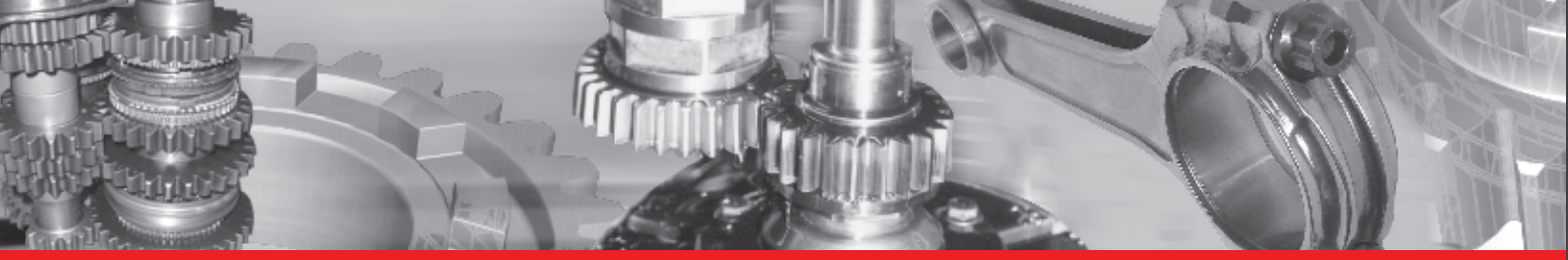


840
SERIES

RACING TRANMISSIONS

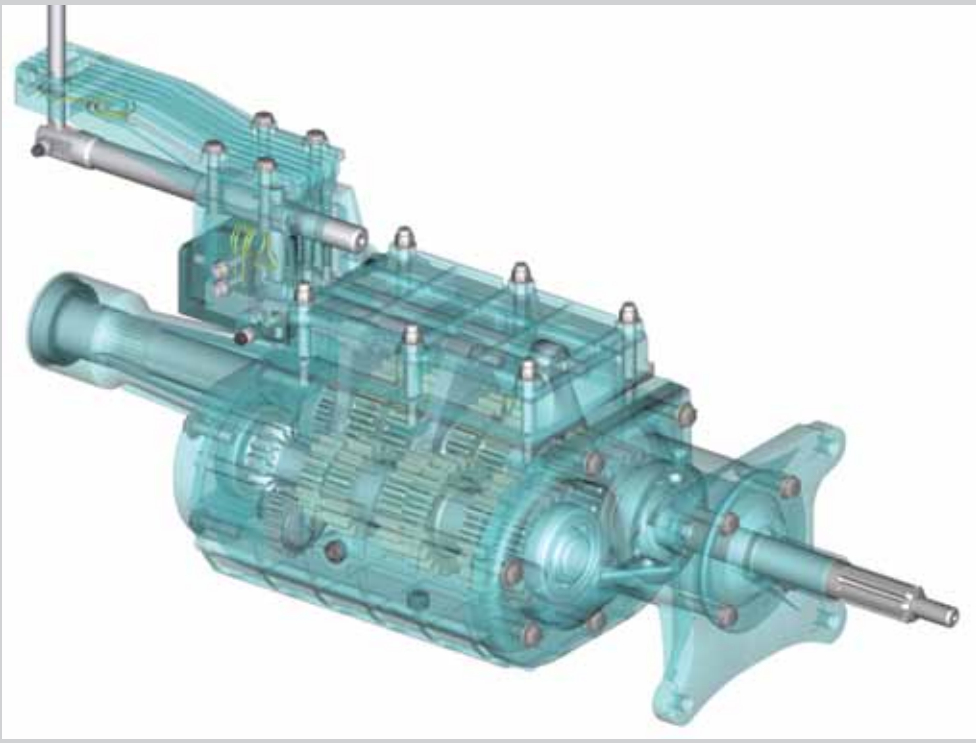
The 840 series has been one of the best options for front engine-rear wheel drive racing cars with4/6 cylinder engines since 1975. formerly with the TC models and actually with the GT.

It is the most affordable Saenz transmission in H pattern shifter version. A sequential shifter version is available, called S, although under special request.

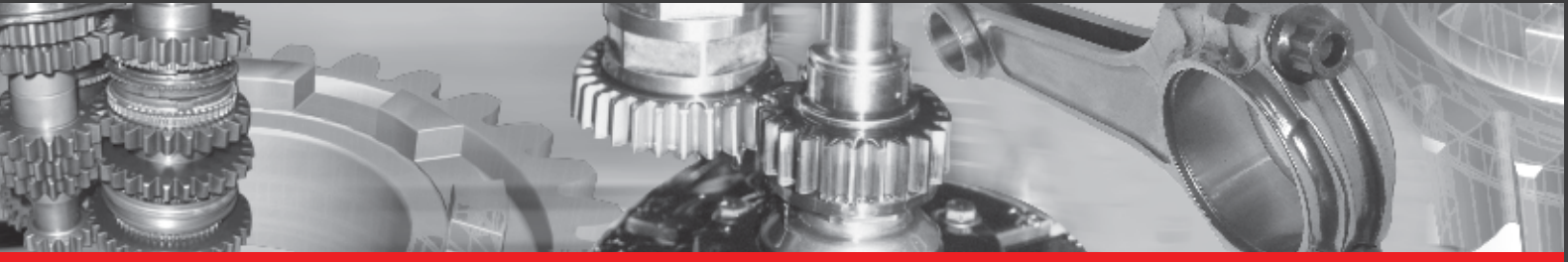
GTR series allows to used different 5th gear ratios and different input pairs give the chance to choose among more than 120 gear ratios.

Given that evolution is permanent in racing, your feedback is always crucial, so do not hesitate in contacting the Saenz Technical Department at:

gabriel@saenzgroup.net



SAENZ



840
SERIES

FEATURES

MAIN FEATURES:

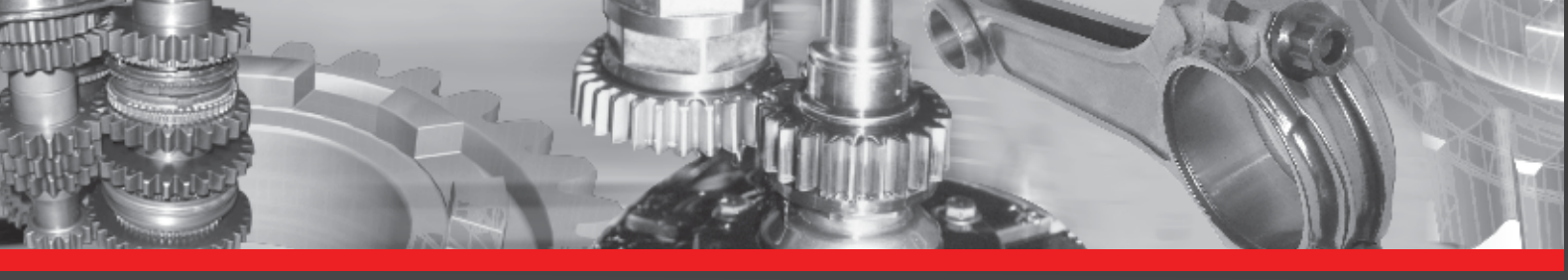
- TOTAL LENGTH: 25 inches / 635 mm
- MAXIMUM WIDTH: 10 inches / 254 mm
- WEIGHT: 88 lbs. / 40 kg. (without oil)
- Five (5) forward gears with reverse
- Aluminum and magnesium alloy main case
- Alloy steel gears and shafts with aerospace quality heat treatments
- Manufactured using strict quality control standards
- Proven in engines with up to 320 ft. lbs. torque
- Possible to individually change every gear ratio

