by two numbers enclosed in parentheses and separated with a comma.

? (12,24) This command will give the program a random number between 12 and 24 (incl.).

Uses of the ? would include telling ANDY to possibly get ANGRY if he bumped into something over 10 times, but the exact number will change every time, or to create sounds that are random (see voice examples on the next page).

IF BUMP COUNT = ? (10,20) - SUB ANGRY

The ? is also used with the commands PAUSE & WAIT. This word in a program will make ANDY wait until an amount of time has passed or until a sensor is triggered.

PAUSE 10 This will make ANDY pause for 10 units of time before proceeding.
PAUSE ? (1,10) Will make ANDY pause for up to 10 units of time before proceeding.
WAIT BUMP This will make ANDY wait for a bump before continuing with his program.

If a program line has the word SLOW in it, ANDY's motors will move at approximately half speed until the program says FAST. But remember that ANDY is programmed with units of time, not distance, so he will not travel as far or turn as sharply if he is set on SLOW as he would with the same command set on FAST.

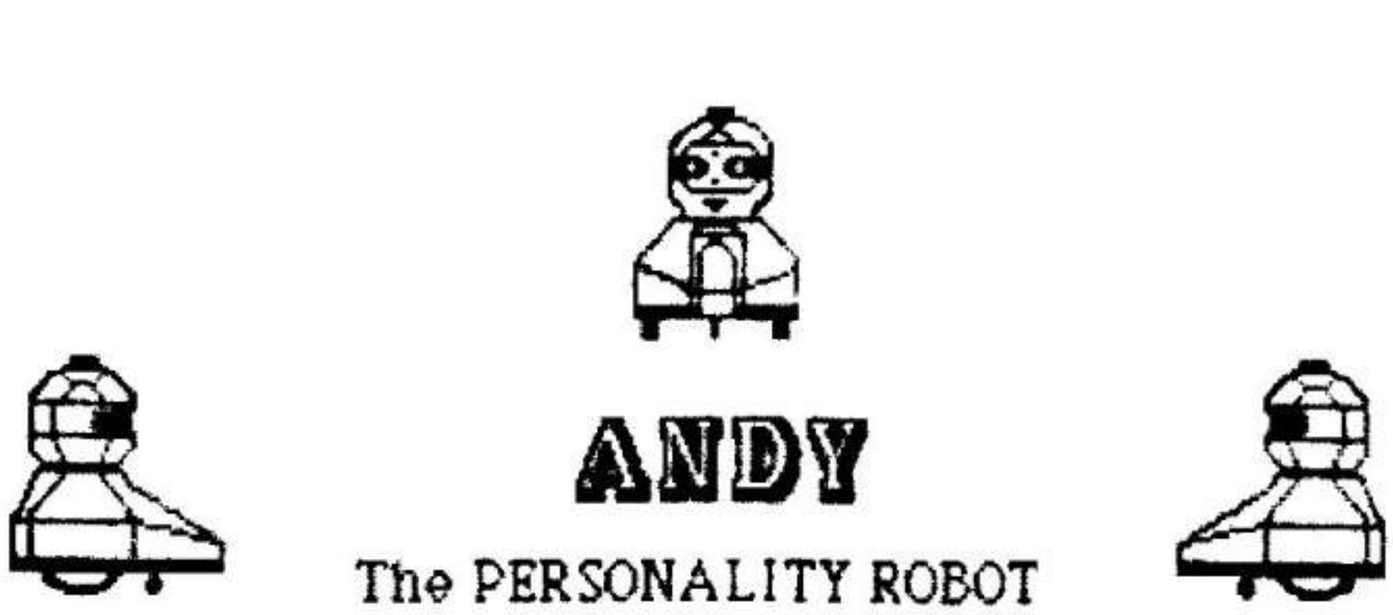
Don't forget to put END at the end of each subroutine. This is needed to conserve memory by telling the editor the exact length of your subroutine.

The word STOP can be used in a program, to reset the sensors when you require it. Pressing the ESC (ATARI) & Z (COMMODORE) will stop the program and return control to the command line.

The CLR/HOME key on the COMMODORE will insert a whole line for ease of editing, the shift key and CLR/HOME will delete a line. Holding the shift key and pressing SELECT/OPTION/F3 orF1 will reverse the cursor's direction along the control or subroutine lines.

The remaining commends control ANDY's voice. ANDY has an 8 note voice (1 to 8) that can remain constant or increase/ decreese in frequency. With these commands, whistling sounds, hoppy sounds, etc., are achieveble. Please note that ONLY 1 to 8 will create valid notes from the PERSONALITY EDITOR.

VOICE 2 FOR 20 will produce the 2nd note for 20 units of time.
VOICE 2 TO 8 will produce a rising sound from 2 to 8 and then stop.
VOICE 8 TO 1 will produce a lowering sound from 8 to 1 and then stop.
VOICE ? (2,4) TO ? (6,8) will produce a random sound of 2 to 4 going up to 6 to 8.



The next page contains a list of commands for the PERSONALITY EDITOR. After reading this manual and experimenting with ANDY for a while, you may want to remove the commend page for use as a reference guide to help you develop your ANDY PERSONALITY programs.

The Personality Editor

From

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If you want to control ANDY directly from BASIC or LOGO, a list of the registers that control him is provided, and a sample program has also been supplied on your comand disk. To run this program, change it for your needs, or to find out how to program certain parts of ANDY, use one of the following commands:

ATARI 800 (48K) & 800XL LOAD "D: DEMO.BAS" Once loaded, type RUN or LIST
COMMODORE 64 LOAD "DEMO.BAS",8 Once loaded, type RUN or LIST

The programs have a screen set up to give you a list of all the locations and ways to control ANDY. Copy this list or print out our program for all the information that you need to enable ANDY to be controlled without using the PERSONALITY EDITOR.

