SMART

ZAP

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INTRODUCTION TO SMART ZAP

Smart Zap Prom Programmer is a compact, high performance, stand alone system. Capable of many I/O standards, it communicates in both serial and parallel modes. Smart Zap has been designed for high performance at a low cost. It provides exceptional versatility and ease of operation. The heart of Smart Zap is the 8031 microcontroller, an 8 bit, 3.6Mhz device, with serial I/O , timers, parallel ports, and ram built in.

To operate Smart Zap:

1. Install a personality module in the U12 socket.

2. Choose proper dip switch settings from Table 1.

3. Install the master PROM in the center socket (U11), and the PROM to be zapped in the left socket (U10). NOTE: For 24 pin devices, (2700's and 2800's) the top two pins (on each side) of the master and zap sockets are not used.

4. Turn the power on, the red and green LEDs should flash then the yellow LED should light.

If you have any questions about the operation or assembly of the Smart Zap PROM programmer, then please call or write:

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WARNING: This unit contains static sensitive devices, handle it with care.

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SMART ZAP OPERATION, STAND ALONE

Stand alone mode (Dip switches 3 and 8 both off).

Before applying power be sure the proper personality module has been installed for the EPROM being used. See PERSONALITY MODULE SCHEMATICS for proper assembly of the personality modules.

Turn the power on and the red and green LEDs will flash, now you are ready to enter either the VERIFY or the ZAP mode.

VERIFY: This mode will verify the master to the clone chip. To do this simply push the (verify) button. The red and green LEDs {see note 1} will flash together, showing that Smart Zap is busy. When this operation is completed a green lamp will be given for pass or a red lamp for fail.

ZAP: The Zap mode is entered by pushing the red (zap) button. If dip switch 1 is on, the verify erase before zap mode is active. The program will first verify that the clone chip is erased. If the verify erase fails the red lamp will blink 4 times then remain on. If the verify passes then the program will go into the zap routine. While in the zap routine the red and green lamps will flash, showing that the Smart Zap is busy. When the zap and verify are completed a green lamp is given for a pass and a red lamp is given for a fail. If dip switch 1 is off the program will go straight to zap without verifying erase and the indication at completion will be the same as above.

Verify Erase: To verify that a chip is erased all you have to do is install the chip and push the Zap and Verify buttons at the same time. A red lamp indicates the chip is not erased, and a green lamp indicates that it is.

Power must be off before inserting or removing any device in a SMART ZAP socket.

EEPROM PROGRAMMING

Dip switches 1 and 2 serve a different purpose when SMART ZAP is used to program EEPROMs.

Dip switch 1 will cause FFH (256) to be written into each location before it is zapped, if the dip switch is in the on position

Dip switch 2 will cause WE (write enable) to be a pulsed signal if it's on and a held signal if it's off. Many EEPROMs only require WE to be pulsed at the beginning of a write cycle, but some like SEEQ's 52BXX series require that WE be held for the entire write cycle.

{note 1} For simplicity we will refer to LEDs (light emitting diodes) as lamps throughout the remainder of this manual.

SMART ZAP OPERATION

External mode, Serial or Parallel (Dip switch 3 on, 8 off)

When Smart Zap is powered up in the external mode it will wait in the command mode, indicated by the yellow lamp being on, for a valid command to be received. When a command is received it will be executed immediatly, and upon successful completion the program will return to the command mode. Following are the valid commands:

Command Word Hex	Decimal		Mode
F0H	240	(or Zap button)	Zap
F5H	245	(or Vfy button)	Verify
F6H	246		Verify erase only
F7H	247	(or both Zap & Vfy)	Upload
F9H	249		Setup Changes
FAH	250		Timing Changes
FBH	251		Module Read
FFH	255		Null
61H a	97	a	Error Return on
53H S	83	S Upper case.	Motorola Hex
50H P	80	(error return mode only)	End Binary File
3BH ;	59		Mostek Hex
3AH :	58		Intel Hex
40H	64		MASTER CLONE
80H	128		

Proper execution of the chosen mode will be indicated by a green lamp. While the routine is being performed the green and red lamps will alternately flash. The lamps alternate each time 32 characters have been received. If you wish to return to the command mode, while in one of the above modes, simply press the Zap and Verify buttons at the same time and release them. This should give you a yellow lamp, and put you back in the command mode.

If an I/O input failure has occured while executing a mode, the red lamp will flash on and off. The indicated failures are:
2 blinks, unknown command received, 3 BLINKS - EOF MISSING
4 blinks, checksum failure (hex format only), ← verify Bad IN Normal Mode
5 blinks, bad hex format,
6 blinks, input buffer overflow,
7 blinks, no stop bit received.

ERROR RETURN MODE:

In the 3 line echo mode an error is indicated by echoing the complement of the received byte, then the following information will be sent: the address where the error occured, in high byte low byte order, the data byte as received by the Zapper and the data byte as read from the programmed device (ie EPROM, EEprom).

In the 5 line mode, "F" (46H) is sent to the host computer if a failure occurs, then the Zapper sends the same error data as in the 3 line mode. When the end of file is reached the Zapper will send a "P" (50H) if the command has not failed.

The following are examples of how to use the different commands:

Zap (binary data):
Send F0H (240) followed by the data to be zapped. Or you can push the ZAP button followed the zapping data.

Verify (binary data):
Send F5H (245) followed by the data to be verified with the chip in the zap socket, or push the Verify button followed by the zapping data.

Verify Erase:
Send F6H (246) only.

Upload (binary data):
Send F7H (247) or push the Zap and Verify button at the same time. Now send 40H (64) or push the Zap button, if the data to be sent out is from the master socket, or send 80H (128) or push the verify button, if the data to be sent out is from the clone socket.

Setup Changes:
Send F9H (249) then the start address high byte, the start address low, the end address high, and then the end address low. The setup change can be used for zapping, verifying, or uploading from one location thru all locations.

Timing Changes:
Send FAH (250) then the overzap byte, the loopmax byte, then the delay time highbyte then lowbyte. Overzap byte is used in the fast zapping mode (dip switch 2=on) Overzap pulse equals the overzap byte times the loop count. The loopmax is the number of times the program will try to zap a location. Overzap byte and loopmax byte are standard Intel designations, set to that standard unless changed. See an Intel manual for a complete explanation. The delay time bytes are a value used to generate the 1 millisecond delay when zapping, it is normally set to 0133H (307) but can be made smaller if necessary.

Module ID Code:
Send FBH (251) then receive back the module ID code followed by the Beginning Address (high then low byte) and Ending Address of range to be zapped.

Null:
Sending FFH (255) does nothing in the command mode. This command is used to compensate for software discrepancies in some computers in the area of the transmit buffer.

Error Return on:

Send 61H (97). This command enables an enhanced error response mode for the first operation which follows it only. When an error occurs it causes the address where the error occured, in high byte low byte order, to be sent back to the host computer, followed by the data as received from the host computer then the data as read from the programmed device (ie EPROM, EEPROM).

Zap Motorola Hex:

The first byte in a Motorola Hex file is always 53H (80), when Smart Zap receives this command it will assume that you want to use the following data to zap a device unless you have performed the Verify Hex sequence.

End Binary File:

This command is only used if Error Return mode has been enabled. Send 50H (80) to indicate the end of a binary file has been reached. This command can't be used to end a file before the preset number of bytes have been sent. The preset number of bytes is determined either by the default number of bytes in the device being programmed or by the range allowed by use of the Setup Changes command.

Zap Mostek Hex:

Same as Motorola hex except the first byte is always 3BH (59).

Zap Intel Hex:

Same as Motorola hex except the first byte is always 3AH (58).

Verify Hex:

Hold down the Verify button before powering up the Smart Zap unit, continue to hold the button down until the Good lamp stays on, about 2 seconds. When the Verify button is released the Green lamp will go off, and the unit is ready to verify from a hex file.

*NOTE: If echo mode is on then Smart Zap will expect an echo of all words it sends, and it will echo all words it receives. If a failure occurs while in echo mode the data will be complemented before it is echoed back, this is a software signal to the host computer that a failure has occured.

OUTLINE OF CIRCUIT OPERATION FOR SMART ZAP

C1,R1	Power on system reset.
Cy1	3.6Mhz Crystal.
PS1	Power supply, produces +15VDC and -15vdc. +30vdc is developed by a voltage doubler.
U1	Parallel port, input of dip switch and external parallel data.
U2	Parallel port, output of address and input/output of data to eproms.
U3	Parallel port, monitors the verify and zap switches and reads the personality module's ID code.
U4	Address latch, gets LSB of address from U6 and latches address when ALE goes high.
U5	Program memory, ROM that contains the processors control program as firmware.
U6	MCS51 Microcontroller "8031".
U7	Output buffer, open collector device.
U8,U9	Translators, translate TTL levels to RS232C levels.
Q6	+5VDC regulator.
Q4	VPP regulator and switch, R17 and R18 adjust the 25VDC level. Q3 controls the VPP low level, when U7 pin 4 is low, Q3 is off allowing VPP to go high. When U7 pin 4 is high then Q3 is on causing the VPP low level. C16 and C17 are used for wave shaping. Q1 and Q2 are active during power down, if +5vdc is low then VPP is also forced low.
Q5	+5/+6VDC Regulator, R21, R22, and R26 are used to select +5vdc. When U7 pin 2 is open Q5 goes to +6VDC.

SUMMARY OF TEST MODES
(See table #3 for dip switch settings)

NOTE: Master, Clone, and Personality Module sockets are not used for the test modes, and should be empty. All DIP switches are assumed to be off before beginning a test sequence.(Dip switch on=1 off=0)

Dip switch test:
Turn power off.
Set switches 1, 2, 3, 8 on
Turn power on.
The red and green lamps flash twice.
All DIP switches off gives a green lamp.
All DIP switches on gives a red lamp.
Alternating switches (on-off-on...) gives a yellow lamp.

Lamp and push button switch test:
Turn power off.
Set switches 1 and 8 on.
Turn power on.
The red and green lamps flash twice.

Lamp test: 3 seconds after power on the lamps will sequence in this order: red, yellow, green.

Switch test: each time a button is pressed the corresponding lamp will change from off to on or on to off.
Push the verify button for the green lamp,
Push the zap button for the red lamp,
Push both buttons for the yellow lamp.

VCC1 Test:
Turn power off.
Set switches 2 and 8 on.
Turn power on.
The red and green lamps flash twice.
When the green lamp is on then the 5VDC level is active, when the red lamp is on the 6VDC level is active and when the yellow lamp is on the pulse test is active. Press the Zap button to move from one test to the next. Attach your meter to ground and the +5/+6 volt test point (see the parts lay out for test point location). +5vdc and +6vdc should be within + or - 3% , pulse rise and fall times should be less than 60 micro seconds, pulse goes from 5 to 6 volts.

VPP Test:
Turn power off.
Set switches 1, 2, and 8 on.
Turn power on.
The red and green lamps flash twice.

VPP Test continued:
When the green lamp is on then the Vpp low level (0vdc) is active, when the red lamp is on the Vpp high level (25vdc)is active and when the yellow lamp is on the pulse test is active. Press the Zap button to move from one test to the next. Attach your meter to ground and the Vpp test point (see the parts lay out for test point location). +25vdc should be within + or - 2%, 0vdc should be between -0.1 and +0.7 volts, pulse rise and fall times should be less than 50 micro seconds, the pulse goes from 0 to 25 volts. If 25vdc is greater than 25.5vdc then turn off the power, clip out R18 and install R19, then rerun this test.

ADDRESS AND DATA LINES TEST:
Turn power off.
Set switches 3 and 8 on.
A personality module may be installed.
Turn power on.
The red and green lamps flash twice.
When the green lamp is on all address and data line are low, when the red lamp is on all lines are high, and when the yellow lamp is on then all lines are in an alternating high and low pattern, which changes at a 1/2 second rate. Put a module that is commonly used in the module socket. Use the pinout of the device which can be programmed with this module to determine where the address and data lines are located on the Master and Clone sockets. Check each address and data line on both sockets for proper levels. If any pins fail the Z.I.F. socket may not be well seated in its main socket.

SERIAL AND PARALLEL I/O TEST (optional):
Turn power off.
Set switch 1, 3, and 8 on.
Turn power on.
The red and green lamps flash twice.

Test 1: Push verify button and output will begin counting from 0 to 255 at a 1/2 second rate.

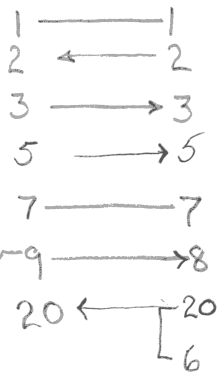
Test 2: Install jumpers at jumper1 and jumper2 locations (see parts layout for location). Cycle power, push the Zap button, if the green lamp is on then the test is passing, if the red lamp is on then the test is failing. This test gives a continuous indication of pass or fail condition, so you can check for bad connections while watching the lamps.

Test 3: Cycle power, the red and green lamps flash twice. Push both the Verify and Zap buttons. The program sets R3 to zero then it waits for input, if its in an echo mode it outputs the received data. The input is compared to R3, the yellow lamp blinks if they are not equal and the test stops, or else R3=R3+1 and the test is repeated.

*NOTE: If echo mode is on then Smart Zap will expect an echo of all words it sends, and it will echo all words it receives.

