Complete FireRed Upgrade



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# Set Up

## Necessary Modifications

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

**Pokemon Defines**:

1. Open the file **include/constants/species.h**.
2. Modify the Pokemon indices found in this file to match the ones in your hack.
3. **DO NOT DELETE ANY POKEMON NAMES**. If there is a Pokemon species you are not using, then set its index to **0xFEFE**.
4. If you have not added in any new Pokemon to Fire Red, you can leave the unused species indices as their default values.

**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.

## Configuration 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**

|  |  |
| --- | --- |
| *Flag Definition* | *Description* |
| TOTEM\_VAR | This represents are series of vars using for initiating battles with [Totem Pokemon](https://bulbapedia.bulbagarden.net/wiki/Totem_Pok%C3%A9mon). There are four vars in total, each representing a specific Pokemon slot on the field. Adding the following values to the var will indicate which slot that var is for:  0: *Player Pokemon in Singles, Left Player Pokemon in Doubles*  1: *Enemy Pokemon in Singles, Right Enemy Pokemon in Doubles*  2: *Right Player Pokemon in Doubles*  3: *Right Enemy Pokemon in Doubles*  The vars must be set to the addition of two values. Choose one from each of the following sets:  **Stats**:  1: *Attack*  2: *Defense*  3: *Speed*  4: *Special Attack*  5: *Special Defense*  6: *Accuracy*  7: *Evasion*  **Amount**:  0x10: *Increase Stat by 1*  0x20: *Increase Stat by 2*  0x30: *Increase Stat by 3*  0x40: *Increase Stat by 4*  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*  So, for instance, having the enemy Pokemon start the battle with its *Attack* raised by *2*, you would set the var TOTEM\_VAR + 1 to the value of 0x21 (0x1 + 0x20). |
| NPC\_FOLLOWING\_VAR | If the *Follow Me* feature is used, this var must be set to the *NPC Id* (*Person Id* in *Advance Map*) of the following NPC. If no NPC is following the player, this var should be set to 0. |
| OW\_SPRITE\_SWITCH\_VAR | Setting this var to a value other than 0 will change the picture used for the player’s Overworld sprite. The value should correspond to the *Picture Id* of the NPC. |
| 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 **src/table/Trainer\_Backsprite\_Table.s** for a list of available backsprites. |
| BATTLE\_BG\_VAR | If CUSTOM\_BATTLE\_BACKGROUNDS 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 **/include/battle.h** for a list of options.  Search for BATTLE\_TERRAIN\_GRASS in the file to see them. |
| SWARM\_SPECIES\_VAR | A var that is automatically set by the engine. It contains the map name Id of the map where there currently is a [*swarm*](https://bulbapedia.bulbagarden.net/wiki/Pok%C3%A9mon_outbreak) in progress. |
| SWARM\_MAP\_NAME\_VAR | A var that is automatically set by the engine. It contains the species that is currently *swarming*. |

