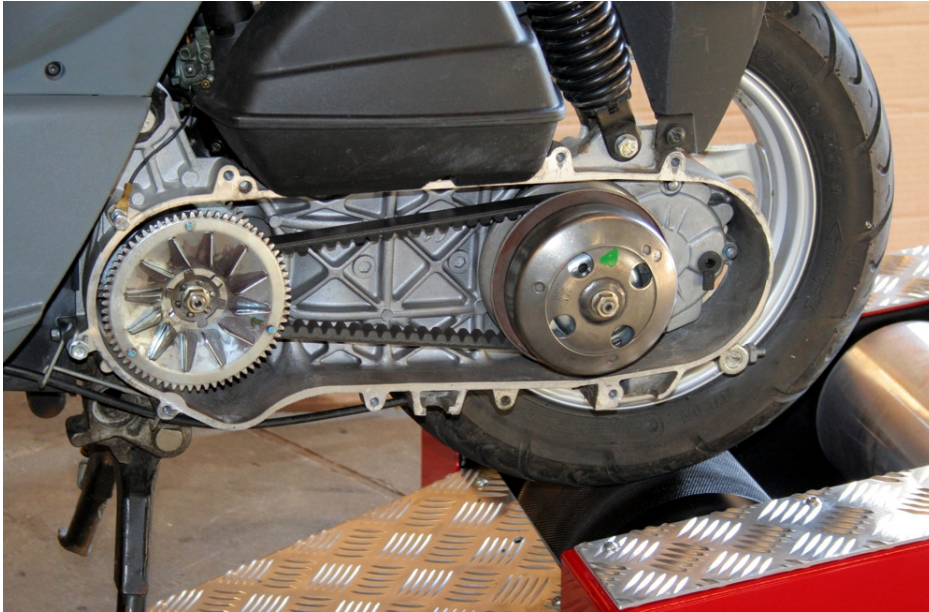


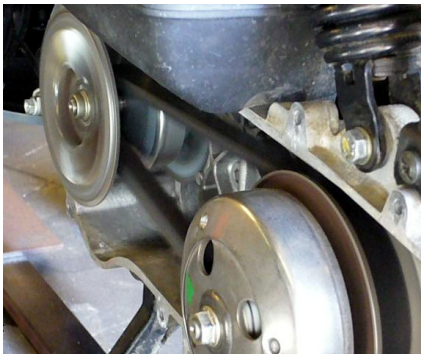
MJPOWER ENGINEERING

VARIOMATIC TUNING GUIDE.

THE OBJECT OF THIS GUIDE IS TO EXPLAIN THE FUNCTION OF THE VARIOMATIC CLUTCH AND THE RELATIONSHIP BETWEEN THE WEIGHT OF THE VARIOMATIC ROLLERS AND THE ENGINE SPEED.

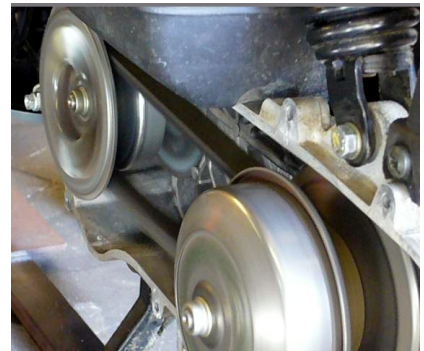


NORMAL VARIOMATIC BELT-DRIVE LAYOUT ON A SMALL SCOOTER. ENGINE IS SHUT-OFF AND THE BELT IS SITTING AT THE LOW-GEAR POSITION WITH A SMALL DIAMETER DRIVE RADIUS ON THE CRANKSHAFT AND A LARGE DRIVEN RADIUS AT THE CENTRIFUGAL CLUTCH.



THE LEFT PICTURE SHOWS THE UN-EXTENDED VARIOMATIC CLUTCH WITH A WIDE GAP BETWEEN FRONT PLATE AND CLUTCH.

