Chip's Challenge File Layout

Based on the "Chip's Challenge File Layout Information, copyright 1997 Greg Heier", which can be found in many places online. This document is an attempt to clean up, somewhat reorganize, and clarify some of the information presented there.

A note on naming conventions: the names of various objects used in this document are designed to be generally more generic than what has been presented in the past. This is an attempt to avoid terms that are specific to the original Chip's Challenge game (and clones), allowing for more generalized rules that can be applied to similar games using similar algorithms, without being tied down to the original nomenclature. For instance, the use of "artifact" instead of "chip" or "left wall hugger" instead of "bug".

General Layout

Each level of Chip's Challenge (and similar games that use the file format described here) is made up of a 32x32 tile grid (the "map"; 1024 tiles total). Each map contains two layers: the top layer (which will generally contain the bulk of the objects in the map) and the bottom layer (used when various objects should be placed under other objects listed on the top layer; e.g. fire under blocks).

Data consisting of multiple bytes follow the little endian scheme (least significant byte first).

Each file contains the general sections listed below:

File Header

Offset	Bytes	Description
$00 (0)	4	Magic Number, used to check for a valid file. The value must be $0002AAAC. Tile World also accepts $0102AAAC (Atari Lynx rules).
$04 (4)	2	Number of levels contained in the file.

Level Information

Level 1 information will always begin with offset $06 (6). All other offsets are calculated from level 1.

Offset	Bytes	Description
+$00 (0)	2	Number of bytes in this level (not including this word).
+$02 (2)	2	Number of levels contained in the file.
+$04 (4)	2	Time allotted (in seconds). 0 indicates unlimited time.
+$06 (6)	2	Number of artifacts to pick up.
+$08 (8)	2	0 or 1 (0 is not used in the original CHIPS.DAT). Exact purpose is unknown.
+$0A (10)	2	Number of bytes in top map layer (not including this word). [TMB]
+$0C (12)	Varies	Top map layer detail. See Map Detail section below.
	2	Number of bytes in bottom map layer (not including this word). [BMB]
	Varies	Bottom map layer detail. See Map Detail section below.
	2	Number of bytes in optional fields
	1	Optional field type. See Optional Fields section below.
	1	Number of bytes in this optional field

Each level after level 1 follows the same pattern. Offsets should be calculated accordingly.

Map Detail

The map detail consists of a series of object codes (see Chip's Challenge File Format Object Codes), in the range of $00 - $6F. Object codes $70 - $9F (OR'd copies of $3F - $6F) and $A0 - $CF (XOR'd copies of $70 - $9F) are used internally.

$FF indicates Run-Length-Encoding (RLE), which takes the form $FF [number of copies] [object code].

For example, $FF $08 $02 would indicate a row of 8 artifacts. If the bottom map layer is not used, it appears as "$FF $FF $00 $FF $FF $00 $FF $FF $00 $FF $FF $00 $FF $04 $00", which is 1024 empty tiles (255 + 255 + 255 + 255 + 4) under the top layer.

Optional Fields

The upper limit of the optional fields is 1152 bytes. Chip's Challenge will crash when loading the level if there are more bytes present.

CHIPS.DAT contains these fields in this order: 3, 7, 6, 4, 5, 10. However, this is not strictly required. Each level will always contain fields 3 and 6.

Field Type	Description
1	Level time [NOT USED]
2	Number of artifacts in the level [NOT USED]
3	Map Title
4	Map of trap buttons to traps
5	Map of cloner buttons to cloners
6	Map Password (encrypted)
7	Hint Text
8	Map Password (not encrypted) [NOT USED]
9	[NOT USED]
10	Map of Monsters

Any other field type numbers are treated as 9 and ignored.

Field Type 1 – Level Time [NOT USED]

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte).
+$02 (2)	2	Time allotted (in seconds). 0 indicates unlimited time.

Duplicate of information contained at offset +$04 of the level.

