



LAND CRUISER

MORE INFO THAN YOU'VE EVER SEEN ABOUT FJ-40 CASES

T-CASE TECH

By David Freiburger

We boggled ourselves with numbers, dates, ratios, and information. In fact, we even racked Marlin's brain. And anyone who knows Marlin Czajkowski (pronounced "Cha-cow-ski") of Marlin Crawler also knows that the guy has a wealth of Toyota knowledge and can spew specifications and technical minutia with the best of them. Much of that knowledge came from developing ultralow gearsets (4.70:1) and add-on Crawler boxes for Toyota pickups. But Marlin's latest venture is 3.64:1 Crawler gears that drop into FJ-40, FJ-45, and FJ-55 Land Cruiser transfer cases. That's big enough news, but when a campfire chat turned into a discussion of the many changes 'Cruiser cases have had through the years, we decided to rip open Marlin's head and spill the contents onto the next few pages.

The first thing we learned is that 'Cruiser transfer cases are a ripoff of American technology (much like their engines and differentials). The cases are clones of the Spicer Model 18, except that the Spicer gears are helical/spur and the 'Cruiser units are helical/helical. Also, the Toyotas are metric throughout, with the exception of the 1-inch idler shaft.

The '58-'63 'Cruisers have a single-speed case with centered rear output, no low range, and odd trans bolt patterns. And after July 1980, the T-case switched to a split unit not covered here, and the Marlin Crawler gears won't fit at this time.



At left is the brittle case with no drain-plug gusset; the right side shows a soft case with the gusset.

That's why this story covers the popular two-speed models used from 1964 to July 1980. We've dug up all the relevant info we could find, and our only caveat is this: Many reference sources differ as to the exact months and years some changes were made. When possible, we deferred to the Toyota parts books for clarification. So if you have a source that disagrees with this story, overlook the date and use our info to spot the hard parts used in your particular 'Cruiser.

HOUSINGS

All of the Land Cruiser T-case housings are cast from aluminum and look very similar. However, there are significant differences that affect strength and determine which internal components may be used. Those changes are shown in the chart. Of particular interest strengthwise is the case material.

HOUSING SPECS

Years	Type	Rear Bearing*	Inner Case Width (ins.)	Case Material	Idler Shaft Gusset	Drain Hole Gusset
'64-'66	Three-speed	6305	3.457	Brittle	None	No
'67-'69	Three-speed	6306	3.457	Brittle	None	No
'70-1/75	Three-speed	6306	3.457	Soft	Small	Yes
9/73-7/78	Four-speed	63/32R	3.513	Soft	Small	Yes
7/78-7/80	Four-speed	63/32R	3.513	Soft	Large	Yes

*BCA/Bower part number

The '64-'69 units are very brittle and more crack-prone, whereas the later models are softer and tend to stretch a bit before they crack. The soft cases are preferable, and they can be identified by a large gusset around the drain plug; none of the brittle cases have this.

Another strength consideration is the type of gusset around the idler shaft. The '64-'69 versions are surrounded by five webs and have no support ring; '70-July '78 cases have a small, slightly raised ring; and the latest units have a large, fully raised support. That makes the July '78-'80 cases Marlin's favorite, not counting the superior billet case from Warden's Automotive.

Other concerns are the rear bearing types (see chart) and the case width. All three-speed cases have an internal width of approximately 3.457 inches, and the four-speeds are 3.513 inches. This affects the cluster gear and shims that can be used, as you'll read later.

FRONT OUTPUT HOUSING & SHAFT

The cast-aluminum front output housing is interchangeable among all the cases, provided you use the front output stub shaft to match. All of them also use the same BCA PN 6306 outer bearing.