**Flag Options**

|  |  |
| --- | --- |
| *Flag Definition* | *Description* |
| INVERSE\_FLAG | Setting this flag will enable [Inverse Battles](https://bulbapedia.bulbagarden.net/wiki/Inverse_Battle).  This flag is automatically cleared at the end of each battle. |
| SKY\_BATTLE\_FLAG | Setting this flag will indicate to the engine that a [Sky Battle](https://bulbapedia.bulbagarden.net/wiki/Sky_Battle) is in progress.  This flag is automatically cleared at the end of each battle. |
| NO\_CATCHING\_FLAG | Setting this flag will cause enemy Pokemon 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\_POKEMON\_FLAG | If CATCH\_TRAINERS\_POKEMON is defined, then setting this flag allows the player to capture Pokemon belonging to the opposing trainer. Capturing a Pokemon in this way will automatically end the battle.  This flag is automatically cleared at the end of each battle. |
| EXP\_SHARE\_FLAG | If OLD\_EXP\_SHARE is not defined, then setting this flag activates the Gen 6+ Exp. Share. |
| DOUBLE\_BATTLE\_FLAG | If ACTIVATE\_DOUBLE\_BATTLE\_FROM\_FLAG is defined, then setting this flag will cause battles against trainers to be [Double Battles](https://bulbapedia.bulbagarden.net/wiki/Double_Battle), if possible. |
| TAG\_BATTLE\_FLAG | This flag is set by the engine when the scripting command *trainerbattle 0x10* is used in a script to activate a tag battle. If setting this flag manually, take care to also set PARTNER\_VAR and PARTNER\_BACKSPRITE\_VAR. 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 *trainerbattle 0x11* is used in a script to activate a battle against two opponents. If setting this flag manually, take care to also set SECOND\_OPPONENT\_VAR. This flag is automatically cleared at the end of each battle. |
| ACTIVATE\_TUTORIAL\_FLAG | Setting this flag activates Professor Oak’s tutorial during the next trainer battle. This flag is automatically cleared at the end of each battle. |
| WILD\_CUSTOM\_MOVES\_FLAG | //TODO |
| SMART\_WILD\_FLAG | Setting this flag allows Wild Pokemon to use the basic AI checks used in trainer battles. This flag is automatically cleared at the end of each battle. |
| SCALE\_TRAINER\_LEVELS\_FLAG | Setting this flag causes all Trainer Pokemon to have levels that match the highest level in your party. |
| HIDDEN\_ABILITY\_FLAG | Setting this flag before a Wild battle causes Wild Pokemon to be generated with their hidden abilities. It is cleared at the end of each battle. |
| DOUBLE\_WILD\_BATTLE\_FLAG | Setting this flag causes all wild battles to be against two wild Pokemon in a Double battle format. It is cleared at the end of each battle. |
| NO\_RANDOM\_WILD\_ENCOUNTERS\_FLAG | Setting this flag will stop Pokemon from appearing while walking through grass or caves, of while surfing on water. Pokemon can still appear if the player chooses to fish or smash rocks |

**Battle Tower Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| BATTLE\_TOWER\_FLAG | Setting this flag indicates to the engine that the Player is in the [Battle Tower](https://bulbapedia.bulbagarden.net/wiki/Battle_Tower). This means that:   * Trainer Pokemon will be generated within the restrictions of the tier set in the var defined in BATTLE\_TOWER\_TIER. The amount of Pokemon generated will match the number set in the var defined in BATTLE\_TOWER\_POKE\_LEVEL. * Trainer Pokemon will have Pokemon with the level contained in the var defined in BATTLE\_TOWER\_POKE\_LEVEL. * The battle format will be loaded from the var defined in BATTLE\_TOWER\_BATTLE\_TYPE. * The music in-battle will be played based on what is contained in the var defined in BATTLE\_TOWER\_SONG\_OVERRIDE. |
| BATTLE\_TOWER\_POKE\_NUM | Setting this var to a value between 1 & 6 dictates the quantity of Pokemon 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 MAX\_LEVEL will set all Pokemon in the Battle Tower to that level.  Setting it to 0 will default in 1.  Setting to a number greater than MAX\_LEVEL will default in MAX\_LEVEL. |
| 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: [Smogon OU](https://www.smogon.com/dex/sm/formats/ou/)  3: [Smogon Uber](https://www.smogon.com/dex/sm/formats/uber/)  4: [Smogon Little Cup](https://www.smogon.com/dex/sm/formats/lc/)  5: Skeli’s Middle Cup |
| BATTLE\_TOWER\_TID | If battles in the Battle Tower are against a trainer with this trainer Id, a random team will automatically be generated for the trainer. |
| 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 Battle Tower battles and Link Battles. |
| TOWER\_TRAINER\_ID\_VAR | This var is set by special 0xXX to indicate which trainer class and details is being spawned as the first opponent. |
| TOWER\_TRAINER\_ID\_2\_VAR | This var is set by special 0xXX to indicate which trainer class and details is being spawned as the second opponent in multi battles. |
| TOWER\_TRAINER\_ID\_PARTNER\_VAR | This var is set by special 0xXX 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. |

**Times of Day**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| TIME\_MORNING\_START | If TIME\_ENABLED is defined, set this to the hour (in 24 hr system) that morning starts. |
| TIME\_DAY\_START | If TIME\_ENABLED is defined, set this to the hour (in 24 hr system) that day starts. |
| TIME\_EVENING\_START | If TIME\_ENABLED is defined, set this to the hour (in 24 hr system) that evening starts. |
| TIME\_NIGHT\_START | If TIME\_ENABLED is defined, set this to the hour (in 24 hr system) that night starts. |