SERIAL CONNECTOR P2 JUMPER CONNECTIONS

TTL Levels	RS232C (+ or - 12)	Connector pins	Board holes	Label
U8 pin 11	U8 pin 13	2	C	Input ← RD
U9 pin 2	U9 pin 3	3	B	Output → TD
U9 pin 4	U9 pin 6	5	A	CTS →
U8 pin 8	U8 pin 10	20	D	DTR ←
		7		Gnd



SERIAL FORMAT FOR INPUT/OUTPUT

1 Start bit
8 Data bits
1 Stop bit
No parity bit

DATA TERMINAL READY (DTR) AND CLEAR TO SEND (CTS)

DTR is output by the host computer, when it is +15vdc (RS232C) or 0vdc (TTL) then the host computer is ready to receive data. When DTR is -15vdc (RS232C) or +5vdc (TTL) then either the host computer's receive buffer is full, or the it is busy and can't receive data.

CTS is output by SMART ZAP, when it is +15vdc (RS232C) or 0vdc (TTL) then Smart Zap is ready to receive data. When CTS is -15vdc (RS232C) or +5vdc (TTL) then either SMART ZAP's input buffer is full, or it is busy and can't receive data.

JUMPER CONNECTIONS FOR SERIAL CONNECTOR

Jumper points A, B, C, and D are artwork jumpered for RS232 levels(+-12), to use TTL levels cut artwork and jumper to TTL holes. Pin E controls 'DTR' input level and pin F controls 'CTS' output level. E an F (located near the DIP switch) are jumpered to 0 for positive logic, this is the normal setup for an IBM. For negative logic cut artwork jumpers and jumper to 1, E and F may be set for opposite logic modes.

For 5 line hookup:
Set the host computer's echo mode off and SMART ZAP dip switch 7 off

For 3 line hookup:
Set the host computer's echo mode on and SMART ZAP dip switch 7 on. All data received will be echoed back, so the input buffers will never fill up. Your computer must read the echoed data to check for transmition errors, after each character sent.

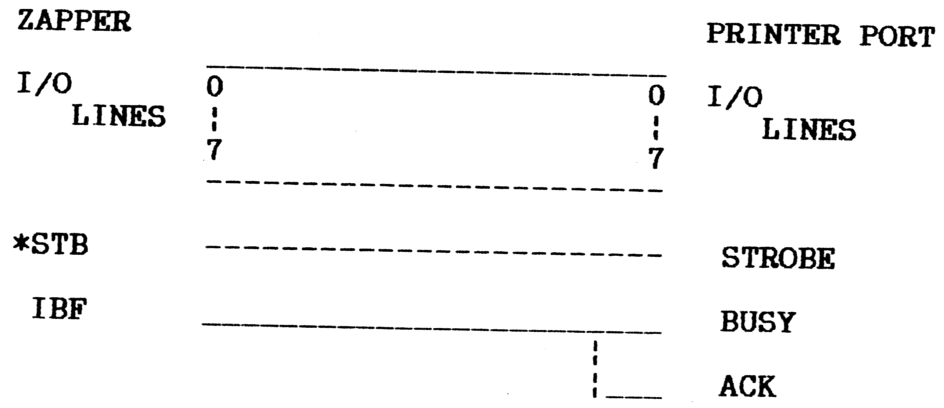
PARALLEL CONNECTOR P1 DEFINITIONS

Pin	Label	Definition
1	I/O 4	In/Out Data 4
2	I/O 5	In/Out Data 5
3	I/O 6	In/Out Data 6
4	I/O 7	In/Out Data 7
5	Gnd	
6	Gnd	
7	Gnd	
8	Gnd	
9	*STB	⌐⌐> (Input) >.5us pulse , clocks Data to Zapper.
10	IBF	<— (Output) Input buffer full, if High don't send
11	*ACK	⌐⌐> (Input) Send low, read data, send high.
12	*OBF	<—— (output) Output buffer full, low when full.
13	I/O 0	In/Out Data 0
14	I/O 1	In/Out Data 1
15	I/O 2	In/Out Data 2
16	I/O 3	In/Out Data 3

An (*) asterisk in front of a label indicates an active low signal.

ILLUSTRATED SIGNAL CONNECTIONS

PRINTER PORT TO ZAPPER, ONE DIRECTION, ECHO OFF.



ELECTRONIC PARTS LIST

C1	10 microfarads	16 volt
C2	2200 microfarads	25 volt
C3	1000 microfarads	35 volt
C4	470 microfarads	50 volt
C5	470 microfarads	35 volt
C6	1 microfarads	50 volt
C7	.1 microfarads	
C8	39 picofarads	
C9	39 picofarads	
C10	.1 microfarads	
C11	.1 microfarads	
C12	.022 microfarads	
C13	.1 microfarads	
C14	.1 microfarads	
C15	.1 microfarads	
C16	.001 microfarads	
C17	.022 microfarads	
C18	.1 microfarads	
C19	.1 microfarads	
C20	.01 microfarads	
C21	.1 microfarads	

CY1	3.6864MHZ Crystal

CR1	1N5401
CR2	1N4001
CR3	1N4001
CR4	1N4001
CR5	1N4001
CR6	1N746 3.3volt Zener
CR7	1N4001
CR8	1N4001
CR9	1N4001
CR10	1N4001

DS1	Green LED (Good)
DS2	Red LED (Bad)
DS3	Yellow LED (Ready)

Q1	PN2222 Transistor
Q2	PN2222 Transistor
Q3	PN2222 Transistor
Q4	317MP
Q5	317MP
Q6	7805T (LM340T-5)

R1	10K	1/8 Watt Resistors
R2	10K	1/8 Watt
R3	10K	1/8 Watt
R4	10K	1/8 Watt
R5	10K	1/8 Watt
R6	10K	1/8 Watt
R7	10K	1/8 Watt
R8	10K	1/8 Watt
R9	8.2K	
R10	10K	
R11	470	2 Watt
R12	330	
R13	1K	
R14	10K	
R15	1K	
R16	4.7K	
R17	2.32K	1%
R18	121	1% (select)
R19	127	1% (select)
R20	10K	
R21	464	1%
R22	121	1%
R23	OMIT	
R24	1.62K	1%
R25	1K	1/2 Watt
R26	1K	1/2 Watt
R27	1K	1/2 Watt
R28	10K	
R29	10K	
R30	10K	
R31	10K	

SW1	DIP Switch 8 Pos
SW2	Push Button Switch, Verify
SW3	Red Push Button Switch, Zap
SW4	SPST Toggle Switch

T1	9.0 VAC Transformer >2amp

U1	8255
U2	8255
U3	74LS541
U4	74LS373
U5	2764
U6	8031
U7	7406
U8	1489
U9	1488

MISC MATERIALS LIST

1 Circuit Board (T-101)
4 Stand-offs with mounting screws
3 LED holders
3 40 pin low profile sockets
1 28 pin low profile socket
2 20 pin low profile sockets
2 16 pin low profile sockets
3 14 pin low profile sockets
3 28 pin Wire wrap sockets
1 Heat Sink
1 Module Kit:
    1 dip header 28 pin
    1 dip header cover
    1 2k ohm resistor (red-black-red)
    1 11k ohm resistor (brown-brown-orange)
    1 12" length of wire

1 DB25 female connector (RS232)
1 2.5mm power supply connector
1 12" length of wire
3 mounting bolts with nuts

NORMAL OPERATING MODE. TABLE 1
DIP SWITCH SETTINGS

SW# 1	2	3	4	5	6	7	8	OPERATING MODE
1	X	X	X	X	X	X	0	Verify erase|Write 'FF'
X	1	X	X	X	X	X	0	Fast Zap|Short WE cycle
X	X	1	X	X	X	X	0	External mode
X	X	0	X	X	X	X	0	Stand alone mode
X	X	1	1	X	X	X	0	Serial I/O mode
X	X	1	0	X	X	X	0	Parallel I/O mode
X	X	X	X	0	0	X	X	Baud rate 300 *
X	X	X	X	1	0	X	X	Baud rate 1200 *
X	X	X	X	0	1	X	X	Baud rate 4800 *
X	X	X	X	1	1	X	X	Baud rate 9600 *
X	X	X	X	X	X	1	X	Echo mode enabled +
X	X	X	X	X	X	X	1	Test mode enabled

TEST MODE. TABLE 3
DIP SWITCH SETTINGS. (Cycle power to enter each mode)

SW# 1	2	3	4	5	6	7	8	TEST MODE
0	0	0	X	X	X	X	1	Dip switch test
1	0	0	X	X	X	X	1	Lamp/button switch test
0	1	0	X	X	X	X	1	VCC1 test
1	1	0	X	X	X	X	1	VPP test
0	0	1	X	X	X	X	1	Address/Data line test
1	0	1	0	X	X	+	1	I/O test, parallel
1	0	1	1	*	*	+	1	I/O test, serial
1	1	1	X	X	X	X	1	Dip switch test (alt)

NOTE: X = don't care, 1 = on, 0 = off, * = baud rate, + = echo.

ASSEMBLY INSTRUCTIONS

For the master builder this kit should be a snap, for anyone who has ever built a kit this one should be easy, if you have never built a kit before then we suggest that you follow the assembly instructions and steps exactly as written.

The first step is to check the contents of the kit received against the parts list. This will familiarize you with the parts and help prepare for assembly. The next step is to become familiar with the PC board. Note that the board has a legend silk screened on it showing the location and position of almost all devices to be installed.

Component placement is shown on both the silk screen on the PC board and on the parts layout. Install all components on the legend side of the board following the order of installation shown in the assembly chart.

Before installing any parts we suggest that you read thru all the instructions, some steps of assembly will be made clearer by knowing the whole process.

Some important notes about assembly that even those who assemble from a parts list should read:

1) The socket for U5 must be installed before C4 or you may have trouble getting U5's socket in later.

2) C14 is marked on the legend in a confusing location, see the parts layout for its actual location.

3) C21 is not marked on the board legend, see the parts layout for its exact location which is between C2 and C3.

4) Mount R11 1/8 inch away from the board to allow for better heat dissipation.

5) All resistors are 1/4 watt unless otherwise indicated.

6) If you have the right angle RS232 connector it need not (and can not) be bolted to the board.

ORDER OF ASSEMBLY CHART

DS1	Green lamp	'GOOD' position
DS2	Red lamp	'BAD' position
DS3	Yellow lamp	'READY' position
Standoffs	Near corners	In 1/8 inch holes
SW2	Push button switch	(Black or White)
SW3	Push button switch	(Red)
SW4	SPST ON/OFF switch	
* NOTE *	Install dips later.	* NOTE *
Sockets	For SW1,U1-U12	(listed below)
SW1	Dip switch	16 pin Low Profile socket
U1	8255	40 pin LP socket
U2	8255	40 pin LP socket
U3	74LS541	20 pin LP socket
U4	74LS373	20 pin LP socket
U5	2764 (note 1)	28 pin LP socket
U6	8031	40 pin LP socket
U7	7406	14 pin LP socket
U8	1489	14 pin LP socket
U9	1488	14 pin LP socket
U10	Clone socket	28 pin LP socket
U11	Master socket	28 pin LP socket
U12	Personality module	28 pin LP socket
P1	16 pin LP socket	(for parallel I/O)
P2	DB25 (note 6)	RS232 connector
P3	Coaxial 2.5mm	Power connector
Q1	PN2222	small plastic type
Q2	PN2222	small plastic type
Q3	PN2222	small plastic type
Q4	317mp	with screws
Q5	317mp	with screws
Q6	7805	with heat sink and screws
CY1	Crystal	3.6864MHZ
R1-R8	10K 1/8 Watt	(brown-black-orange)
R9	8.2K	(grey-red-red)
R10	10K	(brown-black-orange)
R11	470 2 Watt (note 4)	(yellow-violet-brown)
R12	330	(orange-orange-brown)
R13	1K	(brown-black-red)
R14	10K	(brown-black-orange)
R15	1K	(brown-black-red)
R16	4.7k	(yellow-violet-red)
R17	2.32K 1%	(red-orange-red-brown)
R18	121 1%	(brown-red-brown-black-brown)
R19	Select	** do not install now **
R20	10K	(brown-black-orange)
R21	464 1%	(yellow-blue-yellow-black-brown)
R22	121 1%	(brown-red-brown-black-brown)
R23	OMITTED	
R24	1.62K 1%	(brown-blue-red-brown-brown)
R25	1K 1/2 Watt	(brown-black-red)
R26	1K 1/2 Watt	(brown-black-red)
R27	1K 1/2 Watt	(brown-black-red)

ORDER OF ASSEMBLY continued

R28	10K	(brown-black-orange)
R29	10K	(brown-black-orange)
R30	10K	(brown-black-orange)
R31	10K	(brown-black-orange)
CR1	1N5401	Diode, note polarity
CR2	1N4001	Diode, note polarity
CR3	1N4001	Diode, note polarity
CR4	1N4001	Diode, note polarity
CR5	1N4001	Diode, note polarity
CR6	1N746 (3.3v)	Zener diode, note polarity
CR7	1N4001	Diode, note polarity
CR8	1N4001	Diode, note polarity
CR9	1N4001	Diode, note polarity
CR10	1N4001	Diode, note polarity
C1	10 microfarads	16Volts
C2	2200 microfarads	25Volts
C3	1000 microfarads	35Volts
C4	470 microfarads	50Volts
C5	470 microfarads	35Volts
C6	1 microfarads	50Volts
C7	.1 microfarads	(104)
C8	39 picofarads	(39)
C9	39 picofarads	(39)
C10	.1 microfarads	(104)
C11	.1 microfarads	(104)
C12	.022 microfarads	(223)
C13	.1 microfarads	(104)
C14	.1 microfarads	(104) (note 2)
C15	.1 microfarads	(104)
C16	.001 microfarads	(102)
C17	.022 microfarads	(223)
C18	.1 microfarads	(104)
C19	.1 microfarads	(104)
C20	.01 microfarads	(103)
C21	.1 microfarads	(104) (note 3)
T1	9vac	wall transformer
** Power supply test **		(See text)
SW1	Dip switch	
U1	8255	
U2	8255	
U3	74LS541	
U4	74LS373	
U5	2764	
U6	8031	
U7	7406	
U8	1489	
U9	1488	
U10	Clone socket	
U11	Master socket	
U12	Personality module (socket)	
** FINAL TEST **		(See text)

LAMPS (LEDs):

There are three colored lamps used on this board, DS1 is a green lamp and is installed in the hole labeled 'Good'. The leads of each lamp are bent up from the bottom into the adjacent holes and soldered. The longer lead is the plus(+) lead and is inserted into the hole marked plus. DS2 is the red lamp and it goes in the hole marked 'Bad'. DS3 is the yellow lamp and it goes in the hole marked 'Ready'. The lamp holder comes with a retaining ring but its unnecessary to use it because the lamps are held in place by their own leads. If you use it be careful, they are hard to install without breaking something!

