Pokémon data substructures (Generation III)

This is the list of Pokémon data substructures in the Generation III Game Boy Advance games, Pokémon Ruby, Sapphire, FireRed, LeafGreen, and Emerald.

Format

A Pokémon's data is slightly more complex than the rest of the Pokémon data structure. It is stored as four distinct substructures, each 12 bytes in length. (The Notes section below explains some of these fields in greater detail.)

Growth			Attacks			EVs & Condition			Miscellaneous		
	size (bytes)	offset (bytes)		size (bytes)	offset (bytes)		size (bytes)	offset (bytes)		size (bytes)	off (by
Species	2	0	Move 1	2	0	HP EV	1	0	Pokérus status	1	0
Item held	2	2	Move 2	2	2	Attack EV	1	1	Met location	1	1
Experience	4	4	Move 3	2	4	Defense EV	1	2	Origins info	2	2
PP bonuses	1	8	Move 4	2	6	Speed EV	1	3	IVs, Egg, and Ability	4	4
Friendship	1	9	PP 1	1	8	Special Attack EV	1	4	Ribbons and Obedience	4	8
Unknown	2	10	PP 2	1	9	Special Defense EV	1	5			
			PP 3	1	10	Coolness	1	6			
			PP 4	1	11	Beauty	1	7			
						Cuteness	1	8			
						Smartness	1	9			
						Toughness	1	10			
						Feel	1	11			

Substructure order

The order of the structures is determined by the personality value of the Pokémon modulo 24, as shown below, where G, A, E, and M stand for the substructures growth, attacks, EVs and condition, and miscellaneous, respectively.

00. GAEM 06. AGEM 12. EGAM 18. MGAE
01. GAME 07. AGME 13. EGMA 19. MGEA
02. GEAM 08. AEGM 14. EAGM 20. MAGE
03. GEMA 09. AEMG 15. EAMG 21. MAEG
04. GMAE 10. AMGE 16. EMGA 22. MEGA
05. GMEA 11. AMEG 17. EMAG 23. MEAG

Encryption

The four data substructures are stored in an encrypted form. Decrypting the data involves two steps: actually decrypting the data, and validating the decrypted data. To obtain the 32-bit decryption key, the entire Original Trainer ID number must be XORed with the personality value of the entry. This key can then be used to decrypt the data by XORing it, 32 bits (or 4 bytes) at a time. To validate the checksum given in the encapsulating Pokémon data structure, the entirety of the four unencrypted data substructures must be summed into a 16-bit value.

Notes

PP bonuses

The PP bonuses byte stores the number of times PP has been increased for each move in the attacks substructure. Each move has two bits, meaning the PP of each move can be increased 0 to 3 times.

Bits	Move
0-1	Move 1
2-3	Move 2
4-5	Move 3
6-7	Move 4

Pokérus status

Pokérus status is stored in a single byte, with the upper and lower halves representing distinct values.

Bits	Interpretation
0-3	Days left until Pokérus is cured
4-7	Pokérus "strain"

Any value from 0 to 15 is valid for the strain, with 0 indicating that the Pokémon does not have Pokérus at all. The number of days can be any value from 0 to 4, although for some "strains", some of those higher values are also invalid. If any bit is set in the "strain" and the number of days is at 0, the Pokémon has been "cured" of Pokérus, as indicated by a small black dot on the Pokémon's status screen.

Origins

Trainer gender tells the game how to color the name of the Pokémon's Original Trainer on the Pokémon's status screen. If *Level met* is 0, it is interpreted as the Pokémon having been hatched from an Egg; however, the games only differentiate a hatched Pokémon from other Pokémon if its current Trainer is the Pokémon's Original Trainer. If a hatched Pokémon is traded, its origin text on the status screen is displayed just like a caught Pokémon's and will not say "Hatched" or "Egg".

Trainer gender		Poké Ball caught in		Game of origin		Level met	
Bit 15		*Bits 11 - 14*		*Bits 7 - 10*		*Bits 0 - 6*	
Value	**Gender**	**Value**	**Ball**	**Value**	**Game**	**Value**	**Interpretation**
0	**Male**	1	Master Ball	1	**Sapphire**	0	Hatched
1	**Female**	2	Ultra Ball	2	**Ruby**	>0	Caught or other
		3	Great Ball	3	**Emerald**		
		4	Poké Ball	4	**FireRed**		
		5	Safari Ball	5	**LeafGreen**		
		6	Net Ball	15	**Colosseum** or **XD**		
		7	Dive Ball				
		8	Nest Ball				
		9	Repeat Ball				
		10	Timer Ball				
		11	Luxury Ball				
		12	Premier Ball				

IVs, Egg, and Ability

IVs for each of the stats from HP to Special Defense take up the lowest 30 bits of this field, each IV taking 5 bits. Bit 30 is a 1 if the Pokémon is still an Egg or 0 otherwise. Bit 31 indicates the Ability the Pokémon has: 0 indicates its first Ability, while 1 indicates its second Ability (if it has one).

In the table below, bit 0 is the least significant bit of the 32-bit field and bit 31 is the most significant.

Bits	Stat
0-4	HP
5-9	Attack
10-14	Defense
15-19	Speed
20-24	Special Attack
25-29	Special Defense
30	Egg?
31	Ability

Ribbons and Obedience

For most of the Ribbons, a value of 0 indicates that the Pokémon does not have the Ribbon while 1 indicates that it does. For the Contest Ribbons, the values 1 to 4 indicate that the Pokémon has the Ribbon or Ribbons for (respectively) the Normal, Super, Hyper, and Master Ranks of that Contest.

The last 6 possible spots for Ribbons are variable. The data identifying what Ribbons these spots correspond to is stored elsewhere. The full list of possibilities for these can be seen here. The only two of these special Ribbons that remain reliably obtainable are those for purifying a Shadow Pokémon and for beating Mt. Battle.

Bits	Ribbon
0-2	Cool
3-5	Beauty
6-8	Cute
9-11	Smart
12-14	Tough
15	Champion
16	Winning
17	Victory
18	Artist
19	Effort
20	Special 1
21	Special 2
22	Special 3
23	Special 4
24	Special 5
26	Special 6

The highest bit of this field, bit 31, determines the obedience of Mew and Deoxys. If this bit is not set, Mew and Deoxys cannot be traded to or from Pokémon FireRed, LeafGreen, or Emerald, and will always disobey the player in battle in those games (except in link battles). If this bit is set on a Pokémon that is transferred to a later generation, the Pokémon will be treated as having had a fateful encounter.[1]

See also

- Pokémon data structure (Generation III)

Links

- PokemonMakerV4x Help and 80 bytes Make a Pokémon

References

1. Pokémon Ruby, Sapphire, and Emerald - Various Notes (Upokecenter via the Internet Archive)

Data structure in the Pokémon games	
Generation I	Pokémon species • Pokémon • Poké Mart • Character encoding • Save
Generation II	Pokémon species • Pokémon • Trainer • Character encoding • Save
Generation III	Pokémon species (Pokémon evolution • Pokédex • Type chart) Pokémon (substructures) • Move • Contest • Contest move • Item Trainer Tower • Battle Frontier • Character encoding • Save
Generation IV	Pokémon • Save
TCG GB and GB2	Character encoding

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