**Other Number Definitions**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| KANTO\_DEX\_COUNT | Number of Pokemon in the regional Pokedex. |
| NATIONAL\_DEX\_COUNT | Number of Pokemon in the national Pokedex. |
| MAX\_NUM\_POKEMON | Set to the highest Pokemon index + 1. |
| MAX\_LEVEL | The highest possible level for a Pokemon. If you change this value, make sure the also modify the equivalent value found in “[special\_inserts.asm](https://github.com/Skeli789/Complete-Fire-Red-Upgrade/blob/master/special_inserts.asm)”. |
| NUM\_TRAINER\_CLASSES | The number of trainer classes. Vanilla FR has 107. |
| EVOS\_PER\_MON | If you’ve changed the number of evolutions per Pokemon, update this number. |
| DUSK\_BALL\_MULTIPLIER | The catch rate for [Dusk Balls](https://bulbapedia.bulbagarden.net/wiki/Pok%C3%A9_Ball#Dusk_Ball). |
| STANDARD\_IV | The number of IVs for each stat that standard Trainer’s Pokemon are generated with. |
| SWARM\_CHANCE | The chance in percent that a [swarm](https://bulbapedia.bulbagarden.net/wiki/Pok%C3%A9mon_outbreak) Pokemon will be generated 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 4th 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). |

**Badge Obedience**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| BASE\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have no badges. |
| BADGE\_1\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 1 badge. |
| BADGE\_2\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 2 badges. |
| BADGE\_3\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 3 badges. |
| BADGE\_4\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 4 badges. |
| BADGE\_5\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 5 badges. |
| BADGE\_6\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 6 badges. |
| BADGE\_7\_OBEDIENCE\_LEVEL | The highest level that a traded Pokemon will obey the player at if they have 7 badges. |

**Memory Locations**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| SEEN\_DEX\_FLAGS | The memory location of the *Seen* Pokedex flags. If you have not expanded the Pokedex, this should be set to:  gSaveBlock2Ptr->pokedex.seen |
| CAUGHT\_DEX\_FLAGS | The memory location of the *Caught* Pokedex flags. If you have not expanded the Pokedex, this should be set to:  gSaveBlock2Ptr->pokedex.owned |

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 [Inverse Battle](https://bulbapedia.bulbagarden.net/wiki/Inverse_Battle) if the INVERSE\_FLAG 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 *Daytime*. |
| DNS\_IN\_BATTLE | If TIME\_ENABLED is defined, then certain background palettes will be faded dynamically in battle depending on the time of day. These values can be set in **src/DNS.c**. |
| OVERWRITE\_RIVAL | Loads the buffered rival’s name for trainer classes 0x51, 0x59, and 0x5A. |
| TRAINER\_CLASS\_POKE\_BALLS | Creates trainer Pokemon with custom Poke Balls based on trainer class determined by what is set in **src/Tables/** **Class\_Based\_Poke\_Ball\_Table.c**. |
| TRAINERS\_WITH\_EVS | Trainer Pokemon 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 **src/Tables/Trainers\_With\_EVs\_Table.c**. For example, setting the IV value to 1 will loaded the spread labeled “1” in the *TrainersWithEvsTable*.  Modifying the required conditions to activate this feature can be done by searching for the line *#ifdef TRAINERS\_WITH\_EVS* in **src/build\_pokemon.c**. |
| CONTINUE\_LOST\_BATTLES | If TUTORIAL\_BATTLES is defined, then if Var 0x8000 is set to 0xFEFE before a battle begins, *trainerbattle 0x9* can be used to continue a lost battle. The result of the battle will then be stored in Var 0x800D (LastResult).  If TUTORIAL\_BATTLES is not defined, then *trainerbattle 0x9* will always allow a lost battle to be continued. |
| REALLY\_SMART\_AI | The AI knows everything about the Pokemon 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, the move type the move will become will be displayed (such as Hidden Power, Weather Ball in Weather, etc.). |
| DISPLAY\_REAL\_ACCURACY\_ON\_MENU | When pressing the *L*-button while choosing a move, the "true" move accuracy will be displayed. For example, the move *Psychic* used by a Pokemon with *Compound Eyes* will have its accuracy appear as 130. |
| DISPLAY\_REAL\_POWER\_ON\_MENU | When pressing the *L*-button while choosing a move, the "true" move power will be displayed. For example, moves *like Fury Cutter* will show their correct power. |
| CUSTOM\_BATTLE\_BACKGROUNDS | Setting BATTLE\_BG\_VAR 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 | Mega Evolutions can be used. |
| TUTORIAL\_BATTLES | Professor Oak’s tutorial will be activated for *trainerbattle 0x9*. |
| TANOBY\_RUINS\_ENABLED | Causes [Unown](https://bulbapedia.bulbagarden.net/wiki/Unown_(Pok%C3%A9mon)) to be spawned in maps using the [Tanoby Ruins](https://bulbapedia.bulbagarden.net/wiki/Tanoby_Chambers) map names according to the current chamber. |
| ALTERING\_CAVE\_ENABLED | If the current map is the [Altering Cave](https://bulbapedia.bulbagarden.net/wiki/Altering_Cave) and Var 0x4024 is set, Wild Pokemon will spawn. |
| SWEET\_SCENT\_ONLY\_IN\_CLEAR\_WEATHER | In certain generations, [Sweet Scent](https://bulbapedia.bulbagarden.net/wiki/Sweet_Scent_(move)) only spawns wild Pokemon in the Overworld if the weather is clear. |
| OBEDIENCE\_BY\_BADGE\_AMOUNT | Pokemon 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”. |

