

## Complete FireRed Upgrade



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## Colour Coding Legend

Encoding	Represents
<b>Bold</b>	Indicates file paths or things to take note of.
<i>Italicized</i>	Used for things such as proper names or scripting command names.
Green	Used to indicate a definition that should be changed in <b>src/config.h</b> . In example scripts it is used for comments and strings.
Dull Orange	Used to indicate another constant defined somewhere ( <b>not</b> in the config file). In scripts it is used for the <b>#define</b> and <b>#org</b> directives as well.
<i>Italicized Purple</i>	Used to indicate a table of some sort that can be modified (usually found in <b>src/Tables</b> , but not always).
Deep Orange	Used when referring to function names.
Gold	Used for certain definitions like <b>#ifdef</b> .
<u>Blue Underlined</u>	These words are hyperlinks. Clicking on them will take you somewhere (may or may not be in the document).
Red	Used for titles. In scripts they represent references to other scripts.
Faded Blue	Used for showing the inputs for script specials.

# Set Up

## Necessary Modifications

The following modifications must be made before setting up the engine!

### Pokémon Defines:

1. Open the files **include/constants/species.h** and **include/constants/pokedex.h**.
2. Modify the Pokémon indices found in this file to match the ones in your hack.
3. If you have not added in any new Pokémon to Fire Red, you can leave the unused species indices as their default values.
4. If you have added new Pokémon, ideally, you should not delete any Pokémon names and just assign all species you aren't using a unique number starting after your last Pokémon slot. However, if this is too tedious for you, you'll need to do the following two things.
5. First, modify the following tables by removing entries you don't wish to use:

Table	File
<i>gSpecialZMoveTable</i>	src/battle_start_turn_start.c
<i>sSmartWildAITable</i>	src/Battle_AI/AI_master.c
<i>gWildSpeciesBasedBattleBGM</i>	src/Tables/Music_Tables.c
All Tables	src/Tables/Pokemon_Tables.c

6. Secondly, the following Pokémon are necessary and must be changed if you are not using them (preferably all to unique numbers - I can't guarantee they'll all work as the same number):

Species	Reason
SPECIES_NONE 0x0	It's 0. <b>Don't change or remove.</b>
SPECIES_BULBASUR 0x1	Referred to by vanilla FR roaming code.
SPECIES_CHARMANDER 0x4	Referred to by vanilla FR roaming code.
SPECIES_NIDORAN_M 0x20	Special breeding.
SPECIES_FARFETCHD 0x53	Signature item <a href="#">Stick</a> .
SPECIES_CUBONE 0x68	Signature item <a href="#">Thick Club</a> .
SPECIES_MAROWAK 0x69	Signature item <a href="#">Thick Club</a> .
SPECIES_MAROWAK_A 0x40F	Signature item <a href="#">Thick Club</a> .
SPECIES_CHANSEY 0x71	Signature item <a href="#">Lucky Punch</a> . <a href="#">Luck Incense</a> breeding.
SPECIES_MR_MIME 0x7A	<a href="#">Odd Incense</a> breeding.
SPECIES_DITTO 0x84	Signature items <a href="#">Quick Powder</a> & <a href="#">Metal Powder</a> .
SPECIES_SNORLAX 0x8F	<a href="#">Full Incense</a> breeding.

SPECIES_PICHU 0xAC	<a href="#">Volt Tackle</a> breeding.
SPECIES_MARILL 0xB7	<a href="#">Sea Incense</a> breeding.
SPECIES_SUDOWOODO 0xB9	<a href="#">Rock Incense</a> breeding.
SPECIES_WOBBUFFET 0xCA	<a href="#">Lax Incense</a> breeding.
SPECIES_UNOWN 0xC9	Has many forms. Change those too.
SPECIES_MANTINE 0xE2	<a href="#">Wave Incense</a> breeding.
SPECIES_RAIKOU 0xF3	Referred to by vanilla FR roaming code.
SPECIES_ENTEI 0xF4	Referred to by vanilla FR roaming code.
SPECIES_SUICUNE 0xF5	Referred to by vanilla FR roaming code.
SPECIES_AZURILL 0x15E	<a href="#">Sea Incense</a> breeding.
SPECIES_WYNAUT 0x168	<a href="#">Lax Incense</a> breeding.
SPECIES_ROSELIA 0x16B	<a href="#">Rose Incense</a> breeding.
SPECIES_CLAMPERL 0x175	Signature items <a href="#">Deep Sea Tooth</a> & <a href="#">Deep Sea Scale</a> .
SPECIES_CASTFORM 0x181	Signature ability: <a href="#">Forecast</a> .
SPECIES_VOLBEAT 0x182	Special breeding.
SPECIES_RAYQUAZA 0x196	Banned with <a href="#">Dragon Ascent</a> in a Battle Tower <a href="#">format</a> .
SPECIES_LATIAS 0x197	Signature item <a href="#">Soul Dew</a> .
SPECIES_LATIOS 0x198	Signature item <a href="#">Soul Dew</a> .
SPECIES_CHIMECHO 0x19B	<a href="#">Pure Incense</a> breeding.
SPECIES_EGG 0x19C	It's an egg. <b>Don't change or remove.</b>
SPECIES_BUDEW 0x1CB	<a href="#">Rose Incense</a> breeding.
SPECIES_BURMY 0x1D1	Changes form after battle.
SPECIES_BURMY_SANDY 0x2C3	Changes form after battle.
SPECIES_BURMY_TRASH 0x2C4	Changes form after battle.
SPECIES_CHERRIM 0x1DA	Signature ability: <a href="#">Flower Gift</a> .
SPECIES_CHERRIM_SUN 0x2EF	Signature ability: <a href="#">Flower Gift</a> .
SPECIES_CHINGLING 0x1E6	<a href="#">Pure Incense</a> breeding.
SPECIES_BONSLY 0x1EB	<a href="#">Rock Incense</a> breeding.
SPECIES_MIME_JR 0x1EC	<a href="#">Odd Incense</a> breeding.
SPECIES_HAPPINY 0x1ED	<a href="#">Luck Incense</a> breeding.
SPECIES_MUNCHLAX 0x1F3	<a href="#">Full Incense</a> breeding.
SPECIES_MANTYKE 0x1FF	<a href="#">Wave Incense</a> breeding.
SPECIES_ROTOM 0x214	Special breeding.
SPECIES_DIALGA 0x218	Signature item <a href="#">Adamant Orb</a> .
SPECIES_PALKIA 0x219	Signature item <a href="#">Lustrous Orb</a> .
SPECIES_GIRATINA 0x21C	Signature item <a href="#">Griseous Orb</a> .
SPECIES_GIRATINA_ORIGIN 0x2CE	Signature item <a href="#">Griseous Orb</a> .
SPECIES_PHIONE 0x21E	Special breeding from <a href="#">Manaphy</a> .
SPECIES_DARKRAI 0x220	Only species that can use <a href="#">Dark Void</a> .
SPECIES_SHAYMIN 0x221	Changes <a href="#">form</a> when frozen.
SPECIES_SHAYMIN_SKY 0x2CF	Changes <a href="#">form</a> when frozen.
SPECIES_DARMANITAN 0x260	Signature ability: <a href="#">Zen Mode</a> .

SPECIES_DARMANITANZEN 0x2E1	Signature ability: <a href="#">Zen Mode</a> .
SPECIES_KELDEO 0x2BC	Changes form with <a href="#">Secret Sword</a> .
SPECIES_KELDEO_RESOLUTE 0x2F5	Changes form if doesn't know <a href="#">Secret Sword</a> .
SPECIES_MELOETTA 0x2BD	Changes form with <a href="#">Relic Song</a> .
SPECIES_MELOETTA_PIROUETTE 0x2EA	Changes form with <a href="#">Relic Song</a> .
SPECIES_GRENINJA 0x2FE	Signature ability: <a href="#">Battle Bond</a> .
SPECIES_ASHGRENINJA 0x347	Signature ability: <a href="#">Battle Bond</a> .
SPECIES_FURFROU 0x310	Special breeding.
SPECIES_AEGISLASH 0x315	Signature ability: <a href="#">Stance Change</a> .
SPECIES_AEGISLASH_BLADE 0x341	Signature ability: <a href="#">Stance Change</a> .
SPECIES_ZYGARDE 0x33A	Signature ability: <a href="#">Power Construct</a> .
SPECIES_ZYGARDE_10 0x345	Signature ability: <a href="#">Power Construct</a> .
SPECIES_ZYGARDE_COMPLETE 0x346	Signature ability: <a href="#">Power Construct</a> .
SPECIES_HOOPA 0x33C	Special message why trying to use <a href="#">Hyperspace Fury</a> .
SPECIES_HOOPA_UNBOUND 0x33D	Only Pokémon that can use <a href="#">Hyperspace Fury</a> .
SPECIES_GROUDON_PRIMAL 0x38D	Is referenced as a <i>Red Primal</i> .
SPECIES_KYOGRE_PRIMAL 0x38E	Is referenced as a <i>Blue Primal</i> .
SPECIES_LYCANROC 0x3C2	Special battle animation.
SPECIES_LYCANROC_N 0x416	Special battle animation.
SPECIES_LYCANROC_DUSK 0x43A	Special battle animation.
SPECIES_WISHIWASHI 0x3C3	Signature ability: <a href="#">Schooling</a> .
SPECIES_WISHIWASHI_S 0x417	Signature ability: <a href="#">Schooling</a> .
SPECIES_MINIOR_SHIELD 0x3DF	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_RED 0x429	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_BLUE 0x42A	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_ORANGE 0x42B	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_YELLOW 0x42C	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_INDIGO 0x42D	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_GREEN 0x42E	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MINIOR_VIOLET 0x42F	Signature ability: <a href="#">Shields Down</a> .
SPECIES_MIMIKYU 0x3E3	Signature ability: <a href="#">Disguise</a> .
SPECIES_MIMIKYU_BUSTED 0x430	Signature ability: <a href="#">Disguise</a> .

Also be sure to change the species indices in **asm\_defines** as well (just copy and paste the data from before but search and replace all #define with .equ and all " 0x" with "," (without quotation marks)).

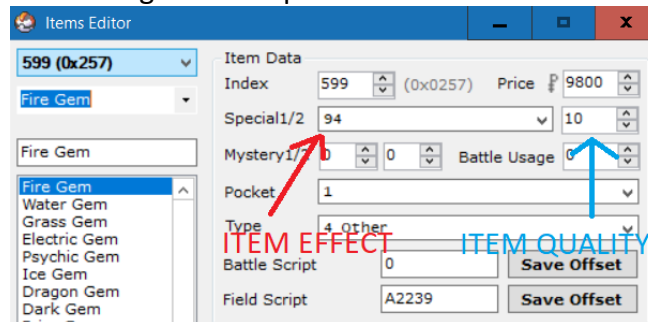
## Item Defines:

### Part 1

1. Open the file **include/constants/items.h**.
2. Modify the item indices found in this file to match the ones in your hack.
3. **DO NOT DELETE ANY ITEM NAMES**. If there is an item you are not using, then set its index to **0xFEFE**.

### Part 2

1. Open the file **include/constants/hold\_effects.h**.
2. Scroll down to where it says **“//NEW ITEM EFFECTS”**. This is the list of new hold item effects. When relevant, the item quality is included.
3. Set up your items in G3T using the example for the *Fire Gem* as a base:



As you can see, the item effect is set to 94 and the item quality is set to 10 (the move type for *Fire*).

## Configuration Options

See below.

## Configurable Options

There are many configurable options in the file **src/config.h**. These options are meant to provide the user with as much versatility as possible. Below is a more detailed description of each option than show in the configuration file:

### Var Options

<i>Flag Definition</i>	<i>Description</i>
TERRAIN_VAR	Setting this var to one of the following values before initiating a battle will load the battlefield with the corresponding <a href="#">terrain</a> : 1: Electric Terrain 2: Grassy Terrain 3: Misty Terrain 4: Psychic Terrain
TOTEM_VAR	<p>This represents are series of vars using for initiating battles with <a href="#">Totem Pokémon</a>. There are four vars in total, each representing a specific Pokémon slot on the field. Adding the following values to the var will indicate which slot that var is for:</p> <p>0: <i>Player Pokémon in Singles, Left Player Pokémon in Doubles</i> 1: <i>Enemy Pokémon in Singles, Right Enemy Pokémon in Doubles</i> 2: <i>Right Player Pokémon in Doubles</i> 3: <i>Left Enemy Pokémon in Doubles</i></p> <p>The vars must be set to the addition of two values. Choose one from each of the following sets:</p> <p><b>Stats:</b></p> <p>1: <i>Attack</i> 2: <i>Defense</i> 3: <i>Speed</i> 4: <i>Special Attack</i> 5: <i>Special Defense</i> 6: <i>Accuracy</i> 7: <i>Evasion</i></p> <p><b>Amount:</b></p> <p>0x10: <i>Increase Stat by 1</i> 0x20: <i>Increase Stat by 2</i> 0x30: <i>Increase Stat by 3</i> 0x40: <i>Increase Stat by 4</i></p>



	<p>0x50: Increase Stat by 5  0x60: Increase Stat by 6  0x90: Decrease Stat by 1  0xA0: Decrease Stat by 2  0xB0: Decrease Stat by 3  0xC0: Decrease Stat by 4  0xD0: Decrease Stat by 5  0xE0: Decrease Stat by 6</p> <p>So, for instance, in a single battle, having the enemy Pokémon start the battle with its <i>Attack</i> raised by 2, you would set the var TOTEM_VAR + 1 to the value of 0x21 (0x1 + 0x20).</p> <p>Additionally, this feature can also be used in trainer battles. If used here, any Pokémon sent out into the set position will have their stats raised. So, using the example from above, all the opposing trainer's Pokémon would start with their <i>Attack</i> raised by 2.</p>
NPC_FOLLOWING_VAR	If the <i>Follow Me</i> feature is used, this var must be set to the <i>NPC Id</i> ( <i>Person Id</i> in <i>AdvanceMap</i> ) of the following NPC. If no NPC is following the player, this var should be set to 0.
BACKSPRITE_SWITCH_VAR	Setting this var to a value other than 0 will change the default back sprite loaded for the player in battle. See <b>assembly/data/Trainer_Backsprite_Table.s</b> for a list of available backsprites.
BATTLE_BG_VAR	If <b>CUSTOM_BATTLE_BACKGROUNDS</b> is defined, setting this var to a value other than 0 will cause the regular battle background loaded to be replaced by a custom one. See <b>/include/battle.h</b> for a list of options. Search for <b>BATTLE_TERRAIN_GRASS</b> in the file to see them.
SWARM_INDEX_VAR	A var that is automatically set by the engine. It contains the index in the swarming table of the species that is currently <a href="#">swarming</a> . Swarms are set to change on a daily basis. If <b>TIME_ENABLED</b> is commented out, then the code will need to be modified to find an alternative method to enable swarms. It can be found in <b>src/wild_encounter.c</b> . The swarming table can be edited by searching for <a href="#">gSwarmTable</a> in <b>src/Tables/Wild_Encounter_Tables.c</b> .
SWARM_DAILY_EVENT_VAR	A pair of two vars (this one and the one immediately following it) that are automatically set by the engine. They are used to determine if a swarm has already been chosen for the given date. If <b>TIME_ENABLED</b> is commented out, then these vars will be set once and never again.

DEFAULT_WALKING_SCRIPT_VAR	A var the contains the index of the script in walking script table that is set to run on every step. Set this var to 0 if you do not want any custom scripts to be run each step. To add a walking script, search for <i>gDefaultWalkingScripts</i> in <b>src/overworld.c</b> and either add ( <i>const u8*</i> ) pointers to scripts preloaded in the rom, or define your own script in one of the assembly files.
DEXNAV_VAR	A var that holds the species to search for in the Overworld via the <i>DexNav</i> feature. Press <i>Select</i> in the DexNav GUI to save.
STATUS_INDUCER_VAR	A var that if set, causes wild and Trainer Pokémon to be generated with the set status condition. It is split into an upper and lower byte. If the upper byte is set to 0, then this status condition will be given to Pokémon until this var is cleared. Any value in the upper byte other than 0 acts as a timer and is subtracted by 1 for each battle completed. For example, setting this var to <i>0x0640</i> will paralyze all enemy Pokémon in battles for 6 battles. See <a href="#">here</a> for a list of status bytes.
SECOND_OPPONENT_VAR	A var that can be set by the engine (with <i>trainerbattle 0xA</i> or <i>trainerbattle 0xB</i> ) to represent the trainer id of the second trainer in battles against two opponents. If set manually in conjunction with <b>TWO_OPPONENT_FLAG</b> , a battle against two opponents will be started the next time a trainer battle is initiated.
PARTNER_VAR	A var that can be set by the engine (with <i>trainerbattle 0xA</i> or <i>trainerbattle 0xC</i> ) to represent the trainer id of the partner trainer in multi battles. If set manually in conjunction with <b>TAG_BATTLE_FLAG</b> , a battle with a partner against a single trainer will be started the next time a trainer battle is initiated. If setting manually, take care to set <b>PARTNER_BACKSPRITE_VAR</b> as well.
PARTNER_BACKSPRITE_VAR	A var that can be set by the engine (with <i>trainerbattle 0xA</i> or <i>trainerbattle 0xC</i> ) to represent the backsprite id of the partner trainer in multi battles. If setting manually, take care to also set <b>PARTNER_VAR</b> and <b>TAG_BATTLE_FLAG</b> .

### Flag Options

**NOTE:** Many of the following flags are cleared at the end of battle. To remove this, open the file **src/end\_battle.c** and remove the flag from *gEndBattleFlagClearTable*.

Flag Definition	Description
INVERSE_FLAG	Setting this flag will enable <a href="#">Inverse Battles</a> . This flag is automatically cleared at the end of each

	battle.
SKY_BATTLE_FLAG	Setting this flag will indicate to the engine that a <a href="#">Sky Battle</a> is in progress. This flag is automatically cleared at the end of each battle.
NO_CATCHING_FLAG	Setting this flag will cause enemy Pokémon to always dodge balls thrown at them. This flag is automatically cleared at the end of each battle.
NO_RUNNING_FLAG	Setting this flag prevents the player from running away during wild battles. This flag is automatically cleared at the end of each battle.
NO_CATCHING_AND_RUNNING_FLAG	This flag acts as a combination of the above two flags. This flag is automatically cleared at the end of each battle.
CATCH_TRAINERS_POKÉMON_FLAG	Setting this flag allows the player to capture Pokémon belonging to the opposing trainer. Capturing a Pokémon in this way will automatically end the battle. Comment out this line if you do not want to use this feature. This flag is automatically cleared at the end of each battle.
EXP_SHARE_FLAG	If <a href="#">OLD_EXP_SHARE</a> is commented out, then setting this flag activates the Gen 6+ Exp. Share.
DOUBLE_BATTLE_FLAG	Setting this flag will cause battles against trainers to be <a href="#">Double Battles</a> , if possible. Comment out this line if you don't want to use this flag.
TAG_BATTLE_FLAG	This flag is set by the engine when the scripting command <i>trainerbattle 0xA</i> or <i>trainerbattle 0xC</i> is used in a script to activate a tag battle. If setting this flag manually, take care to also set <a href="#">PARTNER_VAR</a> and <a href="#">PARTNER_BACKSPRITE_VAR</a> . This flag is automatically cleared at the end of each battle.
TWO_OPPONENT_FLAG	This flag is set by the engine when the scripting command <i>trainerbattle 0xA</i> or <i>trainerbattle 0xB</i> is used in a script to activate a battle against two opponents. If setting this flag manually, take care to also set <a href="#">SECOND_OPPONENT_VAR</a> . This flag is automatically cleared at the end of each battle.
ACTIVATE_TUTORIAL_FLAG	If <a href="#">TUTORIAL_BATTLES</a> is defined, Setting this flag

	activates Professor Oak's tutorial during the next trainer battle. This flag is automatically cleared at the end of each battle. Comment out this line if you don't want to use this flag.
WILD_CUSTOM_MOVES_FLAG	Setting the flag before a wild battle starts will create the wild Pokémon with the moves given in the input vars. This works with both regular wild battles and scripted wild battles (if scripted, set the input vars before using the <i>wildbattle</i> scripting command). Setting any value to 0xFFFF will cause the default move to be loaded in that slot. Setting any value to 0x0 will load a blank move in that slot. Note that there are additional inputs for wild double battles. The input is as follows: Var 0x8000: <b>Move 1</b> - Pokémon <b>1</b> Var 0x8001: Move 2 - Pokémon <b>1</b> Var 0x8002: Move 3 - Pokémon <b>1</b> Var 0x8003: Move 4 - Pokémon <b>1</b> Var 0x8004: <b>Move 1</b> - Pokémon <b>2</b> (Wild Double) Var 0x8005: Move 2 - Pokémon <b>2</b> (Wild Double) Var 0x8006: Move 3 - Pokémon <b>2</b> (Wild Double) Var 0x8007: Move 4 - Pokémon <b>2</b> (Wild Double)
SMART_WILD_FLAG	Setting this flag allows wild Pokémon to use the basic AI checks used in trainer battles. This flag is automatically cleared at the end of each battle.
SCALE_WILD_POKEMON_LEVELS_FLAG	Setting this flag will cause all <b>random</b> wild Pokémon encounters (this does not include scripted encounters) to have Pokémon with levels that match the lowest level in your party. Comment out this line if you don't want to use this feature.
SCALE_TRAINER_LEVELS_FLAG	Setting this flag causes all Trainer Pokémon to have levels that match the highest level in your party.
HIDDEN_ABILITY_FLAG	Setting this flag before a Wild battle causes Wild Pokémon to be generated with their <a href="#">hidden abilities</a> . It is cleared at the end of each battle. It also lets the <i>givepokemon</i> scripting command give Pokémon with their hidden abilities.
DOUBLE_WILD_BATTLE_FLAG	Setting this flag causes all wild battles to be against two wild Pokémon in a Double battle format (if the player has at least two viable Pokémon on their team). It is cleared at the end of each battle.
NO_RANDOM_WILD_ENCOUNTERS_FLAG	Setting this flag will stop Pokémon from appearing while walking through grass or caves, or while

	surfing on water. Pokémon can still appear if the player chooses to fish, smash rocks, or use <i>Sweet Scent</i> .
FLAG_REMOVE_EVO_ITEM	A flag set by the engine to help with certain item-based evolutions.
SHINY_CREATION_FLAG	The next Pokémon generated by the engine will be shiny. This includes wild Pokémon, gift Pokémon, or the first Pokémon in the next trainer battle. It is automatically cleared at the end of each battle.
AUTO_RUN_FLAG	Setting this flag enables auto-run. For convenience, this flag is toggled in the overworld by pressing the <i>L-Button</i> (as long as the button setting is not set to <i>L=A</i> ). By default, this flag is defined in the config to be the same as the flag that allowed running in vanilla FR.
RUNNING_ENABLED_FLAG	If this line is uncommented, this flag can be used to control when the player can run. If this flag is not set, the player will be forced to walk.
DISABLE_BAG_FLAG	Setting this flag prevents the bag from being utilized in-battle.

### Start Menu Features

Any of the following flags can be commented out to remove them from the engine. If any of the flags are defined and not set, their respective start menu item will be hidden by default.

<i>Definition</i>	<i>Description</i>
FLAG_SYS_BAG_GET	This flag allows the hacker to toggle the <i>bag</i> in the start menu, for events where the player isn't allowed to use items, or lost their bag for various reasons. If this is commented out, <i>BAG</i> will always be present on the start menu.
FLAG_SYS_PLAYER_GET	This allows the hacker to toggle on/off the <i>Trainer Card</i> from the start menu. Commenting this out will cause <i>PLAYER</i> to always be present.
FLAG_SYS_SAVE_GET	This allows the hacker to toggle the <i>save game</i> feature from the start menu. Commenting this out causes <i>SAVE</i> to be permanent on the start menu.
FLAG_SYS_DEXNAV	This allows the hacker to toggle <i>TOOLS</i> from the start menu. If this flag is defined and not set, <i>POKéDEX</i> will show up on the start menu. When the flag is set, <i>TOOLS</i> will replace <i>POKéDEX</i> , which yields a separate menu including both <i>POKéDEX</i> and <i>DEXNAV</i> . If this is commented out, The <a href="#">DexNav</a> feature will be inaccessible.
FLAG_POKETOOLS_MENU	This flag causes <i>TOOLS</i> to open a separate start menu as opposed to the multichoice list generated by default. This flag is purely for aesthetic purposes, although an advanced hacker could use this to

	create two separate start menus. If this is commented out, the default <i>TOOLS</i> multichoice will load (see above).
--	--

### Pedometer Flags

Setting any of these flags will initiate a pedometer of the corresponding size. The pedometer value can be read using *special 0x8A*.