THE RIGHT PICTURE CLEARLY ILLUSTRATES THE EFFECT OF THE ROLLERS WHEN THEY ARE SLUNG OUT FULLY BY THE CENTRIFUGAL FORCE OF THE CRANKSHAFT ROTATIONAL SPEED.

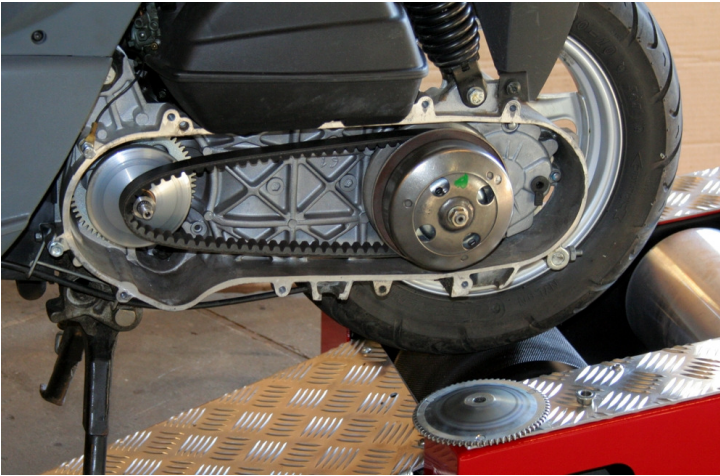


ENGINE AT IDLE, BELT IN LOW GEAR POSITION AND THE CENTRIFUGAL CLUTCH NOT ACTIVATED.



ENGINE AT FULL SPEED, BELT IN HIGH GEAR POSITION WITH THE CENTRIFUGAL CLUTCH FULLY ENGAGED.

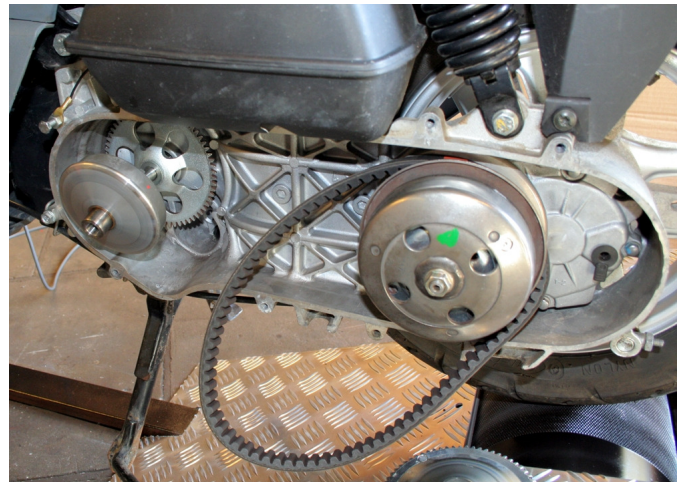
A VARIOMATIC TRANSMISSION IN DIFFERENT STAGES OF DISASSEMBLY.



FIRST STEP IS TO REMOVE THE CENTER NUT ON THE CRANKSHAFT SO THE FRONT PLATE CAN BE REMOVED.

NEXT THE VARIOMATIC CLUTCH IS REMOVED FROM THE CRANKSHAFT.

USE YOUR FINGERS TO ENSURE THAT THE UNIT DOESN'T FALL APART AND DROP THE ROLLERS ALL OVER THE FLOOR, BUT INSTEAD SLIDES OFF AS A COMPLETE ASSEMBLY.



