

IronWorks®

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TPJ'S DOMINO

AN HONOR &
A CHALLENGE



IW SPOTLIGHT
GMS RACING ENGINES

PAPA CLUTCH
SHIFTING GEARS IN IOWA

LA SPEED SHOP
SUPER COOL IN SoCAL

**WALT SIEGL'S SPEEDGLIDE • 1942 WLA • BERT BAKER • THE LEATHERWORKS • PROJECT XR
RACE TECH'S SUSPENSION BIBLE • SAM KANISH • CYCLE ELECTRIC • ONE ARMED BOB'S TRIKES
CALIFORNIA TOURING • BRIAN KLOCK • BIG BIKE OUTFITTERS • E-FAB'S LOCK BAKER**



Oil and Spiders

More transmissions than you might believe get returned to BAKER Drivetrain for repair because the end user forgot to put oil in the unit. The complaint is usually excessive noise and difficulty shifting gears. Upon disassembly we find gear teeth with beautiful hues of blue, gold, and purple. When we notify the customer of our findings, quite often they will swear up and down that they put oil in the transmission. But there are only two ways that gear teeth turn blue, gold, and purple. The first way is to closely examine the gear teeth in bright sunlight about two hours after dropping three hits of acid. The second way is for gears to run without oil. Gear teeth turning blue, gold, and purple bathed in oil is as likely as President Obama having one of those special cone shaped white hoods in his closet.

The gears, shift system, and bearings in a Harley-Davidson transmission are splash lubricated, which means the churning action of the constant mesh gears kicks up and distributes oil when the transmission is in operation. The oil distribution and transmission function can be viewed with one of our Voyeur see-through top covers; pretty cool stuff. It is a very simple but very effective way to distribute the oil in the proper order of importance. That is, the shift system and bearings get lubricated by splash oil and oil mist which is more than adequate to keep them running smoothly. The gears, on the other hand, get continually coated by fresh oil and that's a good thing because the points of contact between two gears in mesh are subjected to very high stresses.

Look up "involute gear" in Wikipedia to view an animated simulation of two gears in mesh. As shown, the gear teeth come together in a mesh as the involutes (gear tooth profiles) of a gear and its mate roll together. The full torque of the engine (plus torque multiplication through the primary drive) is transmitted up and down the gear teeth, in a point-contact fashion, as gears roll together in mesh. In the world of machinery and mechanisms, this is referred to as "point loading"; it shears and fornicates the heck out of the poor little oil polymers over and over.

Modern oils are complicated, and transmission oils are no exception. Gear lubes carry a GL rating, which defines how much pressure (load between gears) they can withstand. The most common ratings today are GL-1 and GL-5.

GL-1 lubes have a much lower pressure rating than GL-5 oils.

Gear lubes come in many viscosities (weights), with the most common being 75w90, 75w140, and 85w140. Imagine these oil polymer molecules looking like a spider... when the oil is cold the spider's legs contract (like a dead spider), which lets the polymers bounce off each other, creating easier flow. Flow in oil is measured as viscosity, so when the oil is cold the viscosity is lighter (the 75 part of 75w140). As temperature increases, the spider's legs open up and connect with the "legs" of other polymer molecules, making the oil thicker and increasing viscosity. This is how oil can change weight from 75 to 140 with a change in temperature. When oils are sheared with miles of use, the "legs" are cut off, preventing the poly-

mer molecules from linking together and making the oil unable to change viscosity.

Besides pressure ratings, chemistry is different between GL ratings, and normally they don't interchange. Most GL-5 rated lubes are not compatible with GL-1 applications because GL-5 oils contain high pressure additives that attack "bright metals" such as copper, brass, and bronze that can be found in some transmissions. Oils such as Spectro 6 Speed contain special buffers that allow this GL-5 rated oil to be used in GL-1 applications without fear of bright metal damage. GL-1 oils should never be used in GL-5 applications. They won't cause any physical damage to met-

als but they also won't stand up to the intense pressure found in a GL-5 environment.

Syn3 is nothing more than 20w50 synthetic motor oil. It will work in a transmission if there is nothing else available but there's no good reason to use it when there are better choices. Motor oils are designed to lubricate motors, not transmissions, and they have totally different chemistry. Gear lubes use generous amounts of Zinc (zddp), phosphorus, and other extreme pressure anti wear additives not found in motor oils. They don't need much in the way of detergents (no fuel, carbon or ash contamination in transmissions).

So if you don't want the gear teeth in your transmission to turn blue, gold, and purple, do the following:

Keep your transmission filled with a quality GL-5 rated oil and change it every 5000 miles or once a year to keep fresh legs on the spiders.