STAND-OFFS:

Four stand-offs are supplied with this kit, they are used as legs to allow the unit to be set on any flat surface. The stand-offs mounting screws go in the 1/8 inch holes near each corner of the board, see parts layout for exact location.

SWITCHES:

There are three different types of switches used on SMART ZAP. SW2 and SW3 are push button switches. SW4 is a single poll single throw switch (on/off). SW1 is a dip switch and is used to set up different modes of operation.

Install the two push button switches in the holes just below the words 'Verify' and 'Zap'. Wire the switches to the corresponding holes, indicated by the arrows on the bottom side of the board. The on/off switch goes in the hole between the words 'On' and 'Off'. It is wired to the two holes below it, as seen from the top of the board. If the switch supplied with your kit has three terminals then use the center one and the bottom one. When the ON/OFF switch is installed leave one of the two nuts on the switch shaft, use the other one to tighten it to the board from the top. This will prevent the switch body from coming in contact with the printed circuit.

SOCKETS:

All the dips (dual inline packages) will be mounted in sockets which are provided, they vary in size from 14 to 40 pins. Three of the 28 pin sockets are the wire wrap type ,these sockets will be used for U10, U11, and U12. They must be used in these locations because they are the only type which will receive the optional Z.I.F (zero insertion force) sockets. The sockets should all be soldered in before the dips are installed in them. There are several ways that manufacturers mark dip sockets to indicate where pin 1 is, some actually have numbers on the socket, others have a notch on one end. But however the sockets are marked be sure that pin one lines up with the triangled corner of the symbol that is silk screened onto the board.

CONNECTORS:

P1 is actually a DIP socket and was probably installed with them. P2 is a standard female RS232 connector, it can only be installed on way, on the top side of the board. P3 is a coaxial power plug, install it in the 2 holes marked 'AC' and 'INP' in the corner of the board.

TRANSISTORS:

Q1, Q2, and Q3 are small half moon shaped devices, to install these observe that the flat side aligns with the flat side of the symbol on the board. Note that the flat side is turned toward the center of the board.

Although Q4, Q5, and Q6 are actually ICs they will be discussed in this section for simplicity. Q6 is the largest of the three pin devices and is installed with a heat sink under it. Q6 can get quit hot when programming some devices, so the heat sink is provided to protect it and the operator. Q4 and Q5 do not require heat sinks as they operate at a safe temperature. Mount Q4, Q5, and Q6 so that the parts markings face up away from the board or heat sink, this is done by putting a 90 degree bend in all three legs of each device. Assemble the bolts to the devices with the nuts on the top of the board, so they won't touch the printed circuitry.

RESISTORS:

All the color coded resistors are marked as indicated in the order of assembly chart. R19 is a select resistor and is not installed during normal assembly. Its use is explained during the Vpp test procedure. R11 should not be assembled tight to the board but should be left 1/8 inch up from the surface, it may scorch the board otherwise.

DIODES:

Diodes are a polarized device and as such need to be installed a certain way. All diodes are marked on the board with a symbol like this --¦>¦--. A diode is a two element device, an anode and a cathode, the anode is the triangle portion of the symbol and the vertical line is the cathode. Around one end of every diode is a solid band which equates to the line portion of the diode symbol. When installing diodes be sure this solid line is on the same end of the diode as the line on the symbol.

ELECTROLITIC CAPACITORS:

When installing caps it is necessary to observe whether one of the leads is marked positive (+) or negative (-), if they are then it is a polarized device and its markings must conform to those silk screened onto the board. The following caps are all polarized type devices C1, C2, C3, C4, C5, and C6.

JUMPER WIRES:

It is not necessary to install any jumpers as part of the normal assembly operation. Jumpers are only used if your system requires the SMART ZAP to operate in different way than normal. See the section on "Jumper connections for serial connector" for a discussion of jumpers.

Crystal:

Crystals are not polarized and can be installed either way.

Transformer:

T1 supplies 9 volts ac to the board where it is rectified and regulated . Plug the output cord from the transformer into P3, don't put a lot of stress on this connector. After this stage of assembly, anytime the transformer is plugged into an outlet, there will be 9vac present on the board, even when the power switch is off.

Preliminary Power supply test:

After all the previously discussed parts have been installed (everything except the dips should be installed) plug in the wall transformer and turn on the on/off switch. Check that the 5 volt power supply is working, the voltage at the 5 volt test point should be five volts plus or minus 10% . If there is no five volts or it is too low then check the board over for solder shorts or misassembled parts. If the five volts is too high check around the other voltage regulators (Q4,Q5) for solder shorts or misassembly. When the voltage is normal then unplug the wall transformer and complete the assembly steps.

DIPS:

U1 thru U9 are dips and are properly installed by observing that the notched out end aligns with the notched out end of it's socket. The board is also marked with a dot at the side of each socket location to indicate the pin 1 position, double check that the notch is on the same end as this dot. The dip switch (SW1) is installed just like a dip except that it has numbers printed by each little switch position. Be sure that the switch marked number one (1) is closest to the corner of the board.

PERSONALITY MODULE:

Build a module per the instructions on the next page, it will be used as part of the check out procedure. Build whatever module you will be needing.

FINAL TEST:

Make sure that all switches on the dip switch are in the off position, and do not have a personality module installed. Plug in the wall transformer and turn on the power switch, the red and green lamps should blink continuously, if they don't then double check all the dips that were just installed. Some of them may be in the wrong position or turned 180 degrees from normal or a pin may be bent up under one of them instead of pushed into the socket. When the lamps blink normally then proceed to the "SUMMARY OF TEST MODES" section and run all the tests described there except the "SERIAL AND PARALLEL I/O TEST". Especially important is the VPP test and select procedure.

PERSONALITY MODULE ASSEMBLY INSTRUCTIONS

There are two ways to locate pin one of the dip header. First the numbers are printed on the bottom of the dip header, second the dip header has one corner cut off to show the location of pin one.

Install the dip header into the personality module socket on the board, this will keep the unit stable while the wires are being soldered in place.

Refer to the PERSONALITY MODULE schematics and choose the desired module.

Carefully cut and install all wires per schematic.

R1 is used to setup Vpp for the chip to be programmed, if the required Vpp is 25vdc then R1 isn't used. If Vpp is 21 volts then use the 11k resistor for R1 and if Vpp is 12.5 volts then use the 2K resistor. Install the proper resistor for R1.

Put the cover on the dip header and secure it in place with masking tape. Mark the following on the top of the module:
1) Label pin 1 for ease of installation.
2) Indicate which device it is wired for IE. 2764.
3) Show which Vpp level R1 is selected for IE. 12.5 volts.

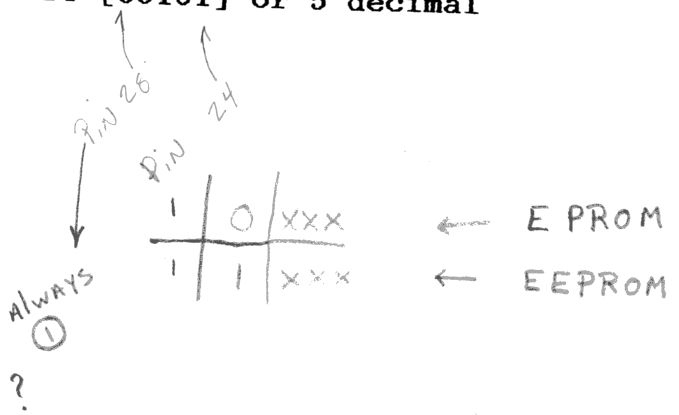
To verify that the module is wired properly, run the VPP test procedure with this module installed. If the REF pin (pin 18) is wired to Vcc (pin 22) the the low level of the VPP test will be 5 volts and if the REF pin is unused then the low level should still be 0 volts. Verify that the VPP high level is right for the R1 that is installed in the module. The proper levels are:
R1 not installed, Vpp equals 25 + or - .5 volts;
R1 is 11K ohms, Vpp equals 21 + or - .5 volts;
R1 is 2K ohms, Vpp equals 12.5 + or - .5 volts.

Smart Zap does several tests on the personality module itself. At power on, with the personality module installed, the red and green lamps will flash twice, then the yellow lamp should come on. If the red and green lamps continue to flash, then the module is not being recognized or it is giving an invalid ID code number.

BRIEF DESCRIPTION OF PERSONALITY MODULE PINS

Pin 1	Label "1B", goes to pin 1 of the Master socket (U11).
Pin 2	Label "1A", goes to pin 1 of the Clone socket (U10).
Pin 3	Label "27B", goes to pin 27 of the Master socket (U11).
Pin 4	Label "27A", goes to pin 27 of the Clone socket (U10).
Pin 5	Label "26B", goes to pin 26 of the Master socket (U11).
Pin 6	Label "26A", goes to pin 26 of the Clone socket (U10).
Pin 7	Label "23B", goes to pin 23 of the Master socket (U11).
Pin 8	Label "23A", goes to pin 23 of the Clone socket (U10).
Pin 9	Label "22B", goes to pin 22 of the Master socket (U11).
Pin 10	Label "22A", goes to pin 22 of the Clone socket (U10).
Pin 11	Label "A15", is address line 15 coming from U2.
Pin 12	Label "A14", is address line 14 coming from U2.
Pin 13	Label "A13", is address line 13 coming from U2.
Pin 14	Label "A11", is address line 11 coming from U2.
Pin 15	Label "GND", system power supply common or ground.
Pin 16	Label "VPP", EPROM programming voltage.
Pin 17	Label "ADJ", used to adjust Vpp high voltage level.
Pin 18	Label "REF", used to set Vpp low voltage to 0 or 5 vdc.
Pin 19	Label "OE", connects output enable to U10 and U11.
Pin 20	Label "PM", connects program pulse to U10.
Pin 21	Label "CT1, reserved for future expansion.
Pin 22	Label "VCC", module operating power (+5vdc).
Pin 23	Label "S5", informs processor that a module is present.
Pin 24	Label "S0", LSb of ID code . Bit 0
Pin 25	Label "S1", NSb of ID code . Bit 1
Pin 26	Label "S2", NSb of ID code . Bit 2
Pin 27	Label "S3", NSb of ID code . Bit 3
Pin 28	Label "S4", MSb of ID code . Bit 4

Pins 24 thru 28 of the personality module form a binary code which can be read out by the host computer. Set up the host computer and SMART ZAP to operate in the external mode. Send the module ID code command which is FB hex or 251 decimal from the host computer to SMART ZAP, and receive back the module ID code. Verify this code by assuming that pin 24 is the LSb and pin 28 is the MSb. For example, if the module being tested has pin 24 and 26 wired to 5 volts and pins 25, 27, and 28 wired to ground, then the binary code would be [00101] or 5 decimal



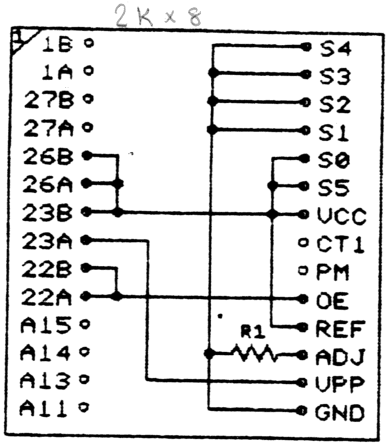
8748/8749 ADAPTER PARTS LIST

C1	39 picofarad cap
C2	39 picofarad cap
C3	.02 microfarad cap
C4	.001 microfarad cap
C5	.02 microfarad cap
C6	.1 microfarad cap
CR1	1N4001 diode. used to select 18 + or - .5volts
CR2	1N4001 diode. used to select 18 + or - .5volts
CR3	1N4001 diode. used to select 18 + or - .5volts
CR4	1N4001 diode. used to select 18 + or - .5volts
CY1	3Mhz to 4Mhz crystal (clock)
P1	Cable with 28 pin connector
R1	2K ohm resistor
R2	1K ohm resistor
R3	121 ohm 1% resistor
R4	1.91K ohm 1% resistor
R5	1K ohm resistor
R6	100 ohm 1/2 watt resistor
R7	100 ohm 1/2 watt resistor
R8	10K ohm resistor
U1	socket for 8748/8749 (ZIF socket)
VR1	17.0 volt zener diode (voltage regulator)
VR2	17.0 volt zener diode (voltage regulator)
VR3	1N746 3.3 volt zener diode (voltage regulator)
VR4	LM317MP 3 terminal voltage regulator

Personality module:

- 1 dip header 28 pin
- 1 dip header cover
- 1 2k ohm resistor (red-black-red)
- 1 11k ohm resistor (brown-brown-orange)
- 1 12" length of wire