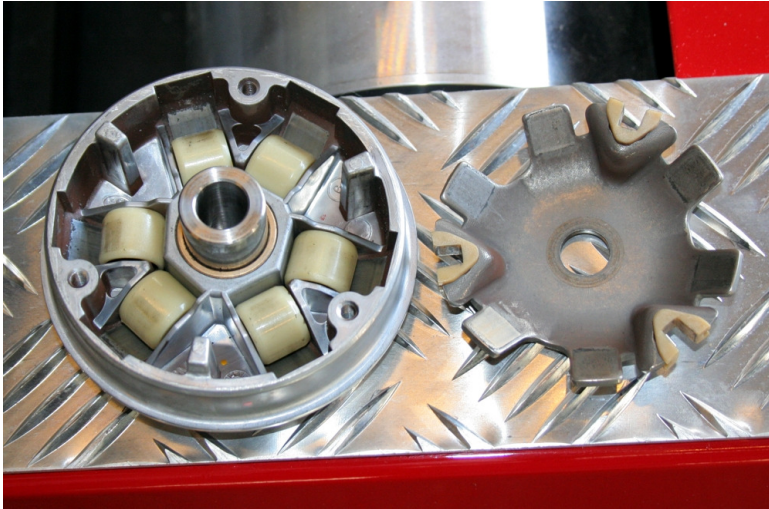
THE VARIOMATIC CLUTCH UNIT.

FROM THE LEFT:

CENTER NUT.

FRONT PLATE.

THE VARIOMATIC CLUTCH.



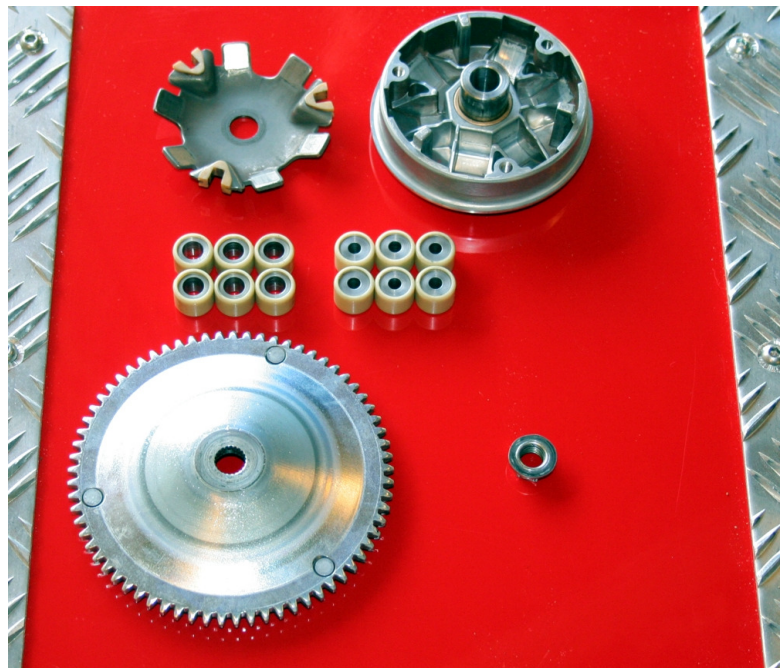
THE BACK COVER OF THE VARIOMATIC CLUTCH IS REMOVED AND THE ROLLERS CAN BE SEEN.

THE ROLLERS ARE ESSENTIAL TO THE FUNCTION OF THE VARIOMATIC. THE FURTHER THEY ARE SLUNG AWAY FROM THE CENTER BY THE CENTRIFUGAL FORCE WHEN THE CRANKSHAFT ROTATES, THE FASTER THE REAR WHEEL SPINS, BUT THE CRANKSHAFT IS KEPT AT THE SAME RPM.

