



**BorgWarner  
Morse TEC**

MT2007AP  
August 2007

## Morse® Hy-Vo® Chain\*

### 2007 Morse® Application Guide Automatic Transmission and Transfer Case Chains

Full Product  
Line Offering

Gemini® Systems

Over 120 years of  
Drivetrain Chain  
Manufacturing and  
Engineering



Advanced  
Technology –  
Rocker Joint,  
Round Pin,

ET Guide,  
ZX Link Design

Patented Randomization  
Patterns

OEM Quality

Engineering Support

Availability

Drivetrain  
Leadership

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Before installing any parts listed in this applications guide, consult the appropriate OEM Vehicle Manufacturer's instruction manual for proper installation procedures. This guide contains parts information only. Use parts only for the applications listed in this guide.

**Morse® Hy-Vo® Chain  
STANDARD WARRANTY POLICY  
“LIMITED WARRANTY”**

**WARRANTY**

BorgWarner, Morse® Hy-Vo® chains and sprockets are warranted to be free from defects in material and workmanship for a period of 24 months from the date of purchase and installation on the consumer's vehicles. MORSE TEC does not warrant or make any representations concerning its products when not installed with new (OEM approved) sprockets and used strictly in accordance with the manufacturer's instructions for such installation and operation, and in accordance with good installation and maintenance practices of the automotive industry.

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Any MORSE TEC product being returned for warranty claim must be accompanied by the mating system parts, i.e. sprockets and/or chain, and returned through national accounts. MORSE TEC reserves the right to examine all parts returned to it for warranty claim to determine whether or not any such part has failed because of a defect in material or workmanship. MORSE TEC obligation under this warranty shall be limited to repairing, replacing, or crediting, at its option, any part found to be so defective.

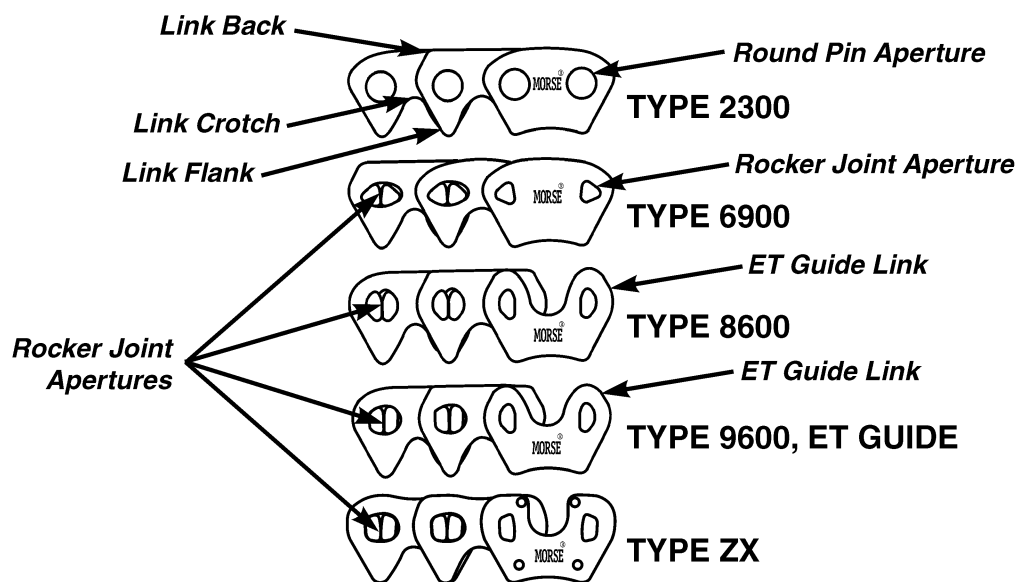
Regardless of whether any part is repaired, replaced, or credited under this warranty, transportation charges on the return of such part must be prepaid by the customer.

MORSE TEC liability under this warranty shall terminate on any part where there has been any alteration, abuse, misuse of, or damage resulting from negligence of others; any part on which the model number or trademark has been defaced or removed; or any part damaged by flood, fire, storm, or other acts of God.

