

BRP-Rotax
Maintenance Manual

3) Index

A

Airbox temperature 76-00-00 / 9
Alternators 74-00-00 / 3
Auxiliary tools 00-00-00 / 37

B

Boost pressure display 73-00-00 / 16
Bowden cable 78-00-00 / 19

C

Carburetor assembly 73-00-00 / 53
Carburetor disassembly 73-00-00 / 19
Carburetor heat systems 73-00-00 / 16
Carburetor individual components 73-00-00 / 23, 73-00-00 / 24
Carburetor socket assembly 73-00-00 / 53
Carburetor socket disassembly 73-00-00 / 17, 73-00-00 / 19
Carburetor synchronization 73-00-00 / 33
Caution lamps inspection 76-00-00 / 34
Charging coil 74-00-00 / 14
Choke 73-00-00 / 31
Classification of parts 00-00-00 / 27
Cleaning agents 00-00-00 / 36
Communication program 76-00-00 / 13
Components 71-00-00 / 5
Compressor pressure ratio 76-00-00 / 10
Constant depression carburetor 73-00-00 / 12, 73-00-00 / 21
Consumable materials 00-00-00 / 34
Coolant hoses fitting 75-00-00 / 14
Cooling air duct 75-00-00 / 14
Cut-in speed 74-00-00 / 18
Cyl. head assembly 72-00-00 / 73, 72-00-00
Cyl. head temperature sensor 75-00-00 / 15
Cylinder designation 71-00-00 / 5
Cylinder head disassembly 72-00-00 / 57
Cylinder head fitting 72-00-00 / 92
Cylinder head removal 72-00-00 / 55
Cylinders assembly 72-00-00 / 86
Cylinders inspection 72-00-00 / 81
Cylinders removal 72-00-00 / 75

D

Description of design 71-00-00 / 3
Diaphragms 73-00-00 / 25
Disc spring pretension 72-00-00 / 51
Drain plug 79-00-00 / 10
Drip tray disassembly 73-00-00 / 17
Dual ignition coil 74-00-00 / 17

E

Electric starter 80-00-00 / 3
Electric starter installation 80-00-00 / 12
Electric starter dismantling 80-00-00 / 5
Electric starter inspection 80-00-00 / 9
Electric starter disassembly 80-00-00 / 11
Electronic module 74-00-00 / 14
Engine components 71-00-00 / 12
Engine views 71-00-00 / 5
Exhaust gas temperature display 78-00-00 / 5
Exhaust system assembly 78-00-00 / 15
Exhaust system inspection 78-00-00 / 11
Exhaust system disassembly 78-00-00 / 7
Exhaust turbocharger 78-00-00 / 3

F

Filter oil 00-00-00 / 34
Float bracket 73-00-00 / 28
Float housing 73-00-00 / 27
Float needle valve inspection 73-00-00 / 30
Floats 73-00-00 / 27
Fly wheel hub 72-00-00 / 9, 74-00-00 / 49
Fuel filter 73-00-00 / 7
Fuel handling 73-00-00 / 15
Fuel lines 73-00-00 / 40, 73-00-00 / 43
Fuel lines assembly 73-00-00 / 55, 73-00-00 / 58
Fuel lines disassembly 73-00-00 / 17, 73-00-00 / 19
Fuel pressure 73-00-00 / 35, 37
Fuel pressure regulator 73-00-00 / 44
Fuel pump 73-00-00 / 45, 73-00-00 / 47

G

Gear set inspection 72-00-00 / 44
Gearbox configurations 72-00-00 / 5
Gearbox parts inspection 72-00-00 / 39
Governor 72-00-00 / 7
Governor drive removal 72-00-00 / 33

H

Heat conduction compound 00-00-00 / 35
Hose clamps 75-00-00 / 14
Hourmeter 72-00-00 / 8
Hydraulic valve tappets 72-00-00 / 83

I

Idle speed adjustment 73-00-00 / 33
Ignition 74-00-00 / 3, 74-00-00 / 6
Ignition cables 74-00-00 / 9
Ignition check 74-00-00 / 21
Ignition circuits inspection 74-00-00 / 21
Ignition electric set reassembly 74-00-00 / 41

BRP-Rotax

Maintenance Manual

Ignition electric set fitting 74-00-00 / 43
Ignition electric set removal 74-00-00 / 35
Ignition housing 72-00-00 / 14
Ignition housing inspection 72-00-00 / 11
Ignition housing removal 72-00-00 / 11
Ignition timing 74-00-00 / 19
Instruments 79-00-00 / 10
Intake air temperature sensor inspection 76-00-00 / 42
Intake manifold fitting 73-00-00 / 60
Intermediate gear 72-00-00 / 20

L

List of valid pages 00-00-00 / 11
Lithiumbase grease 00-00-00 / 34
Loctite 00-00-00 / 34
Lubrication system purging 79-00-00 / 26

M

Magnetic plug 79-00-00 / 10
Main oil pump 79-00-00 / 3, 79-00-00 / 5
Measuring tools 00-00-00 / 39
Molycote 00-00-00 / 34
Multimeter 00-00-00 / 39
Multipurpose grease 00-00-00 / 35

O

Oil circuit 79-00-00 / 5
Oil cooler 79-00-00 / 25
Oil lines 79-00-00 / 25
Oil pressure sensor 79-00-00 / 27
Oil pump disassembly 79-00-00 / 14
Oil pump 79-00-00 / 11
Oil pump checking 79-00-00 / 15
Oil pump reassembly 79-00-00 / 18, 79-00-00 / 19
Oil pump removal 79-00-00 / 11
Oil sump 79-00-00 / 21
Oil tank 79-00-00 / 22
Oil temperature display 79-00-00 / 10
Oil temperature sensor 79-00-00 / 26
Operating fluids 71-00-00 / 11
Operating limits 71-00-00 / 11
Orange caution lamp 76-00-00 / 11
Oscilloscope 00-00-00 / 39
Output connections on the TCU for lamps 76-00-00 / 11
Overspeeding 76-00-00 / 8

P

PC interface 76-00-00 / 12
Piston rings inspection 72-00-00 / 79
Pistons fitting 72-00-00 / 86
Pistons inspection 72-00-00 / 77
Pistons removal 72-00-00 / 75
Pitting 72-00-00 / 45, 72-00-00 / 47
Position finding 78-00-00 / 20
Preservation 71-00-00 / 18, 71-00-00 / 19
Preservation oil 00-00-00 / 35
Pressure connecting lines 73-00-00 / 10, 73-00-00 / 49
Pressure measurement system 71-00-00 / 22, 79-00-00 / 26
Pressure sensors inspection 76-00-00 / 44
Propeller gearbox 72-00-00 / 5, 72-00-00 / 22, 80-00-00 / 3
Propeller gearbox disassembly 72-00-00 / 28
Propeller gearbox reassembly 72-00-00 / 49
Propeller gearbox installation 72-00-00 / 53
Propeller shaft removal 72-00-00 / 30
Pushrods 72-00-00 / 85

R

Red boost lamp 76-00-00 / 11
Return to service 71-00-00 / 18
Rev counter inspection 74-00-00 / 55
Rev counter drive 72-00-00 / 21
Rev counter, mechanical 72-00-00 / 8
Roller bearings for F2 removal 72-00-00 / 24
Roller bearings for F3 removal 72-00-00 / 26
Roller bearings for F4 removal 72-00-00 / 27
Rotary seal 75-00-00 / 10

S

Servo motor 78-00-00 / 20
Silastic 00-00-00 / 34
Special tools 00-00-00 / 40
Sprag clutch 72-00-00 / 15
Sprag clutch dismantling 72-00-00 / 17
Sprag clutch installation 72-00-00 / 18
Sprag clutch removal 72-00-00 / 16
Spring, wastegate 78-00-00 / 19
Starting carburetor 73-00-00 / 31
Stator removal and refitting 74-00-00 / 48
Stroboscope 00-00-00 / 39
Suction pump 79-00-00 / 8
Surface damage 71-00-00 / 15
Return to service 00-00-00 / 25, 71-00-00 / 17, 71-00-00 / 18
Rev counter inspection 74-00-00 / 53
Rev counter drive 72-00-00 / 21
Rev counter, mechanical 72-00-00 / 8

d04350

BRP-Rotax
Maintenance Manual

T

Table of amendments 00-00-00 / 19
Target pressure reduction 76-00-00 / 8
TCU inspection 76-00-00 / 32
Technical data 71-00-00 / 11, 71-00-00 / 15
Temperature measuring system 71-00-00 / 22, 75-00-00 / 15, 79-00-00 / 26
Three-way solenoid valve 76-00-00 / 53
Throttle potentiometer calibration 76-00-00 / 31
Throttle potentiometer inspection 76-00-00 / 37
Tightening torques 00-00-00 / 33
Trigger coil kit 74-00-00 / 13
Trigger coil kit replacement 74-00-00 / 46
Trigger coils arrangement 74-00-00 / 8
Turbocharger assembly 78-00-00 / 15
Turbocharger disassembly 78-00-00 / 7
Turbocharger inspection 78-00-00 / 11
Turbo control unit 76-00-00 / 32
Type description 71-00-00 / 4

V

Vacuum pump 72-00-00 / 7, 72-00-00 / 10
Vacuum pump drive removal 72-00-00 / 32
Valve guide 72-00-00 / 62
Valve lapping paste 00-00-00 / 34
Valve seats 72-00-00 / 63
Valves 72-00-00 / 64

W

Water pump removal 75-00-00 / 6
Water pump housing 75-00-00 / 7, 75-00-00 / 13
Water pump housing inspection 75-00-00 / 7
Water pump shaft 75-00-00 / 9
Weights 71-00-00 / 11, 71-00-00 / 12
Wiring diagrams 74-00-00 / 24
Wiring harness inspection 76-00-00 / 35

BRP-Rotax
Maintenance Manual

NOTES

02620

BRP-Rotax
Maintenance Manual

4) List of the valid pages

02708

Chapter	Page	Date	Chapter	Page	Date
00-00-00	Cover page		71-00-00	43	05 01 2007
	1	05 01 2007		44	05 01 2007
	2	05 01 2007		45	05 01 2007
	3	05 01 2007		46	05 01 2007
	4	05 01 2007		1	05 01 2007
	5	05 01 2007		2	05 01 2007
	6	05 01 2007		3	05 01 2007
	7	07 01 2008		4	05 01 2007
	8	07 01 2008		5	05 01 2007
	9	07 01 2008		6	05 01 2007
	10	05 01 2007		7	05 01 2007
	11	07 01 2008		8	05 01 2007
	12	07 01 2008		9	05 01 2007
	13	07 01 2008		10	05 01 2007
	14	07 01 2008		11	05 01 2007
	15	07 01 2008		12	05 01 2007
	16	07 01 2008		13	05 01 2007
	17	05 01 2007		14	05 01 2007
	18	05 01 2007		15	05 01 2007
	19	07 01 2008		16	05 01 2007
	20	05 01 2007		17	05 01 2007
	21	05 01 2007		18	05 01 2007
	22	05 01 2007	19	05 01 2007	
	23	05 01 2007	20	05 01 2007	
	24	05 01 2007	21	05 01 2007	
	25	05 01 2007	22	05 01 2007	
	26	05 01 2007	72-00-00	1	05 01 2007
	27	05 01 2007		2	07 01 2008
	28	05 01 2007		3	07 01 2008
	29	05 01 2007		4	05 01 2007
	30	05 01 2007		5	05 01 2007
	31	05 01 2007		6	05 01 2007
	32	05 01 2007		7	05 01 2007
	33	07 01 2008		8	07 01 2008
	34	01 01 2008		9	05 01 2007
	35	01 01 2008		10	05 01 2007
	36	01 01 2008		11	05 01 2007
	37	05 01 2007		12	05 01 2007
	38	05 01 2007		13	05 01 2007
	39	05 01 2007		14	05 01 2007
	40	05 01 2007		15	05 01 2007
	41	05 01 2007		16	07 01 2008
42	05 01 2007	17		05 01 2007	

d04350

BRP-Rotax
Maintenance Manual

Chapter	Page	Date	Chapter	Page	Date
	18	05 01 2007		61	07 01 2008
	19	05 01 2007		62	05 01 2007
	20	05 01 2007		63	05 01 2007
	21	05 01 2007		64	05 01 2007
	22	01 01 2008		65	05 01 2007
	23	01 01 2008		66	01 01 2008
	24	07 01 2008		67	05 01 2007
	25	07 01 2008		68	05 01 2007
	26	07 01 2008		69	05 01 2007
	27	07 01 2008		70	05 01 2007
	28	01 01 2008		71	05 01 2007
	29	05 01 2007		72	05 01 2007
	30	05 01 2007		73	05 01 2007
	31	05 01 2007		74	05 01 2007
	32	05 01 2007		75	05 01 2007
	33	05 01 2007		76	05 01 2007
	34	05 01 2007		77	05 01 2007
	35	07 01 2008		78	05 01 2007
	36	05 01 2007		79	07 01 2008
	37	05 01 2007		80	05 01 2007
	38	07 01 2008		81	05 01 2007
	39	05 01 2007		82	05 01 2007
	40	07 01 2008		83	07 01 2008
	41	05 01 2007		84	05 01 2007
	42	05 01 2007		85	05 01 2007
	43	05 01 2007		86	05 01 2007
	44	07 01 2008		87	05 01 2007
	45	07 01 2008		88	05 01 2007
	46	07 01 2008		89	05 01 2007
	47	05 01 2007		90	07 01 2008
	48	05 01 2007		91	05 01 2007
	49	07 01 2008		92	05 01 2007
	50	07 01 2008		93	05 01 2007
	51	07 01 2008		94	05 01 2007
	52	07 01 2008		95	07 01 2008
	53	07 01 2008		96	05 01 2007
	54	01 01 2008		97	05 01 2007
	55	05 01 2007		98	05 01 2007
	56	05 01 2007		99	05 01 2007
	57	07 01 2008		100	05 01 2007
	58	07 01 2008		101	05 01 2007
	59	05 01 2007		102	07 01 2008
	60	05 01 2007		103	05 01 2007

d04350

BRP-Rotax
Maintenance Manual

Chapter	Page	Date	Chapter	Page	Date
73-00-00	104	05 01 2007	74-00-00	29	07 01 2008
	105	05 01 2007		30	07 01 2008
	106	05 01 2007		31	07 01 2008
	107	05 01 2007		32	07 01 2008
	108	05 01 2007		33	07 01 2008
	109	05 01 2007		34	07 01 2008
	110	05 01 2007		35	07 01 2008
	111	07 01 2008		36	07 01 2008
	112	05 01 2007		37	07 01 2008
	113	05 01 2007		38	07 01 2008
	114	07 01 2008		39	07 01 2008
	115	07 01 2008		40	07 01 2008
	116	05 01 2007		41	07 01 2008
	117	05 01 2007		42	07 01 2008
	118	05 01 2007		43	07 01 2008
	1	07 01 2008		44	07 01 2008
	2	07 01 2008		45	07 01 2008
	3	05 01 2007		46	07 01 2008
	4	05 01 2007		47	07 01 2008
	5	05 01 2007		48	07 01 2008
	6	05 01 2007		49	07 01 2008
	7	05 01 2007		50	07 01 2008
	8	05 01 2007		51	07 01 2008
	9	05 01 2007		52	07 01 2008
	10	05 01 2007		53	07 01 2008
	11	05 01 2007		54	07 01 2008
	12	05 01 2007		55	07 01 2008
	13	05 01 2007		56	07 01 2008
14	05 01 2007	57	07 01 2008		
15	05 01 2007	58	07 01 2008		
16	07 01 2008	59	07 01 2008		
17	07 01 2008	60	07 01 2008		
18	07 01 2008	1	05 01 2007		
19	07 01 2008	2	07 01 2008		
20	07 01 2008	3	05 01 2007		
21	07 01 2008	4	05 01 2007		
22	07 01 2008	5	05 01 2007		
23	07 01 2008	6	05 01 2007		
24	07 01 2008	7	05 01 2007		
25	07 01 2008	8	05 01 2007		
26	07 01 2008	9	05 01 2007		
27	07 01 2008	10	05 01 2007		
28	07 01 2008	11	05 01 2007		

d04350

BRP-Rotax
Maintenance Manual

Chapter	Page	Date	Chapter	Page	Date
	12	05 01 2007		55	05 01 2007
	13	05 01 2007		56	05 01 2007
	14	05 01 2007		57	07 01 2008
	15	05 01 2007		58	07 01 2008
	16	07 01 2008		59	07 01 2008
	17	05 01 2007		60	07 01 2008
	18	05 01 2007		61	05 01 2007
	19	05 01 2007		62	07 01 2008
	20	05 01 2007		63	05 01 2007
	21	05 01 2007		64	05 01 2007
	22	05 01 2007	75-00-00	1	07 01 2008
	23	05 01 2007		2	05 01 2007
	24	05 01 2007		3	05 01 2007
	25	05 01 2007		4	05 01 2007
	26	05 01 2007		5	05 01 2007
	27	05 01 2007		6	05 01 2007
	28	05 01 2007		7	05 01 2007
	29	05 01 2007		8	05 01 2007
	30	05 01 2007		9	05 01 2007
	31	05 01 2007		10	05 01 2007
	32	05 01 2007		11	07 01 2008
	33	05 01 2007		12	05 01 2007
	34	05 01 2007		13	05 01 2007
	35	05 01 2007		14	07 01 2008
	36	05 01 2007		15	07 01 2008
	37	05 01 2007		16	05 01 2007
	38	05 01 2007		17	07 01 2008
	39	05 01 2007		18	07 01 2008
	40	05 01 2007		19	05 01 2007
	41	05 01 2007		20	05 01 2007
	42	05 01 2007	76-00-00	1	05 01 2007
	43	05 01 2007		2	07 01 2008
	44	05 01 2007		3	05 01 2007
	45	05 01 2007		4	05 01 2007
	46	07 01 2008		5	05 01 2007
	47	07 01 2008		6	05 01 2007
	48	05 01 2007		7	05 01 2007
	49	07 01 2008		8	05 01 2007
	50	07 01 2008		9	05 01 2007
	51	05 01 2007		10	05 01 2007
	52	05 01 2007		11	05 01 2007
	53	05 01 2007		12	05 01 2007
	54	05 01 2007		13	05 01 2007

d04350

BRP-Rotax
Maintenance Manual

Chapter	Page	Date	Chapter	Page	Date
	14	05 01 2007		57	07 01 2008
	15	05 01 2007		58	07 01 2008
	16	05 01 2007		59	07 01 2008
	17	05 01 2007		60	07 01 2008
	18	05 01 2007	78-00-00	1	07 01 2008
	19	05 01 2007		2	05 01 2007
	20	05 01 2007		3	05 01 2007
	21	05 01 2007		4	05 01 2007
	22	05 01 2007		5	05 01 2007
	23	05 01 2007		6	05 01 2007
	24	05 01 2007		7	05 01 2007
	25	05 01 2007		8	05 01 2007
	26	05 01 2007		9	05 01 2007
	27	05 01 2007		10	05 01 2007
	28	05 01 2007		11	07 01 2008
	29	05 01 2007		12	07 01 2008
	30	05 01 2007		13	07 01 2008
	31	05 01 2007		14	07 01 2008
	32	05 01 2007		15	07 01 2008
	33	05 01 2007		16	07 01 2008
	34	05 01 2007		17	07 01 2008
	35	07 01 2008		18	07 01 2008
	36	07 01 2008		19	07 01 2008
	37	05 01 2007		20	07 01 2008
	38	05 01 2007		21	07 01 2008
	39	01 01 2008		22	07 01 2008
	40	05 01 2007		23	07 01 2008
	41	05 01 2007		24	07 01 2008
	42	05 01 2007	79-00-00	1	05 01 2007
	43	05 01 2007		2	05 01 2007
	44	05 01 2007		3	05 01 2007
	45	05 01 2007		4	05 01 2007
	46	05 01 2007		5	05 01 2007
	47	05 01 2007		6	05 01 2007
	48	05 01 2007		7	05 01 2007
	49	05 01 2007		8	05 01 2007
	50	05 01 2007		9	05 01 2007
	51	05 01 2007		10	05 01 2007
	52	05 01 2007		11	05 01 2007
	53	07 01 2008		12	05 01 2007
	54	07 01 2008		13	05 01 2007
	55	07 01 2008		14	05 01 2007
	56	07 01 2008		15	05 01 2007

d04350

BRP-Rotax
Maintenance Manual

Chapter	Page	Date	Chapter	Page	Date
80-00-00		16			05 01 2007
		17			05 01 2007
		18			07 01 2008
		19			07 01 2008
		20			05 01 2007
		21			05 01 2007
		22			05 01 2007
		23			05 01 2007
		24			05 01 2007
		25			05 01 2007
		26			05 01 2007
			27		07 01 2008
			28		05 01 2007
			29		05 01 2007
			30		05 01 2007
			1		07 01 2008
			2		05 01 2007
			3		05 01 2007
			4		05 01 2007
			5		05 01 2007
			6		05 01 2007
			7		05 01 2007
			8		05 01 2007
			9		05 01 2007
			10		05 01 2007
			11		05 01 2007
			12		05 01 2007
			13		07 01 2008
			14		07 01 2008
		Rear page			

d04350

BRP-Rotax
Maintenance Manual

5) Table of amendments

***Approval**
The technical content of this document is approved under
the authority of
DOA Nr. EASA.21J.048.

08215

Ser. No.	Section	Pages	Date of correction	Sign of acceptance	Date of accept. of resp. authority	Date of implementation	Sign/ Signature
0	00-00-00	all	05 01 2007	DOA*			
0	71-00-00	all	05 01 2007	DOA*			
0	72-00-00	all	05 01 2007	DOA*			
0	73-00-00	all	05 01 2007	DOA*			
0	74-00-00	all	05 01 2007	DOA*			
0	75-00-00	all	05 01 2007	DOA*			
0	76-00-00	all	05 01 2007	DOA*			
0	78-00-00	all	05 01 2007	DOA*			
0	79-00-00	all	05 01 2007	DOA*			
0	80-00-00	all	05 01 2007	DOA*			
1	00-00-00	11-13, 15,19, 34-36	01 01 2008	DOA*			
1	72-00-00	22, 23, 28, 51-54, 66	01 01 2008 01 01 2008	DOA* DOA*			
1	73-00-00	1, 2, 17, 18, 25, 26, 53, 54, 55, 58	01 01 2008 01 01 2008	DOA* DOA*			
1	76-00-00	39	01 01 2008	DOA*			
2	00-00-00	7-9,11-16, 19,33	07 01 2008	DOA*			
2	72-00-00	2, 3,8,16, 24-27,35 38, 40,44-46, 49-53, 57, 58, 61, 79, 83,90,95,102 111,114,115	07 01 2008 07 01 2008 07 01 2008 07 01 2008 07 01 2008	DOA* DOA* DOA* DOA* DOA*			
2	73-00-00	1,2,16-60	07 01 2008	DOA*			
2	74-00-00	2, 16,46, 47, 49, 50, 57-60,62	07 01 2008 07 01 2008	DOA* DOA*			
2	75-00-00	1,11,14,15,17,18	07 01 2008	DOA*			
2	76-00-00	2,35,36,53-60	07 01 2008	DOA*			
2	78-00-00	1,11-24	07 01 2008	DOA*			
2	79-00-00	18,19,27	07 01 2008	DOA*			
2	80-00-00	1,13,14	07 01 2008	DOA*			

d04350

BRP-Rotax
Maintenance Manual

NOTES

02620

10) Maintenance

The following sections describe maintenance procedure for engines of the 912/914 Series above and beyond the maintenance and special checks, see corresponding Maintenance Manual (Line Maintenance) for the respective engine type, 912 Series or 914 Series, and the systems descriptions given hitherto. The description is subdivided into subsections and descriptions of the function of the various systems.

Some overlapping maintenance instructions are treated as generally valid information at the beginning of this chapter.

10.1) Trouble shooting

In the Operators Manual, possible problems as well as feasible remedies are listed. At the same time, brief reference is made to the necessary remedial action.

See the respective sections in the Operators Manual for the corresponding engine type in the 912/914 Series.

10.2) Tightening torques

In general, all screw connections on ROTAX engines must be tightened using a torque wrench.

If not specified otherwise for a component, tighten screw connections to the following torque:

M4	:	4 Nm (35 in.lb)
M5	:	6 Nm (55 in.lb)
M6	:	10 Nm (90 in.lb)
M8	:	24 Nm (17.7 ft.lb)
M10	:	35 Nm (25.8 ft.lb)

||| ■ **CAUTION:** If not specified otherwise, the threads are not lubricated when fastened.

◆ **NOTE:** Adhere to the tightening torques specified see also indications in the Illustrated Parts Catalog.

BRP-Rotax
Maintenance Manual

10.3) Consumable materials

▲ **WARNING:** Use only the specified or **technically equivalent** materials for all maintenance work.

The materials listed have undergone longterm testing and are suitable for all operating conditions indicated by the manufacturer.

▲ **WARNING:** When handling chemicals, comply with all the customary regulations and specifications of the producer, including the expiry date.

◆ **NOTE:** Consider the curing time of the sealing surface compound as stated by the manufacturers' instructions.

No.	part no.	description, application	Qty.
1	899785	LOCTITE 221 violet, light duty screw locking agent	10 ml
2	897651	LOCTITE 243 blue, medium duty screw locking agent	10 ml
3	898441	LOCTITE 2701, heavy-duty screw locking agent	5 ml
4	899789	LOCTITE 603 green, oil tolerant grouting product, heavy-duty	10 ml
5	897511	LOCTITE 380 black, grouting product, heavy-duty, fasthardening	20 ml
6	899784	LOCTITE 574 orange, surface sealing compound	50 ml
7	n.a	LOCTITE 518 red, can be used instead LOCTITE 574 orange	
8	297434	LOCTITE Anti-Seize 8151, for the prevention of fretting corrosion	50 g
9	297433	MOLYKOTE G-N, lubricant	100 g
10	897166	MOLYKOTE 44 medium, longterm lubricant for shaft seals	100 g
11	897330	Lithium-base grease, to avoid leakage current	250 g
12	897870	K&N Filter oil 99 - 11312, for optimum filter efficiency and moisture protection	14.8 ml
13	297368	SILASTIC 732 multipurpose onecomponent siliconbased sealing compound	310 ml

d04230

BRP-Rotax
Maintenance Manual

SECTION 72

ENGINE

1) Table of contents

SECTION 72

ENGINE

1) Table of contents	72-00-00 / 1
2) Systems description	72-00-00 / 5
2.1) Propeller gearbox	72-00-00 / 5
2.1.1) Gearbox version	72-00-00 / 5
2.2) Hydraulic governor	72-00-00 / 7
2.3) Vacuum pump	72-00-00 / 8
2.4) Connections for instrumentation	72-00-00 / 8
2.4.1) Mechanical rev counter and hourmeter (optional)	72-00-00 / 8
3) Maintenance	72-00-00 / 9
3.1) Removal of the fly wheel hub	72-00-00 / 9
3.2) Vacuum pump removal and inspection	72-00-00 / 10
3.3) Governor removal and inspection	72-00-00 / 10
3.4) Ignition housing removal and inspection	72-00-00 / 11
3.5) Ignition housing fitting	72-00-00 / 14
3.6) Sprag clutch	72-00-00 / 15
3.6.1) Sprag clutch removal	72-00-00 / 16
3.6.2) Sprag clutch dismantling	72-00-00 / 17
3.6.3) Sprag clutch installation	72-00-00 / 18
3.7) Reduction gear for electric starter	72-00-00 / 20
3.8) Rev counter drive	72-00-00 / 21

BRP-Rotax
Maintenance Manual

3.9)	Propeller gearbox	72-00-00 / 22
3.9.1)	Removal of roller bearing for - Series 2	72-00-00 / 24
3.9.2)	Removal of roller bearing for - Series 3	72-00-00 / 26
3.9.3)	Removal of roller bearing for - Series 4	72-00-00 / 27
3.9.4)	Propeller gearbox disassembly	72-00-00 / 28
3.9.5)	Propeller shaft removal	72-00-00 / 30
3.9.6)	Vacuum pump drive removal	72-00-00 / 32
3.9.7)	Propeller governor drive removal	72-00-00 / 33
3.9.8)	Drive of the propeller governor installation	72-00-00 / 35
3.9.9)	Vacuum pump drive installation	72-00-00 / 38
3.9.10)	Gearbox components inspection	72-00-00 / 39
3.9.11)	Toothed shaft profiles inspection	72-00-00 / 43
3.9.12)	Gear set (gear wheels) inspection	72-00-00 / 44
3.9.13)	Propeller gearbox reassembly	72-00-00 / 49
3.9.14)	Disc spring pre-tension adjustment (with overload clutch) ...	72-00-00 / 51
3.9.15)	Disc spring pre-tension adjustment (with dog hub)	72-00-00 / 51
3.9.16)	Propeller gearbox — installation	72-00-00 / 53
3.10)	Cylinder head — removal	72-00-00 / 55
3.11)	Cylinder head - disassembly	72-00-00 / 57
3.11.1)	Cylinder head and studs	72-00-00 / 59
3.11.2)	Reworking of the sealing surface to the exhaust manifold ...	72-00-00 / 61
3.11.3)	Valve guides	72-00-00 / 62
3.11.4)	Valve seats	72-00-00 / 63
3.11.5)	Valves	72-00-00 / 64
3.11.6)	Valve springs	72-00-00 / 67
3.11.7)	Washers	72-00-00 / 69
3.11.8)	Rocker arm and rocker arm shaft	72-00-00 / 70
3.11.8.1)	Rocker arm with plastic bushing	72-00-00 / 71
3.11.8.2)	Rocker arm with pressed sinter bushing	72-00-00 / 72
3.11.8.3)	Rocker arm shaft	72-00-00 / 72
3.12)	Cylinder head reassembly	72-00-00 / 73
3.13)	Cylinder and piston - removal	72-00-00 / 75
3.13.1)	Checking pistons	72-00-00 / 77
3.13.2)	Checking the piston ring	72-00-00 / 79
3.13.3)	Piston pin	72-00-00 / 80
3.13.4)	Cylinders inspection	72-00-00 / 81
3.14)	Hydraulic valve tappets	72-00-00 / 83
3.15)	Pushrods	72-00-00 / 85

d04351

BRP-Rotax
Maintenance Manual

3.16) Piston and cylinder assembly fitting	72-00-00 / 86
3.16.1) Hydraulic valve tappets fitting	72-00-00 / 86
3.16.2) Pistons fitting	72-00-00 / 86
3.16.3) Cylinders fitting	72-00-00 / 90
3.16.4) Cylinder head fitting	72-00-00 / 92
3.17) Intake manifold and compensation tube assembly	72-00-00 / 95
3.18) Crankshaft inspection.....	72-00-00 / 95
4) Wear limits	72-00-00 / 97
5) Form Sheets	72-00-00 / 117
5.1) Form sheet for material testing ROTAX 912/914 Series	72-00-00 / 117
5.1.1) Inspection on cracks	72-00-00 / 117
5.1.2) Hardness test	72-00-00 / 117

BRP-Rotax
Maintenance Manual

NOTES

BRP-Rotax
Maintenance Manual

2.2) Hydraulic governor

See Fig. 72 -2

◆ NOTE: Not included in the range of delivery.

A hydraulic governor can be fitted on engines of the 912/914 Series configuration 3 to control a hydraulic constant speed propeller. Engines of the 912/914 Series configurations 2 and 4 can be retrofitted for this purpose.

i.e., the drive for the governor in the propeller gearbox and the crankcase, its connection cable and the oil feed line to the propeller shaft must be retrofitted.

- On configuration 912/914 - 2, the hollow propeller shaft must also be exchanged for the correct one
- On configuration 912/914 - 4, the propeller shaft can remain. It is the same design as for configuration 912/914 - 3, with the exception that the inside bore is plugged. After removal of the plug cover the propeller shaft is suitable for use with a governor.

Gear ratio (i)	912 A/F/UL		912 S/ULS/ULSFR 914 Series	
crankshaft : propeller shaft	50 : 22	2.273*	51 : 21	2.429
propeller shaft : governor	22 : 29	0.759	22 : 29	0.759
Total	1.722		1.842	

* optional 2.429 possible

08218

Fig. 72-2

◆ NOTE: Installation of both the hydraulic governor and vacuum pump is not possible.

◆ NOTE: The gear ratio crankshaft to vacuum pump or propeller governor is 1.722 or 1.842, depending on engine type.

Direction of rotation of the governor counterclockwise (CC), looking from the magneto side above onto the governor flange.

d02622

BRP-Rotax

Maintenance Manual

2.3) Vacuum pump

It is possible to install a vacuum pump for employment of an inertial navigation system. To do this, the drive kit for the vacuum pump must be retrofitted on propeller gearbox and crankcase.

◆ NOTE: Installation of both the vacuum pump and hydraulic governor is not possible.

Gear ratio: Vacuum pump and hydraulic governor are driven the same way and therefore have an equivalent gear ratio. See hydraulic governor.

2.4) Connections for instrumentation

■ CAUTION: Consult also the relevant section on connections for instrumentation in the Installation Manual.

2.4.1) Mechanical rev counter and hourmeter (optional)

These are driven from the camshaft via a bevel gear to the rev counter shaft. A flexible shaft allows connection of a combined instrument, rev counter or hourmeter. Subsequent installation of a flex. rev counter shaft is possible after removal of the rev counter cover on the ignition housing. On engines produced from the year 2007 onwards, it is also necessary to replace the ignition cover and press the worm gear into the camshaft using the tool with part no. 877190.

For connection of a rev counter, see 71-00-00 sec. 2.3 item no. 21 (on 912 Series) or item no. 32 (on 914 Series).

The total transmission ratio from crankshaft to rev counter shaft $i = 4$

◆ NOTE: As the mechanical hourmeter is directly coupled to the engine speed, the readings may deviate considerably from those given by electronic hourmeters (e.g. TCU, FlyDat). Maintenance and overhaul intervals are always dictated by the readings of the electronic hourmeters.

d04351

BRP-Rotax
Maintenance Manual

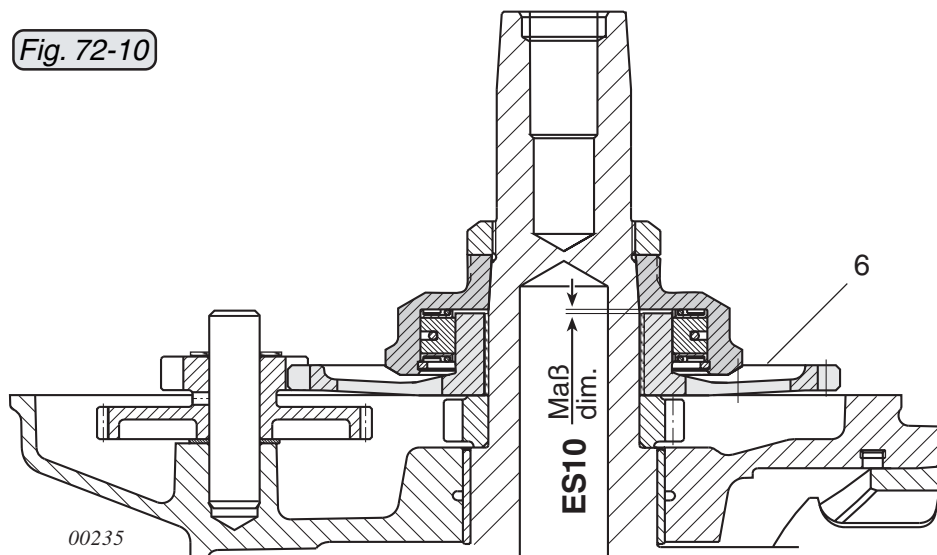
3.6) Sprag clutch

See Figs. 72-10 and 72-12.

After removing the fly wheel hub and the ignition housing, see 72-00-00 sec. 3.1 and 72-00-00 sec. 3.4, measure the axial clearance (ES10) of the free wheel gear (6).

See 72-00-00 sec. 4.

◆ **NOTE:** If there is no or too little axial clearance, the sprag clutch may not disengage and the electric starter may be damaged.



BRP-Rotax

Maintenance Manual

3.6.1) Sprag clutch removal

See Fig. 72-11.

Lock the crankshaft. See the latest issue Maintenance Manual (Line Maintenance) for the respective engine type, 912 Series or 914 Series.

Pull out the intermediate gear shaft (1) and remove the intermediate starter gear (2) with the thrust washers 12.5/21.5/1 (3) on both sides of the intermediate gear.

■ CAUTION : Use of impact wrench is not permitted, lock nut (4) must be heated.

Use a hot air gun to heat up hex. nut (4) M34x1.5 to about 100 to 120 °C (212 to 248 °F). Unscrew the hex. nut (4) M34x1.5 from the crankshaft using socket wrench a/f 46, part no. 877450.

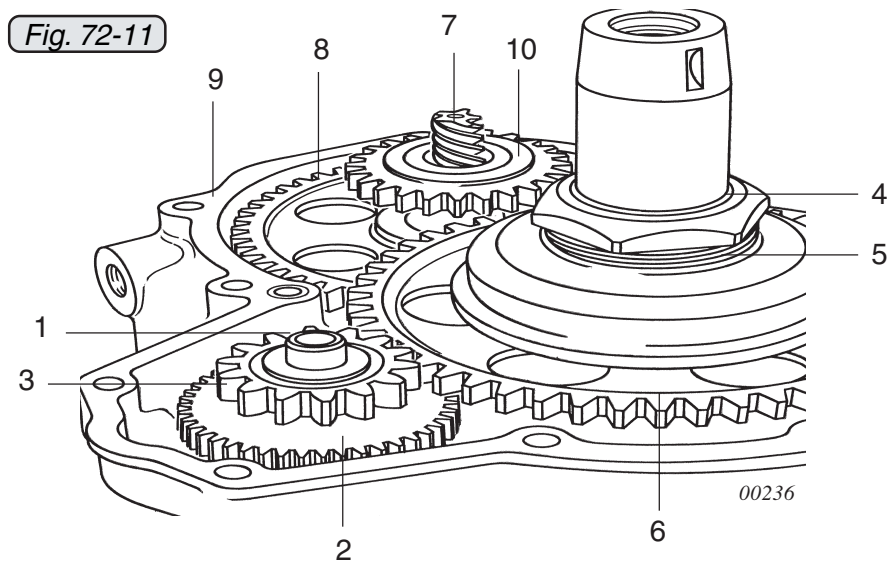
◆ NOTE: The hex. nut (4) has a lefthanded thread!

Insert protection piece, part no. 877410, into the crankshaft and remove the sprag clutch housing (5) from the crankshaft with puller, part no. 877375.

The free wheel gear (6), the pump gear (10) pressed onto the camshaft and the timing gear (8) underneath it can be removed only after splitting the crankcase.

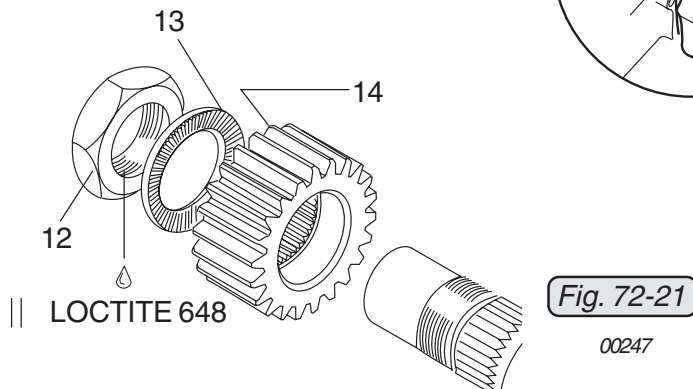
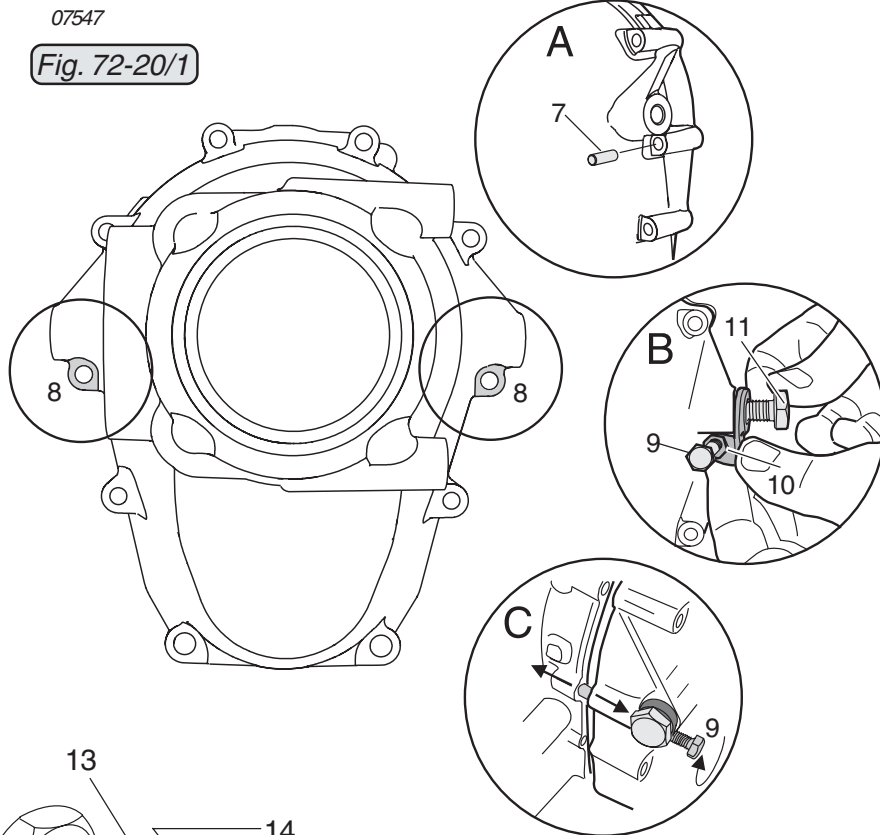
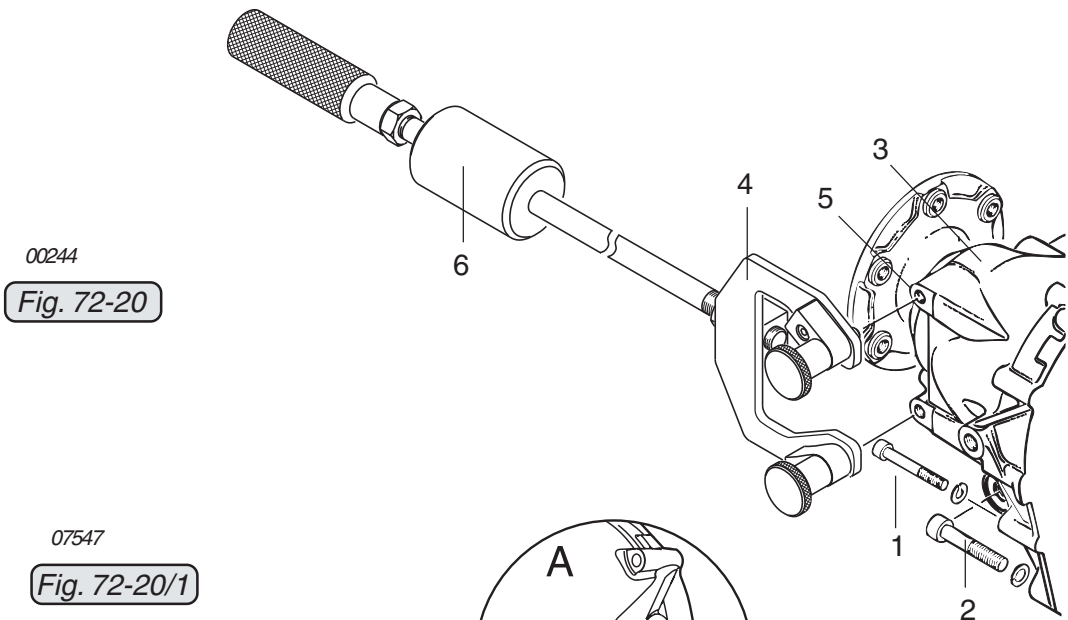
◆ NOTE: The mechanical rev counter is driven via the worm gear (7) pressed into the camshaft.

◆ NOTE: The worm gear (7) is optional on newer engine versions.



d04351

BRP-Rotax
Maintenance Manual



d04231

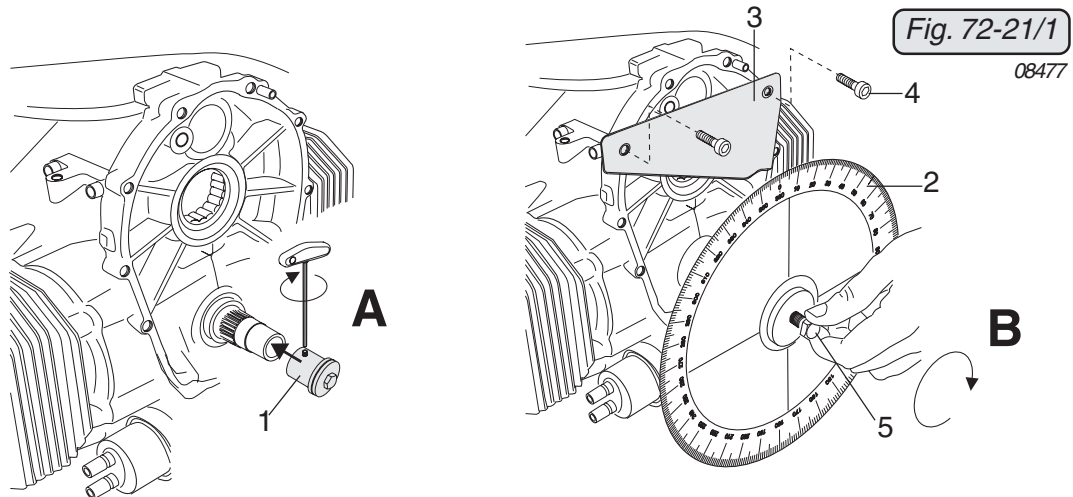
BRP-Rotax
Maintenance Manual

Propeller shock load - Inspection of crankshaft distortion on installed crankshaft

See Figs. 72-21/1 to 72-21/3

(A) Carefully mount holder (1) onto the crankshaft part no. 877520 for protractor (2).

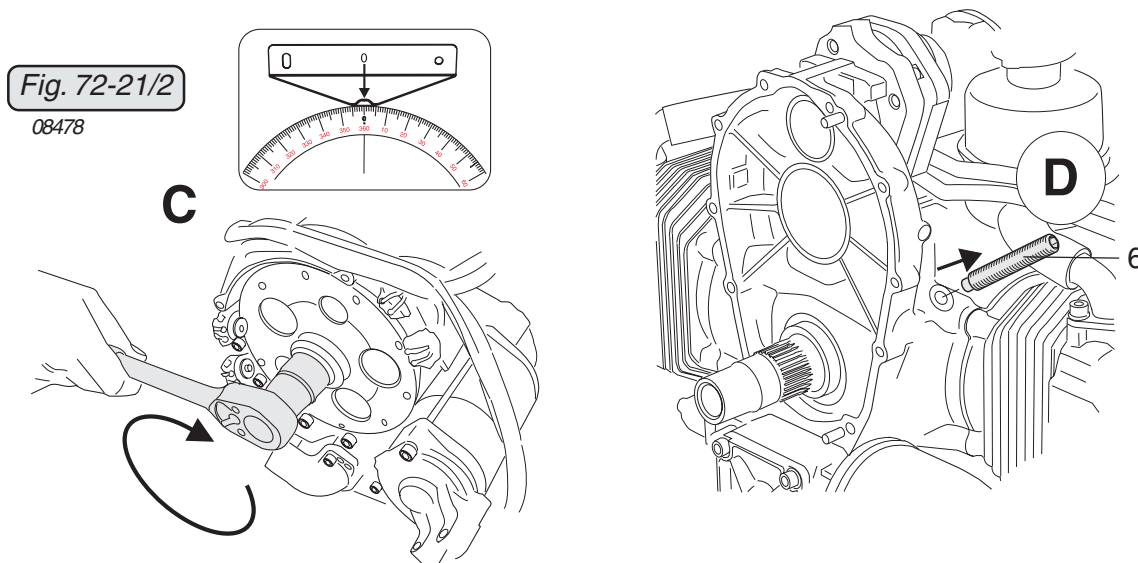
(B) Install the metal sheet (3) with allen screw M6x20 (4) between drive sleeve and roller bearing.



Lock the crankshaft. See Line Maintenance 912/914 12-00-00 sec. 2.7.

(C) Set the protractor (2) to 0° and lock with hex. screw (5). **(D)** Remove the fixation of the crankshaft (6).

