

## Bravo 21 Transmissions

Over the last year we have updated and improved the Bravo 21 with several technical changes as we have discovered and reacted to areas of concern that did not show up as problems during testing.

We are hard at work for quick solutions to any and all technical issues that are reported to us.

### Bravo 21 Transmissions

We have heard from some customers about the following random transmission issues. We will also address what has been done to date and what steps we have planned for the future with the drive system.

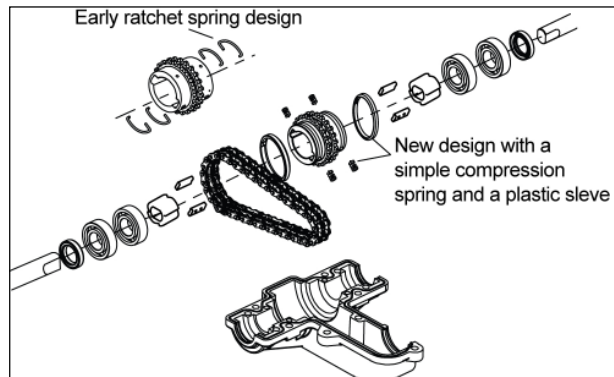
#### 1. Ratchet spring failure

Failure Symptom – one or both wheels stop driving and sometimes a cracked chain housing.

The design of placing the freewheel system inside the transmission housing and protecting the system from the elements has worked very well except for an unfortunate issue with the ratchet spring. Our initial execution with a specialty spring shape worked great in testing but proved itself to be very tolerance sensitive once in production. This means; some transmissions will continue to run forever – while some springs will fail prematurely.

In December of 2009 we began deliveries of mowers with a new ratchet spring design (a simple compression spring). We have had zero reported failures with the new solution.

**Remedy:** Replace the complete transmission.



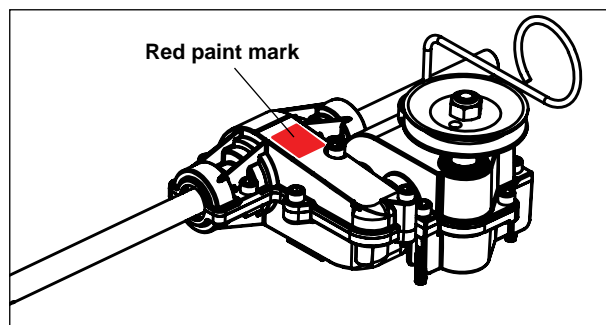
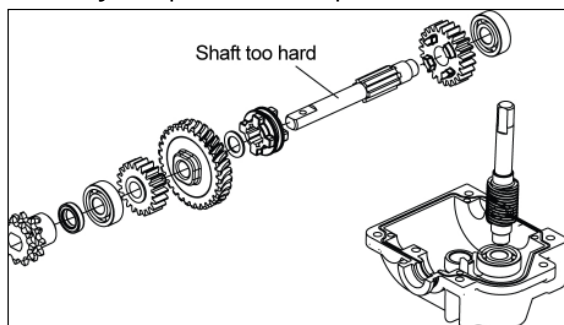
#### 2. Transmission main shaft failure

Failure Symptom – the transmission quits driving as if the shifter is placed in the neutral position.

During the spring and summer of 2010 we have encountered some failures to the transmission shaft. We have identified this to be a heat treatment issue on some shafts – shafts are too hard and brittle. We have not been able to identify any specific batch of shafts or production code on the transmissions.

Transmissions marked with red paint on the chain housing have an updated heat treatment process on the shaft.

**Remedy:** Replace the complete transmission.



### 3. Other transmission improvements

We have experienced a few other issues that are currently being acknowledged and incorporated as improvements to current and future production.

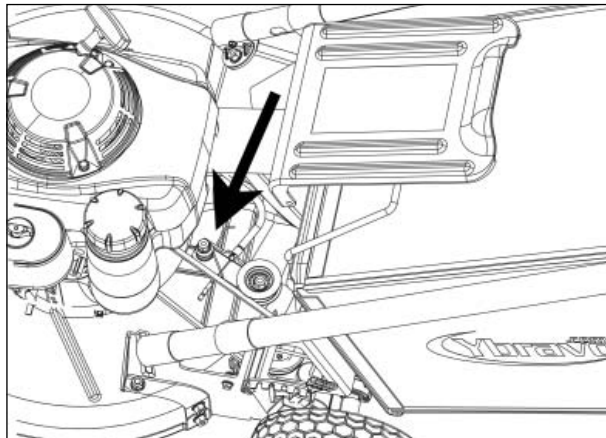
#### - Shift lever breaking

If handled too rough it has happened on a few units that the shift lever has broken. If this failure occurs during the warranty period we will take care of the customer with a replacement transmission (old transmission to be returned to Ybravo.com). Currently, to replace the shift lever it involves a complete tear down of the transmission. During 2011 we will update the design to allow the shift lever to be replaced from the outside without even removing the transmission from the mower.

#### - High “pullback” force on a new mower

This problem is typically minimized after a brief break in period of the belt, pulleys and transmission. We are however taking several steps to reduce the pull back force on new products out of the box. This involves measuring the assembled transmission for pullback, a longer run time in the test stand for a new transmission, adjusting the tolerances at the input shaft seal ring, etc. We will also introduce a new drive belt with dryer – less rubbery - surface in the first quarter of 2011.

**NOTE:** If a customer experiences an intermittent high pullback force on a used mower the problem is most likely a disconnected/broken return spring (part #: 201148-1) for the tensioning pulley.



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### 4. Ease of service

To make servicing the bearings in the rear wheel brackets easier the transmission axles have received a chrome finish. This prevents rust next to the bearing thus making it easier to remove the wheel bracket from the shaft. We also offer a wheel bracket puller (part #: 201176-1) that can be used to assist the removal of the bearing from the shaft.