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## Link and Pin Nomenclature



**NOTE:** A round pin chain can be rolled into a ball. A rocker pin chain cannot be. Each type requires certain sprockets and should not be interchanged. ET guide (elastically tuned) type guide links began in 1995 on certain applications. ET guide links more evenly distribute load for better wear characteristics.

## Chain Components

- **Link Apertures:** Holes in Links either round or Rocker Joint shaped to match the connecting Pins. This is the area of articulation in the chain.
- **Guide Link:** Link plate positioned on the outside of the chain. This pilots the chain on the sprocket.
- **Link Flank:** Lower portion of link which engages the sprocket teeth.
- **Link Crotch:** Space between link flanks which clear the sprocket tooth tip.
- **Link Back:** The outside curvature of the Link design to provide strength and operating smoothness. Some are designed flat rather than curved.
- **Round Pin:** Singular round pin used to articulate the chain.
- **Rocker Joint Pin:** Two pins are utilized to articulate the chain.
- **Rocker Pin Styles:**
  - **Type 6900** two triangular pins that rock in the aperture
  - **Type 8600** two ovular-shaped pins that rock in the aperture (Some may be ET Guide.)
  - **Type 9600** two ovular-shaped pins that rock in the aperture. The guide link is an ET design riveted link.
  - **Type ZX** two ovular-shaped pins that rock in the aperture. The guide link is an ET design riveted link. Enhanced link closure design.

## Chain Quality Parameters

- **Tensile Strength:** The ability of the chain to endure under the loads that are applied during sprocket engagement and operation. It is measured as the ultimate strength of the chain which is the load at which it would break or fail. There are centrifugal forces created during operation. The steel quality of the links and pins and the chain design are important in contributing to a high tensile strength.
- **Fatigue Strength:** The ability of the chain to endure the loads and operating conditions repeatedly over time.
- **Wear Rating:** The amount of wear that occurs during operation.

## Chain Operating & Measurement Terms

- **Pitch:** Effective length between the centerpoints of the apertures, which are the points of joint articulation.
- **Width:** The approximate dimension between the inside and outside guide links.
- **Random Chain:** Certain patterns are interlaced in a random link pattern utilizing two different link styles in rows across the chain.
- **Chordal Action:** Radial or transverse motion of the chain strand resulting from sprocket engagement. Sound is created from this engagement.
- **Decibel Measurements:** The measurement of the total sound coming from the system in operation.
- **Chain Description:** Nominal measurements for a chain:
  - Example: 3/8P x 1-1/4 W x 72P
  - 3/8 pitch by 1-1/4 approximate width by 72 total pitches
  - 72 pitches would be 36 total guide plates per side





## Why Morse® Hy-Vo® Chain?

### Design Features and Benefits

**Application Specific Design Styles:** Morse offers a full line of applications which include round pin, three styles of rocker joint pin chain, ET guide links, and the new patented Morse Gemini® system. Each of these are specified by application based upon loads, operating conditions, and operating space. (Substituting design styles is not recommended since sprocket engagement would be affected.)

**ET Guide Links:** A patented guide link design which offers more even load distribution during operation. Chain designs will be upgraded based upon OE service conversions.

**Chain Randomization:** This is a patented design utilizing two different link styles to break up frequencies created from sprocket engagement. Patterns are selected at the time of OE design to minimize noise and vibration levels and to optimize operating strengths for each application.

### Quality Features and Benefits

**Quality and OEM Certification:** In addition to having QS 9000 Certification, Morse Hy-Vo Products utilize only the finest grades of steel for the links and pins. This means no inclusions or dirt in the steel itself. This contributes to the highest Tensile, Fatigue, and Wear characteristics. Proprietary Design and Manufacturing Techniques also create the highest quality chain in the aftermarket.

### Important Rebuilding Notes

**Chain Elongation:** Even though Morse Hy-Vo Products are built to last, when the rebuilder has the unit down, the sprockets and chain should be checked thoroughly.