Definition	Description
FLAG_LONG_PEDOMETER	4 byte pedometer (max value 0xFFFFFFFF or 4 294 967 295)
FLAG_MED_PEDOMETER	2 byte pedometer (max value 0xFFFF or 65 535)
FLAG_SMALL_PEDOMETER_1	1 byte pedometer (max value 0xFF or 255)
FLAG_SMALL_PEDOMETER_2	1 byte pedometer (max value 0xFF or 255)

### Battle Tower Options

Definition	Description
BATTLE_TOWER_FLAG	Setting this flag indicates to the engine that the Player is in the <a href="#">Battle Tower</a> . This means that: <ul style="list-style-type: none"> <li>Trainer Pokémon will be generated within the restrictions of the tier set in the var defined in <a href="#">BATTLE_TOWER_TIER</a>. The amount of Pokémon generated will match the number set in the var defined in <a href="#">BATTLE_TOWER_POKE_LEVEL</a>.</li> <li>Trainer Pokémon will have Pokémon with the level contained in the var defined in <a href="#">BATTLE_TOWER_POKE_LEVEL</a>.</li> <li>The battle format will be loaded from the var defined in <a href="#">BATTLE_TOWER_BATTLE_TYPE</a>.</li> <li>The music in-battle will be played based on what is contained in the var defined in <a href="#">BATTLE_TOWER_SONG_OVERRIDE</a>.</li> <li>The bag will be inaccessible in battle.</li> </ul>
BATTLE_TOWER_POKE_NUM	Setting this var to a value between 1 & 6 dictates the quantity of Pokémon the player and trainers can use in the Battle Tower. Setting it to 0 will default in 1. Setting it to a number greater than 6 will default in 6.
BATTLE_TOWER_POKE_LEVEL	Setting this var to a value between 1 and what is defined in <a href="#">MAX_LEVEL</a> will set all Pokémon in the Battle Tower to that level. Setting it to 0 will default in 1. Setting to a number greater than <a href="#">MAX_LEVEL</a> will default in <a href="#">MAX_LEVEL</a> .
BATTLE_TOWER_BATTLE_TYPE	Setting this var to one of the below values set the battle format in the Battle Tower:

	0: Single Battle 1: Double Battle 2: Multi Battle 3: Link Multi Battle  Any other value defaults in Single Battle.
BATTLE_TOWER_TIER	Setting this var to one of the below values indicates to the engine which ruleset should be following for battles in the Battle Tower:  0: Regular Battle Tower Rules 1: No Restrictions 2: <a href="#">Smogon OU</a> 3: <a href="#">Smogon Uber</a> 4: <a href="#">Smogon Little Cup</a> 5: Skeli's Middle Cup
BATTLE_TOWER_TRAINER_NAME	This var is automatically set by the engine to hold the index of the random name for the Battle Tower trainer. It is set to 0xFFFF after every battle. Do not set it manually.
BATTLE_TOWER_SONG_OVERRIDE	Setting this var to a song Id will cause that song to be played in <i>Battle Tower</i> battles and <i>Link Battles</i> .
TOWER_TRAINER_ID_VAR	This var is set by <i>special 0x52</i> to indicate which trainer class and details is being spawned as the first opponent. The frontier trainer details should be added to the <i>gTowerTrainers</i> table which can be found in <b>src/Tables/Frontier_Trainers.c</b> .
TOWER_TRAINER_ID_2_VAR	This var is set by <i>special 0x52</i> to indicate which trainer class and details is being spawned as the second opponent in multi battles. The frontier trainer details should be added to the <i>gTowerTrainers</i> table which can be found in <b>src/Tables/Frontier_Trainers.c</b> .
TOWER_TRAINER_ID_PARTNER_VAR	This var is set by <i>special 0x52</i> to indicate which trainer class and details is being spawned as the player's partner in multi battles if the partner is chosen to be randomized. The frontier trainer details should be added to the <i>gTowerTrainers</i> table which can be found in <b>src/Tables/Frontier_Trainers.c</b> .

#### Character Customization Vars

Definition	Description
VAR_PLAYER_WALKRUN	Set this var to change the player's walking/running

	overworld sprite frames. The upper byte is used as the table Id, For example, setting to 0x0200 will load the walking/running frames from table 2, sprite 0.
VAR_PLAYER_BIKING	Switch player biking frames (same rules as above).
VAR_PLAYER_SURFING	Switch player surfing frames (same rules as above).
VAR_PLAYER_VS_SEEKER	Switch player VS Seeker frames (same rules as above).
VAR_PLAYER_FISHING	Switch player Fishing frames (same rules as above).
VAR_PLAYER_VS_SEEKER_ON_BIKE	Switch player Biking/Vs Seeker frames (same rules as above).
VAR_TRAINERCARD_MALE	Set this var to the trainer sprite id of the male player front sprite that appears on the trainer card.
VAR_TRAINERCARD_FEMALE	Set this var to the trainer sprite id of the female player front sprite that appears on the trainer card.
VAR_RUNTIME_CHANGEABLE	<p>If a person event has a given overworld table id 0xFF, it can be changed at runtime by changing these variables to a sprite number. There are 15 variables used in total.</p> <p>For example, setting <b>VAR_RUNTIME_CHANGEABLE+2</b> to 16, will cause all NPCs with ids 0xFF02 to appear with the little boy overworld sprite (in vanilla FR).</p> <p>Person event no: <input type="text" value="2"/> <input type="button" value="↑"/><input type="button" value="↓"/></p> <p>Picture no: <input type="text" value="0"/> <input type="button" value="↑"/><input type="button" value="↓"/></p> <p>Unknown: <input type="text" value="\$00"/> <input type="text" value="\$FF"/></p> <pre>#define VAR_RUNTIME_CHANGEABLE 0x4080 #org 0x800000 setvar VAR_RUNTIME_CHANGEABLE+2 16 'Var 0x4082</pre>

### Healing Place Hack

The following vars relate to JPAN's healing place hack. If **SET\_HEALING\_PLACE\_HACK** is not defined, ignore these vars.

VAR_HEALINGMAP	Set this var to the map and bank for the player to respawn to after whitening out. For example, if it is set to 0x0104, the player will respawn in their room (vanilla FR) (map bank 4, map 1). Configure in <b>asm_defines.s</b> .
VAR_HEALING_XPOS	Set this var to the x-position the player will respawn at on the map in <b>VAR_HEALINGMAP</b> .
VAR_HEALING_YPOS	Set this var to the y-position the player will respawn at on the map in <b>VAR_HEALINGMAP</b> .

### TM / HM Options

Definition	Description
EXPANDED_TMS	Allows TMs and HMs past the original 58 to be used



	up to 128 total TMs + HMs.
NUM_TMS	Set this to the total number of TMs in the game.
NUM_HMS	Set this to the total number of HMs in the game.
TMS_BEFORE_HMS	Uncomment this line if you'd like HMs to appear at the end of the TM list in the bag.
DELETABLE_HMS	Uncomment this line if you'd like HMs to be deleted without the use of the <i>Move Deleter</i> like normal moves.
REUSABLE_TMS	Allows TMs to be reused infinitely without being removed from the bag. Also prevents TMs from being sold, held, or bought more than once. If using this feature, don't forget to assign all TMs a <i>Mystery 1</i> (in G3T) value of 1!

### Times of Day

<i>Definition</i>	<i>Description</i>
TIME_MORNING_START	If <b>TIME_ENABLED</b> is defined, set this to the hour (in 24 hr system) that morning starts. This is also the day start time used for many events that only have a daytime/nighttime variant.
TIME_DAY_START	If <b>TIME_ENABLED</b> is defined, set this to the hour (in 24 hr system) that day starts.
TIME_EVENING_START	If <b>TIME_ENABLED</b> is defined, set this to the hour (in 24 hr system) that evening starts.
TIME_NIGHT_START	If <b>TIME_ENABLED</b> is defined, set this to the hour (in 24 hr system) that night starts.

### Other Number Definitions

<i>Definition</i>	<i>Description</i>
KANTO_DEX_COUNT	Number of Pokémon in the regional Pokedex.
NATIONAL_DEX_COUNT	Number of Pokémon in the national Pokedex.
MAX_LEVEL	The highest possible level for a Pokémon. If you change this value, make sure to also modify the equivalent value found in " <a href="#">special inserts.asm</a> ".
NUM_TRAINER_CLASSES	The number of trainer classes. Vanilla FR has 107.
EVOS_PER_MON	If you've changed the number of evolutions per Pokémon, update this number. Vanilla FR has 5.
EV_CAP	The most EVs a Pokémon can accrue for a given stat.
DUSK_BALL_MULTIPLIER	The catch rate (*10) for <a href="#">Dusk Balls</a> . So 30 is 3.0.
STANDARD_IV	The number of IVs for each stat that standard Trainer's Pokémon are generated with.
SWARM_CHANCE	The chance in percent that a <a href="#">swarm</a> Pokémon will

	appear on a route if there is currently a swarm in progress on that route.
WILD_DOUBLE_RANDOM_CHANCE	The chance that a wild double will be initiated if the player is walking in grass with a background byte with its 4 <sup>th</sup> bit set. For instance, grass with a background byte of 0x5 will have a chance of starting a wild double battle, and grass with a background byte of 0x25 will have a chance of starting a wild double battle and be covered by the player (water is similarly 0x6 and 0x26).
CREATE_WITH_X_PERFECT_IVS	Set this to the number of 31 IVs Pokémon defined in the <a href="#">gSetPerfectIvList</a> should be generated with. For example, if Mewtwo is in the table, and this is defined to 3, any Mewtwo generated (wild or Trainer) will always have at least 3 IVs set to 31. This does not include roaming Pokémon.
CREATE_ROAMER_WITH_X_PERFECT_IVS	Set this to the number of 31 IVs roaming Pokémon should be generated with.
EGG_HATCH_LEVEL	Set this to level Pokémon <i>Eggs</i> should hatch at. Before Gen 4 it was 5, from Gen 4 onwards it has been 1.
AI_TRY_TO_KILL_RATE	In battles against a trainer with AI flags of 1 (only check if the move shouldn't be used), the AI will try to use a move to knock out the opponents XX percent of the time, where XX is the number defined here. Setting this to 0 means basic AI will always use random moves in-battle, assuming that move has no reason not to be used.
MB_OMNIDIRECTIONAL_JUMP	Setting a tile's behaviour byte to this number makes the tile act as a 4 way ledge. Meaning, the player will jump over it when approaching it from all 4 directions. For a related option, see <a href="#">CAN_ONLY_USE_OMNIDIRECTIONAL_JUMP_ON_HEIGHT_2</a> .
MAP_PLAYER_HOME	The map bank and map number of the player's home. This is used to help load the correct message when the Player <i>white's out</i> . The upper byte represents the map bank, while the lower byte represents the map number. So: $((4 \ll 8)   0)$ Means <i>map bank 4</i> and <i>map number 0</i> , aka, the Player's home in vanilla FR.
POWER_ITEM_EV_YIELD	The EVs gained by a Pokemon holding a Power Item

	after gaining experience. The default value is 8, but you can set it to 4 for the older game mechanics (or any other number you choose).
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### Badge Obedience

<i>Definition</i>	<i>Description</i>
BASE_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have no badges.
BADGE_1_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 1 badge.
BADGE_2_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 2 badges.
BADGE_3_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 3 badges.
BADGE_4_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 4 badges.
BADGE_5_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 5 badges.
BADGE_6_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 6 badges.
BADGE_7_OBEDIENCE_LEVEL	The highest level that a traded Pokémon will obey the player at if they have 7 badges.

### OW Palette Ids

These represent the OW palette Ids of the ninja overworld disguises. If you have changed the default OW palettes, you may want to change these values as well.

<i>Definition</i>	<i>Description</i>
TREE_DISGUISE_PAL_ID	The OW palette Id the ninja tree disguise uses (movement type <i>0x39</i> in AdvanceMap).
ROCK_DISGUISE_PAL_ID	The OW palette Id the ninja mountain disguise uses. (movement type <i>0x3A</i> in AdvanceMap).
WEIRD_DISGUISE_PAL_ID	The OW palette Id the ninja weird disguise uses (I have no idea what the movement type is).

### Pre-Battle Mugshot Options

Different vars for the [Pre-Battle Mugshots](#).

<i>Definition</i>	<i>Description</i>
FR_PRE_BATTLE_MUGSHOT_STYLE	Enable pre-battle mugshots
VAR_PRE_BATTLE_MUGSHOT_STYLE	Change mugshot tilemap style.
VAR_PRE_BATTLE_MUGSHOT_SPRITE	Change player's mugshot image.
VAR_MUGSHOT_PLAYER_PAL	Change player's tilemap palette for Two Bars.
FLAG_LOAD_MUGSHOT_SPRITE_FROM_TABLE	Load Opponent mugshot from table.

## Memory Locations

Definition	Description
EXISTING_FOSSIL_IMAGE_TABLE_ADDRESS	If <b>FOSSIL_IMAGE HACK</b> is defined, and you already have a fossil image table inserted somewhere in your hack that you wish to use, uncomment this line and replace the given pointer with your pointer. See <a href="#">Special 0x18B</a> for table details.
EXISTING_OW_TABLE_ADDRESS	If you have used JPAN's hacked engine to add new overworld tables in, and you would like to use the table already inserted in your hack to keep track of these tables, uncomment this line and replace the given pointer with your pointer.

NOTE: Putting a `//` before any of the below features will remove them from the engine.

## Misc Features

Definition	Description
INVERSE_BATTLES	Enables the possibility of having an <a href="#">Inverse Battle</a> if the <b>INVERSE_FLAG</b> is set.
TIME_ENABLED	Various features are updated to account for the time of day. Certain palettes are also dynamically faded depending on the time of day. Removing this feature will always result in <i>Daytime</i> .
DNS_IN_BATTLE	If <b>TIME_ENABLED</b> is defined, then certain background palettes will be faded dynamically in battle depending on the time of day. These values can be set in <b>include/new/dns_data.h</b> .
OVERWRITE_RIVAL	Loads the buffered rival's name for trainer classes 0x51, 0x59, and 0x5A.
TRAINER_CLASS_POKE_BALLS	Creates trainer Pokémon with custom Poke Balls based on trainer class determined by what is set in <b>src/Tables/Class_Based_Poke_Ball_Table.c</b> .
TRAINERS_WITH_EVS	Trainer Pokémon with a custom moveset, custom item, an AI value greater than 1, and an IV value (labeled EVs in most trainer editors) greater than 0 will have custom stats loaded from the spread number indicated by the IV value in <b>src/Tables/Trainers_With_EVs_Table.h</b> . For example, setting the IV value to 1 will loaded the spread labeled "1" in <a href="#">gTrainersWithEvsSpreads</a> . Modifying the required conditions to activate this feature can be done by searching for the line

	<i>#ifdef TRAINERS_WITH_EVS</i> in <b>src/build_Pokémon.c</b> .
CONTINUE_LOST_BATTLES	If <b>TUTORIAL_BATTLES</b> is defined, then if Var 0x8000 is set to 0xFEFE before a battle begins, <i>trainerbattle 0x9</i> can be used to continue a lost battle. The result of the battle will then be stored in Var LAST_RESULT (LastResult). If <b>TUTORIAL_BATTLES</b> is not defined, then <i>trainerbattle 0x9</i> will always allow a lost battle to be continued.
REALLY_SMART_AI	The AI knows everything about the Pokémon on the player's side (such as which moves it has, its ability, item, etc.) without having seen it first. This does not allow the AI to know what move the player will use before they use it.
DISPLAY_REAL_MOVE_TYPE_ON_MENU	When choosing a move or viewing a Pokémon's moves on the summary screen, the move type the move will become when used will be displayed (such as Hidden Power, Weather Ball in Weather, etc.).
DISPLAY_REAL_ACCURACY_ON_MENU	When pressing the <i>L-button</i> while choosing a move, the "true" move accuracy will be displayed. For example, the move <i>Psychic</i> used by a Pokémon with <i>Compound Eyes</i> will have its accuracy appear as 130.
DISPLAY_REAL_POWER_ON_MENU	When pressing the <i>L-button</i> while choosing a move, the "true" move power will be displayed. For example, moves like <i>Fury Cutter</i> and <i>Return</i> will show their correct power.
CUSTOM_BATTLE_BACKGROUNDS	Setting <b>BATTLE_BG_VAR</b> will allow custom backgrounds to be loaded in battles.
OVERWRITE_BG_FOR_LEADER_CHAMPION	Special Battle Background palettes will be loaded in for battles against Gym Leaders and the Champion, using the regular indoor background graphics as a base.
BRIDGE_FIX	The water battle background will only be loaded in battle if the player's surfing sprite is shown. This means that if the player is walking on water, the battle background loaded will be incorrect.
MEGA_EVOLUTION_FEATURE	<a href="#">Mega Evolutions</a> can be used.
TUTORIAL_BATTLES	Professor Oak's tutorial will be activated for <i>trainerbattle 0x9</i> .
TANOBY_RUINS_ENABLED	Causes <a href="#">Unown</a> to be spawned in maps using the

	<a href="#">Tanoby Ruins</a> map names according to the current chamber. Error prevention has been added to also allow random Unown to be generated outside of the Tanoby Ruins maps.
ALTERING_CAVE_ENABLED	If the current map is the <a href="#">Altering Cave</a> and Var 0x4024 is set, Wild Pokémon will spawn based on the contents of the var.
SWEET_SCENT_ONLY_IN_CLEAR_WEATHER	In certain generations, <a href="#">Sweet Scent</a> only spawns wild Pokémon in the Overworld if the weather is clear.
OBEDIENCE_BY_BADGE_AMOUNT	Pokémon obedience is determined by the number of badges the Player has rather than by which badges the player has. The other badge defines in this case act as “number of badges acquired” instead of “acquired badge X”.
SAVE_BLOCK_EXPANSION	Expands the amount of memory that is saved when the player saves the game. This feature breaks compatibility with the FR <i>Mystery Gift</i> and <i>Trainer Tower</i> features. Uncommenting this line also requires removal of all related hooks. Search for <i>Save Expansion Hooks</i> in <b>hooks</b> . WARNING: Removing this also removes added vars, PC box space, roaming Pokémon, and many other features. It is highly recommended to keep it.
SELECT_FROM_PC	If uncommented, allows the player to select and manipulate data of Pokémon from the PC storage boxes. See <a href="#">PC Selection</a> for more details.
SET_HEALING_PLACE_HACK	If uncommented, the whiteout hack from JPN's FR engine is implemented, allowing <a href="#">VAR_HEALINGMAP</a> , <a href="#">VAR_HEALING_XPOS</a> , and <a href="#">VAR_HEALING_YPOS</a> to be utilized to overwrite the default respawn point.
FOSSIL_IMAGE_HACK	Grants the ability to load custom images from a table using <a href="#">Special 0x18B</a> . If <a href="#">EXISTING_FOSSIL_IMAGE_TABLE_ADDRESS</a> is commented out, then the table of images can be found by searching for <a href="#">gFossilImageTable</a> in <b>src/script_specials.c</b> . Otherwise the table is loaded from <a href="#">EXISTING_FOSSIL_IMAGE_TABLE_ADDRESS</a> .
EVO_HOLD_ITEM_REMOVAL	Evolving a Pokémon by having it hold an item upon level up or trading removes the item after evolution (like normal). Commenting this out

	means Pokémon will retain their items after evolution.
EXPAND_MOVESETS	Adds level up moves for each Pokémon which can be found in <b>src/Tables/Learnsets.c</b> . This file also includes learnsets for expanded Pokémon which are commented out by default. Comment this line if you would rather use the learnsets created in the <i>Dynamic Pokémon Expansion</i> . Commenting this line out without properly having expanded the level up moves in some way will cause Pokémon to learn garbage moves.
FATHER_PASSES_TMS	During breeding, any TMs the father knows will be passed down to the baby if it can learn that TM. This feature was removed from main series Pokémon games in Gen 6.
INHERIT_MASTER_CHERISH_BALL	If defined, an offspring can be hatched into a parent's <i>Master</i> or <i>Cherish Ball</i> (unlike in the actual games).
GIVEPOKEMON_BALL_HACK	The last byte of the <i>givepokemon</i> scripting command allows you to pass in a Poké Ball type to assign to the Pokémon. Ball types can be found in <b>include/new/catching.h</b> .
FRLG_ROAMING	When a <a href="#">roaming</a> Pokémon is created, it will either be a <i>Entei</i> , <i>Raikou</i> , or <i>Suicune</i> , depending on the player's starter choice.
CAN_RUN_IN_BUILDINGS	Allows the player to run indoors (you're a jerk if you don't let them).
NO_POISON_IN_OW	Pokémon will not take damage from <a href="#">Poison in the overworld</a> as the player walks.
POISON_1_HP_SURVIVAL	Instead of allowing Pokémon to faint from Poison in the overworld, Pokémon will survive the poison with 1 HP like in Gen 4. If <b>NO_POISON_IN_OW</b> is defined then this line is useless.
BW_REPEL_SYSTEM	When the player's repel wears off, they will be prompted with a textbox to use another one if they have in their bag.
AUTO_NAMING_SCREEN_SWAP	After the player types the first character as an uppercase character in any naming screen, the text will automatically flip to lowercase letters.
MULTIPLE_PREMIER_BALLS_AT_ONCE	When the Player buys more than 10 Poké Balls at once, they will receive Premier balls equal to the

	number of Poké Balls they bought divided by 10 (rounded down), as opposed to just a single <a href="#">Premier Ball</a> regardless of how many Poké Balls were purchased.																								
NON_TRAINER_SPOTTING	This feature allows you to assign scripts to regular NPCs and set their trainer byte, to cause them to walk up to the player as if they were a trainer. Additionally, by setting the NPC's <i>Unknown</i> halfword in AdvanceMap (right under <i>Person Id</i> ) to a flag, the game will check (and set) that flag before the NPC walks up to the player to prevent the script from running in an infinite loop (placing a flag here is not needed if you'll make the NPC disappear after their first encounter).																								
BIKE_ON_ANY_NON_INSIDE_MAP	Normally, the ability to bike on the map is determined by a byte in the map header. This feature makes it so the bike can be used on all outdoor maps. Note that biking in areas such as <i>Route Gates</i> will no longer work.																								
GEN_4_PLAYER_RUNNING_FIX	Increases the lag between frames as the player OW runs, to simulate a more accurate Gen 4 running effect.																								
EXPAND_MOVE_REMINDER_DESCRIPTION	Move descriptions will take up 5 lines in the <i>Move Reminder</i> screen as opposed to 4. It is recommended to use this feature as many attack descriptions were expanded to take up 5 lines.																								
ITEM_PICTURE_ACQUIRE	An item is shown in the lower right corner of the textbox when the player finds or obtains an item used one of the standard scripting functions ( <i>callstd</i> ). Key Items, TMs, & HMs appear enlarged in the centre of the screen instead.																								
EXPANDED_TEXT_BUFFERS	Expands the number of text buffers available for string scripting. The following text buffers are now available. <table><tr><th>XSE Buffer #</th><th>String Arg</th><th>Size</th></tr><tr><td>0x5</td><td>FD 07 (\v\h07)</td><td>32 bytes</td></tr><tr><td>0x6</td><td>FD 08 (\v\h08)</td><td>32 bytes</td></tr><tr><td>0x7</td><td>FD 09 (\v\h09)</td><td>32 bytes</td></tr><tr><td>0x8</td><td>FD 0A (\v\h0A)</td><td>32 bytes</td></tr><tr><td>0x9</td><td>FD 0B (\v\h0B)</td><td>32 bytes</td></tr><tr><td>0xA</td><td>FD 0C (\v\h0C)</td><td>100 bytes</td></tr><tr><td>0xB</td><td>FD 0D (\v\h0D)</td><td>100 bytes</td></tr></table>	XSE Buffer #	String Arg	Size	0x5	FD 07 (\v\h07)	32 bytes	0x6	FD 08 (\v\h08)	32 bytes	0x7	FD 09 (\v\h09)	32 bytes	0x8	FD 0A (\v\h0A)	32 bytes	0x9	FD 0B (\v\h0B)	32 bytes	0xA	FD 0C (\v\h0C)	100 bytes	0xB	FD 0D (\v\h0D)	100 bytes
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0x9	FD 0B (\v\h0B)	32 bytes																							
0xA	FD 0C (\v\h0C)	100 bytes																							
0xB	FD 0D (\v\h0D)	100 bytes																							
FOOTSTEP_NOISES	When the player or any NPC walks through grass																								



	or sand, sounds will be played. The sounds that play can be altered by modifying the values in the functions <a href="#">PlayGrassFootstepNoise</a> and <a href="#">PlaySandFootstepNoise</a> both found in <a href="#">src/overworld.c</a> . <sup>1</sup>
CAN_ONLY_USE_OMNIDIRECTIONAL_JUMP_ON_HEIGHT_2	If a tile's behaviour byte in AdvanceMap is set to <a href="#">MB_OMNIDIRECTIONAL_JUMP</a> , then the player will only jump over the block when their height is 2 (0xC in AdvanceMap, also labeled <i>Height 2</i> (0x3)). This means that the player will not jump over the tile if they're surfing, for example.
HOOPA_CHANGE_IN_PC	Hoopa-Unbound will revert to its confined form when placed in or withdrawn from a PC Box.
SHAYMIN_CHANGE_IN_PC	Shaymin-Sky will revert to its confined form when placed in or withdrawn from a PC Box. This feature was removed in Gen 7.