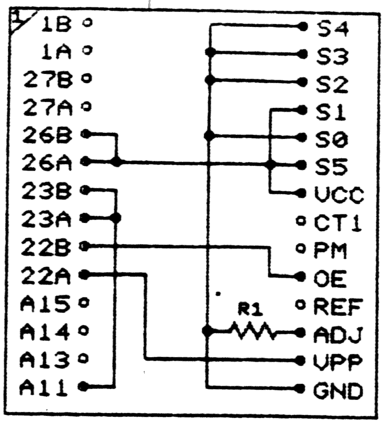
2K x 8



2716

I.D.= 01(HEX)

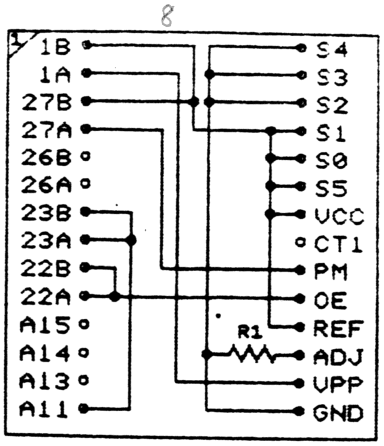
4



2732

I.D.= 02(HEX)

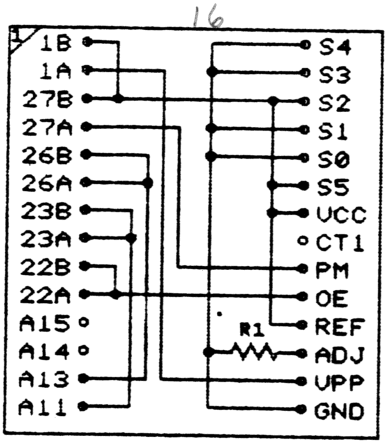
8



2764

I.D.= 03(HEX)

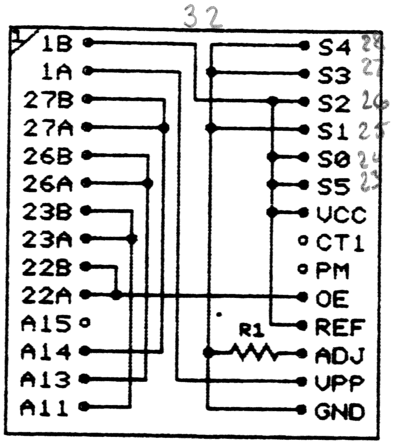
16



27128

I.D.= 04(HEX)

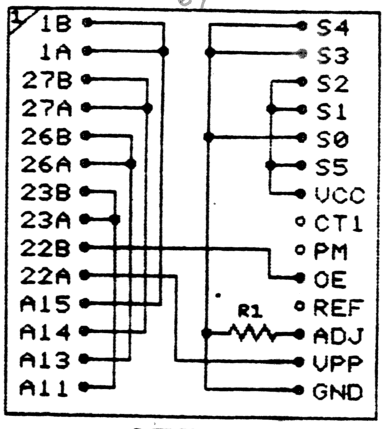
32



27256

I.D.= 05(HEX)

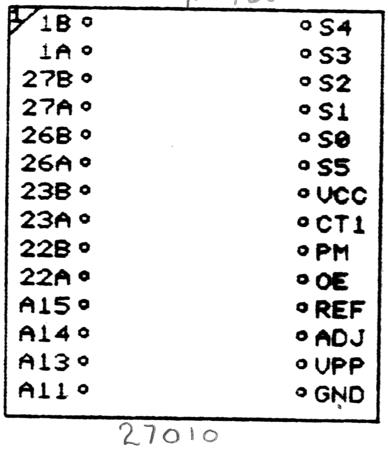
64



27512

I.D.= 06(HEX)

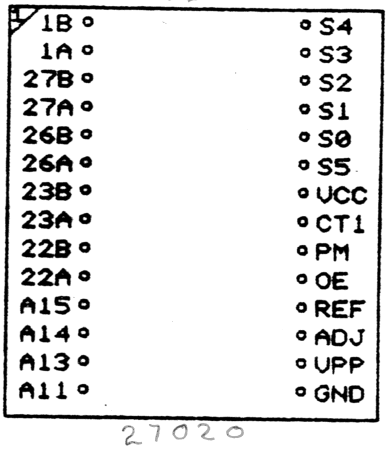
00100 128



27010

I.D.= 7 (HEX)

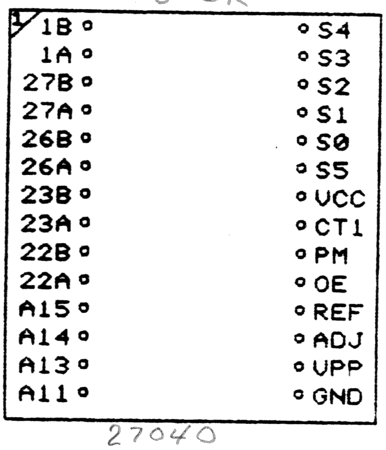
256



27020

I.D.= 8 (HEX)

512K



27040

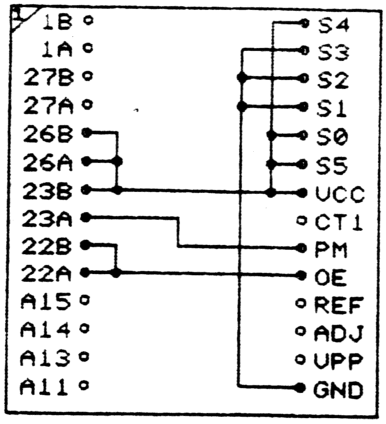
I.D.= 9 (HEX)

R1=N/A IF VPP=25VDC, R1=11K IF VPP=21VDC, R1=2K IF VPP=12.5VDC

A = Clone Socket

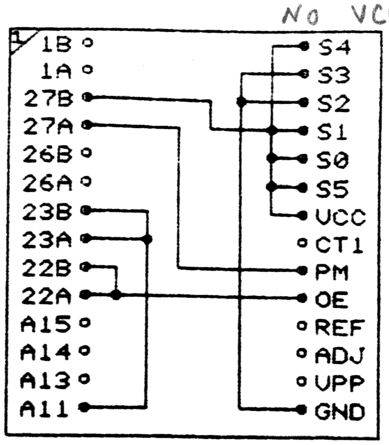
B = MASTER Socket

No REF
No ADJ
No VCC



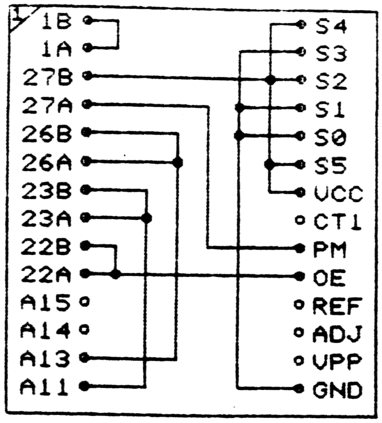
2816A

I.D. = 11 (HEX)



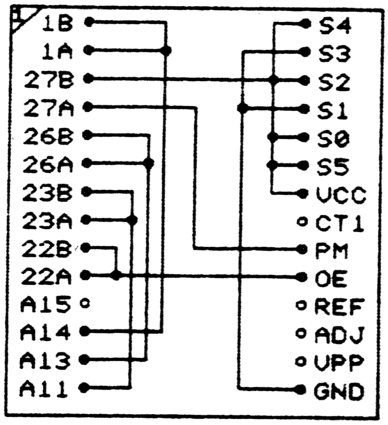
2864

I.D. = 13 (HEX)



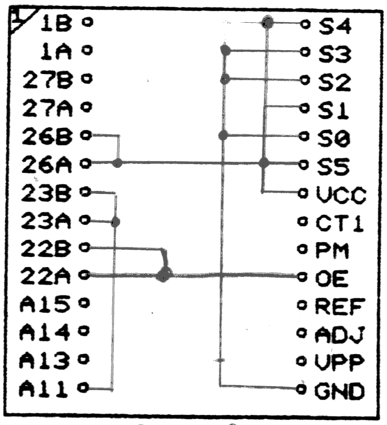
28128

I.D. = 14 (HEX)



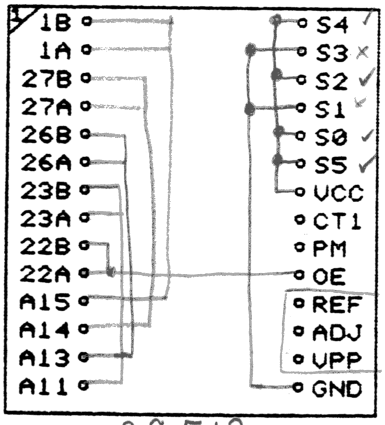
28256

I.D. = 15 (HEX)



2832

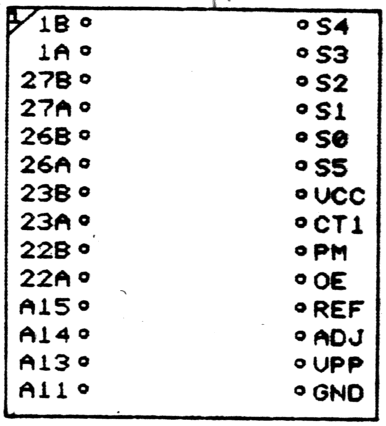
I.D. = 12 (HEX)



28512

I.D. = 16 (HEX)

10101



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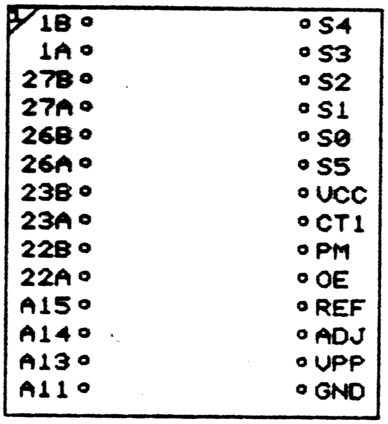

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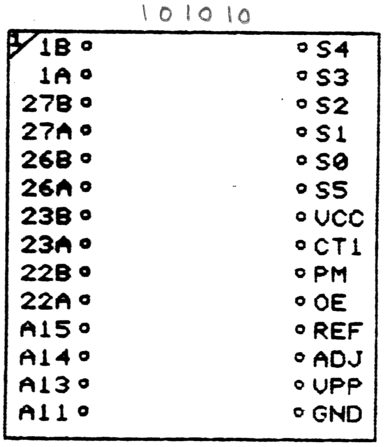
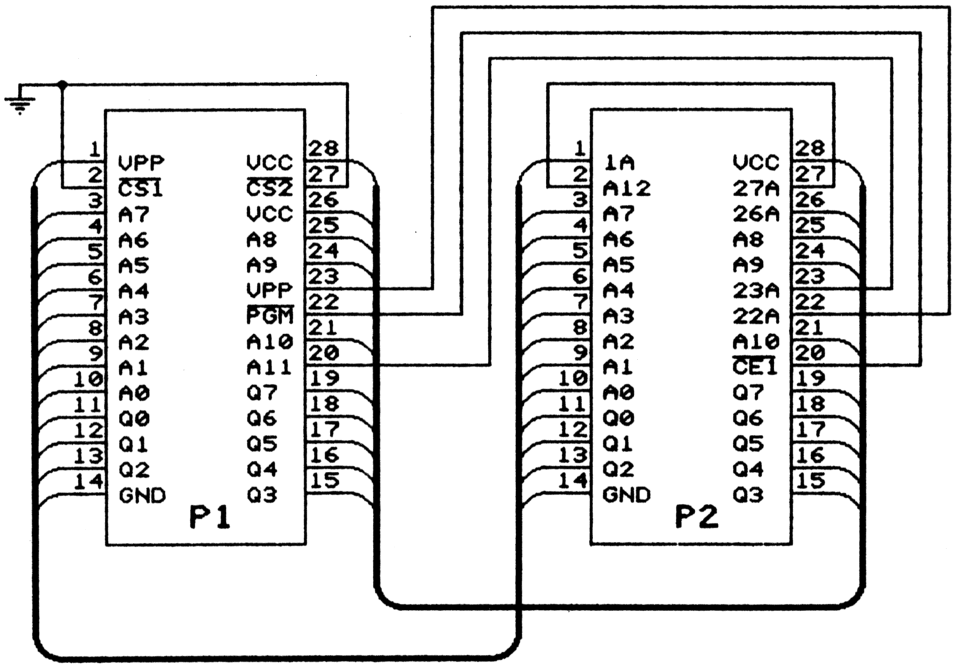
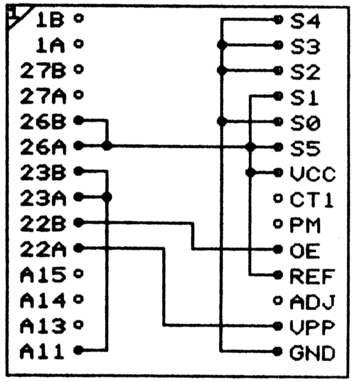
101010



I.D. = 19 (HEX)

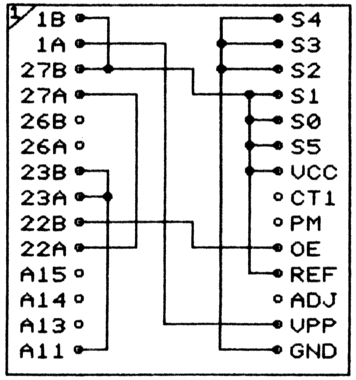
2532/2564 ADAPTER SCHEMATIC





2532

I.D.= 2 (HEX)