REVERSE:

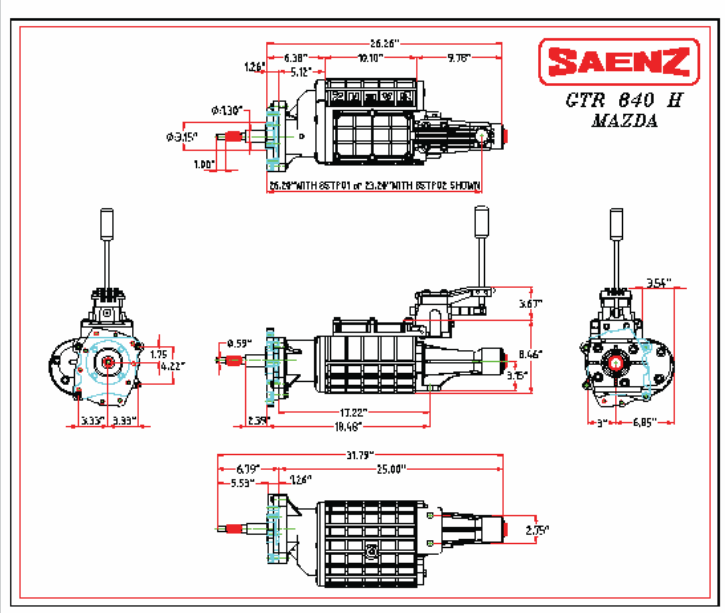
These gearboxes have been designed to include a reverse gear to comply with most series rules and to move the car using low speed only.

With the intent of minimizing weight, the reverse gear groupings were designed weaker than the forward ones. It is therefore highly recommended that full engine torque should never be applied to the reverse grouping. Damage will occur if this warning is not heeded.

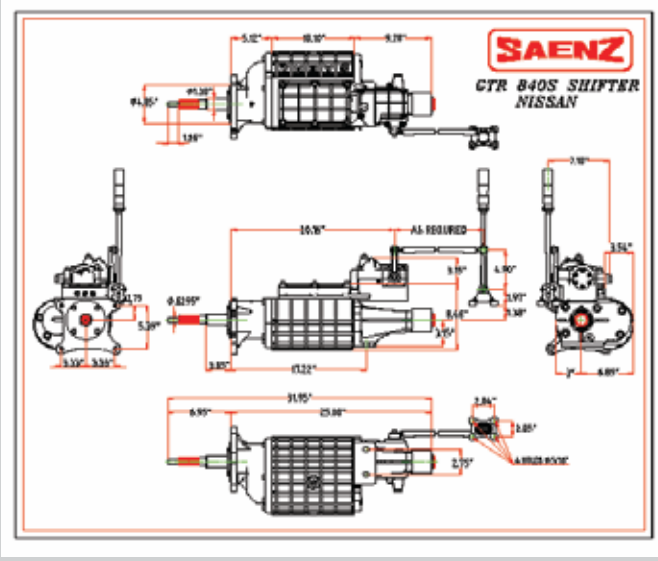
SAENZ



MAIN DIMENSIONS

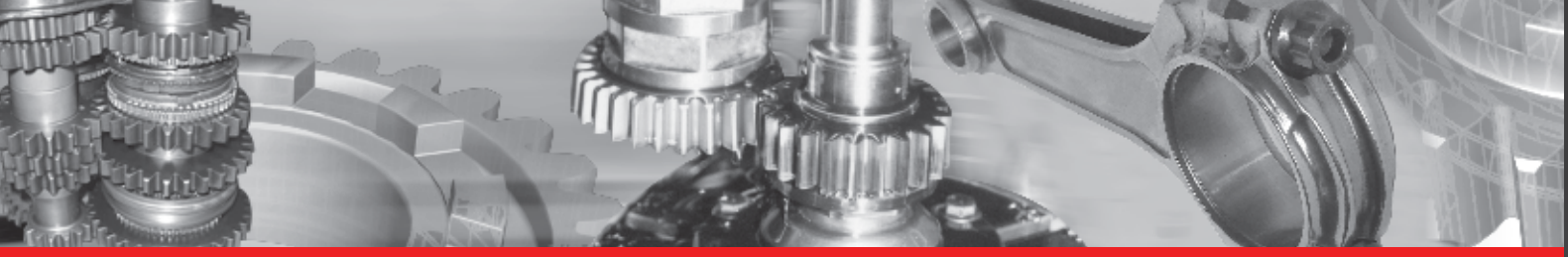


This drawing shows a GTR840 adapted for RX7 Mazda engine, any other adaptor, input shaft length could be made upon request.



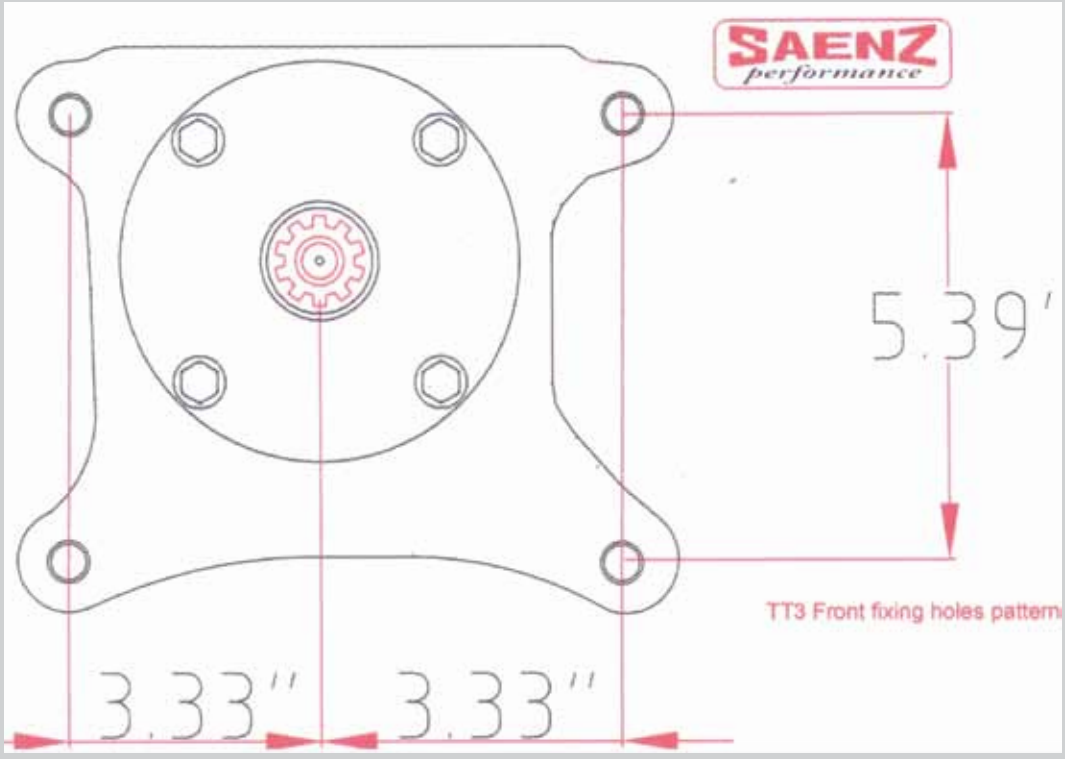
Input shaft and input seal case dimensions shown are as the ones for Nissan, they could be made as required.