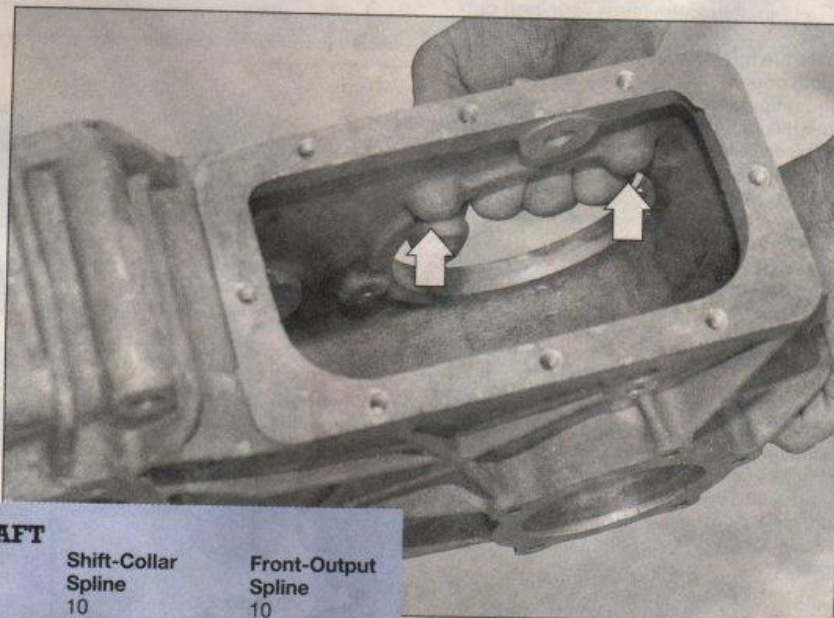
The chart shows that the nut that holds the front output yoke was retained with a cotter pin until January 1974, and a stake nut was used thereafter. If you're making a swap, it may be preferable to use the 27-spline output stub to match the splines on the pinion of aftermarket axle gears. Since the shifter mechanism also mounts on the front housing, know that vacuum shift was used until September 1972. With the later mechanical shifters, the four-speeds use a slightly longer actuator than the three-speeds.

REAR DRUM & YOKE

Year	Bolt Pattern	Bolt Size
'63-8/69	2.20x1.88	8 mm
8/69-1/74	2.10x1.80	10 mm
1/74-7/78	2.25x1.91	11 mm
7/78-7/80	2.25x1.91	11 mm

REAR DRUM & YOKE

The 'Cruiser parking brakes use a drum on the rear output of the T-case, and the drums have studs on them for