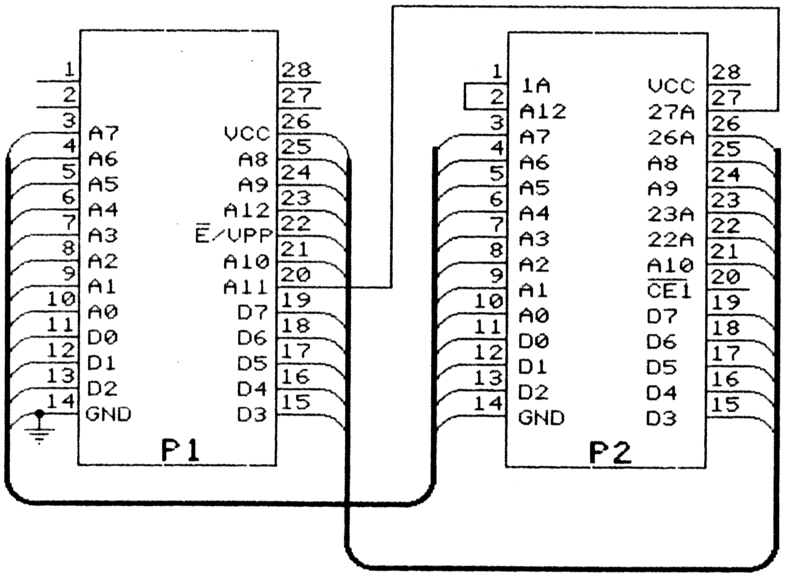


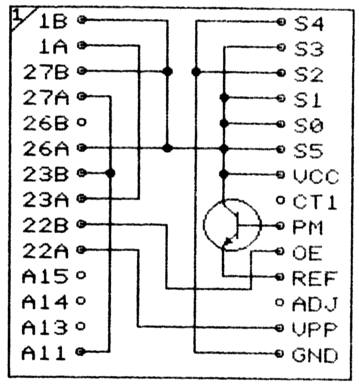
2564

I.D.= 3 (HEX)

NOTES: 2516 IS THE SAME AS 2716, DON'T USE ADAPTER.
PLUG P2 INTO CLONE SOCKET.
PLUG 2532/2564 INTO P1 SOCKET
USE A 2732/2764 AS A MASTER.
SET DIP SWITCH 2 TO OFF POSITION.
ALL WIRES SHOWN BUSSED TOGETHER CONNECT SAME PIN NUMBERS.

68764/68766 ADAPTER SCHEMATIC



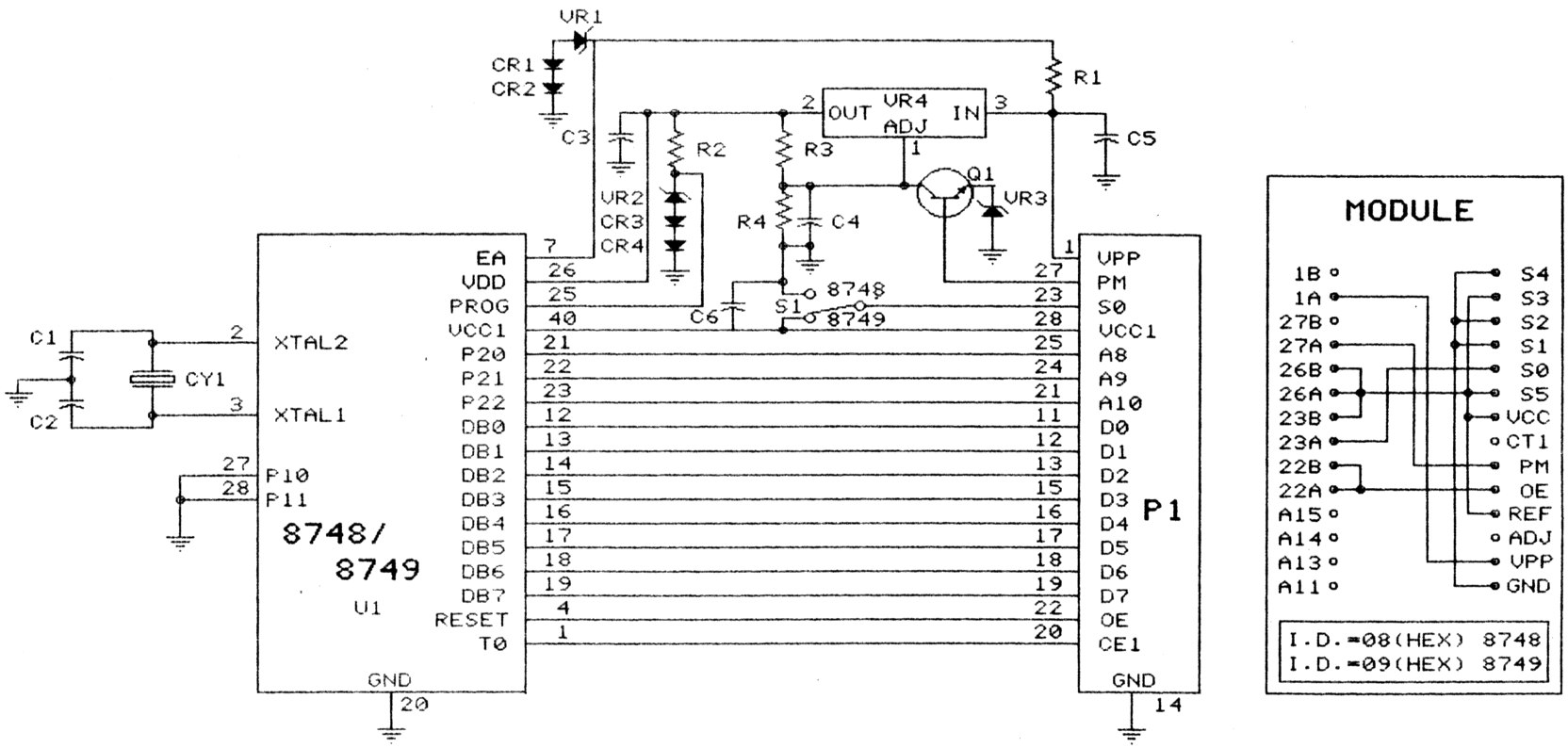


68764/68766 MODULE

I.D.=0B (HEX)

NOTES: PLUG P2 INTO CLONE SOCKET ONLY
PLUG 68764/68766 INTO P1 SOCKET
USE 2764 AS A MASTER IN STAND ALONE MODE
LEAVE TOP 2 PINS ON BOTH SIDES OF P1 EMPTY
SET DIP SWITCH 2 TO THE OFF POSITION
PINS SHOWN BUSSED TOGETHER CONNECT SAME PIN NUMBERS.

8748/8749 PROGRAMMING ADAPTER



PARTS LIST

C1 39 PICOFARAD CAP
C2 39 PICOFARAD CAP
C3 .02 MICROFARAD CAP
C4 .001 MICROFARAD CAP
C5 .02 MICROFARAD CAP
C6 .1 MICROFARAD CAP

CR1 1N4001 DIODE
CR2 1N4001 DIODE
CR3 1N4001 DIODE
CR4 1N4001 DIODE

CY1 3MHZ TO 4MHZ CRYSTAL

P1 28 PIN PLUG W/CABLE

Q1 PN2222 TRANSISTOR

R1 2K OHM RESISTOR
R2 1K OHM RESISTOR
R3 121 OHM 1% RESISTOR
R4 1.91K OHM 1% RESISTOR

S1 SPDT SWITCH

U1 40 PIN WIRE WRAP SOCKET

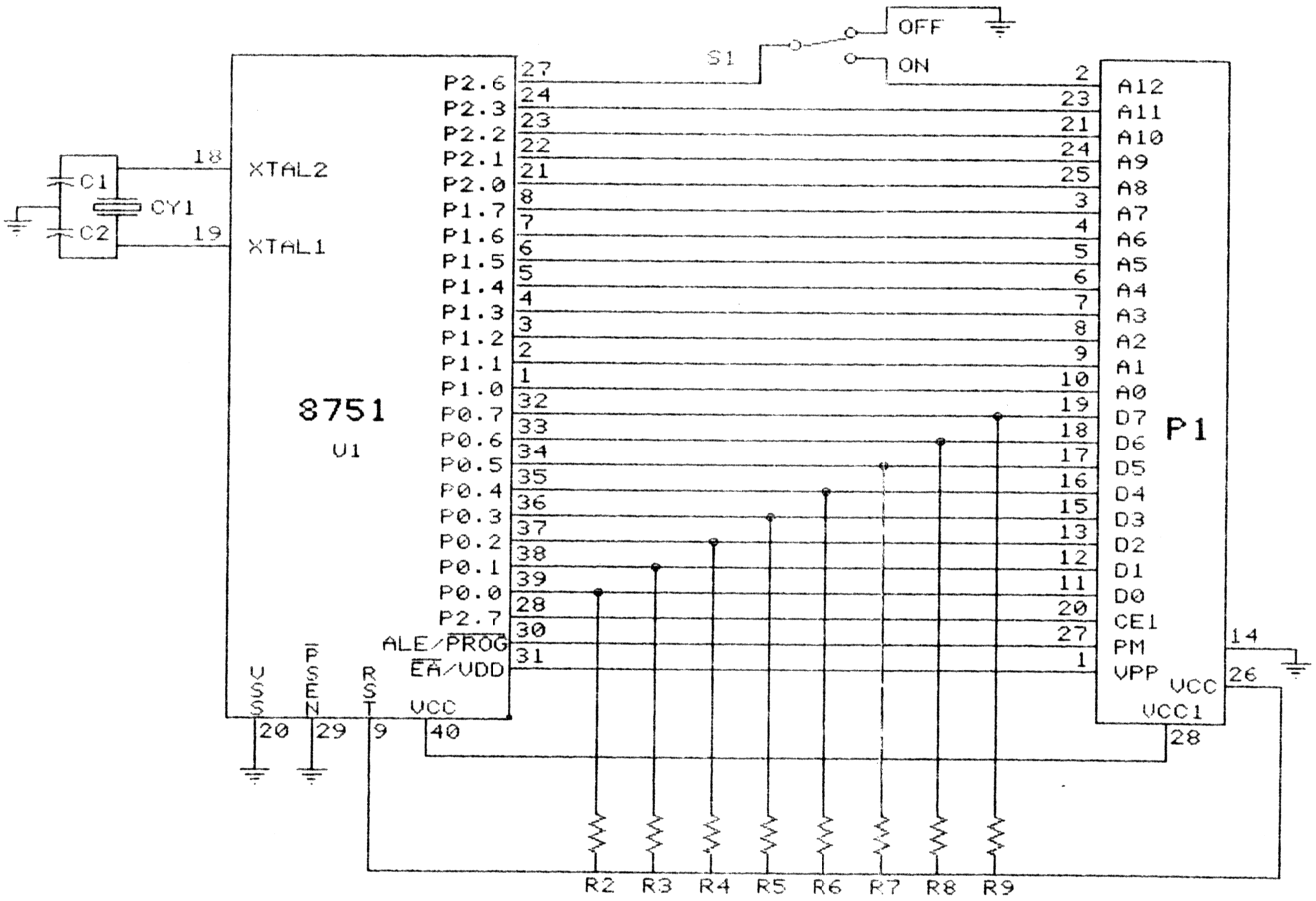
U1(A) 40 PIN Z.I.F. SOCKET

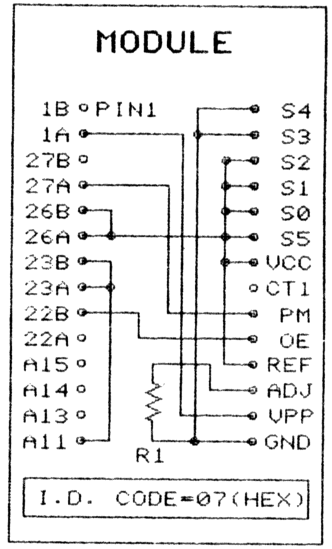
VR1 17.0 VOLT ZENER DIODE
VR2 17.0 VOLT ZENER DIODE
VR3 3.3 VOLT ZENER (IN746)
VR4 LM317MP 3 TERMINAL REGULATOR

PERSONALITY MODULE :
28 PIN DIP HEADER
DIP HEADER COVER
12" OF WIRE

NOTE: PLUG P1 INTO CLONE SOCKET, USE 2732 AS MASTER IN STAND ALONE MODE.
NOTE: ONLY INSTALL OR REMOVE 8748/49 WHEN POWER IS OFF.