**Misc Battle Effect Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| OLD\_BURN\_DAMAGE | [Burn](https://bulbapedia.bulbagarden.net/wiki/Burn_(status_condition)) damage takes 1/8 of max health instead of 1/16. |
| OLD\_PARALYSIS\_SPD\_DROP | [Paralysis](https://bulbapedia.bulbagarden.net/wiki/Paralysis_(status_condition)) lower Speeds down to 1/4 instead of ½. |
| OLD\_CONFUSION\_CHANCE | [Confusion](https://bulbapedia.bulbagarden.net/wiki/Status_condition#Confusion) stops attacks 50% of the time instead of 33%. |
| INFINITE\_WEATHER | [Weather abilities](https://bulbapedia.bulbagarden.net/wiki/Category:Abilities_with_effects_on_weather_conditions) make weather last for infinite turns. |
| INFINITE\_TERRAIN | [Terrain abilities](https://bulbapedia.bulbagarden.net/wiki/Category:Abilities_with_effects_on_terrain) make terrain last for infinite turns. |
| NO\_SHEER\_COLD\_NERF | Remove all Gen 7 [Sheer Cold](https://bulbapedia.bulbagarden.net/wiki/Sheer_Cold_(move)) nerfs. |
| OLD\_MOVE\_SPLIT | The [Physical/Special](https://bulbapedia.bulbagarden.net/wiki/Damage_category#Physical.2FSpecial_split) split is based on move types.  Status moves are still set with the split byte, however. |

**Ability Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| OLD\_GALE\_WINGS | [Gale Wings](https://bulbapedia.bulbagarden.net/wiki/Gale_Wings_(Ability)) activates regardless of the user's HP. |
| OLD\_PRANKSTER | [Prankster](https://bulbapedia.bulbagarden.net/wiki/Prankster_(Ability)) won’t fail against Dark-Types. |

**Damage Calculation Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| OLD\_CRIT\_DAMAGE | [Critical hits](https://bulbapedia.bulbagarden.net/wiki/Critical_hit) to do 2x damage; 3x with [Sniper](https://bulbapedia.bulbagarden.net/wiki/Sniper_(Ability)). |
| 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 Pokemon [stat boosts](https://bulbapedia.bulbagarden.net/wiki/Badge#Stat_boost). |
| OLD\_ATE\_BOOST | “[Ate](https://bulbapedia.bulbagarden.net/wiki/Category:Abilities_that_can_modify_move_types)” abilities give a 1.3x boost instead of 1.2x. |
| OLD\_GEM\_BOOST | [Gems](https://bulbapedia.bulbagarden.net/wiki/Gem) give a 1.5x boost instead of 1.2x. |
| OLD\_EXPLOSION\_BOOST | [Exploding](https://bulbapedia.bulbagarden.net/wiki/Explosion_(move)) moves halve the target’s Defense. |
| OLD\_HIDDEN\_POWER\_BP | [Hidden Power](https://bulbapedia.bulbagarden.net/wiki/Hidden_Power_(move)) has its Base Power calculated from the attacker’s IVs. |
| PORTAL\_POWER | Enables Hoopa-Unbound’s signature ability in Pokemon Unbound, Portal Power. This reduces the power of non-contact moves by 25%. |
| OLD\_SOUL\_DEW\_EFFECT | [Soul Dew](https://bulbapedia.bulbagarden.net/wiki/Soul_Dew) doubles Latios & Latias' Sp. Atk & Sp. Def. |
| OLD\_PARENTAL\_BOND\_DAMAGE | The second hit of [Parental Bond](https://bulbapedia.bulbagarden.net/wiki/Parental_Bond_(Ability)#Generation_VI) does 50% of the original damage instead of 25%. |