### Misc Battle Effect Options

<i>Definition</i>	<i>Description</i>
OLD_BURN_DAMAGE	<a href="#">Burn</a> damage does 1/8 of max health instead of 1/16.
OLD_PARALYSIS_SPD_DROP	<a href="#">Paralysis</a> lower Speed down to 1/4 instead of ½.
OLD_CONFUSION_CHANCE	<a href="#">Confusion</a> stops attacks 50% of the time instead of 33%.
INFINITE_WEATHER	<a href="#">Weather abilities</a> make weather last for infinite turns.
INFINITE_TERRAIN	<a href="#">Terrain abilities</a> make terrain last for infinite turns.
NO_SHEER_COLD_NERF	Remove all Gen 7 <a href="#">Sheer Cold</a> nerfs.
OLD_MOVE_SPLIT	The <a href="#">Physical/Special</a> split is based on move types. Status moves are still set with the split byte, however.

### Ability Options

<i>Definition</i>	<i>Description</i>
OLD_GALE_WINGS	<a href="#">Gale Wings</a> activates regardless of the user's HP.
OLD_PRANKSTER	<a href="#">Prankster</a> won't fail against Dark-Types.

### Damage Calculation Options

<i>Definition</i>	<i>Description</i>
OLD_CRIT_DAMAGE	<a href="#">Critical hits</a> to do 2x damage; 3x with <a href="#">Sniper</a> .
CRIT_CHANCE_GEN_6	Uses the Gen 6 crit chance.
CRIT_CHANCE_GEN_2_TO_5	Uses the Gen 2-5 crit chance.
BADGE_BOOSTS	Having badges gives the Player's Pokémon <a href="#">stat boosts</a> .
OLD_ATE_BOOST	" <a href="#">Ate</a> " abilities give a 1.3x boost instead of 1.2x.
OLD_GEM_BOOST	<a href="#">Gems</a> give a 1.5x boost instead of 1.2x.

<sup>1</sup> Credits to [Squeetz](#) for the original routine.

OLD_EXPLOSION_BOOST	<a href="#">Exploding</a> moves halve the target's Defense.
OLD_HIDDEN_POWER_BP	<a href="#">Hidden Power</a> has its Base Power calculated from the attacker's IVs.
PORTAL_POWER	Enables Hoopa-Unbound's signature ability in Pokémon Unbound, <i>Portal Power</i> . This reduces the power of non-contact moves by 25%.
OLD_SOUL_DEW_EFFECT	<a href="#">Soul Dew</a> doubles Latios & Latias' Sp. Atk & Sp. Def.
OLD_PARENTAL_BOND_DAMAGE	The second hit of <a href="#">Parental Bond</a> does 50% of the original damage instead of 25%.

### Capturing Pokémon Options

Definition	Description
NO_HARDER_WILD_DOUBLES	In Gen 5, Pokémon encountered in wild double battles were <a href="#">harder to catch</a> (based on how many species are owned). This feature implements that catch rate decrement.
CRITICAL_CAPTURE	Allows for <a href="#">Critical Capture</a> to occur. The odds at which this occurs can be found in the function: <i>static bool8 CriticalCapture(u32 odds)</i> found in <b>src/catching.c</b> .

### Exp. Gain Options

Definition	Description
OLD_EXP_SHARE	The <a href="#">Exp. Share</a> acts like it did before Gen 6.
TRAINER_EXP_BOOST	Gives an Exp boost for defeating a trainer's Pokémon. (Pre Gen 7)
OLD_EXP_SPLIT	Exp. is split amongst all participating Pokémon. (Pre Gen 6)
FLAT_EXP_FORMULA	Use a Flat Exp. calculation formula. (Gens 2- 4, 6)
GEN_7_BASE_EXP_YIELD	Base Exp is retrieved from the table <i>gBaseExpBySpecies</i> found in the file <b>src/Tables/Experience_Tables.c</b> , instead of being loaded from the Pokémon's base stats. This is done to account for larger Exp. values that started in Gen 5. The table is pre-set to match <a href="#">Gen 7 Exp. values</a> .
CAPTURE_EXPERIENCE	When a Pokémon is caught, experience will be rewarded as if the caught Pokémon fainted.

### Other Battle Options

Definition	Description
NO_GHOST_BATTLES	Disables the <a href="#">Ghost battle</a> feature from Pokémon Tower in Lavender town.
GEN4_PLUS_SELECTION_SCREEN	This does not give the <a href="#">Gen 4+ selection screen</a> , it only adds in-battle features that supports it.
OBEDIENCE_CHECK_FOR_PLAYER_ORIGINAL_POKÉMON	Opens up the possibility that the Player's Pokémon can <a href="#">disobey</a> them, as opposed to just traded Pokémon.
WILD_ALWAYS_SMART	All wild Pokémon use AI features meant for

	trainers.
HAIL_IN_BATTLE	Enables the <a href="#">Hail</a> weather effect in battle when the OW weather is set to WEATHER_STEADY_SNOW (0x7).
FOG_IN_BATTLE	Enables the <a href="#">Fog</a> weather effect in battle. Do not enable this feature without first enabling one of the fog features below!
FOG_IN_BATTLE_1	Enables the Fog weather effect when the OW weather is set to WEATHER_FOG_1 (0x6).
FOG_IN_BATTLE_2	Enables the Fog weather effect when the OW weather is set to WEATHER_FOG_2 (0x9).
FOG_IN_BATTLE_3	Enables the Fog weather effect when the OW weather is set to WEATHER_FOG_3 (0xA).
HIDE_HEALTHBOXES_DURING_ANIMS	Hides the healthboxes (battle bars, etc.) during move animations, and some special animations (like Mega Evolution). This has been done since Gen 4.
DONT_HIDE_HEALTHBOXES_ATTACKER_STAT US_MOVES	If <a href="#">HIDE_HEALTHBOXES_DURING_ANIMS</a> is defined, when the attacker is using a move that only targets itself, the healthboxes will not be hidden.
ENCOUNTER_MUSIC_BY_CLASS	The music played when a trainer spots the player in the overworld is determined by the trainer class, rather than the music Id set in the trainer data. The song options are listed in <a href="#">src/Tables/Music_Tables.c</a> and can be modified by changing the values in <a href="#">gClassBasedTrainerEncounterBGM</a> . Any class not defined in the array will be automatically set to <a href="#">BGM_EYE_BOY</a> .

### DexNav Options

The following options relate to the [DexNav](#) feature and can be found in [include/new/dexnav\\_config.h](#).

<i>Definition</i>	<i>Description</i>
DEXNAV_TIMEOUT	The number of seconds before the <i>DexNav</i> search times out for the player. The maximum is 1092 seconds.
SNEAKING_PROXIMITY	The amount of tiles (both horizontally and vertically) the player is allowed to be before having to sneak to avoid the Pokémon from running away. <i>Sneaking</i> is defined by not running or biking.

SEARCHLEVEL0_MOVECHANCE SEARCHLEVEL5_MOVECHANCE SEARCHLEVEL10_MOVECHANCE SEARCHLEVEL25_MOVECHANCE SEARCHLEVEL50_MOVECHANCE SEARCHLEVEL100_MOVECHANCE	The chance in percent that a Pokémon with any of these search levels will be encountered with an <a href="#">Egg Move</a> in the first slot.
SEARCHLEVEL0_ABILITYCHANCE SEARCHLEVEL5_ABILITYCHANCE SEARCHLEVEL10_ABILITYCHANCE SEARCHLEVEL25_ABILITYCHANCE SEARCHLEVEL50_ABILITYCHANCE SEARCHLEVEL100_ABILITYCHANCE	The chance in percent that a Pokémon with any of these search levels will be encountered with its <a href="#">Hidden Ability</a> (if it can have one).
SEARCHLEVEL0_ITEM SEARCHLEVEL5_ITEM SEARCHLEVEL10_ITEM SEARCHLEVEL25_ITEM SEARCHLEVEL50_ITEM SEARCHLEVEL100_ITEM	The chance in percent that a Pokémon with any of these search levels will be encountered with a held item (if it can have one).
SEARCHLEVEL0_ONESTAR SEARCHLEVEL5_ONESTAR SEARCHLEVEL10_ONESTAR SEARCHLEVEL25_ONESTAR SEARCHLEVEL50_ONESTAR SEARCHLEVEL100_ONESTAR  SEARCHLEVEL0_TWOSTAR SEARCHLEVEL5_TWOSTAR SEARCHLEVEL10_TWOSTAR SEARCHLEVEL25_TWOSTAR SEARCHLEVEL50_TWOSTAR SEARCHLEVEL100_TWOSTAR  SEARCHLEVEL0_THREESTAR SEARCHLEVEL5_THREESTAR SEARCHLEVEL10_THREESTAR SEARCHLEVEL25_THREESTAR SEARCHLEVEL50_THREESTAR SEARCHLEVEL100_THREESTAR	The chance in percent that a Pokémon with any of these search levels will be encountered with X number of perfect IVs, where X is equal to the number of stars.

## Engine Setup

## Mega Evolution / Primal Reversion / Ultra Burst

Before setting up Mega Evolution, two things must be done. First, make sure `EVOS_PER_MON` in the config file is set to the correct number (it should be the same as the number + 1 at 0x43116 in your rom). Second, if you're not using the *Dynamic Pokémon Expansion*, your Pokémon Editor of choice will need to be modified:

**G3T:**

In your Gen3Tools folder, open up **Customisation/Pokémon Editor.ini**, and add the line **FE=Mega Evolution** to the bottom of the file.

0D=Allow PKMN creation  
0E=Create extra PKMN  
0F=Beauty  
FE=Mega Evolution

**D&D:**

Has Mega Evolution pre-installed, however it cannot set up Wish-based Mega Evolution correctly.

**G3HS:**

1. Open up the file **PokeRoms.ini**, find your rom code.
2. Modify “evolutionmethods” such that the 254<sup>th</sup> evolution method is set to *Mega Evolution*:

[illegible]

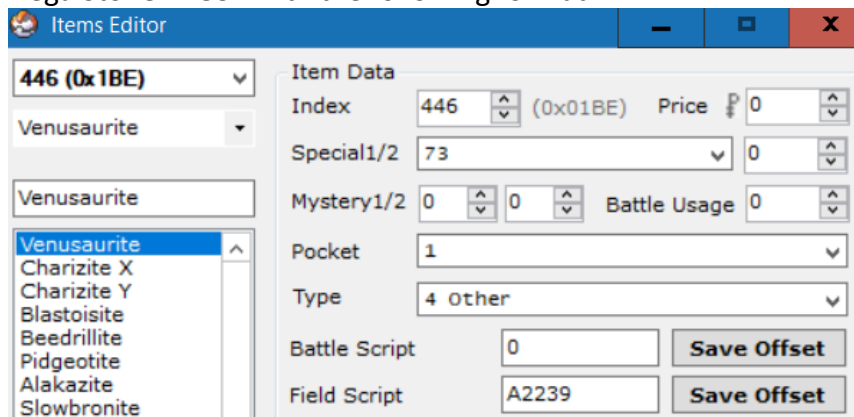
3. Modify “evomethodsproperties” such that the 254<sup>th</sup> method is set to *Item*.

## [Mega Evolution](#)

Mega Evolution set up is similar to the how the [previous](#) Mega Evolution system by Touched was set up. If a Pokémon is able to Mega Evolve, Mega Evolution can be triggered by pressing start on the move menu once the mega trigger appears.

### NOT Using Dynamic Pokémon Expansion:

1. Create a Mega Stone in G3T with the following format:



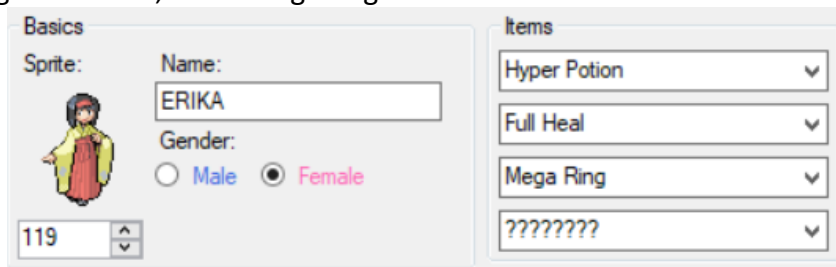
The screenshot shows the 'Items Editor' window. On the left, a list of items includes Venusaurite, Charizite X, Charizite Y, Blastoisite, Beedrillite, Pidgeotite, Alakazite, and Slowbronite. The 'Item Data' section on the right is configured as follows: Index 446 (0x01BE), Price 0, Special1/2 73, Mystery1/2 0, Battle Usage 0, Pocket 1, Type 4 other, Battle Script 0, and Field Script A2239. There are 'Save Offset' buttons for the Battle and Field scripts.

2. Create a Mega Ring key item. Its format is the same as any other key item.
3. Update the definition for the Mega Ring item in **include/constants/items.h**.
4. Open the file **src/mega.c** and search for *KeystoneTable*. Add your mega ring item to this table:

```
item_t KeystoneTable[] =  
{  
    ITEM_MEGA_RING,  
};
```

**\*\*NOTE:** The item does not need to be called *Mega Ring*. Any item added to this table can act as a mega ring.

5. If **DEBUG\_MEGA** is defined, then Mega Evolution can be used from the start of the game without the requirement of having the Mega Ring in the bag. Otherwise, the player must have a Mega Ring item in the bag to use Mega Evolution (Mega Evolution can always be used in Link Battles or the Battle Tower). If you want a trainer to be able to use Mega Evolution, add a mega ring item to their battle items:



The screenshot shows the 'Trainer Editor' window. The 'Basics' tab is active, showing the trainer's name as ERIKA, gender as Female, and a sprite of a woman in a yellow and red dress. The 'Items' tab is also visible, showing a list of items: Hyper Potion, Full Heal, Mega Ring, and a placeholder '????????'.

Don't forget to give the trainer's Pokémon the relevant Mega Stone to hold!

6. Find the Pokémon in G3T that you wish to bestow the ability of Mega Evolution upon. Set up the evolution data with following template:

Venusaur

Sprites

Type  
Grass  
Poison

Abilities  
Overgrow

Held Items  
????????  
????????

Evolution  
M Venusaur | Mega Evolution  
Venusaurite

Condition Mega Evolution

Nothing required 190

Evolve to Go! M Venusaur

Unknown Bytes 0 0

Brand New Species

In the above image:

- “Nothing required” is set to the mega stone item index created earlier.
- “Evolve to” is set to a new species representing the mega form (you’ll need to expand Pokémon or replace an existing one). Make sure this mega form has the same gender rate and Exp rate as the non-mega form or things will get messed up.

*Wish Mega Evolution* (for Rayquaza) should be set up using the following template:

Rayquaza

Sprites

Type  
Dragon  
Flying

Abilities  
Air Lock

Held Items  
????????  
????????

Evolution  
M Rayquaza | Mega Evolution

Condition Mega Evolution

Nothing required 47

Evolve to Go! M Rayquaza

Unknown Bytes 2 0

In the above image:

- “Nothing required” should be set to the move id for *Dragon Ascent* (0x22F / 559). G3T has issues with setting numbers past 0xFF, so you’ll need to hex edit or use a different Pokémon editor to set the proper value for *Dragon Ascent*.
- “Evolve to” is set to a new species representing Mega Rayquaza (you’ll need to expand Pokémon or replace an existing one). Make sure Mega Rayquaza has the same gender rate and Exp rate as Rayquaza or things will get messed up.
- The first of “Unknown Bytes” should be set to 2.

7. Set the Mega form's evolution data like the following template:

Notice that the item is left blank. Also notice that *Mega Rayquaza* still has its first unknown byte set to 2. Do not forget this!

8. Now just give the player a mega ring item and a Pokémon with the appropriate mega stone and they will be able to Mega Evolve!

### Using Dynamic Pokémon Expansion:

Add evolution methods in **src/Evolution\_Table.c** with the following format:

Regular Mega Evolution:

```
[SPECIES_VENUSAUR] = {{EVO_MEGA, ITEM_VENUSAURITE, SPECIES_VENUSAUR_MEGA, MEGA_VARIANT_STANDARD}},
[SPECIES_VENUSAUR_MEGA] = {{EVO_MEGA, ITEM_NONE, SPECIES_VENUSAUR, MEGA_VARIANT_STANDARD}},
```

Wish Mega Evolution:

```
[SPECIES_RAYQUAZA] = {{EVO_MEGA, MOVE_DRAGONASCENT, SPECIES_RAYQUAZA_MEGA, MEGA_VARIANT_WISH}},
[SPECIES_RAYQUAZA_MEGA] = {{EVO_MEGA, MOVE_NONE, SPECIES_RAYQUAZA, MEGA_VARIANT_WISH}},
```

Notes about Mega Evolution:

- Only a single Mega Evolution may be used by each side during any given battle.
- In multi battles, both trainers can Mega Evolve a single Pokémon, effectively allowing for two Mega Evolutions per side during any given battle.
- Mega Evolution is not prevented if any Pokémon on the side Ultra Bursted or underwent Primal Reversion.
- If Rayquaza uses a Z-Move, it'll be unable to Mega Evolve.



## Primal Reversion

Primal Reversion does not rely on a mega ring to activate and will thus always activate if Kyogre or Groudon hold the appropriate item. Much less setup is required for Primal Reversion.

### **NOT Using Dynamic Pokémon Expansion:**

1. Find the Red Orb and Blue Orb in G3T's item editor and modify them to match the following:

The first screenshot shows the Red Orb (Index 276, 0x114) configuration. The Special1/2 is set to 93, Mystery1/2 is 0, and the item quality is 0. The second screenshot shows the Blue Orb (Index 277, 0x115) configuration. The Special1/2 is set to 93, Mystery1/2 is 0, and the item quality is 1. Both items have a Pocket of 1, Type of 4 (Other), and a Field Script of A2239.

The item effect should be set as 93 and the item quality should be set as 0 for the Red orb and 1 for the Blue Orb. These numbers determine whether the Primal Reversion is *Red* (0) or *Blue* (1).

2. Modify Kyogre and Groudon's evolution data in G3T to match the following:

The first screenshot shows Kyogre's evolution data. The evolution is set to PKyogre (Mega Evolution). The condition is Mega Evolution, and the 'Nothing required' field is set to 21. The 'Evolve to' field is set to PKyogre. The 'Unknown Bytes' are set to 1 and 0. The second screenshot shows Groudon's evolution data. The evolution is set to PGroudon (Mega Evolution). The condition is Mega Evolution, and the 'Nothing required' field is set to 20. The 'Evolve to' field is set to PGroudon. The 'Unknown Bytes' are set to 1 and 0.

In the above images:

- “Nothing required” is set to the *Blue Orb* item index for Kyogre and to the *Red Orb* item index for Groudon. Note again that G3T does not represent these item indices correctly so you may need to use another editor.
- “Evolve to” is set to a new species representing the primal form (you’ll need to expand Pokémon or replace an existing one). Make sure this primal form has the same gender rate and Exp rate as the non-primal form or things will get messed up.
- The first of the “Unknown Bytes” is set to 1 to represent Primal Reversion.

3. Set up the primal forms' evolution data in G3T to match the following:

The image shows two side-by-side screenshots of the G3T editor interface. The left window is for PKyogre, and the right window is for PGroudon. Both windows have a 'Sprites' button in the top right. In the PKyogre window, the 'Type' is set to 'Water' (twice), 'Abilities' is '[&hFB][?]Eordie', 'Held Items' are two empty slots with '????????', 'Evolution' is 'Kyogre | Mega Evolution', 'Condition' is 'Mega Evolution', 'Nothing required' is '0', 'Evolve to' is 'Go! Kyogre', and 'Unknown Bytes' are '1' and '0'. The PGroudon window has 'Type' set to 'Ground' and 'Fire', 'Abilities' is '[?][&hFB][?]Elat', 'Held Items' are two empty slots with '????????', 'Evolution' is 'Groudon | Mega Evolution', 'Condition' is 'Mega Evolution', 'Nothing required' is '0', 'Evolve to' is 'Go! Groudon', and 'Unknown Bytes' are '1' and '0'.

Notice that the items are left blank. Also notice that both Primal Pokémon still have their first unknown bytes set to 1. Do not forget this!

Note about Primal Reversion:

- The alpha and omega symbols on the health bar are generated based on which species is in its Primal form. By default, the alpha symbol is set to appear if the species is Primal Kyogre, and the omega symbol is set to appear if the species is Primal Groudon. To change this requirement, modify the following functions in **src/mega.c**:

```
bool8 IsBluePrimal(u8 bank)
{
    u16 species = GetBankPartyData(bank)->species;
    return species == PKMN_KYOGRE_PRIMAL;
}

bool8 IsRedPrimal(u8 bank)
{
    u16 species = GetBankPartyData(bank)->species;
    return species == PKMN_GROUDON_PRIMAL;
}
```

These can easily be modified by adding species to compare to. So if I wanted the omega symbol to appear for Primal Dialga as well, I would make the following modification:

```
bool8 IsRedPrimal(u8 bank)
{
    u16 species = GetBankPartyData(bank)->species;
    return species == PKMN_GROUDON_PRIMAL || species == PKMN_DIALGA_PRIMAL;
}
```

Don't forget to also define **PKMN\_PRIMAL\_DIALGA** in **include/constants/species.h**!

**Using Dynamic Pokémon Expansion:**

Add evolution methods in **src/Evolution\_Table.c** with the following format:

```
[SPECIES_GROUDON] = {{EVO_MEGA, ITEM_RED_ORB, SPECIES_GROUDON_PRIMAL, MEGA_VARIANT_PRIMAL}},
[SPECIES_GROUDON_PRIMAL] = {{EVO_MEGA, ITEM_NONE, SPECIES_GROUDON, MEGA_VARIANT_PRIMAL}},
```

## Ultra Burst

Primal Reversion does not rely on a mega ring to activate and will thus always activate if Necrozma holds the appropriate item. Much less setup is required for Ultra Burst.

