MOTORCYCLE SERVICE NEWS

NUMBER 259

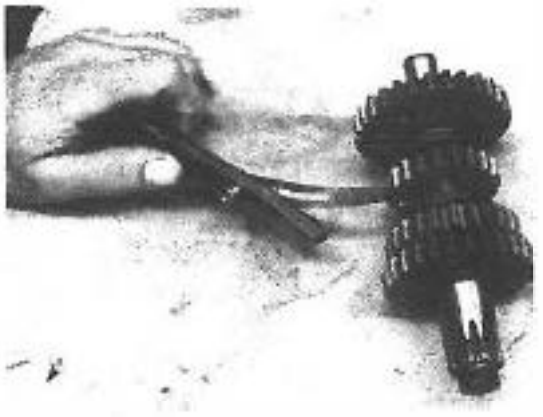
PAGE 1 of 4

YAMAHA INTERNATIONAL CORPORATION
MONTEBELLO, CALIFORNIA
DATE 1-15-71

ALL MODELS — SPACING TRANSMISSION AXLES AND GEARS

The drive axle and individual gears must have minimum side-to-side play to prevent "popping out of gear". In many cases, shims are installed at the factory. However, each time any engine is reassembled, the transmission and gears should be measured and side play adjusted when necessary with additional shims. This procedure will reduce repeated transmission damage and customer dissatisfaction (such as DT1's repeatedly popping out of 3rd gear), and will increase service department profitability.

MEASURING INDIVIDUAL GEAR SIDE PLAY:



A spinning gear is usually held in place either by (1) a circlip and shim on both sides, or (2) a circlip and shim on one side, with a shouldered section of the axle on the other side. Any spinning gear should have between .003" - .005" side play for maximum efficiency. If there is no side play, the gear will bind up. If there is too much side play, the gear will move over when the sliding gear tries to engage it. This can cause the engaging dogs to become rounded. If a shim is needed, measure the axle diameter, select the proper shim from the list on page four (arranged by shim sizes), and install so the spinning gear is moved toward the sliding gear that engages it (to maintain complete engagement).

MAIN AXLE SPACING:

Since tightening the clutch retaining nut pulls the main axle completely to one side, adjustment of this axle is normally not necessary. (Axle cannot move from side to side). That is, however, as long as factory installed shims are kept in place on the right end of the axle (parts book will verify size and location). Refer to drawing #4 for standard main axle shim location.

MEASURING DRIVE AXLE SIDE PLAY:

1. Measure distance between axle bearings in case. Measure the depth of each case, from top of the case down to the transmission bearing inner race. Adding the depth of both case halfs (subtracting thickness of flat edge laid across case to assist in measurement) will give total distance between bearings.

