

ST6 Low Profile -Servicing and Technical Information

Inline Sequential Transmission – 6 speed



Albins Performance Transmissions

5 Daveyduke Drive Mitchell Park, VIC, 3355, Australia +613 5335 8022

Document Number	F4599 Albins ST6 Low Profile Servicing ar	d Technical Inf	formation
Document Revision	2.0		
Build Maturity	Production		///

This printed document was current when printed on the 30/03/2020

Table of Contents

1 -	-	Technical Specifications4
	<u>a.</u>	Standard Attachments 4
	<u>b.</u>	Optional Attachments 4
	<u>C.</u>	Notes
2 ·	-	Overview6
3 ·	-	Gear Ratios7
	<u>a.</u>	Standard Gear Ratios
	<u>b.</u>	Standard Drop-Gear Ratios
	<u>C.</u>	Torque flow
	<u>d.</u>	Selector / Shift direction 8
	<u>e.</u>	Changing Drop Gears9
4	-	Servicing10
	<u>a.</u>	Service Intervals
	<u>b.</u>	Lubrication
5	-	Recommended Torque Settings13
	<u>a.</u>	Clearance Settings
6	-	Variations14

DNV.GL

Table of Figures

Table 1 – Standard Ratios	. 7
Table 2 - Standard Drop-Gear Ratios	. 7
Table 3 - ST6 Low Profile Servicing	10
C C C C C C C C C C C C C C C C C C C	

8
8
9
11
12
14
14
15
15

DNV.GL

This printed document was current when printed on the 30/03/2020 Filename: F4599 Albins ST6 Low Profile Servicing and Technical Information Revision 2.0

1 - Technical Specifications

CAUTION – ASSISTED LIFT ONLY

All ST6 variants weigh greater than 30,0 kg. Please observe safe-lift procedures.

- Mass (dry) 56,0 kg (Specification and option specific)
 - Gears 6 forward and 1 reverse. (Refer Section 3 – Gear Ratios).
- Lubrication

SAE 75W-140 Gear Oil, Synthetic

Input – 1000Nm

- Specification • Quantity Approximately 2,5 litres, excluding oil cooler and lines.
- 80 110°C¹ Operating Temp
- Torque Capacity²
 - Gear select travel 20,5° in either direction (41,0° total)
- Reverse lock out travel 3,5 mm to disengage
- Gear position travel 45° rotation between gears.

a. Standard Attachments

- Temperature sensor Albins Part P13097 - M12x1.5mm port.
 - Throw out bearing Push type, Hydraulic, specification specific
- Specification and Engine specific (see Section 6 Variants) Clutch/Input spline
- Mounting options 20x M8x1.25mm tapped holes (Refer to installation drawing)

b. Optional Attachments

- Sequential shifter Albins Part P14471
- Oil filter in line 173,0 µm element. Albins Part P16938.
- Albins Part P20850. Gear position sensor
- Paddle shift system Various options available - Engine Management System dependent.
- **Bell housing** Included on some variants - Refer Section 6 - Variants

¹ To maximise the life of the transmission, Albins recommend the oil is allowed to reach a minimum of 60°C before applying full load conditions.

 2 Torque ratings are provided as a recommendation only $\,$ - various factors impact the transmission durability including engine and shift-cut management strategy, vehicle use, environment, system temperature and traction.

DNVG

c. Notes

- Gear position wiring Refer to current revision DWG for P20850
- Shift linkage detail Rod end ART 4 E (or equivalent)
- Breather line 5/10

5/16'' push-on pneumatic line with 100 - 150mm of vertical run as close to the transmission as practical. Where a catch-can is fitted, it should be positioned higher than the breather outlet.

DNVG

It is recommended that the Albins sequential shifter mechanism is used as it has been specifically designed for use with the ST6.

Where the Albins shifter is not used, it is highly recommended that the shifter mechanism have adjustable travel stops at the gear lever. Although the ST6 transmission has internal travel limit stops, additional stops on the gear lever prevent overloading the connecting rod and associated system components.

The travel limits for both gear shifting and reverse lock-out must be observed to ensure reliable and consistent operation.

Due to the varying clutch / flywheel combinations available, the throw out bearing to clutch finger clearance should be checked. Confirm clearance with clutch manufacturer.

A pedal stop must be fitted to prevent the slave cylinder from over-travel.

2 - <u>Overview</u>

The ST6 Low Profile is intended for off-road/motorsport use.

The Low Profile transmission is a variant of our popular ST6-I inline configuration, but reconfigured to give far greater clearance in most transmission tunnels. While we designed the transmission to be as compact as possible while maintaining the durability and strength of the ST6 range, minor vehicle modifications may be required for some installations.

Refer to ST6 variant-specific installation drawings for dimensions of the transmission.

The ST6 uses a sequential shift pattern with 6 forward gears and 1 constant mesh reverse gear with a mechanical reverse lockout when using shift-lever actuation. When a paddle-shift system is used, the reverse lock-out can be deleted.