8751 PROGRAMMING ADAPTER





PARTS LIST

C1 39 PICOFARAD CAP
C2 39 PICOFARAD CAP

C/1 4MHZ CRYSTAL

MODULE 28 PIN DIP HEADER
AND COVER

1 2" PIN CABLE & CONNECTOR

R1 2K OR 11K OHM RESISTOR
R2 10K OHM 1/4 WATT RESISTOR
R3 10K OHM 1/4 WATT RESISTOR
R4 10K OHM 1/4 WATT RESISTOR
R5 10K OHM 1/4 WATT RESISTOR
R6 10K OHM 1/4 WATT RESISTOR
R7 10K OHM 1/4 WATT RESISTOR
R8 10K OHM 1/4 WATT RESISTOR

R9 10K OHM 1/4 WATT RESISTOR

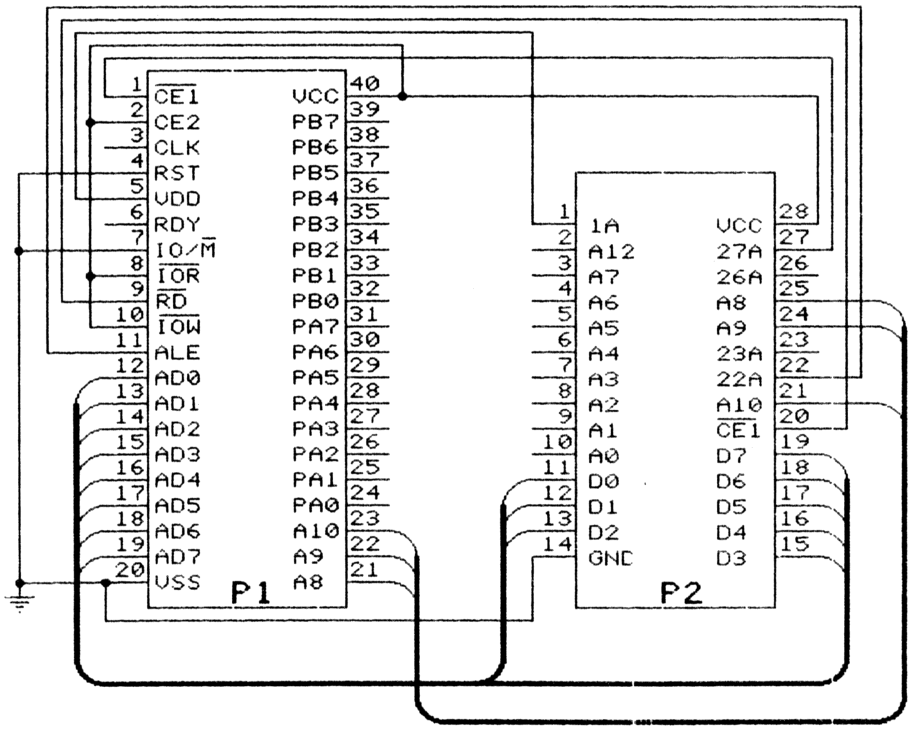
S1 SPDT SWITCH

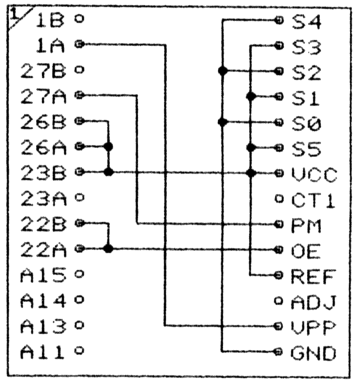
U1 40 PIN WIRE WRAP SOCKET
U1(A) 40 PIN Z.I.F. SOCKET

WIRE 12 INCHES, INSULATED

NOTE: ONLY INSTALL OR REMOVE 8751 WHEN POWER IS OFF.

8755 ADAPTER SCHEMATIC



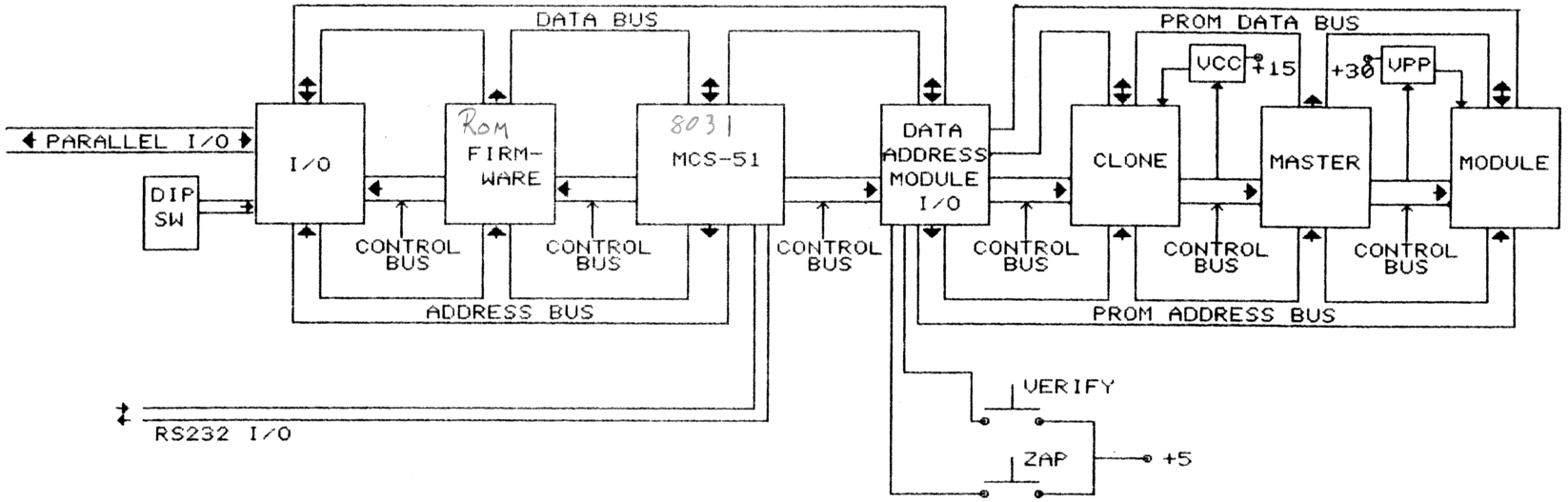


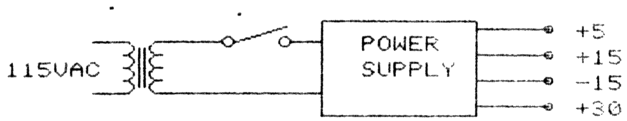
8755 MODULE

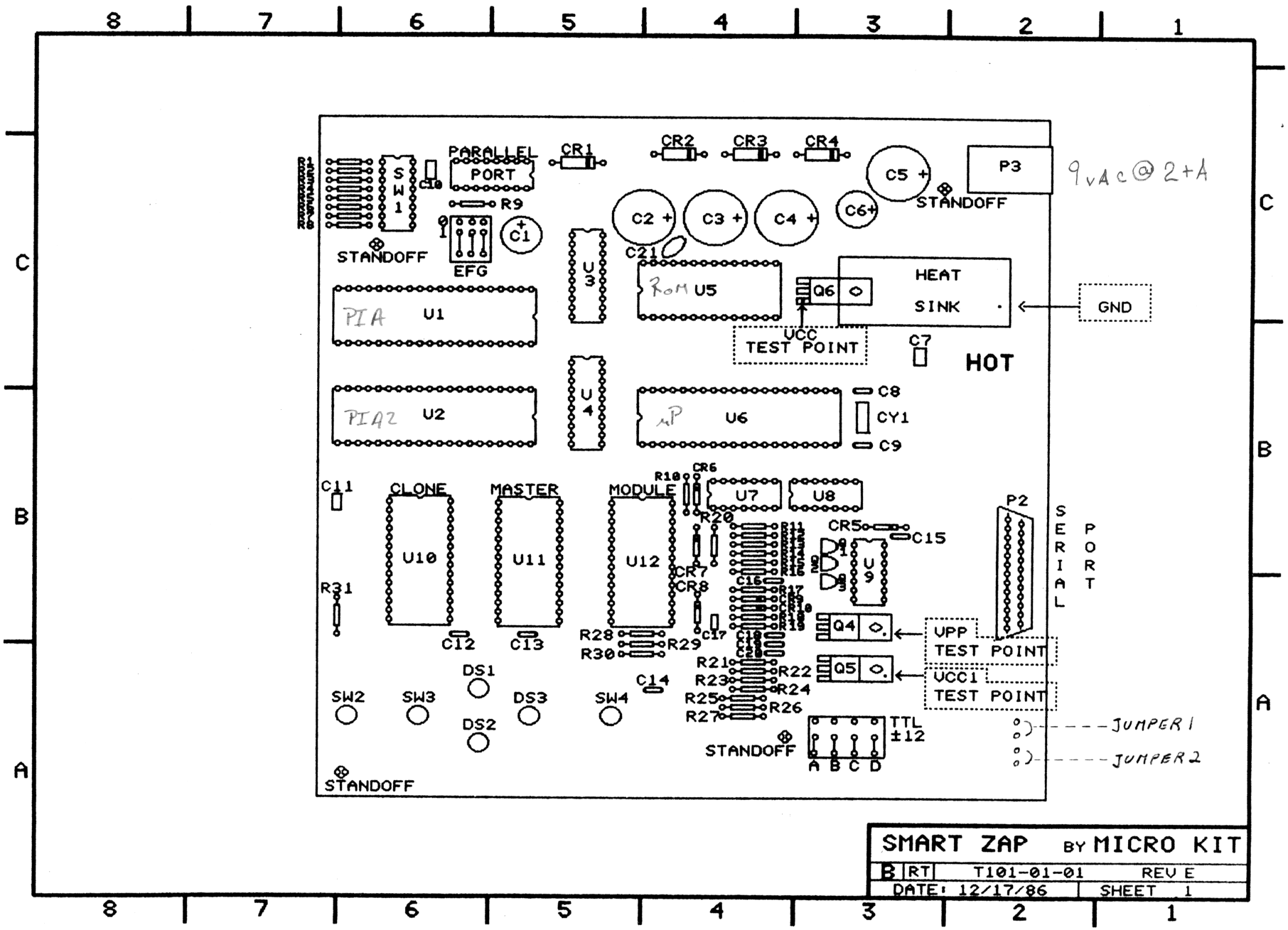
I.D.=0A (HEX)

NOTES: TURN UNIT POWER OFF BEFORE PLUGGING IN AN 8755
PLUG P2 INTO CLONE SOCKET
PLUG AN 8755 INTO P1 SOCKET
USE A 2716 AS A MASTER IN STAND ALONE MODE
ALL PINS SHOWN BUSSED TOGETHER CONNECT SAME SIGNAL NAMES

