

***Dr.Pulley***<sup>®</sup>

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**HiT Clutch**

User Handbook 2008

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# Instruction of *Dr.Pulley®* HiT Clutch

## 1. HiT Clutch

HiT clutch — High Thrust clutch

*The source of Grip Force is Unique*

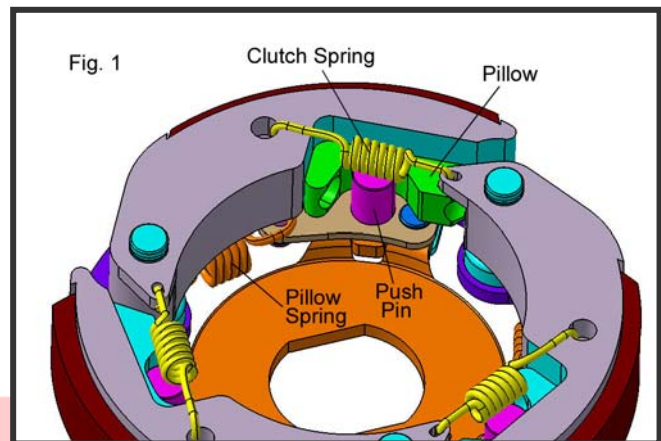
### Conventional clutch

---- The grip force comes only from the centrifugal force and the friction coefficient of the wear pad on the clutch weight.

### HiT clutch

---- The grip force comes not only from the centrifugal force and the friction coefficient of clutch weight, but most importantly from the compression mechanism—push pin & pillow system of HiT Clutch (Fig.1 ).

The push pin can receive the torque from the engine and then compress the clutch weight to grab the clutch bell very tightly.



## 2. The Structure of HiT Clutch

There are two types of springs installed in a HiT Clutch (Fig.1 ). One is the well-known clutch spring,

used to determine the rev at which the clutch weight is going to engage (i.e., initial clutch-in) with the clutch outer.

The other is the pillow spring (only in HiT clutch), used to determine the timing when the push pin can receive the torque transmitted from the engine and thrust against the pillow to compress the clutch weight to grab the clutch outer very tightly.

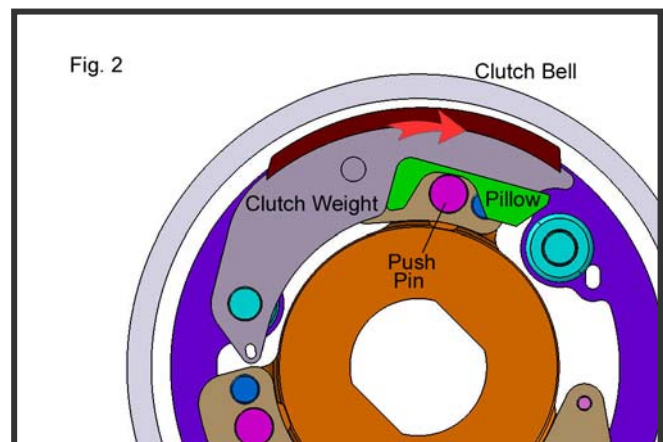
## 3. The Operation of HiT Clutch

### Step 1:

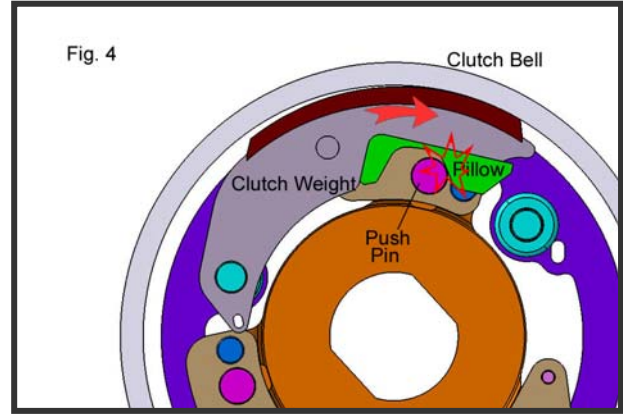
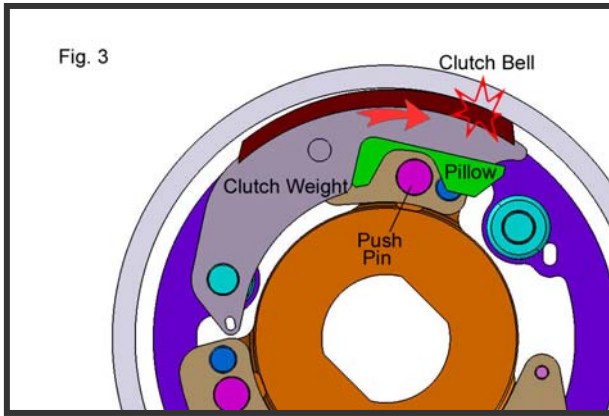
The clutch weight is driven to rotate but the initial rev is not high enough, so the clutch weight and the bell are in non-contacting state (Fig.2.)