Turn crankshaft to approx. 80° for easy installation of the piston stopper.



BRP-Rotax

Maintenance Manual

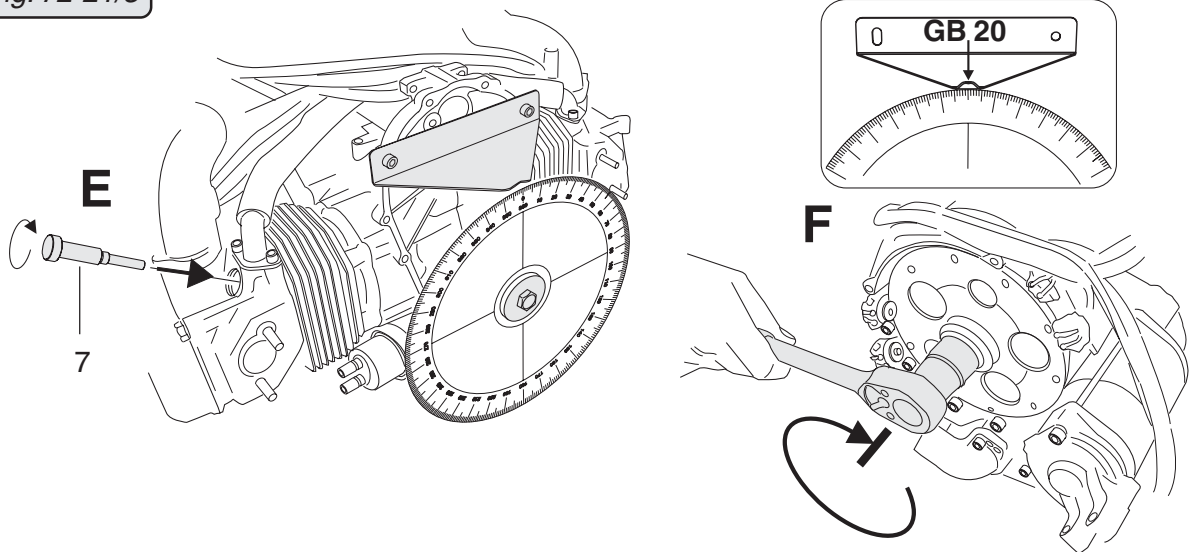
(E) Starting with cylinder 1 screw in piston stopper (7) completely. (F) Carefully turn crankshaft (via the screw in the centre of the flywheel hub) until the piston touches the stopper. Read the value from the protractor (2).

Same procedure for cylinder 2, 3 and 4. See section 4.

■ **CAUTION:** All 4 readings must not exceed a deviation of 2°. If a value exceeds the 2° limit, then the engine needs to be overhauled by a ROTAX-authorized service partner.

08479

Fig. 72-21/3



3.9.1) Removal of roller bearing for - Series 2

See Fig. 72-22.

After the propeller gearbox is removed, the crankcase side propeller shaft bearing and oil seal can be replaced if necessary.

Remove the retaining ring (1) with the circlip pliers. Screw extractor (2) part no. 877615 with 8 allen screws M6x25 to the crankcase. Screw stud (3) M10x45/20, part no. 941180, into the pull-in spindle (4), part no. 877580 and fit hex. nut (5) M24x1.5 onto the pull-in spindle.

For better guidance, place the press-in insert (6), part no. 877592, into the roller bearing (7). Place the pull-in spindle (4) into the extractor (2) and through the crankcase.

On the rear side of the crankcase, push the pullout plate (8), part no. 877560, onto the stud and attach with the hex. nut M10 (9), part no. 242091.

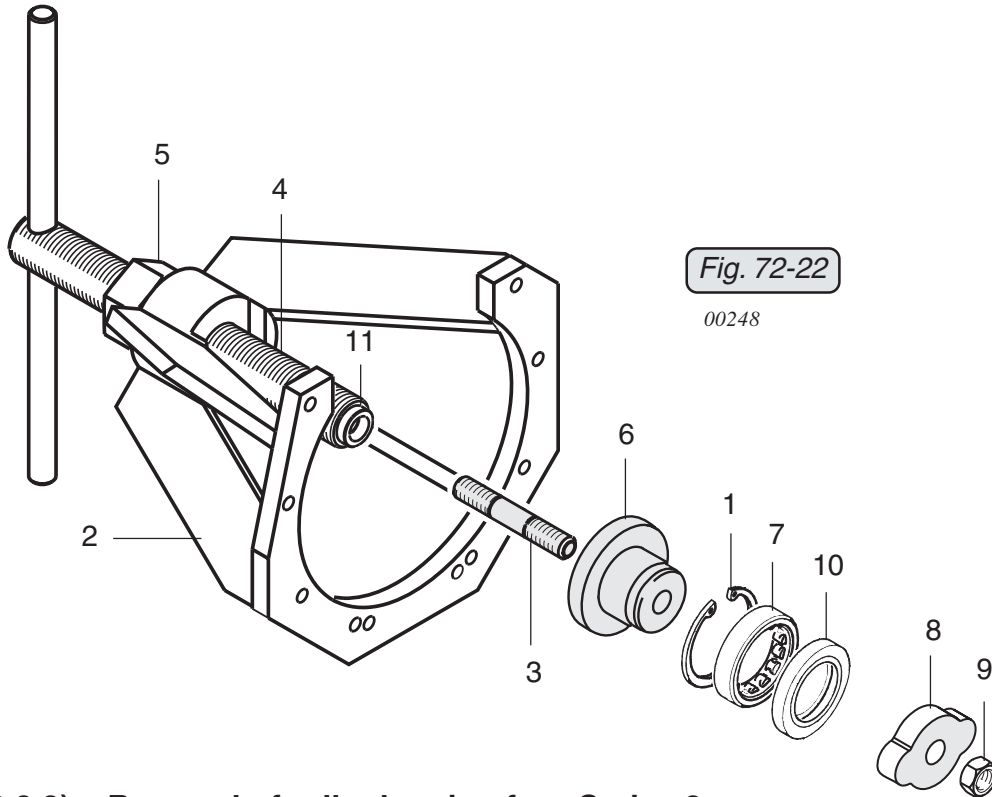
d04351

BRP-Rotax

Maintenance Manual

Keep pull-in spindle in position with the handle lever and turn the hex. nut clockwise until the roller bearing (7) with oil seal (10) is pulled out of the housing. Unscrew hex. nut, remove pullout plate with roller bearing and oil seal and withdraw spindle (11). Unscrew extractor from housing.

■ **CAUTION** : During this procedure, the oil seal (10) is destroyed and must be replaced.



3.9.2) Removal of roller bearing for - Series 3

See Fig. 72-23.

After the propeller gearbox is removed, the crankcase side propeller shaft bearing and oil inlet flange can be replaced if necessary.

Before disassembly, the governor flange must be removed. On configuration 912 Series 3 with hydraulic governor, the procedure for pressing out varies from that for Series 2 and 4. On Series 3, the roller bearing is pressed out together with the oil inlet flange.

Remove the retaining ring (1) with circlip pliers. Fit puller cap (2), part no. 876489, and push hex. screw (3) through the cap, roller bearing (4) and oil inlet flange (5). Fit washer (6) and nut (7) on the back end. By turning the hex. screw clockwise, the roller bearing is pulled out together with the oil inlet flange. Take out O-ring (8) and both O-rings (9).

d04351

BRP-Rotax
Maintenance Manual

3.9.3) Removal of roller bearing for - Series 4

See Fig. 72-24.

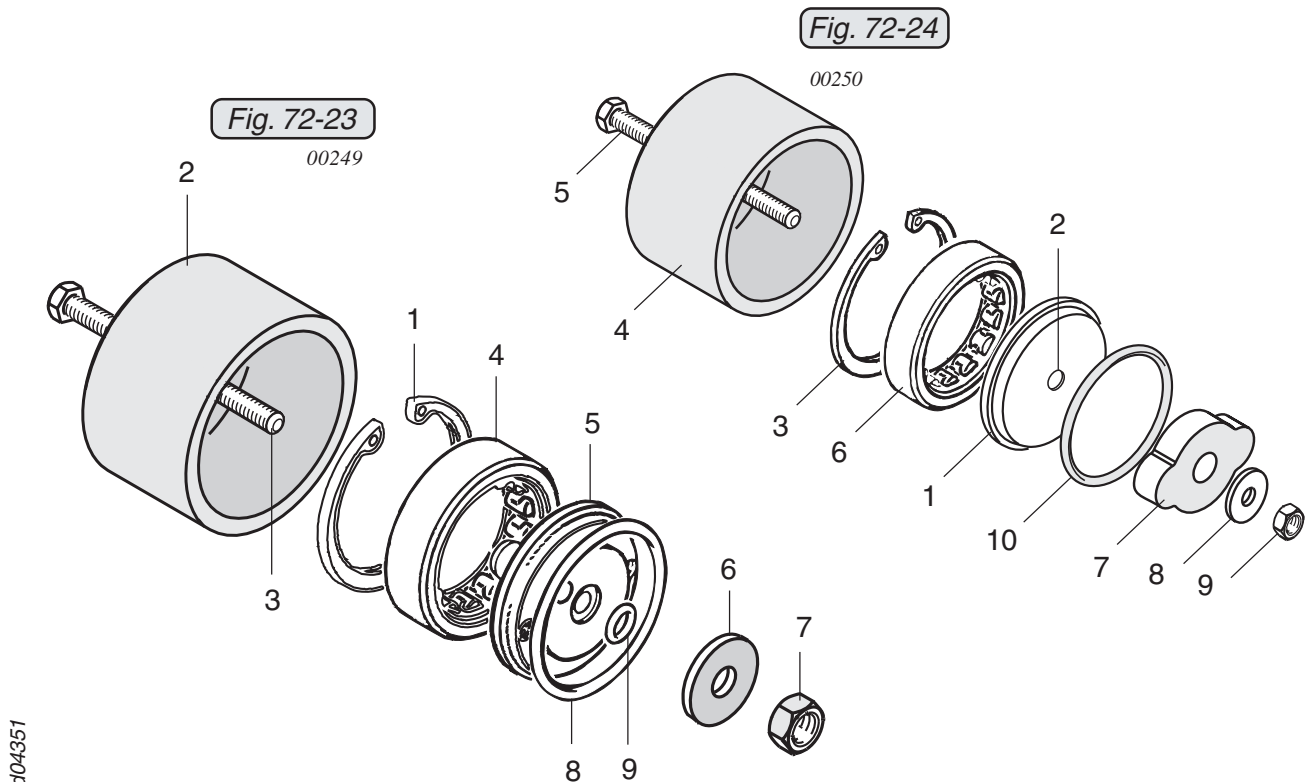
After the propeller gearbox is removed, the crankcase side propeller shaft bearing can be replaced if necessary.

For the extracting procedure it is necessary to drill a bore (2) of at least 6.2 mm dia., (1/4") into the center of the oil inlet cover (1).

■ CAUTION : The oil inlet cover is thus rendered useless and must be replaced before installation!

■ CAUTION : Grease the grooves of the drill slightly to ensure that the majority of the metal chips adhere to the drill. Remove metal chips carefully after drilling.

The roller bearing is pulled out together with the oil inlet cover. Remove the retaining ring (3) with circlip pliers. On the gearbox side, fit puller cap (4), part no. 876489, and push hex. screw (5) through the cap, roller bearing (6) and the hole drilled in the oil inlet cover (1). Fit the pullout plate (7) with the nut (9) and washer (8) on the back end. By turning the hex. screw clockwise, the roller bearing is pulled out together with the oil inlet cover. Remove the O-ring (10).



BRP-Rotax

Maintenance Manual

3.9.4) Propeller gearbox disassembly

See Figs. 72-25, 72-26 and 72-27.

- CAUTION : Only push the dog gear down until it is possible to remove the two ring halves, otherwise the gearbox housing could be destroyed. The gear cover should be rotated back and forth during this step!

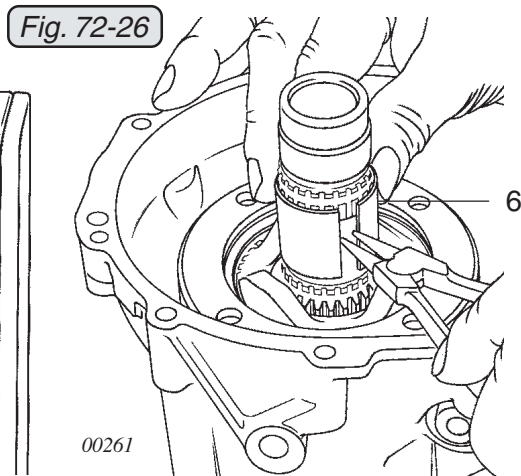
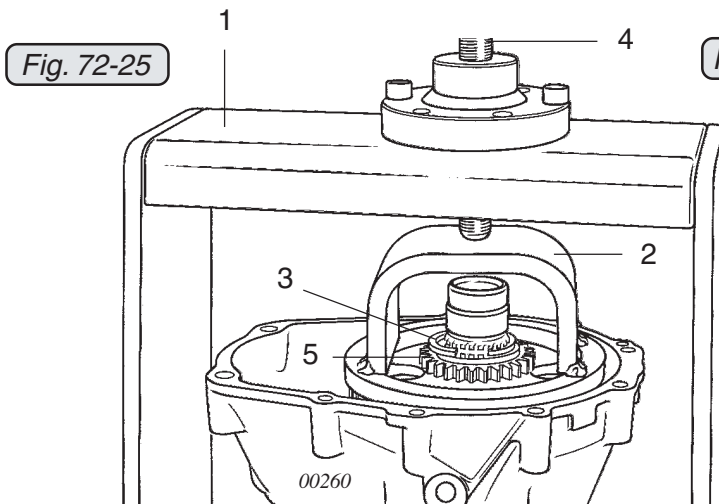
Place the complete gearbox in a suitable fixture (1) and press down the gear wheel with the mounting yoke (2), part no. 876885, until the ring halves (3) can be removed, see 00-00-00 section 10.4

- CAUTION: Do not overstress bearing bushing (6), as otherwise it will become unusable.

Now relieve the pressure on the gear by turning spindle (4) back and remove the mounting yoke and the gearbox from the fixture. Remove the drive gear (5), the thrust washer and the dog gear. Force bearing bushing (6) apart with circlip pliers and withdraw from the propeller shaft.

Remove the complete overload clutch (7) or dog hub (13), disc springs (8) 80x35x3, step collar (9), 6 mm (0.236 in.) distance sleeve (17), compensating shim (10), eccenter (11) (for fuel pump on the ROTAX 912 Series, of no significance on the 914 Series) and 8 mm (0.31in.) distance sleeve (12).

- CAUTION: The overload clutch is fitted **in serial production on all certified aircraft engines** and on all noncertified aircraft engines of configuration 3. All other engine versions are equipped with a dog hub, but available with an optional overload clutch or can be retrofitted to accommodate one.



c04231

BRP-Rotax
Maintenance Manual

3.9.8) Propeller governor drive installation

See Figs. 72-32, 72-33 and 72-34.

■ **CAUTION** : The oil inlet flange must be fitted well aligned and the O-ring must not be squeezed.

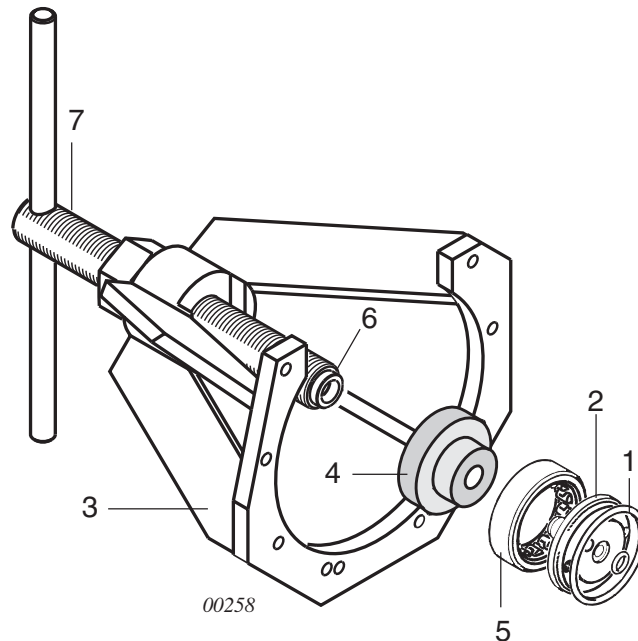
Install needle sleeve and ball bearing as described in 72-00-00 sec. 3.9.9. Grease new O-ring (1) and insert it together with the oil inlet flange (2) into the crankcase. Take care that both M6 threads are horizontal and the oil gallery is in a position to let the oil pass. For better positioning, at first tighten governor flange only slightly with 2 allen screws M6x20 (12) and oil inlet flange with 2 allen screws M6x16 (13).

Screw extractor (3), part no. 877615, onto the crankcase, place press-in insert (4), part no. 877590, into roller bearing (5), place on the centering (6) and press it fully home into the crankcase with the spindle (7). Fit circlip in groove with its sharp edge towards the outside.

Fit vacuum pump gear (8) Fig. 72-32 and fix drive sleeve (9) Fig. 72-32 with holder, part no. 242660. Apply LOCTITE 2701 to the allen screw M8x16 and tighten.

Fit the governor flange (8) again. Fit distance sleeve (9) and new O-ring (10) 32x4 into the crankcase. Place one O-ring (11) 7x2 into the oil inlet flange and one into the governor flange and keep them in position with some grease. Fit the governor flange and attach it to the crankcase with 4 allen screws (12) M6x20 and to the oil inlet flange with 2 allen screws (13) M6x16.

Fig. 72-33



d04351

BRP-Rotax

Maintenance Manual

- CAUTION : Longer screws will damage the oil inlet flange.
- ◆ NOTE: Tightening torque 10 Nm (90 in.lb). The allen screws (12) and (13) are secured with LOCTITE 221.

Fit the governor (14) and the new gasket (15). Take care that the gear-tooth system engages.

Depending on governor type different screws and nuts are needed. See SB-912-052 and SB-914-035, "Installation / Use of governors", latest issue.

Fit the pressure oil line (18) to the governor flange and the oil pump housing and secure with a clamp. The screw plugs (19) and (20) normally remain closed. A pressure gauge for governor pressure inspection can be connected at position (19) if necessary. The maximum governor pressure is between 21.5 bar (312 p.s.i) and 24.5 bar (355 p.s.i), depending on governor type. The governor starts regulating at 3400 to 4150 rpm.

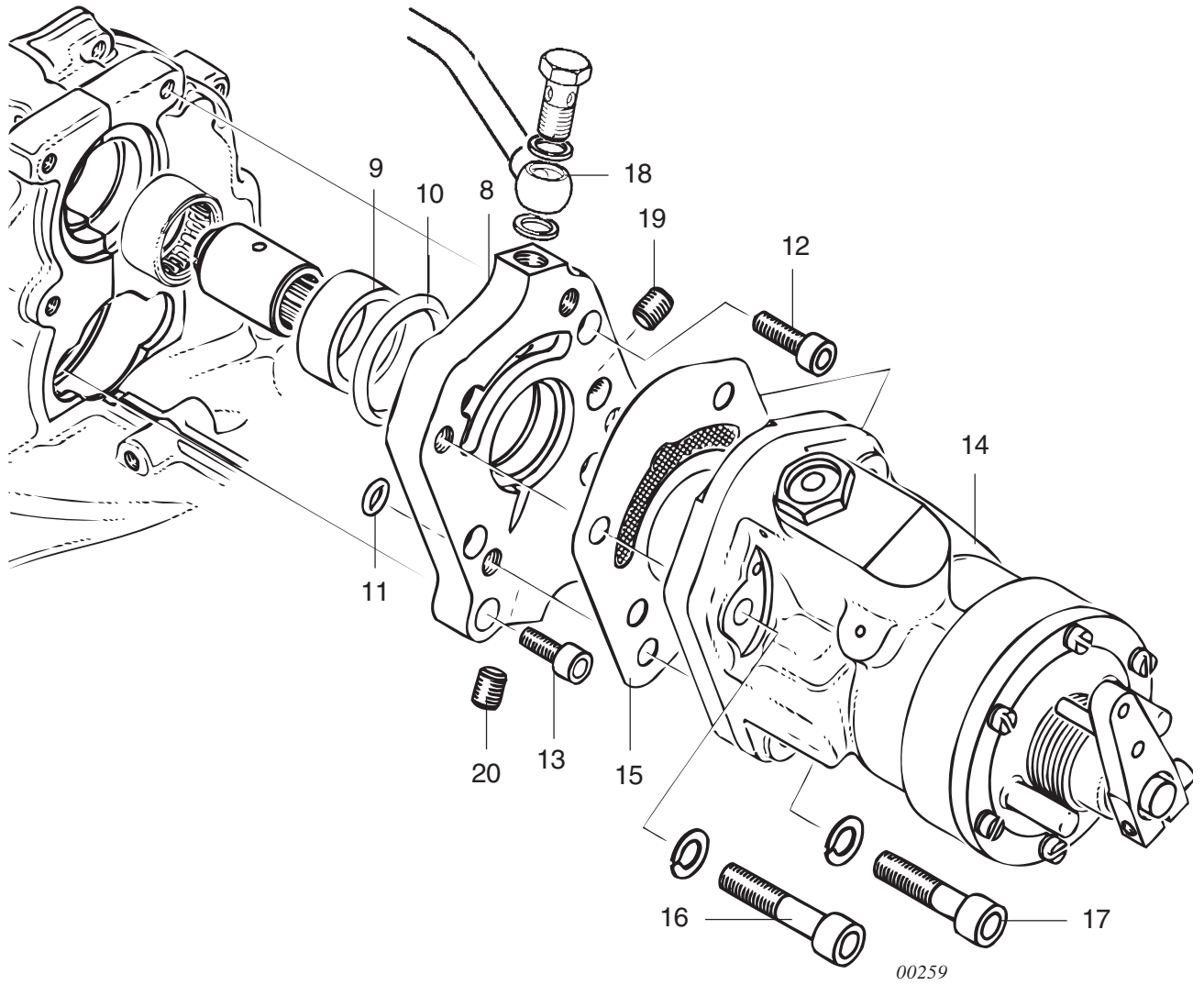
Malfunction of the propeller governing may be caused by the following:

- incorrect adjustment of governor actuation
- malfunction of propeller governor
- insufficient oil pressure, oil pressure fluctuations
- propeller pitch control.

d02622

BRP-Rotax
Maintenance Manual

Fig. 72-34



d02622

BRP-Rotax

Maintenance Manual

3.9.9) Vacuum pump drive installation

See Figs. 72-34, 72-35 and 72-36.

Lubricate new needle sleeve (3). Position puller cap (10), part no. 876489, on vacuum pump side, place press-in insert, part no. 877579, (11) onto the needle sleeve and fix with the hex. nut (12). Turning the hex. screw (13) clockwise presses the needle sleeve in completely.

The ball bearing is pressed in with the same procedure, but the puller cap (10), part no. 876489, is fitted on the pump flange side and the press-in insert (14), part no. 877595, is used.

Then the new oil seal (9) is pressed in using insertion jig, part no. 877276, and greased. Apply LOCTITE 221 to the sunk screw (7) M5x12 and the washer (8) for ball bearing fixation and tighten.

■ CAUTION : The length of allen screw (6) M8x14 must never be altered, as otherwise the screw will collide with the drive shaft of the vacuum pump.

Fit vacuum pump gear (4) and fix drive sleeve (5) with holder, part no. 242660. Apply LOCTITE 2701 to allen screw (6) M8x14 and turn it in.

Fig. 72-35

00253

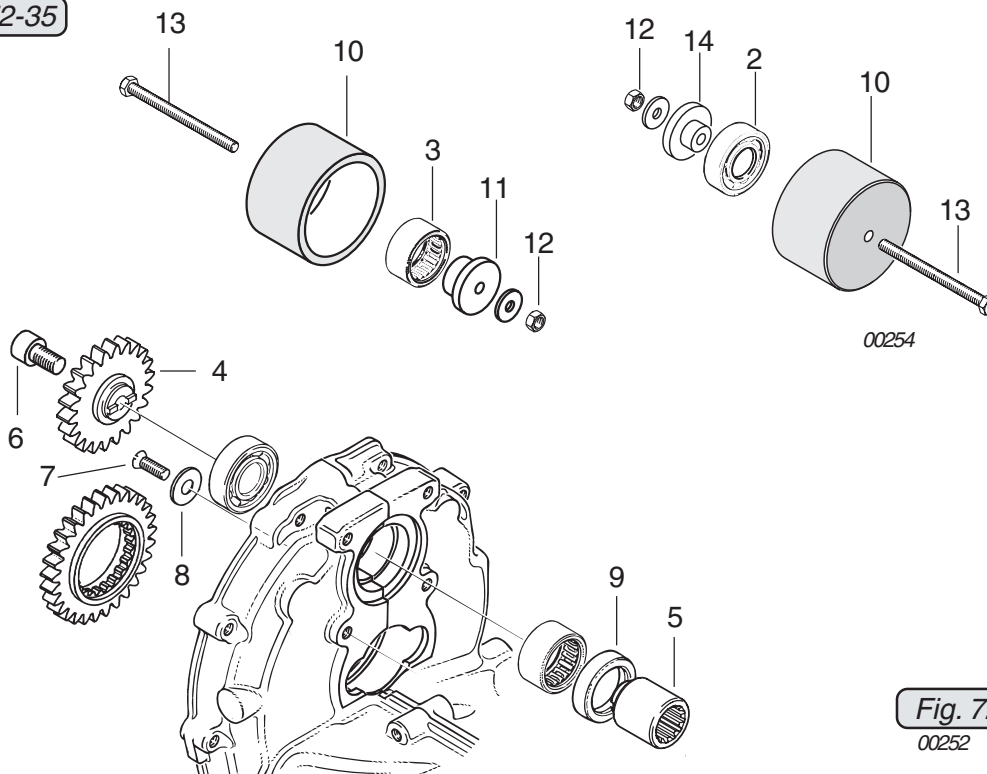


Fig. 72-36

00252

d04351

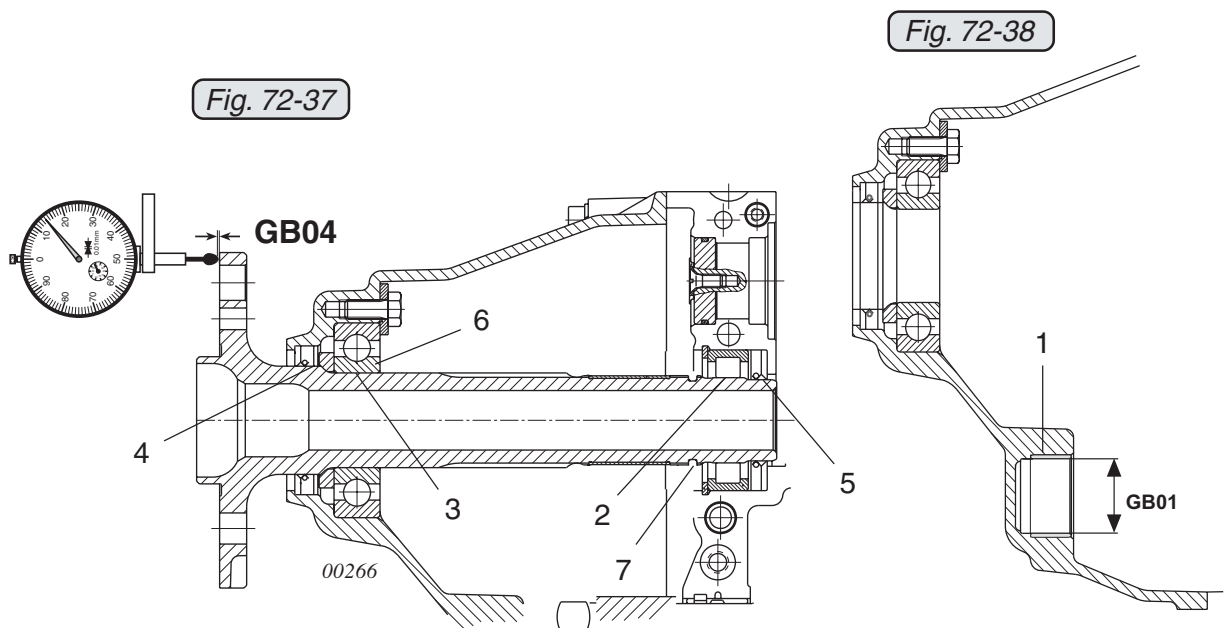
BRP-Rotax
Maintenance Manual

3.9.10) Gearbox components inspection

See Figs. 72-37, 72-38, 72-39, 72-40, 72-41 and 72-42.

Clean disassembled gearbox with suitable cleaning agents and check the following parts:

- Check that the bearing bushing (1) for crankshaft support bearing in the gear cover fits tightly and measure dimension (GB01). See 72-00-00 sec. 4.
- Measure both bearing seats (2) and (3) on the propeller shaft. See dimension (GB02) and dimension (GB03). Check oil seal running surface (4) and (5). Roll propeller shaft and check for run out. Check the run out of the propeller flange, see dimension (GB04). See 72-00-00 sec. 4.



■ CAUTION:

The entire propeller shaft with attachment bores must be free of corrosion, and there must be no fretting corrosion at bearing points ((2) and (3)).

d02622

BRP-Rotax

Maintenance Manual

Treatment of corrosion damage and surface damage to the propeller flange

The flange of the propeller shaft is subject to corrosion. After wrapping the propeller shaft (2) in plastic tape or covering it with plastic tubing, the propeller flange can be treated with an abrasive.

■ **CAUTION:** Before applying the protective coating, carefully cover the flange face (3), the attachment bores and the propeller shaft in this area (2).

To prevent corrosion damage, the back of the propeller flange should be coated with a corrosioninhibiting agent.

Where there is greater corrosion damage and the material has been affected, the propeller shaft must be replaced.

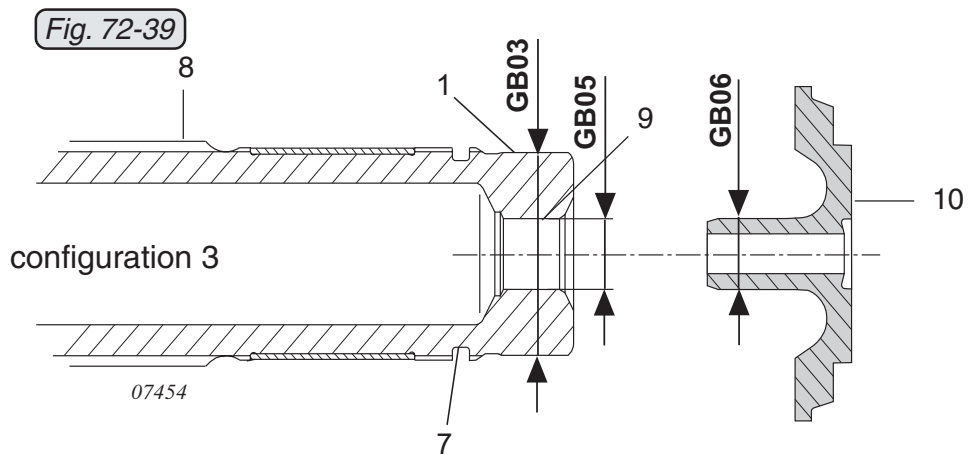
When carrying out any of these steps, the manufacturers instructions must be observed.

— The ball bearing (6) must be an interference fit on its outer race in the gearbox housing and on its inner race on the propeller shaft. Check groove (7) for the retaining rings and the gear-tooth system (8) for wear or damage.

On configuration 3, the inner diameter (9) of the propeller shaft must be checked in the area of the oil inlet flange (10), dimension (GB05/GB06). See 72-00-00 sec. 4.

◆ **NOTE:** Not the dimension GB05 or GB06 are decisive, but the radial clearance GB05/GB06.

Inspect the propeller shaft for cracks. See 00-00-00 sec.10.4. Register the results of the magnetic particle inspection in the respective form sheet. See 72-00-00 sec. 5.



d04351

BRP-Rotax
Maintenance Manual

3.9.11) Toothed shaft profiles inspection

See Fig. 72-43.

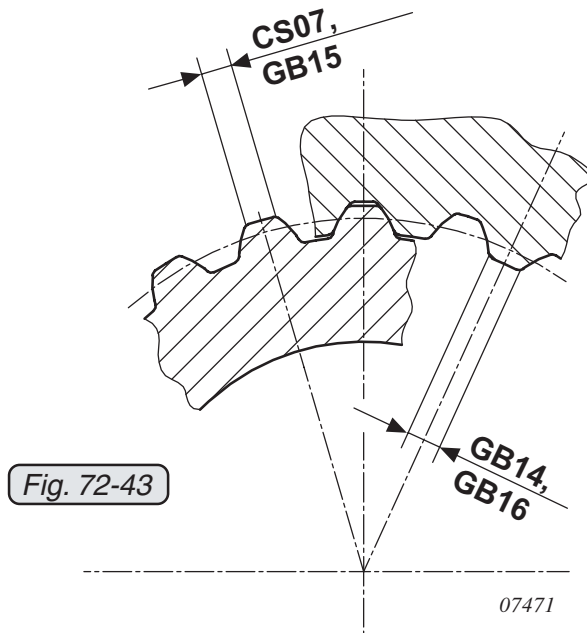
There are two important toothed shaft connections in the gearbox.

- **crankshaft to drive gear**
- **propeller shaft to clutch hub of the overload clutch**

Carry out a visual inspection of all toothed shaft profiles for damage and wear.

To check the toothed shaft profiles, the tooth width at the head of the respective inner and outer gear-tooth system must be measured. The lowest value is decisive in each case.

See 72-00-00 sec. 4.



BRP-Rotax

Maintenance Manual

3.9.12) Gear set inspection

The gear set is inspected to detect any damage to the gear-tooth system.

◆ NOTE: The gear set can be inspected with the gearbox installed by using an endoscope with flexible shaft. This must be done in such a way that the condition of the gear flanks can be **precisely evaluated** - which requires experience.

■ CAUTION: Inspect all gear tooth contact surface for signs of damage and pitting.

Gear set pitting can cause high frequency vibration. This vibration may result in severe problems. As it is transmitted throughout the engine and its attached components:

- fuel pump damage
- gearbox wear (splines and contact area)
- external alternator wear
- exhaust system wear
- crankcase mating surfaces

◆ NOTE: This vibration can be detected with dynamic propeller analysis equipment. Normal vibration level for the engine is approx 0.5 to 1.0 inch per seconds or ask the aircraft manufacturer for the figures for the particular installation.

Pitting can take many forms, from **tolerable break-in pitting** to **spallation**. To assist your judgement, please read the following.

General note on pitting:

Pitting is the breaking off of smaller or larger material particles from the active gear tooth contact surface. Whereas the fracture of a tooth results in gearbox failure, pitting will not normally influence the running of the gearbox. There are different degrees of pitting.

◆ NOTE: Fine pitting or areas of pitting hardly influence the operation of the gear-tooth system.

However, pitting will normally increase with the period of operation.

d04351

BRP-Rotax

Maintenance Manual

The speed at which the pitting increases depends on the lubricant used and the load. The pitted area can become so large that the remaining, unaffected tooth flank can no longer transmit the load safely. Further operation of the components in this condition will result in the total destruction of the gear-tooth system.

◆ **NOTE:** The most common area where pitting forms is on the base of the gear tooth on the drive gear. For this reason, inspect the drive gear first.

Pitting is damage caused by material fatigue. The latest insights reveal that its formation is influenced by exceeding the permissible Hertzian stress for the material, tangential stress on the surface (friction) and temperature strain. This means that in addition to the material and heat treatment of the material, the surface quality and structure, the surface treatment and the lubricant (viscosity at operating temperature and the additives used) are also important.

Pitting can be divided into the following categories according to the size of the pitted area, the type of pitting involved and the number of areas affected.

- minor pitting (breakin pitting)
- advanced pitting
- spallation (large zones of the tooth surfaces have broken off)

Minor Pitting: See Figs. 72-44, 72-45 and 72-46.

Characteristics:

Isolated small areas of pitting (up to approx. 0.5 % of the flank area) or porelike zones of pitting, usually only found at the root of the flank. The formation of this type of pitting may stop once the gearbox wearin period is over.

Causes:

High local pressure on new gears which have not yet been broken in can cause isolated pitting. With increased wear, the stress on these areas is relieved and the pitting may stop. In the same way, changes in the operating conditions can stop the progress of pitting formation.

Conclusion:

This type of pitting does not prevent safe operation. The gear set can remain in use.

◆ **NOTE:** Figs. 72-44 to 72-46 show gear flanks with minor pitting.

BRP-Rotax

Maintenance Manual

- ◆ **NOTE:** Because of the small size of the pitting shown and the copying process, the pictures may not show the pitting clearly enough. If you are in any doubt, seek assistance by studying technical publications or consult your authorized ROTAX distributor or Service Center.

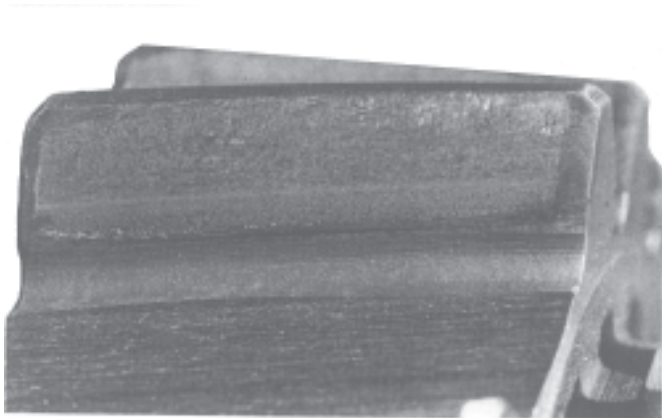


Fig. 72-44
Magn.: approx. 100%

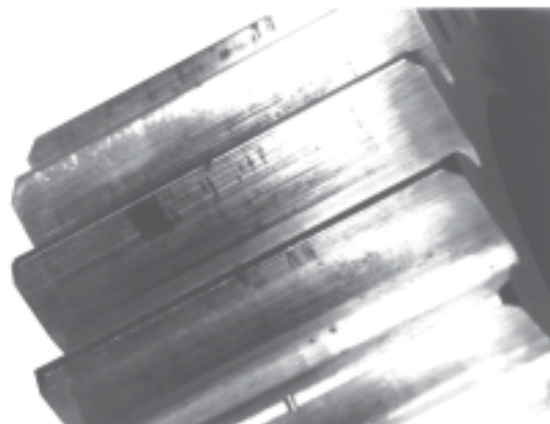


Fig. 72-45
Magn.: approx. 75%

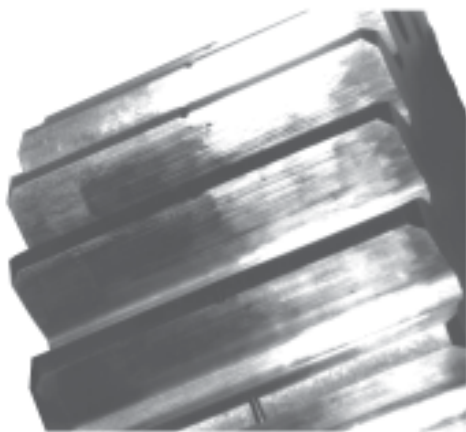


Fig. 72-46
Magn.: approx. 75%

d04351

BRP-Rotax

Maintenance Manual

3.9.13) Propeller gearbox reassembly

See Figs. 72-51, 72-52 and 72-53.

- ◆ **NOTE:** At the modification of the gearbox (e.g. reduction ratio, retro-fit of overload clutch) the part number on the gearbox housing must be corrected. See Fig. 72-51/1.

Heat gearbox housing (1) with hot air (or in an oven) to approx 100 °C (212 °F). Press shaft seal (2) into the gearbox housing from the inside, using insertion jig, part no. 876518, and grease sealing lips (3). Add radius ring (4) 36/50/ 5.5 with rounded side towards shaft seal. The weight of the ball bearing (5) must cause it to fall into the bearing point of the heated gearbox housing. Fix ball bearing in position, using 4 hardened washers (6) 7.2/18.8/3 and hex. screws (7) M7x16.

- ◆ **NOTE:** Secure screws with LOCTITE 221 and tighten to 15 Nm (130 in.lb).

Slide the propeller shaft into the gearbox housing and place on a suitable flat surface (8). Apply LOCTITE Anti-Seize to the bearing seat (10) of the propeller shaft (9). Fit a sleeve (12 which is approx. 30 mm (1.18 in.) longer than the propeller shaft. The inner diameter should be selected so that the sleeve presses against the inner ring (11). Press on the gearbox housing, turning it slightly (left-right).

- **CAUTION :** Do not tap!

It is an advantage if the gearbox housing is still warm at this stage.

Place distance sleeve (13) 35.2/42/8 and eccentric (14) for the fuel pump onto the propshaft.

Place these components on horizontally and in this order: step collar (15) with the $\varnothing 40.8$ mm (1.60") towards the disc spring, then two disc springs (16) facing each other and the third disc spring (17) with its back to the second disc spring. Make sure that the disc springs lie against the centering rib (18) of the clutch hub. Apply LOCTITE Anti-Seize to the tooth profile of the slipper clutch (19) and place it onto the propeller shaft.

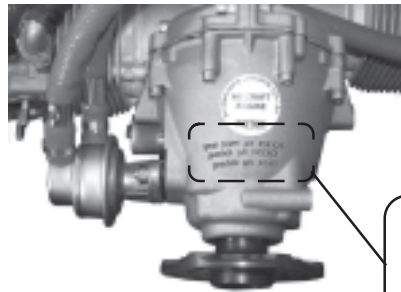
Carefully fit pre-oiled bearing bushing (20) onto the propeller shaft using circlip pliers. Push on dog gear (21), apply LOCTITE Anti-Seize to both sides of the plastic thrust washer (22) 33.2/51/1.2 and place it on together with drive gear (23).

BRP-Rotax

Maintenance Manual

- ◆ **NOTE:** Gearboxes without an overload clutch have no third disc spring (17), centering rib or slipper clutch. Instead, they are fitted with a second step collar, see Fig. 72-53.
- **CAUTION :** If the disc springs are not well centered, the dog gear cannot be depressed sufficiently to allow insertion of ring halves. Do not increase the pressure, but remove the clutch again and center the disc springs more accurately.
- ◆ **NOTE:** Coat contact surfaces of disc springs and dogs as well as the tooth profile of propeller shaft with LOCTITE Anti-Seize.

Fig. 72-51/1



gear cover p/n XXXXXX
 gearbox p/n XXXXXX
 gearbox s/n XXXXX

part no. (6 digit)

Fig. 72-51

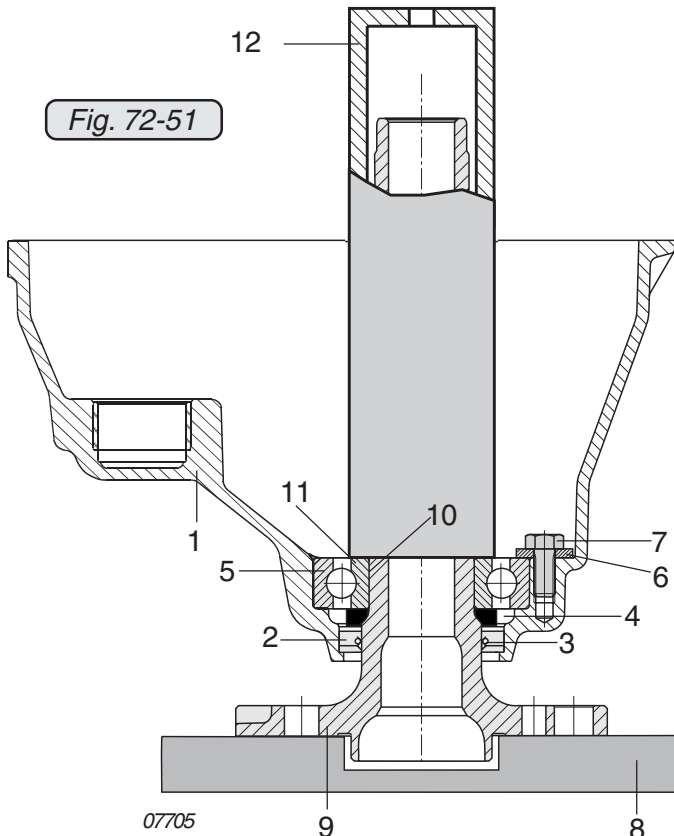
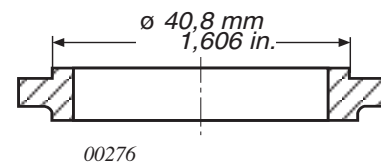


Fig. 72-52



d04351

BRP-Rotax

Maintenance Manual

3.9.14) Disc spring pre-tension adjustment (with overload clutch)

See Figs. 72-53 and 72-25 (see Section 72-00-00 / 3.9.4).

When the propeller shaft assembly is uncompressed, the contact surface (24) for the ring halves must lie in the groove of the propeller shaft 1 mm (0.039 in.) over the upper edge (25). The difference must be compensated for by placing shims (26) between eccentric (14) and step collar (15).

- ◆ NOTE: To facilitate adjustment, they can first be pushed apart until the top edge (25) of the contact surface (24) for the ring halves slips into the groove in the propeller shaft and a 1 mm (0.039 in.) compensating shim (26) can be inserted between step collar (15) and eccentric (14).
- ◆ NOTE: To check the friction torque of the dog hub in free rotation, see the corresponding Maintenance Manual (Line Maintenance) for the respective engine type, 912 Series or 914 Series.

3.9.15) Disc spring pre-tension adjustment (with dog hub)

See Fig. 72-53

Completely compress disk springs utilizing mounting yoke part no. 876885. The lower edge of the groove (25) in the propeller shaft must align with the top edge of the retaining ring (24) (distance must not be more than 0.2 mm (0.008 in)). Set distance by shims to max. 0.2 mm (0.008 in).

After completing the adjustment of the disk spring travel, depress dog gear (2) with mounting yoke, part no. 876885, until both ring halves can be inserted.

- CAUTION : Always use new ring halves.

Insert ring halves and release pressure, see 72-00-00 sec. 3.9.4.

- CAUTION : If the spacing is insufficient, never overpress the springs, as this will cause the dog gear to collide with the gear cover.
- CAUTION : The ring halves must be completely inserted in the groove on propeller shaft!

Check that the ring halves are positioned correctly.

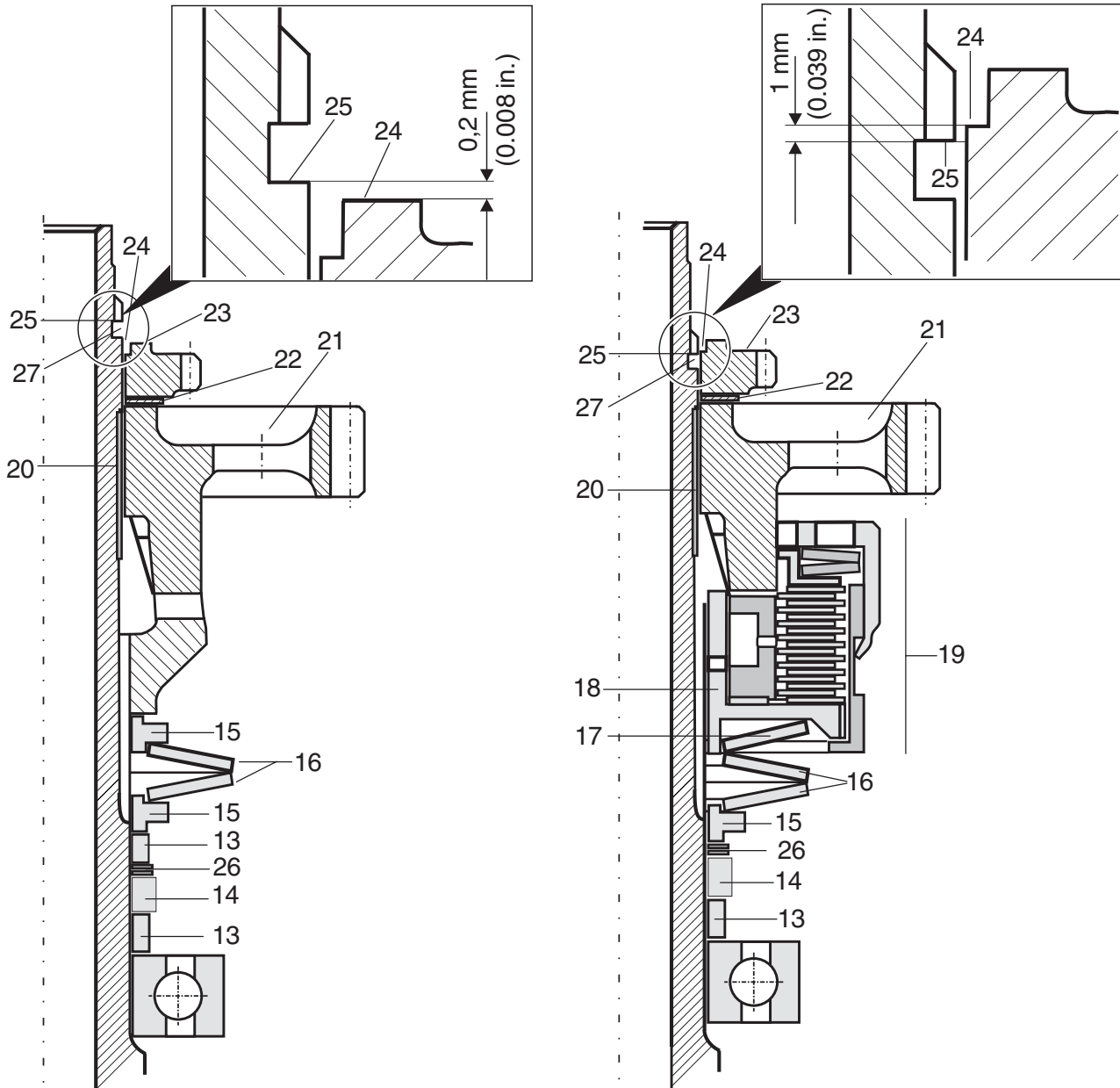
BRP-Rotax

Maintenance Manual

Fig. 72-53

*Version with
dog hub*

*Version with
overload clutch*



08243

d04351

BRP-Rotax

Maintenance Manual

3.9.16) Propeller gearbox — installation

See Figs. 72-54, 72-55 and 72-56.