### NOT Using Dynamic Pokémon Expansion:

1. Create an *Ultraneurozium Z* item in G3T with the following format:

The screenshot shows the G3T Item Editor interface. On the left, a list of items is shown with 'Necrozium Z' selected. The main panel displays the 'Item Data' for this item. The 'Index' is set to 446 (0x01BE), 'Price' is 0, 'Special1/2' is 73, 'Mystery1/2' is 0, 'Battle Usage' is 0, 'Pocket' is 1, and 'Type' is 4 (other). The 'Battle Script' is 0 and the 'Field Script' is A2239. There are 'Save Offset' buttons for both scripts.

2. Modify **both** Necrozma forms' evolution data in G3T to match the following:

The screenshot shows the G3T Evolution Editor interface for two forms of Necrozma: Necrozma-M and Necrozma-W. Both forms are set to 'Psychic' type. The 'Evolution' is set to 'Necrozma-U | Mega Evolution'. The 'Condition' is 'Mega Evolution'. The 'Nothing required' field is set to 189. The 'Evolve to' field is set to 'Go! Necrozma-U'. The 'Unknown Bytes' field is set to 3. The 'Held Items' field is set to '????????'.

In the above images:

- “Nothing required” is set to the *Ultraneurozium Z* item index. Note again that G3T does not represent these item indices correctly so you may need to use another editor.
- “Evolve to” is set to a new species representing *Ultra Necrozma* (you’ll need to expand Pokémon or replace an existing one). Make sure all *Necrozma* forms have the same gender rate and Exp rate or things will get messed up.
- The first of the “Unknown Bytes” is set to 3 to represent Ultra Burst.

- Set up the *Ultra Necrozma*'s evolution data in G3T to match the following:

The screenshot shows the G3T interface for editing the evolution data of Necrozma-U. The 'Type' section shows 'Psychic' and 'Dragon'. The 'Abilities' section shows 'Neuroforce'. The 'Held Items' section shows two blank slots. The 'Evolution' section shows a list with 'Necrozma-M' and 'Necrozma-W', both with 'Mega Evolution'. The 'Condition' is set to 'Mega Evolution'. The 'Nothing required' field is set to 0. The 'Evolve to' field is set to 'Necrozma-M'. The 'Unknown Bytes' field is set to 3.

In the above image:

- The items are left blank.
- The first unknown byte is set to 3. Do not forget this!

Note about Ultra Burst:

- Contrary to what is shown in the above image, *Ultra Necrozma* does **not** need reversion data from both *Necrozma* fusion forms (it needs for at least one of them). *Ultra Necrozma* will always revert to the form it *Ultra Bursted* from at the end of the battle, regardless of which species is written in its evolution data. If the *Ultra Necrozma* was encountered in the wild, it will revert to the first species in its evolution list by default.
- Ultra Burst* is triggered the same way as *Mega Evolution* on the move menu.
- As *Ultra Burst* is not considered *Mega Evolution*, *Ultra Necrozma* can still use Z-Moves if it knows the appropriate base move (*Photon Geyser* by default).

**Using Dynamic Pokémon Expansion:**

Add evolution methods in **src/Evolution\_Table.c** with the following format:

```
[SPECIES_NECROZMA_MANE] = {{EVO_MEGA, ITEM_ULTRA_NECROZIUM_Z, SPECIES_NECROZMA_ULTRA, MEGA_VARIANT_ULTRA_BURST}},
[SPECIES_NECROZMA_WINGS] = {{EVO_MEGA, ITEM_ULTRA_NECROZIUM_Z, SPECIES_NECROZMA_ULTRA, MEGA_VARIANT_ULTRA_BURST}},
[SPECIES_NECROZMA_ULTRA] = {{EVO_MEGA, ITEM_NONE, SPECIES_NECROZMA_MANE, MEGA_VARIANT_ULTRA_BURST},
                             {EVO_MEGA, ITEM_NONE, SPECIES_NECROZMA_WINGS, MEGA_VARIANT_ULTRA_BURST}},
```

## Z-Moves

[Z-Moves](#) work akin to how they work in real Pokémon games.

If a Pokémon holds a *Z-Crystal* corresponding to a specific type, any move of that type can be turned into a Z-Move by pressing the *Start*-button on the move menu, and then the *A*-button to confirm the selection. If a move cannot be turned into a Z-Move, the *Start*-button will do nothing.

If a certain Pokémon holds its signature *Z-Crystal*, then its signature move can be turned into its signature *Z-Move* (also with the *Start*-button). A list of these signature Z-Moves can be found under [gSpecialZMoveTable](#) in `src/include/new/battle_start_turn_start.h`.

The only setup required for Z-Moves involves the creation of Z-Crystals. Each Z-Crystal should be created in G3T with the following format:

The screenshot shows the G3T item editor interface. On the left, a list of memory banks is visible, with 'Flyinium Z' selected. The main panel displays the 'Item Data' for '672 (0x2A0)'. The 'Index' is set to 563 (0x0233) and the 'Price' is 200. The 'Special1/2' is set to 130 and the 'Quality' is set to 2. The 'Mystery1/2' is set to 1 and 0, and the 'Battle Usage' is 0. The 'Pocket' is set to 1 and the 'Type' is '4 Other'. The 'Battle Script' is 0 and the 'Field Script' is A2239. There are 'Save Offset' buttons for both scripts.

The item effect should be set as 130 and the item quality should be set to the move type the Z-Crystal works for (in the above image it is set to 2 [[TYPE\\_FLYING](#)]). The *Mystery 1* byte can also be set to 1 to remove the item quantity for Z-Crystals (acts as if the player only has the single, unique Z-Crystal).

Special Z-Crystals should be set up similarly, the key difference being that item quality should be set to 255.

The screenshot shows the G3T item editor interface for 'Eevium Z'. The 'Item Data' panel shows the 'Index' as 563 (0x0233) and the 'Price' as 200. The 'Special1/2' is set to 130 and the 'Quality' is set to 255. The 'Mystery1/2' is set to 1 and 0, and the 'Battle Usage' is 0. The 'Pocket' is set to 1 and the 'Type' is '4 Other'. The 'Battle Script' is 0 and the 'Field Script' is A2239. There are 'Save Offset' buttons for both scripts.

Once the Z-Crystals are created, have a Pokémon hold one, give it the appropriate move, and then watch the magic happen!

## Trainer Sliding Messages<sup>2</sup>

In generations after Gen 3, Trainers could interrupt the battle with a message. This engine supports three kinds of those messages:

1. After the opponent's first Pokémon faints.
2. After the opponent's last Pokémon is sent in.
3. When the opponent's last Pokémon is low on health.

Trainers can have any combination (or none at all) of the above messages. To set these up, do the following:

1. Navigate to **src/trainer\_sliding.c** and search for *sTrainerSlides*. This is the table used to define the sliding messages.
2. Add an entry with the following format:

```
{0x59, sText_BenFirstMonDown, sText_BenLastSwitchIn, sText_BenLastLowHP},
```

Where 0x59 is the trainer Id (Youngster Ben in this case), *sText\_BenFirstMonDown* is the message displayed when the opponent's first Pokémon has fainted, *sText\_BenLastSwitchIn* is the message displayed when the opponent switches in their last Pokémon, and *sText\_BenLastLowHP* is the message displayed when the opponent's last Pokémon is on low health. If you would not like the trainer to say anything at one of these stages, simply replace the entry with *NULL*:

```
{0x59, sText_BenFirstMonDown, NULL, sText_BenLastLowHP},
```

In this case, the trainer will say something after the first Pokémon is defeated and when their last Pokémon is low on HP, but not after they send in their last Pokémon.

3. At the top of the file (under the **#include**'s), add declarations for the strings you've defined. For example, for the first message struct declared above, the top of the file should look like this:

```
#include "defines.h"
#include "defines_battle.h"
#include "../include/new/helper_functions.h"

extern u8 sText_VegaLastSwitchIn[];
extern u8 sText_VegaLastLowHP[];
extern u8 sText_VegaFirstMonDown[];
```

Each string title is preceded by "extern u8 " and ends with "[]";.

---

<sup>2</sup> Credits to the [Emerald Battle Engine Upgrade V2.0](#) for the original source code.

4. Open the file **strings/trainer\_sliding\_strings.string** and add entries for the strings you've defined. For example, for the first message struct declared above:

```
#org @sText_BenFirstMonDown
You hurt my friend!\p

#org @sText_BenLastSwitchIn
It's all or nothing, now!\p

#org @sText_BenLastLowHP
Oh, no[.]\p
```

The format for the strings follows similarly to *XSE*, the key difference being that each line does **not** start with "`=`". An equal's sign at the beginning of the line will be treated as such and be seen in the game. Also note that each line ends with "`\p`" in order to wait for the player's key press.

Follows these steps and continuously add new entries to the table to add flavour to battles!



## Multi Battles

There are 4 different types of [Multi Battles](#) supported by this engine:

1. Player Vs. Two Trainer Opponents.
  - Can be set up in a script or by being spotted by two different trainers.
2. Player & Partner Vs. Two Trainer Opponents.
3. Player & Partner Vs. One Trainer Opponent.
4. Player & Partner Vs. Two Wild Pokémon.

There are two different ways of setting these up:

### XSE Friendly Method

This method allows you to set up multi battles through scripted events.

- To set up a battle against two opponents:
  - Set the flag **TWO\_OPPONENT\_FLAG**.
  - Set the var **SECOND\_OPPONENT\_VAR** to the trainer id of the second trainer.
  - Use the *loadpointer* scripting command in conjunction with special **0xXX** to load the second trainer's defeat text.
  - Then use the scripting command *trainerbattle 0x3* (or *0x9*) to start the battle.
- To set up a battle with a partner:
  - Set the flag **TAG\_BATTLE\_FLAG**.
  - Set the var **PARTNER\_VAR** to the trainer id of the partner.
  - Set the var **PARTNER\_BACKSPRITE\_VAR** to the [backsprite Id](#) of the partner.
  - Then use the scripting command *trainerbattle 0x3* (or *0x9*) to start the battle.

**This will initiate a battle with a partner against a single opponent.**

- To battle with a partner and two opponents, set all flags and vars listed in the previous two steps, and then use the scripting command *trainerbattle 0x3* (or *0x9*) to start the battle. A sample script to do this looks as follows:

```
#define TWO_OPPONENT_FLAG 0x909
#define TAG_BATTLE_FLAG 0x908
#define SECOND_OPPONENT_VAR 0x5010
#define PARTNER_VAR 0x5011
#define PARTNER_BACKSPRITE_VAR 0x5012
#define SPECIAL_LOAD_SECOND_DEFEAT_TEXT 0xAC

#org @start
setflag TWO_OPPONENT_FLAG 'Setup battle against two opponents
setflag TAG_BATTLE_FLAG 'Setup battle with partner
setvar SECOND_OPPONENT_VAR 0x59 'Youngster Ben
setvar PARTNER_VAR 0x5B 'Team up with Youngster Josh
setvar PARTNER_BACKSPRITE_VAR 0x2 'Brendan's Backsprite
loadpointer 0x0 @SecondTrainerDefeatText
special SPECIAL_LOAD_SECOND_DEFEAT_TEXT
trainerbattle 0x3 0x5A 0x0 @FirstTrainerDefeatText 'Youngster Calvin
end
```



### Non-XSE Friendly Method

This method for setting up multi battles is not possible to code in XSE, but it is significantly easier to code and allows more versatility with random trainer scripts. It is recommended to use the Thumb assembler in conjunction the xse defines provided in this engine to compile these custom scripts (which can then be called after inserting the hex data).

- To set up a battle against two opponents, use the following scripting command:

**trainerbattle 0xB FOE\_1\_ID FOE\_2\_ID FOE\_1\_NPC\_ID FOE\_2\_NPC\_ID 0x0**

**INTRO\_TEXT\_A INTRO\_TEXT\_B DEFEAT\_TEXT\_A DEFEAT\_TEXT\_B CANNOT\_BATTLE\_TEXT**

Where:

- **FOE\_1\_ID**: The trainer Id of the first opponent.
- **FOE\_2\_ID**: The trainer Id of the second opponent.
- **FOE\_1\_NPC\_ID**: The local Id (person Id in AdvanceMap) of the first opponent.
- **FOE\_2\_NPC\_ID**: The local Id (person Id in AdvanceMap) of the second opponent.
- **INTRO\_TEXT\_A**: The intro battle text said by the first opponent.
- **INTRO\_TEXT\_B**: The intro battle text said by the second opponent.
- **DEFEAT\_TEXT\_A**: The defeat text said by the first opponent.
- **DEFEAT\_TEXT\_B**: The defeat text said by the second opponent.
- **CANNOT\_BATTLE\_TEXT**: The text said by either opponent when the player doesn't have enough viable Pokémon to fight with.

This **trainerbattle 0xB** command is special such that you can assign it to random NPCs to effectively make better random double battles than with a *Twins* class, for example.

When using this on two random NPCs, make sure they stand next to each other!

Otherwise it'll look off when they walk towards the player together.

- To set up a battle with a partner, use the following scripting command:

**trainerbattle 0xC FOE\_ID PARTNER\_ID PARTNER\_BACKSPRITE\_ID 0x0 DEFEAT\_TEXT**

Where:

- **FOE\_ID**: The trainer Id of the opponent.
- **PARTNER\_ID**: The trainer Id of the player's partner.
- **PARTNER\_BACKSPRITE\_ID**: The backsprite Id of the player's partner.
- **DEFEAT\_TEXT**: The text said when the opponent loses the battle.

- To battle with a partner and two opponents, use the following scripting command:

**trainerbattle 0xA FOE\_1\_ID FOE\_2\_ID PARTNER\_ID PARTNER\_BACKSPRITE\_ID 0x0**

**DEFEAT\_TEXT\_A DEFEAT\_TEXT\_B**

Where each of the title definitions is the same as listed *trainerbattle 0xB* and *trainerbattle 0xC*. Note that both *trainerbattle 0xB* and *trainerbattle 0xC* cannot be used on random NPCs. They must be used from within an event script.

And with that, you can set up amazing multi battles!

## Wild Double Battles

Encountering two wild Pokémon at once was introduced in Gen 4 with it occurring when the player was teamed up with another player. Then, in Gen 5, it became possible to encounter two Pokémon at once in special grass. This engine supports both of those features.

### Wild Double Battles With Partner

If there is ever a situation where you'd like all wild battles in a given area to be with a partner, add the following as an *On entering map/on menu close [5]* level script in AdvanceMap:

```
#define DOUBLE_WILD_BATTLE_FLAG 0x9F9
```

```
#org @start
```

```
setflag DOUBLE_WILD_BATTLE_FLAG
```

```
setflag TAG_BATTLE_FLAG 'Setup battle with partner (same as above)
```

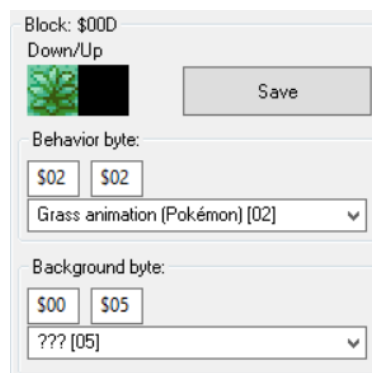
```
setvar PARTNER_BACKSPRITE_VAR 0x2 'Brendan's Backsprite (same as above)
```

```
end
```

This will cause all battles against trainers on the map to be fought with a partner, and all wild battles fought on the map to be against two Pokémon. Conditions can also be added to the script (such as a checkflag to only execute the script if some flag is set). Don't forget to clear these flags once the player no longer needs a partner!

### Wild Double Grass

Special grass tiles that can initiate wild battles can be created as well. Grass with a background byte of 0x5 will have a chance of starting a wild double battle, and grass with a background byte of 0x25 will have a chance of starting a wild double battle and be covered by the player. Wild double water tiles are similarly done using 0x6 and 0x26. The chance a wild double battle will be started when walking in this grass is determined by the value set (in percent) in `WILD_DOUBLE_RANDOM_CHANCE`.



### Scripted Wild Double Battles

Here is a sample script:

```
wildbattle 0xFFFF 0x0 0x0 'Double indicator  
wildbattle PKMN_CLEFAIRY 20 ITEM_NONE  
wildbattle PKMN_PIKACHU 20 ITEM_NONE  
special 0x138 'Starts the battle  
waitstate
```

Sample double wild grass in AdvanceMap:

I'm not entirely sure if this script will compile properly in XSE, but if you use it in PKSV by replacing *wildbattle* with *battle* and *waitstate* with *waitspecial* the battle will begin properly.

## Trainer Backsprites

Adding a backsprite into the game has never been easier.

1. Go to **graphics/Backsprites** and add a minimum of **4** backsprites in for your new trainer. Make sure they're each a size of 64 x 64 and indexed to 16 colours! Sample *Brendan* and *May* backsprites come bundled with the engine.



2. Open **assembly/data/Trainer\_Backsprite\_Table.s** to allow the game to read your new backsprites.
3. Search for *gTrainerBackPicPaletteTable* and add your new entry after the old man. The format should be [FILE\_NAME\_NO\_EXTENSION]0Pal. So, for instance, if I was adding the above Brendan sprites to the table:

```
.word 0x8E76F0C, 0x4 @Primo  
.word 0x8E76F34, 0x5 @Old Man  
.word Brendan_Back_0Pal, 0x6
```

Notice that each entry has an associated number. Numbers should go up by 1 for each entry. This is the **backsprite Id** referenced several other times in the documentation.

4. Search for *gTrainerBackAnimPtrTable* and add your new entry after the old man. So, since in our example we're adding in another backsprite with 4 frames, copy the frame data from *May*:

```
.word 0x8239F6C @May  
.word 0x8239F54 @Primo  
.word 0x8239F5C @Old Man  
.word 0x8239F6C @Brendan New
```

5. Search for *gTrainerBackPicCoords* and add your new entry after the old man's. For simplicity, just copy the old man's data:

```
.byte 0x8, 0x4, 0x0, 0x0 @Primo  
.byte 0x8, 0x4, 0x0, 0x0 @Old Man  
.byte 0x8, 0x4, 0x0, 0x0 @Brendan New
```

6. Search for *TrainerBackspritesTable* and add your new entry after the old man's. To add a new entry in this table, copy the old man's data and just change wherever it says "OldMan" to your new name. So in our example:

```
@5 - Old Man
.hword 0xFFFF
.hword 0x0
.word BackspriteOAM, 0x0
.word BackspriteImageTable_OldMan
.word BackspriteRotscaleTable
.word BackspriteAnimCmd

@6 - Brendan New
.hword 0xFFFF
.hword 0x0
.word BackspriteOAM, 0x0
.word BackspriteImageTable_Brendan
.word BackspriteRotscaleTable
.word BackspriteAnimCmd
```

7. Scroll down to the end of the file and add a backsprite image table in. Copy the backsprite image table name from the entry just added to *TrainerBackspritesTable*, and then add the data like so:

```
BackspriteImageTable_Brendan:
.word Brendan_Back_1Tiles
.hword 0x800, 0x0

.word Brendan_Back_2Tiles
.hword 0x800, 0x0

.word Brendan_Back_3Tiles
.hword 0x800, 0x0

.word Brendan_Back_0Tiles
.hword 0x800, 0x0
```

Notice that the order of the images goes frame 1, frame 2, frame 3, and then frame 0. This is very important!

Unlike what was shown in the tutorial, it is also possible to add in data for a backsprite with 5 frames. In that case, just copy the data from one of the backsprite with 5 frames (like the player) instead.

## Battle Terrain

If you have inserted any new battle backgrounds using the tutorial [here](#), then certain modifications will need to be made to make the engine compatible with those backgrounds.

1. Open up the file **include/battle.h**. Search for **BATTLE\_TERRAIN\_CHAMPION** in the file, and add a new definition there. So, for instance, if your new background was a snow field:

```
#define BATTLE_TERRAIN_LANCE          0x12
#define BATTLE_TERRAIN_CHAMPION       0x13
#define BATTLE_TERRAIN_SNOW_FIELD     0x14
```

2. Open up the file **src/Tables/Terrain\_Table.c**. Search for **BATTLE\_TERRAIN\_CHAMPION** in the file, and add a new entry to the table. So continuing on with the snow example:

```
[BATTLE_TERRAIN_CHAMPION + 4] =
{
    .camouflageType = TYPE_NORMAL,
    .secretPowerEffect = MOVE_EFFECT_PARALYSIS,
    .secretPowerAnim = MOVE_BODYSLAM,
    .naturePowerMove = MOVE_TRIATTACK,
    .burmyForm = SPECIES_BURMY_TRASH,
},

[BATTLE_TERRAIN_SNOW_FIELD + 4] =
{
    .camouflageType = TYPE_ICE,
    .secretPowerEffect = MOVE_EFFECT_FREEZE,
    .secretPowerAnim = MOVE_AVALANCHE,
    .naturePowerMove = MOVE_FROSTBREATH,
    .burmyForm = SPECIES_NONE,
},
```

Notice the entry name is the same as the definition from earlier + 4.

The table has entries for:

- camouflageType: The type the move [Camouflage](#) transforms into.
- secretPowerEffect: The secondary effect of the move [Secret Power](#).
- secretPowerAnim: The animation of the move *Secret Power*.
- naturePowerMove: The attack the move [Nature Power](#) becomes.
- burmyForm: The form [Burmy](#) transforms into after this battle. If you would not like *Burmy* to change form after this battle, leave it as **SPECIES\_NONE** (as shown above).

## Battle Music

There are three different music tables that can be set up. Each table can be found in **src/Tables/Music\_Tables.c**. Any custom song definitions used in these tables should be added to **include/constants/songs.h**. Trainer classes can be found and added into the file **include/constants/trainer\_classes.h**.

### Class Based Encounter Music

If **ENCOUNTER\_MUSIC\_BY\_CLASS** is defined, then the table, *gClassBasedTrainerEncounterBGM*, can be modified to determine which music plays in the background when each trainer class is encountered in the overworld. For example, this table causes all *Youngsters* to have the same encounter music, without having to set the byte for each of them in their trainer data. If you wanted to change which encounter music *Youngsters* have, all you have to do is make the following change:

```
[CLASS_YOUNGSTER] = BGM_EYE_BOY, → [CLASS_YOUNGSTER] = BGM_EYE_GIRL,
```

Now, all *Youngsters* will play the girl encounter when they spot the player.

If you do not want to use this feature, the **switch** statement in *SetUpTrainerEncounterMusic* found in **src/overworld.c** will need to be modified to add new encounter song ids in.

### Class Based Battle Music

The table, *gClassBasedBattleBGM*, can be modified to determine the song that plays during trainer battles against certain classes. For example, if I wanted to make all *Team Rocket* battles play the *Gym Leader* theme, I would add the following onto the end of the table:

```
[CLASS_ELITE_4] = BGM_BATTLE_GYM_LEADER,  
[CLASS_TEAM_ROCKET] = BGM_BATTLE_GYM_LEADER,  
};
```

In a *Multi Battle*, if either trainer has custom battle music, their theme will play. If both trainers have custom battle music, then the theme for the trainer on the right (first opponent) will play.

### Wild Species Based Battle Music

The table, *gClassBasedTrainerEncounterBGM*, can be modified to determine the song that plays during wild battles against certain species of Pokémon. For example, if I wanted to make all *Rattata* battles play the *Deoxys* theme, I would add the following onto the end of the table:

```
[SPECIES_DEOXY_S] = BGM_BATTLE_DEOXY_S,  
[SPECIES_RATTATA] = BGM_BATTLE_DEOXY_S,  
};
```

### Victory Music

In the file **src/end\_battle.c** is a function called *HandleEndTurn\_BattleWon*. In this function is a switch statement (look for **VICTORY\_MUSIC\_SELECTION**) which controls the songs that play when defeating certain trainer classes. See the example from *Pokémon Unbound* (include in the file) for how to append new classes to this switch statement.

## Poke Balls

Several new Poké Balls have been added to the engine, in addition to the Trainer Class Based Poké Ball hack.