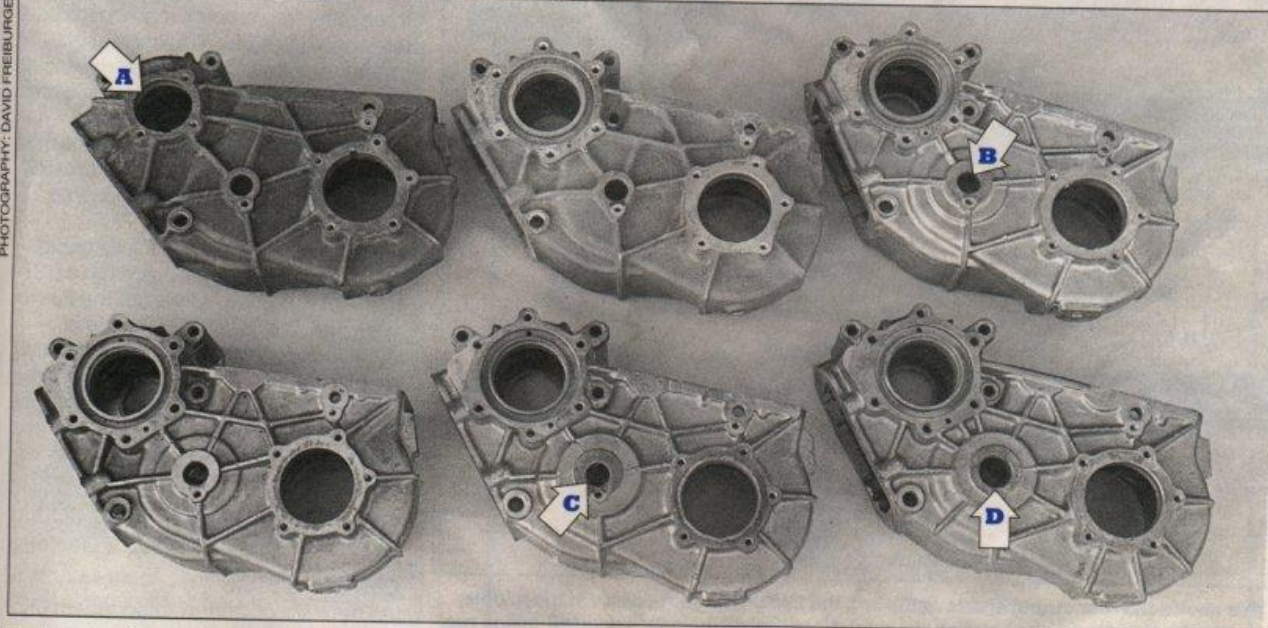


Housings with two cast-on bumps (arrows) behind the bolt holes for the front output housing are three-speed cases with the narrow 3.457-inch internal width.

FRONT OUTPUT HOUSING & SHAFT

Year	Ribs	Nut Type	Shift-Collar Spline	Front-Output Spline
'58-1/74	Three	Castle	10	10
1/74-7/74	Three	Stake nut	27	10
7/74-7/78	Six	Stake nut	27	10
7/78-7/80	Six	Stake nut	27	27

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The top row shows all the three-speed cases. From left to right are the '64-'66 (with four-bolt tail cover; A), the '67-'69, and the '70-January '75 (with small idler pin support ring; B). The second

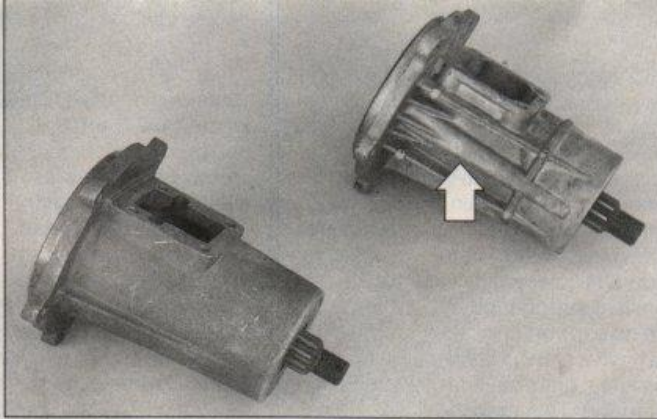
row are four-speed cases. From left to right are the September '73-July '78, the July '78-July '80 (with fully raised idler pin support; C), and an odd non-USA case (with a larger idler pin; D).

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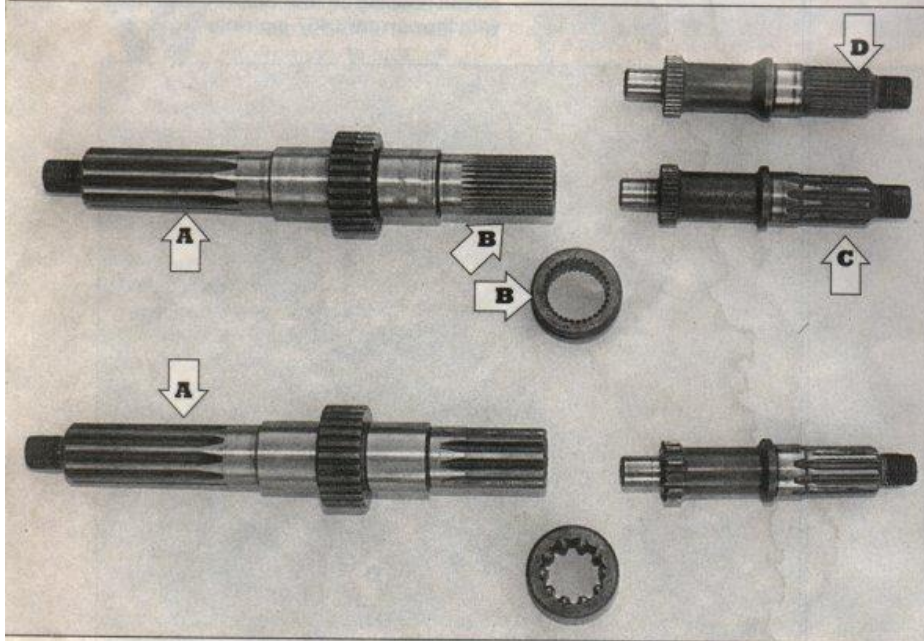
the yoke on the rear driveshaft. They're also splined in the center to match the spines on the rear output shaft. The front output uses a yoke that's identical to the axle pinion yoke and has a four-bolt flange that the front driveshaft bolts to. A 'Cruiser case will always have the same size U-joint and the same four-bolt pat-