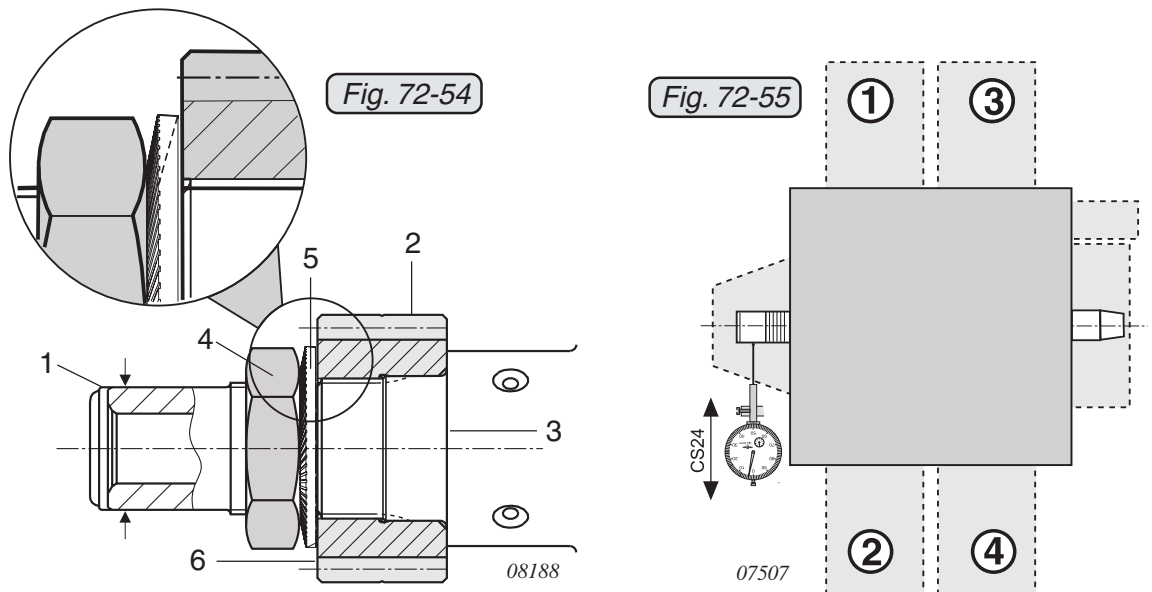
Carry out a visual inspection of the crankshaft (1) on the power take off side. Slide drive gear (2) onto the crankshaft (3).

■ **CAUTION :** Before installing, clean hex. screw (4) with LOCTITE 7063. Make sure to have an appropriate installation position of the friction washer (5).

Apply LOCTITE 648 to hex. nut (4) M30x1.5 and screw the nut onto the crankshaft together with the friction washer (5) VS30. Tightening torque 200 Nm (147.5 ft.lb). Then measure the run out (CS24). See 72-00-00 sec. 4.

◆ **NOTE:** If there is slight radial run out, reinstall nut (4) and measure again.

■ **CAUTION :** Dog gear and drive gear are paired and are marked with a consecutive serial number (6). Use only parts with the same serial number!



Clean sealing surface of gearbox housing and crankcase. Oil which drains onto the sealing surface will eventually create a leak. Insert both dowel pins 6x20 into crankcase. Grease oil seal for propeller shaft in crankcase. Lubricate bearing bore for propeller shaft.

◆ **NOTE:** Engines of the 912/914 Series configuration 3 and configuration 4 have no oil seal.

Keep the rollers of the roller bearing in position with grease to facilitate assembly of propeller shaft.

BRP-Rotax

Maintenance Manual

Position gearbox housing with completely pre-assembled gear unit, previously coated with a thin layer of sealing compound LOCTITE 5910 or 574. Turn propeller shaft slightly to allow the dog gear to engage. By gently tapping on the gearbox housing (not on the propeller shaft) with a plastic mallet, the gearbox is fitted on the crankcase.

◆ **NOTE:** If there is resistance with a gap of approx. 10 mm (0.4 in.), the alignment of the rollers may need readjusting. Fix the rollers in position again with grease, press them outwards and / or turn the vacuum pump /governor gear slightly to allow engagement.

■ **CAUTION :** If excessive force is applied at assembly, the roller bearing or the vacuum pump drive can be damaged.

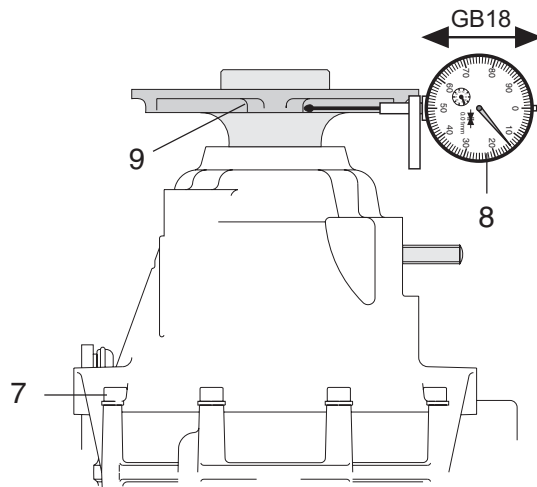
If the sealing surface becomes oily during the assembly process, clean it and reapply surface sealing compound LOCTITE 5910 or 574.

Tighten gearbox evenly with 2 allen screws M8x45 and 8 allen screws (7) M6x45 and lock washers in a crosswise pattern.

Check the radial gear backlash at the propeller flange (9) with the dial gauge (8), dimension (GB18). See 72-00-00 sec. 4.

Check the friction torque. See the relevant Manual (Line Maintenance) 12.00.00 chapter 7 of the corresponding engine type 912 Series and 914 Series.

Remove crankshaft locking screw and fit crankshaft plug screw M8 x 20 with new Cu gasket ring and tighten to 15 Nm (133 in.lb). For verification turn crankshaft with spanner 24 a/f on hex. screw on magneto side.



07508

Fig. 72-56

d04231

BRP-Rotax
Maintenance Manual

3.11) Cylinder head - disassembly

See Fig. 72-59.

If the rocker arms are to be dismantled without removing the cylinder head, turn the crankshaft to set the piston of the respective cylinder to ignition T.D.C. so that only little pressure remains on the rocker arm. Depress rocker arm with check lever part no. 877690 towards the hydraulic valve tappet. Now the rocker arm is completely released and the rocker arm shaft can be removed.

◆ **NOTE:** Never use force to press out the rocker arm shaft. The hexagon of the collar cap nut may be in an unfavorable position and prevent removal of the rocker arm shaft. In this case, loosen the nut.

Withdraw rocker arm shaft and remove both rocker arms.

◆ **NOTE:** Newer engine versions have plastic bushings as bearings. These plastic bushings must be laid aside in an ordered manner to prevent any mixup.

Compress the valve springs using valve spring mounting device (1), part no. 877380, valve spring mounting pliers (2) or similar tool and lift out valve cotters. Release valve spring. Remove valve spring retainer and both springs and withdraw valve.

◆ **NOTE:** Prior to removal of valves, clear burrs which may be present on valve stems to prevent damage to valve stem seal and valve guide. Mark valves coordinately.

Repeat procedure for the second valve. Clean cylinder head.

Check oil return tubes for leaks (visual inspection). If there is leakage in area (3), the respective oil return tubes must be replaced. For this procedure, heat the return tubes with a hot air gun to max. 120 °C (248 °F). Extract the oil return tubes and remove any glue residues from the bore. Apply LOCTITE 648 on the new oil return tubes in the area of the two grooves and twist and push tube into position in the preheated cylinder head. After then heat the cylinder head 10 to 15 minutes to 100 °C (212 °F) so that the LOCTITE hardens.

BRP-Rotax

Maintenance Manual

When replacing the coolant elbow, mark its position, heat the area of the coolant below with a hot air gun to max. 120 °C (248 °F) and unscrew the fitting. Remove residues of LOCTITE means and check threads. Apply LOCTITE 648 to the thread on the cylinder head and to the new coolant fitting and screw the fitting into the cold cylinder head. Leave cylinder head to harden for approx. 10 minutes at 100 °C (212 °F).

If there are oil carbon residues on the sealing face with the cylinder, remove them carefully. Check that the sealing face is level.

In the case of slight wear, valve and valve seat may be seal-lapped, using emery paste.

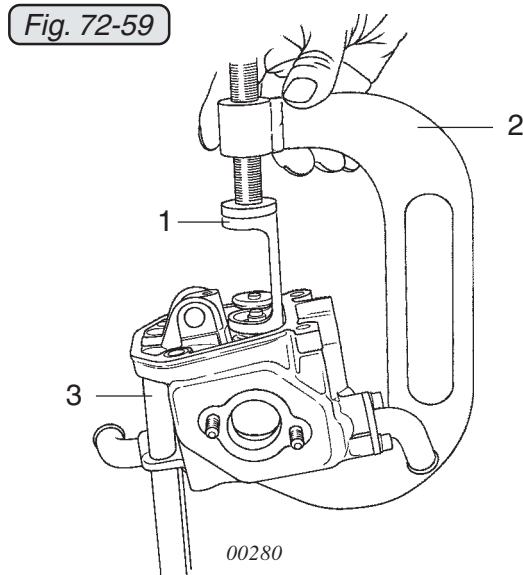
Clean cylinder head and individual components with suitable cleaning agents. See 00-00-00 sec. 10.3.

Check cylinder head sealing surface and if necessary, blue it and the cylinder. The flat surface of the cylinder and the cylinder head may only be slightly machined.

◆ **NOTE:** In the event of more serious leakage, cylinder and cylinder head can be reworked as described in the Overhaul Manual by a ROTAX authorized overhaul facility.

If the engine has been "run hot", the hardness of the cylinder head and the cylinder material must be checked.

See 72-00-00 sec. 5 and the corresponding Maintenance Manual (Line Maintenance) for the respective engine type 912 or 914 Series.



BRP-Rotax
Maintenance Manual

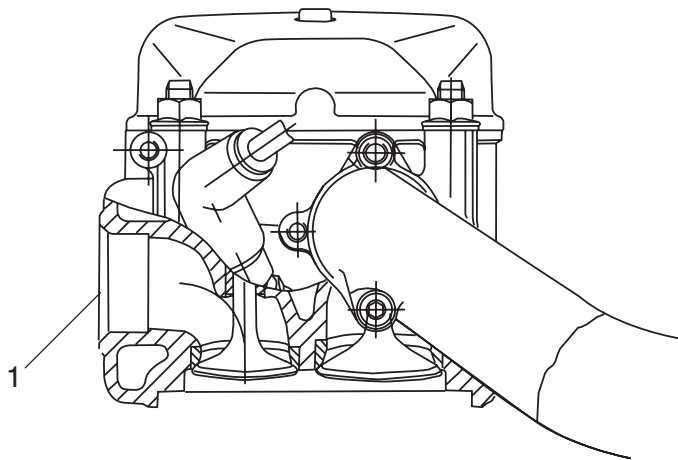
3.11.2) Reworking of the sealing surface to the exhaust manifold

See Fig. 72-63.

Reworking is permissible if there is a leak at the sealing surface (1) to the exhaust manifold.

If a rework is necessary, the cylinder head must be sent to a ROTAX authorized overhaul facility for overhaul.

Fig. 72-63



08244

BRP-Rotax
Maintenance Manual

3.11.3) Valve guides

See Figs. 72-64 and 72-65.

Check diameter of valve stem (1) and inner diameter of valve guide (2), see dimension (VT01) and dimension (CH01).

If wear limit is reached, replace valve guide.

See 72-00-00 sec. 4.

For this procedure, the cylinder head must be sent to a ROTAX authorized overhaul facility for maintenance.

Fig. 72-64

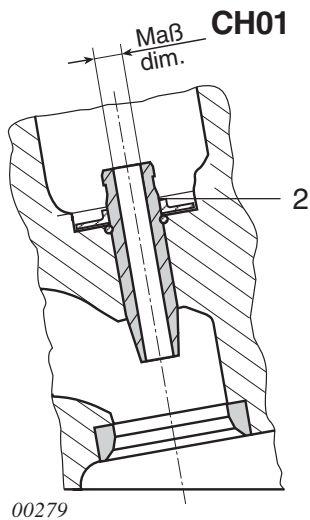
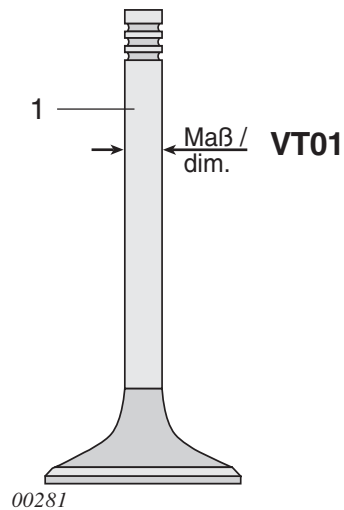


Fig. 72-65



BRP-Rotax
Maintenance Manual

3.13.2) Checking the piston ring

See Figs. 72-88 and 72-89.

Check the end clearance of the cleaned piston rings.

To determine the end clearance (4), remove the piston rings from the piston using piston ring pliers, clean them and insert into the cylinder. Use a piston as pusher to align piston squarely in cylinder and approx. 10 mm (0.395 in.) from the top edge. The end clearance is measured using the feeler gauge (4), see dimension (PI07).

See 72-00-00 / 4.

By closely inspecting the ring surface (5), the portion of surface contact can be seen and indicates the wear. Install piston rings using piston ring pliers with the marking (6) "TOP" or the dot mark pointing upwards towards the piston crown.

Fig. 72-88

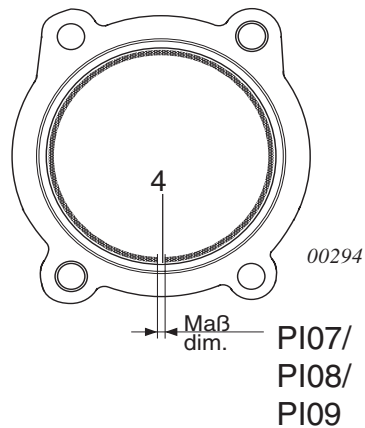
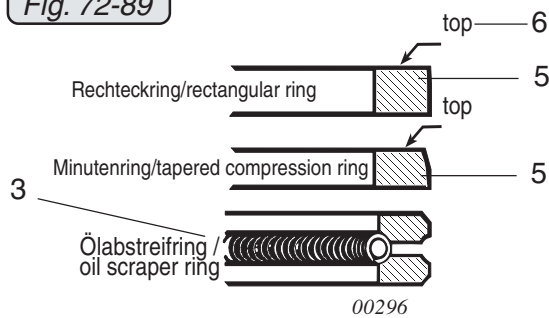


Fig. 72-89



d04351

BRP-Rotax
Maintenance Manual

3.13.3) Piston pin

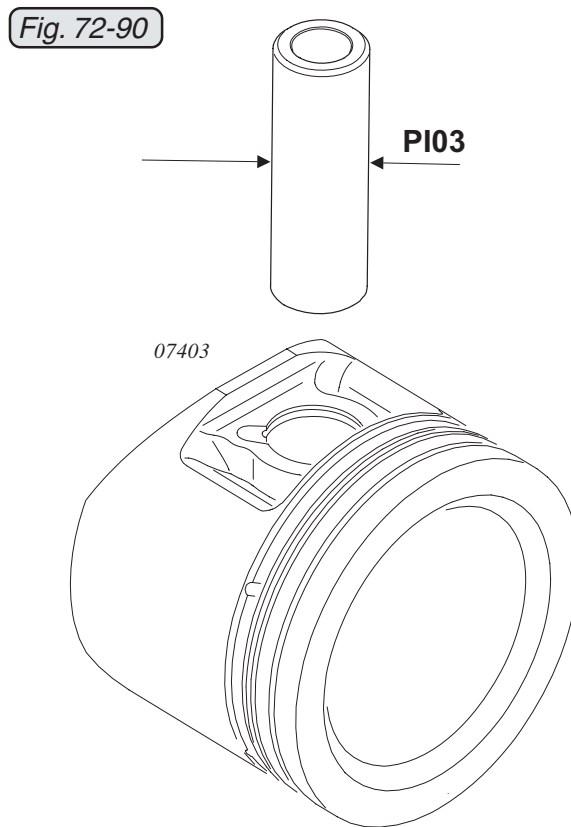
See Fig. 72-90

Measure piston pin and check for traces of seizure in area of con-rod seat. In case of distinct traces of seizure, replace piston pin even if dimensions are correct.

Measure dimension PI03.

See 72-00-00 sec. 4.

- ◆ **NOTE:** The mono hook circlips for axial piston pin circlip must be used only once and must therefore be replaced.



d02622

3.14) Hydraulic valve tappets

See Figs. 72-94, 72-95, 72-96 and 72-97.

Pull hydraulic valve tappets (1) out of the housing using the mono hook circlip puller (2), part no. 976380.

■ **CAUTION** : Never insert the puller into the retainer (3), but always into the groove in the hydraulic valve tappet. Inserting it into the retainer could cause the hydraulic valve tappet to fall apart. See Fig 72-94.

Lay hydraulic valve tappets aside, arranging them in a manner that ensures they will be refitted in their original place.

Carry out a visual inspection of the hydraulic valve tappets for damage and wear.

◆ **NOTE**: The hydraulic valve tappets rotate during engine operation, so the camshaft lobes (4) should be worn evenly.

Failure of a hydraulic valve tappet to rotate will result in uneven wear (2) on the contact surface (1). If there is fretting/pitting, the tappet must be replaced. See Fig. 72-97.

■ **CAUTION**: The cams of the camshaft can be checked for damage after removing the hydraulic valves.

In the event of damage of the camshaft, the assy. engine block must be sent to a ROTAX authorized overhaul facility.

■ **CAUTION** : Taking apart hydraulic valve tappets is not planned and not necessary.

■ **CAUTION** : In the event of malfunctions such as operation with un-purged hydraulic valve tappets, the components in the tappet (plate) are worn down.

■ **CAUTION** : If it is necessary to replace a hydraulic valve tappet, make sure that a tappet with a polished cam running surface (ROTAX part no. 881831) is used.

Depending on storage conditions, new hydraulic valve tappets are partially emptied and pump full of oil during engine startup. Oil enters the hydraulic valve tappet through the bore (5). The retaining ring (3) keeps the piston (6) in position when the hydraulic valve tappet is removed. See Fig. 72-95 and 72-96.

◆ **NOTE**: When putting into operation, observe SI-912-018 /SI-914-20 "Venting the lubrication system", latest issue.

See 72-00-00 sec. 4.

BRP-Rotax Maintenance Manual

Fig. 72-94

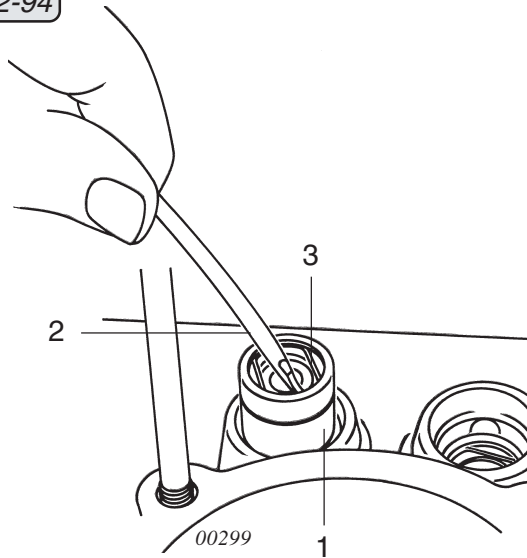


Fig. 72-95

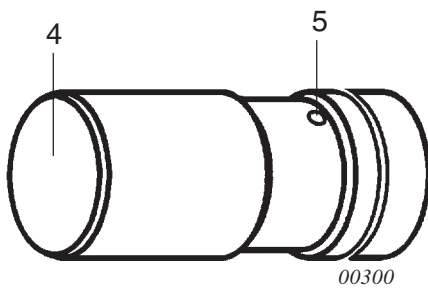


Fig. 72-96

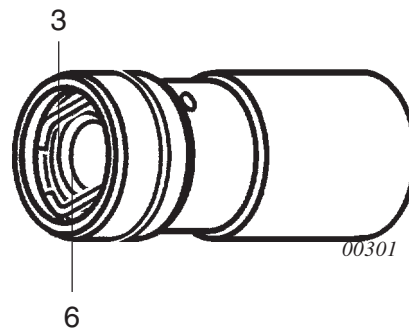
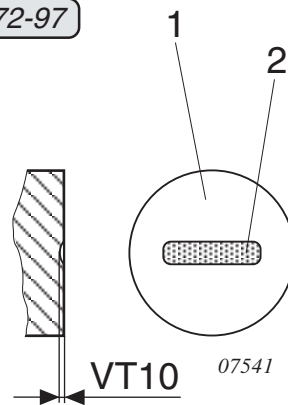


Fig. 72-97



d02622

BRP-Rotax
Maintenance Manual

Fig. 72-104

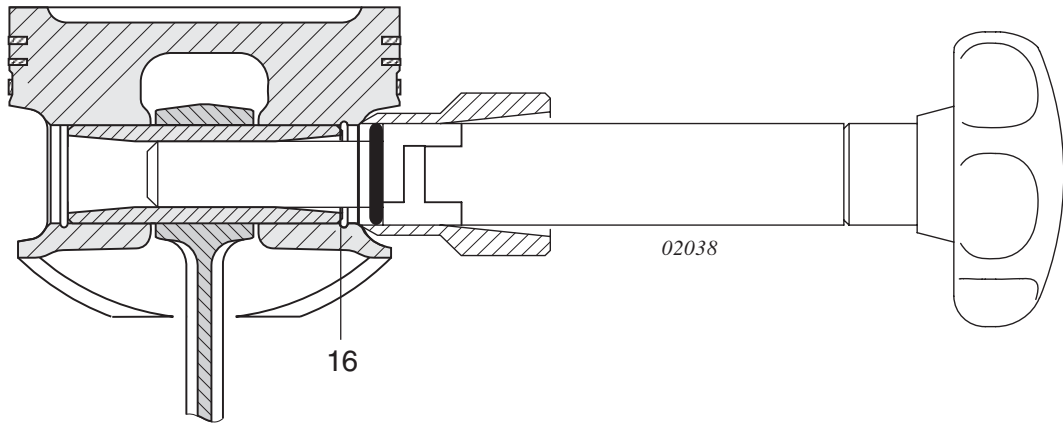
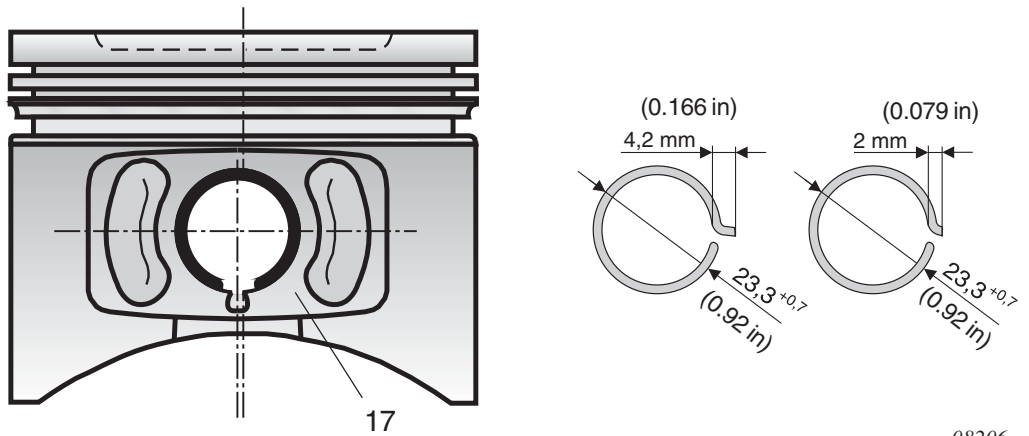


Fig. 72-105



d02622

BRP-Rotax

Maintenance Manual

3.16.3) Cylinders fitting

See Fig. 72-106.

Place O-ring 87x2 on the cylinder skirt and oil the cylinder wall.

- ◆ NOTE: On engines with crankcases bearing serial numbers up to S/N 27811, there is an O-ring 87x2 fitted to depress stud bolt M8x297. This O-ring is not fitted on housing with serial numbers above S/N 06.0010.
- ◆ NOTE: In case of oil leakages in the area of the cylinder barrel a repair solution from crankcase S/N 06.0010 was created. See SI-912-019/SI-914-021 "Oil leakages in the area of the cylinder barrel", latest issue.
- CAUTION : To prevent breakage to the piston rings, the appropriate piston ring retainer, part no. 876978 or 876967 must be used. The gaps in the rings (2) and (3) must be positioned in the prescribed angle range. See Fig. 72-106.

Pay attention to the position of the piston ring gaps (4). The gap in the first piston ring (1) should be positioned in the center of the bottom piston skirt. The ring gap in the second piston ring (2) and the gap in the oil scraper ring (3) should be inclined away from the center of the top piston skirt at an angle of between 25° and max. 30°. See Fig. 72-106.

- CAUTION : The ring gap should never be in the area of the piston pin bore.
- CAUTION : Check twice whether the piston pin circlips are installed as prescribed.

Lubricate piston, compress piston rings with piston ring retainer and carefully fit the coordinated cylinder. Proceed in the same way for the other cylinders.

d04351

BRP-Rotax
Maintenance Manual

3.17) Intake manifold inspection and compensation tube assembly

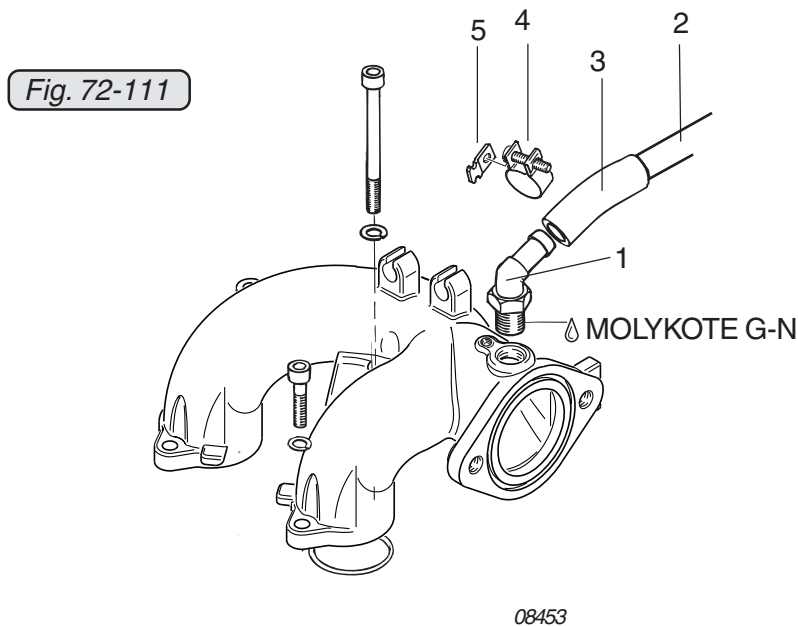
See Fig. 72-111

Check the angular tube (1) screwed into the intake manifold for cracks and tight fit, replace if necessary.

◆ NOTES: Mark the position of the angular tube with a suitable pen (touchup pen).

Remove the angular tube. Clean threads, apply MOLYKOTE G-N to both angular tubes and fit them into position with at least 5 turns.

Attach compensation tube (2) and the resonator hoses (3) (long hose on cylinder side 2/4) on both ends with screw hose clamps (4). The clip (5) serves to hook in the carburetor support spring. See 73-00-00 sec. 3.5.



3.18) Crankshaft inspection

Measure the crankshaft (CS04, CS05, CS07 und CS24). See 72-00-00 sec. 4. In the case of deviation, the whole assy. engine block must be sent to an ROTAX authorized overhaul facility.

BRP-Rotax
Maintenance Manual

NOTES

BRP-Rotax
Maintenance Manual

Description	Code	Reading new		wear limit	wear limit		07221			
		min	max	100%	50%		Readings			
Piston										
							Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4
Piston red 79,5 mm / 3,1 in.	PI01	79,488	79,502	79,390	79,439	actual				
		3,1294	3,1300	3,1256	3,1275	renewed				
Piston green 79,5 mm / 3,1 in.	PI01	79,498	79,512	79,390	79,444	actual				
		3,1298	3,1304	3,1256	3,1277	renewed				
Piston red 84mm / 3,3 in.	PI01	83,988	84,002	83,890	83,939	actual				
		3,3066	3,3072	3,3027	3,3047	renewed				
Piston green 84mm / 3,3 in.	PI01	83,998	84,012	83,890	83,944	actual				
		3,3070	3,3075	3,3027	3,3049	renewed				
Clearance cyl. A" with Piston "red"	CY01/ PI01	0,000	0,024	0,130	0,077	actual				
		0,0000	0,0009	0,0051	0,0030	renewed				
Clearance cyl. B with Piston "green"	CY01/ PI01	0,000	0,026	0,130	0,078	actual				
		0,0000	0,0010	0,0051	0,0031	renewed				
Piston pin bore	PI02	20,001	20,005	20,040	20,023	actual				
		0,7874	0,7876	0,7890	0,7883	renewed				
Piston pin	PI03	19,992	19,995	19,970	19,981	actual				
		0,7871	0,7872	0,7862	0,7867	renewed				

d02622

BRP-Rotax

Maintenance Manual

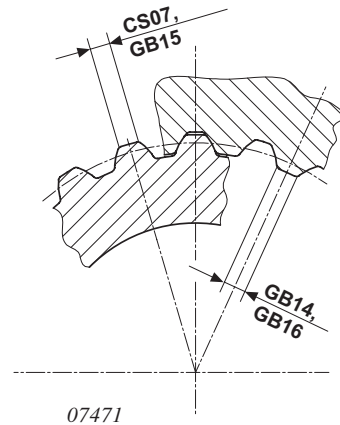
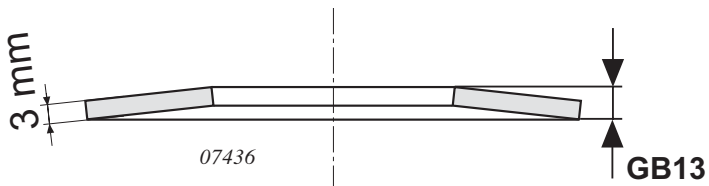
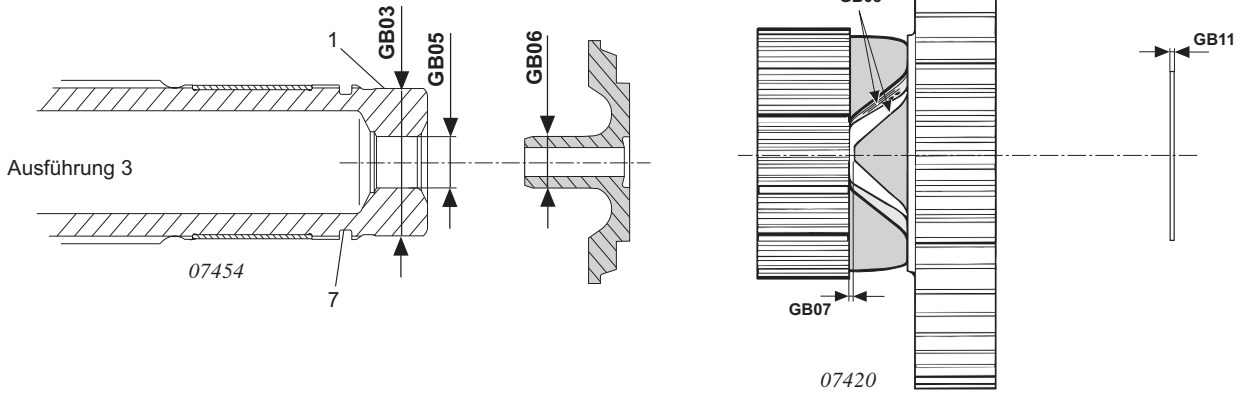
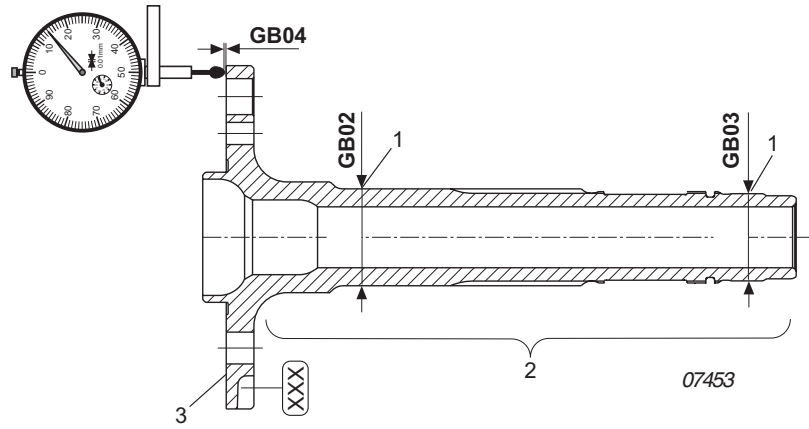
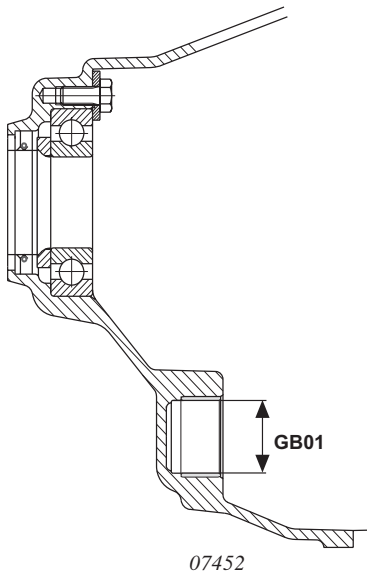
Description	Code	Reading new		wear limit	wear limit		07221			
		min	max	100%	50%		Readings			
Piston										
							Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4
Piston pin clearance in piston pin bore	PI02/ PI03	0,006	0,013	0,050	0,032	actual				
		0,0002	0,0005	0,0020	0,0012	renewed				
Piston pin clearance in con rod	CS06/ PI03	0,015	0,035	0,050	0,043	actual				
		0,0006	0,0014	0,0020	0,0017	renewed				
Piston ring groove clearance rectangular ring 1	PI04	0,030	0,062	0,100	0,081	actual				
		0,0012	0,0024	0,0039	0,0032	renewed				
Piston ring groove clearance tapered compression ring 2	PI05	0,030	0,062	0,100	0,081	actual				
		0,0012	0,0024	0,0039	0,0032	renewed				
Piston ring groove clearance oil scraper ring 3	PI06	0,020	0,055	0,100	0,078	actual				
		0,0008	0,0022	0,0039	0,0031	renewed				
Piston ring end gap rectangular ring 1	PI07	0,15	0,35	1,00	0,68	actual				
		0,0059	0,0138	0,0394	0,0266	renewed				
Piston ring end gap tapered compression ring 2	PI08	0,15	0,35	1,000	0,68	actual				
		0,0059	0,0138	0,0394	0,0266	renewed				
Piston ring end gap oil scraper ring 3	PI09	0,15	0,40	1,00	0,70	actual				
		0,0059	0,0157	0,0394	0,0276	renewed				

BRP-Rotax
Maintenance Manual

Description	Code	Reading new		wear limit	wear limit		08470 Readings				
		min	max	100%	50%		Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4	
Cylinder head											
Push rod deflection	Int. V.	VT09	0,000 0,0000	0,100 0,0039	0,200 0,0079	0,150 0,0059	actual				
			renewed								
	Exh. V.	VT09	0,000 0,0000	0,100 0,0039	0,200 0,0079	0,150 0,0059	actual				
			renewed								
Wear on hydraulic valve tap-pets	Int. V.	VT10	0,0 0,000	0,0 0,000	0,10 0,0039	0,05 0,0020	actual				
			renewed								
	Exh. V.	VT10	0,0 0,0000	0,0 0,0000	0,10 0,0039	0,05 0,0020	actual				
Intermediate gear of electric starter											
Idle gear bore Ø	ES01		12,000 0,4724	12,018 0,4731	12,040 0,4740	12,029 0,4736	actual				
			renewed								
Idle gear shaft Ø	ES02		11,973 0,4714	11,984 0,4718	11,960 0,4709	11,967 0,4711	actual				
			renewed								
Radial clearance	ES01/ ES02		0,016 0,0006	0,045 0,0018	0,100 0,0039	0,073 0,0029	actual				
			renewed								

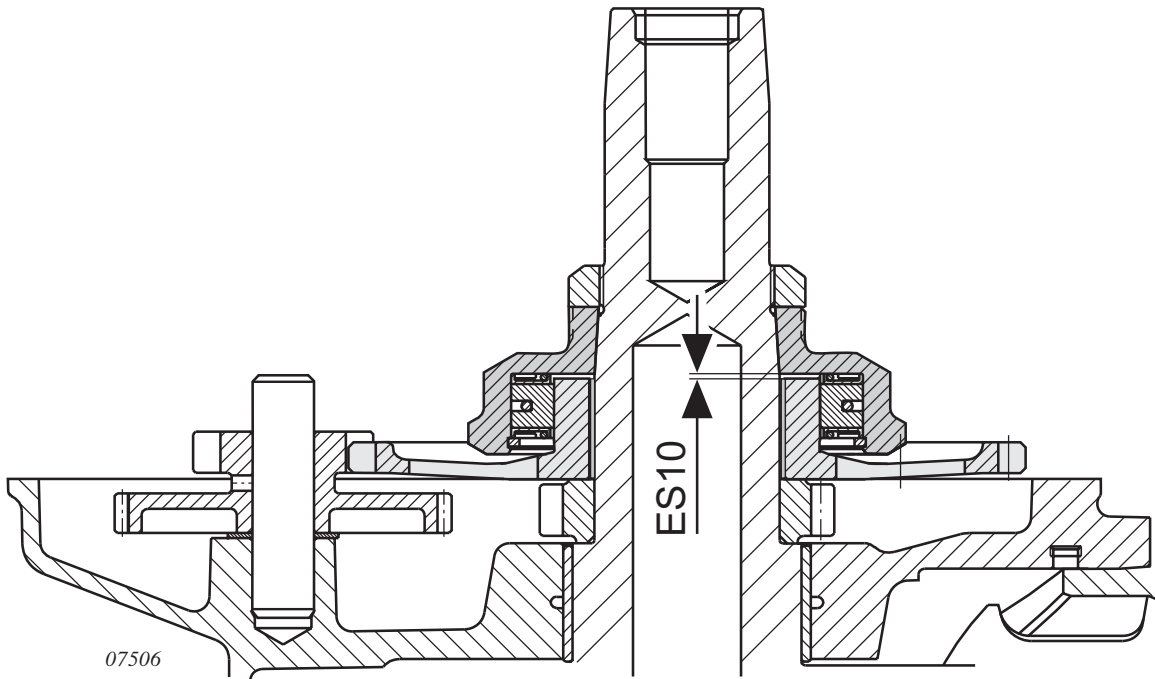
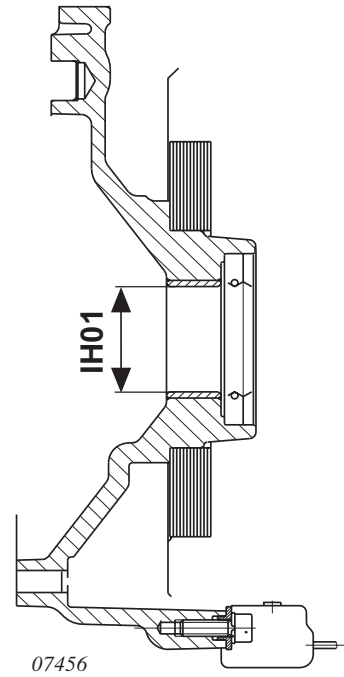
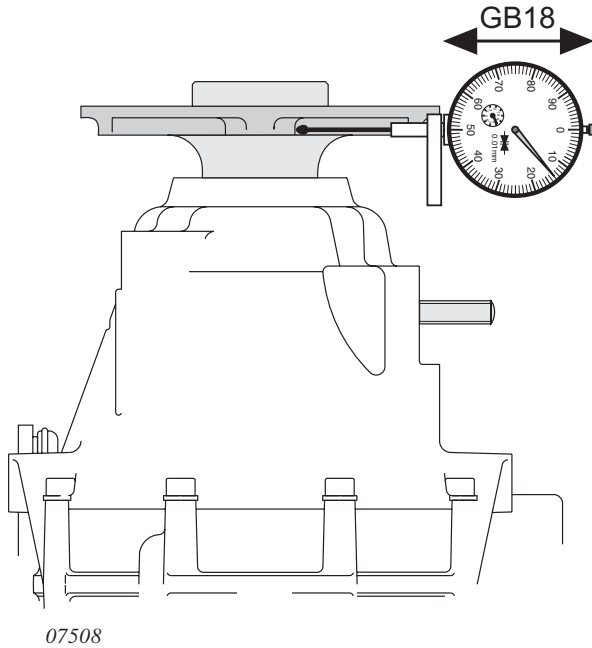
d04351

BRP-Rotax Maintenance Manual



d02622

BRP-Rotax
Maintenance Manual



d02622

BRP-Rotax

Maintenance Manual

Description	Code	Reading new		wear limit	wear limit		08471 Readings			
		min	max	100%	50%					
Propeller gear box										
1) Bearing bush in gear cover										
Bore	GB01	28,03	28,04	28,10	28,07	actual				
		1,1035	1,1039	1,1063	1,1051	renewed				
Radial clearance	GB01/ CS04	0,03	0,05	0,12	0,09	actual				
		0,0012	0,0020	0,0047	0,0033	renewed				
2) Propeller shaft										
Propeller shaft dia. 35 mm	GB02	35,009	35,020	35,003	35,006	actual				
		1,3783	1,3787	1,3781	1,3782	renewed				
Propeller shaft dia. 31,5 mm	GB03	31,470	31,481	31,460	31,465	actual				
		1,2390	1,2394	1,2386	1,2388	renewed				
Out of true on prop shaft flange, dia. 122 mm	GB04	0,00	0,05	0,06	0,06	actual				
		0,0000	0,0020	0,0024	0,0022	renewed				
Bore at back end of prop shaft (on ver- sion 3 only)	GB05	11,00	11,02			actual				
		0,4331	0,4339			renewed				
Spigot dia. On oil inlet flange, (on ver- sion 3 only)	GB06	10,935	10,960			actual				
		0,4305	0,4315			renewed				
Radial clearance of spigot	GB05/ GB06	0,040	0,085	0,160	0,123	actual				
		0,0016	0,0033	0,0063	0,0048	renewed				
3) Dog gear, Thrust washer										
Thickness of thrust washer	GB11	1,075	1,325	1,000	1,038	actual				
		0,0423	0,0522	0,0394	0,0408	renewed				
Free height of disk spring	GB13	5,20	5,40	4,8	5,00	actual				
		0,2047	0,2126	0,1889	0,1968	renewed				

Description	Code	Reading new		wear limit	wear limit		08486 Readings			
		min	max	100%	50%					
Crankshaft							Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4
Crankshaft angle of twist	GB 20	0	2			actual				
		(degrees)	(degrees)			renewed				

BRP-Rotax
Maintenance Manual

Description	Code	Reading new		wear limit	wear limit	Readings
		min	max	100%	50%	
4) Tooth profile						
Crankshaft	CS07	0,95	1,00	0,80	0,88	actual
		0,0374	0,0374	0,0315	0,0344	renewed
Drive gear	GB14	0,95	1,00	0,80	0,88	actual
		0,0374	0,0374	0,0315	0,0344	renewed
Propeller shaft	GB15	1,50	1,60	1,10	1,30	actual
		0,0591	0,0630	0,0433	0,0512	renewed
Clutch / Dog hub	GB16	1,50	1,60	1,10	1,30	actual
		0,0591	0,0630	0,0433	0,0512	renewed
5) gear set, Backlash on gear set						
Drive gear pitting up to 5 % of flank area		0,0	0,0	5,0%	2,5%	actual
						renewed
Dog gear pitting up to 5 % of flank area		0,0	0,0	5,0%	2,5%	actual
						renewed
Backlash of teeth	GB18	0,07	0,15	0,20	0,18	actual
		0,0028	0,0059	0,0079	0,0069	renewed
6) Overload clutch						
Axial gap	GB07	1,0	1,2	0,5	0,8	actual
		0,039	0,047	0,020	0,030	renewed
Wear on dog hub	GB08	0,0	0,0	0,2	0,1	actual
		0,000	0,000	0,008	0,004	
Ignition housing						
Bearing bush in ignition housing	IH01	32,03	32,04	32,10	32,07	actual
		1,2610	1,2614	1,2638	1,2626	renewed
Radial clearance	IH01/ CS05	0,03	0,05	0,12	0,09	actual
		0,0012	0,0020	0,0047	0,0033	renewed
Sprag clutch						
Axial clearance	ES10	0,5	1,1	0,2	0,4	actual
		0,020	0,043	0,008	0,014	renewed

d04351

BRP-Rotax
Maintenance Manual

NOTES

BRP-Rotax
Maintenance Manual

SECTION 73

FUEL SYSTEM

1) Table of contents

SECTION 73

FUEL SYSTEM

1) Table of contents	73-00-00 / 1
2) Systems description	73-00-00 / 3
2.1) Fuel system (on 912 Series)	73-00-00 / 3
2.2) Fuel system (on 914 Series)	73-00-00 / 5
2.3) Fuel filter	73-00-00 / 7
2.4) Fuel pump (on 912 Series)	73-00-00 / 7
2.5) Fuel pump (on 914 Series)	73-00-00 / 7
2.6) Fuel pressure regulator (only on 914 Series)	73-00-00 / 8
2.7) Pressure connecting lines (only on 914 Series)	73-00-00 / 10
2.8) BING constant depression carburetor type 64-3	73-00-00 / 12
2.9) Handling of fuel	73-00-00 / 15
2.10) Connections for instrumentation	73-00-00 / 16
2.10.1) Airbox air temperature display (only on 914 Series)	73-00-00 / 16
2.10.2) Boost pressure display	73-00-00 / 16
2.11) Carb heat system and winter operation	73-00-00 / 16
3) Maintenance	73-00-00 / 17
3.1) Disassembling fuel pump, carburetors, carburetor sockets, fuel lines and drip tray (on the 912 Series)	73-00-00 / 17
3.2) Disassembling carburetors, carburetor sockets, fuel lines and drip tray (on the 914 Series)	73-00-00 / 21
3.3) BING-constant depression carburetor inspection	73-00-00 / 23
3.3.1) General note	73-00-00 / 23
3.3.2) Float needle valve leakage test	73-00-00 / 24
3.3.3) Individual components of the carburetor (on the 912 Series)	73-00-00 / 25
3.3.4) Individual components of the carburetor (on the 914 Series)	73-00-00 / 26
3.3.5) Diaphragm	73-00-00 / 27
3.3.6) Jet needle	73-00-00 / 27
3.3.7) Float chamber, floats	73-00-00 / 29
3.3.8) Float brackets	73-00-00 / 30
3.3.9) Carburetor jets	73-00-00 / 31
3.3.10) Float needle valve inspection	73-00-00 / 32

d04352

BRP-Rotax
Maintenance Manual

3.3.11) Starting carburetor (choke)	73-00-00 / 33
3.3.12) Carburetor assembly	73-00-00 / 33
3.3.13) Carburetor synchronization	73-00-00 / 35
3.3.14) Idle speed adjustment	73-00-00 / 35
3.3.15) Throttle cable and linkage	73-00-00 / 35
3.4) General information on the fuel system	73-00-00 / 36
3.4.1) Fuel pressure (on 912 Series)	73-00-00 / 37
3.4.2) Fuel pressure (on 914 Series)	73-00-00 / 39
3.4.3) Carburetor sockets and compensation tube	73-00-00 / 40
3.4.3.1) Carburetor sockets	73-00-00 / 40
3.4.3.2) Compensation tube	73-00-00 / 40
3.4.4) Fuel pressure regulator (only on 914 Series)	73-00-00 / 42
3.4.5) Fuel pump (on 912 Series)	73-00-00 / 43
3.4.6) Fuel pump (on 914 Series)	73-00-00 / 45
3.4.7) Pressure connecting lines (only on 914 Series)	73-00-00 / 47
3.5) Assembly of carburetor sockets, carburetor and fuel lines	73-00-00 / 51
3.5.1) Fuel pump	73-00-00 / 51
3.5.2) Carburetors and carburetor sockets	73-00-00 / 51
3.5.3) Assembly of the fuel lines (on 912 Series)	73-00-00 / 53
3.5.4) Assembly of the fuel lines (on 914 Series)	73-00-00 / 57
3.6) Intake manifolds fitting	73-00-00 / 59
3.7) Engaging the carburetor support	73-00-00 / 59
3.8) Connecting fuel lines (tank)	73-00-00 / 60

BRP-Rotax
Maintenance Manual

2.9) Handling of fuel

Use only clean gasoline of a registered brand.