### Adding Support for Added Balls

Although catching data has been added in for the new balls, item data has not. This means that if you want to give the player a certain ball, you'll need to add in item data for it. Adding a new Poké Ball follows the following format in G3T:

The screenshot shows the G3T item editor interface. On the left, a list of items is displayed, with 'Dusk Ball' selected. The main area shows the 'Item Data' for the selected item. The 'Index' is set to 60 (0x3C) and the 'Price' is 1000. The 'Special1/2' is 0, 'Mystery1/2' is 0, and 'Battle Usage' is 2. The 'Pocket' is 3 and the 'Type' is 12. The 'Battle Script' is A1E1D and the 'Field Script' is 0. There are 'Save Offset' buttons for both scripts.

Regarding the *Type* field, this related to the *Ball Type* - 1 of the given ball. So looking in **include/new/catching.h**, we see that the *Dusk Ball*'s type is 13, so subtracting 1 is 12.

### Class Based Poke Balls

Loosely based on the hack created by [Sagiri](#), if **TRAINER\_CLASS\_POKE\_BALLS** is defined, this implements the feature from Gen 7 where certain Trainer classes always send out Pokémon in a specific type of Poké Ball.

To modify the trainer class balls, open **src/Tables/Class\_Based\_Poke\_Ball\_Table.c**. All the trainer classes have been preloaded into the table, but if you would like to change a trainer class name to your own custom name, do so in **include/constants/trainer\_classes.h** and then update the table accordingly. The ball type defines that can be used can be found in **include/new/catching.h**. So, for example, if you wanted to change the *Youngster*'s ball to a *Great Ball*, you'd make the following change:

```
[CLASS_YOUNGSTER] = BALL_TYPE_POKE_BALL, → [CLASS_YOUNGSTER] = BALL_TYPE_GREAT_BALL,
```

And then the next time the player battles a *Youngster*, all their Pokémon would be sent out in *Great Balls*!

## Trainers With EVs

Loosely based on [DoesntKnowHowToPlay's hack](#), if `TRAINERS_WITH_EVS` is defined, this feature allows trainer Pokémon to have certain EV spreads. Preloaded spreads can be found in `src/Tables/Trainers_With_EVs_Table.h`. New spreads should also be added in here as well.

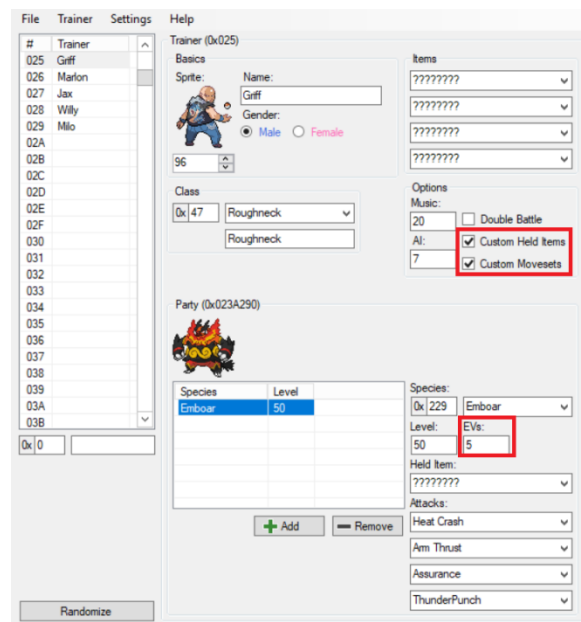
Note that since this is a `.h` file, if you want your changes to compile, you will need to make a change to the file `src/build_pokemon.c` so the compiler recompiles the Trainer's With EVs file. The change can be as simple as adding a whitespace character and then removing it. **Don't use the undo button to remove the change!** The change needs to be removed manually by using the backspace character so the editor saves the file with an updated timestamp.

### Assigning a Spread

In order for a Pokémon to use a spread, the following must be done:

- The Pokémon must have a custom moveset.
- The Pokémon must have a custom item (this item can still be set to 0).
- The Pokémon must have an IV (labeled "EVs" in most Trainer editors) value greater than 1 (the 0<sup>th</sup> spread is left empty for this reason).

For example, looking in the file, you can see that spread 5 is predefined as a "Bulky Physical Attacker". If I wanted to assign this to a Pokémon, the layout would look like this (in [Hopeless Trainer Editor](#)):



As can be seen in the image, both *Custom Movesets* and *Custom Hold Items* have been selected, and the *EVs* value has been set to 5. Note that the hold item has been set to "????????", meaning that *Emboar* is not actually holding an item (this is still fine).



## Creating a New Spread

If you want to create a new spread, add it to the end of the table and start counting at 31. The table can at most hold up to the 255<sup>th</sup> spread. Spreads have the following members:

- `.nature`: The nature of the Pokémon. Natures can be found in **`include/pokemon.h`**.
- `.ivs`: The IVs for the Pokémon. All stats are set to this value (meaning custom *Hidden Powers* are not possible).
- `.hpEv`: The number of *HP* EVs the Pokémon has.
- `.atkEv`: The number of *Attack* EVs the Pokémon has.
- `.defEv`: The number of *Defense* EVs the Pokémon has.
- `.spAtkEv`: The number of *Special Attack* EVs the Pokémon has.
- `.spDefEv`: The number of *Special Defense* EVs the Pokémon has.
- `.spdEv`: The number of *Speed* EVs the Pokémon has.
- `.ball`: If set to `TRAINER_EV_CLASS_BALL` and `TRAINER_CLASS_POKE_BALLS` is defined, then the ball loaded will be the one for the trainer class. Otherwise look in **`include/new/catching.h`** for a list of available Poké Ball types.
- `.ability`: The ability number of the Pokémon. Can be set to:
  - `Ability_1`: The Pokémon will have its first ability.
  - `Ability_2`: The Pokémon will have its second ability.
  - `Ability_Hidden`: The Pokémon will have its [hidden ability](#).
  - `Ability_Random_1_2`: The Pokémon will have one of its primary abilities.
  - `Ability_RandomAll`: The Pokémon will have one of its possible abilities.

Example:

```
[31] =  
{  
    .nature = NATURE_DOCILE,  
    .ivs = 31,  
    .hpEv = 128,  
    .atkEv = 252,  
    .spdEv = 128,  
    .ball = BALL_TYPE_CHERISH_BALL,  
    .ability = Ability_RandomAll,  
},
```

In the above example, the nature for the spread is set to *Docile*, each stat has an IV of 31, the *HP* stat has 128 EVs, the *Attack* stat has 252 EVs, and the *Speed* stat has 128 EVs. All EV stat not referenced in this spread will be set to a default value of 0. Any Pokémon using this spread will also be released in a *Cherish Ball* and have any one of its possible abilities (including its hidden ability).

## Battle Frontier

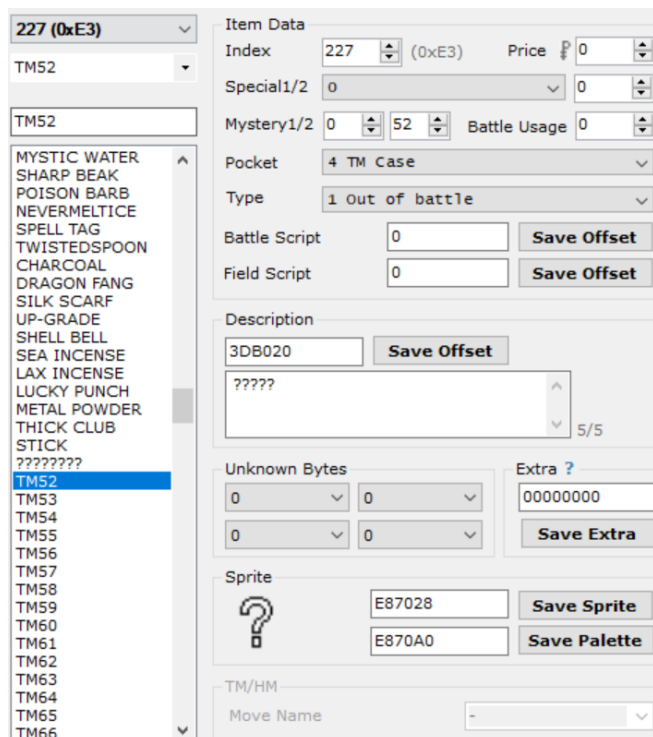
//TO WRITE

## Upgraded TM/HM Expansion

This engine includes a vastly improved TM/HM system over those created in the past. Why is it so much better, you ask? It allows the hacker to use ANY item id for their TMs. None of this item ID sorting or item gap nonsense! It also fixes the graphical problems with high TM numbers in the TM case.

To set this feature up, you must set the *Mystery 2* byte of your item to the TM Id, starting at 01 for TM01. The HMs must start at a TM Id **after** the max number of TMs you plan on including. For example, if you want 120 TMs and 8 HMs, HM01 would be given a TM Id of 121. Otherwise, the items are set up as normal (see image ->). The item sprite and palette don't matter, as the disk is loaded outside of the item data, and the TM animation must be removed for the expansion to work correctly.

This engine does not mess with any of the original tables to allow a hack in progress to keep all its data. Therefore, once all your item data is set up, you must set up the *TM Move Table* and *TM Compatibility Table*. The *TM Move Table* has a pointer at 0x125A8C and is simply a list of move IDs corresponding with the TM ID. The *TM Compatibility Table* is more complicated. Its pointer lies at 0x43C68 and is 16 bytes per species. Taken from [this tutorial](#):



The new TM compatibility is broken into 4 words (4 bytes each), where the first word corresponds to TMs 1-32, then 33-64, and so on. Each bit starting from the far right corresponds to a TM.

For example, if you want to learn TMs 3, 7, 20, 54, 87, and 102:

1-32: 00000000000010000000000001000100

33-64: 00000000001000000000000000000000

65-96: 00000000010000000000000000000000

97-128: 00000000000000000000000000000000

becomes, in hex: [00 08 00 44] [00 20 00 00] [00 40 00 00] [00 00 00 20]

reversing each part and combining:

44 00 08 00 00 00 20 00 00 00 40 00 20 00 00 00

## Reusable TMs

If you've defined *REUSABLE\_TMS* in *src/config.h*, you will then also need to set the *Mystery 1* byte to 1 for each of your TMs. This will tell the game to treat the item like an HM (except extra code has

been written to sort TMs/HMs by the TM index. For more info see [TM/HM Expansion](#).), preventing you from giving it to a Pokemon to hold, selling it, etc. That's it!

### Pickup<sup>3</sup>

The items found by the ability [Pickup](#) can be modified in `src/Tables/Pickup_Items.c`. Modify *sPickupCommonItems* and *sPickupRareItems* to change the items that appear. **DO NOT** add any new items to the tables; only change the pre-existing items. The default values were chosen based on the following table (common is highlighted in blue, rare is highlighted in red):

Pokémon Omega Ruby and Alpha Sapphire [\[edit\]](#)

Level	30%	10%	4%	1%
1-10				
11-20				
21-30				
31-40				
41-50				
51-60				
61-70				
71-80				
81-90				
91-100				

### Select from PC Hack

If `SELECT_FROM_PC` is defined, the player can select Pokémon directly from the PC to modify certain data. To initiate, set *pcSelect\_StateTracker* (defined in `asm_defines.s`) to 1 before using Special 0x3C. The hack will store the box number and slot to *Var 0x8000* and *0x8001*, respectively. All data retrieval/manipulation specials will be able to access the selected PC Pokémon by setting *Var 0x8003* to 1. For example, nicknaming a Pokémon in the PC:

```
#define pcSelect_StateTracker 0x203B7AC

#org @start
writebytetoffset 0x1 pcSelect_StateTracker
special 0x3C 'Select boxed mon, box stored to Var8000, slot to Var8001
waitstate
writebytetoffset 0x0 pcSelect_StateTracker
compare LASTRESULT 0x7F
if 0x1 goto @NothingSelected 'User cancelled out of the PC menu
bufferPokémon 0x0 0x8002
setvar 0x8003 0x1 'Data source is in the PC Box
special 0x7d
compare LASTRESULT 0x1
if 0x1 goto @traded
special 0x9e
```

<sup>3</sup> Credits to [Sagiri](#) for the original code.

waitstate  
end

## Time of Day Based Wild Encounters

In order to use this feature, `TIME_ENABLED` must be defined. Once it is open the file `src/Tables/Wild_Encounter_Tables.c`. Find where it says `//Modify this section`. This is the data that will be modified.

### Example: Modifying the Night Data

For this example, HOOTHOOT will be added onto ROUTE 1 in place of PIDGEY.

First, the wild data needs to be created. If you open up AdvanceMap to the wild data for ROUTE 1, you should see this:

Type:

Encounter ratio:  8%

	Min/max level:	Pokémon:	No:	Chance:
Pokémon 1:	3 3	PIDGEY	16	20%
Pokémon 2:	3 3	RATTATA	19	20%
Pokémon 3:	3 3	PIDGEY	16	10%
Pokémon 4:	3 3	RATTATA	19	10%
Pokémon 5:	2 2	PIDGEY	16	10%
Pokémon 6:	2 2	RATTATA	19	10%
Pokémon 7:	3 3	PIDGEY	16	5%
Pokémon 8:	3 3	RATTATA	19	5%
Pokémon 9:	4 4	PIDGEY	16	4%
Pokémon 10:	4 4	RATTATA	19	4%
Pokémon 11:	5 5	PIDGEY	16	1%
Pokémon 12:	4 4	RATTATA	19	1%

Now that you know what the data looks like, convert it into a C structure (see image below) and paste it at the top file, directly under the line `#ifndef UNBOUND //Modify this section`, or under previously created wild data structures. No matter what, it must be placed above the line `const struct WildPokemonHeader gWildMonMorningHeaders[] =`:

```
const struct WildPokemon gRoute1_LandMonsNight[] =
{
    {3, 3, PKMN_PIDGEY},
    {3, 3, PKMN_RATTATA},
    {3, 3, PKMN_PIDGEY},
    {3, 3, PKMN_RATTATA},
    {2, 2, PKMN_PIDGEY},
    {2, 2, PKMN_RATTATA},
    {3, 3, PKMN_PIDGEY},
    {3, 3, PKMN_RATTATA},
    {4, 4, PKMN_PIDGEY},
    {4, 4, PKMN_RATTATA},
    {5, 5, PKMN_PIDGEY},
    {4, 4, PKMN_RATTATA},
};

const struct WildPokemonInfo gRoute1_LandMonsInfoNight = {21, gRoute1_LandMonsNight};
```

^ This line is very important and must be added in as well. Make sure the label correctly matches the name for your newly created wild data structure. The 21 is the encounter rate.

Now that the wild data has been copied from AdvanceMap, it's time to make modifications. Change all the "PKMN\_PIDGEY" to "PKMN\_HOOTHOOT":

```
const struct WildPokemon gRoute1_LandMonsNight[] =
{
    {3, 3, PKMN_HOOTHOOT},
    {3, 3, PKMN_RATTATA},
    {3, 3, PKMN_HOOTHOOT},
    {3, 3, PKMN_RATTATA},
    {2, 2, PKMN_HOOTHOOT},
    {2, 2, PKMN_RATTATA},
    {3, 3, PKMN_HOOTHOOT},
    {3, 3, PKMN_RATTATA},
    {4, 4, PKMN_HOOTHOOT},
    {4, 4, PKMN_RATTATA},
    {5, 5, PKMN_HOOTHOOT},
    {4, 4, PKMN_RATTATA},
};

const struct WildPokemonInfo gRoute1_LandMonsInfoNight = {21, gRoute1_LandMonsNight};
```

The data for Route 1 at night is now complete. As this is data for night time, we need to add it to our night table, *gWildMonNightHeaders*. Make sure you leave the pre-existing entry at the bottom of the table:

```
const struct WildPokemonHeader gWildMonNightHeaders[] =
{
    {
        .mapGroup = MAP_GROUP(ROUTE_1),
        .mapNum = MAP_NUM(ROUTE_1),
        .landMonsInfo = &gRoute1_LandMonsInfoNight,
        .waterMonsInfo = NULL,
        .rockSmashMonsInfo = NULL,
        .fishingMonsInfo = NULL,
    },
    {
        .mapGroup = 0xFF,
        .mapNum = 0xFF,
        .landMonsInfo = NULL,
        .waterMonsInfo = NULL,
        .rockSmashMonsInfo = NULL,
        .fishingMonsInfo = NULL,
    }
};
```

The only thing left to do now is define "MAP\_ROUTE\_1". Go back to AdvanceMap and find the map bank and map number for ROUTE 1 (the map bank is 3, and the map number is 19). At the top of the file, add a line formatted like `#define MAP_NAME ((MAP_BANK << 8) | MAP_NUM)`

```
#define MAP_ROUTE_1 ((3 << 8) | 19)
```

**Make sure the map name matches what's in the brackets for ".mapGroup" and ".mapNum" (ie. ROUTE\_1 became MAP\_ROUTE\_1).**

Now wild night data has successfully been added for Route 1. Morning and Evening data follow the same pattern. Any route that doesn't have morning or night data defined will load the standard day data set in AdvanceMap.

For water, fishing, or Rock Smash data, follow the same steps, but look [here](#) to see how to structure those kinds of wild datasets.

If you followed everything correctly, here is what the file should look like now:

```
#include "..\\defines.h"

#ifndef UNBOUND //Modify this section

#define MAP_ROUTE_1 ((3 << 8) | 19)

const struct WildPokemon gRoute1_LandMonsNight[] =
{
    {3, 3, PKMN_HOOTHOO},
    {3, 3, PKMN_RATTATA},
    {3, 3, PKMN_HOOTHOO},
    {3, 3, PKMN_RATTATA},
    {2, 2, PKMN_HOOTHOO},
    {2, 2, PKMN_RATTATA},
    {3, 3, PKMN_HOOTHOO},
    {3, 3, PKMN_RATTATA},
    {4, 4, PKMN_HOOTHOO},
    {4, 4, PKMN_RATTATA},
    {5, 5, PKMN_HOOTHOO},
    {4, 4, PKMN_RATTATA},
};

const struct WildPokemonInfo gRoute1_LandMonsInfoNight = {21, gRoute1_LandMonsNight};

const struct WildPokemonHeader gWildMonMorningHeaders[] =
{
    {
        .mapGroup = 0xFF,
        .mapNum = 0xFF,
        .landMonsInfo = NULL,
        .waterMonsInfo = NULL,
        .rockSmashMonsInfo = NULL,
        .fishingMonsInfo = NULL,
    }
};

const struct WildPokemonHeader gWildMonEveningHeaders[] =
{
    {
        .mapGroup = 0xFF,
        .mapNum = 0xFF,
        .landMonsInfo = NULL,
        .waterMonsInfo = NULL,
        .rockSmashMonsInfo = NULL,
        .fishingMonsInfo = NULL,
    }
};

const struct WildPokemonHeader gWildMonNightHeaders[] =
{
    {
        .mapGroup = MAP_GROUP(ROUTE_1),
        .mapNum = MAP_NUM(ROUTE_1),
        .landMonsInfo = &gRoute1_LandMonsInfoNight,
        .waterMonsInfo = NULL,
        .rockSmashMonsInfo = NULL,
        .fishingMonsInfo = NULL,
    },
    {
        .mapGroup = 0xFF,
        .mapNum = 0xFF,
        .landMonsInfo = NULL,
        .waterMonsInfo = NULL,
        .rockSmashMonsInfo = NULL,
        .fishingMonsInfo = NULL,
    }
};

const struct SwarmData gSwarmTable[] =
{
    {
        .mapName = 0xFF,
        .species = 0xFFFF,
    },
};
```



## Swarms

Also known as “[mass outbreaks](#)”, swarms are when a certain species of Pokémon that doesn't normally appear in the wild, makes an appearance for a single day. To get the most out of this feature, the real-time clock is utilized to run a function daily that updates the swarms. To add a swarm, in the file **src/Tables/Wild\_Encounter\_Tables.c**, search for the first occurrence of *gSwarmTable*. Each element in this table is a struct with the following members:

- **mapName**: The map name (or section) id where the swarming Pokémon will be located.
- **species**: The species to swarm in locations with the given mapName.

For example, to make *Sentret* swarm on *Route 1*, add the following to the table (the levels are loaded from *Route 1*'s wild data):

```
{  
    .mapName = MAP_NAME_ROUTE_1,  
    .species = SPECIES_SENTRET,  
}
```

The species names can be found in **include/constants/species.h**. The map names are not predefined anywhere (use AdvanceMap 1.92's world map editor as a map name reference), so before this entry is added, the following line needs to be added above the table (or in an external, included file):

```
#define MAP_NAME_ROUTE_1 0x65
```

To buffer swarm text so an NPC can tell the player what and where a Pokémon is swarming, see *special 0x58*.

## Roaming Pokemon

[Roaming Pokémon](#) have been staples in the Pokémon games since Gen 2. This engine allows you have up to 10 roaming Pokémon at once, where, if one is encountered, can be trapped, battled, and captured by the player. To set up Pokémon that roam around, use *special 0x129* (see the example script for *special 0x59*).

In order to control where Pokémon can roam, open up **src/roamer.c** and look for *sRoamerLocations*. The roaming movement is divided into several sets of maps with each set containing at most seven different maps (each row in the table is a set). The different maps are and should be defined in **include/constants/maps.h**. Every time the player changes maps, the roamer moves as well. Most likely they will move within a given set, but they may change sets entirely. It's recommended to only place closely related maps within each set. So, for example, if you had two regions, you'd want one set containing only maps from region A, and another set containing only maps from region B. As many sets as you'd like can be added to the table, however the table must be terminated with:

```
{0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF},
```

## Day & Night System

A brand new DNS has been included in the engine. It features dynamic palette fading throughout the day, as well as options to allow windows to light up at night. Both of these options can be customized by editing `include/new/dns_data.h`. Note that since this is a `.h` file, if you want your changes to compile, you will need to make a change to the file `src/DNS.c` so the compiler recompiles the DNS file. The change can be as simple as adding a whitespace character and then removing it. **Don't use the undo button to remove the change!** The change needs to be removed manually by using the backspace character so the editor saves the file with an updated timestamp.

### Changing Which Palettes Are Faded

Open up the `DNS.h` file and search for `OW_BG_PAL_0`. Here is a listing of all palettes that can be faded. `OW_BG_PAL_0` through `OW_BG_PAL_15` represent the palettes of the background in the overworld. By default, OW BG palettes 0 - 11 are set to be faded, but 12 can be faded as well by making the following change:

```
#define OW_BG_PAL_12 FALSE → #define OW_BG_PAL_12 TRUE
```

Similarly, whether any other palette is faded can be changed by changing its value from `TRUE` to `FALSE` or vice versa. It is **NOT** recommended to fade palettes 13-15 as these are the colours used for the menus and text boxes.

Other than the OW backgrounds, the `OW_SPRITE_PAL` represent the sprites in the overworld, the `BBG_PAL` defines represent the background in battle, and the `B_SPRITE_PAL` defines represent the sprites in battle.

### Changing the Colours Faded Throughout the Day

In the same file is a table representing the actual fading colours (*gDNSNightFadingByTime*). Currently the table only has entries from 12 AM - 7:59 AM and 5 PM - 11:59 PM. The rest of the day no fading changes can be seen. If you would like to add fading for more time during the day, simply look for the line *Day has no fade* and start adding new entries there. For example, adding an entry for 8 AM - 8:59 AM:

```
[8] = {
    {RGB(0, 24, 16), 1}, //8:00 AM
    {RGB(0, 24, 16), 1}, //8:10 AM
    {RGB(0, 24, 16), 1}, //8:20 AM
    {RGB(0, 24, 16), 1}, //8:30 AM
    {RGB(0, 24, 16), 1}, //8:40 AM
    {RGB(0, 24, 16), 1}, //8:50 AM
},
```

The colour can change every ten minutes, so each of those colour indices represent a colour at that ten minute period.