SAENZ



SPLINES, YOKES AND ADAPTORS

840 SERIES



840 front bolt pattern is shown.

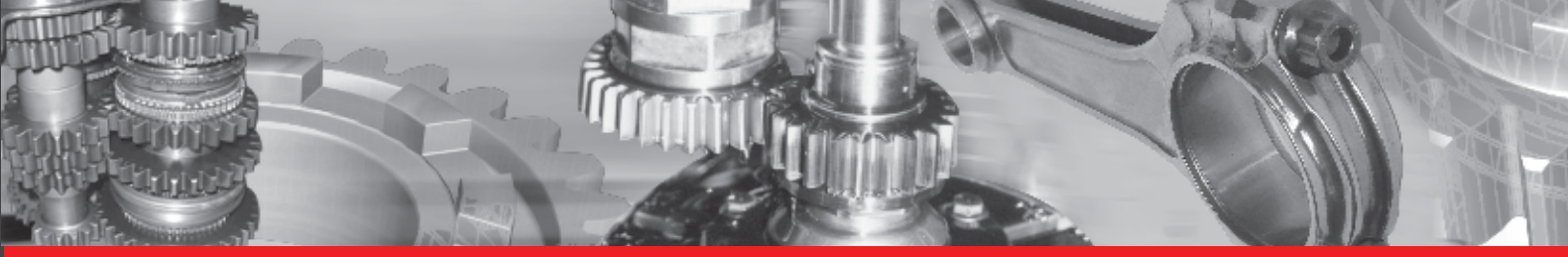
There is a wide variety of adaptors and it is possible to custom-make any adaptor to suit your specific application.

10 splines on 1.102" O.D. is standard input shaft, although any other could be supplied upon request.

Ford 28 splines is for the rear yoke.

A wide variety of adaptors is available, and any could be made upon request.

SAENZ



840 SERIES

GT & GTR SERIES AVAILABLE RATIOS

Both series receive power at the input shaft (8GE01 or 8RE01) through the clutch.

The input shaft makes input gear turn at same RPM as the engine.

The input gear makes the layshaft turn through the input crown.

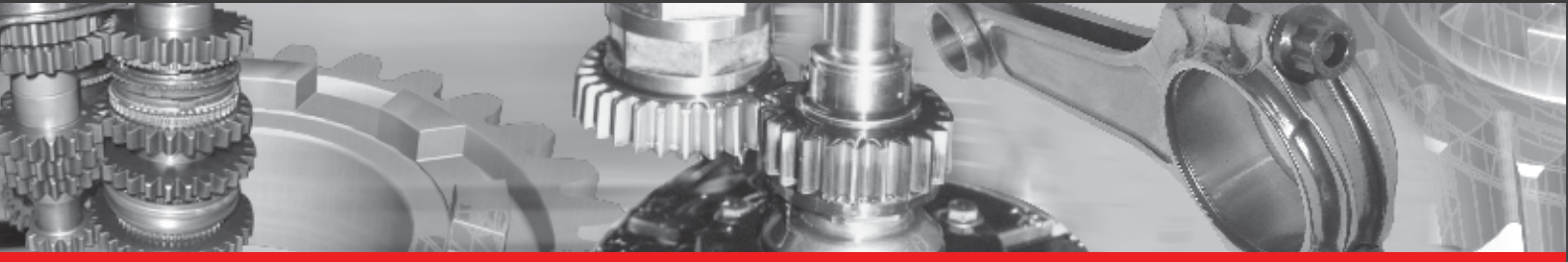
All the crown gears in the layshaft turns at its same angular speed The gear engaged to crowns turn at different speed depending on each ratio.

Once each gear is shifted, main shaft starts turning at its same gear speed.

The only difference between the GT and GTR series is that in the GT series, when 5th gear is shifted input shaft engages main shaft and there is no gear working. So in a840 GT series, top gear is always in a 1 to 1 ratio.

The GTR series allow for a change in the 5th gear ratio and there are also different input pair ratios available for it.

SAENZ

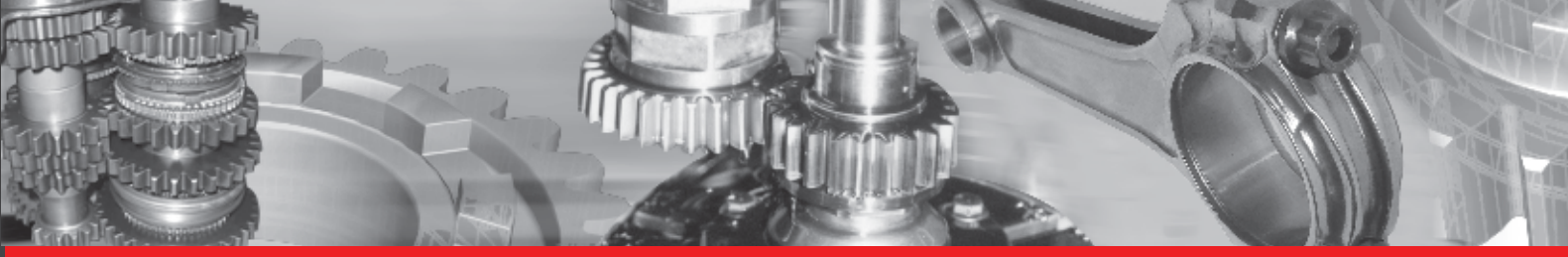


840 SERIES

GT 840 standard ratio chart

	Gear	Crown	
Nº	**driven**	**driver**	**driver22- driven 24**
1	36	16	2.455
2	30	14	2.338
3	32	15	2.327
4	31	15	2.255
5	32	16	2.182
6	31	16	2.114
7	27	14	2.104
8	30	16	2.045
9	26	14	2.026
10	29	16	1.977
11	27	15	1.964
12	30	17	1.925
13	28	16	1.909
14	26	15	1.891
15	29	17	1.861
16	25	15	1.818
17	28	17	1.797
18	26	16	1.773
19	29	18	1.758
20	27	17	1.733
21	25	16	1.705
22	28	18	1.697
23	29	19	1.665
24	24	16	1.636
25	28	19	1.608
26	26	18	1.576
27	27	19	1.550
28	24	17	1.540
29	26	19	1.493
30	27	20	1.473
31	24	18	1.455
32	25	19	1.435
33	26	20	1.418
34	23	18	1.394
35	25	20	1.364
36	26	21	1.351
37	22	18	1.333
38	23	19	1.321
39	24	20	1.309
40	25	21	1.299
41	22	19	1.263
42	24	21	1.247
43	21	19	1.206
44	22	20	1.200
45	24	22	1.190
46	21	20	1.145
47	23	22	1.140
48	21	21	1.091
49	20	21	1.039