Remember that it is very difficult for the aftermarket customer to measure chain elongation. One reason for this is shaft movement when the unit is apart. In certain cases, when the shafts are fixed with the cover off, an experienced field estimate may be acceptable.

Morse has special equipment to measure elongation parameters. In addition, each application could be different depending upon the application parameters.

The accuracy rate or error rate is 50% without using the right equipment to measure elongation of a chain. Every application has its own variations and the manufacturer's recommended specifications for chain tolerances should be referenced.

**If the chain has been in service for over 60,000 miles,  
if the unit is torn down, or if the unit shows  
signs of problems, neglect, or abuse – replace the chain.**

## Application Listings for Morse Hy-Vo Chain

### Automatic Transmission Chains

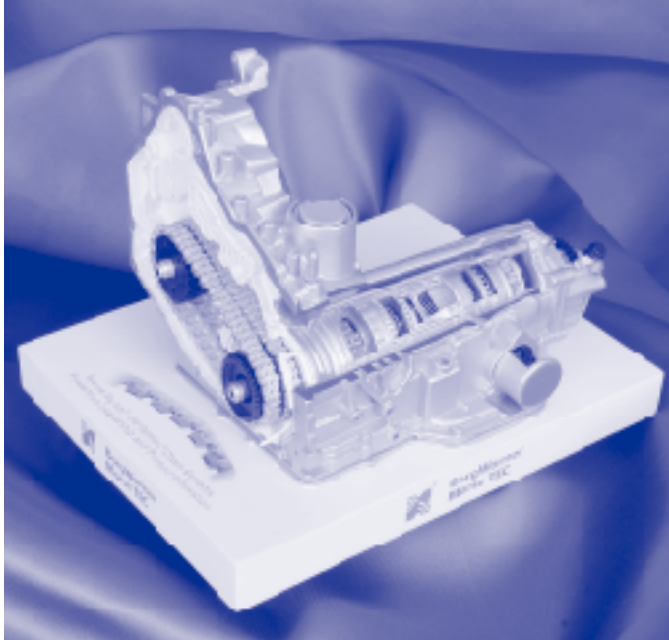
Transmission	Description	Year	Morse Part Number
<b>General Motors</b>			
125/125C	3/8 Pitch x 3/4 Wide x 84 Pitches, Round Pin Type	80-83	HV-019
125C	3/8 Pitch x 7/8 Wide x 84 Pitches, Round Pin Type	80-Up	HV-018
325	3/8 Pitch x 1-3/4 Wide x 110 Pitches, Rocker Joint Type	79-81	HV-010
325-4L	3/8 Pitch x 1-1/4 Wide x 102 Pitches, Rocker Joint Type	82-85	HV-016
425	3/8 Pitch x 2 Wide x 124 Pitches, Rocker Joint Type	66-78	HV-001
4T40E (4 Cylinder)	3/8 Pitch x 3/4 Wide x 84 Pitches, Rocker Joint Type	95-03	HV-039
4T40E (4 Cylinder)	3/8 Pitch x 5/8 Wide x 84 Pitches, Rocker Joint Type – New ZX Design	11/03-Up	HV-079
4T45E (6 Cylinder)	3/8 Pitch x 7/8 Wide x 84 Pitches, Rocker Joint Type, ET guide	99-2/04, 7/04-Up	HV-058
4T45E (6 Cylinder)	3/8 Pitch x 5/8 Wide x 84 Pitches, Rocker Joint Type – New ZX Design	3/04-6/04	HV-079
4T45E (6 Cylinder)			
4T45E Saturn LS	3/8 Pitch x 7/8 Wide x 84 Pitches, Rocker Joint Type, ET Guide	99-6/04	HV-058
4T60/4T60E	3/8 Pitch x 7/8 Wide x 84 Pitches, Round Pin Type	83-93	HV-018
4T60E	3/8 Pitch x 7/8 Wide x 84 Pitches, Rocker Joint Type, ET Guide (Previously HV035)	94-99	HV-058
4T60E (Riviera)	3/8 Pitch x 7/8 Wide x 84 Pitches, Rocker Joint Type (Previously HV036 with a Special Lacing Pattern for Riviera only – The HV058 accommodates this)	95-99	HV-058
4T60 Allante Only	1990 Cadillac GM # 8661010 is not available. Discontinued.	90	
4T65 Gemini Design (Excludes 05 V8)	3/8 Pitch x 1/2 Wide x 84 Pitch – Two per Application, One Blue Guide Link	97-Up	HV-065
4T65E Gemini Design S (V8 and retro HV-065)	3/8 Pitch x 1/2 Wide x 84 Pitch – S Design, Two per Application, Two Blue Guide Links	05-Up	HV-093 can replace HV-065
4T65 Gemini Kit	With 33 Drive & 37 Driven Sprockets – Kit Sprockets and Gemini Chains (Volvo)	97-Up	TK001*
4T65 Gemini Kit	With 35 Drive & 35 Driven Sprockets – Kit Sprockets and Gemini Chains	97-Up	TK002*
4T65 Gemini Kit	With 37 Drive & 33 Driven Sprockets – Kit Sprockets and Gemini Chains (3.8L, L67 Grand Prix)	97-Up	TK003*
4T80E	.436 Pitch x 1 Wide x 84 Pitches, Rocker Joint Type	93-Up	HV-038