-Continued-

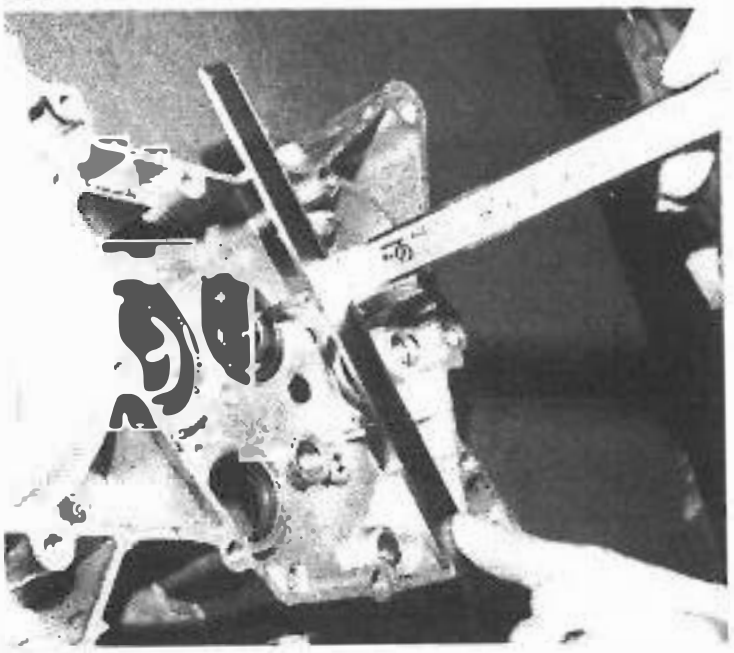
MOTORCYCLE SERVICE NEWS

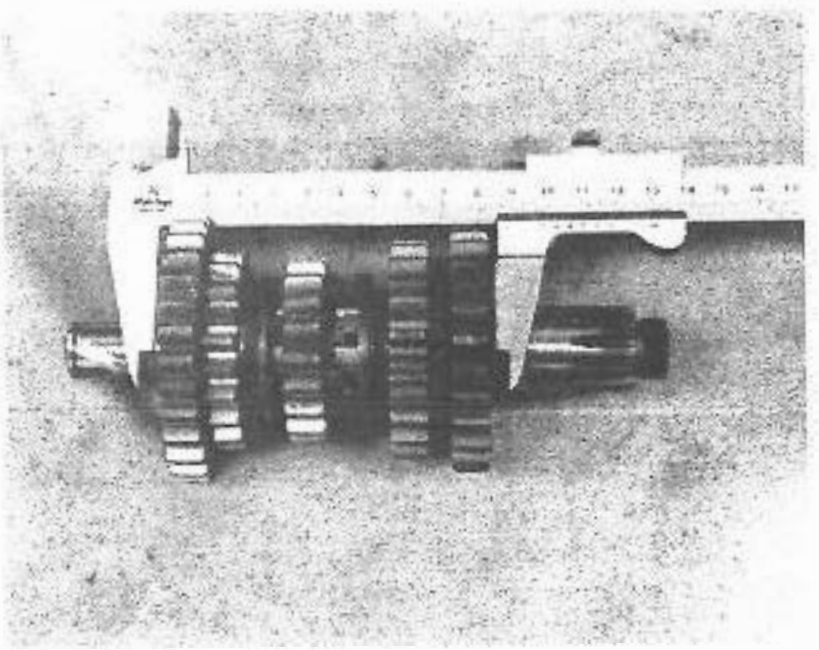
NUMBER 259

PAGE 2 of 4

YAMAHA INTERNATIONAL CORPORATION
MONTEBELLO, CALIFORNIA
DATE 1-15-71

ALL MODELS — SPACING TRANSMISSION AXLES AND GEARS - continued





2. Measure transmission shaft length. Measure transmission axle length from one bearing contact surface to the other bearing contact surface (across gears and circlips, if any on the outer ends). Include standard shims usually included in the engine and listed in the parts book.

3. Combine measurements to determine side play. Subtract transmission axle length from total case depth. The remainder will be the amount of the side play.

Example:		Results:
Total case depth	= 6.111"	.011" is excessive
Axle length	= 6.100"	-.003" recommended side play
Side-to-side play	= .011"	.008" must be taken up

As a general rule, half the excessive side play should be taken up at each end of the axle. Select the proper shims from the page 4 list, combining some if necessary. If the model in question is not listed, then measure the diameter of the axle and match it with a shim of similar ID and appropriate thickness.

4. Final transmission spacing check. Whenever possible, install assembled gears and shift drum assembly into a case and rotate through all gears. Check that you have 50 - 75% penetration of the engagement dogs into the slots (or holes).

Amount of engagement can be adjusted, either by shimming the individual gear more toward the sliding gear, or, shimming the drive axle. As the axle moves over, it carries the circlipped spinning gear (or gears) toward the sliding gear(s).