Field Type 2 – Number of Artifacts in the Level [NOT USED]

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte).
+$02 (2)	2	Number of artifacts to pick up.

Duplicate of information contained at offset +$06 of the level.

Field Type 3 – Map Title

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), including terminating 0.
+$02 (2)	Varies	Map title. Can be up to 63 bytes. Terminates with $00.

The Map Title is ASCII encoded.

Field Type 4 – Map of trap buttons to traps

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), a multiple of $0A bytes.
+$02 (2)	Varies	Trap records

Trap records conform to the following format.

Offset	Bytes	Description
+$00 (0)	2	Button X position
+$02 (2)	2	Button Y position
+$04 (2)	2	Trap X position
+$06 (2)	2	Trap Y position
+$08 (2)	2	Always $00. Exact purpose is unknown.

$00 - $1F are valid X and Y positions on the 32x32 grid.

Field Type 5 – Map of cloner buttons to cloners

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), a multiple of $08 bytes.
+$02 (2)	Varies	Cloner records

Cloner records conform to the following format.

Offset	Bytes	Description
+$00 (0)	2	Button X position
+$02 (2)	2	Button Y position
+$04 (2)	2	Cloner X position
+$06 (2)	2	Cloner Y position

$00 - $1F are valid X and Y positions on the 32x32 grid.

Field Type 6 – Map Password (encrypted)

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), including terminating 0.
+$02 (2)	Varies	Encoded password. Terminates with $00.

The password is encoded by XORing each byte in it with $99. This produces the following encoding:

A	B	C	D	E	F	G	H	I	J	K	L	M
$D8	$DB	$DA	$DD	$DC	$DF	$DE	$D1	$D0	$D3	$D2	$D5	$D4
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
$D7	$D6	$C9	$C8	$CB	$CA	$CD	$CC	$CF	$CE	$C1	$C0	$C3

Standard passwords are 4 bytes (characters) long, although the format allows for passwords up to 9 bytes (characters).

Field Type 7 – Hint Text

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), including terminating 0.
+$02 (2)	Varies	Hint Text. Can be up to 127 bytes. Terminates with $00.

The Hint Text is ASCII encoded.

Field Type 8 – Map Password (not encrypted) [NOT USED]

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), including terminating 0.
+$02 (2)	Varies	Plain text password. Terminates with $00.

Duplicate of field 6, except not encrypted. Password text is ASCII encoded. Not generally used.

Field Type 9 – [NOT USED]

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), including terminating 0.
+$02 (2)	Varies	Field data

Field type 9 is not used. All other field types are treated the same and are ignored.

Field Type 10 – Map of Monsters

Offset	Bytes	Description
+$00 (0)	1	Field Type
+$01 (1)	1	Number of bytes in this optional field (not counting this byte), a multiple of $02 bytes.
+$02 (2)	Varies	Monster records

Monster records conform to the following format.

Offset	Bytes	Description
+$00 (0)	2	Monster X position
+$02 (2)	2	Monster Y position

$00 - $1F are valid X and Y positions on the 32x32 grid.

Under the original Chip's Challenge game, each monster placed on the map must be listed in optional field 10, otherwise it will not move. Additionally, a maximum of 128 monsters is allowed.