### Step 2:

When the rotating speed of HiT Clutch is high enough, the clutch weight will centrifugally fly outward to touch the clutch bell to proceed the initial slippery clutch-in. The clutch weight is slippily contacting with the bell but the push pin is unactuated yet (Fig.3).



The friction resistance is produced between the clutch wear pad and the inner surface of clutch bell during the stage of slippery clutch-in.



**Step 3:**

When the friction resistance is higher than the predetermined distortion strength of pillow spring, the pillow spring will be deformed or extended, and the push pin will thrust into the pillow to compress the clutch weight to grab the clutch outer very tightly. (Fig.4, the push pin is actuated and pressed against the pillow)

**4. Grip Force vs. Pillow Angle for Two/Four-Wheel Vehicle**

The strength of grip force provided by HiT is effected by the contact angle [defined by the degree of pillow, such as 25, 30, 35, 40 or 60 degree] between the push pin and the contacting surface of pillow. A pillow with higher angle can provide stronger grip force to reduce or even eliminate the clutch slippage.

**4.1 Pillow, Pillow Spring and Clutch Spring Installed**

- For two-wheel CVT vehicles or scooters, the pillows installed can be 25 to 40 degree. **Normally 35 degree pillows are installed** unless specified;
- For four-wheel CVT vehicles, ATV, Buggy or GoKart, the pillow installed can be 45 to 60 degree. **Normally 45 degree pillows are installed** unless specified.

**4.2 Example** Combination of pillow type/ pillow spring/ clutch spring in HiT-161301

	Scooter				ATV			
	Stock Cylinder		Modified Cylinder		Stock Cylinder		Modified Cylinder	
	Clutch Engaged Rev <sup>1</sup> Normal	Clutch Engaged Rev <sup>1</sup> High	Clutch Engaged Rev <sup>1</sup> Normal	Clutch Engaged Rev <sup>1</sup> High	Clutch Engaged Rev <sup>1</sup> Normal	Clutch Engaged Rev <sup>1</sup> High	Clutch Engaged Rev <sup>1</sup> Normal	Clutch Engaged Rev <sup>1</sup> High
Pillow Deg.	J035	J045-060	J050-060	J045-060	J050-060	J050-060	J050-060	J050-060
Pillow Spring <sup>2</sup>	M → H	N → M	S → H	N → M	N → H	N → H	M → H	N → H
Clutch Spring <sup>3</sup>	S → M	M → Ht	S → H	M → HT	S → Ht	S → Ht	S → H	M → Ht

Note:

- 1 Engaged Rev: Normal rev means <4500 rpm; High rev means >5000 rpm
- 2 Pillow Spring selection: N (none), S (soft), M (medium), H (hard)
- 3 Clutch Spring selection: S (soft), M (medium), H (hard), Ht (hardest)

### 4.3 Example HiT Clutch vs. Pillow

1. HiT Clutch installed with 30-45 degree pillows is for a scooter mounted with a stock cylinder and requiring the clutch get engaged at a normal rev
2. HiT Clutch installed with 45-50 degree pillows is for a scooter mounted with a modified cylinder and requiring the clutch get engaged at a higher rev [>5000 rpm]
3. HiT Clutch installed with 60 degree pillows is for
  - i.) a scooter mounted with a modified cylinder and requiring the clutch get engaged at a normal rev [< 4500 rpm], or
  - ii.) a four-wheel CVT vehicle -- ATV/ Buggy/ GoKart/ Microcar /Snowmobile

## 5. Benefits of HiT Clutch

- Grip force much stronger
- Clutch slippage much less
- Stop losing power at takeoff and re-acceleration
- Transmission efficiency of clutch system much improved
- Excellent throttle response
- Excellent capability of hillclimbing, roundabout and overtaking

## 6. Tuning HiT Clutch

The unique mechanism of HiT Clutch can provide solid engagement to upgrade the acceleration and riding performance of vehicle.

Various combinations of **actuation timing of HiT clutch**, **performance of engine** and **CVT transmission** may result in different behaviors of vehicle as the following:

1. Very powerful at takeoff to jump into the air ( wheelie )
2. Solid engaged to have powerful takeoff and comfort riding
3. Solid engaged to have powerful takeoff but having vibration at takeoff
4. Solid engaged but upgrade not obviously

The pillow springs and clutch springs originally installed in HiT clutch are optimum to upgrade the vehicle to enable **powerful takeoff and comfortable riding**. When the tuning of HiT is required, first select the clutch spring and then secondly determine your preferred pillow spring by testing different pillow springs with the selected clutch spring.

### Troubleshooting

<u>Problems</u>	<u>Possible Causes</u>	<u>Suggested Solutions</u>
1. Powerful takeoff but unable to jump into the air*	Engine power too weak	Tune the cylinder.
	Actuation timing too late.	Replace with softer pillow spring or use no pillow spring
	Engaged rev too low.	Replace with harder clutch spring.