-continued-

MOTORCYCLE SERVICE NEWS

NUMBER 259

YAMAHA INTERNATIONAL CORPORATION
MONTEBELLO, CALIFORNIA
DATE 1-15-71

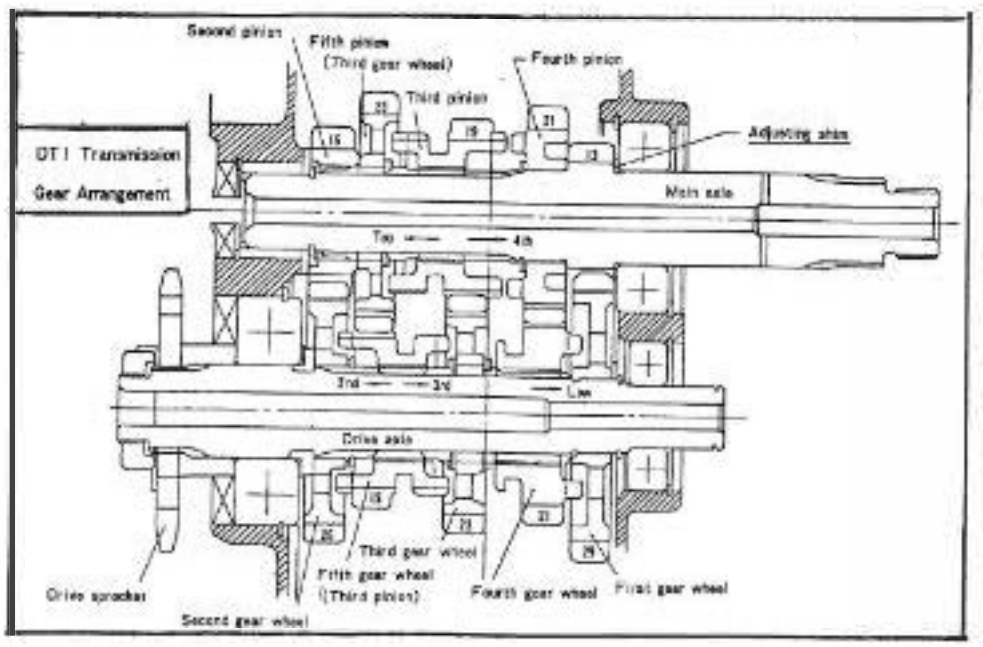
ALL MODELS — SPACING TRANSMISSION AXLES AND GEARS - continued

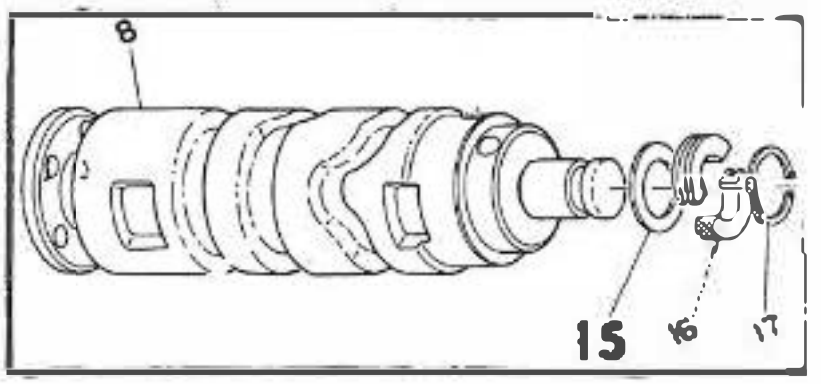
TROUBLESHOOTING TRANSMISSION PROBLEMS:

Less than 50% engagement of the gear dogs and slots can eventually cause the gears to separate under load, which will in turn bend the shift fork that moves the sliding gear. This will lead to constant popping out of gear. The normal correction procedure is to replace the shift fork, sliding gear, and corresponding spinning gear. Check the guide bar for bends (straighten or replace) and shift drum fork groove for scoring (replace if it binds fork movement). Next, carefully space out the transmission. If all damaged parts are not replaced, the problem will occur again. If the transmission (and gears) spacing is not checked and adjusted, the problem will occur again.

IMPORTANT NOTE: Popping out of gear can also occur as the axle moves because of insufficient support at one end. If a transmission bearing circlip is left off, if the left-hand drive axle bearing comes loose in the case, or if a bearing retaining plate becomes bent (such as type used on GT1 & AT1, behind clutch), then additional parts must be checked and possibly replaced.

IMPORTANT; PROPER SHIFT DRUM SPACING: Some models have shift drums anchored at one end with half-moon shift drum holders and a circlip (such models as C6, Hf1, CT1, etc.). The shift drum is properly spaced by placing a spacer (#15 in Fig. #5) directly behind the half-moon holders, on the outside of the crankcase. If the spacer is placed inside the case, against the shift drum shoulder, the drum will be spaced too far toward the right. This will pull the shift forks to the right, causing incomplete gear engagement.