Unleaded fuels contain alcohol. Alcohol binds up to 50 % of its own volume in water. Water enters the system mainly in the form of condensation. For this reason, avoid extreme differences in temperature, long period storage, direct sun and plastic containers. When handling fuel, observe the directives without fail.

When refuelling, observe the relevant regulations of the competent aviation authorities.

- ▲ **WARNING:** Before refueling, switch off ignition and remove ignition key!
- ▲ **WARNING:** Filter fuel (using filter funnel) when filling the tank. Use only clean, non-translucent safety approved fuel containers.
- ▲ **WARNING:** Only handle fuel in well ventilated places. Never fill fuel in enclosed spaces. Gasoline is highly inflammable and explosive. Do not smoke, do not allow open flames or sparks in the vicinity. Do not fill the tank to the brim, allow for expansion of the fuel. Never refuel while engine is running.

For further information, see SI-912-016 and SI-914-019 "Operating fluids", latest issue.

BRP-Rotax

Maintenance Manual

2.10) Connections for instrumentation

- **CAUTION:** Also consult the instructions regarding the connection for instrumentation in the Installation Manual.

2.10.1) Airbox air temperature display (only on 914 Series)

A connection is provided in the airbox for measurement of the air temperature. On the standard engines, this connection is closed by a plug screw.

2.10.2) Boost pressure display

A connection is provided for an absolute pressure gauge in the compensation tube for the indication of the boost pressure.

- **CAUTION:** If no manifold pressure gauge is installed make sure that the connector is sealed so that no external air can be drawn in.
- ◆ **NOTE:** On newer engines the planking plug for the manifold pressure is closed with a M 3.5 screw. See therefore SI-912-020 and SI-914-022 "Running modifications" respectively.

2.11) Carb heat system and winter operation

The risks of carburetor icing are commonly known. The icing of air humidity in the carburetor may be avoided by preheating the air.

- ◆ **NOTE:** An airbox with a carburetor preheating flap is available for engines of the 912 Series.
- ◆ **NOTE:** Engines of the 914 Series normally do not require any preheating device as the intake air is preheated by the turbocharger.
- ◆ **WARNING:** Carburetor icing is a common cause of engine faults.

Because of the heating up of intake air due to the boost process, preheating of the intake air might not be necessary. But the option of a change over for air intake from the engine compartment is recommended as, for instance, the filter could be blocked by icing.

Preheating of the intake air will result in loss of engine performance because of the reduction in air density.

A further measure to reduce the risk of carburetor icing is to keep the water content of the fuel low by proper handling. Also, install a generously dimensioned water trap in the fuel system of the aircraft to prevent the formation of ice in the fuel lines, filters etc.

d04352

3) Maintenance

The following sections describe maintenance procedure for engines of the 912/914 Series above and beyond the maintenance and special checks, see corresponding Maintenance Manual (Line Maintenance) for the respective engine type, 912 Series or 914 Series, and the systems descriptions given hitherto. The description is divided into subsections and descriptions of the function of the various systems.

3.1) Disassembling fuel pump, carburetors, carburetor sockets, fuel lines and drip tray (on the 912 Series)

See Fig. 73-9 and 73-9/1.

■ CAUTION: When disassembling the fuel lines support them so that tension or additional strain is avoided.

■ CAUTION: Replace the insulating flange each time when the fuel pump is removed.

To remove the fuel pump (1) remove feed line (2) and hex nuts (3), then remove the fuel pump together with the insulating flange (4).

◆ NOTE: See SI-912-020 "Running modification", latest issue.

The carburetors must be removed for inspection or maintenance.

◆ NOTE: Models produced from the year 2007 onwards have a flexible fuel line (5). See Fig. 73-9/2.

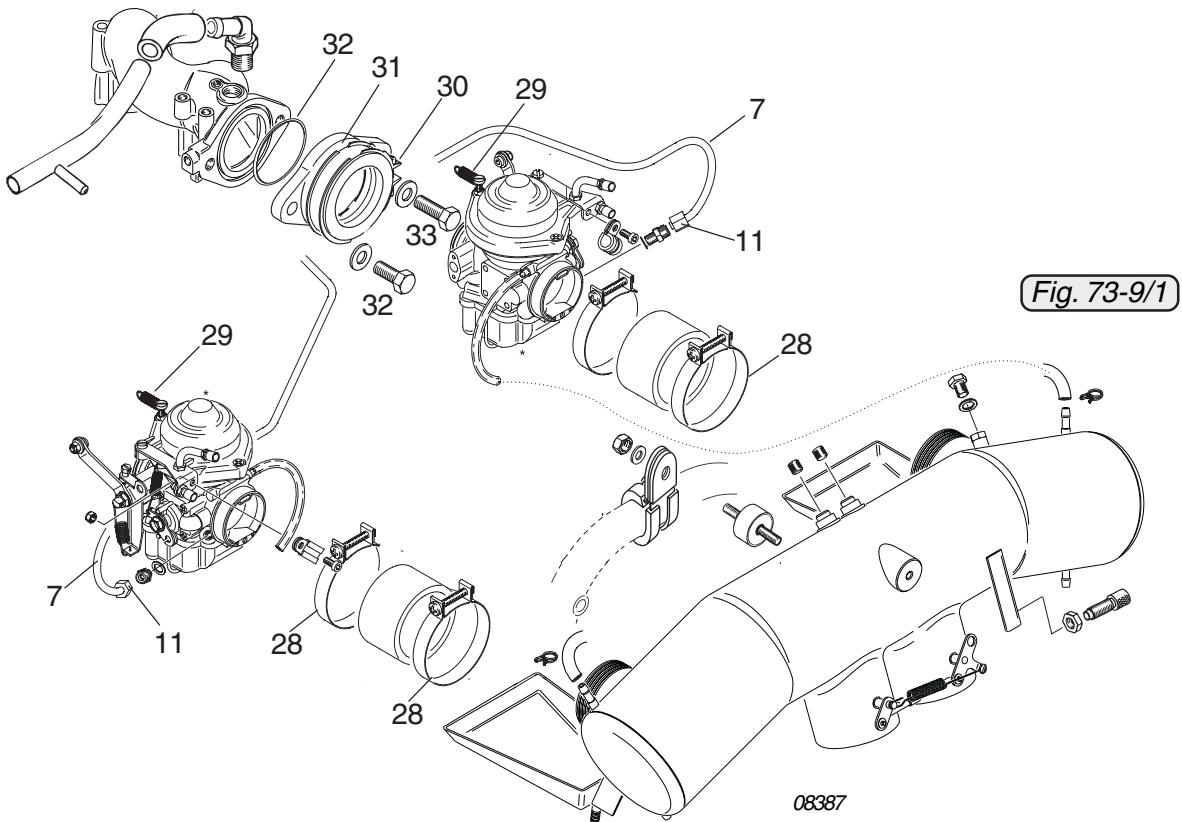
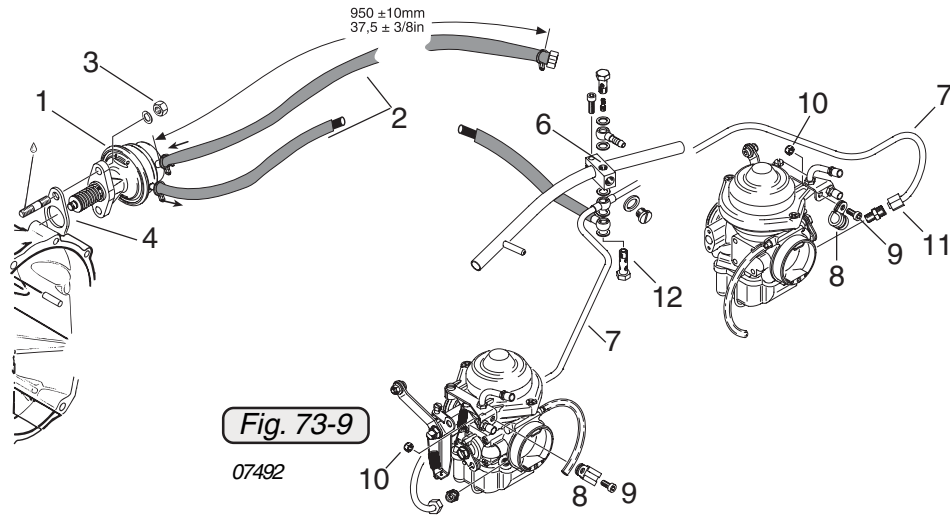
◆ NOTE: Usually it is not necessary to remove the clamp block (6). However, if it should become necessary to remove it, ensure that it is refitted in the same position.

Rigid fuel line

The fuel line (7) is supported by a cable clamp (8) on the carburetors. These clamps are attached with allen screws M5x12 (9) and lock nuts (10), which must be removed. Unscrew the collar nut (11) from the carburetor. Unscrew the banjo bolts (12) from the clamp block (6).

BRP-Rotax

Maintenance Manual



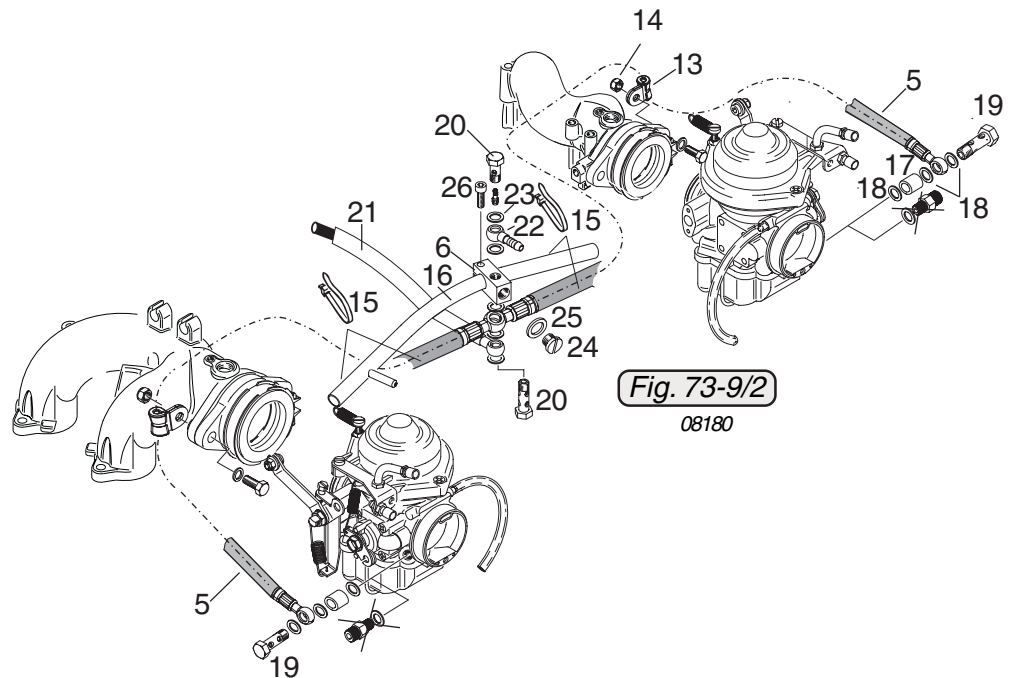
BRP-Rotax
Maintenance Manual

Flexible fuel line

See Fig. 73-9/2

Each fuel line (5) is supported by a cable clamp (13) on the intake manifold. Each of these clamps is attached with an allen nut M8 (14), which must be removed. Further the fuel line is attached with 2 cable straps (15) to the compensation tube (16).

At the carburetors the ring hose nipple of the fuel line is installed with a distance sleeve (17) and sealing rings (18). After unscrewing the banjo bolt (19) take off the fuel lines.



All fuel lines lead to the fuel manifold. Unscrew the banjo bolts (20). Remove the fuel line (21) (hose line).

Now the two fuel lines (5, 7), the ring hose nipple (22) (connection for return line and pressure gauge) and 5 sealing rings (23) can be removed.

Unscrew allen screw M10x1x8 (24) with the sealing ring (25).

Carry out a visual inspection of all fuel lines for damage and wear. Pay particular attention to the formation of any cracks in the area of the connections.

Check the lines for free passage with compressed air and inspect the lines for scuffing marks.

d04352

BRP-Rotax

Maintenance Manual

Carry out a visual inspection of the clamp block (6) of the fuel manifold, the two banjo bolts (20) and the ring hose nipple (22).

◆ **NOTE:** It is not normally necessary to remove the clamp block (6). However, if it should become necessary to remove it, it must be reattached with an allen screw M5x16 (26) (tightening torque 6 Nm (53 in.lb). Ensure that it is refitted in the same position.

Inspect banjo bolts (20) for hairline cracks, deformation or tears in the area of the hole (27). If the hole is visibly ovalshaped, the banjo bolt has been overstretched and must be replaced. See Fig. 73-9/2.

■ **CAUTION :** In the event of leaks, the max. permissible torque must never be exceeded.

If the engine is equipped with a ROTAX Original Airbox, the screw hose clamps (28) must be released before the carburetors can be removed. See Fig. 73-9/1. Remove the tension spring (29) for carburetor suspension.

Losen the clamp (30) on the carburetor socket (31) and remove the carburetor with twisty motions. Close off the intake openings of the carburetor sockets with appropriate covers.

Remove the hex. screws (31) M8x25, M8x30 (33) and washers to disassemble the carburetor sockets (12). Then the carburetor socket (31) and the O-Ring (32) can be taken off.

◆ **NOTE:** See SB-912-030, "Cracks, wear and distortion on the carburetor flange", latest issue.

Fig. 73-9/3

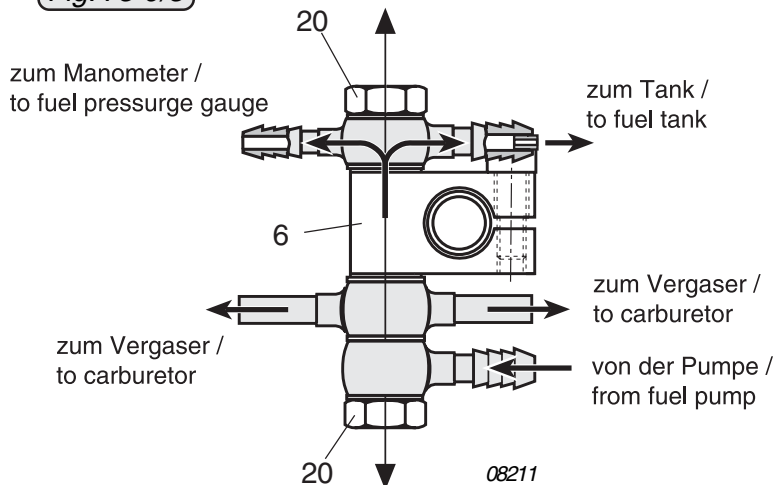
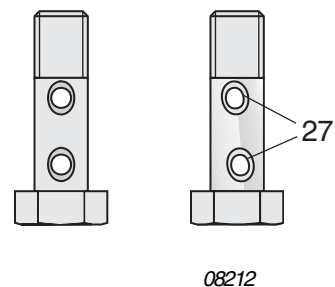


Fig. 73-9/4



d04352

BRP-Rotax

Maintenance Manual

3.2) Disassembling carburetors, carburetor sockets, fuel lines and drip tray (on the 914 Series)

See Figs. 73-10 and 73-11.

To remove the carburetors, loosen the screw hose clamps (3). Remove the fuel line (4) by removing banjo bolts M10 (5) with sealing rings (6).

Remove the clamps (7) of the pressure connecting lines (8) on the carburetor (float chamber venting) and the fuel pressure regulator (17) (only on 914 Series) and pull off the lines.

Remove the tension spring (9) for carburetor suspension with a suitable tool.

Now the airbox (10) can be pulled off the carburetors towards the back .

- ◆ NOTE: If required, remove 2-pin plug connection of temperature sensor (11) and/or loosen air intake hose (12).

Remove 3-pin plug connection of the throttle potentiometer.

Release the clamp (13) of the carburetor socket (14), remove the carburetor with the fuel lines with slight turning and swiveling movements and close off the intake openings.

Remove cable clamp (16), release collar nut (17) and take off the fuel lines.

Remove the hex. screws (15) 2 M8x25 and washers to disassemble the carburetor sockets (14). Then the carburetor socket (14) and the O-Ring (18) can be taken off.

- ◆ NOTE: See SB-914-019, "Cracks, wear and distortion on the carburetor flange", latest issue.

- ◆ NOTE: On older engine versions, the drip tray (19) is not fitted on the airbox but directly on the intake manifold (20), see Fig. 73-10.

BRP-Rotax

Maintenance Manual

Fig. 73-10

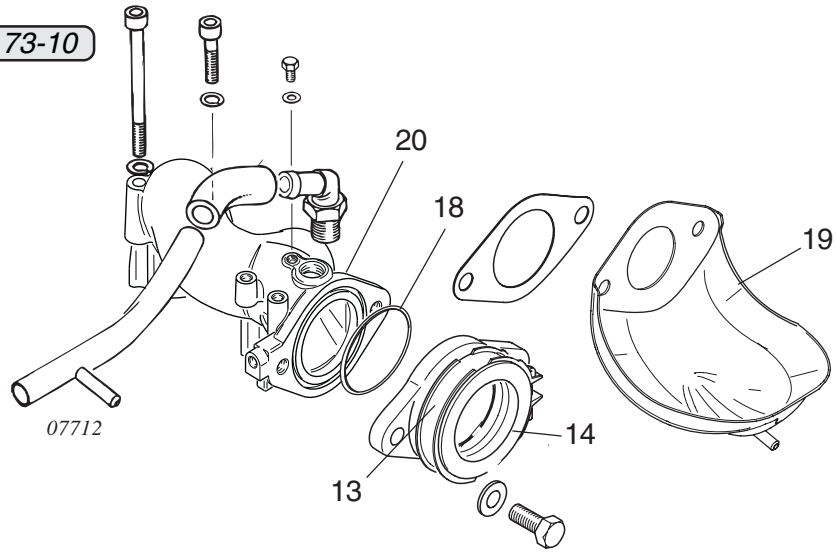
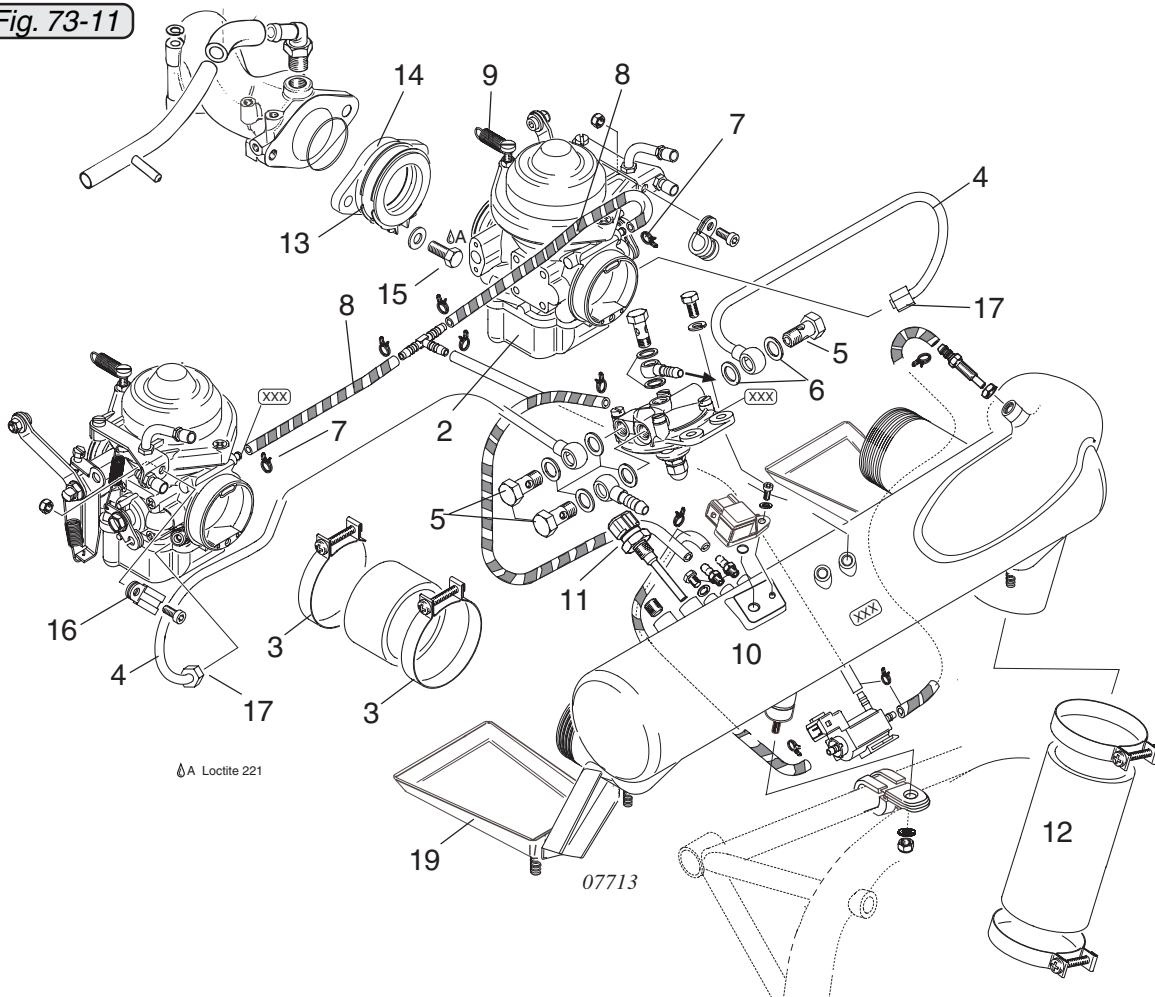


Fig. 73-11



d04352

BRP-Rotax

Maintenance Manual

3.3) BING-constant depression carburetor inspection

3.3.1) General note

See Figs. 73-12, 73-13 and 73-14.

■ CAUTION: No modification may be made to the carburetor calibration. The determination of the main jet is carried out by the manufacturer on a test bed at 300 m (1000 ft) above Mean Sea Level.

Only aeronautical personnel or authorized testers acting on our instructions may carry out modifications to BRP-Rotax specifications.

■ CAUTION: To avoid contamination in the fuel system, proceed with great care and cleanliness. It is essential to store carburetors and dismantled parts on clean surfaces.

◆ NOTE: See SI-912-012 or SI-914-014, "Routine modification of the Bing constant depression carburetor", latest issue.

The fuel supply must be closed off before the carburetors are removed for closer inspection. Collect any fuel spilt during disassembly and dispose of it in an ecological manner.

BRP-Rotax

Maintenance Manual

3.3.2) Float needle valve leakage test

See Fig. 73-12.

This check is carried out to ensure that the float valve seat is not leaking. If the pressure is not maintained, pay particular attention during disassembly to the float valve with the viton tip and the carburetor housing.

Turn the carburetor upside down, as the float needle valve is only closed in this position.

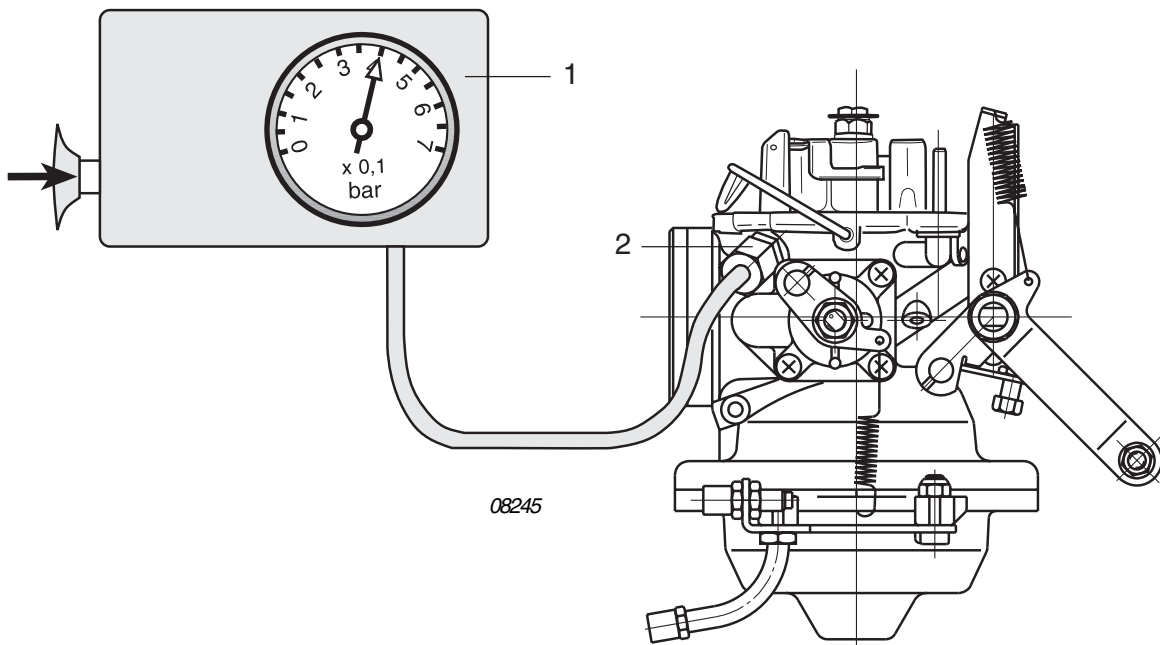
Connect pump (1) to the fuel supply line (2) and generate an excessive pressure of approx. 0.4 bar (5.8 p.s.i.).

The excessive pressure must be maintained for about 5 seconds.

■ **CAUTION:** If excessive pressure drops, this indicates leakage which may cause fuel overflow and in consequence engine damage due to hydraulic shock.

Replacement of the float valve seat is not permissible.

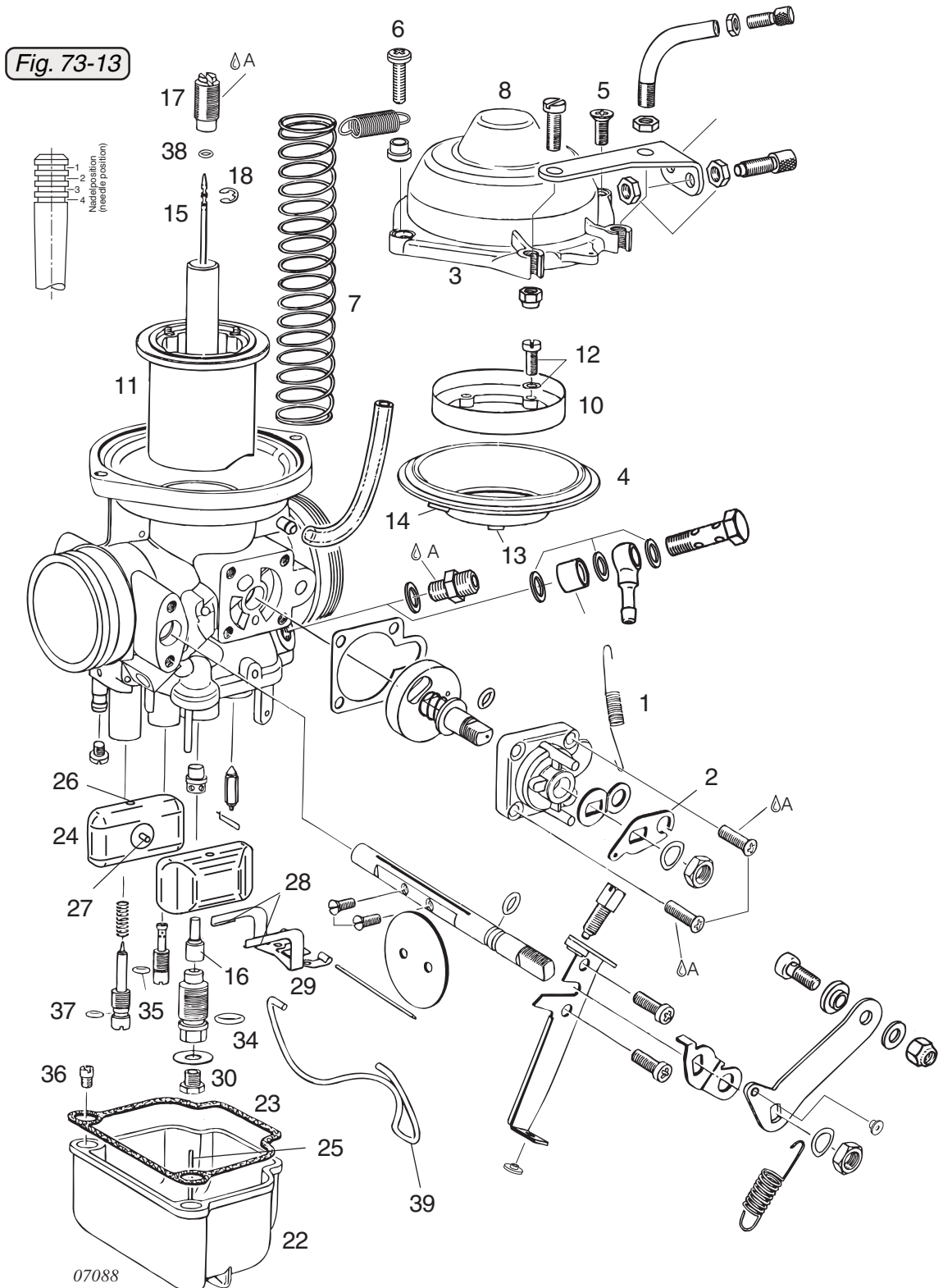
Fig. 73-12



d04352

BRP-Rotax
Maintenance Manual

3.3.3) Individual components of the carburetor (on the 912 Series)
See Illustrated Parts Catalog Rotax 912/914



d04352

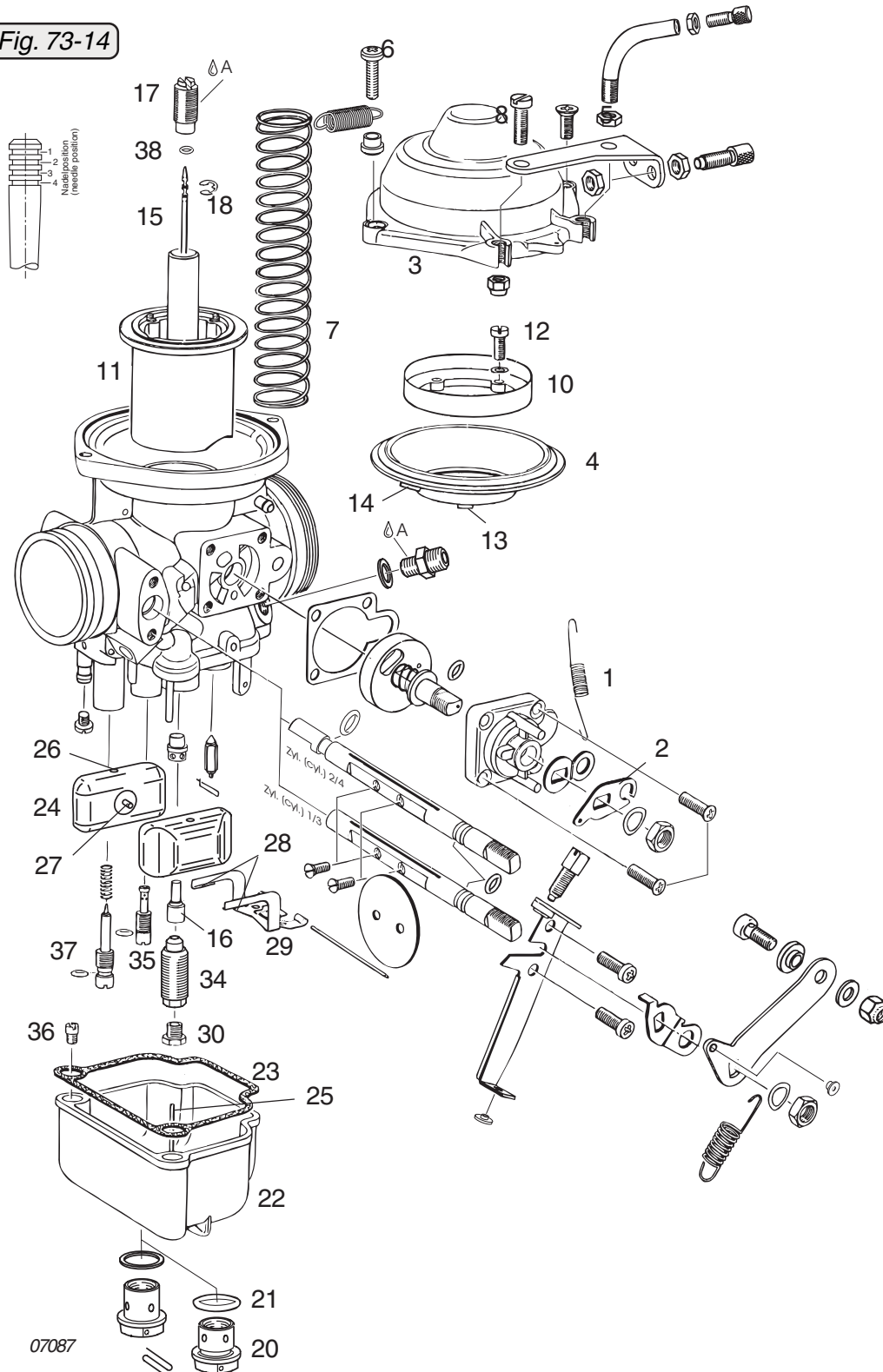
07088

BRP-Rotax
Maintenance Manual

3.3.4) Individual components of the carburetor (on the 914 Series)

See Illustrated Parts Catalog Rotax 912/914

Fig. 73-14



BRP-Rotax

Maintenance Manual

3.3.5) Diaphragm

See Figs. 73-15 and 73-16.

The plunger (carburetor piston) (8) is attached to the diaphragm (6). Depending on the pressure prevailing, the plunger is moved up or down. For inspection, remove the two counter sunk screws (1) M5x12, take off the chamber top (2) and remove the plunger spring (3). Check that the cover plate (4) on the chamber top is tightly seated. Wash chamber top with cleaning agent and blowclean the inside venting bore with compressed air. Then carry out a visual inspection.

Pull carburetor piston out of the carburetor housing and remove the 4 allen screws (5) M4x12. The diaphragm (6) is held by the retaining ring (7) on the carburetor piston (8). The position of the carburetor piston is controlled via the diaphragm. There are 2 indexing tabs on the diaphragm (5). Tab (9) fits exactly into the recess in the slider piston and nose (10) must engage in the recess in the carburetor housing.

Check diaphragm for cracks or brittleness, replace if necessary.

3.3.6) Needle

See Fig. 73-16.

The needle (12) controls the fuel consumption at part load. It can be regulated by selecting a needle position between 1 and 4. Modifications are allowed only after consultation with the engine manufacturer.

Unscrew the retaining screw (11), check needle (12) with shaft securing (13) and O-Ring (20) for signs of wear.

Pay especial attention to the grooves and the taper of the needle. If there is visible wear, the needle must be replaced and a new one refitted in the same position.

◆ NOTE: The needle must move freely when fitted.

Carry out a visual inspection of the outer diameter of the carburetor piston (8) and the two inside compensation bores.

◆ NOTE: The needle is damped by the O-ring (38).
See Figs. 73-13 and 73-14.

The set up of the needle position (Fig. 73-15/1) and the determination of the main jet should to be carried out in accordance with the table of Fig. 73-15/2. The settings have to be recorded in appendix chapter 8.2 "carburetor jetting and jet needle position".

BRP-Rotax

Maintenance Manual

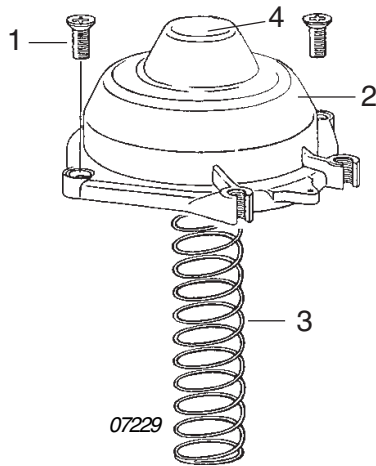


Fig. 73-15

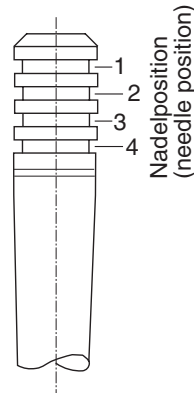


Fig. 73-15/1

Carburetor calibration		
912 A/F/UL	Target	
	Carburetor 1/3	Carburetor 2/4
Needle	2,72	2,72
Idle jet	35	35
Main jet ⁴⁾	155 or 158	155 or 158
Start jet ¹⁾	85	85
Needle position ³⁾	3	3
912 S/ULS/ULSFR	Target	
	Carburetor 1/3	Carburetor 2/4
Needle	2,70	2,70
Idle jet	35	35
Main jet	155	155
Start jet ¹⁾	85	85
Needle position ³⁾	3	3
914 F/UL	Target	
	Carburetor 1/3	Carburetor 2/4
Needle	2,72	2,72
Idle jet	35	35
Main jet ²⁾	156 or 160	158 or 164
Start jet ¹⁾	85	85
Needle position ³⁾	1 or 2	2

Fig. 73-15/2

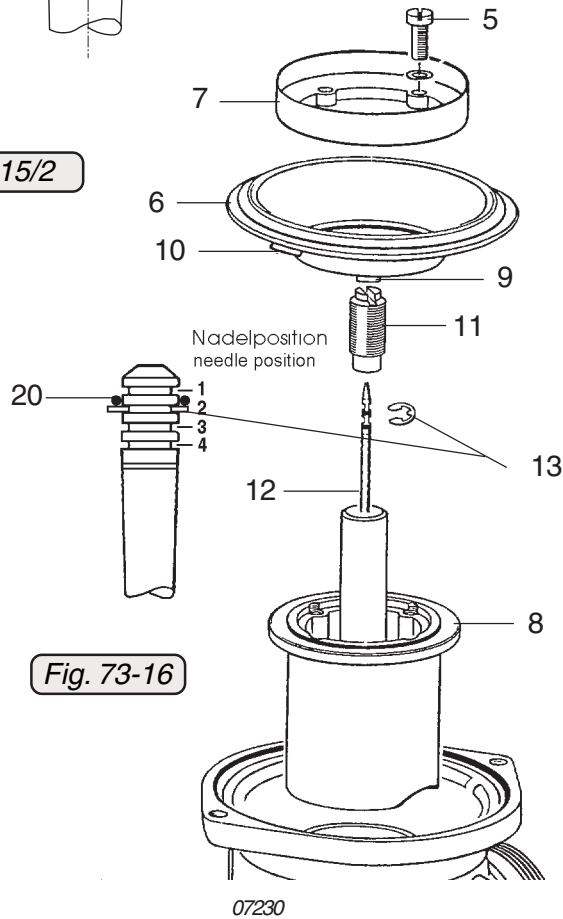


Fig. 73-16

- 1) See SI-03-1998, latest version.
- 2) Depending on the airbox version. See SI-914-013 and SI-914-015, latest version.
- 3) Depending on CO measurement value and specific fuel consumption. See SI-914-013 and SI-914-015, latest version.
- 4) On configuration with air filter. See SB-912-044, latest version.

d04352

BRP-Rotax

Maintenance Manual

The values of the carburetor jetting and of the jet needle position have to be recorded in the appendix in chapter 8.2 "Carburetor jetting and jet needle position".

3.3.7) Float chamber, floats

See Figs. 73-17, 73-18, 73-19 and 73-20.

On the 912 Series: Release the spring clip (39). See Fig. 73-13.

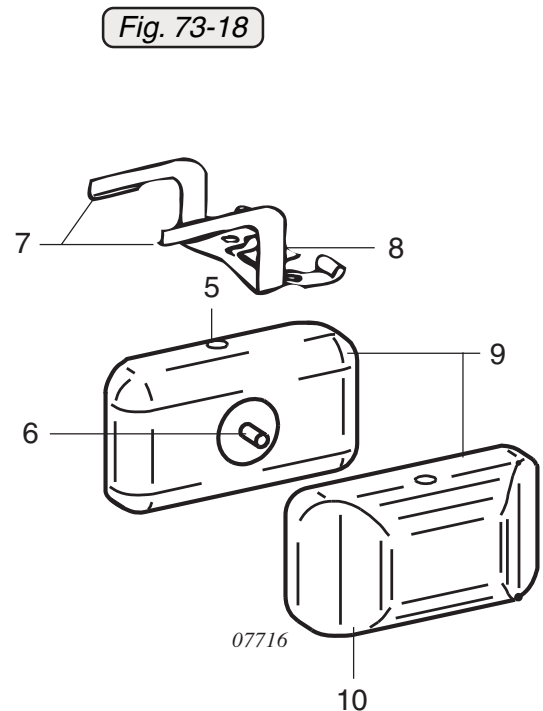
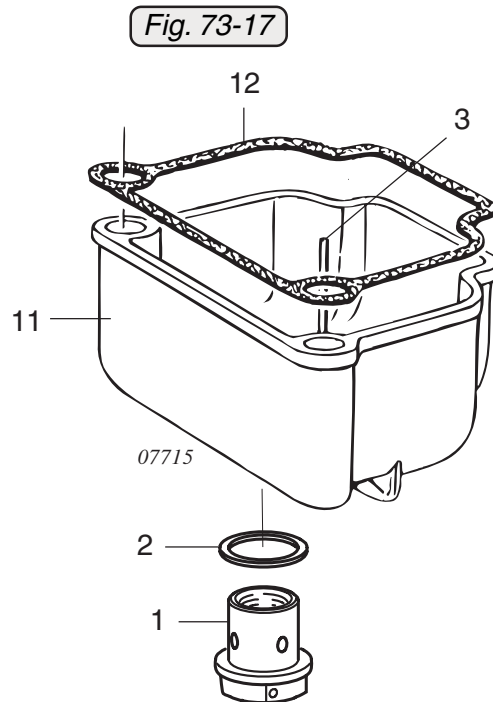
On the 914 Series: Remove the safety wiring and the end screw (1) with the sealing ring (2) 16x22x1. Tightening torque 5.5 Nm (48.7 in.lb)

Remove and clean the float housing (11) with the sealing (12).

Check both floats (9) for free movement on the guide pin (3). When the float is at its lowest position, it still must have radial clearance and must not stick on the float chamber wall (10).

■ **CAUTION:** A stuck float causes the carburetor to flood.

Check the wear on the guide sleeves (5) inserted in the float. Check the pins (6) for the float support (7) for wear caused by excessive vibration. If there is noticeable wear, replace both floats and if necessary also the float brackets (8).



d04352

BRP-Rotax

Maintenance Manual

3.3.8) Float brackets

See Figs. 73-18, 73-19 and 73-20.

Check that the float suspension brackets (8) are parallel. To do so, remove main jet and attach the gauge (13) to the mixing tube with a hex. screw (14). When the needle valve is closed, the two arms (15) of the float bracket must be evenly spaced.

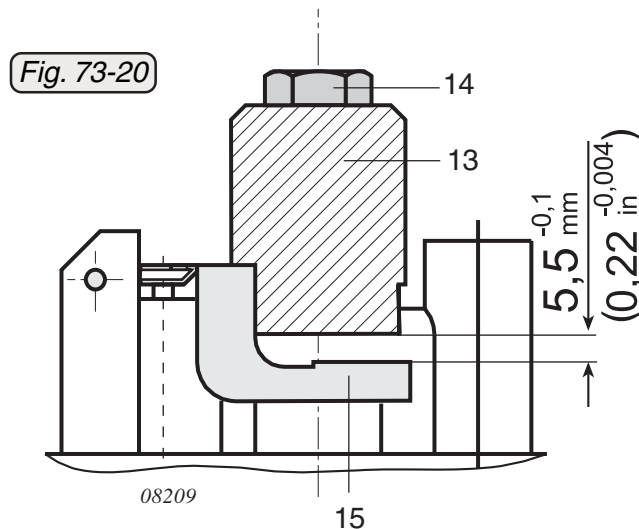
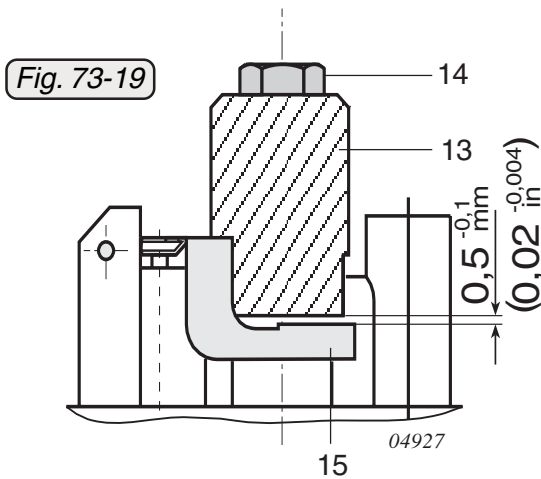
Spacing:

On the 912 Series: 0.4 to 0.5 mm (.016 to .02 in.)

On the 914 Series: 5.4 to 5.5 mm (.21 to .22 in.)

Always replace float brackets together with the float needle valve.

If there is a noticeable fault, the float bracket can be bent for correction or be replaced. After the check, remove the gauge and refit the main jet.



d04352

BRP-Rotax
Maintenance Manual

3.3.9) Carburetor jets

See Figs. 73-21 and 73-22.

■ **CAUTION:** Always maintain high standards of cleanliness when performing any work on the carburetor.

Remove the float chamber. Unscrew the main jet (14), the mixing tube (15), the needle jet (16), the idle jet (17), the starting jet (18) and the idle mixture screw (19). Clean carburetor and jets with gasoline. Carefully blow through all jets channels in the carburetor housing with compressed air and check for free passage.

Check oval form of inner diameter of needle jet (16), replace if necessary. Check for correct jetting. See corresponding Illustrated Parts Catalog.

▲ **WARNING:** Any adjustments to the main jets may only be performed in accordance with BRP-Rotax instructions, by an aviation facility or an authorized tester.