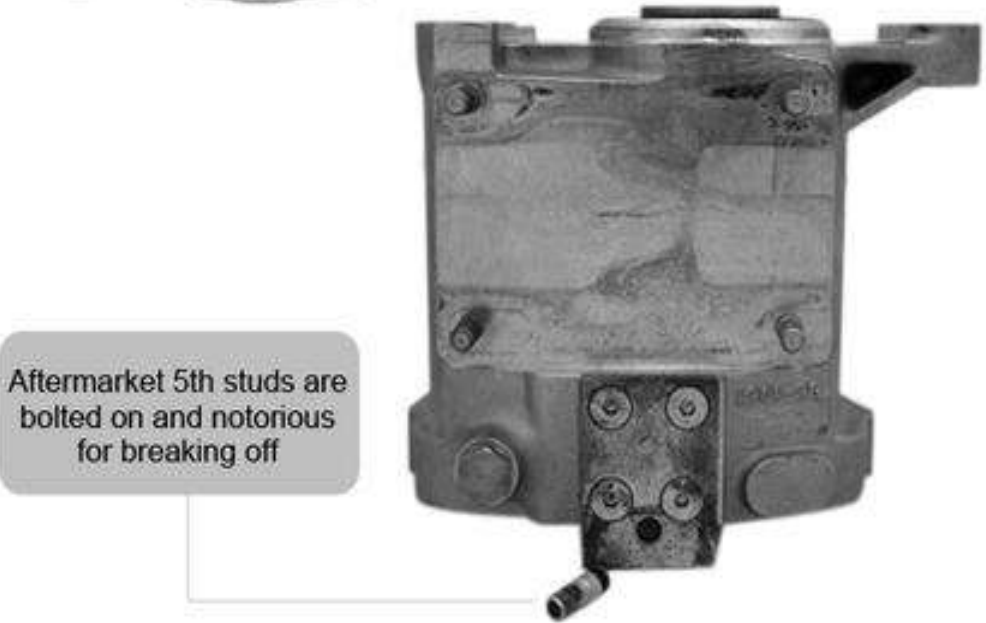
Don't drop acid. **IV**



All 6-into-4 case options come with a machined in 5th stud. We took the weakest point on other aftermarket transmissions and made it into the strongest point on ours. The 5th stud commonly breaks out of its bolted on plate causing your driveline to tweak in the chassis. The 6-Into-4 Transmission case comes in two different versions. Our 1936-64 case is a no ear case to work with the factory primary. Our 1965-1986 version comes with the primary ear bosses on it. These can be used with stock primary applications, belt drive applications, or running no primary plate at all. We do recommend the use of our bearing support for this application, BAKER PN 6-4SSP-A. Both cases have a provision for an electronic speedometer. The electronic speedometer would utilize a stock 1996-2006 speed sensor, PN 74437-96. Pending what type of electronic speedometer you use, an additional speedometer recalibration box might have to be purchased, BAKER PN 95E-56B. The BAKER 6-into-4 case does not have a gear drive speedometer cable provision on the case.



Our case is 1/2" wider and door is 1/2" shorter to allow 5th stud to be integral part of case



Aftermarket 5th studs are bolted on and notorious for breaking off



No ear case for stock
1936-1964 Applications



Primary ear case for
1970-1986 stock primary and
bearing support applications

- Late 1984-1986 length mainshaft. Diaphragm type wet clutch.
- 1970-Early 1984 length mainshaft. Shovelhead mainshaft.
- 1970-Early 1984 Splined mainshaft. Shovelhead splined mainshaft.
- 1965-1969 length mainshaft. Panhead/Shovelhead.
- 1936-1964 length mainshaft. Knuckle/Panhead mainshaft.

Shift Drum Options

- Standard Drum Shift Pattern (1-N-2-3-4-5-6 shift pattern)
- Reverse Drum Shift Pattern (6-5-4-3-2-N-1 shift pattern)
- N1 Drum Shift Pattern (N-1-2-3-4-5-6 shift pattern)

Klassic Kicker Gears

Kicker Gears All BAKER 4-Speeds come standard with our Klassic Kicker Gears. Made out of 1018 HR Steel, tumble finished to around a 20 micro and heat treated to 50-55 RC; these gears roll smooth as glass.



Kicker Cover Options

We manufacture and offer 6 different kicker covers making the 6-into-4 completely customizable from stock to custom build. Our kicker covers come in different finishes ranging from the standard chrome cover to the raw replica cover to the show polished Function Form Hydraulic cover. Depending on the choice of cover and finish, additional charges may apply.