All these gears are changeable, fixed 1st gears could be made upon request



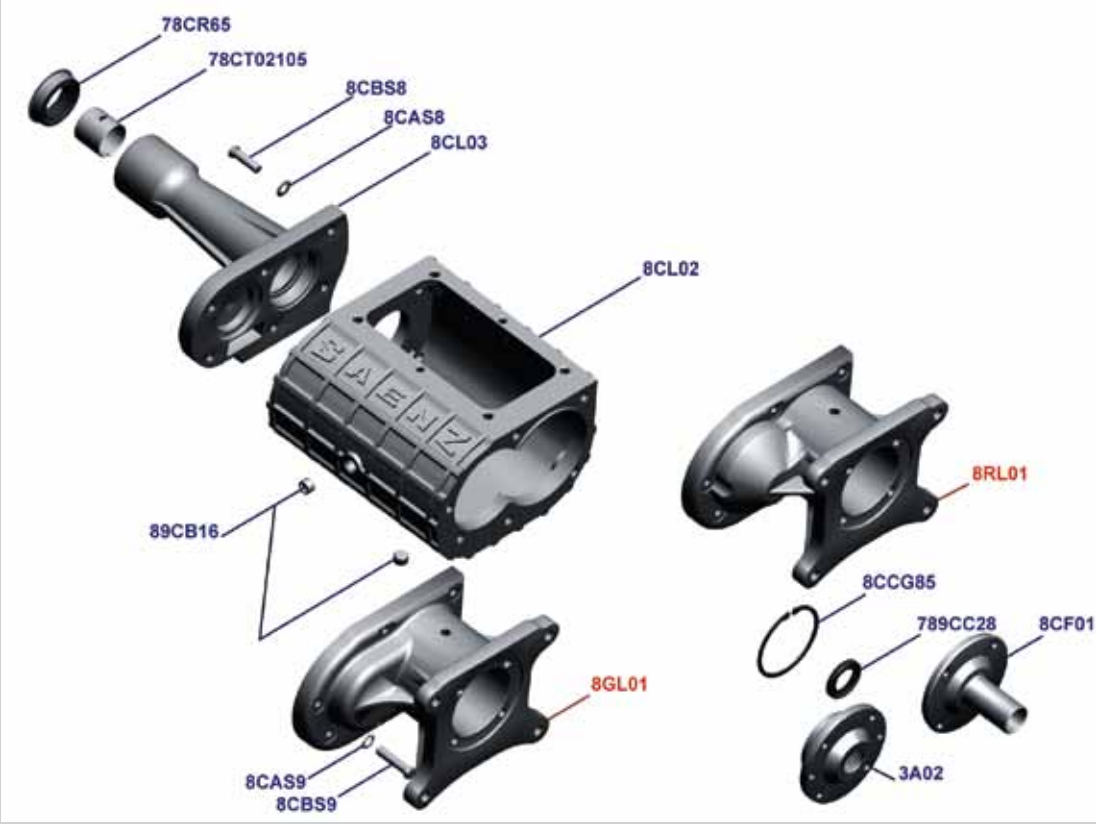
840 SERIES

GTR 840 standard ratio chart

	Gear	Crown		Standard input pairs	
Nº	**driven**	**driver**	**driver22- driven 24**	**.1:1**	**driver 21- driven 19**
1	36	16	2.455	2.250	2.036
2	30	14	2.338	2.143	1.939
3	32	15	2.327	2.133	1.930
4	31	15	2.255	2.067	1.870
5	32	16	2.182	2.000	1.810
6	31	16	2.114	1.938	1.753
7	27	14	2.104	1.929	1.745
8	30	16	2.045	1.875	1.696
9	26	14	2.026	1.857	1.680
10	29	16	1.977	1.813	1.640
11	27	15	1.964	1.800	1.629
12	30	17	1.925	1.765	1.597
13	28	16	1.909	1.750	1.583
14	26	15	1.891	1.733	1.568
15	29	17	1.861	1.706	1.543
16	25	15	1.818	1.667	1.508
17	28	17	1.797	1.647	1.490
18	26	16	1.773	1.625	1.470
19	29	18	1.758	1.611	1.458
20	27	17	1.733	1.588	1.437
21	25	16	1.705	1.563	1.414
22	28	18	1.697	1.556	1.407
23	29	19	1.665	1.526	1.381
24	24	16	1.636	1.500	1.357
25	28	19	1.608	1.474	1.333
26	26	18	1.576	1.444	1.307
27	27	19	1.550	1.421	1.286
28	24	17	1.540	1.412	1.277
29	26	19	1.493	1.368	1.238
30	27	20	1.473	1.350	1.221
31	24	18	1.455	1.333	1.206
32	25	19	1.435	1.316	1.190
33	26	20	1.418	1.300	1.176
34	23	18	1.394	1.278	1.156
35	25	20	1.364	1.250	1.131
36	26	21	1.351	1.238	1.120
37	22	18	1.333	1.222	1.106
38	23	19	1.321	1.211	1.095
39	24	20	1.309	1.200	1.086
40	25	21	1.299	1.190	1.077
41	22	19	1.263	1.158	1.048
42	24	21	1.247	1.143	1.034
43	21	19	1.206	1.105	1.000
44	22	20	1.200	1.100	0.995
45	24	22	1.190	1.091	0.987
46	21	20	1.145	1.050	0.950
47	23	22	1.140	1.045	0.946
48	21	21	1.091	1.000	0.905
49	20	21	1.039	0.952	0.862

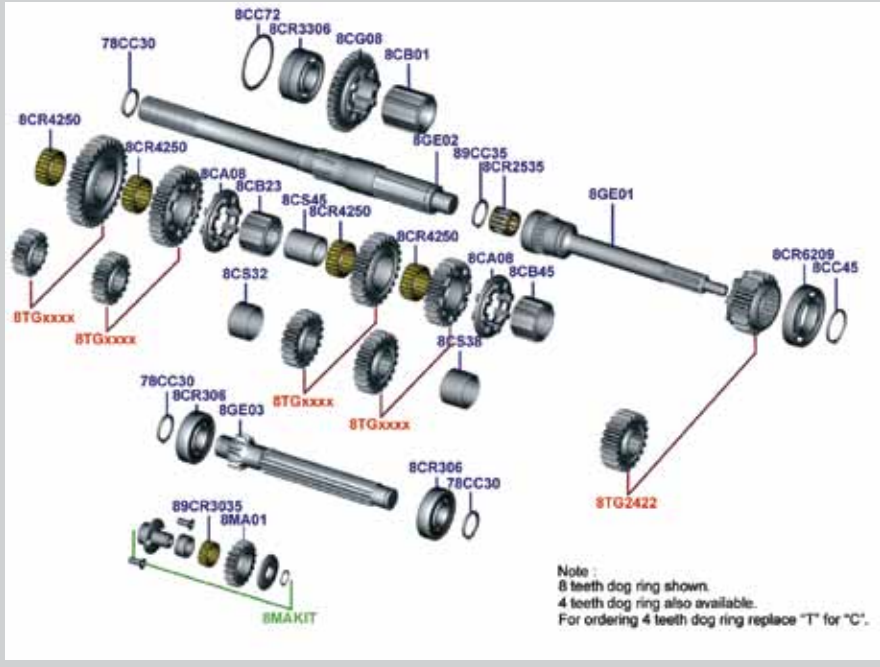
All these gears are changeable, fixed 1st gears, special input pairs could be made upon request