Using ATARI LOGO, for example, the PEEKS AND POKES need to be changed to .EXAMINE and .DEPOSIT respectively.
The memory locations and the numbers put in them will remain the same.
STICK(0) and STICK(1) are called JOY0 and JOY1 in ATARI LOGO,
and Trig(1) is equivalent to JOYB1.

COMMAND LIST:

IF "Sens" - SUB "Subname" - GOTO "Line number" - "Command"	Goto a subroutine, line number or command when a sensor is triggered.
FD "n"	Move forward "n" units of time.
BK "n"	Move backward "n" units of time.
RT "n"	Spin to the right for "n" units of time.
LT "n"	Spin to the left for "n" units of time.
FAST	Default motor speed for FD,BK,RT & LT.
SLOW	Half motor speed.
EYES OFF "n" (ATARI)	Turn off L.E.D. eyes for "n" units of time.
EYES ON "n" (COMMODORE)	Turn on L.E.D. eyes for "n" units of time.
PAUSE "n"	Stop everything and wait for "n" units of time.
WAIT "Sens"	Stop everything and wait for "Sens" to be triggered before continuing with the PERSONALITY PROGRAM.
?(n1,n2)	Any number between "n1" and "n2".
VOICE "n1" FOR "n2" NB. 1 to 8	Turn on sound "n1" for "n2" units of time.
VOICE "n1" TO "n2"	Sound "n1" will rise/fall to "n2" in predefined steps.
COUNT "Sens"	Count the number of times that "Sens" is triggered.
IF "Sens" COUNT = "n1" - "Subname" > "n1" - "line number" < "n1" - "command"	Once "Sens" has been triggered "n1" times goto "Sub" or line number. Mathematical expressions CAN be used.
GOTO "Line number", "n" TIMES	Go from current line number to "line number" or SUB "subname""n" times before continuing with the program.
SUB "Subname", "n" TIMES	
SETLIGHT "n1"	Sets the number (1-255) that triggers the light or sound sensors. 1 is least sensitive, 255 is the most.
SETSOUND "n1"	
STOP	This will reset ANDY's sensors in a program.
END	Used to END a subroutine and to END the main program.
JSTCK	Gives ANDY control to a joystick in port1, stopped with joystick button (same as STCK on command line).

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PROGRAMMING HINTS:

i) GENERAL

When programming ANDY from BASIC, be careful when reading the sound sensor as the motor noise will be detected. In the BASIC demonstration program, whenever the motor is started the sound detector is "switched off" with a flag in the program. As soon as the motor is stopped (ie., The program is set to receive data from the sensors) then the flag is changed so that the sensor will be received again.

The light sensor will also trigger when a bright window is seen so be aware of the area that ANDY will drive around and set the light sensitivity to whatever you want him to see.

When programing the voice, the higher the sound number (lower tone) the longer the duration of the sound. There is a limit to the number that can be used; in general, 100 will be the maximum (these numbers will produce slight changes in sound, the PERSONALITY EDITOR is pre-set for 8 notes). Sounds will vary within the tolerances of each ANDY by a small margin.

ii) ATARI 800 (48K) & 800XL

The ATARI handles ANDY very easily, the list of commands and locations are in the BASIC program as selection 3 from the main menu. The voice command requires the screen to be blanked out and a small machine language subroutine. The routine is at the end of the BASIC program, and will only load if the program is NOT already installed.

The locations for the voice are:
1) POKE 1776, X & POKE 1777, Y. A whistle of note X rising (or falling) to note Y will be obtained with a USR(1539) command (either in direct or program mode.)
2) POKE 1776, X & POKE 1778, Y & POKE 1779,255. A note X will continue for duration Y. Note the second loop controlled by 1779, this register controls an innerloop for the duration. (ie., 1778=10 and 1779=255 will be the same duration as 1778=255 and 1779=10). This is started with a USR(1536) command.

iii) COMMODORE 64

The COMMODORE 64 computer has a keyboard interrupt system that has to be disabled in order to use the joystick ports to control ANDY. POKE 49152,120 & POKE 49153,96 to set up the machine code. To start this routine simply type SYS 49152 before sending program instructions to ANDY and then type a BASIC "PRINT" statement. POKE 56322, 255 & POKE 56320, 127 to re-enable the interupts and keyboard. DO NOT TRY THIS EXCEPT FROM WITHIN A PROGRAM, AS THE SYS CALL WILL DISABLE THE KEYBOARD AND STOP YOU TYPING IN YOUR COMMAND.

Voice locations are:
1) POKE 49197, X & POKE 49198, Y. A sound X going to Y will be obtained with a SYS 49158 (from a program or direct mode, assuming the BASIC command program has been run once.)
2) POKE 49197, X & POKE 49186, Y & POKE 49187, 255. A sound X will be obtained for duration Y with a SYS 49155. Like ATARI the duration can be controlled with two registers.

Additional locations are in the BASIC program supplied on the your command disk. Typing "H" from the initial menu will print on the screen all the locations required for control of ANDY.

ANDY

Users Guide, Personality Editor & BASIC Guide

From

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Every effort has been made to ensure the accuracy of the product documentation in this manual. However, because we are constantly improving and updating our computer software and documentation, Axlon Inc. is unable to guarantee the accuaracy of printed material after the date of publication and disclaims liability for changes, errors or omissions.

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