Fig. 73-21

912 Series

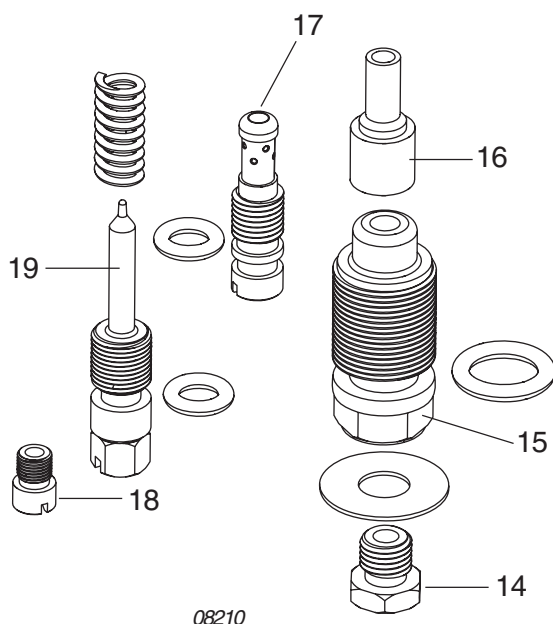
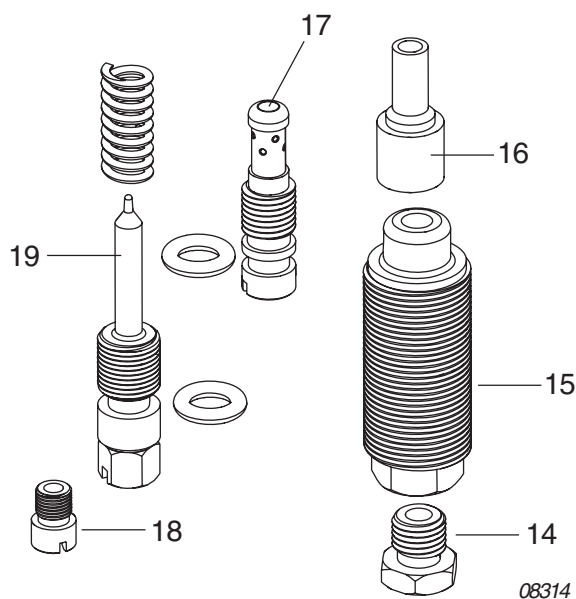


Fig. 73-22

914 Series



d04352

BRP-Rotax

Maintenance Manual

3.3.10) Float needle valve inspection

See Fig. 73-23, 73-24.

Remove the float chamber. Remove the bearing pin (4) of the float bracket (5) and pull out the float needle.

Check fuel inlet for free passage.

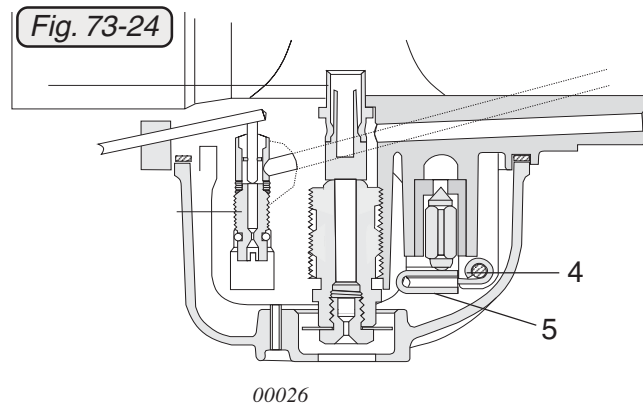
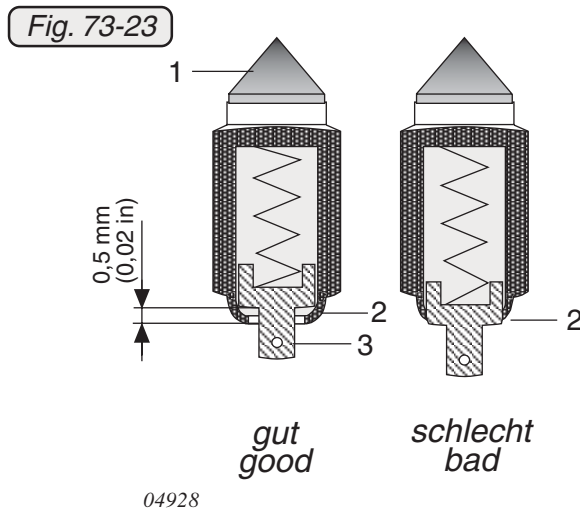
Inspect the viton tip (1). Inspect clip end for visible wear to the beaded edge (2) of the sprung pin (3), the valve must be replaced. If the distance becomes less than 0.5 mm (.02 in.), the float level will be affected, leading even to interruption of the fuel flow.

Insert float valve into the valve seat.

Engage float valve clip into float bracket, place it in position and fix float bracket with pin.

Replace the float chamber and fix with spring clip.

◆ NOTE: In addition to this information, also observe the Service Bulletins SB-912-048 and SB-914-033, "Replacement of pin in carburetor", latest issue.



BRP-Rotax
Maintenance Manual

3.3.11) Starting carburetor (choke)

See Figs. 73-25, 73-26 and 73-27.

Remove 4 countersunk screws M4x14 and remove the complete rotary disc valve housing.

- ◆ **NOTE:** The shafts for the rotary disc valve have two markings, L and R. The shaft marked R is for the carburetors for cylinders 2/4, the shaft marked L for the carburetor for cylinders 1/3. Fig. 73-25 shows the positions of the markings on the choke shaft.

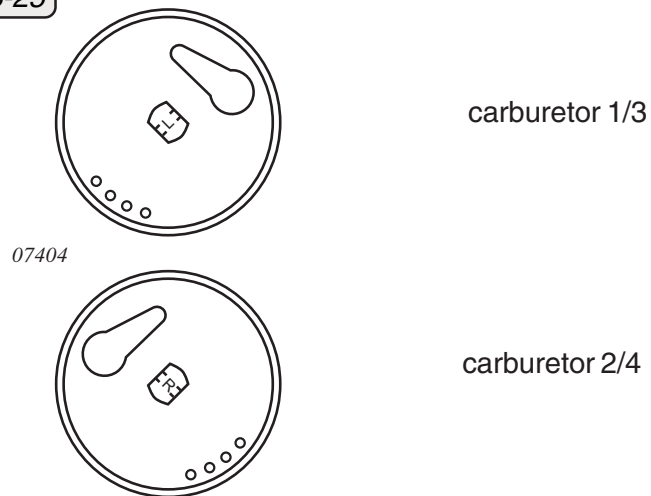
Remove hex. nut and pull the complete rotary disc valve from the housing. Clean all parts and check.

- ◆ **NOTE:** The choke shaft (1) is marked with a dot (2). This mark must point towards the cable engagement (3) or to bore (4).

Clean all parts and blow out all bores and ducts with compressed air. Check all parts and replace any defective ones.

- ◆ **NOTE:** SI-03-1998 "Engine start at low temperatures", latest issue can be carried out to improve cold starting performance.

Fig. 73-25



3.3.12) Carburetor assembly

The carburetor with new O-rings and gaskets is assembled in reverse order.

d04352

BRP-Rotax
Maintenance Manual

the drawings show the
carburetor for cyl. 2/4

Fig. 73-26

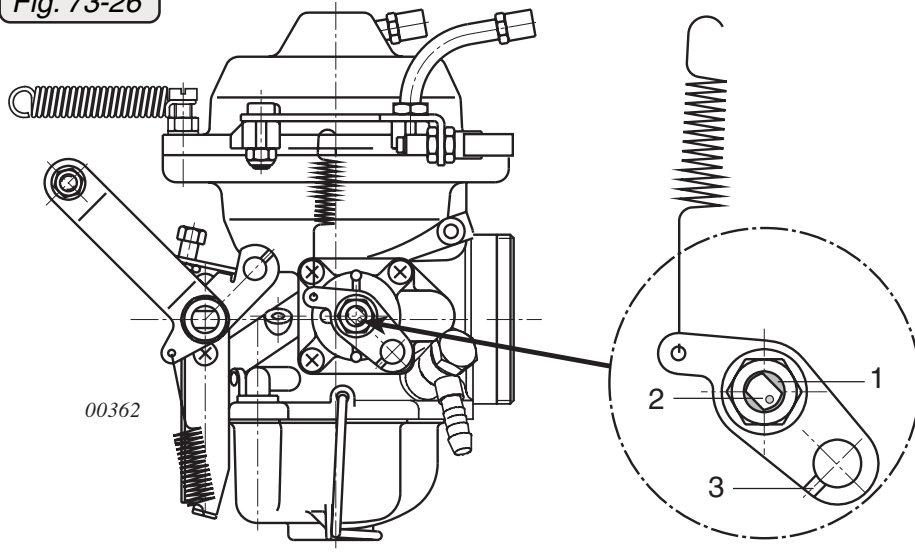
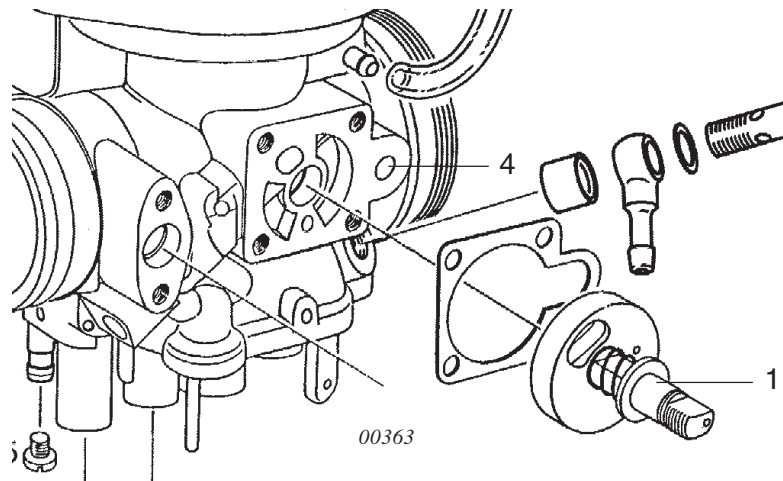


Fig. 73-27



d04352

BRP-Rotax
Maintenance Manual

3.3.13) Carburetor synchronization

See the corresponding section in the respective Maintenance Manual (Line Maintenance) for the engine type, 912 Series or 914 Series.

3.3.14) Idle speed adjustment

See the corresponding section in the respective Maintenance Manual (Line Maintenance) for the engine type, 912 Series or 914 Series.

3.3.15) Throttle cable and linkage

See the corresponding section in the respective Maintenance Manual (Line Maintenance) for the engine type, 912 Series or 914 Series.

BRP-Rotax

Maintenance Manual

3.4) General information on the fuel system

The most common reason for engine failure is a fault in the fuel system. Many problems can be prevented by regular checks. Contamination and formation of condensate can lead to erratic engine running or misfiring.

- Check float chamber for dirt and water.
- In the event of serious contamination or water, drain, clean and flush the whole fuel system thoroughly, including the tank, filter, fuel pumps, float housing and fuel lines.

■ CAUTION :

- Unsuitable routing of fuel lines may cause engine failure.
- After repair work, the fuel system must be checked for leaks.
- Always use clean and non-translucent, safety approved fuel containers. Do not smoke, do not allow open flames or sparks in the vicinity.
- Never refuel with engine running.
- Do not fill the tank to the brim, allow for expansion of the fuel.
- Remove spilt fuel immediately, dispose of it respecting environmental regulations.
- Gasoline is highly inflammable and under certain conditions explosive. Handling of fuel in well ventilated places only.
- Close fuel cock, as the float needle valve may not retain the fuel pressure over a longer period or during transport of the aircraft.

BRP-Rotax

Maintenance Manual

3.4.1) Fuel pressure (on 912 Series)

See Fig. 73-28.

The pressure inside the fuel system must not exceed 0.4 bar (5.80 p.s.i). Normally, it will lie between 0.15 (2.18 p.s.i) and 0.3 bar (4.4 p.s.i). The fuel pressure tester, part no. 874230, can be used to measure the pressure and check the correct functioning of the fuel system.

Installation of the fuel pressure testing device

Connect the pressure gauge (1) with the hose (2) to the 4-fold nipple (3) instead of the fuel return line. Fit the pressure gauge where it can be easily observed by the operator of the ground test run.

■ **CAUTION:** Make sure there is no danger that the pressure gauge and hose will get drawn into the propeller airstream. If necessary, secure with tie wraps.

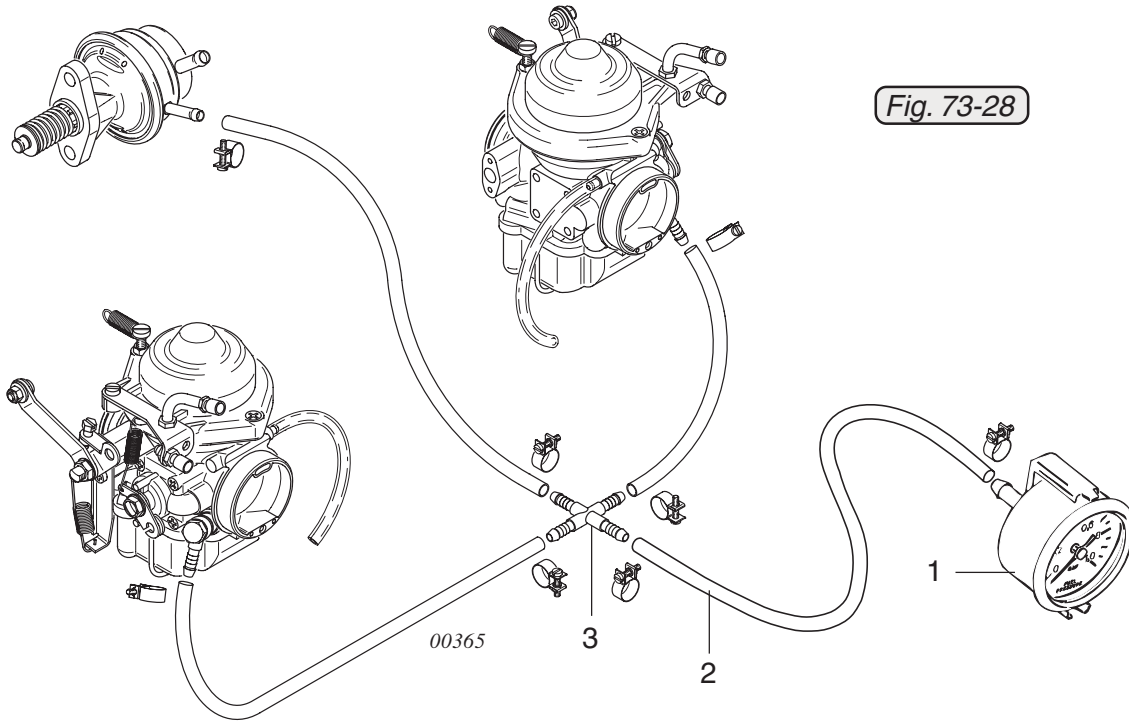
If the nominal fuel pressure values are not met during the test run, stop the engine and start with the trouble shooting procedure.

▲ **WARNING:** No aircraft take-off before an obvious fault has been found and eliminated!

■ **CAUTION:**

- Fault free operation of the carburetors cannot be guaranteed if the fuel pressure is below 0.15 bar (2.18 p.s.i) or above 0.4 bar (5.80 p.s.i). If the minimum required fuel pressure cannot be achieved, it is necessary to use an additional electric fuel pump.
- There must be a suitable fuel filter with 0.1 mm (0.004 in.) mesh size between the fuel tank and the fuel pump. Do not use paper filters.
- Select fuel lines in accordance with national aviation regulations. They should have a minimum crosssection of 5 mm (0.2 in.).
- The tank must be fitted with a fuel cock (with a screen) to allow immediate interruption of the fuel supply at any time.

BRP-Rotax
Maintenance Manual



BRP-Rotax

Maintenance Manual

3.4.2) Fuel pressure (on 914 Series)

There is no specific connection on the engine for reading the fuel pressure. However, it makes sense to take fuel pressure readings for monitoring purposes and for troubleshooting.

See latest installation manual for the respective engine type. All the necessary items are available as spare parts.

■ **CAUTION:** **The fuel pressure must be approx. 250 hPa above the constantly varying boost pressure in the “air-box”.** Otherwise the perfect functioning of the carburetors is not assured. See 73-00-00 sec. 2.

Fit the pressure gauge where it can be easily observed by the operator of the ground test run.

■ **CAUTION:** Make sure there is no danger that the pressure gauge and hoses will get drawn into the propeller airstream. If necessary, secure with tie wraps.

▲ **WARNING:** No aircraft take-off before an obvious fault has been found and eliminated!

If during the test run the nominal fuel pressure values are not met, shut down engine and start with the trouble shooting procedure.

BRP-Rotax

Maintenance Manual

3.4.3) Carburetor sockets and compensation tube

See Figs. 73-29/1, 73-30, 73-31 and 73-32.

3.4.3.1) Carburetor socket

The carburetor attachment on the engine is designed to ensure that it can be securely fixed to the intake manifold with carburetor sockets (1). See 73-00-00 sec. 3.1.

In addition to chemical strain due to fuel and UV radiation, the carburetor socket is also subject to stress as a result of vibration. Tightening the attachment clamp (2) too firmly can also cause damage to the sockets and distance sleeve (3). Tightening torque 2.5 Nm (22 in.lb).

Compress carburetor socket in the area of the carburetor connection to allow easier detection of existing cracks (4) and (5). Also pay particular attention to the area of the inner diameter (6).

▲ **WARNING:** If cracks are suspected, fit a new carburetor socket. See SB-912-030 and SB-914-019, "Cracks, wear and distortion on the carburetor flange", latest issue.

3.4.3.2) Compensation tube

See Fig. 73-29.

To simplify carburetor synchronisation a new compensation tube (7) has been introduced. See therefore the latest issue of SI-912-020 and SI-914-022 "Running modifications" respectively.

Normally it is not necessary to unmount the compensation tube, should this however be necessary, then the springs (8) have to be unhinged and the hose clips (9) have to be loosened. The hoses (10) have to be cut for removal.

BRP-Rotax
Maintenance Manual

Fig. 73-29

08469

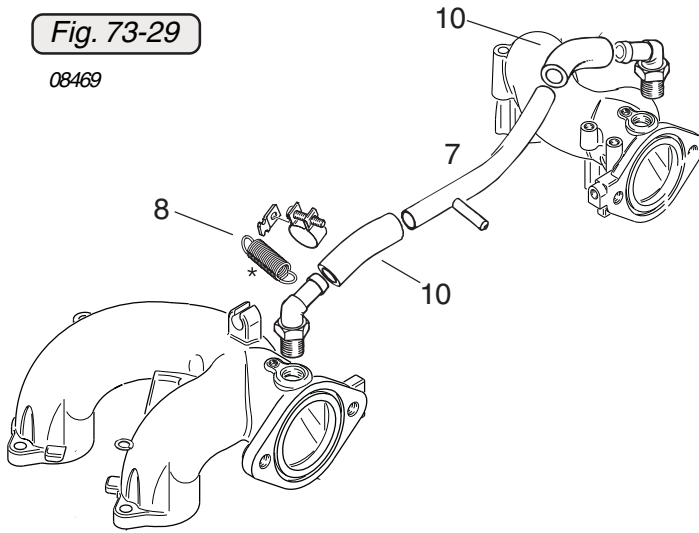
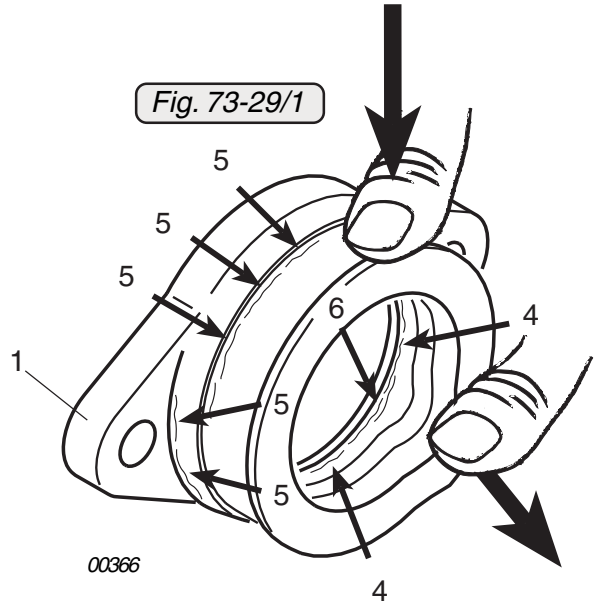


Fig. 73-29/1



00366

Fig. 73-30

05793

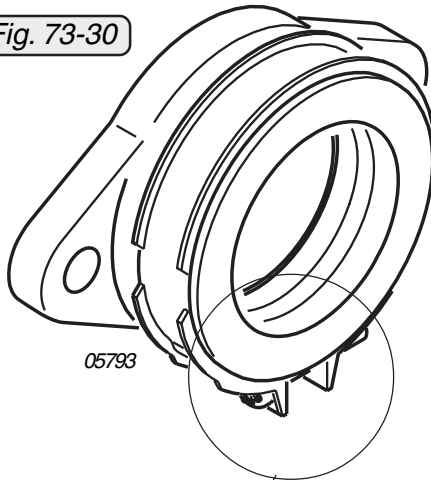


Fig. 73-31

05792

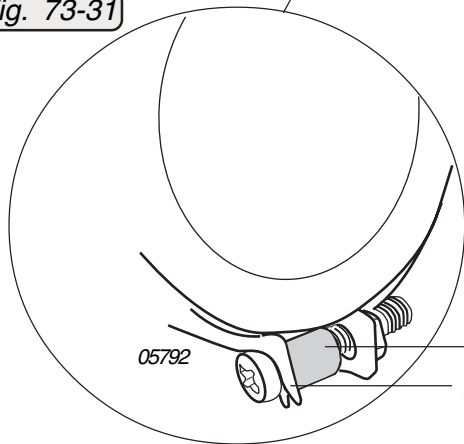
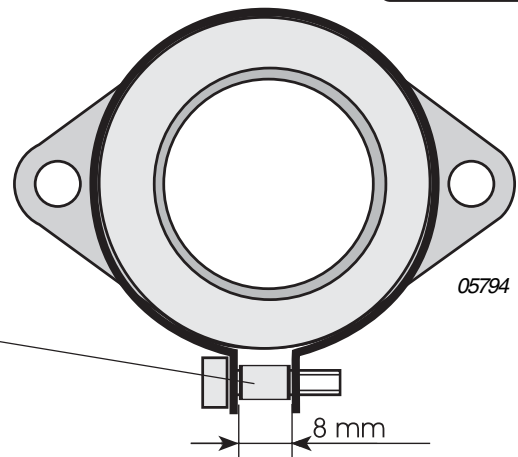


Fig. 73-32

05794



d04352

BRP-Rotax

Maintenance Manual

3.4.4) Fuel pressure regulator (only on 914 Series)

See Fig. 73-33.

Carry out a visual inspection of the fuel pressure regulator (2).

- ◆ **NOTE:** All new fuel pressure regulators are calibrated by the engine manufacturer and should not need further adjustment.

However, if this should become necessary, there is an adjustment screw (4) on the bottom side of the regulator.

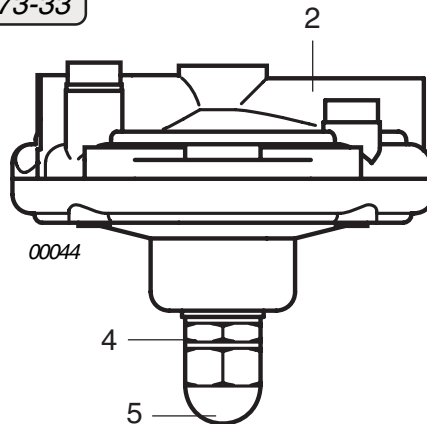
Set ignition switch for both ignition circuits to "OFF" position. Switch on the electric fuel pump, set to the correct fuel pressure (approx. 250 hPa above the airbox pressure) using the adjuster screw (4) and tighten with the cap nut (5) to a tightening torque of 5 Nm (45 in.lb).

- ◆ **NOTE:** Apply LOCTITE 243 to the thread.
- **CAUTION:** The fuel pressure regulator must not be disassembled, as there are no spare parts available. If necessary, replace the complete regulator.

The fuel pressure regulator is attached to the airbox with hex. screws M6x16 and lock washers. Tightening torque 8 Nm (70 in.lb).

- **CAUTION:** Failure to tighten the cap nut will result in a pressure drop in the fuel system, which can cause engine damage.

Fig. 73-33



d04352

BRP-Rotax

Maintenance Manual

|| 3.4.5) Fuel pump (on 912 Series)

See Figs. 73-34 and 73-35.

Depending on the engine configuration, it may already have been fitted with a pump with fuel hoses, see Fig. 73-9.

On engines without fuel hoses, observe the aircraft manufacturer's instructions.

Check fuel hoses for scuffing marks and kinks. In the event of damage, the complete pump with all the hoses must be replaced, as the hoses are pressed in one piece with the pump.

Check pump flange (1) for planeness. If the pump plunger (2) shows scuff marks, the pump must be replaced and the eccentric in the propeller gearbox inspected. Check the connections (3) of the fuel lines.

Pumps working at reduced power, for example as a result of contaminated valves or leaking diaphragms, must be replaced.

◆ NOTE: A leaking diaphragm can be detected by the fuel emerging from the ventilation holes (4).

The fuel sucked in is filtered by a fine screen integrated in the pump. It is not possible to dismantle the fuel pump. If contamination of the fuel pump is suspected, the pump must be inspected on the intake side (5) using an endoscope.

◆ NOTE: The consecutive (6digit) serial number is displayed on the pump housing (6).

◆ NOTE: Service Bulletins SB-912-049 "Checking eccenters and fuel pump plungers", latest issue must be observed.

BRP-Rotax
Maintenance Manual

Fig. 73-34

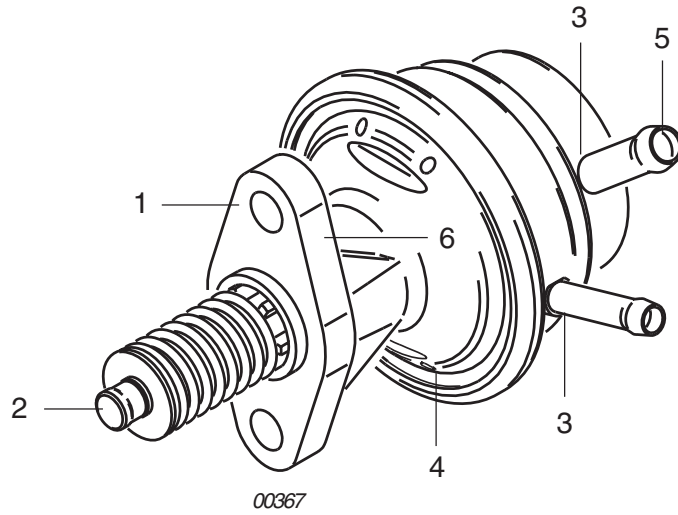
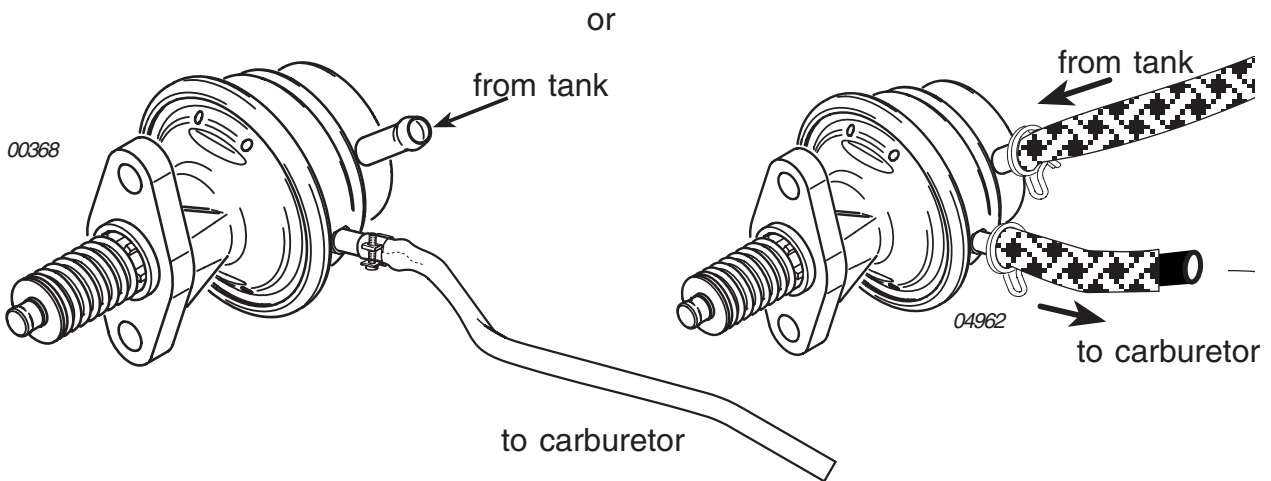


Fig. 73-35



d04352

BRP-Rotax

Maintenance Manual

3.4.6) Fuel pump (on 914 Series)

See Fig. 73-36.

Two electrical fuel pumps are included in each delivery.

- ◆ NOTE: The built-in screen on the suction side of the electric fuel pumps cannot be replaced.

Check and cleaning of the fuel filter, see Line Maintenance 12-00-00 sec. 2.10.

Cleaning of the pre-filter

- CAUTION: Be careful - don't damage the intake connection.
 - Use a forceps to carefully pull out pre-filter from the intake connection.
- CAUTION: Always follow the safety regulations when handling fuel.
 - Use fuel to clean pre-filter.
- CAUTION: Make sure that no material gets into the fuel pump.
 - Carefully accommodate the pre-filter in the intake connection.

Perform visual check on fuel pump.

- CAUTION : The fuel pump must not be disassembled, as there are no spare parts available. If necessary, replace the complete fuel pump.

In the event of a malfunction in the fuel system, the pump performance and/or the current input of the fuel pump can be checked.

With a pressure difference of approx. 250 hPa, the fuel pump is pumping at approx. 100 l/h.

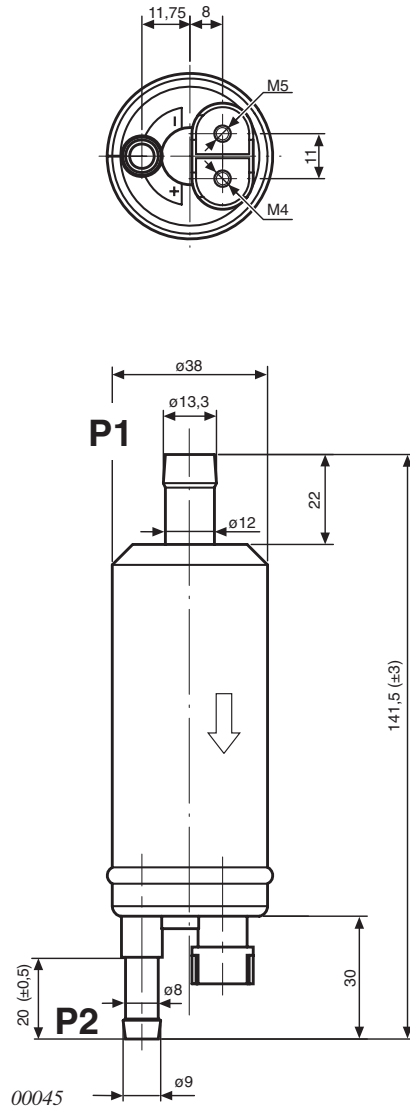
The current input at this quantity is approx. 2 A.

- ◆ NOTE: These figures are reference values.

BRP-Rotax

Maintenance Manual

Fig. 73-36



d04352

BRP-Rotax

Maintenance Manual

3.4.7) Pressure connecting lines (only on 914 Series)

See Figs. 73-37 and 73-38.

The pressure connecting lines are of essential importance for safe operation of the engine. See also 73-00-00 sec. 2 and the corresponding Maintenance Manual (Line Maintenance) for the respective engine type, 912 or 914 Series.

Check all lines and T-fittings for damage (mechanical, thermal, etc.) and leakage.

■ **CAUTION:** All lines are secured with clamps. Check them for safety reasons.

If the lines have been detached or replaced, connect them correctly:

- hose nipple (2) to the T-fitting (3)
- T-fitting (3) to the fuel pressure regulator (4)
- T-fitting (3) to the condensation trap (5) (on older engine configurations)
- condensation trap (5) to the airbox pressure sensor (on older engine configurations)
- hose nipple (6) to solenoid valve (7) ((towards 2-pin electric connector (8))

◆ **NOTE:** On newer engines the solenoid valve (7) is mounted on the airbox (1). See 76-00-00 sec. 3.1.2.9.

- hose nipple (9) to solenoid valve (7) ((towards electric connector (8) on the opposite side))
- solenoid valve (7) (top connection) to T-fitting (10)
- T-fitting (10) to float chamber venting of carburetor 1/3
- T-fitting (10) to float chamber venting of carburetor 2/4

Secure all lines with clamps 8 (11).

An exception are the 3 lines on the solenoid valve which, due to the shape of the valve, must be secured with clamps 6.8 (12).

The lines to the float chamber venting must be fixed to the fuel lines with tie wraps (13). Do not constrict!

BRP-Rotax

Maintenance Manual

- **CAUTION:** Ensure that the total slip-on length is used for all pressure connecting lines and that the clamps are fixed securely.

In addition, all lines must be routed in such a way that scuffing and kinks are avoided. See 73-00-00 sec. 3.4.5 and 73-00-00 sec. 3.4.6.

Reconnect plug connections to temperature sensors and throttle potentiometer.

Check that the plug connections are attached securely.

d04352

BRP-Rotax
Maintenance Manual

NOTES

BRP-Rotax

Maintenance Manual

3.5) Assembly of carburetor sockets, carburetor and fuel lines

3.5.1) Fuel pump

See Fig. 73-39

■ CAUTION: It is necessary to use a new insulating flange. Do not reuse the old insulating flange.

◆ NOTE: Don't use sealing compound on the sealing surface of the gearbox housing or on the fuel pump flange.

Install fuel pump with new insulating flange (1). Secure and tighten hex. nuts M8 (2) together with washer and tighten evenly (Use LOCTITE 243). Tightening torque 15 Nm (11.1 ft.lb).

◆ NOTE: Always use LOCTITE 243 as a fastener when a fuel pump is (re-) mounted or when an insulating flange is affected.

Attach fuel lines again.

3.5.2) Carburetors and carburetor sockets

See Figs. 73-39/1, 73-40 and 76-41.

Attach carburetor socket (4) and new O-ring (5) with hex. screws (6) M8x25 and M8x30 (7) with washers.

◆ NOTE: On intake manifolds without an O-ring groove, a gasket (8) (see Illustrated Parts Catalog) must be fitted.

The screws are locked with LOCTITE 221. Tightening torque 15 Nm (133 in.lb).

Fit carburetor into carburetor socket, which should be **free of grease and oil**, align and fix with hose clamp (9). Tightening torque 2.5 Nm (22 in.lb).

Check distance of 5 to 6 mm (0.2 in. to 0.24 in.) on allen screw (10) as this is important to allow free movement of the tension spring (11).

Engage tension spring in the bracket (12) using a suitable tool.

■ CAUTION: To ensure efficient carburetor suspension, a distance of 40 mm (1.57 in.) between allen screw and engagement latch must be respected.

BRP-Rotax Maintenance Manual

Fig. 73-39

08389

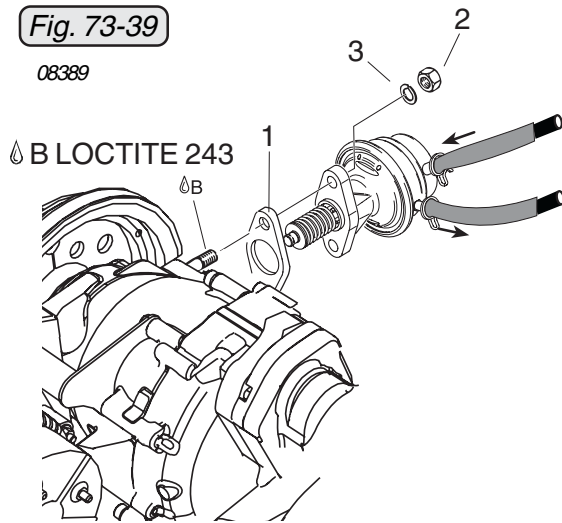


Fig. 73-39/1

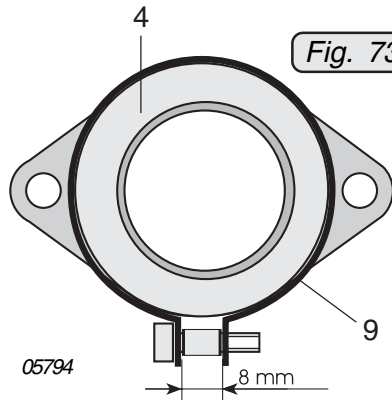


Fig. 73-40

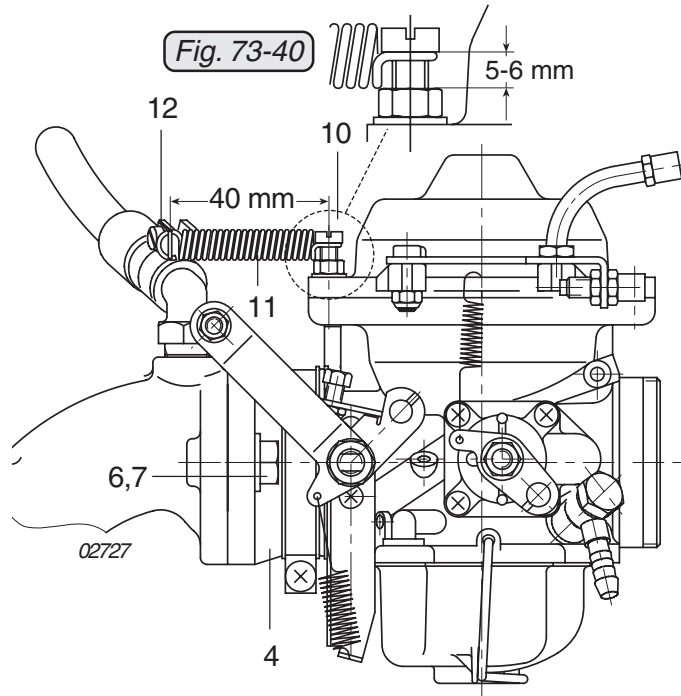
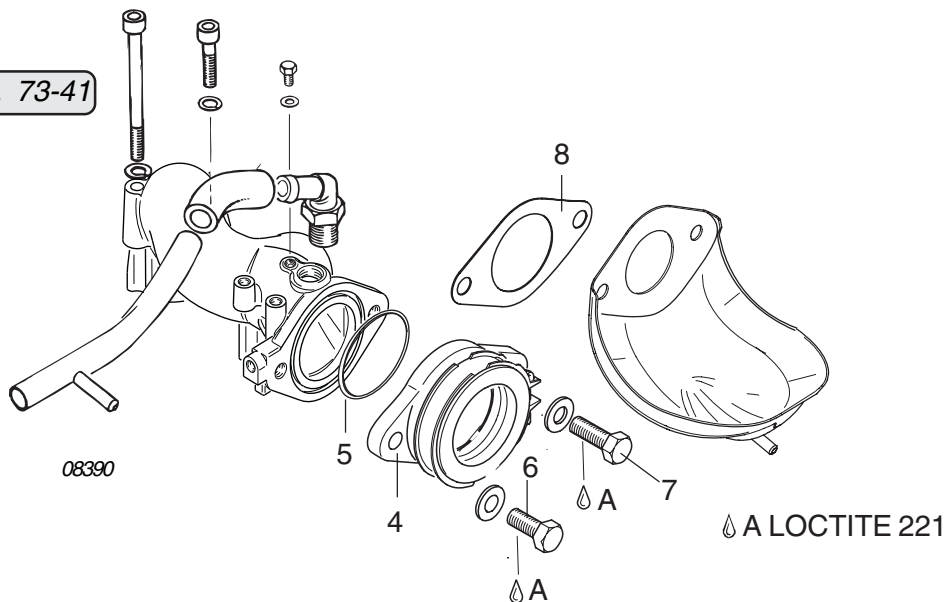


Fig. 73-41



BRP-Rotax

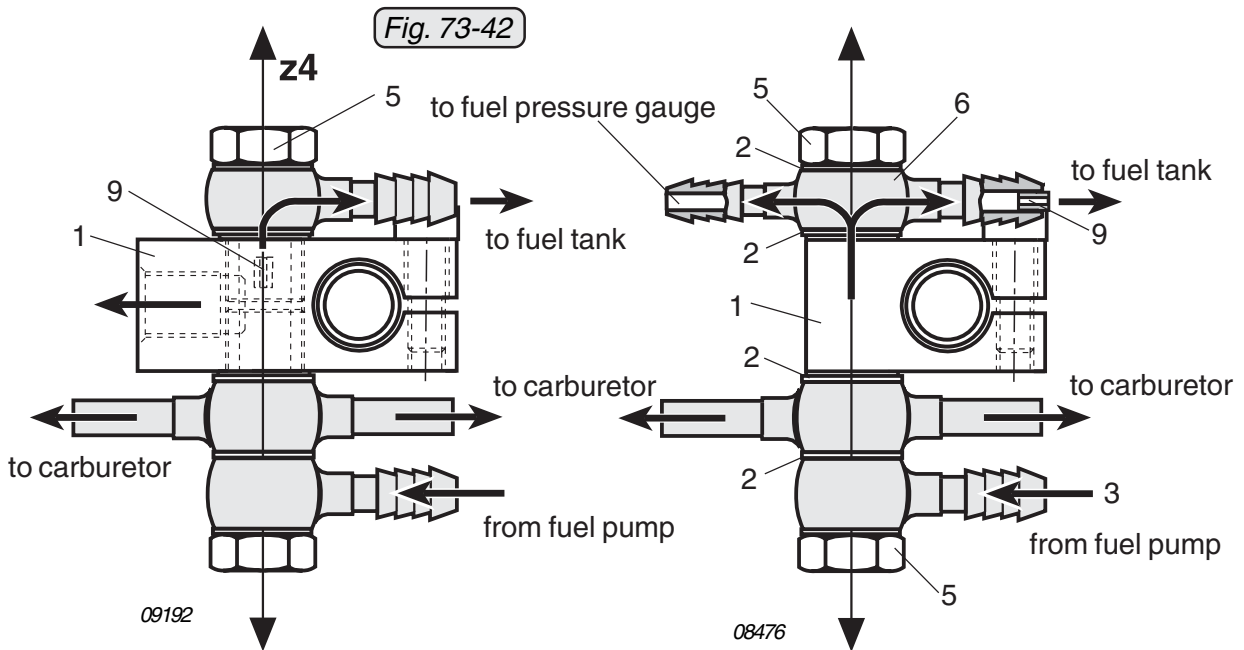
Maintenance Manual

3.5.3) Assembly of the fuel lines (on 912 Series)

See Figs. 73-42, 73-43, 73-44

■ CAUTION: To prevent locked up stresses, all components should first be screwed on loosely and then tightened to the prescribed tightening torque.

If the clamp block (1) has been removed, it must now be reattached with an allen screw M5x16 and a tightening torque of 6 Nm (53 in.lb).



◆ NOTE: For easier assembly of the fuel line, observe the original position of the clamp block.

The lines from the fuel pump (3) and the lines to the carburetors are attached to the **bottom side** of the clamp block, each between a sealing ring (2) and the banjo bolt (5) (tightening torque 10 Nm (90 in.lb)).

The ring hose nipple (6) is attached to the **top side** of the clamp block between a sealing ring (2) and the banjo bolt (5) (tightening torque 10 Nm (90 in.lb)).

- connection for return line to the tank (Ø outside 7mm (0.28 in.))
slip-on length: max. 17 mm (0.67 in.)
- connection to the pressure gauge (Ø outside 6 mm (0.24 in.))
slip-on length: max. 17 mm (0.67 in.)

d04352

BRP-Rotax

Maintenance Manual

The double hose nipple (6) is optional.

◆ NOTE: The double hose nipple (6) contains an integrated restrictor (9) (0.35 mm (.0138 in.)) which plays a decisive role in ensuring correct functioning of the fuel system.

◆ NOTE: If no pressure gauge is connected, a single ring hose nipple is fitted. The restrictor (9) is then in the top banjo bolt (5)

■ CAUTION: Do not get the connections mixed up.

Unscrew allen screw M10x1x8 (11) with the sealing ring (10). Tightening torque 15 Nm (133 in.lb) - screw secured with LOCTITE 221. See Fig. 73-44.

◆ NOTE: When converting to a double hose nipple for measurement of the fuel pressure, the jet must be removed from the banjo bolt (5).

Screw the fuel lines to the carburetors.

Rigid line

◆ NOTE: Do not tighten the clamp block until all lines have been connected.

▲ WARNING: The lines must be fitted without tension and with all the standard in serial supports to prevent breaks caused by vibration during operation.

■ CAUTION: When assembling the fuel lines, ensure that they are adequately supported to prevent strain on the connections. See Fig. 73-43.

◆ NOTE: An optional double hose nipple (6) is available for measurement of the fuel pressure.

Assembly at the carburetor should be carried out analogously the disassembly. See sec. 3.4.4.

BRP-Rotax

Maintenance Manual

Fig. 73-43

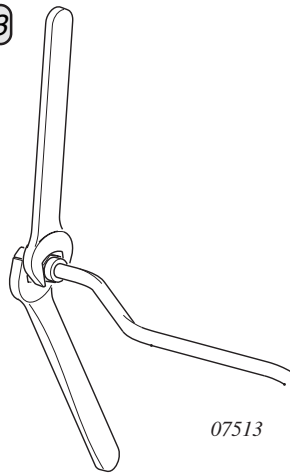
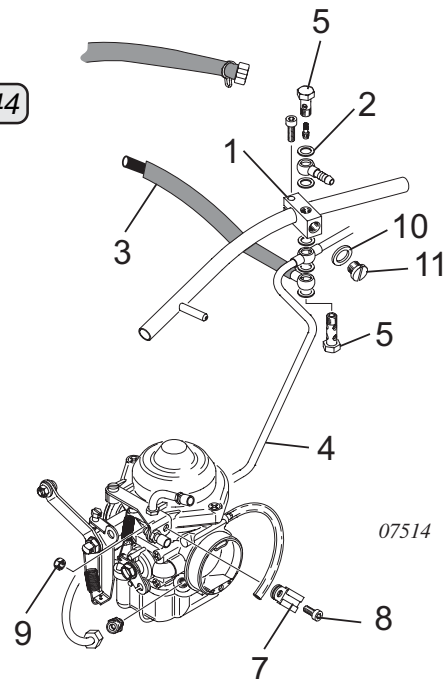


Fig. 73-44



Flexible lines

See Fig. 73-45

See SI-912-020, "Running modifications", latest issue.

From 2007 on, all new models will have a flexible line instead of the present rigid fuel line.

Assembly at the carburetor should be carried out analogously the disassembly. See sec. 3.4.4.

◆ **NOTE:** In case of a retrofit on configurations with steel fuel lines remove the screw connectors (1) and remove remaining sealant residues in a way that they do not get into the carburetor or the fuel system.

For installation on an old style intake manifold perform the following:

- Remove the intake manifold and machine the nut/clamp contact area until the surface is parallel with the sealing surface of the carb socket. The thickness of the material must not be dressed down less than 10,5 mm (0.413 in.) and should be smooth and flat so that the nut/clamp assembly has an even contact surface (see Fig. 73-46).
- Ensure proper support of the flexible fuel line. Install Hex. screw (2) and washer (3) with 15 Nm (133 in. lb.). Install the cable clamp (4) at the hex. screw (2) of the carburetor socket with the hex. nut (5). Tightening torque of hex. nut (5) 24 Nm (18 ft. lb.)

BRP-Rotax

Maintenance Manual

■ **CAUTION:** While tightening hex. nut (5), hold hex. screw (2) with a wrench to prevent it from loosening.

Always fix the flexible fuel line at the compensation tube with clamps (6) in such a way that no wear is possible.