-continued-

MOTORCYCLE SERVICE NEWS

NUMBER 259

PAGE 4 of 4

YAMAHA INTERNATIONAL CORPORATION
MONTEBELLO, CALIFORNIA
DATE 1-15-71

ALL MODELS — SPACING TRANSMISSION AXLES AND GEARS-continued

SHIMS AVAILABLE, AND PART NUMBERS			
ID	OD	THICKNESS	PART NUMBER
15.2	24	.6	257-17219-00-06
15.2	20	.8	184-17417-00-08
15.2	30	.6	184-17427-00-06
		.8	-08
		1.0	-10
17	25	.3	214-17428-00-03
		.5	-05
		.7	-07
17	26	.6	156-17427-00-06
		.7	-07
		.8	-08
20	30	.3	136-11561-00-03
		.4	-04
		.5	-05
		.6	-06
		.7	-07
		.8	-08
20.2	33	.5	137-17427-00-05
		.6	-06
		.7	-07
		.8	-08
		.9	-09
		1.0	-10
25	34	.3	168-17428-01-03
		.5	-05
25.1	33	.1	156-17417-00-01
		.2	-02
		.3	-03
30	44	.3	156-11564-00-03
		.4	-04
		.5	-05
		.6	-06
		.7	-07

Measurements in millimeters

MODELS	PROPER DRIVE AXLE SHIM SIZE	
	LEFT SIDE	RIGHT SIDE
J71	25 x 34 x .3	13.2 x 24 x .6
	.5	
ALL G5T, G5S, G6S	20 x 30 x .3	15.2 x 30 x .6
	.4	20 x .8
	.5	30 x .0
	.6	30 x 1.0
	.7	
	.8	
HS1(B)	Same as above	Same as above
HT1(B)	Same as above	Same as above
ALL AS1C/AS2C	Same as above	Same as above
ALL AT1/CT1	Same as above	Same as above
ALL CS1C, CS3C	Same as above	Same as above
ALL DS3C/M1, DS5/M2C, DS6(B&C)	17 x 26 x .6	25 x 34 x .3
	.7	.5
	.8	
ALL DT1/RT1	25 x 34 x .3	17 x 25 x .3
	.5	.5
		.7
R5(B)	Same as above	20.2 x 33 x .5
		.6
		.7
		.8
		.9
		1.0
XS1(B)	30 x 44 x .3	Same as above
	.4	
	.5	
	.6	
	.7	

Measurements in millimeters

MOTORCYCLE SERVICE NEWS

NUMBER 259

PAGE 4 of 4

YAMAHA INTERNATIONAL CORPORATION
MONTEBELLO, CALIFORNIA
DATE 1-15-71

ALL MODELS — SPACING TRANSMISSION AXLES AND GEARS-continued

SHIMS AVAILABLE, AND PART NUMBERS			
ID	OD	THICKNESS	PART NUMBER
15.2	24	.6	257-17219-00-06
15.2	20	.8	184-17417-00-08
15.2	30	.6	184-17427-00-06
		.8	-08
		1.0	-10
17	25	.3	214-17428-00-03
		.5	-05
		.7	-07
17	26	.6	156-17427-00-06
		.7	-07
		.8	-08
20	30	.3	136-11561-00-03
		.4	-04
		.5	-05
		.6	-06
		.7	-07
		.8	-08
20.2	33	.5	137-17427-00-05
		.6	-06
		.7	-07
		.8	-08
		.9	-09
		1.0	-10
25	34	.3	168-17428-01-03
		.5	-05
25.1	33	.1	156-17417-00-01
		.2	-02
		.3	-03
30	44	.3	156-11564-00-03
		.4	-04
		.5	-05
		.6	-06
		.7	-07

Measurements in millimeters

MODELS	PROPER DRIVE AXLE SHIM SIZE	
	LEFT SIDE	RIGHT SIDE
J71	25 x 34 x .3	13.2 x 24 x .6
	.5	
ALL G5T, G5S, G6S	20 x 30 x .3	15.2 x 30 x .6
	.4	20 x .8
	.5	30 x .0
	.6	30 x 1.0
	.7	
	.8	
HS1(B)	Same as above	Same as above
HT1(B)	Same as above	Same as above
ALL AS1C/AS2C	Same as above	Same as above
ALL AT1/CT1	Same as above	Same as above
ALL CS1C, CS3C	Same as above	Same as above
ALL DS3C/M1, DS5/M2C, DS6(B&C)	17 x 26 x .6	25 x 34 x .3
	.7	.5
	.8	
ALL DT1/RT1	25 x 34 x .3	17 x 25 x .3
	.5	.5
		.7
R5(B)	Same as above	20.2 x 33 x .5
		.6
		.7
		.8
		.9
		1.0
XS1(B)	30 x 44 x .3	Same as above
	.4	
	.5	
	.6	
	.7	

Measurements in millimeters