**Capturing Pokemon Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| CATCH\_TRAINERS\_POKEMON | Allows the possibility to capture trainer Pokemon by setting the CATCH\_TRAINERS\_POKEMON\_FLAG. |
| NO\_HARDER\_WILD\_DOUBLES | In Gen 5, Pokemon encountered in wild double battles were [harder to catch](https://bulbapedia.bulbagarden.net/wiki/Catch_rate#Capture_method_.28Generation_V.29) (based on how many species are owned). This feature implements that catch rate decrement. |
| CRITICAL\_CAPTURE | Allows for [Critical Capture](https://bulbapedia.bulbagarden.net/wiki/Catch_rate#Critical_capture) to occur. The odds at which this occurs can be found in the function  *bool8 CriticalCapture(u32 odds)* found in **src/catching.c**. |

**Exp. Gain Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| OLD\_EXP\_SHARE | The [Exp. Share](https://bulbapedia.bulbagarden.net/wiki/Exp._Share) acts like it did before Gen 6. |
| TRAINER\_EXP\_BOOST | Gives an Exp boost for defeating a trainer’s Pokemon. (Pre Gen 7) |
| OLD\_EXP\_SPLIT | Exp. is split amongst all participating Pokemon. (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 *gBaseExpBySpecies* found in the file **src/Tables/Experience\_Tables.c**, instead of being loaded from the Pokemon’s base stats. This is done to account for larger Exp. values that started in Gen 5. The table is pre-set to match [Gen 7 Exp. values](https://bulbapedia.bulbagarden.net/wiki/List_of_Pok%C3%A9mon_by_effort_value_yield). |

**Other Options**

|  |  |
| --- | --- |
| *Definition* | *Description* |
| ACTIVATE\_DOUBLE\_BATTLE\_FROM\_FLAG | Allow DOUBLE\_BATTLE\_FLAG to be set to active double battles for trainers if possible. |
| NO\_GHOST\_BATTLES | Disables the [Ghost battle](https://bulbapedia.bulbagarden.net/wiki/Ghost_(literal)) feature from Pokemon Tower in Lavender town. |
| GEN\_4\_PLAYER\_RUNNING\_FIX | Increase the lag between frames as the player OW runs, to simulate a more accurate Gen 4 running effect. |
| GEN4\_PLUS\_SELECTION\_SCREEN | This does not give the [Gen 4+ selection screen](https://www.pokecommunity.com/showthread.php?t=414022), it only adds features that supports it. |
| OBEDIENCE\_CHECK\_FOR\_PLAYER\_ORIGINAL\_POKEMON | Opens up the possibility that the Player's Pokemon can [disobey](https://bulbapedia.bulbagarden.net/wiki/Obedience) them, as opposed to just traded Pokemon. |
| WILD\_ALWAYS\_SMART | All wild Pokemon use AI features meant for trainers. |
| HAIL\_IN\_BATTLE | Enables the [Hail](https://bulbapedia.bulbagarden.net/wiki/Hail_(weather_condition)) weather effect in battle when the OW weather is set to WEATHER\_STEADY\_SNOW (0x7). |
| FOG\_IN\_BATTLE | Enables the [Fog](https://bulbapedia.bulbagarden.net/wiki/Fog) 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 is done in Gen 4+ |
| DONT\_HIDE\_HEALTHBOXES\_ATTACKER\_STATUS\_MOVES | If HIDE\_HEALTHBOXES\_DURING\_ANIMS 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 lists in **src/Tables/Music\_Tables.c** and can be modified by changing the values in *gClassBasedTrainerEncounterBGM*. Any class not defined in the array will be automatically set to BGM\_EYE\_BOY. |