2.	Powerful takeoff but no riding comfort.	Actuation timing too early.	Replace with harder pillow spring.
		Engaged rev too high.	Replace with softer clutch spring.
3.	Powerful takeoff but having vibration at initial stage	Actuation timing too early.	Replace with harder pillow spring.
		Engaged rev too low.	Replace with harder clutch spring.
4.	Smooth takeoff but solid engagement not obvious	Belt slippage** happened in the front driving pulley.	Replace with heavier roller.
		Belt slippage happened in the rear driven pulley.	Replace with harder torque spring.
		Belt slippage happened in the pulley.	Replace with a new belt.

\* It's dangerous to actuate the throttle fully and suddenly when softer pillow spring and harder clutch spring are used at the same time, as the vehicle might jump into the air abruptly to cause serious damage or injury.

\*\* The belt slippage can happen in the pulley due to the solid engagement and less slippage with the clutch bell. The abnormal surface temperature of pulley can be taken as checkpoint to see whether the belt slippage exists.

-- WARNING --

Performance parts are not road legal!! and are designed for close circuit, off-road or exhibition use only. Improper installation can result in serious injury. Purchasers are responsible for all foreseeable or unforeseeable consequences of using any performance parts.

## 7. Reference- Types of HiT Clutches

### 50- 100cc

1. HiT151201 -----for bell 105mm
2. HiT161301+107P -----for 107mm of Piaggio/ Honda
3. HiT161301+107M -----for 107mm of Minarelli/ Yamaha
4. HiT161302 -----for 112mm of Minarelli/ Piaggio
5. HiT161303 -----for 110mm of Burgman125

### 125- 250cc

6. HiT181401+125G -----for Gy6 125~200
7. HiT201201+120C -----for Majesty/ Cygnus125
8. HiT231801 ----- for Kymco 250, CFMOTO/eng.172MM, bell 153mm
9. HiT231802-----for CN250, Burgman250, CFMOTO/eng.172A/B/C, bell 135mm
10. HiT201202 -----for Majesty250 [1999], bell 135mm
11. HiT201203 -----for Piaggio 125~250, 4t, bell 134mm
12. HiT201204 -----for Piaggio 125~180, 2t, bell 134mm
13. HiT201205 -----for SYM RV250, Majesty 250 [2000], bell 145mm

### 400- 600cc

14. HiT251701 -----for X9 500,Burgman 400 [2007], bell 160mm
15. HiT251702 -----for Xciting 500, bell 160mm
16. HiT251703 -----for Burgman 400 [2006], bell 150mm
17. HiT251705 -----for Majesty 400, bell 160mm
18. HiT251706 -----for Honda SilverWing 400/600, bell 160mm

## 8. Reference- Specifications of Pillow Springs/ Clutch Springs

### Pillow Springs

1. For HiT 151201/ 161301/ 161302/ 161303

Part No.	Color	Strength, Kg
SP 1425005095-PL	Purple	5.5
SP 1424705095-BL	Blue	7.0
SP 1423005095-RD	Red	8.5
SP 1422605095-NA	None	9.2

2. For HiT 181401/ 201201/ 201202/ 201203  
201204/ 201205/ 231801/ 231802/ 251701  
251702/ 251703/ 251705/ 251706

Part No.	Color	Strength, Kg
SP 1832565105-RD	Red	12.5
SP 2032365103-YL	Yellow	20.0
SP 1828060105-BL	Blue	23.0
SP 2031565103-PK	Pink	25.0
SP 2232580103-GD	Gold	27.0
SP 2232570104-GR	Green	33.0
SP 2231070104-PL	Purple	38.0

### Clutch Springs

1. For HiT151201/ 161301/ 161302/ 161303

Part No.	Color	Strength, Kg
SCD 1628508095-BL	Blue	12
SCD 1628708080-BK	Black	14
SCD 1729007082-YL	Yellow	19
SCD 1829007084-RD	Red	24
SCD 2027805103-PL	Purple	31
SCD 2028306090-GR	Green	39

4. For HiT201202/ 201203/ 201204/ 231802

Part No.	Color	Strength, Kg
SCM 2028008102-BL	Blue	18
SCM 2028006104-RD	Red	24
SCM 2027006104-YL	Yellow	27
SCM 2228006104-GR	Green	34

2. For HiT181401

Part No.	Color	Strength, Kg
SCG 2032007108-BL	Blue	12.0
SCG 2032007104-BK	Black	14.5
SCG 2232006120-YL	Yellow	16.5
SCG 2232006110-RD	Red	20.0

5. For HiT201205/ 231801/ 251701/ 251702  
251703/ 251705

Part No.	Color	Strength, Kg
SCH 2037810106-BL	Blue	12
SCH 2038009106-YL	Yellow	16
SCH 2036610106-RD	Red	20
SCH 2238010104-PL	Purple	31
SCH 2237009104-GD	Gold	38

3. For HiT201201

Part No.	Color	Strength, Kg
SCJ 1828007102-BL	Blue	8.5
SCJ 1828006100-BK	Black	14.0
SCJ 1928006102-YL	Yellow	19.0
SCJ 2028006104-RD	Red	24.0

Enjoy Driving With Your Dr.Pulley