Due to the unique Albins selector barrel profile gear changes are very smooth during the shift, the common 'gritty' feel experienced when changing with conventional sequential transmissions is eliminated.

Gear engagement is achieved by a 6 dog design.

Refer to 'Albins Sequential Shift Strategy' document for shift cut recommendations.

The ST6 has been rated to an input torque of 1000Nm.

The ST6 is lubricated and cooled through the transmission oil which is circulated throughout the system via the internal oil pump.

The oil flows from the pump to the cooler and is then returned to the transmission through the distribution ports. The ports are situated over the length of the transmission.

Albins recommend that an oil filter is fitted on the oil pump suction line.

All bearings are roller or ball bearings for low friction and ease of service. A three bearing layout is incorporated into the design, a sandwich plate houses the centre bearings is located in the centre of the gearset to increase rigidity.

Inspection ports are positioned at key points throughout the transmission, allowing quick inspection of the gears and dog condition without the need to disassemble the transmission.

Refer to 'Albins Dog Wear Guide' document for more information on component inspection.

The gears and shafts of the ST6 are heat treated, gear-profile ground, shot peened and isotropically polished as standard allowing for tight tolerances to be maintained.



3 - <u>Gear Ratios</u>

All gears within the ST6 transmission are constant mesh. 1st through 6th are change gears, and the overall ratio can be tailored to specific circuits/requirements through changing the drop gear set.

Various drop gears are available.

The overall gear train ratio is calculated by multiplication of the selected gear ratio (example, 2^{nd}) by the drop gear ratio.

Example – 1.47 x 0.93 = 1.3671:1

While reverse gear is rated to over 200Nm (input), Albins recommends an engine management strategy with reduced engine output in reverse gear.

a. Standard Gear Ratios

	Ratio	Tooth Count
1 st	2.36	14:33
2 nd	1.82	17:31
3 rd	1.47	19:28
4 th	1.24	21:26
5 th	1.04	23:24
6 th	0.92	24:22
	Table 1 – St	andard Ratios

b. Standard Drop-Gear Ratios

Ratio	Tooth Count	Part #
0.93 / 1.07	(27:29)	24983
0.88 / 1.13	(23:26)	23959
1.00	23:23	23956
0.81 / 1.24	(21:26)	23955
0.66 / 1.53	(19:29)	28592
0.60 / 1.67	(21:35)	27889
0.72/1.38	(21:29)	32868
		a a

Table 2 - Standard Drop-Gear Ratios

More change gear and drop gear ratios are available. Refer see 'Albins ratio charts' document.



c. Torque flow

Torque is transmitted through the drop gear pair to the output as seen in Figure 1.



Figure 1 - Torque Flow - Inline ST6

d. Selector / Shift direction

Up-shifting and down-shifting the transmission through the gears is actuated by rotation of the shift lever located on the right-hand-side of the transmission as seen in Figure 2.

The shift mechanism is a low-maintenance ratchet-pawl system designed to give smooth actuation and positive feedback to the driver.

There is 20,5° of travel in each direction (41,0° total) to actuate a shift event. When using a 40,0 mm lever as seen in Figure 2, this equates to 15,0 mm in either direction (30,0 mm total).

Reversed shift lever rotation is available on request.

Please refer to 'Albins Sequential Shift Strategy' document for shift cut recommendations.



Figure 2 – ST6 Low Profile shift-ratchet direction



e. Changing Drop Gears

The drop gears provide a quick means for changing the overall ratio spread on the transmission from application-to-application.

To change the drop gear ratios, remove the front cover / bell housing from the transmission as seen in Figure 3.

Once the input shaft is removed, the drop gears can be easily removed and replaced with the desired ratio.

Replace the front cover / bell housing, re-instate any O-rings and seals. Check for correct seating and use appropriate lubrication. If any seals, O-rings or bearings appear damaged, replace them,

Note: Oil must be drained from the transmission prior to changing the drop gears.



4 - <u>Servicing</u>

The Albins ST6 is a low-maintenance unit designed to give reliable and trouble-free power transmission. Using the transmission in accordance with Albins recommendations will ensure a long and happy life of the product.

- Use only genuine Albins components.
- Albins use high-quality, fit-for-use components in the ST6 transmission assembly.
- Always use new oil seals, O-rings, compression springs and circlips when re-assembling.
- Thoroughly clean and inspect all parts before re-assembly, replace all worn / damaged components.
- Albins highly recommend that all gears and shafts are crack-tested during any rebuild or overhaul.

Major and Minor service kits are available. Please contact Albins for the latest revision service kits.

a. Service Intervals

The service schedule outlined in Table 3 is recommended to ensure a trouble-free transmission. The schedule is subject to specific customer application and environment.

A major overhaul is dependent on component wear and transmission use and varies from user to user – however a full inspection is highly recommended pre and post major/endurance events.