Fig. 73-45

08180

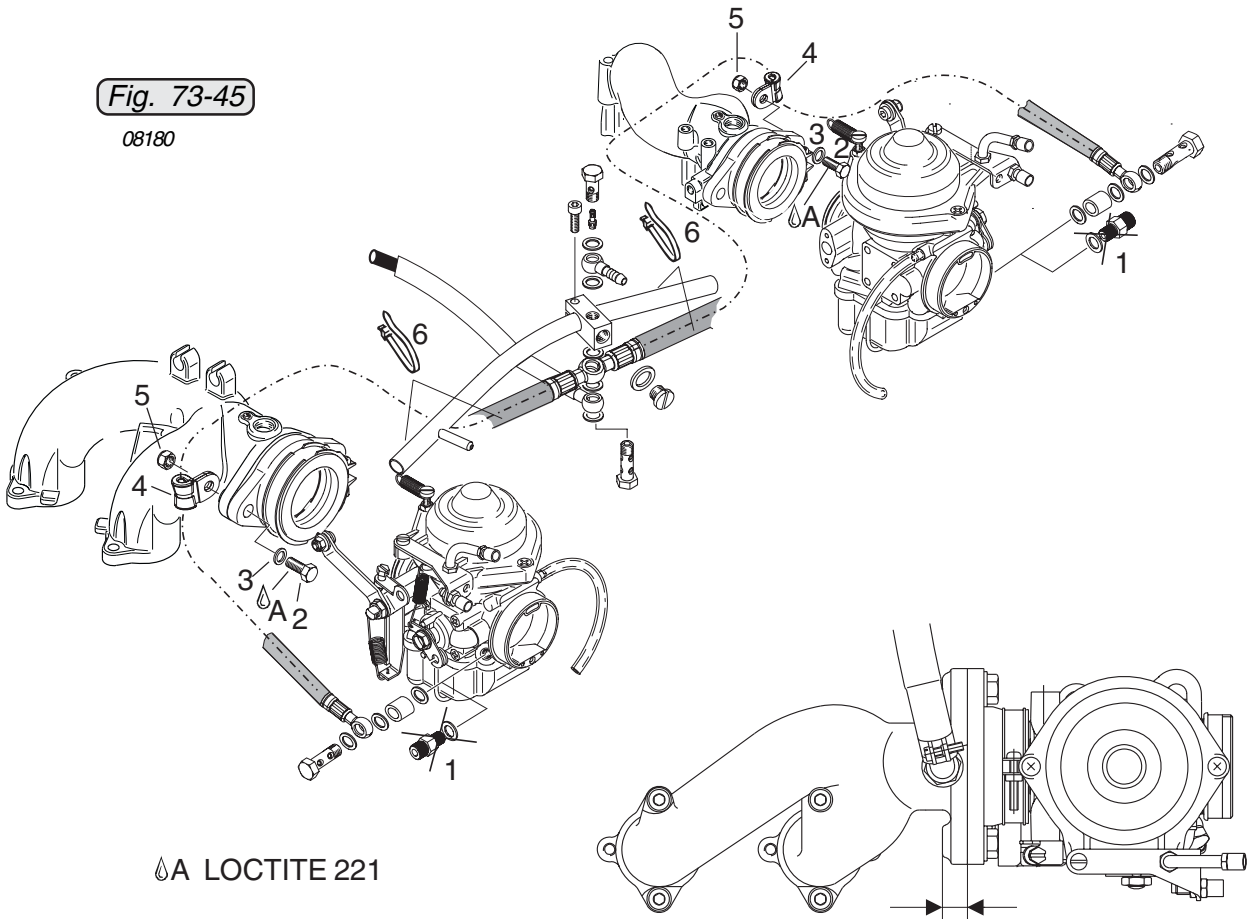
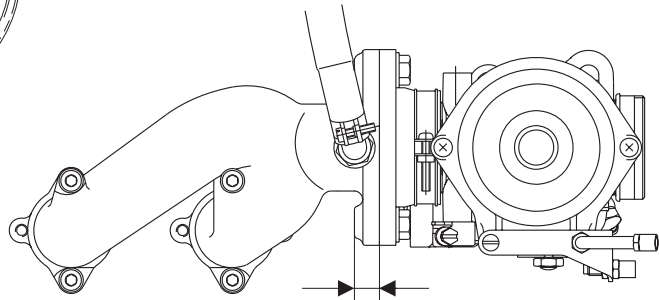


Fig. 73-46

08180



d04352

BRP-Rotax

Maintenance Manual

|| 3.5.4) Assembly of the fuel lines (on 914 Series)

See Fig. 73-47.

Attach fuel line (1) to carburetor (fuel inlet) with collar nut (2). Support the line on the carburetor bracket with a cable clamp (3). The cable clamps are attached with allen screws (4) M5x12 and lock nuts (5). The tighten collar nut to 10 Nm (90 in.lb).

Now the airbox (6) can be refitted on the connections of the carburetors. Do not damage the previously fitted fuel lines and pressure connecting lines.

Ensure that all clamping locations are **free of grease**.

■ CAUTION: Use the complete slip-on length on the connection pieces.

Ensure that the airbox (6) is fitted horizontally and torsion-free. There must be no additional load on the carburetor fixations.

Now the screw hose clamps (7) can be tightened on the connecting hose (8) and, if necessary, on air intake hose (9).

Fit the pressure connecting lines (10) (float chamber venting) on both carburetors and fuel pressure regulator (11) with clamps (12) 8. See 73-00-00 sec. 3.4.9.

Attach the 2 fuel lines (1) to the fuel pressure regulator (11) with banjo bolts (13) M10 and sealing rings (14) 10x14 on both sides.

Tightening torque: 15 Nm (133 in.lb).

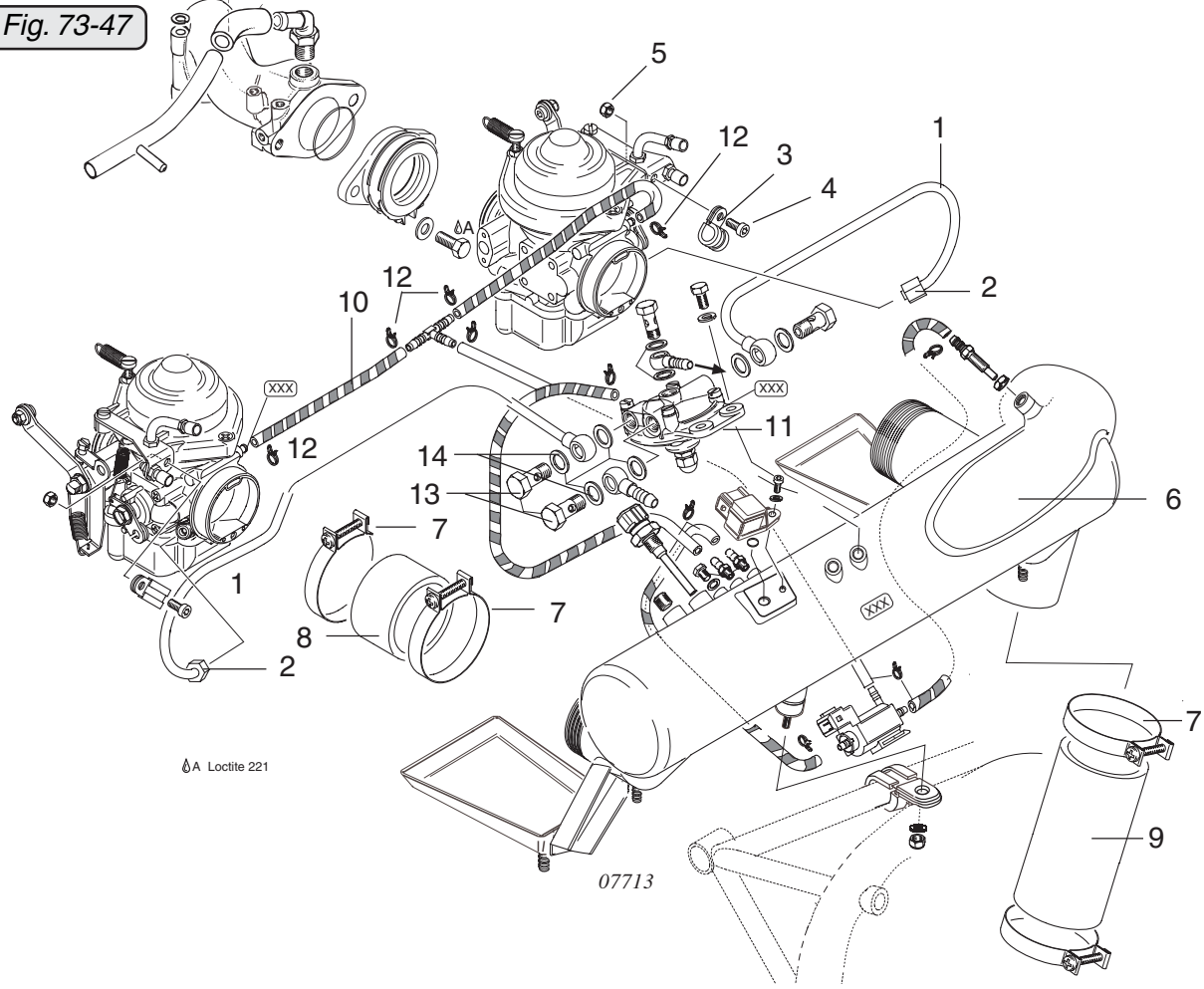
■ CAUTION: When fitting fuel lines, support them adequately to avoid strain or additional load.

Reconnect plug connection to temperature sensors and throttle potentiometer.

Check plug connections for security.

BRP-Rotax
Maintenance Manual

Fig. 73-47



▲A Loctite 221

07713

d04352

BRP-Rotax
Maintenance Manual

3.6) Intake manifolds fitting

See 72-00-00 sec. 3.17.

3.7) Engaging the carburetor support

See Figs. 73-48 and 73-49.

Check that the tension spring (1) moves freely in the allen screw (2) and in the distance sleeve (5) and engage the tension spring in the engagement latch (3) using a suitable tool. Ensure that the two arms (4) of the tension clamp with the engagement latch point upwards. If necessary, correct the position of the tension clamp.

■ **CAUTION:** To ensure efficient carburetor suspension, a distance of 40 mm (1.57 in.) between the allen screw (2) and the engagement latch (3) must be respected.

If a counter sunk screw is fitted instead of the allen screw and the distance sleeve, support set part no. 887730, see Fig. 73-54, must be used.

Repeat procedure for second carburetor.

◆ **NOTE:** Only on 912 Series: On engine models from the year 96 onwards, the carburetor support is already fitted in serial production. We recommend installing it on all engines older than this. See Service Bulletin SB-912-010, "Fitting of a carburetor support", latest issue.

Engines 912 S, 912 ULS, 914 UL and 914 F have been equipped with the carburetor support since the beginning of production.

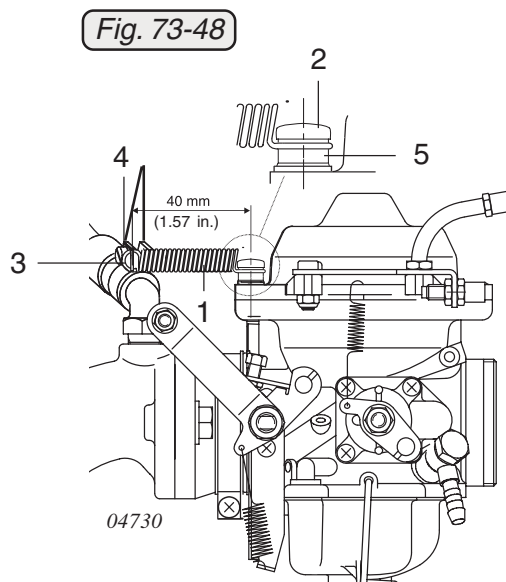
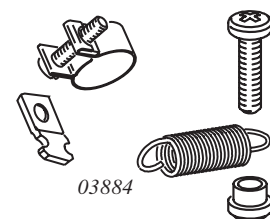


Fig. 73-49



d04352

BRP-Rotax

Maintenance Manual

3.8) Connecting fuel lines (tank)

The fuel lines from the tank to the fuel pump, from the fuel pump to the two carburetors and the return line to the fuel tank must be installed as per the aircraft manufacturer's instructions when installing the engine in the aircraft.

- **CAUTION:** When tightening the fuel lines, no force or torque may be applied to the fuel pump connections or the fuel pressure regulator.

d04352

SECTION 74
IGNITION SYSTEM

1) Table of contents

SECTION 74

IGNITION SYSTEM

1) Table of contents	74-00-00 / 1
2) Systems description	74-00-00 / 3
2.1.) Electric system (alternators, ignition)	74-00-00 / 3
2.1.1) Ignition	74-00-00 / 6
2.1.2) Allocation of trigger coils and ignition circuits	74-00-00 / 8
2.1.3) Firing order	74-00-00 / 9
2.1.4) Ignition cables	74-00-00 / 9
2.2) Connections for instrumentation	74-00-00 / 9
2.2.1) Electronic rev counter	74-00-00 / 9
3) Maintenance / troubleshooting	74-00-00 / 11
3.1) Treatment of corrosion and surface damage	74-00-00 / 11
3.1.1) Electric system	74-00-00 / 11
3.2) Checking the ignition unit, trouble shooting	74-00-00 / 11
3.3) Spark plugs	74-00-00 / 12
3.4) Spark plug connectors and ignition cables	74-00-00 / 12
3.5) Electronic module, trigger coil kit	74-00-00 / 14
3.6) Charging coil	74-00-00 / 15
3.7) Generator coils	74-00-00 / 16
3.8) Dual ignition coil	74-00-00 / 17
3.9) Cut-in speed of ignition	74-00-00 / 18
3.10) Ignition timing control	74-00-00 / 19
3.11) Ignition circuits inspection (ignition check)	74-00-00 / 21
3.12) Measurement values for the ignition unit	74-00-00 / 22
3.13) Wiring diagrams	74-00-00 / 24
3.13.1) Engine internal (on the 912 Series)	74-00-00 / 24
3.13.2) Engine internal (on the 914 Series)	74-00-00 / 30
3.13.3) Engine external (on the 914 Series)	74-00-00 / 34
3.14) Ignition electric setremoval	74-00-00 / 35
3.15) Ignition electric set dismantling	74-00-00 / 37
3.15.1) Dual ignition coils replacement	74-00-00 / 37
3.16) Ignition electric set reassembly	74-00-00 / 41

d02624

BRP-Rotax
Maintenance Manual

3.17) Ignition electric set refitting	74-00-00 / 43
3.18) Trigger coil kit replacement	74-00-00 / 46
3.19) Stator removal and refitting	74-00-00 / 48
3.20) Fly wheel hub'	74-00-00 / 49
3.21) Interference suppression box (only on the 912 Series)	74-00-00 / 52
3.21.1) Interference suppression box dismantling	74-00-00 / 52
3.21.2) Interference suppression box wiring diagram	74-00-00 / 53
3.21.3) Interference suppression box assembly	74-00-00 / 54
3.21.4) Interference suppression box fitting	74-00-00 / 54
3.22) Rev counter and ignition trigger coils	74-00-00 / 55
3.23) External alternator (optional on 912/914 Series)	74-00-00 / 57
3.23.1) V-belt pulley removal	74-00-00 / 57
3.23.2) Alternator removal	74-00-00 / 57
3.23.3) V-belt assembly	74-00-00 / 57
3.23.4) Checking of the external generator	74-00-00 / 59
3.23.4.1) Check of the power output of the generator	74-00-00 / 59
3.23.4.2) Mechanical check	74-00-00 / 59
3.23.5) Alternator assembly	74-00-00 / 59
3.23.6) V-belt tension	74-00-00 / 59
4) Wear limits	74-00-00 / 61
5) Form Sheets	74-00-00 / 63

d04353

BRP-Rotax
Maintenance Manual

3.6) Charging coil

See Fig. 74-12.

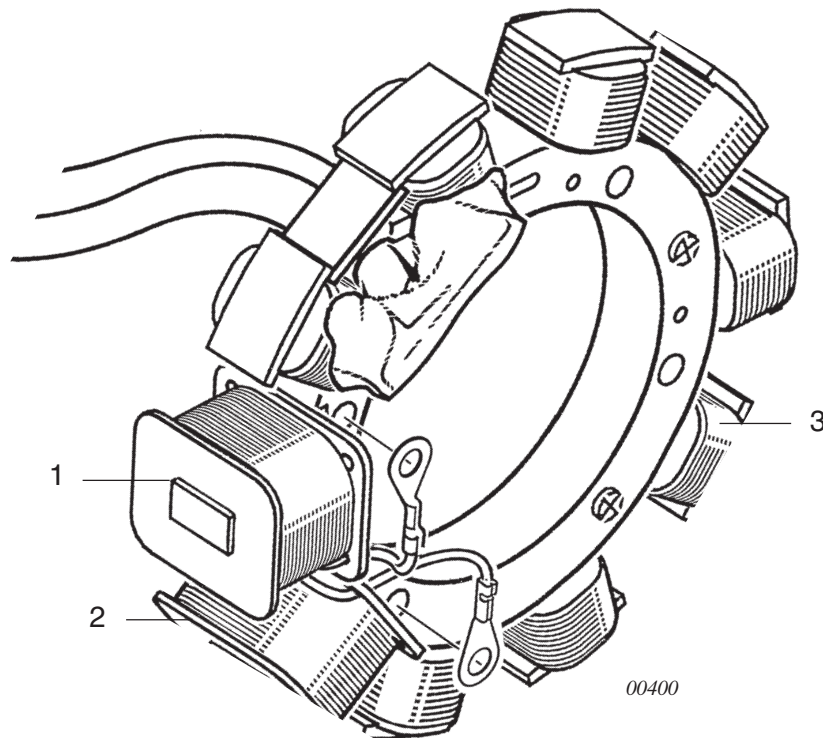
In case of malfunction of one ignition circuit, the 2 single-pin plugs of the red charging cables may be interchanged for localization of the problem.

If the failure remains on the same ignition circuit, the electronic module is the cause and the respective module must be replaced see 74-00-00 sec. 3.5.

If the failure passes on with the ignition circuit, the charging coil (1) for ignition circuit "A" or (2) for circuit "B" is the cause. In this case the stator must be removed see 74-00-00 sec. 3.19

Check charging cable for damage. Measure resistance with a multimeter see 74-00-00 sec. 5, if necessary, replace the complete stator. See 74-00-00 sec. 3.12.

Fig. 74-12



d02624

BRP-Rotax

Maintenance Manual

3.7) Generator coils

See Fig. 74-12.

If the generator does not work, the reason may be a defective or damaged yellow alternator cable or a defective winding on the 8 alternator coils (3). Disconnect alternator cables (yellow) and check resistance values.

Measure the resistance with a multimeter. See 74-00-00 sec. 3.12 and 74-00-00 sec. 5.

◆ **NOTE:** If the value measured corresponds with the values specified, the cause may be a defective rectifier-regulator.

■ **CAUTION :** When performing any of the work described here, ensure that no foreign objects can enter the ignition unit.

Checking the integrated alternator in operation:

The check of the internal alternator is carried out at idle speed and under load on a 150 W (0.201 hp) consumer.

- Establish check circuit as shown on wiring diagram Fig. 74-12.
- Set engine speed to 4000 rpm.
- Check that charge indicating lamp goes out.
- Read off the idle voltage on the voltmeter (8) and record it in the 74-00-00 sec. 5 „Form sheets“.
- Close circuit-breaker (7), read off voltage under load on the voltmeter (8) and record it in the 74-00-00 sec. 5 „Form sheets“ .

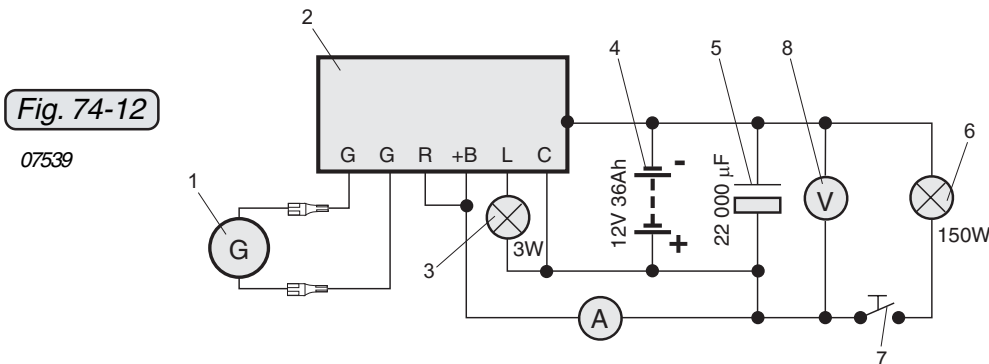


Fig. 74-12

07539

- | | |
|--|---------------------------------------|
| (1) Magneto-generator | (5) Capacitor 22 000 µF/25 V |
| (2) Rectifier regulator part no. 965345 | (6) Consumer (lamps) 150 W (0.201 hp) |
| (3) Charge indicating lamp 3W (0.004 hp) | (7) Circuit breaker |
| (4) Battery 12 V charged | (8) Voltmeter |

Testing is carried out at 4000 rpm with and without consumer.

d04353

BRP-Rotax
Maintenance Manual

Fig. 74-26

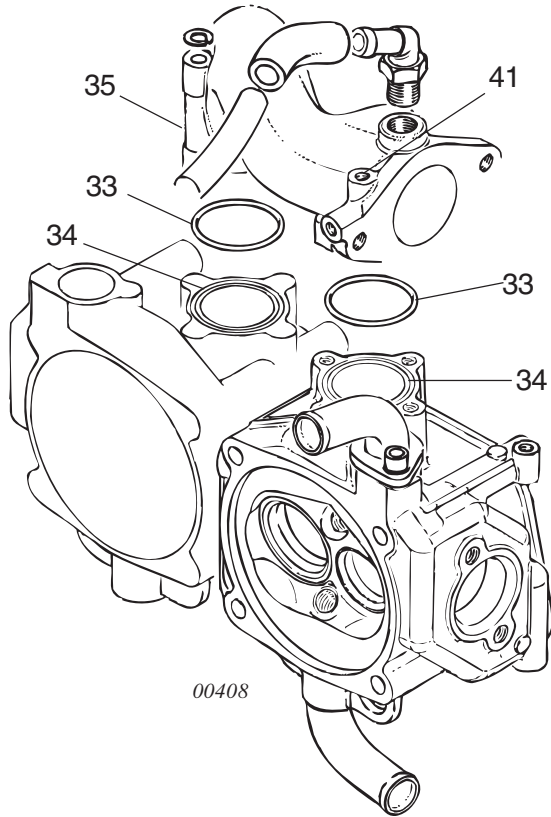
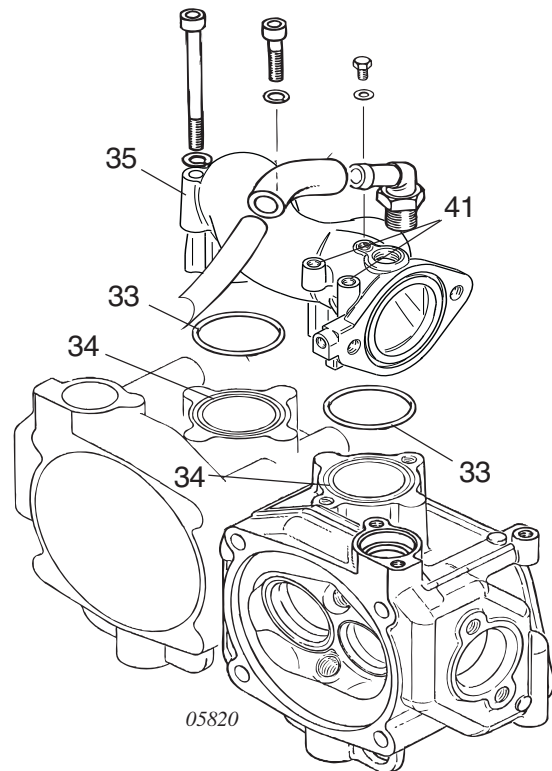


Fig. 74-27



d02624

BRP-Rotax

Maintenance Manual

3.18) Trigger coil kit replacement

See Figs. 74-28, 74-29, 74-30, 74-31, 74-32 and 74-33.

Because of the shielding (6), the trigger coil kit (5) can be exchanged only as a complete set. Remove the attachment screws (7) with the distance sleeves (8) and cable clamps and fit new trigger coil kit. The stator (9) need not be removed in this case.

The trigger coils (1) are only adjustable to a limited extent. The gap (2) between trigger coil and trigger cam (3) is equal to dimension (IH02). The trigger coils must be centred relative to the trigger cam and any offset must not exceed dimension (IH03).

◆ **NOTE:** The trigger coil kit for older engine versions is no longer available. However, there is a new trigger coil kit with new trigger coils which will fit older engines.

For easier adjustment, on the new trigger coils ("clip on pick up"), the attachment has been changed from a cylindrical hole with centering (21) to a elongated hole (22).

The gap (IH02) between the trigger coil and the trigger cam must be adjusted using a feeler gauge. On trigger coil with oblong hole, 5 washers, part no. 827800 (23) are also needed for the fastening.

■ **CAUTION :** As the trigger coils are no longer centered and the screw has clearance in the oblong hole, during adjustment of the gap (IH02), all trigger coils must be pressed clockwise up to the limit stop.

■ **CAUTION :** Fit the cable clamps in such a way that there is adequate grounding between the shielding and the ignition housing.

See 74-00-00 sec. 3.12 and sec. 4.

d04353

BRP-Rotax

Maintenance Manual

Fig. 74-28

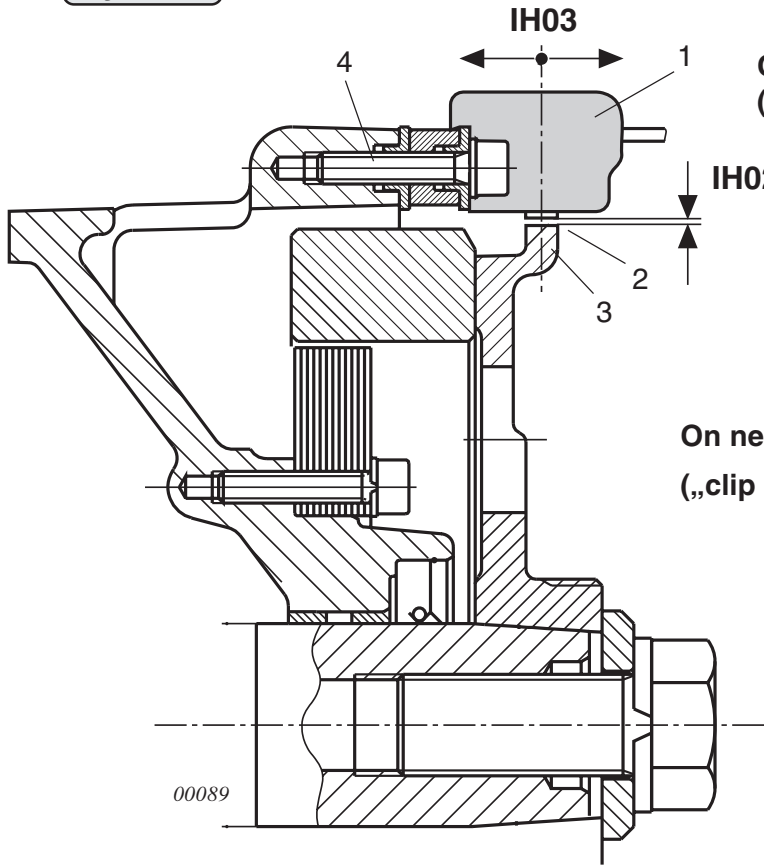
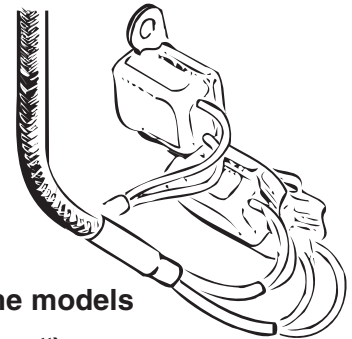


Fig. 74-29

**On older engine models
(discontinued)**



**On new engine models
(„clip on pickup“)**

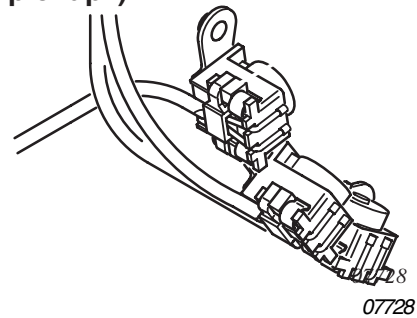


Fig. 74-30

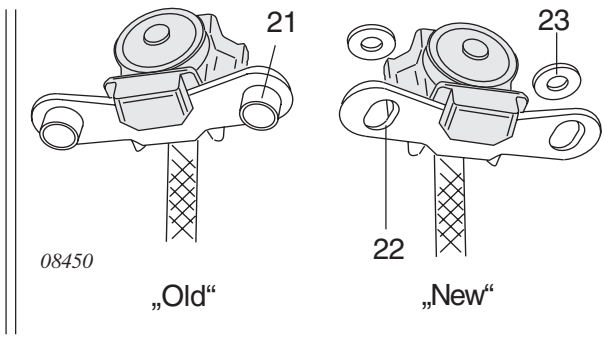
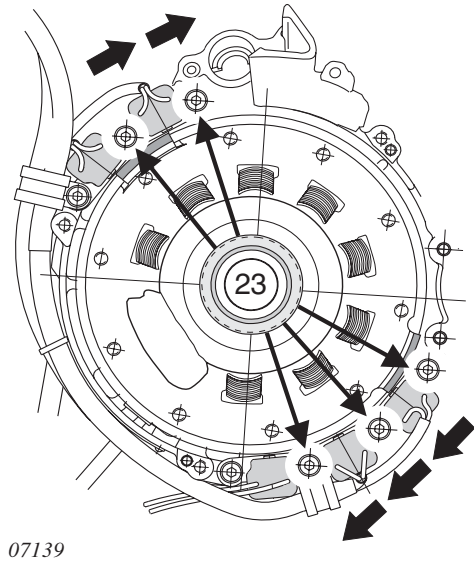


Fig. 74-31

Trigger coil alignment



d04353

BRP-Rotax

Maintenance Manual

3.19) Stator removal and refitting

See Figs. 74-32, 74-33 and 74-34.

Lock crankshaft with the thread bolt, part no. 240880 See also 75-00-00.

Remove hex. screw (10) M16x1.5 together with lock washer and washers. Place protection piece, part no. 877410, on crankshaft, screw puller, part no. 877375, fully onto the thread (11) and press off fly wheel hub (12) together with magneto ring with the hex. screw of the puller. Store fly wheel hub assy. aside so that no foreign objects can be attracted by the magnet.

◆ NOTE: For removal of stator, the ignition housing need not be removed.

Remove four allen screws (13) and the cable clamp. Remove stator ass'y (9) from the centering (14) and carry out a visual inspection. Check cable assembly for damage. The contact faces (15) between stator and ignition housing must be clean to assure good grounding. Check the resistance values of the components, see 74-00-00 sec. 4.

Repair of the stator is not planned. When replacing the stator, pay attention to correct routing of the cable assembly. One each charging coil grounding cable is screwed with the stator fixation. At assembly, apply Lithium grease to the contact areas (20) of the stator and the screw heads.

d02624

BRP-Rotax
Maintenance Manual

3.20) Fly wheel hub'

See Fig. 74-32.

Carry out visual inspection of magneto inner side (16) and the taper surface (17). Under normal circumstances, dismantling of fly wheel hub is not necessary.

If it has been dismantled, clean the contact faces (18) Apply LOCTITE 221 to all 10 allen screws (19) (alternating 5 screws M6x30 and 5 screws M6x25) and screw together.

◆ NOTE: The hole pattern in the magneto ring is symmetrical and therefore it can be assembled in any position.

Check woodruff key in crankshaft for tight fit. Degrease tapers of crankshaft and fly wheel hub and apply LOCTITE 221 sparingly.

Fit fly wheel on assy. Apply grease on the contact face of the washer 17/36/5 (20) and of the lock washer 16 (21). Screw in hex. screw M16x1.5 (10) with washer 17/36/5 and lock washer 16 and immediately tighten to 45 Nm (33.2 ft.lb) +180° angle to rotation.

■ CAUTION : The woodruff key must remain in the groove.

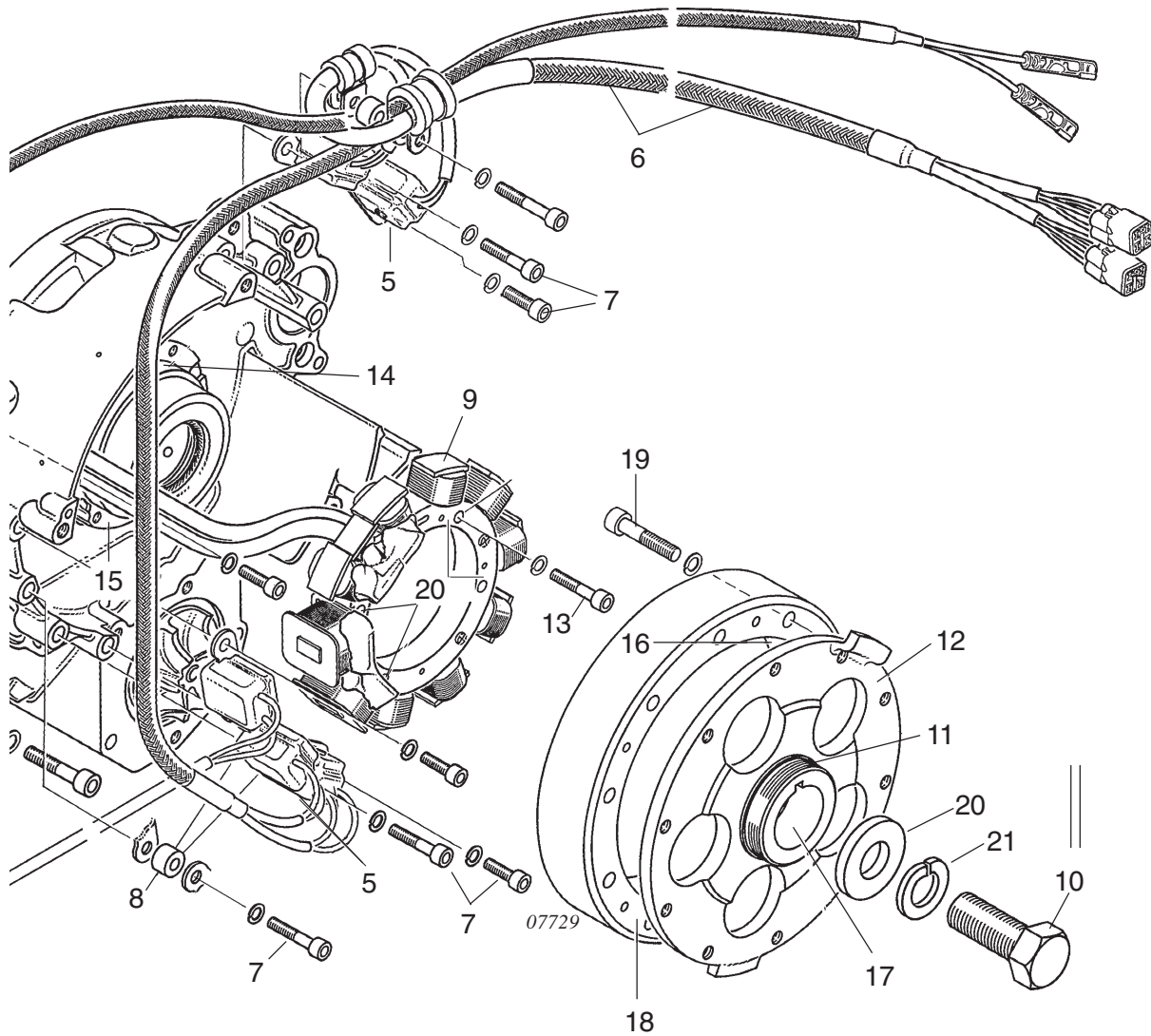
Adjust the air gap of the external triggers with feeler gauge to dimension (1H02). Check external trigger coils for correct axial position with reference to the trigger cam of the fly wheel hub. Offset must not exceed dimension (IH03), see 74-00-00 sec. 3.18.

See 74-00-00 sec. 4.

BRP-Rotax
Maintenance Manual

Older engine models

Fig. 74-32



d04353

BRP-Rotax

Maintenance Manual

3.23) External alternator (optional on 912/914 Series)

3.23.1) V-belt pulley removal

See Fig. 74-38.

After removal of the propeller, the V-belt pulley (3) remains loose on the propeller flange (2).

After removal of the 8 allen screws M5x16 (7) with the lock washers (8), the two pulley carrier plates (4), the V-belt pulley(3) and the narrow V-belt (1) can be taken off.

3.23.2) Alternator removal

Remove the two hex. screws M8x20 (24) with the lock washers (25) and washers (26) and the tension bar (20) below the external alternator.

Remove the hex. screws M10x45 (18) and take off the alternator (15) with the washer (17).

Remove the two allen screws M8x20 (10) with the lock washers (11) and take off the alternator bracket (9).

The alternator support (12) is attached to the gearbox housing with 2 allen screws M6x50 (13), lock washers 6,4 (14). After removal of the attachment screws, it can be taken off.

3.23.3) V-belt pulley assembly

See Fig. 74-38.

Slide the pulley (3) fully over the propeller flange (2) and insert the V-belt 9.5x675 (1) loosely in the V-belt pulley.

Insert the two pulley carriers (4) with the centering (5) facing the inside (6) of the propeller flange and loosely preassemble the propeller with the two pulley carriers.

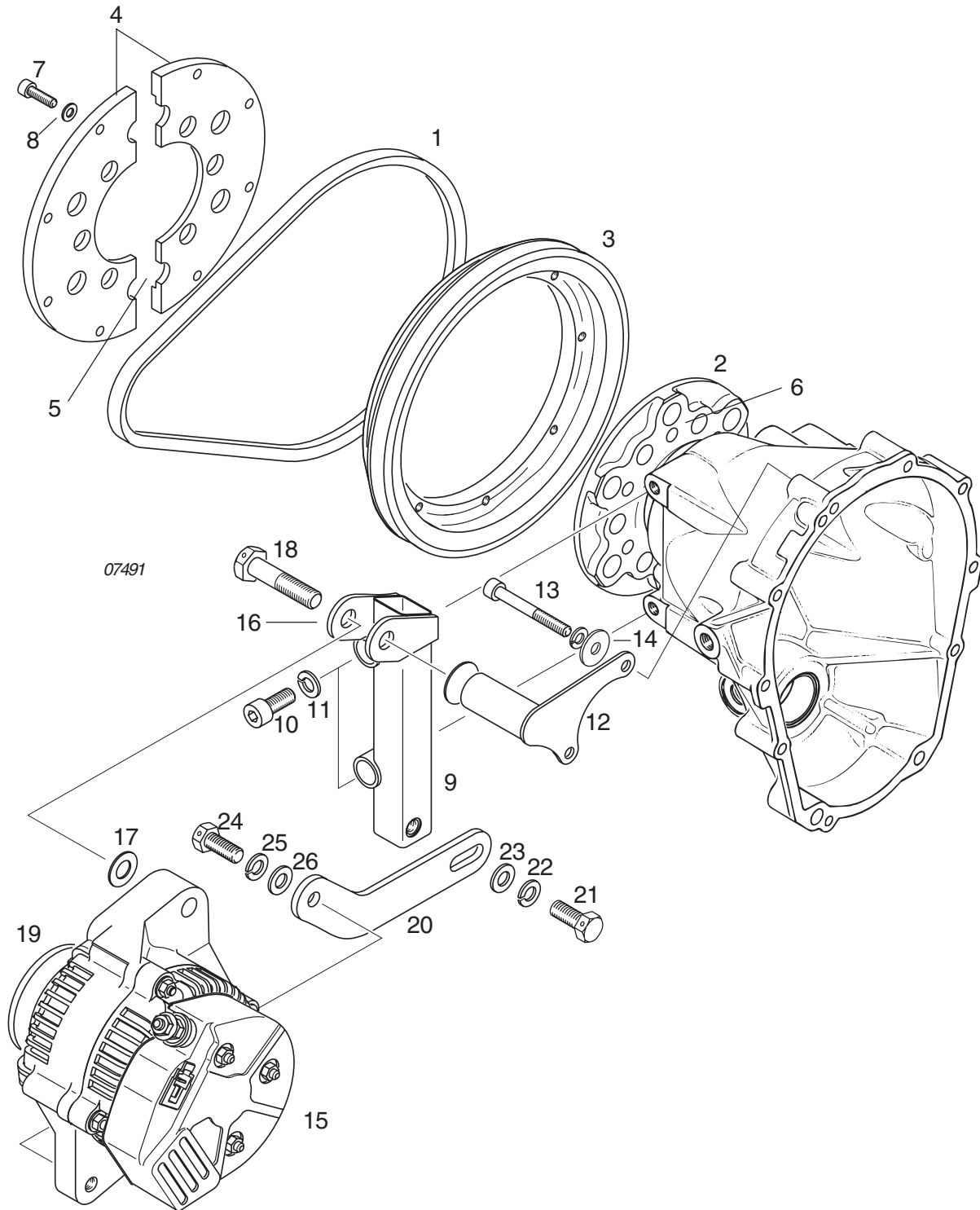
Push the V-belt pulley (3) onto the two V-belt pulley carriers (4) and attach with the 8 allen screws M5x16 (7) with lock washer (8).

■ **CAUTION:** The two pulley carriers must be positioned precisely with the centering exactly on the inside (6) of the propeller flange.

Tighten the propeller with the preassembled pulley to the tightening torque recommended by the propeller manufacturer.

BRP-Rotax
Maintenance Manual

Fig. 74-38



d04353

BRP-Rotax

Maintenance Manual

3.23.4) Checking of the external generator

See Fig. 74-39

3.23.4.1) Check of the power output of the generator

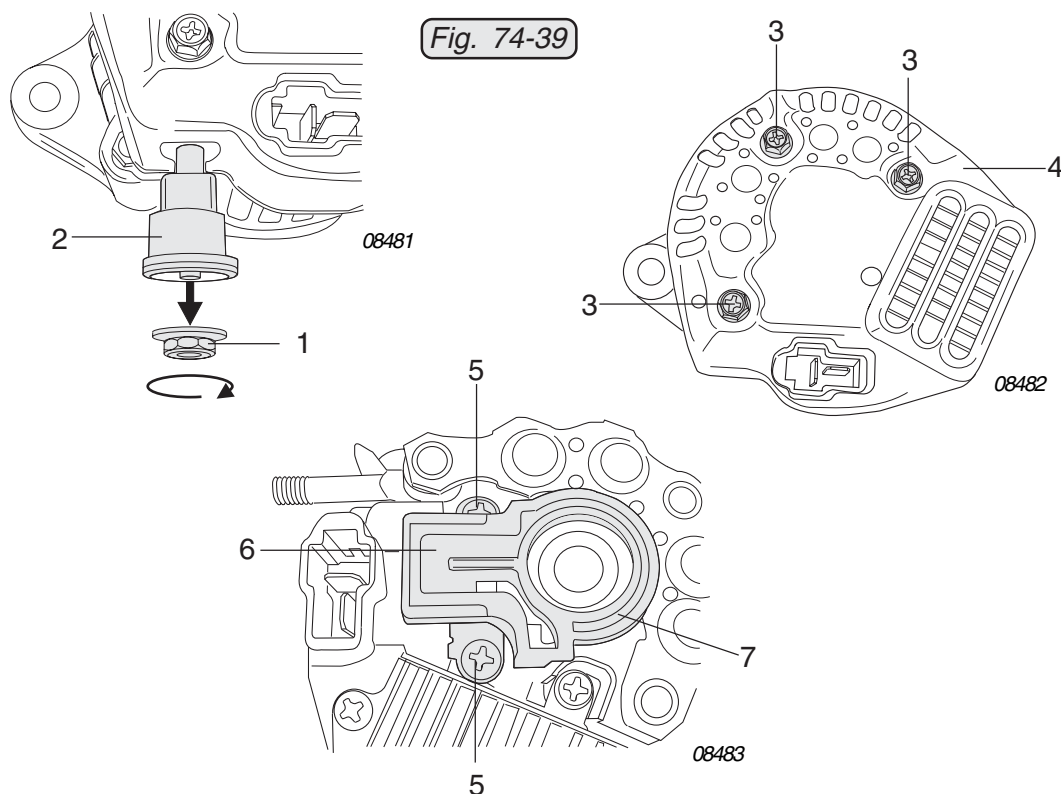
At an alternator rpm of 5000 rpm the output has to be at least 40 amps (between Terminal B (2) and ground).

◆ **NOTE** 5000 rpm of the alternator is equivalent to 1680 rpm of the propeller shaft or the propeller respectively.

3.23.4.2) Mechanical check

■ **CAUTION :** Disconnect the cable from the negative battery terminal.

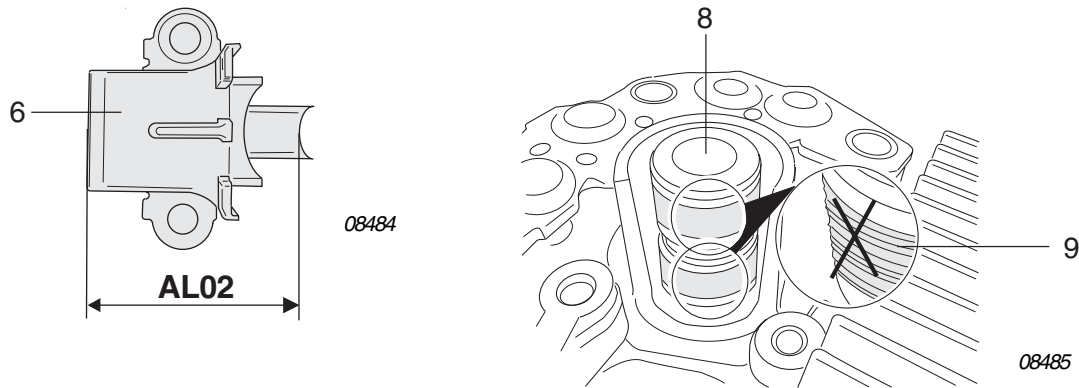
Remove hex-nut (1) from terminal B (2), also remove the three hex-screws (3). Remove the rear bearing plate(4). After loosening the crosshead screw (5) and removing the cover (3) the brush carrier and the rubber can be taken off. Measure the length of the brush carrier (6) (AL02) and record the result in the appendix. Check the shaft for grooves. It should not be possible to feel a ridge (9). Turn the shaft by hand. The bearings must be easy to move and must not show any resistance.



d04353

BRP-Rotax

Maintenance Manual



3.23.5) Alternator assembly

See Fig. 74-38.

Net loose preassemble the alternator bracket (9) on the gearbox housing with the two allen screws (10) M8x20 with high tension lock washer (11) VHZ 8. To attach the alternator support (12), the two allen screws M6x45 (13) with lock washers A6 are unscrewed from the propeller gearbox and then retightened to also hold the alternator support (12).

Push the alternator (15) into the bracket (16) of the alternator bracket, distance with the washer (17) 10.1/20/0.5 and loosely attach the alternator with the hex. screw (18) M10x45.

Now the two allen screws (10) M8 can be tightened to 22 Nm (195 in.lb) and the two allen screws (13) M6 to 10 Nm (90 in.lb) together with the lock washers and washer (14). Insert the V-belt (1) into the pulley of the alternator (19).

Loosely preassemble the tension bar (20) on the side with the oblong hole on the alternator bracket (9) with allen screws (21) M8x16, washer (23) 8.4 and lock washer A8 (22). Then loosely preassemble tension bar (20) on the alternator (15) with allen screw (24) M8x20, lock washer (25) and washer (26).