PARTS

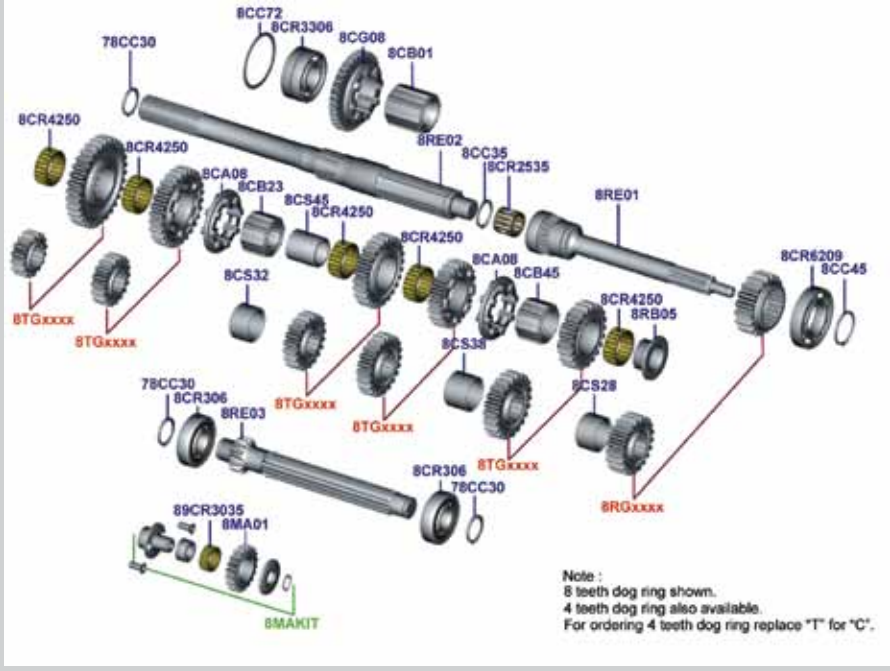


Only front case varies from GT to GTR, GTR is the one of the right.

INTERNAL PARTS GT SERIES

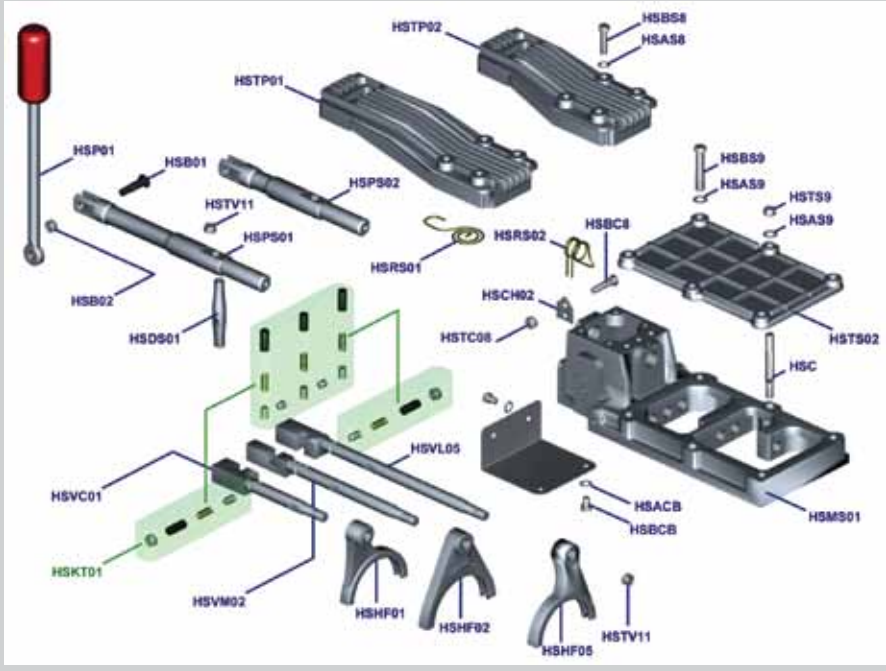


INTERNAL PARTS GTR SERIES

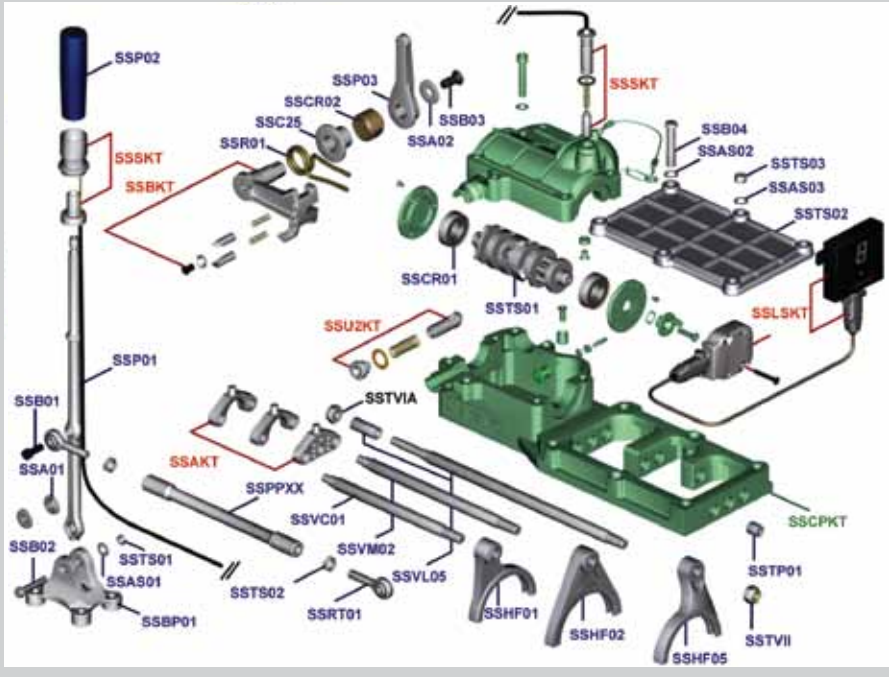


SAENZ

PARTS H SHIFTER



PARTS SEQUENTIAL SHIFTER



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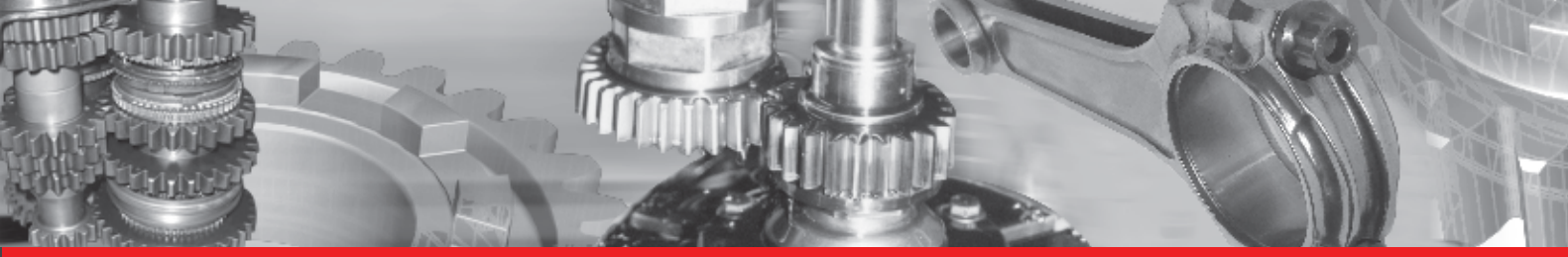