Component	Post-Event	1500km	5000km	Comments
Oil	R			
Oil Filter	I	R		
Dog rings	1	1	I.	
All bearings			I	Replace on major overhaul 🤇 💦
All O-Rings			1	Replace on removal.
All seals			I	Replace on removal.
Drop Gears		1		
Change Gears		I.		
Selector Forks			I	
Shift Barrel			I	
Oil pump gears			I	
I – Inspect				R – Replace

Table 3 - ST6 Low Profile Servicing

DNVG

b. Lubrication

CAUTION – HOT OIL

Please consider that the transmission oil may be very hot after the vehicle has been running.

The ST6 has been provisioned with -8AN fittings for fitment of external oil cooler and in-line filter. The oil pump is driven by the layshaft and is in operation whenever the engine is running. Albins recommends no less than a 170,0 μ m filter element and an inline thermostat.

Filling the Transmission Oil

- Switch off the vehicle engine.
- Disconnect the -8AN line fitting that connects the oil pump outlet on the transmission sandwich plate to oil cooler inlet. Refer Figure 4.
- Oil is to be filled/pumped through the oil-cooler inlet hose. This will fill the oil cooler prior to the transmission.
- Remove the oil level fitting from the side of the transmission and fill to the lower portion of this hole while the transmission/vehicle is level.
- This ensures the cooler and lines are filled and the system is bled.

Draining the Transmission Oil

Remove the drain plugs at the bottom of the transmission. Refer Figure 5.





Figure 5 - ST6 Low Profile Drain Plugs

DNV.GL

This printed document was current when printed on the 30/03/2020 Filename: F4599 Albins ST6 Low Profile Servicing and Technical Information Revision 2.0

5 - <u>Recommended Torque Settings</u>

Fastener		lb-ft		Nm		Compound
M8 nuts	-	18	-	24	-	Loctite 243
M10 nuts	-	40	-	54	-	Loctite 243
Cap screws M4	-	2	-	3	-	Loctite 243
Cap screws M5	-	4	-	5	-	Loctite 243
Cap screws M6	-	7	-	9	-	Loctite 243
Cap screws 1/4" UNF	-	8	-	11	-	Loctite 243
Cap screws M8	-	16	-	22	-	Loctite 243
Cap screws M10	-	40	-	54	-	Loctite 243
Drain Plug	-	40	-	54	-	Oil
Studs M8	-	Fit by	/ hand			Loctite 277
Studs M10	-	Fit by	/ hand			Loctite 277
Shuttle spring cap	-	50	-	68	-	n/a
Selector barrel nut	-	200	-	271	-	Loctite 277

Loctite 7649 primer is recommended for all fasteners that require Loctite.

a. Clearance Settings (At 20°C)

•	Main shaft gear stack end float.	-	0.05 - 0.15mm
•	Lay shaft gear stack end float .	-	0.05 - 0.40mm
•	Drop gear end float.	-	0.05 - 0.40mm

6 -Variations

The ST6 Low Profile is a modular design that can be tailored for specific vehicle use. While the current options cater to many popular applications, the front and rear interfaces can be interchanged between variants.

Please note that the following variants are current at the time of writing, and more may be available. Please contact Albins for more information. Reverse transmission shift lever options are available for all variants.



Figure 6 - F/R ST6 Low Profile



R32/R33 Nissan Skyline GT-R - P34115

Figure 7- Skyline GT-R ST6 Low Profile





Toyota A80 Supra V160/161 6 speed - P34120

Figure 8 - A80 Supra ST6 Low Profile



Tremec TR6060 / T56 6 speed - P34118

Figure 9 - TR6060 / T56 ST6 Low Profile

Additional Bellhousings, Drop Gear Covers and Output flanges:

DNV.GL

Bellhousings:

- Nissan VR38DETT^v
- Nissan SR20^{vi}
- Chevrolet LS^{vii} _

Drop Gear Covers:

- _ TKO600 (utilises all TKO600 bellhousing options)
- Albins AGB interface -

Rear Wheel Drive Output flanges:

- 108mm CV (930) -
- 1350 universal joint
- Toyota/Getrag V160/V161 style^{viii}

This printed document was current when printed on the 30/03/2020

- " Rear mount bolts to factory BNR32/33 crossmember
- ^{III} Accepts all bellhousing options designed for W5x Toyota 5-speed transmissions.
- ^wAccepts all bellhousing options designed for TR6060/T56 transmission
- ^v Input shaft to suit 26 tooth Chevrolet clutch spline
- ^{vi} Input shaft to suit 26 tooth Chevrolet clutch spline
- vii Bolts to AGB interface drop-gear cover viii As used in Toyota A80 Supra 6-speed

This printed document was current when printed on the 30/03/2020 Filename: F4599 Albins ST6 Low Profile Servicing and Technical Information Revision 2.0

DNV.GL

^{*i*} BNR34 Skyline GT-R option available