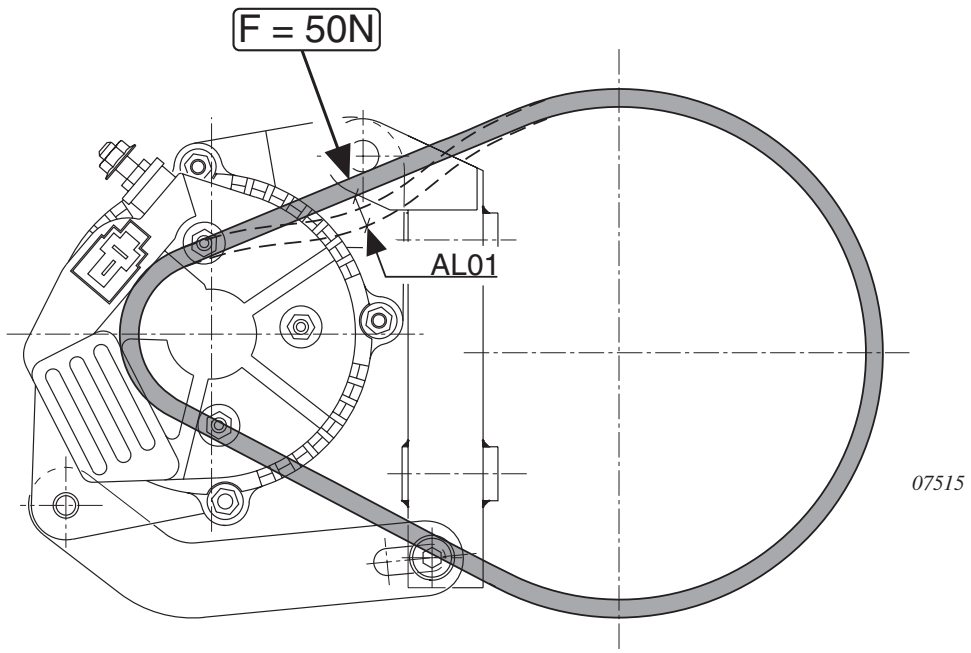
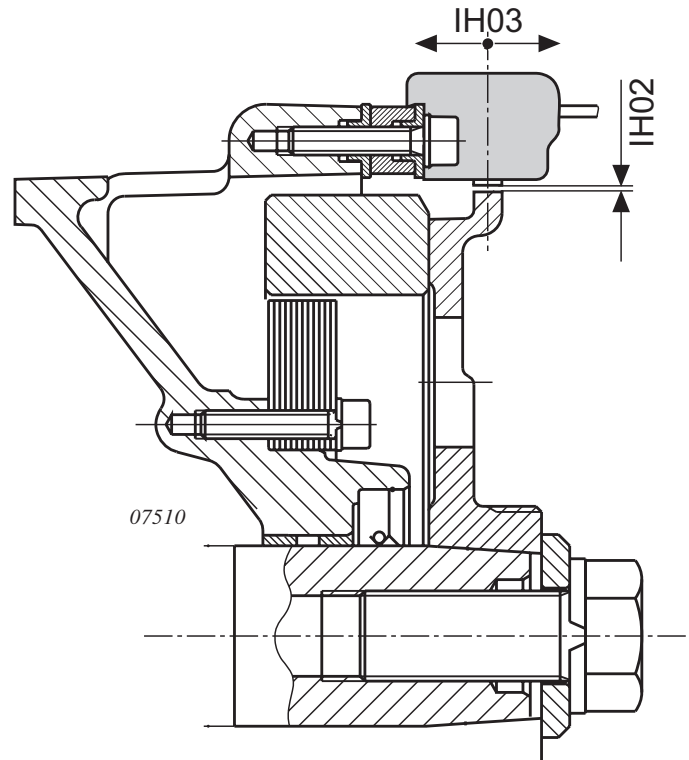
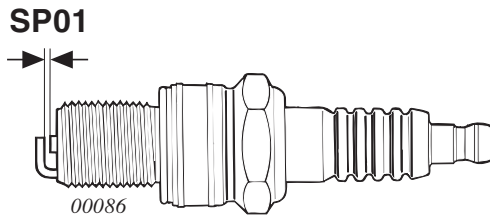
3.23.6) V-belt tension

See latest Maintenance Manual "Line Maintenance" for the respective engine type.

d04353

BRP-Rotax
Maintenance Manual

4) Wear limits



d02624

BRP-Rotax

Maintenance Manual

07201

Description	Code	Reading new		wear limit	wear limit		Readings			
		min	max	100%	50%					
Spark plug										
electrode gap	SP01	0,6 0,022	0,7 0,028	0,9 0,036		actual				
						renewed				
Ignition housing										
							A 1/2	A 3/4	B 1/2	B 3/4
trigger coil gap "old type"	IH02	0,4 0,016	0,5 0,020			actual				
						renewed				
trigger coil gap (with clamps)	IH02	0,3 0,012	0,4 0,016			actual				
						renewed				
trigger coil axial off-set	IH03	0,0 0,000	0,2 0,008			actual				
						renewed				
External alternator										
Deflection of V-belt at a force of 50 N	AL01		6,0 0,236			actual				
						renewed				

08487

Description	Code	Reading new		wear limit	wear limit		Readings			
		min	max	100%	50%					
External alternator										
length of coal brush	AI02	30 1,181		23 0,905	26,5 1,1043	actual				
						renewed				

d02624

BRP-Rotax
Maintenance Manual

SECTION 75
COOLING SYSTEM

1) Table of contents

SECTION 75

COOLING SYSTEM

1) Table of contents	75-00-00 / 1
2) Systems description	75-00-00 / 3
2.1) Cooling system	75-00-00 / 3
2.2) Connections for instrumentation	75-00-00 / 4
2.2.1) Cylinder head temperature display	75-00-00 / 4
3) Maintenance	75-00-00 / 5
3.1) Water pump removal and inspection	75-00-00 / 6
3.2) Water pump housing - dismantling and inspection	75-00-00 / 7
3.3) Fly wheel hub removal	75-00-00 / 9
3.4) Ignition housing removal	75-00-00 / 9
3.5) Water pump shaft - removal	75-00-00 / 9
3.6) Rotary seal - removal	75-00-00 / 10
3.7) Rotary seal - installation	75-00-00 / 10
3.8) Axial position of the water pump shaft	75-00-00 / 12
3.9) Ignition housing assembly	75-00-00 / 13
3.10) Water pump housing — reassembly	75-00-00 / 13
3.11) Coolant hoses fitting	75-00-00 / 14
3.12) Spring band hose clamps	75-00-00 / 14
3.13) Radiator (optional 912/ 914 Series)	75-00-00 / 14
3.14) Cooling air duct (optional 912/ 914 Series)	75-00-00 / 14
3.15) Expansion tank	75-00-00 / 15
3.16) Overflow bottle	75-00-00 / 15
3.17) Temperature measurement system	75-00-00 / 15
3.17.1) Cylinder head temperature sensor	75-00-00 / 15
4) Wear limits	75-00-00 / 19

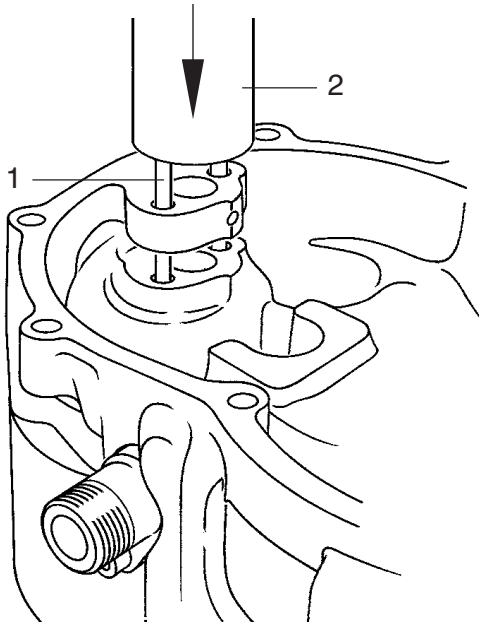
d04354

BRP-Rotax
Maintenance Manual

NOTES

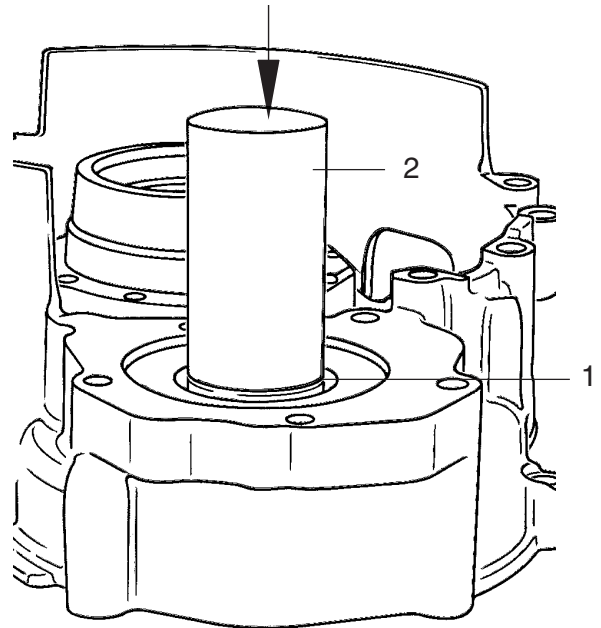
BRP-Rotax
Maintenance Manual

Fig. 75-6



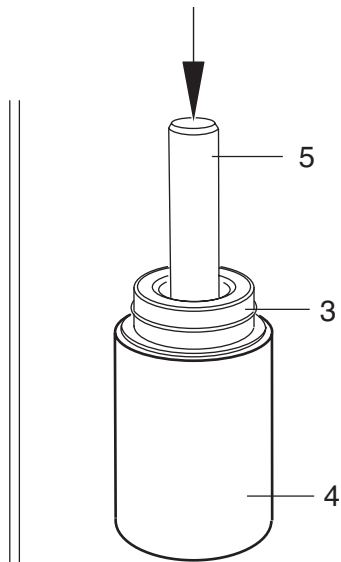
00386

Fig. 75-7



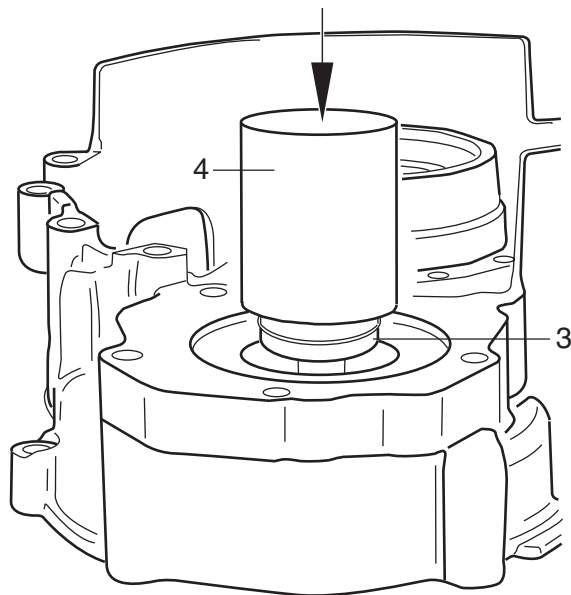
00387

Fig. 75-8



08448

Fig. 75-9



08451

d04354

BRP-Rotax

Maintenance Manual

3.8) Axial position of the water pump shaft

See Fig. 75-10

Check axial position of water pump shaft and pump gear. The step (6) of the gear points inward towards the crankcase.

- ◆ NOTE: To ensure the correct gap (8) (dimension WP02) between the impeller (9) and the water pump housing (10), make sure that the collar (7) of the water pump shaft is flush with the sealing surface (11) of the ignition cover (12).

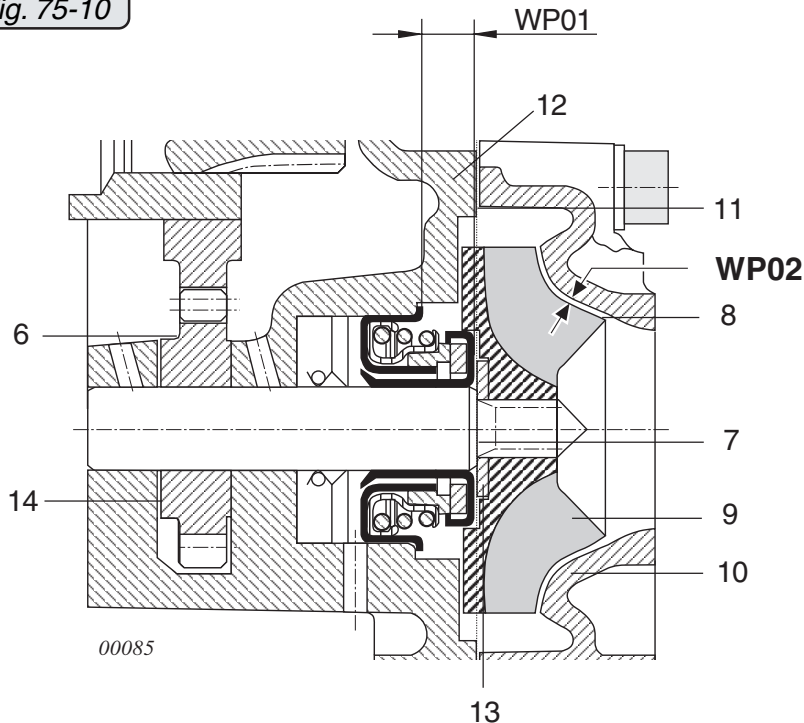
If necessary, turn the ignition cover around and lay it on a planed hardened sheet with an 8 mm (0.32 in.) bore. Press the water pump shaft back as required with a $\varnothing 10$ mm (0.40 in.) bolt. Trial spin the installed pump shaft.

Place stainless steel shim (13) on the shaft, fit impeller (9), turning clockwise, and tighten with special tool, part no. 877295. Tightening torque 15 Nm (133 in.lb).

- ◆ NOTE: Check impeller (9) for out-of-round. If it is noticeably out-of-round, replace impeller or if necessary also the pump shaft.

See 75-00-00 sec. 4.

Fig. 75-10



d02625

BRP-Rotax

Maintenance Manual

3.9) Ignition housing assembly

See 72-00-00 sec. 3.5.

3.10) Water pump housing — reassembly

See Fig. 75-11.

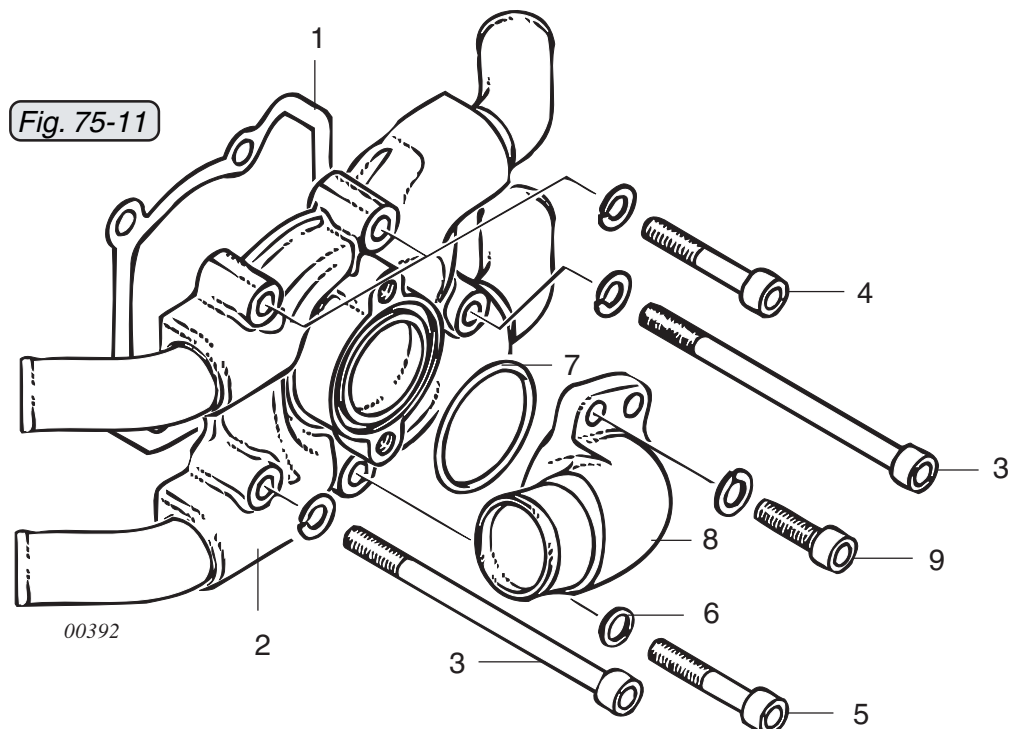
Position gasket (1), attach water pump housing (2) to the ignition housing with 2 allen screws (3) M6x90 and 3 allen screws (4) M6x35 together with lock washers, torque to 10 Nm (90 in.lb).

■ **CAUTION :** The bottom allen screw (5) M6x35 protrudes into the water chamber, so it is of stainless steel and fitted with a sealing ring (6).

Carry out a visual inspection to see whether the impeller scuffs in the pump housing. This can be recognized by scuffing traces in the pump housing or on the impeller. If necessary, the axial position of the water pump impeller can be corrected to achieve an optimum gap, see 75-00-00 sec. 3.8.

Insert O-ring (7) into water pump housing, fit the water inlet elbow (8) in the position marked before disassembly with 2 allen screws (9) M6x20 with lock washers. Tightening torque 10 Nm (90 in.lb).

◆ **NOTE:** The water inlet elbow is symmetrical and can, if required, be fitted in other positions.



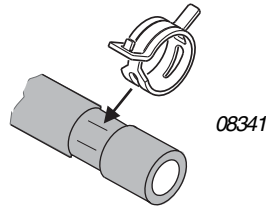
d02625

BRP-Rotax
Maintenance Manual

3.11) Coolant hoses fitting

See Fig. 75-13

- **CAUTION:** The spring band hose clamps must be installed in the drawn origin position. (See sketch)



Fit all coolant hoses (1) coming from the expansion tank to the coolant exit on the cylinder heads (3) with spring band hose clamps (4). Also fit the coolant hoses between the water pump (6) and the coolant entry (7) into the cylinder heads with spring band hose clamps.

- ◆ **NOTE:** Position spring band hose clamps so that they cannot damage neighboring coolant hoses.

Use tool part no. 877840 (spring clamp pliers) or equivalent to mount the spring type hose clips.

On old engine designs the spring type of hose clips are not installed.

- **CAUTION:** It is necessary to look out for a proper overlapping of the coolant hose and of the connecting tube.

Check the clips and hoses for tight fit and leaks. The spring type hose clips have to be mounted in such a way, so that chafing can not occur.

3.12) Spring band hose clamps

Carry out visual inspection. Position the clamps so as to avoid contact and friction with neighboring parts.

Use a suitable tool for assembly. See 00-00-00 sec. 10.6.

3.13) Radiator (optional 912/ 914 Series)

Clean radiator elements and check for damage, straighten fins if necessary. In particular, check the hose connections and the support plates. Check for tightness if leaks are suspected.

d04354

BRP-Rotax

Maintenance Manual

3.14) Cooling air duct (optional 912/ 914 Series)

The cylinders are ram-air cooled. The cooling air is pushed during flight and by the propeller into the engine compartment and is distributed evenly by the cooling air duct to the individual cylinders. Carry out visual inspection for damage, cracks, chafing marks, burnt spots etc. In the event of noticeable damage, replace the cooling air duct.

3.15) Expansion tank

See Fig. 75-12

See latest valid Maintenance Manual “Line Maintenance” of the corresponding engine type. On newer engines the expansion tank is in a different position. See therefore the latest issue of the Service Information “Running modification” SI-912-020 and SI-914-022 respectively.

◆ NOTE: On engines with the old expansion tank, the old hose locations and the old coolant hoses don't have to be upgraded and can be continued to be used.

In the case of repair/overhaul it has to be considered that the old expansion tank part no. 922398 does not offer the space to install the spring hose type clamps this is due to limited space between the tube (cylinder 1 and cylinder 3).

Due to different positions for the supply/drain hoses leading to and from the expansion tank, it is necessary to have different hose lengths. Take care of the proper length of the hose and of its overlapping length with the connectors.



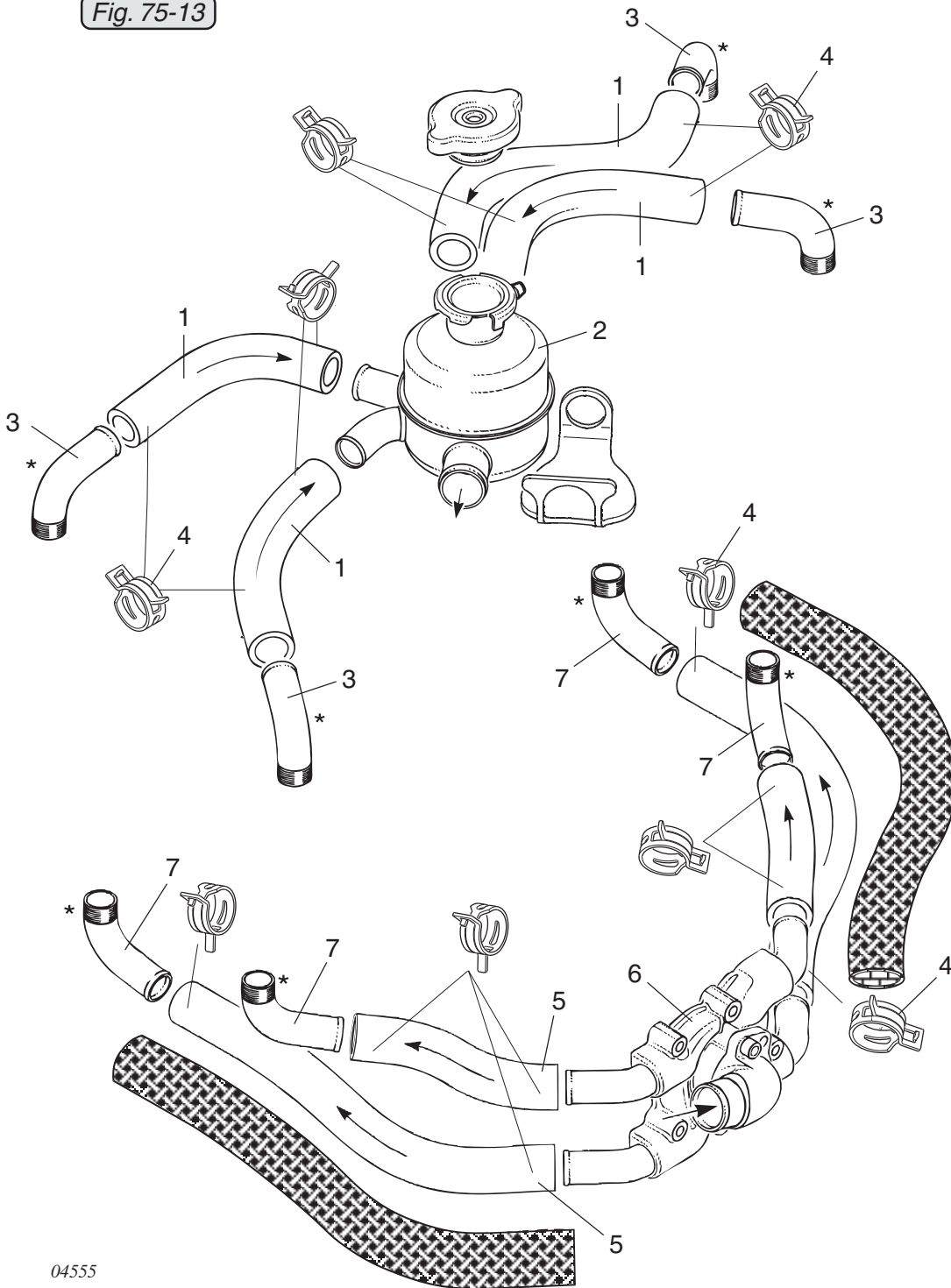
Fig. 75-12

04557

d04354

BRP-Rotax
Maintenance Manual

Fig. 75-13



04555

d02625

BRP-Rotax
Maintenance Manual

3.16) Overflow bottle

See latest Maintenance Manual “Line Maintenance” for the respective engine type.

- **CAUTION:** Check whether the overflow bottle has been modified in accordance with SB-912-039 and SB-914-025, “Modifications of the overflow bottle”, latest issue.

3.17) Temperature measurement system

- ◆ **NOTE:** There are several temperature control points on ROTAX engines of the 912/914 Series. Refer to wiring diagram in Operators Manual.

3.17.1) Cylinder head temperature sensor

See Figs. 75-14 and 75-15.

In serial production, the two temperature sensors (1) are screwed into position on the bottom side of the cylinder heads of cylinders 2 and 3.

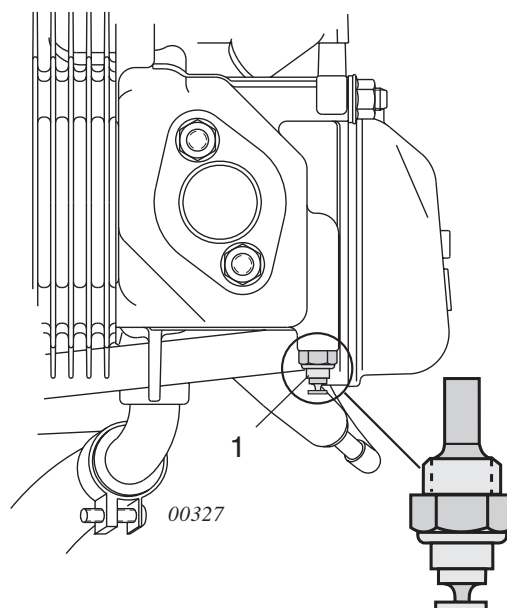
- ◆ **NOTE:** Grounding connection of the temp. sensor directly via the cylinder head.

For sensor resistance, see following graph of sensor resistance overtemperature.

deviation: max $\pm 10\%$

On assembly, tighten the temperature sensor to 10 Nm (90 in. lb). Secure screws with LOCTITE 221.

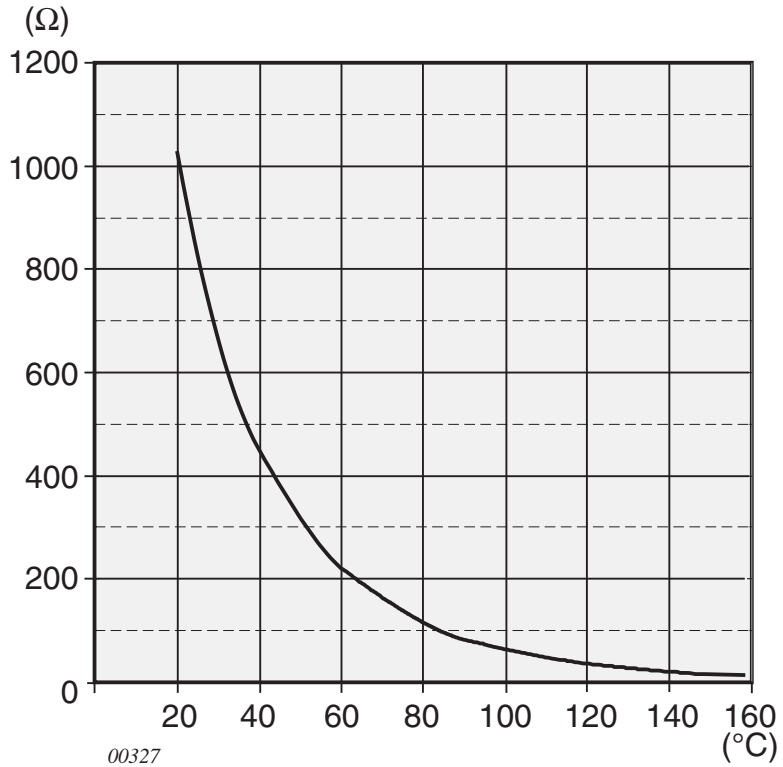
Fig. 75-14



d04354

BRP-Rotax
Maintenance Manual

Fig. 75-15



00327

BRP-Rotax
Maintenance Manual

SECTION 76

ENGINE CONTROL

1) Table of contents

SECTION 76

ENGINE CONTROL

1) Table of contents	76-00-00 / 1
2) Systems description	76-00-00 / 3
2.1) Turbocharger control (only on 914 Series)	76-00-00 / 3
2.1.1) Control of boost pressure in the airbox	76-00-00 / 3
2.1.2) Target pressure reduction	76-00-00 / 8
2.1.2.1) Target pressure reduction at overspeeding	76-00-00 / 8
2.1.2.2) Target pressure reduction at excessive airbox temperature	76-00-00 / 9
2.1.2.3) Target pressure reduction by limiting the compressor pressure ratio	76-00-00 / 10
2.1.3) Lamp output connections on the TCU	76-00-00 / 11
2.1.4) Three-way solenoid valve	76-00-00 / 12
2.1.5) PC interface	76-00-00 / 12
3) Maintenance	76-00-00 / 13
3.1) Control system of the turbocharger (only on 914 Series)	76-00-00 / 13
3.1.1) Checking the turbocharger control unit (TCU) by means of a communication program	76-00-00 / 13
3.1.1.1) Functions of the communication program	76-00-00 / 13
3.1.1.2) Required items	76-00-00 / 13
3.1.1.3) Scope of the communication program	76-00-00 / 15
3.1.1.4) Application of the communication program	76-00-00 / 17
3.1.1.5) Checking the components of the turbocharger control	76-00-00 / 28
3.1.1.6) Checking the throttle valve position	76-00-00 / 29
3.1.1.7) Recalibration of the throttle position	76-00-00 / 31

d02626

BRP-Rotax

Maintenance Manual

3.1.2) Static check of the turbocharger control	76-00-00 / 32
3.1.2.1) Turbo control unit (TCU)	76-00-00 / 32
3.1.2.2) Caution lamps	76-00-00 / 34
3.1.2.3) Wiring harness	76-00-00 / 35
3.1.2.4) Throttle potentiometer	76-00-00 / 37
3.1.2.5) Resistance thermometer (Intake air temperature sensor)	76-00-00 / 42
3.1.2.6) Pressure sensors	76-00-00 / 44
3.1.2.7) Servo motor	76-00-00 / 50
3.1.2.8) Circuit breaker for servo motor	76-00-00 / 52
3.1.2.9) Three-way solenoid valve	76-00-00 / 53
3.2) Wiring diagrams	76-00-00 / 58
3.2.1 Engine external (on the 914 Series)	76-00-00 / 58
4) Form Sheets	76-00-00 / 59

d04355

BRP-Rotax

Maintenance Manual

3.1.2.3) Wiring harness

See Fig. 76-31

The sensors are connected with the TCU via the wiring harness.

▲ **WARNING:** If an inspection reveals irregularities, then the engine must not be taken in operation until the cause is found and rectified.

The easiest way to check function of turbo control components is by the communication program. If this program is not at your disposal, the following static checks can be carried out.

- For verification and troubleshooting, check all connections for passage and physical damage. See Fig. 76-31.
- Verify that all plug connections fit tightly.

■ **CAUTION:** In the event of physical damage or incorrect operation, replace part without delay. Repair on your own authority is not permitted.

◆ **NOTE:** Fig. 76-31 contains a lot of information. Besides the wiring designations, plug allocation, cable length, the polarity of the voltage supply to the single components are also stated.

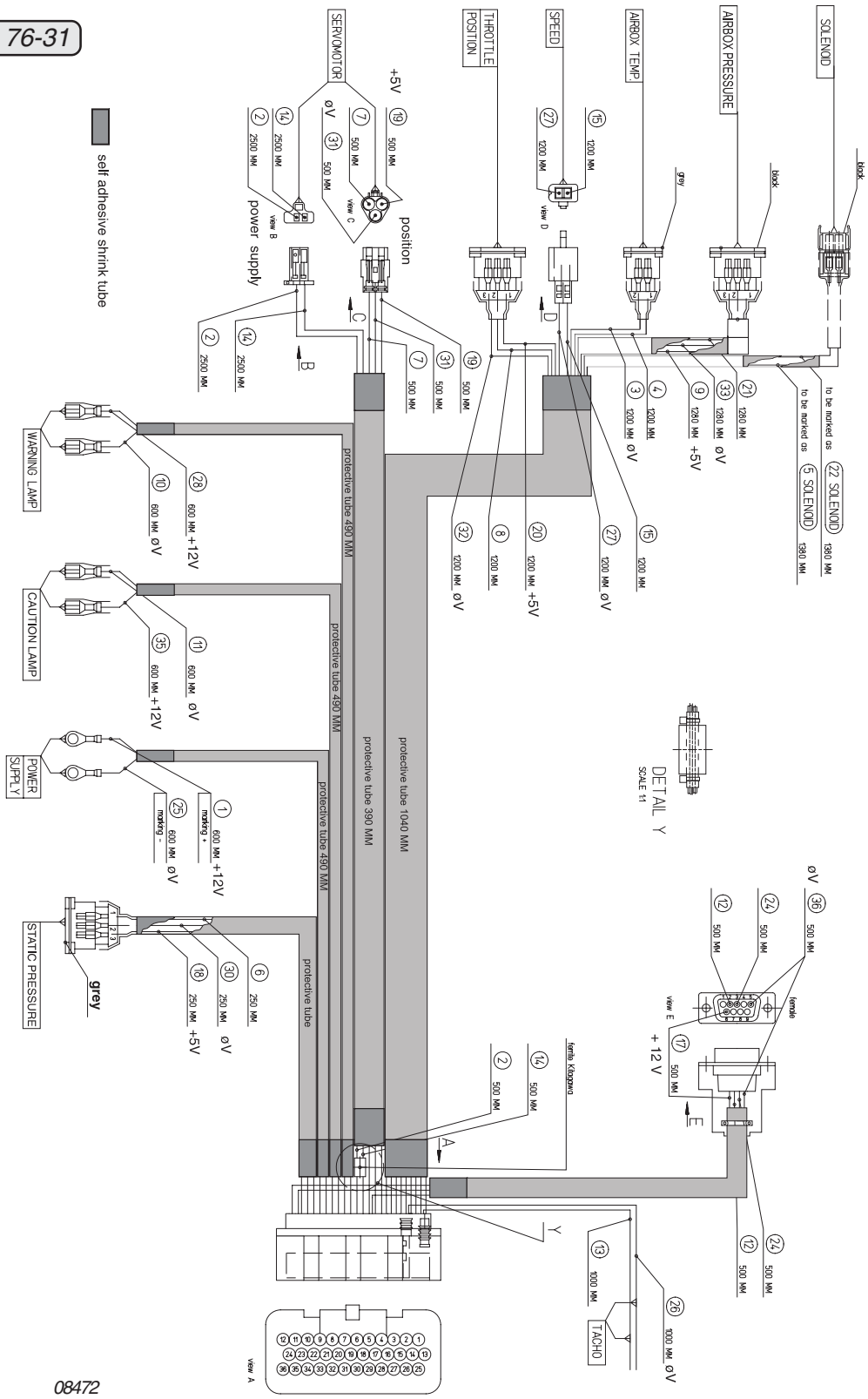
■ **CAUTION:** Due to a modification a three-way solenoid valve was introduced. If the engine is equipped with an old 3-way solenoid valve then, if the wiring harness needs to be replaced, the 3-way solenoid valve also has to be changed. See 76-00-00 sec. 3.1.2.9.

If the wiring harness is replaced, the throttle valve position must be recalibrated (see 76-00-00 sec. 3.1.1.7) and the turbocharger control checked in accordance with 76-00-00 sec. 4

If this aid is not at your disposal, an engine test run has to be performed. See corresponding Maintenance Manual (Line Maintenance) for the respective engine type 914 Series.

BRP-Rotax Maintenance Manual

Fig. 76-31



08472

004355

BRP-Rotax

Maintenance Manual

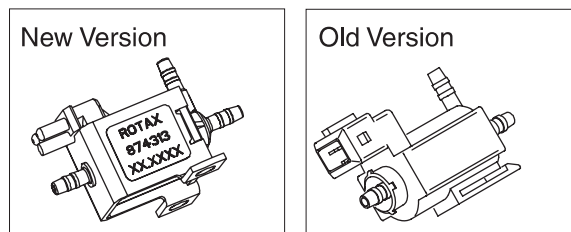
3.1.2.9) Three-way solenoid valve

See Fig. 76-50

The 3-way solenoid valve (1) is installed on the engine suspension frame or directly on airbox on newer engines.

Due to a modification a new 3-way solenoid valve has been introduced. See SI-914-022, „Running Modifications“, latest issue.

Accessories and attachment of the 3-way solenoid valve could differ because of the possible variants of the airbox.



If the 3-way solenoid valve is fastened to the engine suspension frame, then not all parts of the retro-fitting kit are needed. In addition the following parts are needed:

Variant 1: for airbox part no. 667167

◆ NOTE: all parts for variant 1 are included in retrofit kit part no. 881040

parts requirement - retrofit kit part no. 881040

Fig No..	New p/n	Qty/ engine	Description	Old part no.	Application
1	874313	1	3-way solenoid valve	874310	airbox
2	666010	1	adapter cable	-	wiring harness
3	951040	2	bracket	-	3-way solenoid valve
4	840391	2	allen screw M6x14	-	bracket
5	842040	2	lock nut M6	-	bracket
6	866710	4	tie wraps	-	3-way solenoid valve

d04355

BRP-Rotax

Maintenance Manual

Disassembly and assembly - Variant 1

Remove connection wiring harness (11) of 3-way solenoid valve (1).

Cut off tie wraps (6).

Loosen 3x clamps (12) from 3-way solenoid valve and remove lines.

Remove 3-way solenoid valve.

Connect adapter cable (2) to wiring harness.

Install bracket (3) onto airbox.

Tighten 3-way solenoid valve with allen screw (4) and lock nut (5). Tightening torque 8 Nm (70 in. lb).

■ **CAUTION:** Route all pressure connections such that there will be no sharp bends or chafing.

Push lines onto fittings as far as they will go and secure with clamps (12).

Position lines and adapter cable (2) and secure with clamps (6).

Variant 1

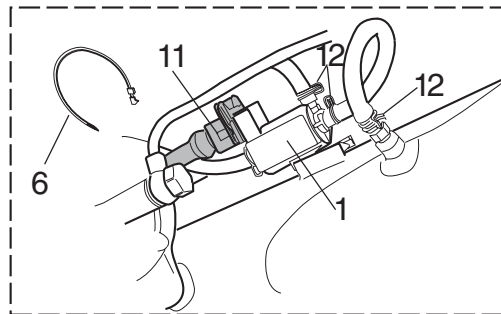
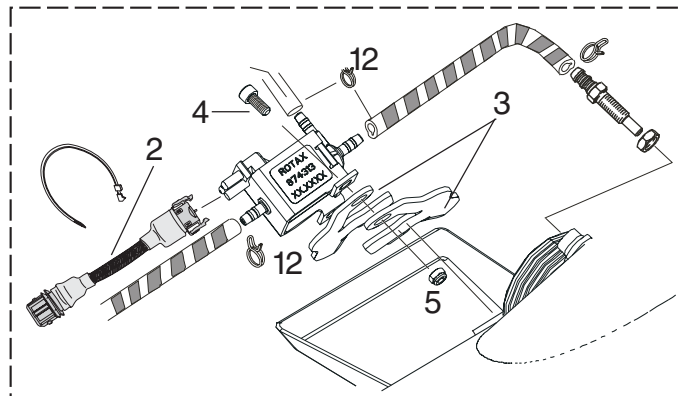


Fig. 76-50



d04355

BRP-Rotax

Maintenance Manual

Variant 2 for airbox part no. 867753

(attachment of the 3-way solenoid valve on the engine suspension frame)

parts requirement:

Fig No.	New part no.	Qty/ engine	Description	Old part no.	Application
-	881040*	1	retrofit kit	-	airbox
7	n.a**	1	bracket	-	3-way solenoid valve
8	241841	2	allen screw M5x12	-	bracket
9	927571	2	washer 5,3	-	bracket
10	842030	2	lock nut M5	-	bracket

* following parts of the retrofit kit are not necessary for Variant 2:
2x bracket (3), 2x allen screw M6x14 (4), 2x lock nut M6 (5)

** not yet available.

Disassembly and assembly - Variant 2

Remove connection wiring harness (11) of 3-way solenoid valve (1).

Cut off tie wraps (6).

Loosen 3x clamps (12) from 3-way solenoid valve and remove lines.

Loosen clamps (13) from engine suspension frame (14) and remove 3-way solenoid valve.

Connect adapter cable (2) to wiring harness.

Tighten the new 3-way solenoid valve with allen screw (8), washer (9) and lock nut (10) onto bracket (7). Tightening torque 8 Nm (70 in. lb).

Install 3-way solenoid valve with clamp (13) onto engine suspension frame.

■ **CAUTION:** Route all pressure connections such that there will be no sharp bends or chafing.

BRP-Rotax

Maintenance Manual

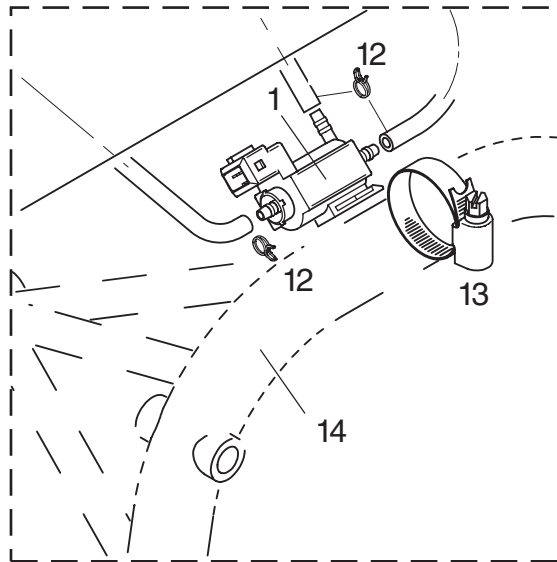
Fit the push lines onto the 3-way solenoid valve and secure with clamp (6).

Position push lines and adapter cable (2) and secure with clamps (6).

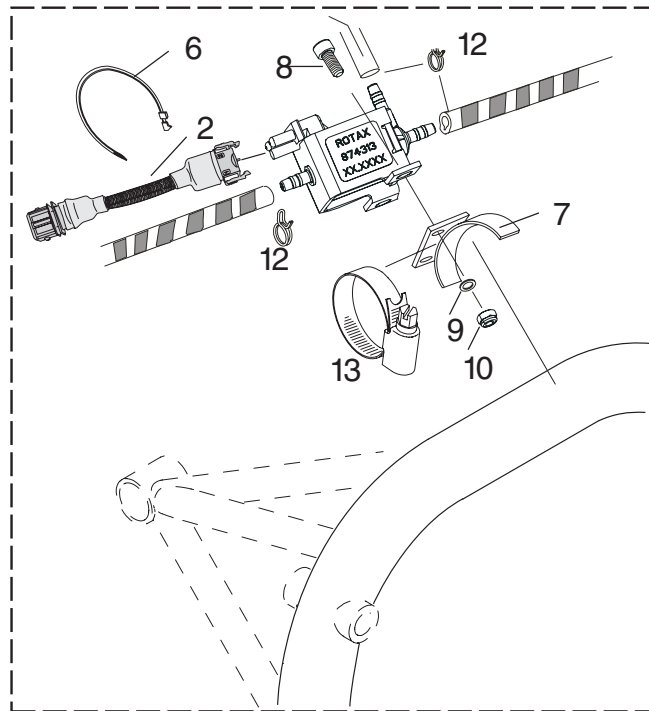
■ CAUTION: Always obey the additional instruction.

Variant 2

07231
Fig. 76-51



07232



d04355

BRP-Rotax

Maintenance Manual

■ **CAUTION:** In the event of physical damage, mechanical defects or readings outside tolerance, replace the part without delay.

- Inspection for physical damage
- check for pneumatic passage

Disconnect the pressure connection lines. See 73-00-00 sec. 2.7.

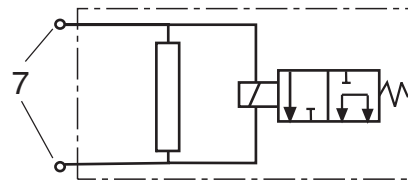
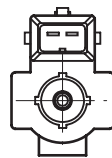
- check the mixture enrichment (dynamic)

To do so, fit a T-fitting into line between solenoid valve and float chamber to facilitate the measuring by pressure gauge of the pressure at airbox pressure exceeding 1250 hPa. The T-fitting may remain in place, but for standard operation it must be securely closed.

- Measure the resistance between the two terminals (2):
 - Disconnect plug connection with wiring harness but reestablish immediately after completion of check and verify tight fit and engagement of catch.
- resistance at 20 °C (68 °F): 28.3 to 31.1 Ω
(older model version)
- resistance at 20 °C (68 °F): 22 to 25 Ω
(newer model version)

Fig. 76-52

08489



BRP-Rotax
Maintenance Manual

3.2) Wiring diagrams

3.2.1 Engine external (on the 914 Series)

See Installation Manual for the respective engine type 914 Series, latest issue.

d04355

4) Form Sheets

06750

Fig. 76-53

Prüfprotokoll für Turboladerregler / Inspection protocol for turbocharger control unit			
Motor / Engine type:	TSN: _____		
Motor / Engine serial no.:	TSO: _____		
TCU Serien-Nr.	TSN: _____		
TCU serial no.	TSO: _____		
TCU Teile Nr.			
TCU part no.:			
TCU Programmversion	<input type="checkbox"/> TLR 4.3	<input type="checkbox"/> TLR 4.5	<input type="checkbox"/> TLR 4.6
TCU Program-Version:			
Sichtkontrolle:			
Visual check:			
Prüfdongle, Serien-Nr.:			
Check dongle, serial no.:			
Prüfung mit:	ROTAX Testkoffer	<input type="checkbox"/>	am Motor
Check with:	ROTAX testcase	<input type="checkbox"/>	on engine
Vergaser 2/4, Serien-Nr.:			
carburetor 2/4, serial no.:			
Lampenkontrolle / lamp control			
Lampen leuchten beim Einschalten:	<input type="checkbox"/> gelbe Lampe	<input type="checkbox"/> rote Lampe	
lamps flash during switch on:	<input type="checkbox"/> yellow lamp	<input type="checkbox"/> red lamp	
Anreicherungsventilkontrolle / solenoid control			
Solenoid schaltet bei :	<input type="checkbox"/> 1250 mbar (966 470)	<input type="checkbox"/> Airboxdruck	
solenoid operates at :	<input type="checkbox"/> 1260 mbar (966 473 / 966 741)	<input type="checkbox"/> Airbox pressure	
Bemerkungen / Remarks: _____			
<div style="display: flex; justify-content: space-between;"> Unterschrift Prüfer / Signature Tester: _____ Datum/Date: _____ </div>			

Over Boost-Kontrolle / over-boost-control	
rote Lampe leuchtet bei :	Airboxdruck >1550 mbar
red lamp flashes at :	O.K. <input type="checkbox"/> airbox pressure >1550mbar
Plausibilitäts-Kontrolle / plausibility-control (MONITOR-Oberfläche / MONITOR-menu)	
LOAD¹⁾ (idle):	0 ÷ 10 % (Sollwert/target value) _____ %
LOAD¹⁾ (full):	115 % (Sollwert/target value) _____ %
ambient pressure²⁾:	_____ mbar
airbox pressure²⁾:	_____ mbar
airbox temperature³⁾:	_____ °C
servoposition (idle)⁴⁾:	100 % ±3 (Sollwert/target value) _____ %
¹⁾ lineare Kennlinienverlauf / linear values of load ²⁾ +/- 10 mbar Difference between the two values (compare actual pressure of the day) ³⁾ die Temperatur sollte in etwa der Umgebungstemperatur entsprechen / temperature should be equal to ambient temperature ⁴⁾ Servoposition bei IDLE = 100% Servoposition = Waste-Gate geschlossen / Servoposition at IDLE = 100% servoposition = Waste-Gate closed	
Kalibrier-Kontrolle / calibration-control	
	<div style="display: flex; justify-content: space-between;"> 966 470 <input type="checkbox"/> 966 473 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 10 <input type="checkbox"/> 966 741 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 1003 <input type="checkbox"/> 900 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 60 <input type="checkbox"/> 60 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 710 <input type="checkbox"/> 710 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 12219 <input type="checkbox"/> 12219 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 250 <input type="checkbox"/> 250 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> 6720 <input type="checkbox"/> 6720 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between;"> -37 <input type="checkbox"/> -37 <input type="checkbox"/> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> (TLR 4.3) (TLR 4.5) </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> (TLR 4.6) </div>
CONTROL UNIT CALIBRATION: READ CALIBRATION TRANSMIT CALIBRATION	

d04355

BRP-Rotax
Maintenance Manual

NOTES

d04355

SECTION 78

EXHAUST SYSTEM AND TURBOCHARGER

1) Table of contents

SECTION 78

EXHAUST SYSTEM AND TURBOCHARGER

1) Table of contents	78-00-00 / 1
2.) System description	78-00-00 / 3
2.1) Exhaust system (on the 912 Series)	78-00-00 / 3
2.2) Exhaust system (on the 914 Series)	78-00-00 / 3
2.3) Turbocharger (only on the 914 Series)	78-00-00 / 3
2.3.1) Exhaust turbocharger	78-00-00 / 3
2.4) Connections for instrumentation	78-00-00 / 5
2.4.1) Exhaust gas temperature display (optional)	78-00-00 / 5
3) Maintenance	78-00-00 / 7
3.1) Disassembly of the complete exhaust system (on the 912 Series)	78-00-00 / 7
3.2) Disassembly of the complete exhaust system incl. turbocharger and engine suspension frame (on the 914 Series)	78-00-00 / 7
3.3) Inspection of the exhaust system and turbocharger components (only on the 914 Series)	78-00-00 / 11
3.3.1) Exhaust bend and exhaust manifold	78-00-00 / 11
3.3.2) Muffler:	78-00-00 / 11
3.3.3) Turbocharger	78-00-00 / 12
3.4) Assembly of the complete exhaust system (on the 912 Series) ...	78-00-00 / 16
3.5) Assembly of the complete exhaust system incl. turbocharger (on the 914 Series)	78-00-00 / 16
3.6) Bowden cable, rope sheave and spring for wastegate control (on the 914 Series)	78-00-00 / 20
3.6.1) Disassembly	78-00-00 / 20
3.6.2) Checking of the components	78-00-00 / 21
3.6.3) Assembly and adjustment	78-00-00 / 21
4) Wear limits	78-00-00 / 23

BRP-Rotax
Maintenance Manual

NOTES

BRP-Rotax

Maintenance Manual

3.3) Inspection of the exhaust system and turbocharger components (only on the 914 Series)

See Fig. 78-3

Visual inspection of all components.