Here are the tooth counts and ratios of the four available 'Cruiser T-case gearsets. From left to right are the '64-September '73 three-speed gears, the September '73-April '75 "crossover" case for use with four-speeds, the April '75-July '80 standard four-speed gears, and the ultralow 3.64:1 Marlin Crawler gears.

43	39	40	57
29	29	31	32
25/39	27/40	27/41	24/49
29	29	31	32
2.31:1	1.99:1	1.96:1	3.64:1



The '58-July '74 three-rib front extension housing is on the left; the July '74-July '80 six rib is on the right. When counting ribs, ignore the bump for the oil passage (arrow).



This shows the rear output shafts at the left, the 2WD/4WD shift collars in the middle, and the front output stub shafts on the right. Note that all the cases used 10-spline rear output (A). From January 1974 to July 1978, the shafts used 27 splines on the shift collar (B) but retained 10 splines for the front output (C). After that time, the front output stub also used 27 splines (D).

tern on the front and the rear. However, the three-speeds used smaller U-joints than the four-speeds, and there were three different combinations of bolt patterns and bolt sizes. You can easily swap the drums, flanges, and driveshaft slip yokes to gain bigger U-joints, except the larger joints often won't clear a swapped-in SM420 trans. Also, the front yokes are interchangeable only until July 1978, when the front output became 27-spline like a Toyota pickup.

Interestingly, the 3.70:1 axle gears used in the '79-'80 'Cruisers have a 27-spline pinion yoke instead of the earlier 10-spline design. The 27-spline is stronger, so all aftermarket gears, such as 4.56s and 4.88s, use 27-spline pinions. That means you'll need a new pinion yoke when swapping gears into an older 4x4. Marlin says that Toyota pickup yokes can be used with minor drilling, and they're more readily available than Land Cruiser yokes.

GEAR RATIOS

There's a common misconception about Land Cruiser low-range ratios. Most people think the three-speed cases have a 2.31:1 low range and the

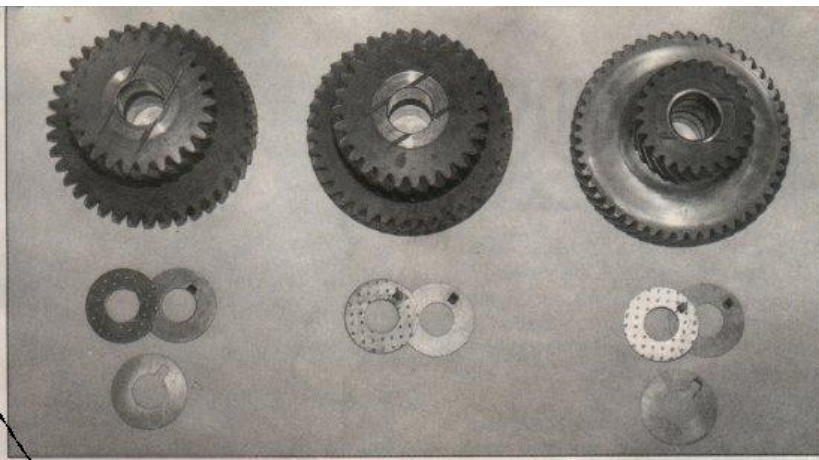
The width of the cluster gears is different between the three-speed-type cases and the four-speed-type cases (so is the inner width of the housing), and different thicknesses and designs of shims are used to set endplay. From left to right is the three-speed cluster, which is about 3.160 inches wide; the four-speed, which is about 3.350; and the Marlin Crawler cluster, which is designed at 3.290 so that different shims can be used to install it in either the narrow or wide housing.