MOUNTING TIPS REMINDERS

- It is very important that the main shaft be aligned with crankshaft. Any misalignment would cause input shaft to bend each engine revolution. So exercise care about gearbox guidance in the bellhousing.

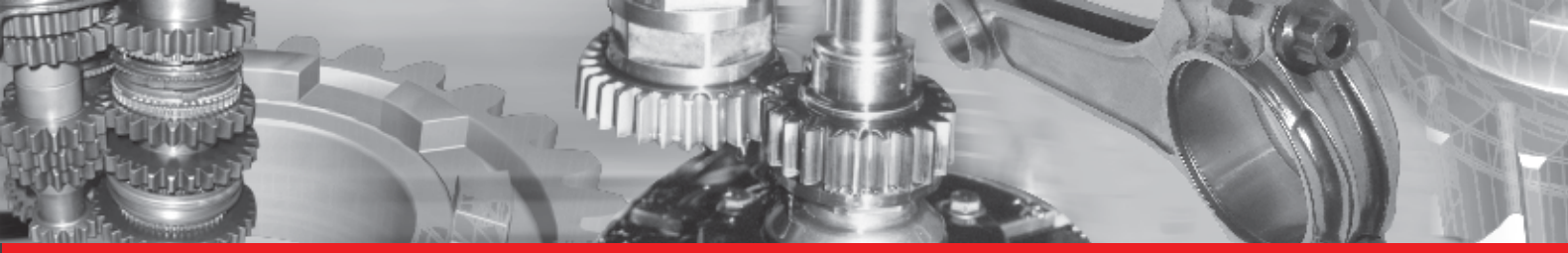
- Check input shaft length splines and guide before mounting.

- Gearbox has to meet freely the bellhousing.

- Tail bolts must easy enter once front bolts are installed.

- Check the rear yoke clearance taking care to avoid rear seal be damaged with suspension movement.

SAENZ



LUBRICATION

The use of a good quality SAE 80-90 viscosity weight oil is recommended. The crankcase capacity is 2.5 liters or 2.65 quarts, approximately. It should be filled to the bottom of the lateral plug.

Please remember the following:

- Use of lower viscosity oil than that recommended will reduce the life of the components of the gearbox.

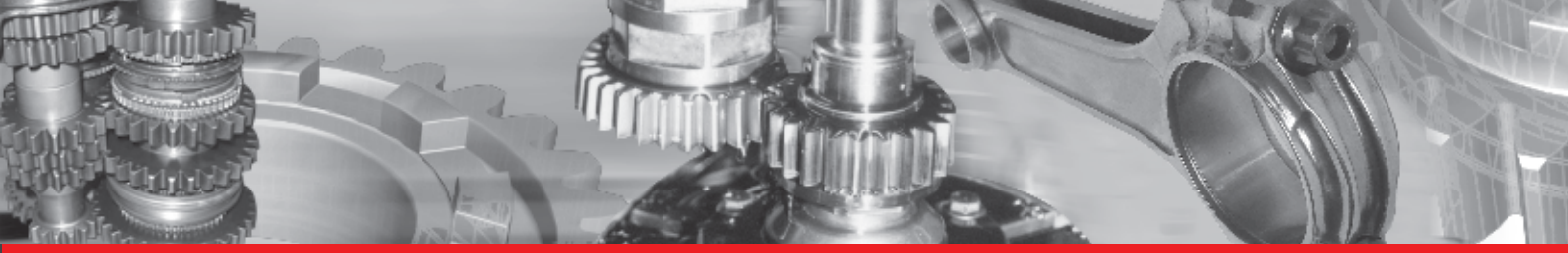
- If less oil than recommended is used, the operating temperature will rise causing breakdown of oil resulting in premature wear and failure of the gears.

- Too much oil will cause an increase of pressure and temperature in the gearbox with similar results.

- An oil cooling system that can maintain operating temperatures will prolong, not only oil life, but component life as well.

- Oil temperature should never exceed manufacturers recommended limits.

Saenz gearboxes have been designed to dissipate generated heat quickly provided they have adequate air circulation around them. For more powerful engines or longer endurance racing it is recommended that a forced oil circulation system be incorporated.



SEALS

Input shaft seal is 28mm X 47mm X 7mm (1.102" X 1.850" X .275")

Main shaft seal is 38.10mm X 60.37mm X 13.04/19.2 mm (1.5" X 2.376" X .513/.756")

Mazda main shaft seals uses 35mmx 50mm x 7mm.

CIRCLIPS

Splined shaft uses 35mm diameter X 2.5mm thick (1.378" X .098") in the front and 30mm diameter X 2.5mm thick (1.378" X .098") in the rear.

Input shaft uses 45mm diameter X 2 mm thick (1.771" X .079")

Drive shaft / splined shaft uses two 30mm diameter X 2.5mm thick (1.378" X .098").

Input shaft bearing uses 85 mm diameter X 2.5mm thick (3.346" X .098")

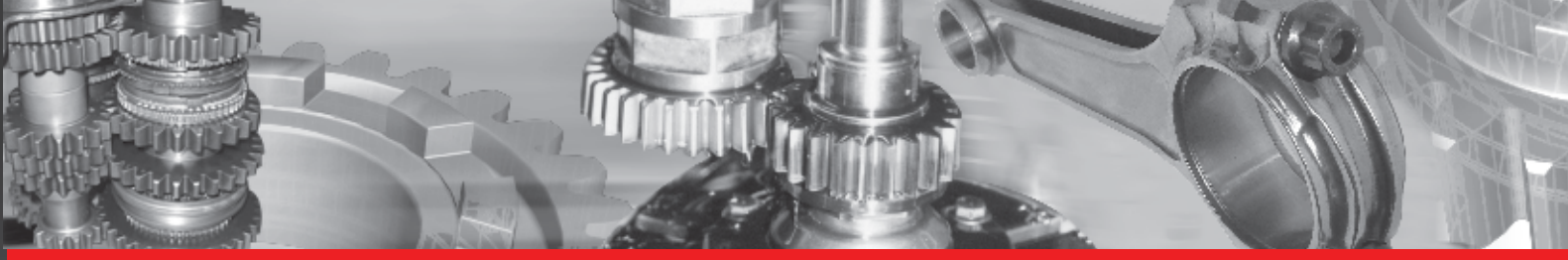
Mazda tail uses one 45mm x 1,75mm and one 50mm x 2mm.