Chip's Challenge File Format Object Codes

	$00 (0)	Empty (Floor)
	$01 (1)	Wall

	$02 (2)	Artifact
	$03 (3)	Water

	$04 (4)	Fire
	$05 (5)	Invisible Wall (doesn't appear)
	$06 (6)	Thin Wall – North
	$07 (7)	Thin Wall – West
	$08 (8)	Thin Wall – South
	$09 (9)	Thin Wall – East
	$0A (10)	Block
	$0B (11)	Dirt
	$0C (12)	Ice
	$0D (13)	Force Floor – South
	$0E (14)	Clone Block – North
	$0F (15)	Clone Block – West
	$10 (16)	Clone Block – South
	$11 (17)	Clone Block – East
	$12 (18)	Force Floor – North
	$13 (19)	Force Floor – East
	$14 (20)	Force Floor – West
	$15 (21)	Exit
	$16 (22)	Blue Door
	$17 (23)	Red Door
	$18 (24)	Green Door
	$19 (25)	Yellow Door
	$1A (26)	Ice Corner – Northwest
	$1B (27)	Ice Corner – Northeast
	$1C (28)	Ice Corner – Southeast
	$1D (29)	Ice Corner – Southwest
	$1E (30)	Blue Block (becomes empty)
	$1F (31)	Blue Block (becomes wall)
	$20 (32)	NOT USED (acts as $05)
	$21 (33)	Thief
	$22 (34)	Gate
	$23 (35)	Toggle Wall Button
	$24 (36)	Cloner Button
	$25 (37)	Toggle Wall (on)
	$26 (38)	Toggle Wall (off)
	$27 (39)	Trap Button
	$28 (40)	Dumb Sentry Button
	$29 (41)	Teleport
	$2A (42)	Bomb
	$2B (43)	Trap
	$2C (44)	Invisible Wall (appears)
	$2D (45)	Gravel
	$2E (46)	Retracted Wall
	$2F (47)	Hint
	$30 (48)	Thin Wall – Southeast
	$31 (49)	Cloner
	$32 (50)	Force Floor – Random
	$33 (51)	Hero – Drowned

	$34 (52)	Hero – Burned
	$35 (53)	Hero – Burned (2)
	$36 (54)	NOT USED (acts as $05)
	$37 (55)	NOT USED (acts as $05)
	$38 (56)	NOT USED (acts as $05)
	$39 (57)	Hero in Exit – End Game (used internally)
	$3A (58)	Exit – End Game (used internally)
	$3B (59)	Exit – End Game (used internally)
	$3C (60)	Hero Swimming – North (used internally)
	$3D (61)	Hero Swimming – West (used internally)
	$3E (62)	Hero Swimming – South (used internally)
	$3F (63)	Hero Swimming – East (used internally)
	$40 (64)	Left Wall Hugger – North
	$41 (65)	Left Wall Hugger – West
	$42 (66)	Left Wall Hugger – South
	$43 (67)	Left Wall Hugger – East
	$44 (68)	Right Sentry - North
	$45 (69)	Right Sentry – West
	$46 (70)	Right Sentry – South
	$47 (71)	Right Sentry – East
	$48 (72)	Sentry – North
	$49 (73)	Sentry – West
	$4A (74)	Sentry – South
	$4B (75)	Sentry – East

	$4C (76)	Dumb Sentry – North
	$4D (77)	Dumb Sentry – West
	$4E (78)	Dumb Sentry – South
	$4F (79)	Dumb Sentry – East
	$50 (80)	Left Sentry – North
	$51 (81)	Left Sentry – West
	$52 (82)	Left Sentry – South
	$53 (83)	Left Sentry – East
	$54 (84)	Chaser – North
	$55 (85)	Chaser – West
	$56 (86)	Chaser – South
	$57 (87)	Chaser – East
	$58 (88)	Random Sentry – North
	$59 (89)	Random Sentry – West
	$5A (90)	Random Sentry – South
	$5B (91)	Random Sentry – East
	$5C (92)	Random – North
	$5D (93)	Random – West
	$5E (94)	Random – South
	$5F (95)	Random – East
	$60 (96)	Right Wall Hugger – North
	$61 (97)	Right Wall Hugger – West
	$62 (98)	Right Wall Hugger – South
	$63 (99)	Right Wall Hugger – East

	$64 (100)	Blue Key
	$65 (101)	Red Key
	$66 (102)	Green Key
	$67 (103)	Yellow Key
	$68 (104)	Water Shoes
	$69 (105)	Fire Shoes

	$6A (106)	Ice Shoes
	$6B (107)	Force Shoes
	$6C (108)	Hero – North
	$6D (109)	Hero – West
	$6E (110)	Hero – South
	$6F (111)	Hero – East