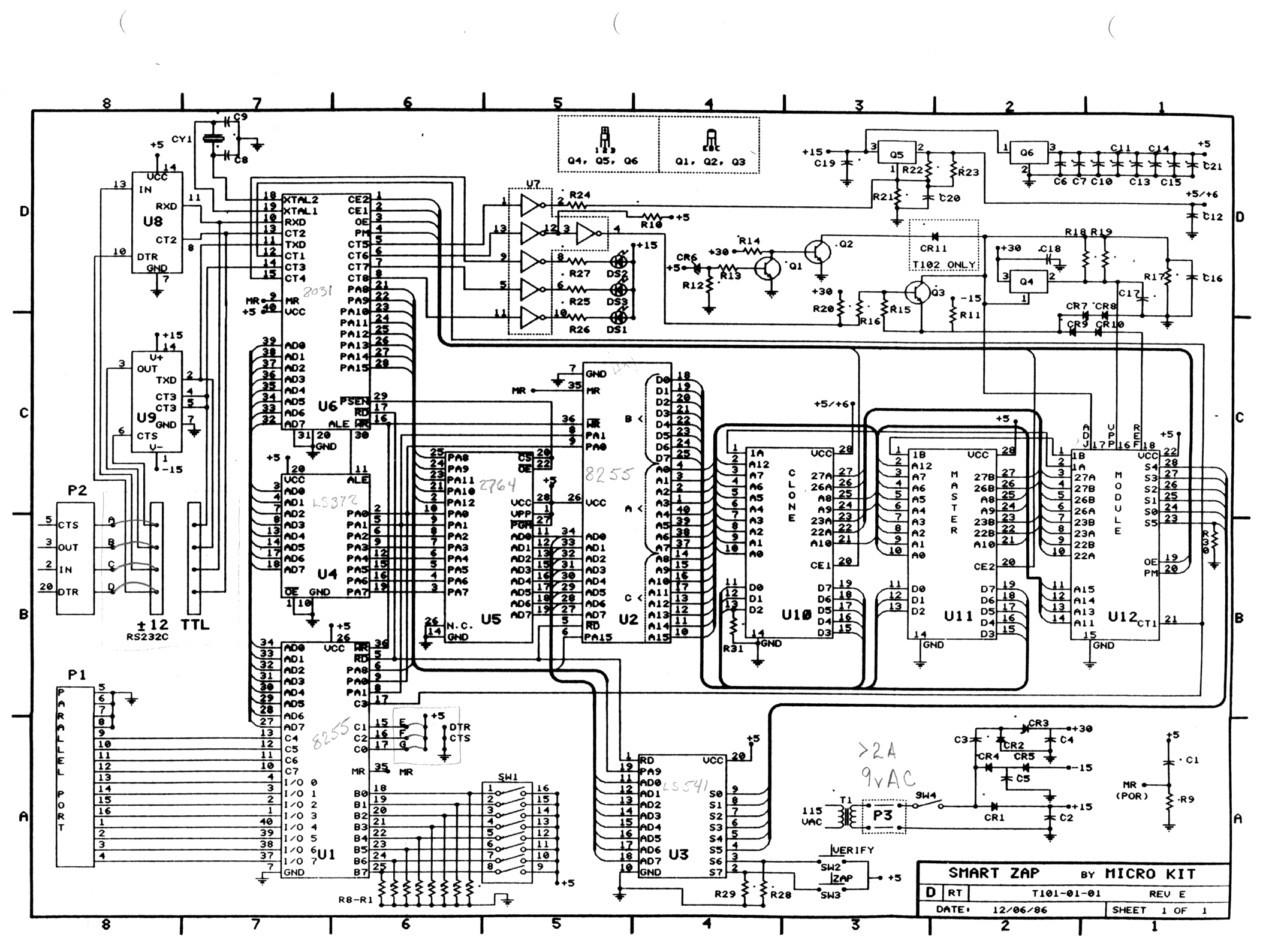
BLOCK DIAGRAM OF SMART ZAP







SMART ZAP BY MICRO KIT			
B	RT	T101-01-01	REV E
DATE: 12/17/86		SHEET 1	


SMART ZAP BY MICRO KIT
T101-01-01 REV E
DATE: 12/06/86 SHEET 1 OF 1
Q4, Q5, Q6
Q1, Q2, Q3
U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
U11
U12
P1
P2
P3
SW1
SW2
SW3
SW4
DS1
DS2
DS3
CR11 T102 ONLY
8031
2764
8255
LS373
LS541
CLONE MASTER MODULE
PARALLEL PORT
RS232C
±12 TTL
>2A 9vAC
115 VAC
VERIFY
ZAP
MR (POR)

```
10 REM       SAMPLE PROGRAM OF IBM FOR SMART ZAP
20 REM       SERIAL @ 9600 BAUD WITH NO ECHO
30 REM       5 LINE HOOKUP (IN,OUT,CTS,DTR,GND)
40 REM       DIP SWITCH  1,2,3,4,5,6 ARE ON 7,8 ARE OFF
45 REM       HOLES E AND F (CUT TRACK AND JUMP E AND F TO (0))
50 REM
60 REM
70 KEY OFF:CLS
80 PRINT"TURN ON SMART ZAP":PRINT:PRINT"HIT SPACE BAR TO CONTINUE"
90 A$=INPUT$(1):IF A$<>" " THEN 80
100 N$="NONE"
110 OPEN "COM2:9600,N,8,1,CS2000,DS,CD" AS #1:REM    OPENS SERIAL PORT 5 LINE
112 COMM = &H2FC:REM    ADDRESS OF MODEM CONTROL REGISTER
115 PRINT #1,CHR$(255);
120 GOSUB 400
130 GOSUB 500:A$=INPUT$(1)
150 IF A$="Z" THEN COMMAND=&HF0:GOTO 1000
160 IF A$="V" THEN COMMAND=&HF5:GOTO 1000
170 IF A$="E" THEN A=&HF6:GOSUB 600:GOTO 130
180 IF A$="U" THEN COMMAND=&HF7:GOTO 2000
190 IF A$="S" THEN 3000
200 IF A$="L" THEN 3100
210 IF A$="C" THEN 3200
220 BEEP:GOTO 130
400 A=&HFB:REM    COMMAND CODE FOR ID MODULE READ
410 GOSUB 600
420 GOSUB 700:MODULE=A
430 GOSUB 700:BEGINH=A
440 GOSUB 700:BEGINL=A
450 GOSUB 700:ENDH=A
460 GOSUB 700:ENDL=A
470 BEGINT=BEGINH*256+BEGINL:ENDT=ENDH*256+ENDL:RETURN
500 B$=HEX$(BEGINT):E$=HEX$(ENDT):M$=HEX$(MODULE)
505 CLS:PRINT:PRINT:PRINT,"SMART ZAPPER",,"MODULE ID                ";M$
506 PRINT,,,"BEGIN AREA FOR ZAPPER    ";B$
507 PRINT,,,"ENDING AREA              ";E$
508 PRINT,,,"FILE NAME                ";N$
510 PRINT:PRINT
520 PRINT,"Z)    ZAP FROM MEMORY":PRINT
530 PRINT,"V)    VERIFY FROM MEMORY":PRINT
540 PRINT,"E)    VERIFY ERASE":PRINT
550 PRINT,"U)    UPLOAD PROM TO MEMORY":PRINT
560 PRINT:PRINT
570 PRINT,"S)    SAVE MEMORY TO DISK":PRINT
580 PRINT,"L)    LOAD FROM DISK TO MEMORY":PRINT
590 PRINT,"C)    CHANGE ID MODULE":RETURN
600 PRINT #1,CHR$(A);:RETURN
700 B$=INPUT$(1,#1):A=ASC(B$):RETURN
1000 REM       FOR ZAP AND VERIFY
1010 A=COMMAND:GOSUB 600
1015 CLS:PRINT" BUSY "
1017 DEF SEG=&H2000:REM    MEMORY BUFFER START
1020 FOR ADDRESS=BEGINT TO ENDT:PRINT #1,CHR$(PEEK(ADDRESS));:NEXT ADDRESS
1060 DEF SEG:GOTO 130
2000 REM       UPLOAD DATA FROM PROM TO MEMORY
2002 A=COMMAND:GOSUB 600:CLS
2010 PRINT:PRINT,"1)  UPLOAD THE PROM IN THE CLONE SOCKET
2020 PRINT:PRINT,"2)  UPLOAD THE PROM IN THE MASTER SOCKET
2030 PRINT:PRINT:A$=INPUT$(1)
2040 IF A$="1" THEN PRINT #1,CHR$(&H80);:GOTO 2060
```

```
2050 IF A$="2" THEN PRINT #1,CHR$(&H40);:ELSE 2010
2060 PRINT:PRINT,"BUSY UPLOADING"
2080 DEF SEG=&H2000:REM   START OF MEMORY
2090 FOR ADDRESS=BEGINT TO ENDT:D=ASC(INPUT$(1,#1)):POKE ADDRESS,D
2100 IF LOC(1)>128 THEN A=INP(COMM):B=A AND &HFE:OUT COMM,B
2110 IF LOC(1)=0 THEN A=INP(COMM):B=A OR &H1:OUT COMM,B
2120 NEXT ADDRESS
2130 DEF SEG:GOTO 130
3000 CLS:PRINT,"SAVEING BUFFER FROM BEGINNING AREA OF    ";B$
3010 PRINT,"TO ENDING AREA OF                              ";E$
3020 PRINT:PRINT,"YES OR NO (N/Y)":A$=INPUT$(1)
3040 IF A$<>"Y" THEN 130
3050 PRINT:PRINT:PRINT"NAME OF FILE ";:INPUT N$
3060 DEF SEG=&H2000
3070 BSAVE N$,BEGINT,ENDT
3080 DEF SEG:GOTO 130
3100 CLS:PRINT:PRINT,"LOADING TO MEMORY STARTING AT  ";B$
3110 PRINT:PRINT"ENTER THE NAME OF FILE ";:INPUT N$
3120 DEF SEG=&H2000
3130 BLOAD N$,BEGINT
3140 DEF SEG:GOTO 130
3200 REM    CHANGE MODULE OR MEMORY WORKING AREA
3210 CLS:PRINT:PRINT,"CHANGE MEMORY SIZE
3220 PRINT:PRINT:PRINT,"R)      READ NEW MODULE ID"
3230 PRINT:PRINT,"I)     INPUT NEW MEMORY WORKING RANGE":A$=INPUT$(1)
3250 IF A$="R" THEN GOTO 120:REM    READS NEW MODULE YOU INSTALLED
3260 IF A$<>"I" THEN BEEP:GOTO 3200
3270 PRINT:INPUT"NEW BEGINNING ADDRESS (HEX INPUT) ";A$
3275 IF LEN(A$)<>4 THEN BEEP:PRINT"MUST USE 4 LOCATIONS":GOTO 3270
3280 GOSUB 3500:I1=H:I2=L
3290 PRINT:INPUT"NEW ENDING ADDRESS    (HEX INPUT) ";A$
3295 IF LEN(A$)<>4 THEN BEEP:PRINT"MUST USE 4 LOCATIONS":GOTO 3290
3300 GOSUB 3500
3310 A=&HF9:REM    COMMAND TO CHANGE MEMORY WORKING AREA
3320 GOSUB 600
3330 A=I1:GOSUB 600:REM    SEND OUT NEW STARTING  ** HIGH THEN LOW
3340 A=I2:GOSUB 600
3350 A=H:GOSUB 600:REM    SEND OUT NEW ENDING ADDRESS
3360 A=L:GOSUB 600
3370 GOTO 120:REM          READS MODULE ** S/B THE SAME
3500 REM   HEX INPUT TO DECIMAL
3510 I=0:FOR D=1 TO 4:C=ASC(MID$(A$,D)):C=C-48+(C>64)*7
3520 I=16*I+C
3530 IF D=2 THEN H=I:I=0
3540 NEXT D:L=I:RETURN
```

```
10 REM       SAMPLE PROGRAM ON IBM FOR   SMART ZAP
20 REM       SERIAL @ 9600 BAUD WITH ECHO ON
30 REM       3 LINE HOOKUP (IN,OUT,GND)
40 REM       DIP SWITCH  1,2,3,4,5,6,7 ARE ON, 8 IS OFF
50 REM
60 REM
70 KEY OFF:CLS
80 PRINT"TURN ON SMART ZAP":PRINT:PRINT"HIT SPACE BAR TO CONTINUE"
90 A$=INPUT$(1):IF A$<>" " THEN 80
100 N$="NONE"
110 OPEN "COM2:9600,N,8,1,CS,DS,CD" AS #1:REM    OPENS SERIAL PORT 3 LINE
115 PRINT #1,CHR$(255);:B$=INPUT$(1,#1)
120 GOSUB 400
130 GOSUB 500:A$=INPUT$(1)
150 IF A$="Z" THEN COMMAND=&HF0:GOTO 1000
160 IF A$="V" THEN COMMAND=&HF5:GOTO 1000
170 IF A$="E" THEN A=&HF6:GOSUB 600:GOTO 130
180 IF A$="U" THEN COMMAND=&HF7:GOTO 2000
190 IF A$="S" THEN 3000
200 IF A$="L" THEN 3100
210 IF A$="C" THEN 3200
220 BEEP:GOTO 130
400 A=&HFB:REM    COMMAND CODE FOR ID MODULE READ
410 GOSUB 600
420 GOSUB 700:MODULE=A
430 GOSUB 700:BEGINH=A
440 GOSUB 700:BEGINL=A
450 GOSUB 700:ENDH=A
460 GOSUB 700:ENDL=A
470 BEGINT=BEGINH*256+BEGINL:ENDT=ENDH*256+ENDL:RETURN
500 B$=HEX$(BEGINT):E$=HEX$(ENDT):M$=HEX$(MODULE)
505 CLS:PRINT:PRINT:PRINT,"SMART ZAPPER",,"MODULE ID                ";M$
506 PRINT,,,"BEGIN AREA FOR ZAPPER   ";B$
507 PRINT,,,"ENDING AREA             ";E$
508 PRINT,,,"FILE NAME               ";N$
510 PRINT:PRINT
520 PRINT,"Z)    ZAP FROM MEMORY":PRINT
530 PRINT,"V)    VERIFY FROM MEMORY":PRINT
540 PRINT,"E)    VERIFY ERASE":PRINT
550 PRINT,"U)    UPLOAD PROM TO MEMORY":PRINT
560 PRINT:PRINT
570 PRINT,"S)    SAVE MEMORY TO DISK":PRINT
580 PRINT,"L)    LOAD FROM DISK TO MEMORY":PRINT
590 PRINT,"C)    CHANGE ID MODULE":RETURN
600 REM OUTPUTS TO ZAPPER AND WAITS FOR ECHO
610 PRINT #1,CHR$(A);
620 B$=INPUT$(1,#1)
630 IF A<>ASC(B$) THEN 900
640 RETURN
700 REM INPUTS FROM ZAPPER THEN ECHO BACK
710 B$=INPUT$(1,#1)
720 A=ASC(B$)
730 PRINT #1,CHR$(A);
740 RETURN
900 CLS:PRINT:PRINT,"ERROR IN ECHO BACK  **  MAYBE PROM FAILED
920 PRINT,"PUSH ZAP OR VERIFY BUTTON TO GET YELLOW LIGHT ON"
930 PRINT:PRINT,"ANY KEY TO CONTINUE
935 BEEP:BEEP:BEEP
940 A$=INPUT$(1)
950 DEF SEG:GOTO 130
```

① ← SEND out Nothing

I.D. & Size.