## Light Up Windows

There are currently two ways to handle light up windows. The first is more tedious. It involves leaving **OW\_BG\_PAL\_12** as **FALSE** (see *Changing Which Palettes Are Faded*) and make all tiles you'd like to light up use that palette. Then, use an on-entry script in AdvanceMap to do setmaptiles and place your light up windows only when the time is night. This can be an extreme annoyance and a time consumer, which is why the second, new method was developed.


This new method uses a table to fade certain palette colours if it nighttime.

1. To start off, find the offset of the tileset containing the palette you wish to fade. For this example, I'll be fading the windows of the player's door in *Palette Town*. Looking in AdvanceMap, the player's door uses tiles from *Tileset 1*, which has an offset of 0x82D4AAC.

Map footer:  
18 00 00 00 14 00 00 00 F8 D0 2D 08 00 D1 2D 08  
94 4A 2D 08 AC 4A 2D 08 02 02 00 00

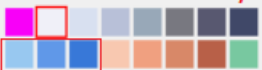
Width:	<input type="text" value="24"/>	Height:	<input type="text" value="20"/>
Border offset:	<input type="text" value="\$002DD0F8"/>	Map offset:	<input type="text" value="\$002DD100"/>
No of tileset part 1:	<input type="text" value="0"/>	No of tileset part 2:	<input type="text" value="1"/>
Offset of tileset part 1:	<input type="text" value="\$002D4A94"/>	Offset of tileset part 2:	<input type="text" value="\$002D4AAC"/>
Border width:	<input type="text" value="2"/>	Border height:	<input type="text" value="2"/>

2. Now open the tile viewer and determine which colours are the ones you wish to fade. For my example, I've determined that the player's door uses palette 8, and the colours used are in indices 8, 9, and 10:

Down/Up 

Palette form ✕

Palette:



8 9 10

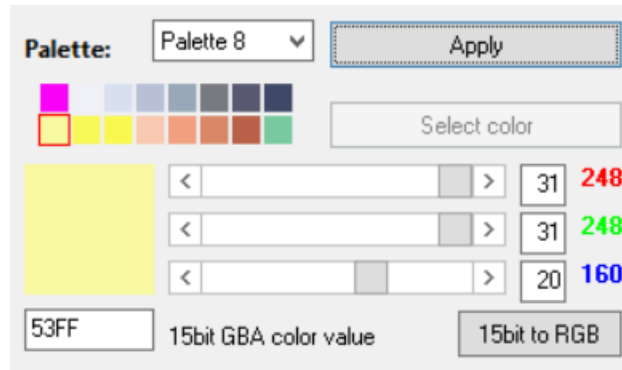
<  >

<  >

<  >

15bit GBA color value

- Now determine the colours you wish to change them to. It's okay to play around with these colours in AdvanceMap. Hitting *Apply* won't save anything permanently unless you exit out of the block editor and choose to save. For my example, I could go to change the window to a yellowy colour:



These colours can be represented by the RGB values of (31, 31, 20), (31, 31, 11), and (31, 31, 10).

- Putting it all together now:

```
{ //Palette Town - Player's Door
  .tilesetPointer = 0x82D4AAC, //Tileset 1
  .paletteNumToFade = 8,
  .paletteIndicesToFade =
  {
    {8, RGB(31, 31, 20)},
    {9, RGB(31, 31, 11)},
    {10, RGB(31, 31, 10)},
    TILESET_PAL_FADE_END
  },
},
```

In the image *.tilesetPointer* is set to the offset of the tileset found in step 1, *.paletteNumToFade* is set to 8 representing the 8<sup>th</sup> palette. *.paletteIndicesToFade* has entries for index 8, 9, and 10, each with the corresponding colour they should be faded. After all that, is the line **TILESET\_PAL\_FADE\_END**. **DO NOT FORGET THIS LINE!**

Some more examples have been left in the file to help guide you further if you need it.



## Pre-Battle Mugshots

The battle transition from the Elite Four has been modified for Fire Red. [Originally created by Jambo51](#), the updated feature allows toggling of different transition styles with vars, as well as use custom images in place of the trainer's front pic. To include this feature, **FR\_PRE\_BATTLE\_MUGSHOT\_STYLE** must be defined in **src/config.h**. Then, you must define var values for **VAR\_PRE\_BATTLE\_MUGSHOT\_STYLE** and **VAR\_PRE\_BATTLE\_MUGSHOT\_SPRITE**. The following table details the types of configurations you can use with these vars.

<b>VAR_PRE_BATTLE_MUGSHOT_STYLE</b>	
0	One Big Bar. Full Trainer Sprites
1	One Small Bar. Half Trainer Sprites
2	Two Small Bars. Half Trainer Sprites

<b>VAR_PRE_BATTLE_MUGSHOT_SPRITE</b>	
0	Player's Front Picture
1	"VS" Symbol instead of Player

To load a custom image instead of the opponent's trainer front sprite, set the flag **FLAG\_LOAD\_MUGSHOT\_SPRITE\_FROM\_TABLE**. The table *sPreBattleMugshotSprites* in **src/Tables/Mugshot\_Tables.c** allows you to set the custom image to load for that given trainer's front pic index. Two examples exist to show you how to add one in for a different trainer picture.

As per Jambo's original routine, the unused 3<sup>rd</sup> argument in the trainerbattle script command lets you turn on the pre-battle mugshot. Changing the value to *0x0Y00* lets you select different palettes for each transition tilemap (for a total of 15 different palettes). The palettes associated with each can be modified by changing the palettes of the images found in the directories **graphics/Battle\_Mugshots/Big** and **graphics/Battle\_Mugshots/DP**.

Finally, if you are using the Two Bar mugshot style, the 3<sup>rd</sup> trainerbattle argument only changes the palette of the opponent's tilemap. The value of **VAR\_MUGSHOT\_PLAYER\_PAL** can be changed to load a different palette for the player's side as well.

### Example Script:

```
#define VAR_PRE_BATTLE_MUGSHOT_STYLE 0x5038
#define VAR_PRE_BATTLE_MUGSHOT_SPRITE 0x5039
```

```
#org @RivalBattle
msgbox @BattleMe 0x6
setvar VAR_PRE_BATTLE_MUGSHOT_STYLE 0x2
setvar VAR_PRE_BATTLE_MUGSHOT_SPRITE 0x0
trainerbattle 0x3 0x146 0x100 @LossMessage
end
```



# Other Features Included

## Save Expansion<sup>4</sup>

The default save space has been expanded tremendously to allow for:

- 4096 new Flags (0x900 - 0x18FF)
- 200 new Vars (0x5000 - 0x51FF)
- 10 new PC Boxes (for a total of 24)
- Up to 10 Roaming Pokémon
- Up to 778 unique items in the bag
- 4 New Step Counters

## Updated & New Item Effects

Several new items effects have been added such as effects for the [Power Items](#) and the [Shiny Charm](#), a complete set of battle effects, as well as some other items like the [Black Flute](#) and [White Flute](#) (which have been updated to the standards from ORAS).

## Trainer Face Fix

The player will face trainers before battle.

## DexNav<sup>5</sup>

A simplified [DexNav](#) system for Fire Red is included in the engine. It replaces the *POKEDEX* option in the Start Menu with *TOOLS*, which can either load a multichoice menu containing the *Pokédex* and *DexNav*, or an entirely new start menu. Selecting the *DexNav* opens the graphical user interface (GUI) to allow the player to view what Pokémon they have caught/seen on the current map, and either press the *R-Button* or *A-Button* on a given Pokémon to search for it on the map. *R* will save the Pokémon information to `DEXNAV_VAR` and allow the player to search for that Pokémon via *R* from the overworld.

## Dynamic Overworld Palettes<sup>6</sup>

Overworld sprites are now loaded in dynamically, allowing for more freedom with creating new overworld sprite palettes.

## Ability Pop-Ups<sup>7</sup>

Whenever a Pokémon's ability activates in battle, a pop-up will appear showing the ability akin the Gen 5+ games.

---

<sup>4</sup> Credits to [FBI](#) for this feature.

<sup>5</sup> Credits to [FBI](#) and the [Community Hack](#) for this feature.

<sup>6</sup> Credits to [Navenatox](#) for this feature.

<sup>7</sup> Credits to [DizzyEgg](#) for this feature.

## Hidden Abilities<sup>8</sup>

[Hidden abilities](#) have been implemented using one of the empty bytes in the Pokémon data.

## Expanded Text Names

The following text names can be expanded by replacing the first four characters in the name with a pointer to a longer text string:

- Trainer Class Names
- Item Names

Additionally, ability names have had their name length changed from 12 to 16.

## Pokédex Screen Stats<sup>9</sup>

The boring old size comparison when viewing a Pokémon's pokedex data has been replaced with a routine by that displays the Pokémon's stats and abilities instead.

## Turbo Boost

A pipelined routine has been written to replace the old main loop with one that now allows the game to run at over 1000% speed using the fast-forward button.

## Various Customizable Updates

The file **bytereplacement** contains a list of optional byte changes:

- Don't count eggs while healing at the Pokémon Centre.
- Extend number of direct sound tracks to 12.
- Eggs hatch at level 1 (there is also a config that goes along with this)
- EV cap lowered to 252.
- Fix for movement type 0xC (Hidden).
- Remove *National Dex* evolution limiters.
- Remove plot related trade restrictions.
- Fix for *Pokédex* species name issue.
- Display foreign Pokémon's id without *National Dex*.
- PC boxes use more wallpapers.
- Max money increased to 9999999.

To remove any of these changes, simply add a # symbol at the beginning of the line or delete the byte change lines entirely.

## Triple Layer Tiles<sup>10</sup>

Taken from [this source](#), blocks can now have three layers on top of each other. See the original post for details on using this feature.

---

<sup>8</sup> Credits to [azurile13](#) for this feature.

<sup>9</sup> Credits to [DoesntKnowHowToPlay](#) and [Squeetz](#) for this feature.

<sup>10</sup> Credits to [Diegoisawesome](#) for this feature

## Script Specials

Several new scripting specials have been added to the engine. Many have been ported from JPAN's hacked engine, and thus will work similar to how they worked there.

If a special is shown to have a var (such as *Var 0x8000*) as an input, set that var to the required data. If **SELECT\_FROM\_PC** is defined, remember to keep track of the Pokémon source from *Var 0x8003* before calling specials that manipulate Pokémon attributes.

If a special is shown to have a return value, it must be called with the **special2** scripting command.

## Pokémon Specials

The following specials check or change Pokémon attributes. If **SELECT\_FROM\_PC** is defined, *Var 0x8003* will allow you to check/change data from PC boxed Pokémon if it is set to 1. Otherwise it will check/change from a party Pokémon.

### Special 0x7 – EV/Contest Stat Checker

**Details:** Checks a party/boxed Pokémon's EVs or Contest stats.

**Input:**

*Var 0x8003:* From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

*Var 0x8005:* Stat to check:

HP EV	0x0
Attack EV	0x1
Defense EV	0x2
Speed EV	0x3
Special Attack EV	0x4
Special Defense EV	0x5
Coolness	0x6
Beauty	0x7
Cuteness	0x8
Smartness	0x9
Toughness	0xA
Luster	0xB

**Returns:** Stat value to given var.

**Example Script:**

```
setvar 0x8003 0x0 'Select from party
setvar 0x8004 0x3 '4th Pokémon in party
setvar 0x8005 0x1
special2 LAST_RESULT 0x7
buffernumber 0x0 LAST_RESULT 'Buffer Attack EV stat into [buffer1]
```



### Special 0x8 – Pokémon IV Checker

**Details:** Checks a party/boxed Pokémon's IVs

**Input:**

*Var 0x8003:* From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

*Var 0x8005:* IV stat to check:

HP IV	0x0
Attack IV	0x1
Defense IV	0x2
Speed IV	0x3
Special Attack IV	0x4
Special Defense IV	0x5

**Returns:** IV stat value to given var.

**Example Script (with PC Selection Hack):**

```
writebytetoffset 0x1 0x0203b7ac 'Or whatever pcSelect_StateTracker is set to
special 0x3C 'Select boxed mon, box stored to var8000, slot to var8001
waitstate
compare LAST_RESULT 0x7F 'Player exited without selecting
if 0x1 goto @DidNotSelect
setvar 0x8003 0x1 'From boxed mon
setvar 0x8005 0x1 'Check attack IV
special2 LAST_RESULT 0x8
buffernumber 0x0 LAST_RESULT 'Buffer attack IV to [buffer1]
```

### Special 0x9 – Pokémon Ribbon Checker

**Details:** Checks a Pokémon's ribbons. The first 5 ribbons have values from 1 - 4 for Normal, Super, Hyper, and Master rank, so be sure to reference the correct bit value(s). See [this page](#) for more info. These values cannot be checked from the PC as they are removed to compress box Pokémon size.

**Input:**

*Var 0x8004:* Holds the party slot number.

*Var 0x8005:* Ribbon bit to check. Here are the possible bits and known ribbon values.

Ribbon	Bit(s)/Rank	Var 0x8005 Val
Cool Ribbons	Normal (1) = bit 1 (0001)	0
	Super (2) = bit 2 (0010)	1
	Hyper (3) = bits 1,2 (0011)	0 & 1
	Master (4) = bit 3 (0100)	2
Beauty Ribbons	Normal (1) = bit 4	3
	Super (2) = bit 5	4
	Hyper (3) = bit 4,5	3 & 4
	Master (4) = bit 6	5
Cute Ribbons	Normal (1) = bit 7	6
	Super (2) = bit 8	7
	Hyper (3) = bit 7,8	6 & 7
	Master (4) = bit 9	8

Smart Ribbons	Normal (1) = bit 10 Super (2) = bit 11 Hyper (3) = bit 10,11 Master (4) = bit 12	9 10 9 & 10 11
Tough Ribbons	Normal (1) = bit 13 Super (2) = bit 14 Hyper (3) = bit 13,14 Master (4) = bit 15	12 13 12 & 13 14
Champion	Bit 16	15
Winning	Bit 17	16
Victory	Bit 18	17
Artist	Bit 19	18
Effort	Bit 20	19
Special 1	Bit 21	20
Special 2	Bit 22	21
Special 3	Bit 23	22
Special 4	Bit 24	23
Special 5	Bit 25	24
Special 6	Bit 26	25
Special 7	Bit 27	26
Fateful Encounter	Bits 28-30	27 - 30
Obedience (Mew/Deoxys)	Bit 31	31

**NOTE:** the “hyper” status is a bit more challenging to check for, as the input is a bit number and these ribbon statuses require checking two bits. If this is something you are interested in implementing, you would need to remove the Normal bit upon receiving Super status, and then check for both bits with two separate special calls to determine the Hyper status.

**Returns:** 1 if the ribbon flag is set, 0 if not.

**Example Script:**

```
setvar 0x8004 0x2 '3rd mon in party
setvar 0x8005 15 'Check Champion ribbon
special2 LAST_RESULT 0x9
buffernumber 0x0 LAST_RESULT
compare LAST_RESULT 0x1
if 0x1 goto @IsAChampion
'Else, Pokémon was not in the hall of fame
```

### Special 0xA – Pokérus Timer Checker

**Details:** Checks the [Pokérus](#) virus timer on a Pokémon.

**Input:**

*Var 0x8003:* From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Pokérus time left to given var.

**Example Script:**

```
setvar 0x8003 0x0 'From party
```

```
setvar 0x8004 0x0 'First party Pokémon
special2 LAST_RESULT 0xA
buffernumber 0x0 LAST_RESULT 'Pokérus timer into [buffer1]
bufferpartypokemon 0x1 0x0 'Buffer first poke name into [buffer2]
msgbox @timeLeft 0x6
```

#org @timeLeft

= [buffer2] is sick for [buffer1] more cycles!

### Special 0xB – Poké Ball Checker

**Details:** Check the Poké Ball type of a Pokémon. The ball Ids can be found in **include/new/catching.h**.

**Input:**

*Var 0x8003:* From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Poké Ball type to given var.

**Example Script:**

```
writebytetoffset 0x1 0x0203B7AC 'Select from PC hack
Special 0x3C 'Store box/slot into vars 0x8000, 0x8001, respectively
waitstate
Compare LAST_RESULT 0x7F
If 0x1 goto @didNotSelect 'Player cancelled without selection
setvar 0x8003 0x1 'From box
special2 LAST_RESULT 0xB
buffernumber 0x1 LAST_RESULT 'Buffer item number to [buffer2]
special 0x7C 'Buffer boxed mon nickname to [buffer1]
msgbox @ball 0x6
```

#org @ball

= [buffer1] is inside a [buffer2]! How fortunate!

### Special 0xC – Check Capture Location

**Details:**

**Input:**

*Var 0x8003:* From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Capture Location Id to given var.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x5 'Last party mon
special2 LAST_RESULT 0xC
buffernumber 0x0 LAST_RESULT 'Buffer capture location to [buffer1]
```

### Special 0xD – Happiness Checker

**Details:** Check the number of happiness points for a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Happiness value (0-255) to given var.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x2 '3rd Pokémon
special2 LAST_RESULT 0xD
buffernumber 0x0 LAST_RESULT 'Buffer happiness to [buffer1]
compare LAST_RESULT 255
if 0x1 goto @maxedHappiness
```

Special 0xE – Hold Item Checker

**Details:** Check hold item value of a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Hold Item Id to given var.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x3 '4th Pokémon
special2 LAST_RESULT 0xE
buffernumber 0x0 LAST_RESULT 'Buffer to [buffer1]
```

Special 0xF – Add/Subtract to EVs

**Details:** Add or subtract values to Pokémon EVs (between 0 and 252).

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

*Var 0x8005*: Stat for math (see Special 0x7 for indices).

*Var 0x8006*: Value to add. 0x01YY to subtract YY, 0x00ZZ to add ZZ.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x1 '2nd party Pokémon
setvar 0x8005 0x3 'Speed EV
setvar 0x8006 0x0150 'Subtracting 0x50, or 80 speed EVs
special 0xF
```

Special 0x10 – Set IVs

**Details:** Set IV values for a Pokémon. No math here, just setting to a specific value.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

*Var 0x8005*: IV stat to change (see Special 0x8 for indices), between 0 and 31 (0x1F).

*Var 0x8006*: IV value to set.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x0 'First Pokémon
setvar 0x8005 0x0 'HP IV
setvar 0x8006 31 'Value to set
special 0x10 'Maximize first party Pokémon's HP IV
```

### Special 0x11 – Set Ribbons

**Details:** Set or clear a Pokémon's ribbon flag.

**Input:**

*Var 0x8004*: Holds the party slot number.

*Var 0x8005*: Ribbon flag to set (see Special 0x9 for indices/values).

0x00XX will set a ribbon, 0x01YY will clear a ribbon.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0x2 '3rd Pokémon
setvar 0x8005 15 'Set Champion ribbon
special 0x11 'Set the ribbon
```

### Special 0x12 – Set Pokérus

**Details:** Set a Pokérus timer of a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

*Var 0x8005*: Number of cycles, 0x0 to 0xF, 0x10 to “cure”.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8003 0x0 'From party.
setvar 0x8004 0x0 'First mon.
setvar 0x8005 0x10 'Cure Pokémon's Pokérus.
special 0x12
```

### Special 0x13 – Change Happiness

**Details:** Add or subtract to a Pokémon's happiness.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.  
*Var 0x8005*: Amount to add/subtract.  
*0x01YY* will subtract YY from happiness; *0x00XX* will add XX to happiness.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x1 '2nd party Pokémon
setvar 0x8005 0x0150 'Subtracting 0x50, or 80 friendship points
special 0x13
```

### Special 0x14 – Change Pokeball

**Details:** Set the ball type of a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).  
From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.  
From Party: *Var 0x8004* holds the party slot number.  
*Var 0x8005*: Ball ID to set.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x0 'First Pokémon
setvar 0x8005 0x1 'Set to Master Ball
special 0x14
```

### Special 0x15 – Change Hold Item

**Details:** Set the hold item of a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).  
From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.  
From Party: *Var 0x8004* holds the party slot number.  
*Var 0x8005*: Item Id to set.

**Note** that if the Pokémon is already holding an item, this will not change the item, unless *Var 0x8005* is set to 0 to remove the item. Then you can call it again to set a new hold item.

**Returns:** 0 to LAST\_RESULT if successful item change, 1 if not.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x5 'Last mon
setvar 0x8005 0x0 'Remove a hold item first
special 0x15
setvar 0x8005 ITEM_SILKSCARF 'Item to give
special 0x15 'Give silk scarf
compare LAST_RESULT 1
if 0x1 goto @Failed
```

**Special 0x16 – Change Species**

**Details:** Change the species of a Pokémon.

**Input:**

*Var 0x8003:* From party (0), or box (1).  
From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.  
From Party: *Var 0x8004* holds the party slot number.  
*Var 0x8005:* Species to change to.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x0 'First Pokémon
setvar 0x8005 PKMN_CHARMANDER 'Set to Charmander
special 0x16
```

**Special 0x17 – Change Attacks**

**Details:** Set or remove a move for a Pokémon. This one does not work with the PC Selection Hack.

**Input:**

*Var 0x8004:* Pokémon Slot (0-5)  
*Var 0x8005:* Move Slot (0-3 for moves 1-4, respectively)  
*Var 0x8006:* Move Id (0 to clear move slot)

**Returns:** Nothing.

**Example Script:**

```
Special 0x9F 'Select a Pokémon from the menu, store slot to Var 0x8004
waitstate
compare LAST_RESULT 0x6
if 0x4 goto @Cancelled
setvar 0x8005 0 'First move
setvar 0x8006 MOVE_HYPERBEAM 'Teach Hyper Beam in slot 0
special 0x17
```

### Special 0x18 – Check Species

**Details:** Check the species of a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Species Id to given var.

**Example Script:**

```
setvar 0x8003 0x0 'From party
setvar 0x8004 0x0 'Check first Pokémon
special2 LAST_RESULT 0x18
compare LAST_RESULT PKMN_RATTATA 'Check if first Pokémon if Rattata
if 0x0 goto @NotCorrect
```

### Special 0x19 – Check Attack PP

**Details:** Check a Pokémon move's PP.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

*Var 0x8005*: Move slot (0-3).

**Returns:** PP left to given var.

**Example Script:**

```
setvar 0x8003 0x0 'From Party
setvar 0x8004 0x0 'First Pokémon
setvar 0x8005 0x0 'First move
special2 LAST_RESULT 0x19
buffernumber 0x0 LAST_RESULT
compare LAST_RESULT 0x0
if 0x1 goto @NoPPLeft
```



## Party Specials

### Special 0x62 – Erase Pokémon

**Details:** Erase a Pokémon from your party, or the entire party.

**Input:**

*Var 0x8004:* Slot to erase (0xF for entire party).

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0xF 'Erase entire party  
Special 0x62
```

### Special 0x63 – Status Checker

**Details:** Check the primary status of a Pokémon.

**Input:**

*Var 0x8004:* Pokémon Slot

**Returns:** Status inflicted to given var.

Status	Bits	Hex Value
Sleep	1	0x1
	2	0x2
	3	0x4
Poison	4	0x8
Burn	5	0x10
Frozen	6	0x20
Paralyzed	7	0x40
Badly Poisoned	8	0x80

**Example Script:**

```
setvar 0x8004 0x0 'First party Pokémon  
special2 0x8004 0x63 'Get statuses to var 0x8004  
setvar 0x8005 0x80 'Badly poisoned  
special2 LAST_RESULT 0x42 'Var 0x8004 & Var 0x8005  
compare LAST_RESULT 0x1 '& will return 1 if the Pokémon has this status  
If 0x1 goto @BadlyPoisoned
```

### Special 0x64 – Status Inducer

**Details:** Inflict a primary status on a party Pokémon.

**Input:**

*Var 0x8004:* Pokémon slot, or *0xF* for entire party.

*Var 0x8005:* Status(es) to induce (see Special 0x63 for values).