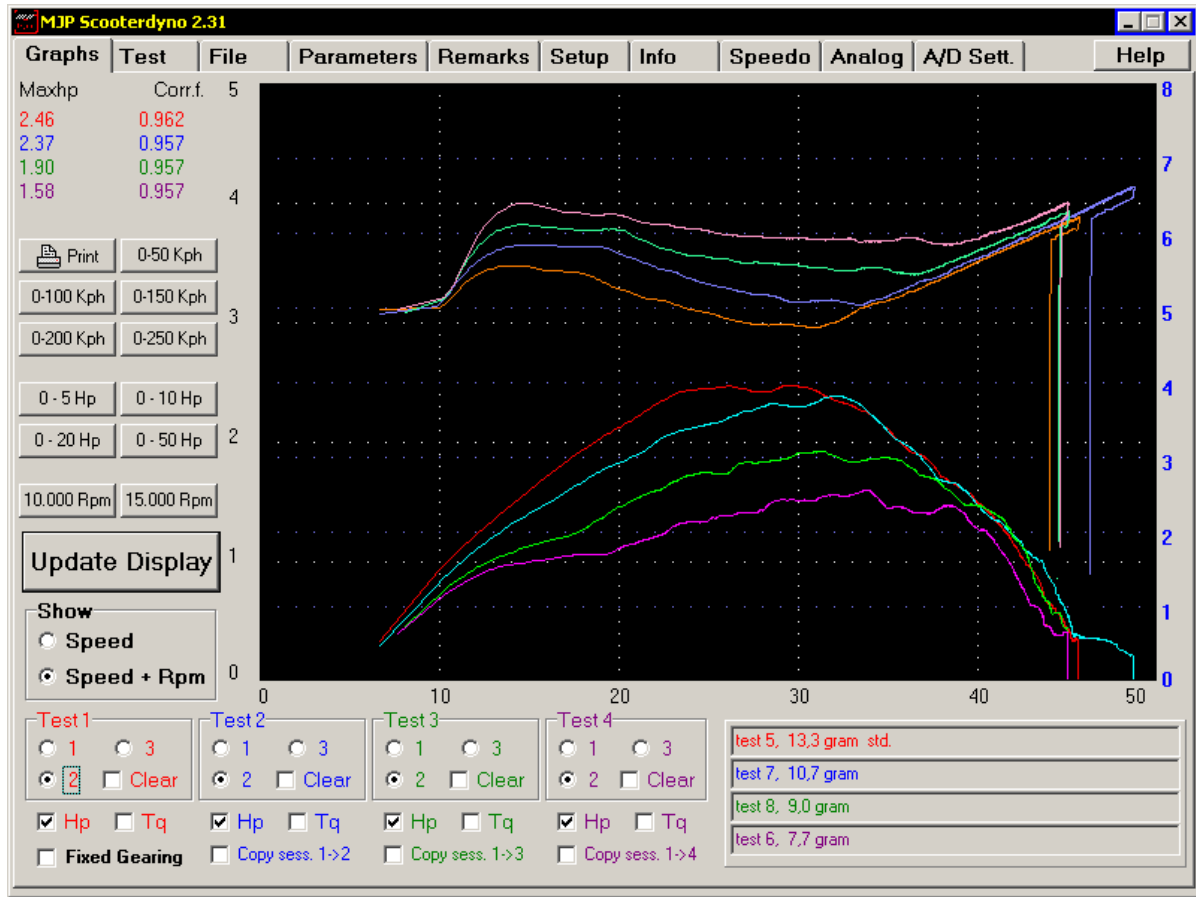
HERE'S THE COMPLETE VARIOMATIC CLUTCH SHOWN DISASSEMBLED WITH TWO DIFFERENT SETS OF ROLLERS.

ON THE LEFT ARE 6 LIGHT ROLLERS THAT WILL HOLD THE ENGINE AT A HIGH RPM DURING ACCELERATION.

ON THE RIGHT 6 HEAVY ROLLERS; BECAUSE OF THEIR GREATER WEIGHT THESE ROLLERS WILL NOT NEED AS HIGH A CRANKSHAFT RPM TO BE SLUNG OUT TO THE SAME DISTANCE THAT WILL GIVE THE SAME SPEED ON THE REAR WHEEL.



TESTS RUN WITH DIFFERENT ROLLER WEIGHTS.



THE GRAPHS SHOW 4 TESTS MADE WITH 4 DIFFERENT WEIGHTS OF ROLLERS.

THE CENTRIFUGAL CLUTCH ENGAGES AROUND 10 KPH AND THE VARIOMATIC ROLLERS CONTROLS THE RPM OF THE CRANKSHAFT AFTER THAT.