MENU & Get Command ← GMENU:

ZAP

ZAP

OUT GMENU #A=8H50:GOSUB 600

upload

SAVE

LOAD

CHANGE

GMENU

READ:

OUT

IN

②

MENU:

② GET I.D. OUT:

ZERROR:

REM IN from ZAP only

hi

Lo

rcv

pgm

ZAP:

```
1000 REM      FOR ZAP AND VERIFY
1010 A=COMMAND:GOSUB 600
1015 CLS:PRINT" BUSY "
1017 DEF SEG=&H2000:REM   MEMORY BUFFER START
1020 FOR ADDRESS=BEGINT TO ENDT:A=PEEK(ADDRESS):GOSUB 600:REM OUTPUTS TO ZAPPER
1050 NEXT ADDRESS
1060 DEF SEG:GOTO 130
```

UPLOAD:

```
2000 REM      UPLOAD DATA FROM PROM TO MEMORY
2002 A=COMMAND:GOSUB 600:CLS
2010 PRINT:PRINT,"1)  UPLOAD THE PROM IN THE CLONE SOCKET
2020 PRINT:PRINT,"2)  UPLOAD THE PROM IN THE MASTER SOCKET
2030 PRINT:PRINT:A$=INPUT$(1)
2040 IF A$="1" THEN PRINT#1,CHR$(&H80);:GOTO 2050
2045 IF A$="2" THEN PRINT#1,CHR$(&H40);:ELSE 2010
2050 PRINT,"IF ONLY THE RED LIGHT COMES ON MEANS THE ECHO FAILED"
2060 PRINT:PRINT,"BUSY UPLOADING"
2065 B$=INPUT$(1,#1)
2080 DEF SEG=&H2000:REM   START OF MEMORY
2090 FOR ADDRESS=BEGINT TO ENDT
2100 GOSUB 700:REM        GET DATA FROM ZAPPER
2110 POKE ADDRESS,A:REM   SAVE DATA TO MEMORY
2120 NEXT ADDRESS
2130 DEF SEG:GOTO 130
```

SAVE:

```
3000 CLS:PRINT,"SAVEING BUFFER FROM BEGINNING AREA OF    ";B$
3010 PRINT,"TO ENDING AREA OF                           ";E$
3020 PRINT:PRINT,"YES OR NO (N/Y)":A$=INPUT$(1)
3040 IF A$<>"Y" THEN 130
3050 PRINT:PRINT:PRINT"NAME OF FILE ";:INPUT N$
3060 DEF SEG=&H2000
3070 BSAVE N$,BEGINT,ENDT
3080 DEF SEG:GOTO 130
```

LOAD:

```
3100 CLS:PRINT:PRINT,"LOADING TO MEMORY STARTING AT  ";B$
3110 PRINT:PRINT"ENTER THE NAME OF FILE ";:INPUT N$
3120 DEF SEG=&H2000
3130 BLOAD N$,BEGINT
3140 DEF SEG:GOTO 130
```

CHANGE:

```
3200 REM     CHANGE MODULE OR MEMORY WORKING AREA
3210 CLS:PRINT:PRINT,"CHANGE MEMORY SIZE
3220 PRINT:PRINT:PRINT,"R)      READ NEW MODULE ID"
3230 PRINT:PRINT,"I)     INPUT NEW MEMORY WORKING RANGE":A$=INPUT$(1)
3250 IF A$="R" THEN GOTO 120:REM     READS NEW MODULE YOU INSTALLED
3260 IF A$<>"I" THEN BEEP:GOTO 3200
3270 PRINT:INPUT"NEW BEGINNING ADDRESS (HEX INPUT) ";A$
3275 IF LEN(A$)<>4 THEN BEEP:PRINT"MUST USE 4 LOCATIONS":GOTO 3270
3280 GOSUB 3500:I1=H:I2=L
3290 PRINT:INPUT"NEW ENDING ADDRESS    (HEX INPUT) ";A$
3295 IF LEN(A$)<>4 THEN BEEP:PRINT"MUST USE 4 LOCATIONS":GOTO 3290
3300 GOSUB 3500
3310 A=&HF9:REM    COMMAND TO CHANGE MEMORY WORKING AREA
3320 GOSUB 600
3330 A=I1:GOSUB 600:REM    SEND OUT NEW STARTING  ** HIGH THEN LOW
3340 A=I2:GOSUB 600
3350 A=H:GOSUB 600:REM    SEND OUT NEW ENDING ADDRESS
3360 A=L:GOSUB 600
3370 GOTO 120:REM         READS MODULE ** S/B THE SAME
```

HTOD:

```
3500 REM   HEX INPUT TO DECIMAL
3510 I=0:FOR D=1 TO 4:C=ASC(MID$(A$,D)):C=C-48+(C>64)*7
3520 I=16*I+C
3530 IF D=2 THEN H=I:I=0
3540 NEXT D:L=I:RETURN
```

END

Varptr(var) None use malloc through a C var

END

```
 10 REM  SAMPLE PROGRAM ON COMMODORE C64 FOR   SMART ZAP
 15 REM  UP TO 28128 OR 27128 (BECAUSE OF MEMORY SIZE OF C64)
 20 REM  SERIAL @ 1200 BAUD WITH ECHO ON
 30 REM  3 LINE HOOKUP
 40 REM  DIP SWITCH 1,2,3,4,5,7 ARE ON
 50 REM  DIP SWITCH 6,AND 8 ARE OFF
 60 REM
 70 REM
 90 CLS$="□":PRINT CLS$
100 PRINT"TURN ON SMART ZAP":PRINT
105 PRINT"AND WAIT FOR YELLOW LIGHT
110 PRINT:PRINT:PRINT"HIT ANY KEY TO CONTINUE"
120 GOSUB 300
130 OPEN 2,2,0,CHR$(8)+CHR$(0):REM OPENS RS232 PORT  1200 BAUD AND 3 LINE
131 N$="NONE"
132 CLS$="□":PRINT CLS$
133 POKE 56,95:POKE 55,255:REM  SET TOP OF BASIC MEMORY
134 PRINT#2,CHR$(255);
135 FOR X=1TO100:REM    WAIT FOR ECHO
136 GET#2,Z$
140 GOSUB 400
150 GOSUB 500:GOSUB 300
160 IF Z$="Z" THEN CCD=240:GOTO 1000
170 IF Z$="V" THEN CCD=245:GOTO 1000
180 IF Z$="E" THEN A=246:GOSUB 600:GOTO 150
190 IF Z$="U" THEN CCD=247:GOTO 2000
200 IF Z$="S" THEN 3000
210 IF Z$="L" THEN 3100
220 IF Z$="C" THEN 3200
230 GOTO 150
300 GET Z$:IF Z$="" THEN 300
310 RETURN
400 A=251:REM    CODE FOR ID MODULE READ
410 GOSUB 600:REM   SEND CODE
420 GOSUB 700:MODULE=A
430 GOSUB 700:HBEGIN=A
440 GOSUB 700:LBEGIN=A
450 GOSUB 700:HIE=A
460 GOSUB 700:LOE=A
470 TBEGIN=HBEGIN*256+LBEGIN:TT=HIE*256+LOE
475 IF TT>16383 THEN PRINT"OVER MEMORY RANGE OF BUFFER":STOP
480 RETURN
500 L=TBEGIN:GOSUB 3600:BE$=H$:L=TT:GOSUB 3600:EN$=H$
510 L=MODULE:GOSUB 3600:MO$=H$
515 PRINT CLS$:PRINT"  SMART ZAPPER","MODULE ID    ";MO$
520 PRINT,,"BEGIN AREA   ";BE$
525 PRINT,,"ENDING AREA  ";EN$
530 PRINT,,"FILE NAME    ";N$
532 PRINT:PRINT
535 PRINT" Z)   ZAP FROM MEMORY"
540 PRINT" V)   VERIFY FROM MEMORY"
545 PRINT" E)   VERIFY ERASE"
547 PRINT" U)   UPLOAD PROM TO MEMORY"
550 PRINT
555 PRINT" S)   SAVE MEMORY TO DISK"
560 PRINT" L)   LOAD FROM DISK TO MEMORY"
570 PRINT" C)   CHANGE ID MODULE":RETURN
600 REM  OUTPUTS TO ZAPPER AND WAITS FOR ECHO
```

```
610 PRINT#2,CHR$(A);
620 GET#2,B$:SR=ST:IF SR=8 THEN 620
630 IF SR<>0 THEN PRINT"ERROR ";SR:STOP
640 B=1:IF B$="" THEN B=0
650 IF B=1 THEN B=ASC(B$)
660 IF A<>B THEN 900
670 RETURN
700 REM  INPUT FROM ZAPPER THEN ECHO BACK
710 GET#2,B$:SR=ST:IF SR=8 THEN 710
720 IF SR<>0 THEN PRINT"ERROR ";SR:STOP
730 A=1:IF B$="" THEN A=0
740 IF A=1 THEN A=ASC(B$)
750 PRINT#2,CHR$(A);
760 RETURN
900 PRINT CLS$:PRINT"ERROR IN ECHO BACK
910 PRINT:PRINT"MAYBE PROM FAILED"
920 PRINT:PRINT"PUSH ZAP OR VERIFY BUTTON
930 PRINT"FOR YELLOW LIGHT"
940 PRINT:PRINT,"ANY KEY TO CONTINUE
950 GOSUB 300:GOTO 150
1000 REM     FOR  ZAP AND  VERIFY
1010 A=CCD:GOSUB 600
1020 PRINT CLS$:PRINT"BUSY"
1030 FOR ADDRESS=TBEGIN+24576 TO TT+24576:REM OFFSET FOR BUFFER (STARTS $6000)
1040 A=PEEK(ADDRESS):GOSUB 600:REM   OUTPUTS TO ZAPPER ** DATA   .
1050 NEXT ADDRESS:GOTO 150
2000 REM   UPLOAD DATA FROM PROM TO MEMORY
2010 PRINT CLS$:A=CCD:GOSUB 600
2020 PRINT"1) UPLOAD THE PROM IN THE CLONE SOCKET":PRINT
2030 PRINT"2) UPLOAD THE PROM IN THE MASTER SOCKET"
2040 GOSUB 300:A=0:IF Z$="1" THEN A=128
2045 IF Z$="2" THEN A=64
2046 IF A=0 THEN 2040
2047 GOSUB 600
2050 PRINT:PRINT"IF ONLY THE RED LIGHT COMES ON
2060 PRINT"MEANS THE ECHO HAS FAILED
2070 PRINT:PRINT" BUSY UPLOADING"
2080 FOR ADDRESS=TBEGIN+24576 TO TT+24576
2090 GOSUB 700:REM  GETS DATA FROM ZAPPER
2100 POKE ADDRESS,A:REM  SAVE DATA TO MEMORY
2110 NEXT ADDRESS:GOTO 150
3000 PRINT CLS$:PRINT"SAVEING PROM DATA STARTING AT ";BE$
3010 PRINT:PRINT,,"ENDING AT ";EN$
3020 PRINT:PRINT"  YES OR NO ( N/Y )"
3030 GOSUB 300
3040 IF Z$<>"Y" THEN 150
3050 PRINT:PRINT:INPUT" NAME OF FILE ";N$
3060 M$="@0:"+N$
3070 OPEN 1,8,2,M$+",P,W"
3080 FOR X=TBEGIN+24576 TO TT+24576+1
3085 PRINT#1,CHR$(PEEK(X));
3090 NEXT X:CLOSE 1
3095 GOTO 150
3100 PRINT CLS$:PRINT"LOADING TO MEMORY BEGINNING AT ";BE$
3110 PRINT:INPUT" ENTER THE NAME OF FILE ";N$
3120 OPEN 1,8,2,N$+",P,R"
3130 FOR X=TBEGIN+24576 TO TT+24576+1
3140 GET#1,A$:IF ST>0 THEN 3180
3150 POKE X,ASC(A$+CHR$(0))
3160 NEXT X
```

```
3180 CLOSE 1:GOTO 150
3200 REM   CHANGE MODULE OR PROM WORKING AREA
3210 PRINT CLS$:PRINT"  CHANGE MEMORY SIZE"
3220 PRINT:PRINT:PRINT" R)   READ NEW MODULE"
3230 PRINT:PRINT" I)   INPUT NEW MEMORY WORKING RANGE"
3240 GOSUB 300
3250 IF Z$="R" THEN GOTO 140
3260 IF Z$<>"I" THEN 3200
3270 PRINT:INPUT"NEW BEGINNING ADDRESS (HEX INPUT)";A$
3275 IF LEN(A$)<>4 THEN PRINT"MUST USE 4 LOCATIONS":GOTO 3270
3280 GOSUB 3500:I1=H:I2=L
3290 PRINT:INPUT"NEW ENDING ADDRESS ";A$
3295 IF LEN(A$)<>4 THEN PRINT"MUST USE 4 LOCATIONS":GOTO 3290
3300 GOSUB 3500
3310 A=249:REM  COMMAND  TO CHANGE MEMORY WORKING AREA
3320 GOSUB 600
3330 A=I1:GOSUB 600:REM  SEND OUT NEW STARTING  ** HIGH THEN LOW
3340 A=I2:GOSUB 600
3350 A=H:GOSUB 600:REM  SEND OUT NEW ENDING ADDRESS
3360 A=L:GOSUB 600
3370 GOTO 140:REM   READS MODULE ** S/B THE SAME
3500 REM  HEX INPUT TO DECIMAL
3510 I=0:FOR D=1 TO 4:C%=ASC(MID$(A$,D)):C%=C%-48+(C%>64)*7
3520 I=16*I+C%
3530 IF D=2 THEN H=I:I=0
3540 NEXT D:L=I:RETURN
3600 REM  DECIMAL TO HEX
3605 H$="":L=L/4096:FOR J=1 TO 4:L%=L:L$=CHR$(48+L%-(L%>9)*7)
3610 H$=H$+L$:L=16*(L-L%):NEXT J:RETURN

READY.
```

External Sample Program (In Test Mode)

```
10 REM  TEST PROGRAM FOR ZAPPER
20 REM
30 REM        7/18/86
40 REM
50 REM     COMMODORE COMPUTER
60 REM
70 REM.   IF FAILS - THE YELLOW LIGHT WILL BE BLINKING
100 PRINT"■■■   TEST
110 PRINT"■■■ SETUP DIP SWITCH FOR I/O TEST
115 PRINT" 1 3 4 5 8  ARE ON -- 2 7 6 ARE OFF"
130 OPEN 2,2,0,CHR$(8)+CHR$(0):REM 1200 BAUD AND 3 LINE
150 REM  USE OPEN2,2,0,CHR$(8)+CHR$(1) FOR 1200 BAUD AND 5 LINE  -- IN LINE 130
310 FOR A=0 TO 255
320 PRINT#2,CHR$(A);
340 NEXT A
350 STOP

READY.
```

```
1 REM     Test for zapper on IBM computer using printer parallel port with no
2 REM     echo -- Dip switch 1,3,6,8 are on - others are off - push both buttons

3 REM     If fails - The yellow light will be blinking
10 A=0
15 OPEN "lpt1:" AS #1
16 WIDTH #1,255:REM       Turns off line feed after carriage return
20 PRINT A
30 PRINT #1,CHR$(A);
40 A=A+1:IF A=256 THEN A=0
45 L=L+1:IF L=512 THEN STOP
50 GOTO 20
```

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