COMMON PROBLEMS WITH 'CRUISER CASES

- If you adjust the parking brake cable without adjusting the shoes inside the rear output drum, the shoe activator will contact the hub of the drum and chew through it.
- Shift forks wear out when the bearings wear and the speed gears start to wobble.
- The two-wheel-drive-to-four-wheel-drive shift collar is often installed backward, which will lock the case in four-wheel drive (the tapered side of the sleeve always goes to the rear).
- The 16-spline four-speed cases will wallow out the spline on the input gear because the splines are a shallower cut.
- The seal between the trans and T-case will leak, thereby draining the tranny. The seal is Toyota PN 90311-42014 and is the same for all 'Cruiser cases.
- In units with two-piece low-range gears, the hub often becomes loose in the rivets. People try to weld the hub to the gear, but the weld will chip off the hardened gears and ruin the case.
- The idler pin tends to wear in the case.
- Marlin recommends rebuilding a 'Cruiser case every 60,000 miles and checking the mainshaft nuts often. The stake nuts should always be installed with Loctite and torqued to 102-123 ft-lb.
- The mainshaft preload must be set so that it rotates with a resistance of 15 in-lb. This is accomplished by using shims under the cast-iron speedo cable housing; the shims are available from Toyota in the following sizes: 0.10 inch, PN 90564-64017; 0.10, PN 90564-64023; 0.20, PN 90564-64024; and 0.25, PN 90564-64025.



The most common problem you'll find is a crack that emanates from the top cover (in the corner closest to the trans bolt at the 3 o'clock position when the case is installed) and can extend clear through the case, leaving it in two chunks.



No longer available

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four-speed cases are 1.99:1. Additionally, many believe there were some early four-speeds with what most people call "a three-speed case on a four-speed," and that this unique case also had the better 2.31:1 low range. Wrong.

There were in fact three basic gear setups with three different gear ratios.



The bushings used in the speed gears came either thick (*left*) or thin (*right*). The thick design was used until February 1976, but Marlin Crawler gears use the thin bushings so that the wall thickness of the gear can be greater. The thin bushing is Toyota PN 90999-73079 and must be honed to fit. The thick bushing is PN 90999-73075 and comes pre-honed.

The '64–September '73 three-speed case had a 2.31:1 ratio. Then there was a crossover case used in September 1973 to April 1975 with the first four-speeds—it had 16 splines to accept the four-speed tranny, and the high-range gears were the narrow style like the earlier three-speeds, but the low-range gears were similar to the later four-speed setups. As a result, the crossover case actually has a 1.99:1 ratio. The April '75–July '80 four-speed-type cases with the wider gears had a 1.96:1 ratio.

THREE-TO-FOUR-SPEED CONVERSION

The lower ratio of the three-speed-type transfer case makes it a desirable unit to swap into a four-speed 'Cruiser with the higher-ratio T-case. To accomplish the swap, you'll need to add a 16-spline T-case input gear (to match the output shaft of the four-speed trans) to a three-speed case. This gear was used on the "crossover" four-speed trucks and is still available from Toyota as PN 36212-60030. Because the shaft on the four-speed is bigger than the three-speed's, you'll also need an input bearing with the dimensions 32 mm by 72 mm by 20 mm. That's available as a BCA PN RW1148, which also happens to be a '74-'82 Datsun B210 axle bearing.

It's also possible to mix and match thrust washers to fit a three-speed-type cluster gear into a four-speed housing to obtain the 2.31:1 ratio, but Marlin reports that this swap tends to produce a slight gear whine.

Of course, the final option is to use the killer 3.64:1 Marlin Crawler gears which will work in any style 'Cruiser case. Machining is usually required, so your best bet is to send your T-case to Marlin for the installation. **4W**

SOURCE

Marlin Crawler, Dept. 4WOR, 1543-B Maple, Fresno, CA 93703, 209/25-CRAWL (252-7295)