*Var 0x8006:* *1* if status should only be given to Pokémon that can be afflicted with it (ie. No paralysis on Electric-types), *0* otherwise.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0xF 'First party Pokémon
setvar 0x8005 0x20 'Freeze entire party
setvar 0x8006 0x1 'Don't freeze Ice-types of Pokémon with Magma Armor
special 0x64
```

### Special 0x65 – Check Pokémon HP

**Details:** Check the amount of HP remaining for a party Pokémon.

**Input:**

*Var 0x8004:* Pokémon slot.

**Returns:** HP to given var.

**Example Script:**

```
setvar 0x8004 0x0 'First Pokémon
special2 LAST_RESULT 0x65
compare LAST_RESULT 0x0
if 0x1 goto @DeadPoke
```

### Special 0x66 – Inflict Party Damage or Heal

**Details:** Inflict damage on/heal a Pokémon, or entire party.

**Input:**

*Var 0x8004:* Pokémon slot, *0xF* for entire party.

*Var 0x8005:* Damage to inflict/heal.

*Var 0x8006:* *1* to heal, otherwise inflict damage.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0xF 'Entire party
setvar 0x8005 20 '20 damage to party
setvar 0x8006 0x0 'Damage party
Special 0x66
```

### Special 0x67 – Generate Random Battle Tower Team

**Details:** Generates a random Battle Tower ready team using *BATTLE\_TOWER\_POKE\_LEVEL*. Teams are generated based on Pokémon found in *src/Tables/Frontier\_Spreads.h*

**Input:** Technically *BATTLE\_TOWER\_POKE\_LEVEL*.

**Returns:** Nothing.

**Example Script:** special 0x67

## Key Specials

### Special 0x2B – Check AB Buttons

**Details:** Check if *A* or *B* has been pressed

**Input:** Nothing.

**Returns:** To the given var:

0x0: Neither pressed.

0x1: *A* was pressed.

0x2: *B* was pressed.

0x3: Both *A* & *B* were pressed.

**Example Script:**

```
#org @Loop
special2 LAST_RESULT 0x2B
compare LAST_RESULT 0x1 'Check for A
if 0x0 goto @Loop 'Player cannot continue onwards until they press A
Continue
```

### Special 0x2C – Check D-Pad

**Details:** Check *D-Pad* presses.

**Input:** Nothing.

**Returns:** To given var:

0x0: No direction is pressed.

0x1: *Up* is pressed.

0x2: *Left* is pressed.

0x3: *Down* is pressed.

0x4: *Right* is pressed.

0x5: *Up-left* is pressed.

0x6: *Up-right* is pressed.

0x7: *Down-left* is pressed.

0x8: *Down-right* is pressed.

**Example Script: Wait Until Player Presses Down Button**

```
#org @start
goto @loop

#org @loop
special2 LAST_RESULT 0x2C
compare LAST_RESULT 0x3 'Down pressed
if 0x1 goto @continue 'exit infinite loop if player pressed down
goto @loop
```

### Special 0x2D – Check Start/Select

**Details:** Check if *Start/Select* are pressed

**Input:** Nothing

**Returns:** To given var:

0x0: Nothing pressed.

0x1: *Select* pressed.  
0x2: *Start* pressed.  
0x3: Both *Start* & *Select* pressed.

**Example Script:**

```
special2 LAST_RESULT 0x2D  
compare LAST_RESULT 0x2 'Start pressed  
If 0x1 goto @PressedStart
```

Special 0x2E – Check L/R

**Details:** Check if *L/R* are pressed.

**Input:** Nothing.

**Returns:** To given var:

0x0: Nothing pressed.  
0x1: *R* pressed.  
0x2: *L* pressed.  
0x3: *L* & *R* pressed.

**Example Script:**

```
special2 LAST_RESULT 0x2E  
compare LAST_RESULT 0x1 'R pressed  
if 0x1 goto @PressedR
```

Special 0x2F – Dump Keys

**Details:** Dump any and all keys that have been pressed.

**Input:** Nothing.

**Returns:** Key presses to Var 0x800D (LASTRESULT):

Key	Bit	Hex
A	1 = 0001	0x1
B	2 = 0010	0x2
Select	3 = 0100	0x4
Start	4 = 1000	0x8
Right	5 = 0001 0000	0x10
Left	6 = 0010 0000	0x20
Up	7 = 0100 0000	0x40
Down	8 = 1000 0000	0x80
R	9 = 0001 0000 0000	0x100
L	10 = 0010 0000 0000	0x200

**Example Script:** Wait until player presses A

```
#org @loop  
special 0x2F  
Compare LAST_RESULT 0x1 'A pressed  
If 0x1 goto @pressedA  
goto @loop
```

### Special 0xC9 – Force Key Input

**Details:** Force a key input from the user.

**Input:**

*Var 0x8004:* Key(s) to force (bitfield) (see *Special 0x2F* for bits).

*Var 0x8005:* Number of times to press it. For held buttons, a good rule of thumb is 0x10 times the number of times you want to move (see Script Example)

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0x10 'Right
setvar 0x8005 0x30 'Step Right 3 Times
special 0xC9 'Force player to move right 3 steps
```

### Special 0xCA – Prevent Key Press

**Details:** Prevent player from being able to press button(s).

**Input:**

*Var 0x8004:* Key(s) to prevent (bitfield). 0 to allow all keys.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0x104 'Prevent R and Select from doing anything
special 0xCA
```

### Special 0xCB – Assign Key Script

**Details:** assign a specific script to a key

**Input:**

*Var 0x8004:* Key to assign script to (0 to remove).

*Loadpointer 0x0:* Script pointer.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0x100 'Assign to R
loadpointer 0x0 @DoSomething
special 0xCB 'Now, when in the overworld, pressing R will launch @DoSomething
```

## Variable Math Specials

### Special 0x3E – Add Variables

**Details:** Add the values of two variables together.

**Input:**

*Var 0x8004:* Variable holding the first value.

*Var 0x8005:* Variable holding the second value.

**Returns:**

*Variable Inside Var 0x8004:* Sum of two values.

*Given Var:* 1 if sum overflows 0xFFFF, 0 otherwise.

**Example Script:**

```
setvar 0x4050 50
setvar 0x4051 25
setvar 0x8004 0x4050
setvar 0x8005 0x4051
special2 LAST_RESULT 0x3E 'Addition result to first variable, 0x4050
buffernumber 0x0 0x4050 'Addition result in [buffer1]
compare LAST_RESULT 0x1
if 0x1 goto @overflow
```

### Special 0x3F – Subtract Variables

**Details:** Subtract the values inside two variables.

**Input:**

*Var 0x8004:* Variable holding first value.

*Var 0x8005:* Variable holding second value.

**Returns:**

*First Variable:* Difference of values.

*Given Var:* 1 if difference underflows 0x0, 0 otherwise.

**Example Script:**

```
setvar 0x8004 0x4059
setvar 0x8005 0x4050
special2 LAST_RESULT 0x3F '[var 0x4059] = [var 0x4059] – [var 0x4050]
Compare LAST_RESULT 0x1
If 0x1 goto @overflowed '[var 0x4059] > [var 0x4050]
```

### Special 0x40 – Multiply Variables

**Details:** Multiply the values of two variables together.

**Input:**

*Var 0x8004:* Variable holding first value.

*Var 0x8005:* Variable holding second value.

**Returns:**

*First Variable:*  $[Var\ 0x8004] \times [Var\ 0x8005]$ .

*Given Var:* 1 if product overflows 0xFFFF, 0 otherwise.

**Example Script:**

```
setvar 0x8006 400
setvar 0x8007 200
setvar 0x8004 0x8006
```

setvar 0x8005 0x8007

special2 LAST\_RESULT 0x40 '400\*200 = 80000 = 0x13880 = (0xFFFF) + 0x3881

buffernumber 0x0 0x8006 'Value will be 0xFFFF, LAST\_RESULT will be equal to 1

### Special 0x41 – Divide Variables

**Details:** Divide the values in two variables.

**Input:**

*Var 0x8004:* Numerator.

*Var 0x8005:* Denominator.

**Returns:**

*Var 0x8004:* Integer result of Var8004 / Var8005

*Given Var:* Remainder (modulus) of the division.

**Example Script:**

```
setvar 0x8004 50
setvar 0x8005 6
special2 0x8006 0x41 'Var8004 = 50 / 6 = 8
buffernumber 0x0 0x8006 'Remainder = 2
```

### Special 0x42 – AND Variables

**Details:** [Bitwise AND](#) two variables.

**Input:**

*Var 0x8004:* First value.

*Var 0x8005:* Second value.

**Returns:** AND result of two variables to given var.

**Example Script:**

```
setvar 0x8004 0xCB '1100 1011
setvar 0x8005 0xAA '1010 1010
special2 0x8004 0x42 '[1100 1011] & [1010 1010] = 1000 1010 = 0x8A
```

### Special 0x43 – OR Variables

**Details:** [Bitwise OR](#) two variables

**Input:**

*Var 0x8004:* First value.

*Var 0x8005:* Second value.

**Returns:** OR result of two variables to given variable

**Example Script:**

```
setvar 0x8004 0x4 '0000 0100
setvar 0x8005 0x10 '0001 0000
special2 0x8004 0x43 'Var8004 = [0000 0100] | [0001 0000] = 0001 0100 = 0x14
```

### Special 0x44 – XOR Variables

**Details:** [Bitwise XOR](#) two variables.

**Input:**

*Var 0x8004:* First value.

*Var 0x8005:* Second value.

**Returns:** XOR result of two variables to given variable

**Example Script:**

```
setvar 0x8004 0x12 '0001 0010
setvar 0x8005 0x18 '0001 1000
special2 0x8007 0x44 'Var8007 = [0001 0010] ^ [0001 1000] = 0000 1010 = 0xA
```



## Battle Specials

### Special 0x51 – Can Team Participate in a Sky Battle

**Details:** Checks if the player has at least one Pokémon on their team that can participate in a [Sky Battle](#). The Pokémon species banned from participating can be found under [gSkyBattleBannedSpeciesList](#) in `src/Tables/Pokémon_Tables.c`.

**Input:** None.

**Returns:** To given var **0** if team can't participate, **1** if it can.

**Example Script:**

```
special2 0x51
compare LASTRESULT 0x0
if == goto @CantParticipate
setflag SKY_BATTLE_FLAG 'Defined in config.h
trainerbattle 0x3 0x20 0x0 @lose
```

### Special 0x52 – Generate Frontier Trainer Id

**Details:** Generates a random battle facility id in [gTowerTrainers](#) or [gSpecialTowerTrainers](#) found in `src/Tables/Frontier_Trainers.c` and a name for the trainer.

**Input:**

```
Var 0x8000: 0 = Load data for trainer Opponent 1.
              1 = Load data for trainer Opponent 2.
              2 = Load data for partner Trainer.
Var 0x8001: 0 = Load from gTowerTrainers.
              1 = Load from gSpecialTowerTrainers.
```

**Returns:** To given var the OW sprite Id of the chosen trainer.

**Example Script:** See below.

### Special 0x53 – Load Frontier Intro Battle Message

**Details:** Loads the battle intro message of the requested trainer.

**Input:**

```
Var 0x8000: 0 = Load data for trainer Opponent 1.
              1 = Load data for trainer Opponent 2.
Var 0x8001: 0 = Load from gTowerTrainers.
              1 = Load from gSpecialTowerTrainers.
```

**Returns:** Nothing

**Example Script:** For battle against a normal single opponent:

```
#define VAR_RUNTIME_CHANGEABLE 0x4080

setvar 0x8000 OPPONENT_1 '0
setvar 0x8001 REGULAR_TRAINER '0
special2 VAR_RUNTIME_CHANGEABLE SPECIAL_GENERATE_TOWER_TRAINER '0x52
reappear FOE_NPC_ID 'The Person Id of the dynamic overworld person event
setvar 0x8000 OPPONENT_1 '0
setvar 0x8001 REGULAR_TRAINER '0
special BUFFER_TOWER_TRAINER_INTRO_MSG '0x53
callstd MSG_NORMAL 'Displays the buffered intro text
```

### Special 0x54 – Get Frontier Streak

**Details:** Gets the streak for the requested Frontier format.

**Input:**

*Var 0x8000:* 0 = Current Streak.  
1 = Max Streak.

*Var 0x8001:* 0xFFFF = Load style from var BATTLE\_TOWER\_BATTLE\_TYPE.  
0 = Single battle.  
1 = Double battle.  
2 = Multi battle.  
3 = Link multi battle.

*Var 0x8002:* 0xFFFF = Load tier from var BATTLE\_TOWER\_TIER.  
0 = Battle Tower standard.  
1 = Free for all.  
2 = Smogon OU.  
3 = Smogon Uber.  
4 = Smogon Little Cup.  
5 = Skeli's Middle Cup.

*Var 0x8003:* 0 = Not *Inverse Battle*.  
1 = *Inverse Battle*.  
2 = Load from INVERSE\_FLAG.

*Var 0x8004:* 0 = Load level from BATTLE\_TOWER\_POKE\_LEVEL.  
1-25 = Level bracket 1.  
26-50 = Level bracket 2.  
51-75 = Level bracket 3.  
76-100 = Level bracket 4.

**Returns:** The requested streak to the given var.

**Example Script:**

```
setvar 0x8000 CURRENT_STREAK '0
setvar 0x8001 LOAD_STYLE_FROM_VAR '0xFFFF
setvar 0x8002 LOAD_TIER_FROM_VAR '0xFFFF
setvar 0x8003 LOAD_INVERSE_FROM_FLAG '2
setvar 0x8004 LOAD_LEVEL_FROM_VAR '0
special2 LASTRESULT SPECIAL_GET_TOWER_STREAK '0x54
```

### Special 0x55 – Update Current Frontier Streak

**Details:** Updates the streak for the current Frontier format.

**Input:**

*Var 0x8000:* 0 = Increment streak by 1.  
1 = Reset streak.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8000 INCREMENT_STREAK_BY_1 '0
special SPECIAL_UPDATE_TOWER_STREAK '0x55
```

### Special 0x56 – Determine Battle Points To Give

**Details:** Gets the number of battle points to give for the player's previous frontier win.

**Input:** None.

**Returns:** To given var:

Streak Length	Num Battle Points
1 - 10	2
11 - 19	3
20	20
21 - 30	4
31 - 40	5
41 - 49	6
50	50
51+	7

#### **Example Script:**

```
special2 LASTRESULT SPECIAL_DETERMINE_BATTLE_POINTS '0x56  
'Add vars here to update total BP amount
```

### Special 0x58 – Buffer Swarm Text

**Details:** Buffers the map name where there is currently a swarm to *buffer1* and the species name where there is currently a swarm to *buffer2*.

**Input:** None.

**Returns:** Nothing.

#### **Example Script:**

```
special 0x58  
msgbox @Saw 0x6 '[buffer1]! They said there's\na whole bunch of [buffer2] there!
```

### Special 0x59 – Buffer Species Roaming Text

**Details:** Buffers the map name where the given roamer can be found to *buffer1*, and the species name of the roamer to *buffer2*.

**Input:**

*Var 0x8000:* Species

**Returns:** To given var **0** if the requested species isn't found roaming. **1** otherwise.

#### **Example Script:**

```
setvar 0x8000 PKMN_CHARMANDER 'Charmander should roam  
setvar 0x8001 25 'Level 25  
setvar 0x8002 0x1 'Can roam on land  
setvar 0x8003 0x0 'Cannot roam on water  
special 0x129 'Create roaming Pokemon  
compare LASTRESULT 0x0  
if 0x1 goto @TooManyRoamers  
setvar 0x8000 PKMN_CHARMANDER 'Find map where Charmander is roaming  
special2 LASTRESULT 0x59 'Buffer roaming text  
compare LASTRESULT 0x0  
if 0x1 goto @NotRoaming  
msgbox @Saw 0x6 '[buffer1]! They said a\n[buffer2] appeared there!
```

### Special 0x5A – Wild Data Switch

**Details:**

**Input:**

**Returns:**

**Example Script:**

### Special 0x5B – Cancel Wild Data Switch

**Details:**

**Input:**

**Returns:**

**Example Script:**

### Special 0x97 – Random Grass Battle

**Details:** Initiate a grass battle with a random Pokémon from the map wild data.

**Input:** None.

**Returns:** Nothing.

**Example Script:** See *Special 0x98*.

### Special 0x98 – Random Sea Battle

**Details:** Initiates a random water battle from the map wild data

**Input:** None.

**Returns:** Nothing.

**Example Script:**

```
#org @start
special 0x8F 'The trainer position special
special2 LAST_RESULT 0x7F 'Returns 1 if ground battles, 2 if water battle
compare LAST_RESULT 0x1
if 0x1 goto @grass
compare LAST_RESULT 0x2
if 0x1 goto @water
release
end

#org @grass
special 0x97 'Generates a random grass battle.
release
end

#org @water
special 0x98 'Generates a random water battle.
release
end
```

### Special 0x156 – Ghost Battle

**Details:** Initiate a ghost battle with a given Pokémon, level, and held item.

**Input:**

*Var 0x8004:* Ghost species (default *Marowak*).

*Var 0x8005:* Ghost level.

*Var 0x8006:* Ghost hold item.

**Returns:** Nothing.

**Example Script:**

setvar 0x8004 PKMN\_CHARIZARD

setvar 0x8005 100

setvar 0x8006 ITEM\_LEFTOVERS

Special 0x156

### Special 0xAC - Load Second Trainer Defeat Message

**Details:** If a battle against two opponents is being started from a flag, this special will load in the defeat text for the second trainer.

**Input:**

*Loadpointer 0x0:* Pointer to defeat text.

**Returns:** Nothing

**Example Script:** See [here](#).

## Timer Specials

Another feature from JPANs engine, which allows the player to utilize the game timer for timed events.

### Special 0x46 – Start Timer

**Details:** Start the timer. If called after it started running, it resets the timer.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x46

### Special 0x47 – Pause Timer

**Details:** Pauses the already-started timer.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x47

### Special 0x48 – Resume Timer

**Details:** Resume a paused timer.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x48

### Special 0x49 – Stop Timer

**Details:** Stops the timer and returns the value. Timer needs to be started anew, resuming the timer will cause the value to be inaccurate.

**Input:** None.

**Returns:** The timer value to the given var.

**Example Script:** special2 LAST\_RESULT 0x49

### Special 0x4A – Get Timer Value

**Details:** Just return the time on the timer.

**Input:** None.

**Returns:** The timer value to the given variable.

**Example Script:** special2 LAST\_RESULT 0x4A

### Special 0x4B – Stop and Update Playtime

**Details:** Stop the timer and update playtime value.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x4B

### Special 0x4C – Update Playtime

**Details:** Update the playtime. This is meant for functions that take a while to process that cause delay in playtime.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x4C

### Special 0x4D – Check Timer Value

**Details:** Check if timer has reached a value stored in *Var 0x8010*.

**Input:**

*Var 0x8010:* Value to check against.

**Returns:** *1* if timer is greater or equal, *0* otherwise.

**Example Script:**

```
setvar 0x8010 100
special2 LAST_RESULT 0x4D
Compare LAST_RESULT 0x1 'Is timer >=
If 0x1 goto @timeReached
```

### Special 0x4E – Save Timer Value

**Details:** Store the timer value to a free RAM address to allow you to later reset it to this value.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x4E

### Special 0x4F – Start Timer at a Time

**Details:** Restart the timer at the value stored with Special 0x4E.

**Input:** None.

**Returns:** Nothing.

**Example Script:** special 0x4F

### Special 0x50 – Store Timer Value to Variable

**Details:** Store the timer value stored from Special 0x4E.

**Input:** None.

**Returns:** Nothing.

*Var 0x8006:* Timer value.

**Example Script:** special 0x50

### Special 0x61 – Load Timer Value from Variable

**Details:** Set the timer value RAM from a variable

**Input:**

*Var 0x8006:* Timer value to set

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8006 200
special 0x61
```

## Safari Specials

### Special 0x86 – Get Safari Balls

**Details:** Check Safari Ball quantity.

**Input:** None.

**Returns:**

*Var 0x8004:* Normal Safari ball number.

*Var 0x8005:* Extra ball slot number.

*Given Var:* Combined number.

**Example Script:**

```
special2 LAST_RESULT 0x86
buffernumber 0x0 0x8004 'Normal number
buffernumber 0x1 0x8005 'Extra balls
buffernumber 0x2 LAST_RESULT 'Combined safari ball number
```

### Special 0x87 – Change Safari Balls

**Details:** Increase or decrease the safari ball count, maximum 100 balls.

**Input:**

*Var 0x8004:* Number to increase/decrease by.

*0x1XX* decreases by XX, *0x1YY* increases by YY.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 0x0130 'Remove 30 safari balls
special 0x87
```

### Special 0x88 - Get Safari Pedometer

**Details:** Get the value of the safari pedometer.

**Input:** None.

**Returns:** Safari pedometer value to given variable.

**Example Script:**

```
special2 LAST_RESULT 0x88
compare LAST_RESULT 50 'Check if taken at least 50 steps
if 0x4 goto @OverFifty
```

### Special 0x89 – Set Safari Pedometer

**Details:** Set a specific number of steps in the safari.

**Input:**

*Var 0x8004:* Pedometer Value to set.

**Returns:** Nothing.

**Example Script:**

```
special2 LAST_RESULT 0x88 'Get current pedometer
Compare LAST_RESULT 50
If 0x3 goto @Continue
setvar 0x8004 50 'Pedometer can only reach 50 steps
Special 0x89
```



## Walking Specials

### Special 0x7E – Get Tile Number

**Details:** Get the tile number at a specified location on the current map.

**Input:**

*Var 0x8004:* Tile x-coordinate.

*Var 0x8005:* Tile y-coordinate.

**Returns:** Tile number to the given var.

**Example Script:**

```
getplayerpos 0x8004 0x8005 'Player's current position
addvar 0x8004 0x2 'Check tile 2 steps to the right of the player
special2 LAST_RESULT 0x7E
compare LAST_RESULT SOME_TILE_NUMBER
if 0x1 goto @CorrectTile
```

### Special 0x7F – Get Tile Behaviour

**Details:** Get a specific tile set of attributes

**Input:**

*Var 0x8004:* Tile x-coordinate.

*Var 0x8005:* Tile y-coordinate.

**Returns:**

*Var 0x8004:* Tile background byte.

*Var 0x8005:* Tile behaviour bytes.

*Given Var:* Tile background byte.

**Example Script:**

```
Getplayerpos 0x8004 0x8005
special2 LAST_RESULT 0x7F 'Get tile attributes on player's current tile
```

### Special 0x81 – Set Walking Script

**Details:** Load a walking script to run each step. Setting to zero removes any walking script.

**Input:**

*Loadpointer 0x0:* Script pointer.

**Returns:** Nothing.

**Example Script:**

```
Loadpointer 0x0 @WalkingMsg
Special 0x81
release
end
```

```
#org @walkingMsg
```

```
Msgbox @msg 0x6
```

```
end
```

```
#org @msg
```

```
= This msgbox will play every single step.
```

### Special 0x8A – Read Pedometer Value

**Details:** This special is not in JPAN's original engine. It reads the value of one of the extra pedometers included in the engine, which are set with flags (see customization).

**Input:**

*Var 0x8004:* Pedometer to read

- 0: always active pedometer (32bit)
- 1: large valued-pedometer (32bit)
- 2: medium valued-pedometer (16bit)
- 3: first small pedometer (8bit)
- 4: second small pedometer (8bit)

**Returns:** Pedometer value to the given variable.

**Example Script:**

```
setvar 0x8004 0x0 'Pedometer that's always on  
special2 LAST_RESULT 0x8A 'Get number of steps player has walked  
buffernumber 0x0 LAST_RESULT
```

## PC Selection Specials

A couple new specials are added, as well as a few existing specials changed to allow data manipulation of boxed Pokémon.

### Special 0x1A – Store/Return Party Pokémon Data

**Details:** Save or Return party/boxed Pokémon Data

**Input:**

*Var 0x8002:*

- 0 For store to free ram.
- 1 For return to party from free ram.
- 2 For store from free ram to box.
- 3 For store from box to free ram.

*Var 0x8005:* Party slot number (for special 0xFE inputs).