- **CAUTION:** Because of the high thermal stress, inspect the complete exhaust system especially for crack formation.

3.3.1) Exhaust bend and exhaust manifold

Visual inspection of all components.

The wear on the walls of the slide fit on the exhaust bend must not exceed approx. 0.3 mm (0.01 in.). See Fig. 78-7

- **CAUTION:** On older engine versions, observe SB-914-017.

On newer versions, the EGT connections have been displaced so that the new drip trays can be assembled (screwed to the airbox).

- **CAUTION:** The flanges of the exhaust bends (3) must not touch the cylinder heads.

On engines of older design, it is not possible to replace individual parts. If it becomes necessary to replace one exhaust bend or exhaust manifold, all 4 exhaust bends including exhaust manifolds must be replaced. See SI-914-022, "Running modifications", latest issue.

3.3.2) Muffler:

- **CAUTION:** When inspecting the muffler, also observe SB-914-006, "Employment of a muffler of reduced noise emission", latest issue. SB-914-015, "Checking or replacement of the exhaust muffler of reduced noise emission", latest issue. SB-914-017, "Checking or replacement of exhaust bend", latest issue and SB-914-028, "Inspection of exhaust muffler", latest issue.

BRP-Rotax

Maintenance Manual

3.3.3 Turbocharger

See Fig. 78-4 up to Fig. 78-14

Visual inspection of the turbocharger.

- ◆ **NOTE:** The turbocharger is handled as a complete unit, i.e. no spare parts are available from BRP-Rotax. In the event of damage, the complete unit has to be replaced.

a) Check plan surface of the turbine opening

See Fig. 78-4

Use a straight edge to test for distortion. A distortion of max. 0.1 mm (0.004 inch) is allowed. If the max allowed distortion is exceeded then it is possible to rework the surface up to 0.5 mm (0.02 inch). The amount of the rework has to be recorded in the appendix.

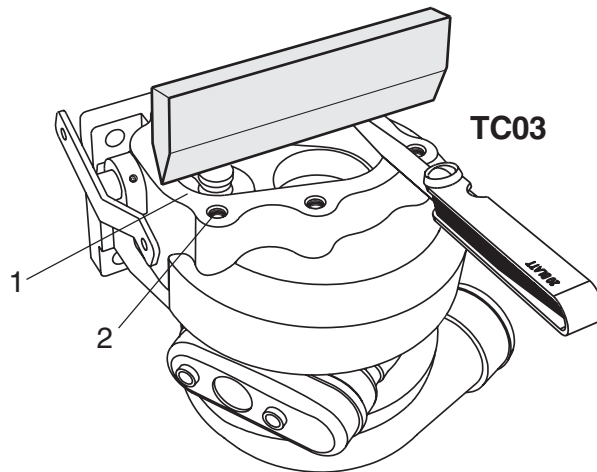


Fig. 78-4

08463

b) Check threaded hole for damage

See Fig. 78-4

- **CAUTION:** It is not allowed to repair any of the threads (2) inside of the turbine housing with thread inserts.

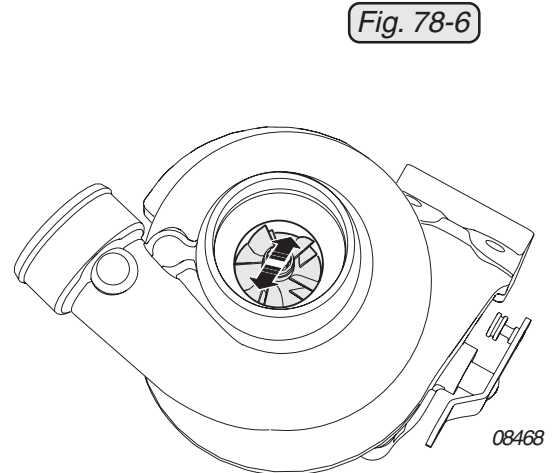
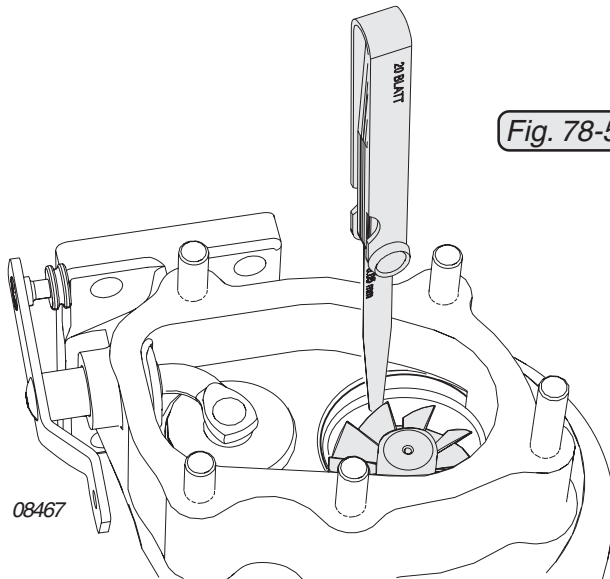
c) Check rotor turbine for clearance

See Fig. 78-5

Apply slightly a radial pressure onto the shaft to minimize the gap between the compressor casing and the compressor wheel. The gap must never be less than 0.1 mm (0.004 inch). Check the complete circumference of 360°.

d04356

BRP-Rotax
Maintenance Manual



|| **d) Check compressor wheel for clearance**

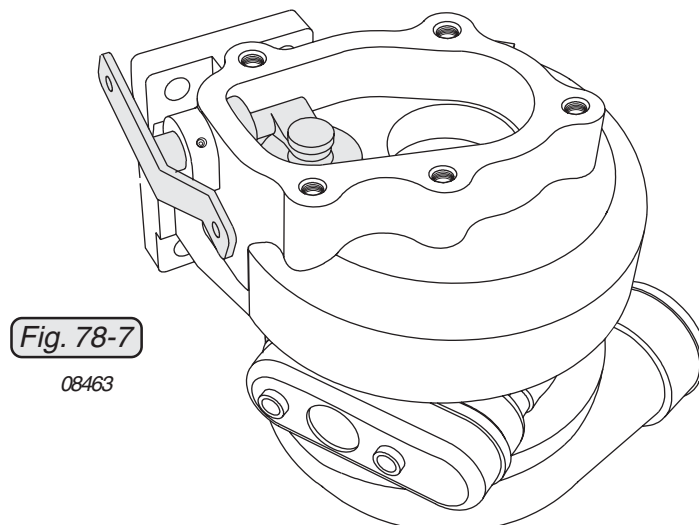
See Fig. 78-6

Apply slightly a radial pressure onto the shaft whereby it must not contact the compressor housing. Check the complete circumference of 360°.

|| **e) Check wastegate lever**

See Fig. 78-7

Check the wastegate lever for free movement. If it does not move freely, lubricate the axle of the wastegate with LOCTITE Anti-Seize 8151, ROTAX part no. 297434.



d04356

BRP-Rotax

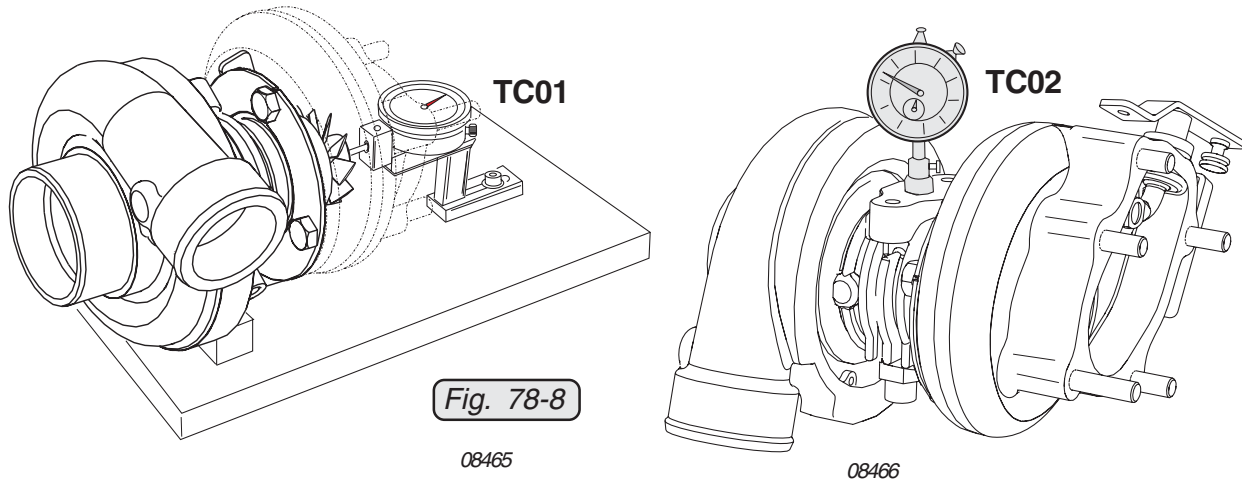
Maintenance Manual

- **CAUTION:** On older engine versions, also observe SB-914-005, “Introduction of a turbo charger with a modified wastegate“, latest issue.

e) Axial- and Radial- clearance charger shaft

See Fig. 78-8

Record the readings in the appendix.



f) Testing the impeller shaft

See Fig. 78-9

The bearings are tested by means of the pressure drop measuring method.

- **CAUTION:** For this test, compressed air at approx. 2 bar (29 p.s.i) and a testing device are needed.

Consisting of:

- 2 pressure gauges
- 1 orifice jet (inner diameter = 1 mm (.039 in.) / length = 3 mm (.12 in.)
- 1 connecting nipple M12x1.5
for the thread in the middle section of the turbocharger
- 1 cover plate for the oil outlet

n.B. connecting hoses

Procedure:

Screw in the connecting nipple and close the oil outlet with the cover plate.

Connect the pressure gauges together with the regulating valves.

d04356

BRP-Rotax

Maintenance Manual

Apply a constant pressure of 2 bar (29 p.s.i) to the connection cable. The pressure drop must not exceed 50%.
(From 2 bar (29 p.s.i) to max. 1 bar (14.5 p.s.i))

- ◆ **NOTE:** For optimum results, the position of the shaft should always be changed slightly during the check, i.e. the shaft should be moved backwards and forwards in axial and radial directions.

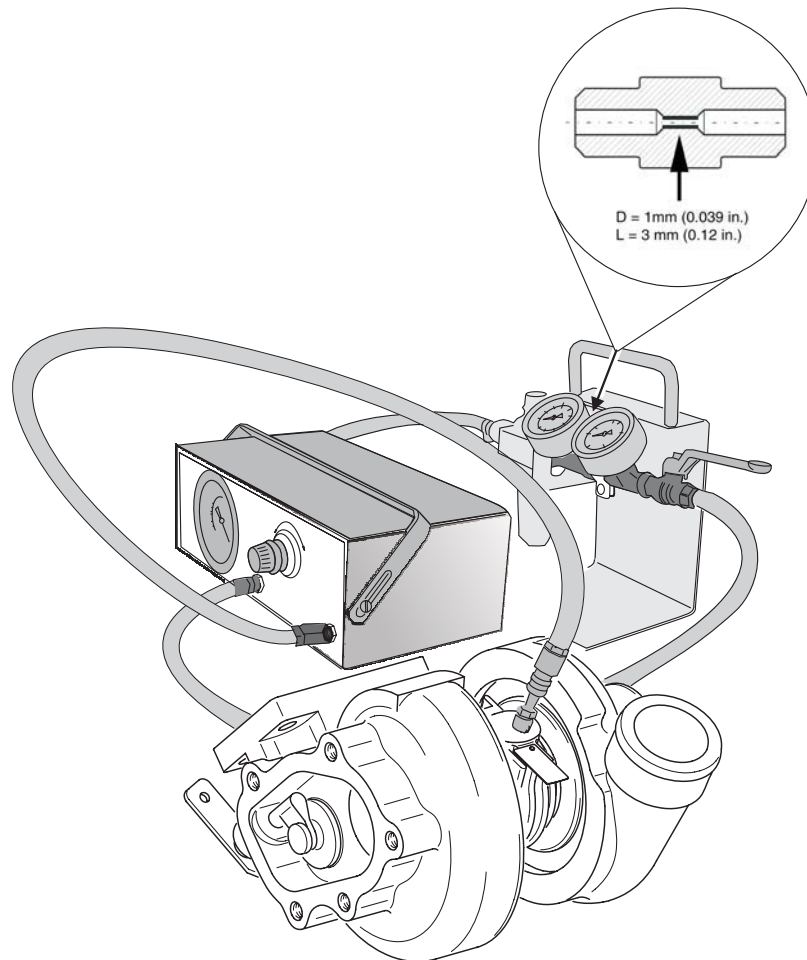
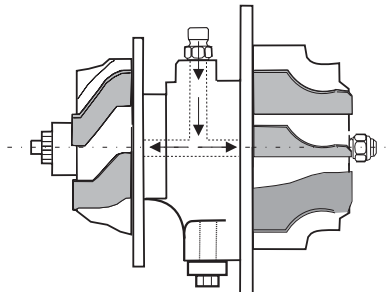


Fig. 78-9

08462



d04356

BRP-Rotax

Maintenance Manual

3.4) Assembly of the complete exhaust system (on the 912 Series)

- CAUTION: For assembly, observe the exhaust system and aircraft manufacturers' instructions.

3.5) Assembly of the complete exhaust system incl. turbocharger (on the 914 Series)

- || See Figs. 78-3, 78-10 and 78-11.

Turbocharger / turbocharger bracket / exhaust manifold

Release and remove the 3 upper hex. screws (20) M8x16 on the turbine housing, but only slacken the lower screw.

Place the turbocharger bracket (16) on the outer side of the retaining ring in position and loosely attach with the allen screws. Fit 4 studs (32) M8x19.5/13 with the longer threaded end (19.5 mm) (.76 in.) into turbine housing and tighten to 6 Nm (53 in.lb).

Screw stud (31) M8x30/13 into the top threaded bore (30) and tighten to 6 Nm (53 in.lb).

Attach muffler (12) with washers and M8 nuts (14) on turbine housing. Screw the support plate (15) onto the turbine housing with the washer and nut (14) M8. Attach turbocharger bracket (16) to the support plate with washer and hex. screw (13) M8x16 and tighten screw slightly.

Tighten muffler attachment nuts M8 to 25 Nm (18.5 ft.lb).

Fit the exhaust manifold (21) onto turbine housing using allen screws (22) M8x25 and tighten slightly with M8 nuts (23).

- CAUTION: The attachment screws for exhaust manifold and turbocharger bracket are not tightened until installation on the engine is complete to prevent locking up of stresses.

Installation of the check valve. See 79-00-00.

BRP-Rotax

Maintenance Manual

Engine suspension frame / exhaust system assembly / exhaust bends

Screw the engine suspension frame (1) to the engine housing with the lock washers and the allen screw M10x110 (3) and M10x35 (4). See Fig. 71-10 and 71-11 in 71-00-00.

Place distance sleeve (29) 10.5/17/15 into left arm of engine suspension frame and attach exhaust bracket on engine housing (7) with washer, lock washer and allen screw (27) M10x50.

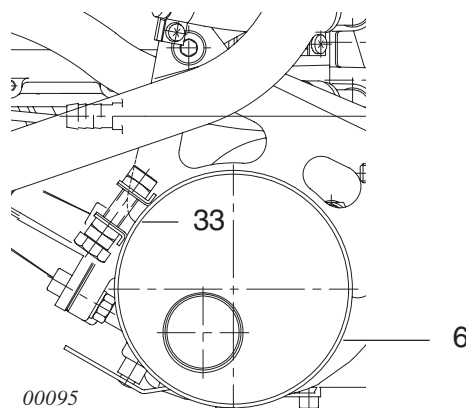
Re-establish attachment (28) exhaust bracket engine suspension frame (not supplied with engine). Tightening torque as specified by the fuselage manufacturer.

Place distance sleeve (10) 10.5/17/15 into right arm of engine suspension frame.

Screw turbocharger assembly to the holder (26) on the engine housing, complete with muffler and turbocharger bracket with washer, lock washer and allen screw (8) M10x50 and allen screw M8x50 (25). The muffler is attached to the exhaust bracket with the tension clamp (6) tightened to a torque of 15 Nm (133 in.lb).

■ **CAUTION:** Position tension clamp so that the tension free zone (33) comes to rest on the edge of the exhaust bracket. See Fig. 78-10.

Fig. 78-10



d04356

BRP-Rotax

Maintenance Manual

Re-establish attachment (9) turbocharger bracket engine suspension frame (not supplied with engine). Tightening torque as specified by the aircraft manufacturer.

Tightening torque of the M10 screws = 15 Nm (133 in.lb).

Reconnect the two oil lines for turbocharger on the oil pump.
See 79-00-00.

◆ **NOTE:** If the location of the oil line connection does not correspond with oil pump housing, correction can be achieved by slightly turning the turbocharger center section (34)

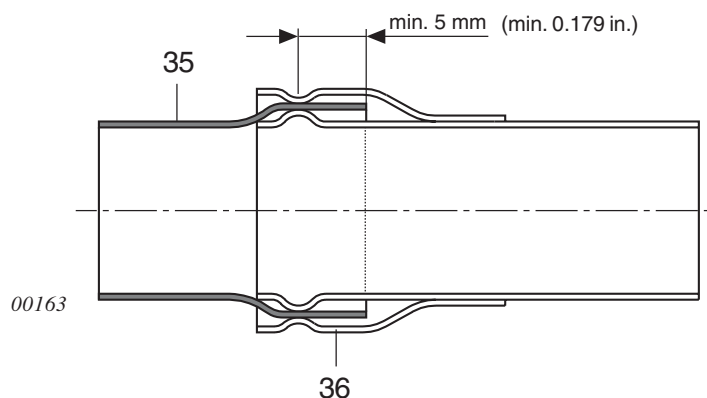
Fit the 4 exhaust bends (3).

◆ **NOTE:** To make assembly easier, LOCTITE Anti-Seize can be applied on the labyrinth end (36). See Fig. 78-11

The connecting ends (35) of the exhaust manifold must overlap the pleat of the labyrinth end by at least 5 mm (.197 in.) at each of the 4 exhaust bends. See Fig. 78-11

■ **CAUTION:** All 4 exhaust bends must be fitted free of stress and must not be damaged during installation.

Fig. 78-11



d04356

BRP-Rotax

Maintenance Manual

After completion of installation as described, all the screw connections on the turbocharger bracket, exhaust manifold, exhaust bends and the tension clamp must be tightened to the specified torques.

See Fig. 78-3

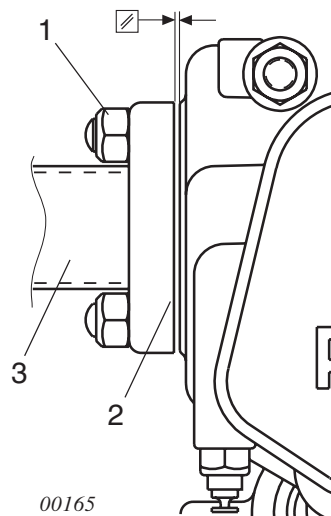
Tightening torque:

Allen screws	(8) M10x50	turbocharger bracket	15Nm/ 133 in.lb
Allen screws	(27) M10x50	exhaust bracket	15Nm/ 133 in.lb
hex. screw	(6) M10	tension clamp	20Nm/ 177 in.lb
hex. nuts	(1) M8	exhaust bend flange	12Nm/ 106 in.lb

When tightening the exhaust bend flanges, ensure equal distance between flange and cylinder head from top to bottom. The flanges (2) of the exhaust bends (3) must not touch the cylinder heads. See Fig. 78-12

- CAUTION: If the exhaust flange is deformed, it must be replaced.
After each disassembly, the lock nuts (1) must be replaced with new lock nuts M8.
- CAUTION: In the high temperature zone of the turbocharger and exhaust system, use exclusively high grade, stainless steel screws.

Fig. 78-12



BRP-Rotax
Maintenance Manual

3.6) Bowden cable, rope sheave and spring for wastegate control (on the 914 Series)

See Fig. 78-13

3.6.1) Disassembly

Remove tension spring (1) with a suitable tool and cut wire (2) of the Bowden cable.

Loosen set screw of nipple (3) and pull Bowden cable out of the cable retainer (4).

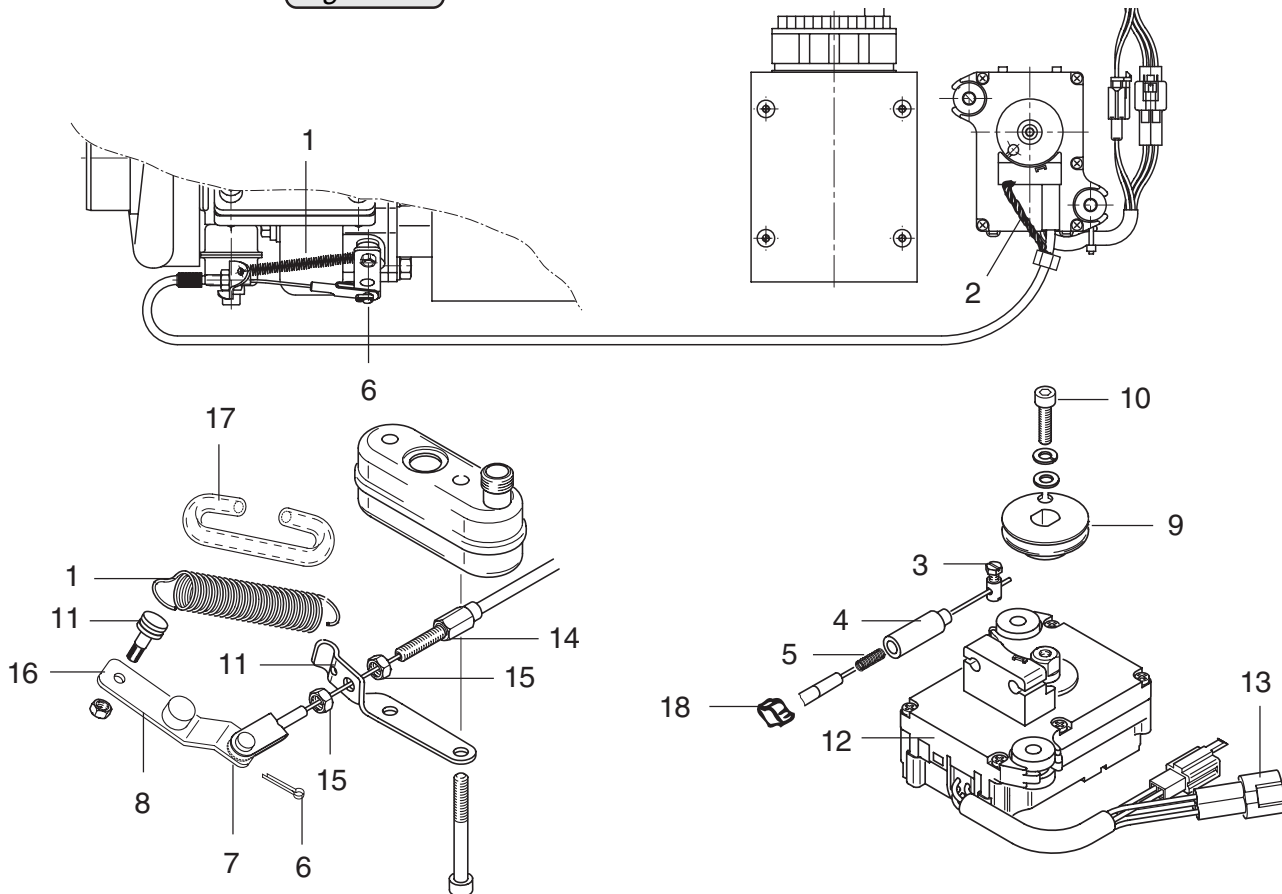
Do not lose the **pressure spring** (5) 5.5/1.2/16.9. Remove spring and store in a safe place.

Remove cotter pin (6) and pin (7) from wastegate lever (8).

Now the Bowden cable can be pulled out from the conduit.

If required, remove rope sheave (9) after removal of the allen screw (10) M5 x 20 along with lock washer and washer.

Fig. 78-13



02618

d04356

BRP-Rotax

Maintenance Manual

3.6.2) Checking of the components

Visual inspection of all components. Check bowden cable for free movement.

- CAUTION: Renew bowden cable if damaged. See the corresponding Maintenance Manual (Line Maintenance) for the respective engine type, 912 Series or 914 Series.

Check spring engagement holes (11) for wear.

- CAUTION: On older engine versions, observe SB-914-008.

3.6.3) Assembly and adjustment

Ascertaining the position of the servo motor:

See Figs. 78-13 and 78-14.

To ascertain the servo motor position, power-up the TCU.

- ◆ NOTE: After the automatic self test of the servo motor (12), put the throttle lever into idle position to make sure that the servo motor will remain always in position with wastegate „**closed**“. The servo motor is self locking.

Position finding is absolutely necessary for correct adjustment of the Bowden cable.

While assembling the rope sheave, **interrupt the voltage supply to the TCU** or unplug the 2-pin plug connection (13). **Risk of destroying** the servo motor if it is activated by the TCU during assembly.

Fit rope sheave as per detail **A**, Fig. 78-9 and secure with washer, lock washer and allen screw M5x20 (10). The rope sheave has to be fixed to prevent rotating of the output shaft when the rope sheave is tightened. Tightening torque to 6 Nm (53 in.lb).

BRP-Rotax

Maintenance Manual

If the cable retainer has been removed at disassembly, apply LOCTITE 648 on cable retainer (4) and press it into servo motor housing.

Fit Bowden cable to wastegate lever with pin (7) and cotter pin (6).

Feed Bowden cable through flexible conduit (and integrated adjusting screw) (14). Using a suitable tool, fit suitable clamp (e.g. crimp clamp (18)) for traction relief as shown in Fig. 78-13. Insert pressure spring (5) in cable retainer (4), thread Bowden cable through and around the rope sheave and fix with a screw nipple (3) with a tightening torque of 2.5 Nm (22.1 in.lb).

Adjust Bowden cable with M6 hex. nuts (15) so that no clearance is perceptible on wastegate lever.

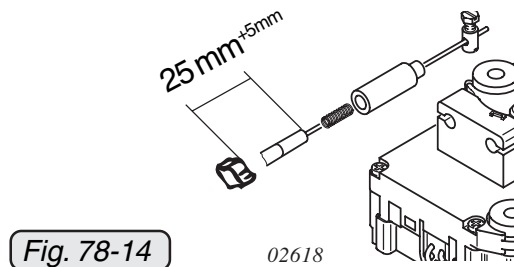
With this adjustment set, pre-tension the pressure spring by 1 to 2 mm (0.04 - 0.08 in.) at straightened cable with the adjustment screw at support.

Insert silicon hose 5x8 (17), length approx. 125 mm (4.92 in.), into the spring.

Engage return spring on support and spring pin (16).

■ **CAUTION:** To minimize wear on spring engagement holes, engage spring on spring pin, twist it by approx. one turn and engage other end of spring on support.

Secure safety wiring (2) between servo motor and traction relief so that the Bowden cable cannot escape from the cable retainer and consequently change the setting during operation.



d04356

BRP-Rotax
Maintenance Manual

4.) Wear limits

08473

Description	Code	Reading new		wear limit	wear limit	Readings
		min	max	100%	50%	
Turbocharger						
Radial clearance	TC01		0,056 0,0022	0,127 0,0050	0,092 0,0036	actual
						renewed
Axial clearance	TC02	0,05 0,0020		0,10 0,0039	0,075 0,0029	actual
						renewed
Rework turbine housing flange	TC03			0,5 0,0020		actual
						renewed

d04356

BRP-Rotax
Maintenance Manual

NOTES

BRP-Rotax

Maintenance Manual

Fig. 79-11

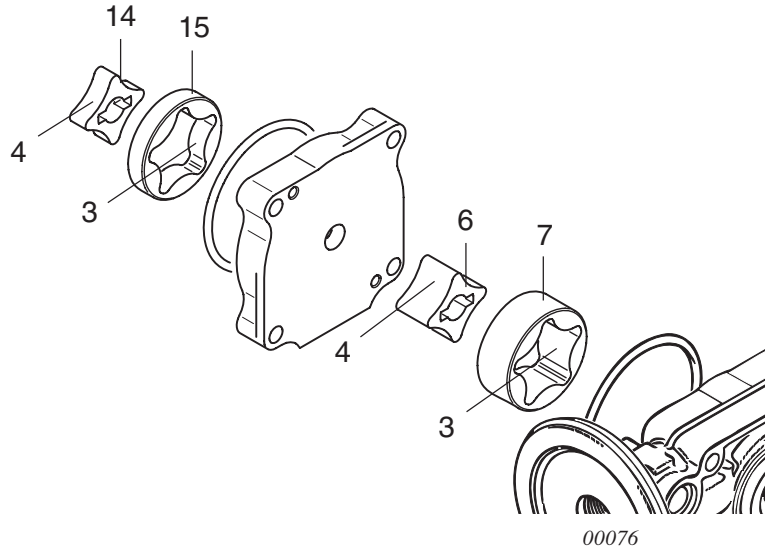


Fig. 79-12

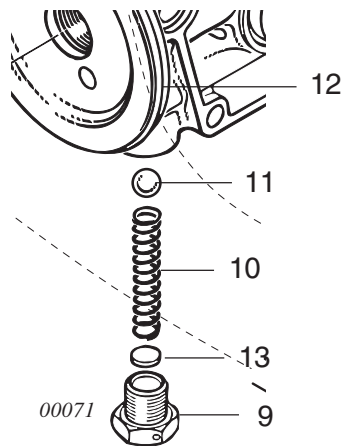
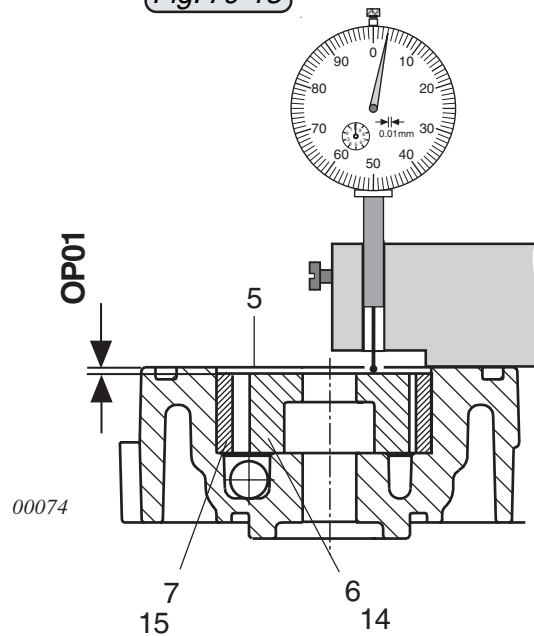


Fig. 79-13



d02628

BRP-Rotax

Maintenance Manual

3.1.4) Oil pump assembly (on 912 Series)

See Fig. 79-5

Lubricate bearing bore for pump shaft in oil pump housing with engine oil and install pump shaft (30). Push needle pin (26) 4x15.8 into the pump shaft (30), insert suction inner and outer rotor (24) and turn the pump shaft to check it. Fit the 2 outer O-rings (4) 11-2.7 and O-ring (5) 30-2.5 in the oil pump housing and fit it to the crankcase.

- ◆ NOTE: Turn oil pump shaft so that the drive pin (31) engages in the groove of the camshaft.
- ◆ NOTE: Models from the year 1995 onwards have a suction inner and outer rotor of height 16 mm (0.63 in.) instead of 13 mm (0.51 in.).
- ◆ NOTE: Apply LOCTITE 515 to the crankcase in the area of the crack between the two crankcase halves.

Push both needle pins (23) 4x15.8 into the pump housing, insert O-ring (25) 57-3 and tighten oil pump cover (22) crosswise by hand evenly with allen screws (12) M6x50 and lock washers. After this tighten allen screws (12) crosswise. Tightening torque 10 Nm (90 in.lb).

Fit ball 8.5 mm (0.33 in.) (21), pressure spring (20) 39.5 mm (1.55 in.) and screw plug (18) M12x1 and secure with wire. Tightening torque with oiled thread 15 Nm (133 in.lb).

- ◆ NOTE: The adjusting shim (19) is not supplied as standard equipment. It is only fitted if a test run reveals that the oil pressure is too low.

If the oil filter nipple (15) has been removed, retighten to 60 Nm (44.3 ft.lb). Slightly lubricate the rubber seal for oil filter (11) with engine oil. Screw oil filter on by hand until it touches the oil filter housing. Then tighten by an extra 3/4 turn.

- ◆ NOTE: Depending on the model, a hose nipple or a screw socket for either a metric connection or a UNF thread is installed.

Tighten the ring hose nipple with 15 Nm (133 in.lb). In the case of a model with a screw socket tighten with 25 Nm (18.5 ft.lb). Tighten oil temperature sensor (16) with LOCTITE 243 and a torque of 7 Nm (62 in.lb). Grease the thread of the banjo bolt (6) and tighten with 12 Nm (105 in.lb). Apply LOCTITE 243 on plug screw (32) and tighten with a torque of 10 Nm (90 in.lb).

d04357

BRP-Rotax

Maintenance Manual

3.1.5) Oil pump assembly (on 914 Series)

See Fig. 79-6

Lubricate bearing bore for pump shaft in oil pump housing with engine oil and install pump shaft (30).

Push needle pin (26) 4x15.8 into the pump shaft, insert oil pump piston with rotor (24) in main oil pump and turn pump shaft to check it.

Insert O-ring (25) 57-3 and push on oil pump housing (27), push second needle pin (26) 4x15.8 into the pump shaft, insert suction inner and outer rotor (28) of the suction pump. Rotate the pump shaft again to check it.

◆ **NOTE:** Apply LOCTITE 515 to the crankcase in the area of the crack between the two crankcase halves.

Push both needle pins (23) 4x29.8 through the two pump housings and insert O-ring (29) 46-3. Fit the 2 outer O-rings (13) 11-2.7 and O-ring (14) 30-2.5 in the oil pump housing and fit it to the crankcase.

◆ **NOTE:** Turn oil pump shaft until the drive pin (31) engages in the camshaft. Tighten oil pump cover (22) crosswise and by hand evenly with allen screws (12) M6x50 and lock washers. After this tighten allen screws (12) crosswise. Tightening torque with oiled thread 15 Nm (133 in.lb).

Fit ball 8.5 mm (0.33 in.) (21), pressure spring (20) 39.5 mm (1.55 in.) long and screw plug (18) M12x1. Tightening torque to 25 Nm (18.5 ft.lb).

■ **CAUTION:** The adjusting shim (19) is not supplied as standard equipment. It is only fitted if a test run reveals that the oil pressure is too low.

If the oil filter nipple (15) has been removed, retighten it to 60 Nm (44.3 ft.lb). Slightly lubricate the rubber seal for oil filter (11) with engine oil. Screw on oil filter by hand until it touches the oil filter housing. Then tighten oil filter by an extra 3/4 turn.

◆ **NOTE:** Depending on the model a hose nipple or a screw socket for either a metric connection or a UNF thread is installed.

Tighten the ring hose nipple with 15 Nm (133 in.lb). In the case of a model with a screw socket tighten with 25 Nm (18.5 ft.lb). Tighten oil temperature sensor (16) with LOCTITE 243 and a torque of 7 Nm (62 in.lb).

d04357

BRP-Rotax

Maintenance Manual

Also fit oil pressure sensor (17) secured with LOCTITE 243. Tightening torque 15 Nm (133 in.lb). Grease the threads of the banjo bolts (6) and (2) and tighten with 12 Nm (106 in.lb).

3.2) Pressure check valve (only on 914 Series)

See Fig. 79-14.

Remove banjo bolt (1) M8 with sealing rings (2) 8x13.

◆ **NOTE:** The valve housing (3) is only removed in the event of damage or for cleaning.

Remove ball (4) 5.5 and pressure spring (5), 22 mm long, from the valve housing.

◆ **NOTE:** The banjo bolt together with the ball and spring serve as a pressure check valve. For further information, see 79-00-00 sec. 2.3.

Clean all components and inspect them visually.

Also check thread and flange surface of turbocharger housing.

If there is leakage at the valve seat (6), it can be reworked with valve lapping paste or other suitable method. If necessary, replace banjo bolt.

Reassembly in reverse order.

Screw valve housing (3) with sealing ring (7) 12x18 into turbocharger housing and tighten to 25 Nm (18.5 ft.lb).

■ **CAUTION:** If the ball (4) installed under the pressure spring (5), the oil circuit is interrupted and the turbocharger will be destroyed.

Insert pressure spring (5) and ball (4).

The pressure oil line (8) is attached with the banjo bolt (1) and sealing rings (2) on both sides. Tightening torque 10 Nm (90 in.lb).

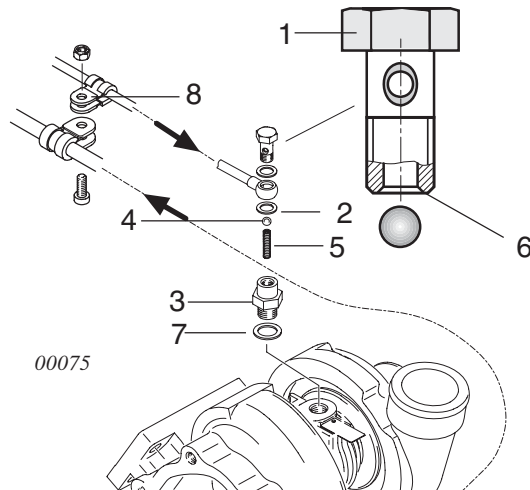


Fig. 79-14

d04357

BRP-Rotax

Maintenance Manual

3.9.2) Oil pressure sensor

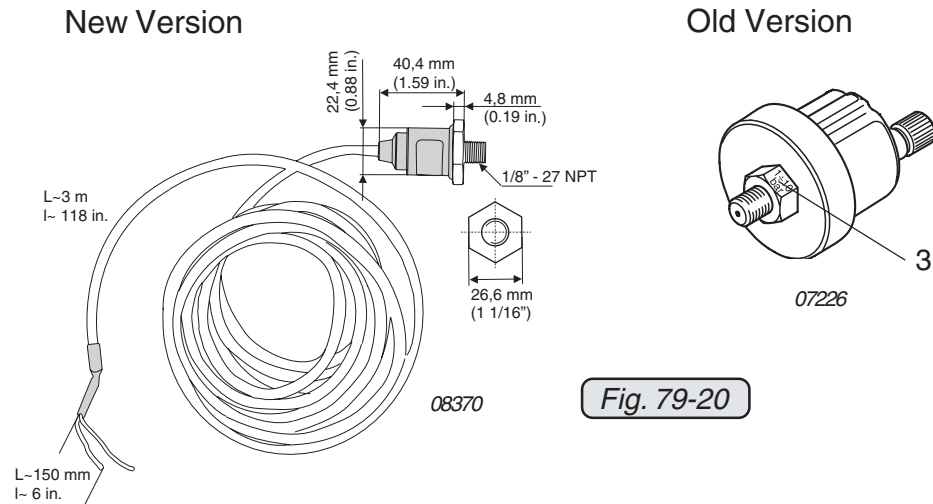
See Figs. 79-19, 79-20 and 79-21.

The sensor (2) for measurement of the oil pressure is screwed into the oil pump housing.

The range of the sensor is from 0 to 10 bar (0 to 145 p.s.i) This range (3) is indicated on the wrench flats of the sensor.

■ **CAUTION:** For this reason, the pressure range of the display instrument must be adjusted to the pressure range of the sensor. If this is not done, an incorrect oil pressure will be displayed.

Due to further development a new oil pressure sensor has been introduced. See therefore the latest issue of Service Instruction „Running Modifications“ SI-912-020 and SI-914-022 respectively.



Tightening torque: 15 Nm (133 in.lb) and LOCTITE 243

The operating pressure must remain within the specified limits. If this is not the case, check

- the lubrication system (see corresponding Maintenance Manual (Line Maintenance) for the respective engine type, 912 Series or 914 Series.)
- oil pressure sensor
- indicating instrument
- wiring connections
- sensor cable

◆ **NOTE:** Grounding connection of the sensor is direct via the oil pump housing.

d04357

BRP-Rotax

Maintenance Manual

For sensor resistance see following graph showing sensor resistance over pressure. Compare pressure gauge with a calibrated instrument.

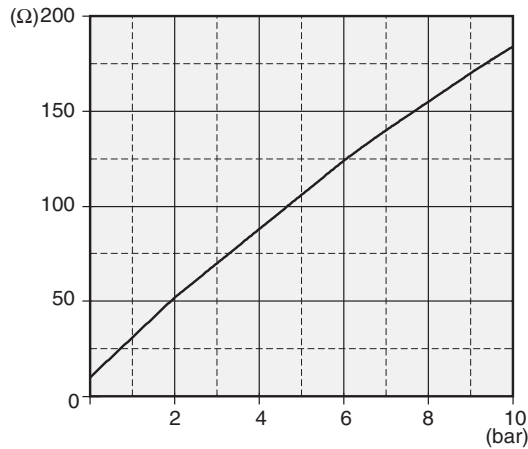
■ **CAUTION:** The graph resistance over pressure has been determined, and is effective at the following conditions only.

ambient temperature: 20 °C (68 °F)
voltage: 12 V
deviation: max ± 5%

After removal of oil pressure sensor, clean the thread. Apply LOCTITE 243 to thread of sensor and tighten to 15 Nm (133 in.lb).

Fit sensor. See 79-00-00 sec. 3.1.5..

Fig. 79-21



00229

d02628

SECTION 80
ELECTRIC STARTER

1) Table of contents

SECTION 80

ELECTRIC STARTER

1) Table of contents	80-00-00 / 1
2) Systems description	80-00-00 / 3
2.1) Electric starter	80-00-00 / 3
3) Maintenance	80-00-00 / 5
3.1) Electric starter dismantling	80-00-00 / 5
3.1.1) Standard starter	80-00-00 / 5
3.1.2) HD starter	80-00-00 / 6
3.2) Electric starter — disassembly	80-00-00 / 7
3.2.1) Standard starter	80-00-00 / 7
3.2.2) HD starter	80-00-00 / 8
3.3) Electric starter — inspection of individual parts	80-00-00 / 9
3.4) Electric starter — reassembly	80-00-00 / 11
3.5) Electric starter — installation	80-00-00 / 12
3.5.1) Standard starter	80-00-00 / 12
3.5.2) HD starter	80-00-00 / 12
4) Wear limits	80-00-00 / 13

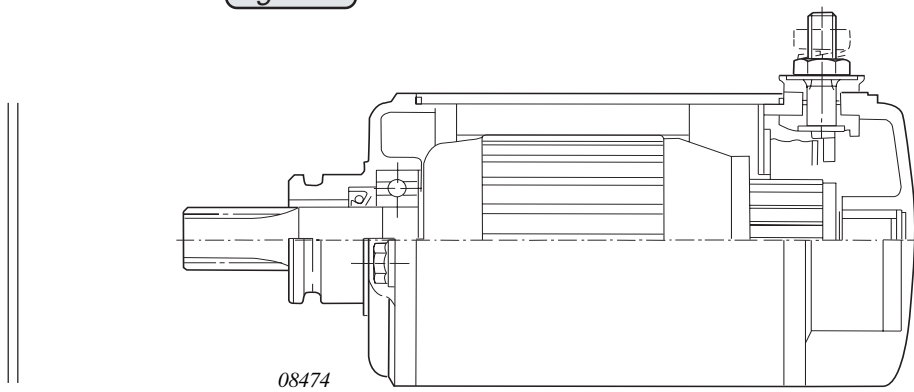
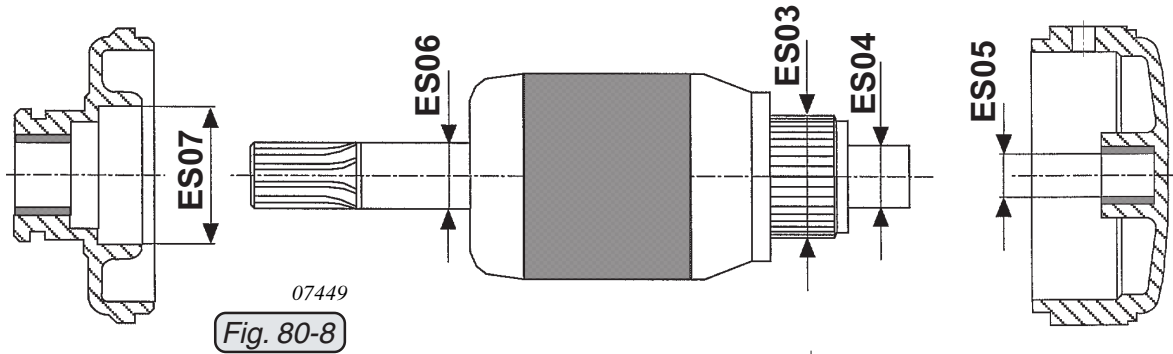
BRP-Rotax
Maintenance Manual

NOTES

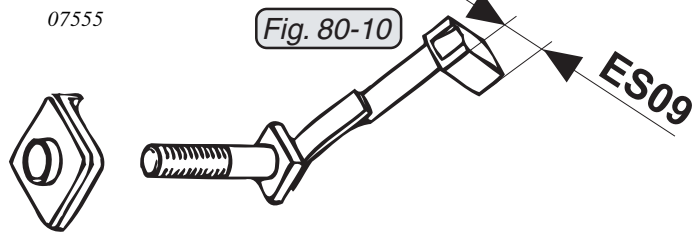
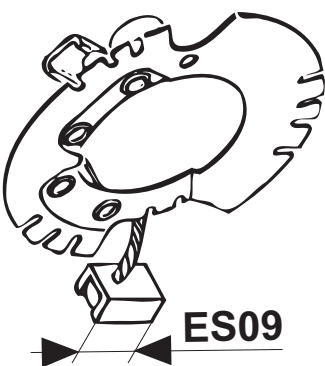
BRP-Rotax
Maintenance Manual

4) Wear limits

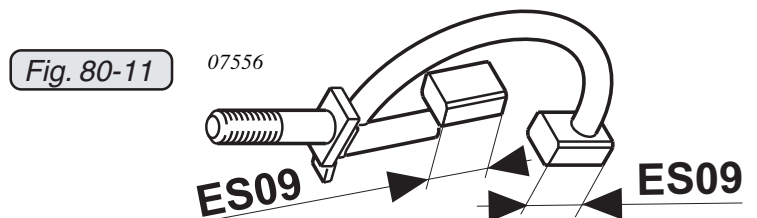
◆ **NOTE:** The wear limits apply to both configurations of the electric starter, standard and HD.



standard configuration



HD configuration



d04358

BRP-Rotax

Maintenance Manual

08475

Description	Code	Reading new		wear limit	wear limit	Readings
		min	max	100%	50%	
Electric starter						
Commutator	ES03	28,0 1,102		27,5 1,083		actual
						renewed
Armature shaft	ES04	9,79 0,3854		9,75 0,3838	9,77 0,3846	actual
						renewed
Armature bushing	ES05	9,82 0,3866		9,86 0,3882	9,84 0,3874	actual
						renewed
Bearing seat on shaft	ES06	15,020 0,5913		15,005 0,5908		actual
						renewed
Bearing seat on shield	ES07	32,000 1,2598		32,069 1,2626		actual
						renewed
Length of plus brush	ES09	12,0 0,472		8,5 3,347		actual
						renewed
Length of minus brush	ES09	12,0 0,472		8,5 3,347		actual
						renewed
Radial clearance armature shaft/ armature bushing	ES05/ ES04	0,0000 0,0000	0,03 0,012	0,11 0,0043	0,07 0,0028	actual
						renewed
Radial clearance bearing seat on shield/roller bearing outer diameter		0,00 0,0000		0,06 0,0024	0,03 0,0012	actual
						renewed
Press fit bearing seat on armature shaft/ roller bearing inner diameter		0,020 0,0008		0,000 0,0000	0,005 0,0002	actual
						renewed

d04358