ON THIS SCOOTER THE RPM DROPS A LITTLE FROM THE LEVEL AT 15-20 KPH TO THE FULLY STABILIZED LEVEL AT 30 KPH, THIS CAN VARY BETWEEN DIFFERENT VARIOMATIC DESIGNS, SOME TYPES ARE BETTER TO HOLD A STEADY RPM THROUGHOUT THE FULL SPEED RANGE.

TEST 1 IS MADE WITH THE HEAVIEST SET (13,3 GRAMS) AND IS REPRESENTED BY THE RED HP AND ORANGE RPM GRAPHS.

MAX. HP IS 2,46 AND THE CRANKSHAFT RPM IS HELD AT APP. 4800 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 32 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

TEST 2 IS MADE WITH 10,7 GRAM ROLLERS AND IS REPRESENTED BY THE CYAN HP AND BLUE RPM GRAPHS.

MAX. HP IS 2,37 AND THE CRANKSHAFT RPM IS HELD AT APP. 5100 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 34 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

TEST 3 IS MADE WITH 9,0 GRAM ROLLERS AND IS REPRESENTED BY THE GREEN HP AND LIGHT GREEN RPM GRAPHS.

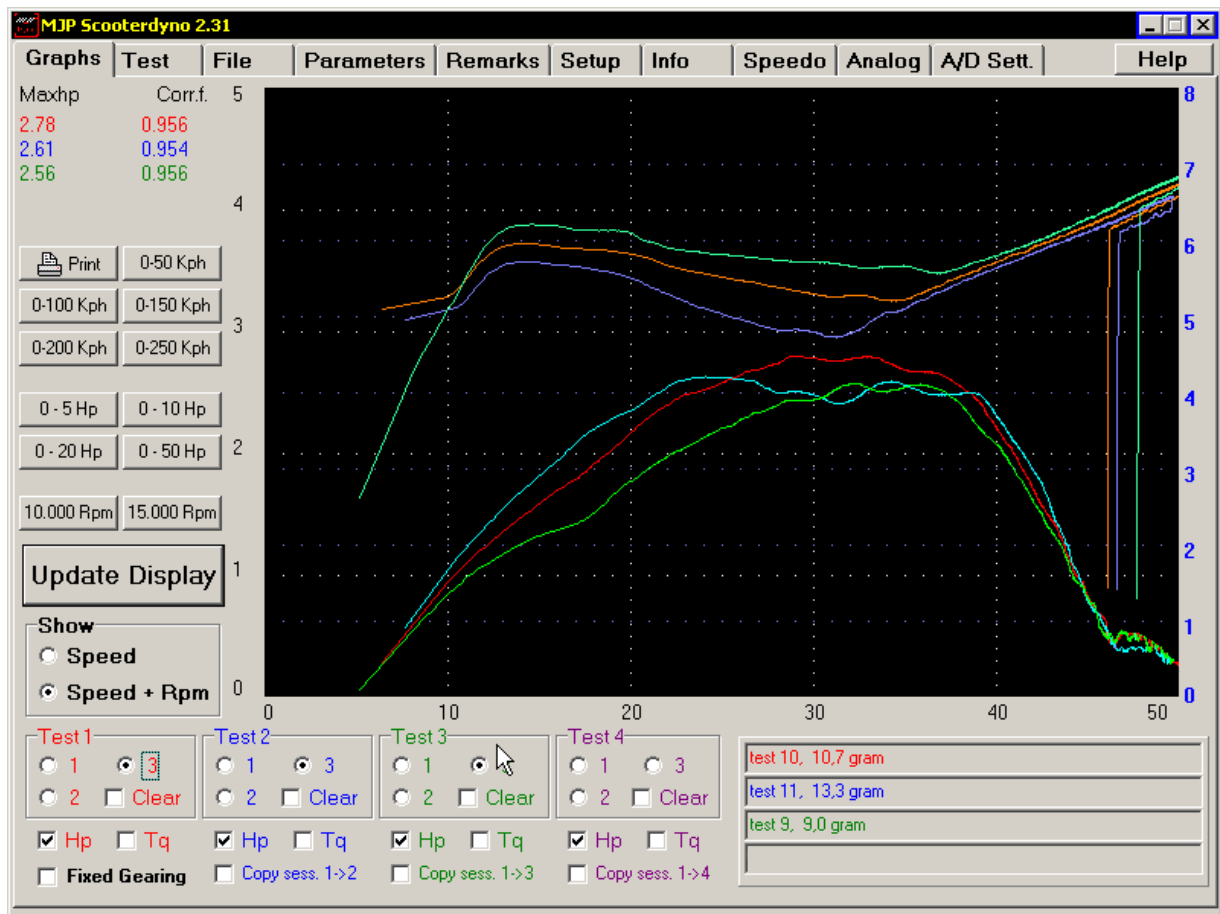
MAX. HP IS 1,90 AND THE CRANKSHAFT RPM IS HELD AT APP. 5600 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 37 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