## Other Necessary Features Setup

### Mega Evolution / Primal Reversion / Ultra Burst

Before setting up Mega Evolution, your Pokemon Editor of choice will need to be modified:

**G3T**:

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



**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 254th evolution method is set to *Mega Evolution*:



1. Modify “evomethodsproperties” such that the 254th method is set to *Item*.

[Mega Evolution](https://bulbapedia.bulbagarden.net/wiki/Mega_Evolution)

Mega Evolution set up is similar to the how the [previous](https://www.pokecommunity.com/showthread.php?t=348182) Mega Evolution system by Touched was set up. If a Pokemon is able to Mega Evolve, Mega Evolution can be trigged by pressing start on the move menu once the mega trigger appears.

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



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



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

1. 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:



Don’t forget to give the trainer’s Pokemon the relevant Mega Stone to hold!

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



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 Pokemon 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:

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 Pokemon 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 Pokemon 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.

1. 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!

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

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 Pokemon, effectively allowing for two Mega Evolutions per side during any given battle.
* Mega Evolution is not prevented if any Pokemon on the side Ultra Bursted or underwent Primal Reversion.
* If Rayquaza uses a Z-Move, it’ll be unable to Mega Evolve.

[Primal Reversion](https://bulbapedia.bulbagarden.net/wiki/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.

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



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).

1. Modify Kyogre and Groudon’s evolution data in G3T to match the following:



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 Pokemon 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.

1. Set up the primal forms’ evolution data in G3T to match the following:



Notice that the items are left blank. Also notice that both Primal Pokemon 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**:



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



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

[Ultra Burst](https://bulbapedia.bulbagarden.net/wiki/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.

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



1. Modify **both** Necrozma forms’ evolution data in G3T to match the following:



In the above images:

* “Nothing required” is set to the *Ultranecrozium 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 Pokemon 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.

1. Set up the *Ultra Necrozma’s* evolution data in G3T to match the following:



In the above image:

* The items are left blank.
* The first unknown byte is set to 1. 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. *Ultra Necrozma* will always revert to the form is *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 trigged 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).

### Z-Moves

//TODO

### Trainer Sliding Messages

//TODO

### Trainer Backsprites

//TODO

### Battle Frontier

//TODO

### Battle Music

//TODO

### Battle Terrain

//TODO

### Poke Balls

//TODO

### Pickup

//TODO

### 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 Advance Map to the wild data for ROUTE 1, you should see this:



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[] =”:



^ 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 Advance Map, it’s time to make modifications.

Change all the “PKMN\_PIDGEY” to “PKMN\_HOOTHOOT”:



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:



The only thing left to do now is define “*MAP\_ROUTE\_1*”. Go back to Advance Map 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)



**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 Advance Map.

For water, fishing, or Rock Smash data, follow the same steps, but look [here](https://github.com/pret/pokeemerald/blob/c74bfbe11017e4f937dc6466a93a6d3dc72cdac7/src/data/wild_encounters.h) to see how to structure those kinds of wild datasets.

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




# Other Features Included

### Save Expansion

//TODO

### Updated Flutes

The [Black Flute](https://bulbapedia.bulbagarden.net/wiki/Black_Flute) and [White Flute](https://bulbapedia.bulbagarden.net/wiki/White_Flute) have been updated to the standards from ORAS.

### Trainer Face Fix

The player will face trainers before battle.

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

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 ‘“I have done it.”

callstd MSG\_FACEPLAYER

end

# Creating New Battle Mechanics

## Moves

## Abilities

## Poke Balls

# Credits

**Graphics**:

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

*Bela* - Poke Balls

*Solo993* - Backsprites

*canstockphoto.ca* - Battle Backgrounds

**Code**:

*Skeli* - A Bunch of Stuff

*Ghoulslash* - Attack Animations, Various Code

*Lixdel* - Attack Animations

*Pret* - PokeRuby, PokeFireRed, PokeEmerald

*Sagari* - Trainer Class Poke Balls, Pickup Update

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

*FBI* - Expanded Saveblock