**Returns:** 0 or 1 to LAST\_RESULT for success/failure, respectively

**Script Example:**

```
setvar 0x8002 0 'Store
setvar 0x8005 0 'Save first party mon data
Special 0x1A    'First party Pokémon data now in Enemy data slot 5
```

### Special 0x1B – Swap Party/Boxed Pokémon Data

**Details:** Swap party and box data

**Input:**

*Var 0x8000:* Box Number .

*Var 0x8001:* Box Position.

*Var 0x8002:* 0 for withdraw from box, 1 for store to box.

*Var 0x8005:* Party slot number (for special 0xFE inputs).

**Returns:** 0 or 1 to LAST\_RESULT for success/failure, respectively.

**Script Example – Swap Party and Boxed Mon**

```
Msgbox @ask 0x6 'Select party mon to deposit
Special 0x9F
waitstate
copyvar 0x8005 0x8004
setvar 0x8002 0 'From party to free ram
Special 0x1A ' Store from party to free ram
msgbox @ask2 0x6 'Select boxed mon to withdraw
writebytetooffset 0x1 0x0203b7ac
special 0x3C 'Select boxed mon, box stored to Var8000, slot to Var8001
waitstate
setvar 0x8002 0x0 'Withdraw
special 0x1B 'Selected boxed mon to selected party slot (Var8005)
setvar 0x8002 0x2 'Free ram to box
special 0x1A 'Free ram (eg. Original selected party mon) to same box slot
```

**NOTE:** Rather than use a single special for this, the dynamic inputs of these specials allow for swapping party/boxed mon, trading, and more.

### Special 0x7C – Buffer nickname

**Details:** Buffer a Pokémon's nickname to [buffer1].

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** Nothing.

**Example Script:** See *Special 0x9E*.

### Special 0x7D – Check Traded Pokémon

**Details:** Check if Pokémon is traded.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** 0 if traded, 1 if not.

**Example Script:** See *Special 0x9E*.

### Special 0x9E – Nickname Pokémon

**Details:** Nickname a Pokémon.

**Input:**

*Var 0x8003*: From party (0), or box (1).

From Box: *Var 0x8000*, *Var 0x8001* hold the box num/slot, respectively.

From Party: *Var 0x8004* holds the party slot number.

**Returns:** 0 if traded, 1 if not.

**Example Script – Nickname a Boxed Pokémon**

writebytetooffset 0x1 0x0203B7AC

special 0x3C 'Select boxed mon, box stored to Var8000, slot to Var8001

waitstate

setvar 0x8003 0x1

special 0x7C 'Buffer nickname

Msgbox @AskNickname 0x5 'Nickname [buffer1]?

Compare LAST\_RESULT 0x1

If 0x0 goto @Nope

Special 0x7D 'Check traded mon

Compare LAST\_RESULT 0

If 0x1 goto @Traded

Special 0x9E 'Nickname boxed mon

waitstate

## Other Specials

### Special 0x24 – Add Multichoice Text By Variable

**Details:** Add a dynamic multichoice option by variables

**Input:**

*Var 0x8004:* Upper halfword of pointer.

*Var 0x8005:* Lower halfword of pointer.

*Var 0x8006:* Multichoice Index.

**Returns: Nothing.**

**Example Script:**

```
setvar 0x8004 0x0890
```

```
setvar 0x8005 0x5040
```

```
setvar 0x8006 0x0
```

```
Special 0x24 'Multichoice index 0 is string pointer 0x08905040
```

**NOTE:** Special 0x25 is easier to use, you don't have to worry about upper/lower sections of a word.

### Special 0x25 – Add Multichoice Text by Pointer

**Details:** Add a dynamic multichoice option by a pointer.

**Input:**

*Var 0x8006:* Multichoice Index.

*Loadpointer 0x0:* Pointer to string.

**Returns: Nothing.**

**Example Script:**

```
setvar 0x8006 0x0
```

```
loadpointer 0x0 @option1
```

```
special 0x25
```

```
setvar 0x8006 0x1
```

```
loadpointer 0x0 @option2
```

```
special 0x25
```

```
preparemsg @msg
```

```
waitmsg
```

```
multichoice 0x0 0x0 0x20 0x0 'See note below
```

```
compare LAST_RESULT 0x0
```

```
if 0x1 goto @selectedOption1
```

```
compare LAST_RESULT 0x1
```

```
if 0x1 goto @selectedOption2
```

**NOTE:** multichoice 0xX 0xY 0xWW 0xZ

0xX: X position of box.

0xY: Y position of box.

0xWW: Multichoice box index.

0x20: 2 options (min).

...

0x25: 7 options (max).

0xZ: 0x0 if B can cancel box, 0x1 if not

### Special 0x75 – Buffer Species

**Details:** Buffer a Pokémon's species to [buffer3] and size to [buffer1].

**Input:**

*Var 0x8005:* Holds the variable that stores measurements.

*Var 0x8006:* Species to evaluate.

**Returns:** Nothing.

**Example Script:** See below

### Special 0x76 – Measure Pokémon

**Details:** Play the measure Pokémon game.

**Input:**

*Var 0x8004:* Party slot of Pokémon.

*Var 0x8005:* Holds the variable that stores measurements.

*Var 0x8006:* Species to evaluate.

**Returns:** To the given var:

1: Pokémon is not of selected type.

2: Pokémon is smaller.

3: Pokémon is bigger, also stores biggest value in variable in *Var 0x8005*.

4: Sizes are equal.

### Special 0x9C – Old Man Battle

**Details:** Initiate an old man battle with a specific Pokémon species and level.

**Input:**

*Var 0x8004:* Species.

*Var 0x8005:* Level.

**Returns:** Nothing.

**Example Script:**

```
setvar 0x8004 PKMN_BEEDRILL
```

```
setvar 0x8005 50
```

```
special 0x9C
```

```
waitstate
```



### Special 0x18B – Show Fossil Image

**Details:** Load a custom image into the fossil image window.

Pointer Table - Defined in <b>src/config.h</b>		
Table can also be generated by the engine in <b>src/script_specials.c</b> . Search for <i>gFossilImageTable</i> .		
Name	Bytes	Description
Fossil Pointer	4	Pointer to a section of data that has the needed information for the function to work.
Palette Pointer	4	A simple uncompressed palette must be on the other end.
Fossil Data (Pointed to from "Fossil Pointer")		
Image Pointer	4	Pointer to the actual image. Uncompressed, 64x64 pixel, so each should take 4kb worth of space.
Constant bytes	4	Don't know what they do, but when changed they mess up the whole picture. Must be 0008581b.
Null bytes	8	8 zeros. Changing them will result in the same as messing with the above bytes.

**Input:**

*Var 0x8004:* Image number.

*Var 0x8005:* X coordinate on screen.

*Var 0x8006:* Y coordinate on screen.

**Returns: Nothing.**

**Example Script:**

setvar 0x8004 0x2 'Show third image in table

setvar 0x8005 0x0 'At (0x0)

setvar 0x8006 0x0 'At (0x0)

Special 0x18B

## Time-Based Specials

### Special 0xA0 - Check And/Or Set Daily Event

**Details:** Checks if a daily event has been run. It can also simultaneously set a daily event to “done”.

**Input:**

*Var 0x8000:* The first of a pair of vars containing the daily event data. Note that the var after this var is used as well (hence why “pair” was mentioned).

*Var 0x8001:* Set to 0 if you just want to check if the event has been done. Any other value sets the daily event as “done”.

**Returns:** 0 if the event has already been completed. 1 otherwise.

### Special 0xA1 - Update Time in Vars

**Details:** Updates the time stored in a pair of vars to the current time.

**Input:**

*Var 0x8000:* The first of a pair of vars containing the daily event data. Note that the var after this var is used as well (hence why “pair” was mentioned).

### Special 0xA2 - Get Time Difference

**Details:** Gets the time difference between the data stored in a pair of vars and the current time. These vars should be set by *special 0xA1* or *special 0xA2*.

**Input:**

*Var 0x8000:* The first of a pair of vars containing the daily event data. Note that the var after this var is used as well (hence why “pair” was mentioned).

*Var 0x8001:* Set to one of the following values:

- 0 - Get the minute difference.
- 1 - Get the hour difference.
- 2 - Get the day difference.
- 3 - Get the month difference.
- 4 - Get the year difference.

### **Example Script:**

```
#define SP_DAILY_EVENT 0xA0
#define SP_UPDATE_TIME_IN_VARS 0xA1
#define SP_GET_TIME_DIFFERENCE 0xA2
#define DAILY_EVENT_VAR 0x50D2 'Also uses 0x50D3
```

```
#dynamic 0x740000
#org @start
setvar 0x8000 DAILY_EVENT_VAR
setvar 0x8001 0x0 'Don't set daily event var to done
special2 LASTRESULT SP_DAILY_EVENT
compare LASTRESULT 0x0
if == goto @AlreadyDid
setvar 0x8000 DAILY_EVENT_VAR
special SP_UPDATE_TIME_IN_VARS
msgbox @havenot "I have not done it."
callstd MSG_FACEPLAYER
end
```

```
#org @AlreadyDid
setvar 0x8000 DAILY_EVENT_VAR
setvar 0x8001 0x0 'Minute difference
special2 LASTRESULT SP_GET_TIME_DIFFERENCE
buffernumber 0x0 LASTRESULT
msgbox @already "\h02 minutes ago I did it."
callstd MSG_FACEPLAYER
end
```



# Creating New Battle Mechanics

**Moves**

**Abilities**

**Poke Balls**

# Code Files

Below is a list of all code files which can be found in **src**, along with features contained in each file. Each file's respective header file can be found in **include/new**.

File	Description
ability_battle_effects.c	
accuracy_calc.c	
attackcanceler.c	
battle_anims.c	
battle_contoller_opponent.c	
battle_start_turn_start.c	
battle_strings.c	
battle_terrain.c	
Battle_transition.c	
BS_Helper_Functions.c	
build_pokemon.c	
catching.c	
character_customization.c	
CMD49.c	
damage_calc.c	
daycare.c	
dexnav.c	
DNS.c	
dynamic_ow_pals.c	
end_battle.c	
end_turn.c	
evolution.c	
exp.c	
form_change.c	
frontier.c	
general_bs_commands.c	
Helper_Functions.c	
item.c	
item_battle_effects.c	
learn_move.c	
link.c	
mega.c	
move_menu.c	
multi.c	
new_bs_commands.c	
overworld.c	

<b>party_menu.c</b>	
<b>pokemon_storage_system.c</b>	
<b>read_keys.c</b>	
<b>roamer.c</b>	
<b>save.c</b>	
<b>script_specials.c</b>	
<b>set_effect.c</b>	
<b>set_z_effect.c</b>	
<b>start_menu.c</b>	
<b>stat_buffs.c</b>	
<b>switching.c</b>	
<b>trainer_sliding.c</b>	
<b>wild_encounter.c</b>	

The following files can be found in **src/Battle\_AI** are contain code for the updated battle AI.

File	Description
<b>AI_Helper_Functions.c</b>	
<b>AI_master.c</b>	
<b>AI_Negatives.c</b>	
<b>AI_Positives.c</b>	

The following files can be found in **src/Tables** and contain various data tables for the user to modify as they see fit.

File	Description
<b>Attack_Data_Table.c</b>	Contains data for all the different battle moves.
<b>Ball_Graphics_Tables.c</b>	Contains data for new in-battle Poke Ball graphics.
<b>Class_Based_Poke_Ball_Table.c</b>	Used in conjunction with the definition <b>TRAINER_CLASS_POKE_BALLS</b> to assign unique Poké Balls toe each trainer class.
<b>Experience_Tables.c</b>	Contains larger Exp yield data for each species (see <b>GEN_7_BASE_EXP_YIELD</b> ). Also contains experience per level tables to help account for a possible increased max level.
<b>Frontier_Trainers.c</b>	Contains <a href="#">data</a> for various trainers which can appear in <i>Battle Facilities</i> .
<b>Learnsets.c</b>	Contains data for the level-up movepool of each Pokémon to support the increased number of moves the engine has to offer.
<b>Music_Tables.c</b>	Contains <a href="#">data</a> to set trainer encounter music by class (see <b>ENCOUNTER_MUSIC_BY_CLASS</b> ), battle music by class, and battle music by wild

	species.
<b>Pickup_Items.c</b>	Contains the different items that can be picked up using the ability <a href="#">Pickup</a> .
<b>Pokemon_Tables.c</b>	Contains data tables for alternate species height and weights (for example, if a mega form is a different size), and several Pokémon ban lists.
<b>Terrain_Table.c</b>	Contains <a href="#">data</a> for each battle background and how it influences various effects in battle such as <i>Camouflage</i> , <i>Nature Power</i> , <i>Secret Power</i> , and <i>Burmy</i> .
<b>Wild_Encounter_Tables.c</b>	Contains data for setting up <a href="#">time-based wild encounters</a> and <a href="#">swarms</a> .

The following files can also be found in **src/Tables** and also contain various data tables for the user to modify, however, as they are header files, a change must be made in the file that includes them in order for them to recompile without cleaning the whole engine.

File	Description
<b>battle_tower_spreads.h</b>	
<b>frontier_spreads.h</b>	
<b>frontier_trainer_names.h</b>	
<b>trainers_with_evs_table.h</b>	

The following files can be found in **assembly/data** and contain various data tables for the user to modify as they see fit.

File	Description
<b>Ability_Description_Table.s</b>	Contains a table with pointers to the different ability descriptions.
<b>Ability_Tables.s</b>	Contains several tables with abilities mainly used by the battle engine to see if certain abilities are in a given list.
<b>Anim_Background_Table.s</b>	Contains a table of all the in-battle animation backgrounds.
<b>Anim_Backgrounds_Graphics_Defines.s</b>	Contains defines for <b>assembly/data/Anim_Background_Table.s</b>
<b>Anim_Particle_Graphics_Defines.s</b>	Contains defines for <b>assembly/data/Anim_Particle_Table.s</b>
<b>Anim_Particle_Table.s</b>	Contains a table of all the in-battle attack particles.
<b>Attack_Anim_Table.s</b>	Contains a table and data for all the new attack animations.
<b>Attack_Description_Table.s</b>	Contains a table with pointers to the attack

	descriptions.
<b>Battle_Script_Commands_Table.s</b>	Contains both the original battle scripting command table, as well as a second battle scripting command table.
<b>Item_Tables.s</b>	Tables with items that are checked during the execution of certain moves.
<b>Move_Effect_Table.s</b>	Contains a table with the battle scripts for each move effect, as well as certain tables of move effects which are used by the AI.
<b>Move_Tables.s</b>	Contains several tables with moves mainly used by the battle engine to see if certain moves are in a given list.
<b>Playanimation_Table.s</b>	Contains a table and data for special in-battle animations.
<b>Trainer_Backsprite_Table.s</b>	Contains various tables relating the trainer backsprites shown at the start of battle.
<b>Type_Tables.s</b>	Contains tables for move type effectiveness and graphics data for the different type icons.
<b>Z-Move_Name_Table.s</b>	Contains a table with pointers to the names of all the different Z-Moves.

The following files can be found in **assembly/battle\_scripts** and contain several different scripts that run in-battle.

File	Description
<b>ability_battle_scripts.s</b>	Contains battle scripts for various ability effects.
<b>attackcanceler_battle_scripts.s</b>	Contains battle scripts for the battle scripting command <i>attackcanceler</i> . See <b>src/attackcanceler.c</b> .
<b>battle_start_turn_start_battle_scripts.s</b>	Contains battle scripts that can run at the beginning of the battle or each turn. See <b>src/battle_start_turn_start.c</b> .
<b>cmd49_battle_scripts.s</b>	Contains battle scripts for the battle scripting command <i>cmd49 (moveend)</i> . See <b>src/CMD49.c</b> .
<b>et_battle_scripts.s</b>	Contains battle scripts that can run at the end of each round. See <b>src/end_turn.c</b> .
<b>fainting_battle_scripts.s</b>	Contains the battle scripts that run when a Pokémon faints.
<b>general_attack_battle_scripts.s</b>	Contains various battle scripts for the different move effects.
<b>item_battle_scripts.s</b>	Contains various battle scripts for item effects.

	See <b>src/item_battle_effects.c</b> .
<b>mega_battle_script.s</b>	Contains battle scripts for Mega Evolution, Primal Reversion, and Ultra Burst. See <b>src/mega.c</b> .
<b>move_menu_battle_scripts.s</b>	Contains battle scripts which print strings for the player while they are selecting moves. See <b>src/move_menu.c</b> .
<b>set_effect_battle_scripts.s</b>	Contains battle scripts for various secondary move effects. See <b>src/set_effect.c</b> .
<b>standard_damage_battle_script.s</b>	Contains battle scripts that are called for nearly every damaging move and moves that fail.
<b>switch_battle_scripts.s</b>	Contains battle scripts that run when Pokémon are switched out. See <b>src/switching.c</b> .
<b>trainer_sliding_battle_scripts.s</b>	Contains battle scripts for when the opposing trainer sliding back onto the screen to give a message. See <b>src/trainer_sliding.c</b> .
<b>z_effect_battle_scripts.s</b>	Contains battle scripts for various secondary Z-Status move effects. See <b>src/set_z_effect.c</b> .

The following files can be found in **assembly/overworld\_scripts** and contain a few different scripts that run in the overworld.

File	Description
<b>system_scripts.s</b>	Contains scripts that are run by the engine rather than as an event script (such as overworld poison, repels, etc.).
<b>trainer_battle_scripts.s</b>	Contains scripts that help initiate new types of trainer battles.

The following files can be found in **assembly/hooks** and contain different sets of hooks for updated functions.

File	Description
<b>bag_expansion_hooks.s</b>	Contains hooks relating to expanding the bag size. See <b>src/item.c</b> .
<b>follow_me_hooks.s</b>	UNUSED
<b>general_hooks.s</b>	Contains various general hooks that didn't fit into one specific category.
<b>illusion_hooks.s</b>	Contains hooks for the ability <a href="#">Illusion</a> .

	See <b>src/ability_battle_effects.c</b> .
<b>mega_hooks.s</b>	Contains hooks for Mega Evolution, Primal Reversion, and Ultra Burst. See <b>src/mega.c</b> .
<b>multi_hooks.s</b>	Contains hooks that help implement <i>multi battles</i> against two opponents. See <b>src/multi.c</b> and <b>src/battle_controller_opponent.c</b> .
<b>multi_partner_hooks.s</b>	Contains hooks that help implement <i>multi battles</i> with a partner See <b>src/multi.c</b> .
<b>pokemon_data_hooks.s</b>	Contains hooks for the alteration of various Pokémon data. See <b>src/build_pokemon.c</b> .

The following files can be found in **assembly** and contain different assembly routines.

File	Description
<b>main.s</b>	Similar to <b>assembly/hooks/general_hooks.s</b> , this file was mainly used by <b>ghouslash</b> , while the former was mainly used by <b>Skeli</b> .
<b>pokedex_screen_stats.s</b>	Contains a routine the replace the Pokédex size comparison with a screen showing the stat values of the Pokémon.
<b>rtc.s</b>	Contains a routine originally created by <a href="#">prime-dialga</a> that implements the real-time clock using whatever hardware the emulator is running on.
<b>thumb_compiler_helper.S</b>	Contains various functions to helper the C compiler.

# Engine Scripts

## Clean.py

Clean.py's role is to clean up the repository. The following commands can be used from the command line:

Command	Description
<b>python scripts/clean.py</b>	Removes all object files (not including those from images), generated repoints, generated offsets, and generated roms.
<b>python scripts/clean.py all</b>	Removes all object files, generated repoints, generated offsets, and generated roms.
<b>python scripts/clean.py build</b>	Removes all object files (not including those from images), generated offsets, and generated roms.
<b>python scripts/clean.py graphics</b>	Removes all object and header files from images.
<b>python scripts/clean.py file FILE_PATH</b>	Removes only the object file for the given file path. Make sure "/" and not "\" is used to separate the directory names.

## String.py

String.py's role is to compile *.string* files (found in the **strings** directory). The following rules apply to compiling *.string* files:

- Placing *MAX\_LENGTH=XX* at the top of the file where *XX* is a number of your choosing will force all strings compiled in that file to have a maximum length of *XX* (not including the terminator character, 0xFF).
- When used in conjunction with *MAX\_LENGTH*, placing *FILL\_FF=True* at the top of the file will force all strings shorter than *MAX\_LENGTH* to have FFs appended onto the end to make them the correct size. This is how arrays of strings are made possible (such as *gMoveNames* and *gAbilityNames*).
- Each string name starts with the directive *#org @* and is followed by the title of the string. Several *#org*'s made be piled on top of one another to make several string defines point to the same string. For example:

```
#org @gAbilityNames
#org @NAME_ABILITY_NONE
-----
```

- The line after the *#org* contains the string. It can be written in plain text with no quotation marks on either side and with no terminator character at the end. The string may be spread onto multiple lines if you so wish. The string is terminated when the next *#org* is parsed.



- There are different escape characters which can be used with the string files:

Character	Becomes
\n	Newline
\p	New textbox (display arrow)
\l	Scroll line
\e	é
\\$	¢
\"	"

- Text buffers can be used too:

Buffer	Description
[.]	...
[BUFFER]	Start a buffer. Usually followed by a hex buffer.
[ATTACKER]	IN-BATTLE: Loads the attacker's name (found in <i>gBankAttacker</i> ).
[TARGET]	IN-BATTLE: Loads the target's name (found in <i>gBankTarget</i> ).
[EFFECT_BANK]	IN-BATTLE: Loads the bank found in <i>gEffectBank</i> .
[SCRIPTING_BANK]	IN-BATTLE: Loads the bank found in <i>gBattleScripting-&gt;bank</i> .
[CURRENT_MOVE]	IN-BATTLE: Loads the move found in <i>gCurrentMove</i> .
[LAST_ITEM]	IN-BATTLE: Loads the item found in <i>gLastUsedItem</i> .
[LAST_ABILITY]	IN-BATTLE: Loads the ability found in <i>gLastUsedAbility</i> .
[ATTACKER_ABILITY]	IN-BATTLE: Loads the attacker's ability (from <i>gBankAttacker</i> ).
[TARGET_ABILITY]	IN-BATTLE: Loads the target's ability (from <i>gBankTarget</i> ).
[SCRIPTING_BANK_ABILITY]	IN-BATTLE: Loads the ability of <i>gBattleScripting-&gt;bank</i> .
[PLAYER_NAME]	IN-BATTLE: Loads the player's name.
[BLACK]	OVERWORLD: Changes the text colour to black.
[RED]	OVERWORLD: Changes the text colour to red.
[GREEN]	OVERWORLD: Changes the text colour to green.
[BLUE]	OVERWORLD: Changes the text colour to blue.
[XX] Eg. [FA] or [52]	Any two hex characters to represent that byte exactly (hex buffer). Can be used in conjunction with [BUFFER]. For example, in the overworld, [BUFFER][02] is the same as saying [buffer1] in XSE.

# Credits

## **Main Contributors:**

Skeli

Ghoulsash

## **Code:**

*Lixdel* - Attack Animations

*Pret* - PokeRuby, PokeFireRed, PokeEmerald

*Sagiri* - Trainer Class Poke Balls, Pickup Update

*DizzyEgg* - Emerald Battle Engine Upgrade V1 & V2, Dizzy's Emerald Hacked Engine

*FBI* - Expanded Saveblock, Dexnav

*Touched* – Follow Me, Mega Evolution source

*Navenatox* – Dynamic Overworld Palettes

*Doesntknowhowtoplay & Squeetz* - Pokedex Screen Stats

*Azurile13* - Hidden Abilities

*Squeetz* - Footstep Noises

*JPAN* – Fire Red Hacked Engine Source

*Diegoisawesome* – Triple Layer Tiles

## **Graphics:**

*Golche* - Attack Particles, Battle Backgrounds, Other Graphics

*Bela* - Poke Balls

*Solo993* - Backsprites

*canstockphoto.ca* - Battle Backgrounds

## **Testers:**

Recko Juice

Gail

Dionen

Criminon

If you actually read all the pages up until this point you deserve a medal. No, wait, a cookie. You deserve a cookie. Good job!



# THE END