Top Cover Options

The 6-into-4 comes standard with a single pole neutral switch top cover with our hidden vent. The transmission can be ordered with our no-neutral top cover.

Gear Ratios

The 6-into-4 comes in a standard, optional or R-Ratio configuration

Standard	Ratios	R-Ratio	Ratios
1st Gear	2.94 / Optional 3.24	1st Gear	2.82
2nd Gear	2.21	2nd Gear	2.08
3rd Gear	1.60	3rd Gear	1.60
4th Gear	1.23	4th Gear	1.23
5th Gear	1.00	5th Gear	1.00
6th Gear	.86	6th Gear	.86

PN	Description	Fitment
M6402	2.94 1st gear (Standard)	1936-86 FL & FX; good all around gear ratio

M6412	3.24 1st gear	1936-86 FL & FX; for heavy GVW applications
M64212	R-Ratio 2.82 1st & 2.08 2nd	1936-86 FL & FX; for light hot rods

Note

Each transmission is hand built to order. Use the base part number above and add suffixes (with a “-“ before each suffix) to specify the desired configuration:

Signature Series: Add a ‘S’ suffix for a polished signature series trans, or ‘RS’ for raw finished case. (DOES NOT INCLUDE NO EAR 6-INTO-4’S)

Case Finishes: R=raw/casted, B=wrinkle black, P=polished

Drum Option: N1=N1 drum (N-1-2-3-4-5-6 shift pattern)

Case Style: Standard case has ‘4-stud ears’ for primary, specify no ear case by adding NE suffix (1936 style)

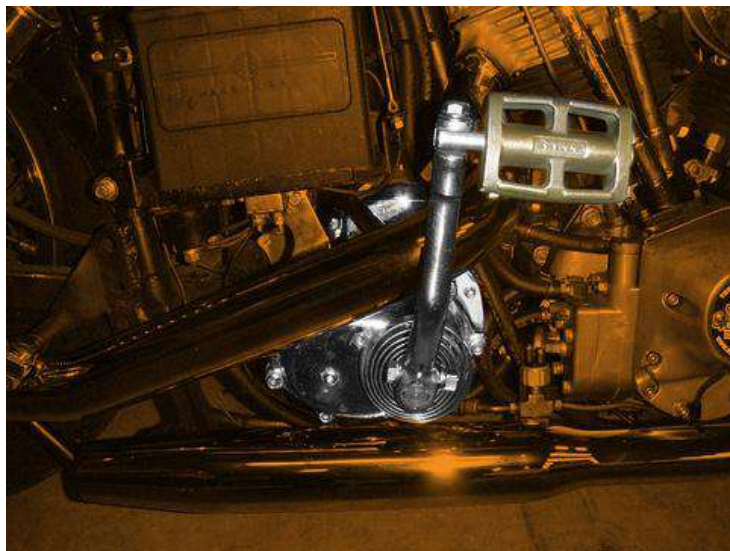
Kicker Cover: Chrome Die Cast Clutch Arm Kicker Cover Standard. Optional kicker cover suffixes:

- FF= function formed polished
- BPH=Billet polished Hydraulic
- BPM=billet polished mechanical
- BC=billet cable type
- E=electric start

Mainshaft: 1970-E84 mainshaft standard, Optional lengths:

- 36 for 1936-64 mainshaft
- 65 for 1965-69 mainshaft
- 84 for 1984-86

Sprocket: 23 Tooth Chain sprocket standard. Specify optional 24 Tooth Chain sprocket by adding -24 suffix or -33 for Belt Pulley – 6-into-4 has 2 more gears than a 4-speed and sticks out 1.6” more. Rear exhaust pipe, oil tank brackets, and starter brackets may have to be modified for fitment. – Electric speed sensor provision in case accepts stock 1994-up speed sensors. – Some 1970s inner primaries may require modification for sprocket nut clearance.



Recommended Exhausts

With the factory exhaust not fitting in most cases, an exhaust company took charge. Click on the link below to check out aftermarket exhausts that will fit your 6-into-4.

- [FTW Manufacturing](#)

Recommended Fluid / Level Picking the right transmission fluid ensures the life and durability of your transmission, that's why BAKER recommends a fully synthetic GL-5 rated gear weight oil of 75W-140. If a GL-5 rated gear lube is not available, these commonly carried viscosities (weights) will work: 75W-90, 75W-140 and 85W-140. BAKER does not recommend the use of Syn3 (20W-50).

BAKER 6-into-4 Fluid Capacity Dry: 22-24fl-oz BAKER 6-into-4 Fluid Capacity Wet: 18-22fl-oz