Circlips can be purchased as a kit (8CCKIT1 or 8CCKIT2 or 8ccKITM for Mazda)

TAIL BUSHINGS

Clevite 02105 as standard.

For Mazda applications, two NK35mm X 45mm x 20mm are used.



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SERIES

BEARINGS

Drive shaft requires 2-NJ306 (8CR306)

Outer input shaft requires 1-6209 (8CR6209)

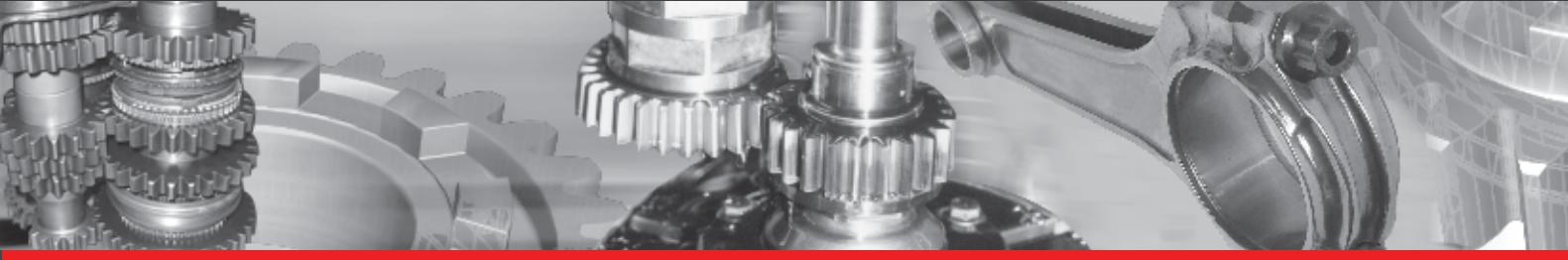
Splined shaft requires 1-3306 (may require special machining) (8CR3306)

Gears require 5-K 42mm X 50mm X 20mm (8CR4250)

Inner input shaft requires 1-K 25mm X 35mm X 30mm (8CR2535)

Reverse intermediate gear requires 1-K 30mm X 35mm X 13mm (89CR3035)

SAENZ



840 SERIES

SUGGESTED MAINTENANCE

The following is the recommended schedule of maintenance under normal use of the gearbox. As with all mechanical components these routines may be adjusted according to the use or abuse the gearbox may incur.

EACH RACE:

- Check oil level.
- Check backlash.
- Visually inspect the dog clutch rings for wear.
- Visually inspect the selectors for wear and feel for any excessive friction between mating parts.

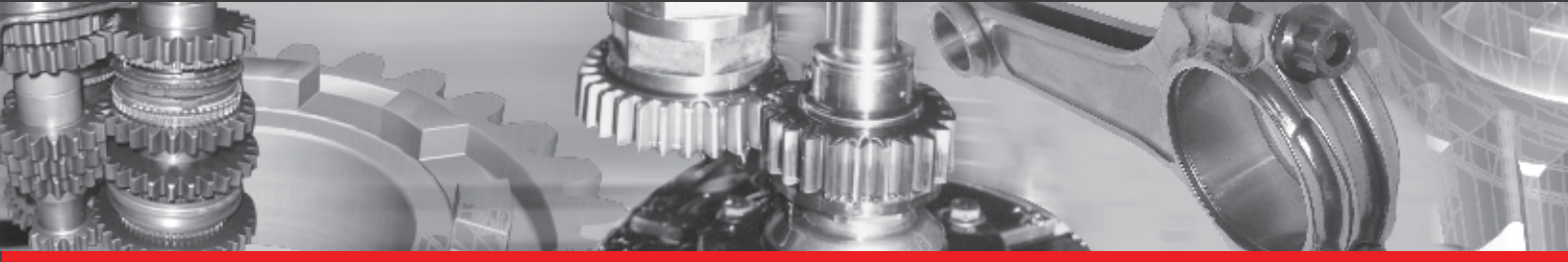
EVERY 1000 MILES:

- Magnaflux inspection of gears.
- Check bearings for wear.
- Check axial backlash of reverse gear (should be .010"-.030"max.).

EVERY 2000 MILES:

- Complete disassembly and visual inspection of all components.
- Adjust tail bushing to .015" backlash, maximum.
- Magnaflux inspection of gears and shafts and selector shafts.
- Runout inspection of shafts.
- Replace worn bearings as required.

SAENZ



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SERIES

H & S SHIFTERS

H SHIFTERS

Shifter lever is straight as standard, but could be custom made under request. Just fill distance from the front of the transmission to the lever position required. H shifter has a mechanical device that prevent 1st and reverse to be engaged by mistake.

SEQUENTIAL SHIFTERS:

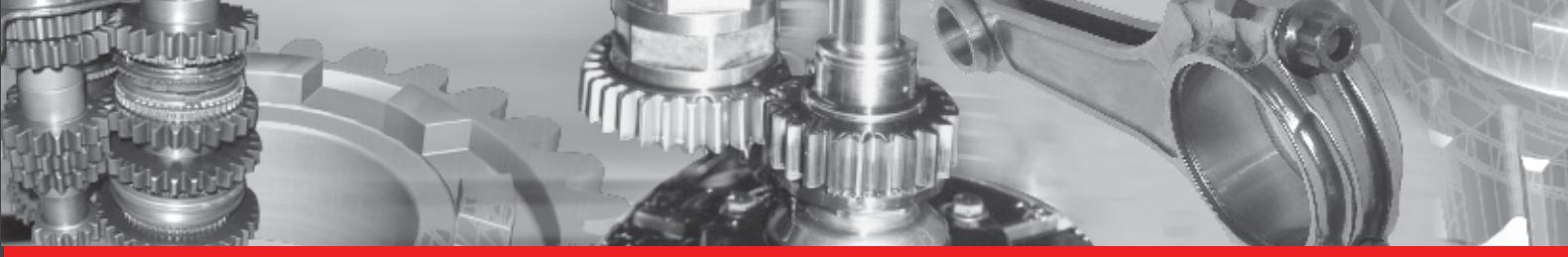
Lever position is decided by driver, just fill in the distance from transmission front (in order) form to receive shifter bar and cable with the proper length.

The Saenz 840S has a lockout that prevents accidentally shifting to neutral and reverse when downshifting.

Doing so is very simple. A simple trigger moves a locker at the end of a cable. This lockout does not allow the cylinder to turn to neutral.

Once trigger is lifted, the lockout retracts allowing the cylinder to pass to neutral. It is possible to go into reverse at this moment, just moving the lever forward. There is no need to use the trigger to shift into 1st .

SAENZ



TROUBLESHOOTING

NOISY GEARBOX:

As your new Saenz transmission uses spur gears to minimize power consumption by the gearbox, it is normally noisy. Any noticeable increase in this noise after some use can be an indicator of trouble.