TEST 4 IS MADE WITH 7,7 GRAM ROLLERS AND IS REPRESENTED BY THE PURPLE HP AND PINK RPM GRAPHS.

MAX. HP IS 1,58 AND THE CRANKSHAFT RPM IS HELD AT APP. 6000 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 39 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

CONCLUSION: THE TESTS CLEARLY SHOWS THAT THE ENGINE ISN'T CAPABLE OF REV'ING HIGH ENOUGH TO USE ANY OF THE ROLLERS THAT ARE LIGHTER THAN THE ORIGINAL HEAVY ONES.

TESTS RUN WITH DIFFERENT ROLLER WEIGHTS 2.



THE GRAPHS SHOW 3 TESTS MADE WITH 3 DIFFERENT WEIGHTS OF ROLLERS.

IN THIS SERIES OF TESTS THE POWER OF THE SCOOTER IS INCREASED SLIGHTLY BY CHANGING THE EXHAUST,

TEST 1 IS MADE WITH 10,7 GRAM ROLLERS AND IS REPRESENTED BY THE RED HP AND ORANGE RPM GRAPHS.

MAX. HP IS 2,78 AND THE CRANKSHAFT RPM IS HELD AT APP. 5200 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 35 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

TEST 2 IS MADE WITH 13,3 GRAM ROLLERS AND IS REPRESENTED BY THE CYAN HP AND BLUE RPM GRAPHS.

MAX. HP IS 2,61 AND THE CRANKSHAFT RPM IS HELD AT APP. 5100 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 32 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

TEST 3 IS MADE WITH 9,0 GRAM ROLLERS AND IS REPRESENTED BY THE GREEN HP AND LIGHT GREEN RPM GRAPHS.

MAX. HP IS 2,56 AND THE CRANKSHAFT RPM IS HELD AT APP. 5700 BY THE VARIOMATIC CLUTCH. POINT OF VARIOMATIC FULL EXTENSION IS 37 KPH, AFTER THIS POINT THE ENGINE RPM INCREASES LINEAR WITH THE REAR WHEEL SPEED.

CONCLUSION: WITH THE INCREASED POWER OF THE ENGINE THE 13,3 GRAM HEAVY ROLLERS NO LONGER REPRESENT THE OPTIMAL CHOICE, THE NEW EXHAUST HAS MOVED RPM WHERE THE ENGINE PRODUCES ITS MAXIMUM HP UP 400 RPM RESULTING IN THE 10,7 GRAM ROLLERS TO BE THE BEST CHOICE.

BELOW 25 KPH THE 13,3 GRAM ROLLERS GIVE AN INTERMITTENT POWER INCREASE BECAUSE THE VARIOMATIC DESIGN ON THIS SCOOTER IS SOMEWHAT SLOW TO STABILIZE THE ENGINE RPM DURING INITIAL ACCELERATION LETTING THE ENGINE REV A BIT TOO HIGH FOR OPTIMUM POWER.