If you should notice a "buzzing" during operation, be sure to check the bearings and circlips.
If a "knocking" is heard during use, stop as soon as possible and do a visual inspection of the gears.
If "knocking" is heard while in neutral but disappears when the clutch is depressed, remove the shifter assembly and check the gear axial backlash. A circlip could be out of seated position.
If the "knocking" disappears after a gear change, check shifter alignment. The selector shaft nuts could be loose, adjust and retighten as required.

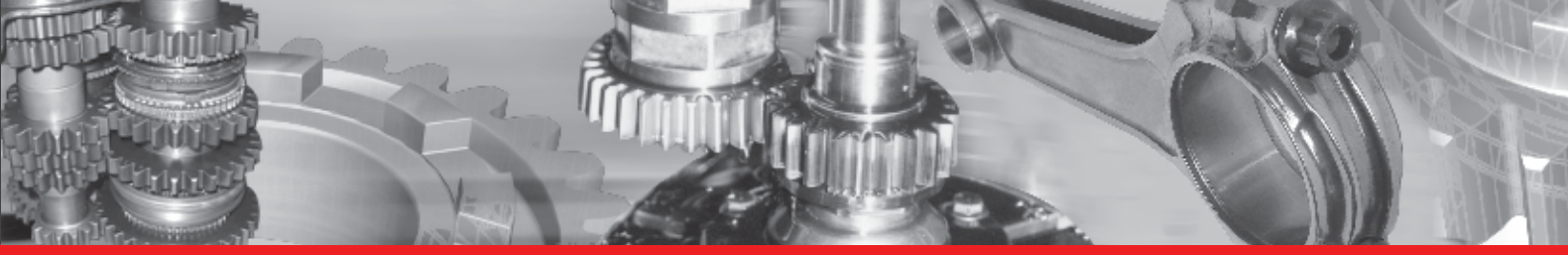
VIBRATIONS:

Any vibration is a good indicator of trouble.
Recheck the alignment of the transmission, be sure that the tailshaft is in alignment with the engine crankshaft.
Check the crankshaft bearing where the input shaft enters the gearbox.
Check the bellhousing and the drive arbor.
Check the other bearings.
Remove the shafts and check alignment and straightness. Shafts should have less than .001" axial runout.

H-SHIFTER PROBLEMS:

If the shifter is difficult to move, check the tightness of the nuts on the selector. If they are loose, selector shafts are probably touching, readjust.
Insure that clutch rings slip freely on their hubs, inspect for burrs and wear.
Allen set screws on the shifter are regulated at the factory and should remain at the factory settings.

SAENZ



TROUBLESHOOTING

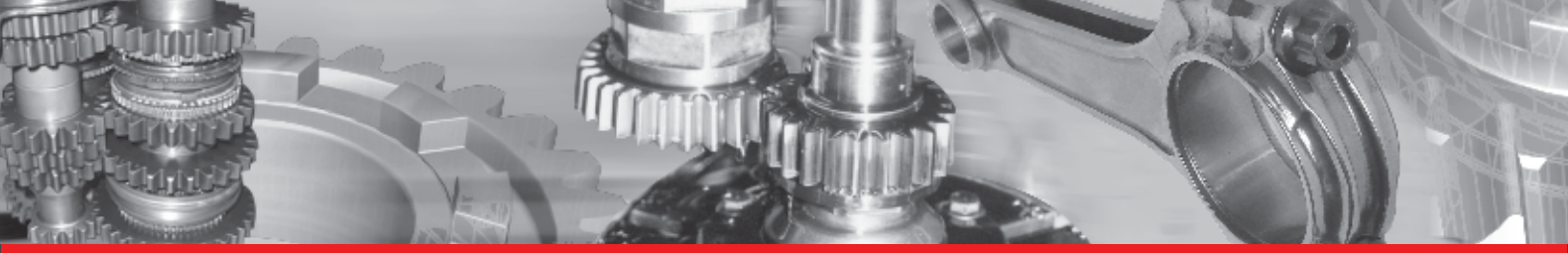
GEAR PROBLEMS:

If a gear connects but disengages when decelerating, it is probably caused by excessive wear on the dog clutches.
If you consider this wear to be premature, check the following; Gear axial backlash should be between .007" to .012" to allow for oil in between.
Check for wear in the selectors, excessive backlash in the groove will prevent the clutch ring from entering the gear clutch completely.
Check to see if the shifter is adjusted correctly, when in neutral the selectors will hold the dog clutch rings midpoint between the gears.
If the gears do not connect at all but remain in neutral, the problem is probably excessive wear in the dog clutches. Check shifter mechanism first.
The most serious situation possible is if a selector shaft or a selector fork breaks while in use. This will allow two gears to become engaged at the same time causing serious damage.

GEARS:

Saenz recommends a break-in period to promote long life of its transmissions. Application of half the engine power to allow transmission components to reach normal operating temperatures for fifteen minutes and then allowing to cool to ambient temperature should be sufficient to properly seat the bearings and other transmission components.

Various things can cause pitting, among them, use of inadequate lubrication, too high of a working temperature and a lack of a break-in period. Pitting is also a fatigue symptom of stress and visual inspection of the gears is important. Heavily pitted gears should be replaced with new ones. Gears will become brighter at the wear points between teeth (normal), should they become darker it is a good indicator that the lubrication is not doing its job or other adjustment is necessary. These components should be replaced.



TROUBLESHOOTING

DOG CLUTCHES:

Movement of the shifter lever should be quick. Since the Saenz transmission is not synchronized, it relies on the dog clutches to absorb the difference in speed between gearing. If the shifter movement is not fast enough the dog rings clash with the gear dogs, causing excessive wear. As the difference between gear ratios increase, so does the wear. They are designed to be attracted to the gears while under power. Excessive wear causes the opposite effect, having the tendency to slip out of gear. As the clutch rings are the same for 2nd through 5th gear it is possible to mix and rotate them. By doing so, wear can be equally dispersed between them, which will increase their useful life. Dog clutch life is also dependent on the cars weight and the driveline inertia. Saenz dog clutches have been designed to compensate for these factors and with proper care will last the life of the gear.

SEQUENTIAL SHIFTER PROBLEMS:

When dog teeth are damaged, sequential system suffers a big stress. This is the main cause of the problems in the system, so we strongly recommend to inspect dogs frequently.
Remove selector cap and check that each dog ring fully engage into eachgear. If so, all is OK, If not, remove cylinder cap and check travel end of sequential cylinder, if any crack appear it has to be replaced.
If barrel is OK, remove it from the selector and check shaft followers (SSAKT), Replace them if damaged.
If both cylinder and followers are correct, and yet there is any dog ring that not fully engage into the gear dog teeth, remove the nut from the fork shaft and correct it with a spacer.

GENERAL:

Good visual inspections will go a long way in ensuring long life, dependability and safety with your new Saenz transmission. Take the time to familiarize yourself with the components and how they appear at the time of purchase. Wear should and will occur at mating points throughout the transmission, but excessive and unusual wear are great indicators that something is wrong.
Here at Saenz we pride ourselves in our products and try to insure customer satisfaction in those products. Should you have any questions about the transmission or any components please do not hesitate contacting us.

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