### Morse Gemini® Chain System

\*Use with new thrust washers from GM #24213762, Volvo #24213761 and reluctor wheel #24212217.



Morse Gemini® systems are a set of 2 chains which run on phased sprockets. This patented design significantly reduces the overall NVH (noise) in the system.

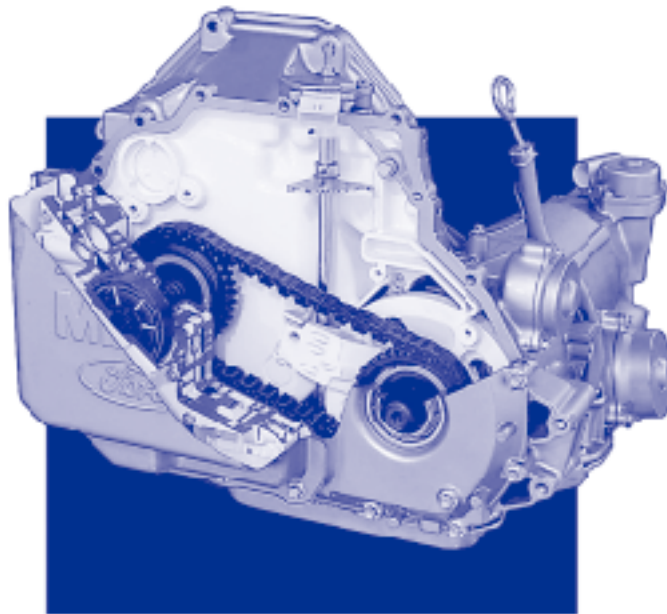


**Morse TEC  
Limited Edition  
GM 4T65E Replica  
Part Number 5002116  
Watch for Promotions  
During the year!**

Transmission	Description	Year	Morse Part Number
<b>GM Racing Applications/Special Order</b>			
<b>4T65E Racing</b>	Spring Link, .4375 Pitch x 1 Wide x 72 Pitches Made in Japan in prototype lab, Special Application 201 HV 3504-72 MTS.		<b>5005 747 HV-121</b>

Transmission	Description	Year	Morse Part Number
<b>Ford</b>			
<b>AXOD/AXODE</b>	3/8 Pitch x 3/4 Wide x 86 Pitches, Round Pin Type (one copper guide link)	<b>86-7/03</b>	<b>HV-021</b>
<b>AXOD</b>	3/8 Pitch x 7/8 Wide x 86 Pitches, Round Pin Type (one green guide link)	<b>86-88</b>	<b>HV-029</b>
<b>AX4S-SHO/AX4N</b>	3/8 Pitch x 3/4 Wide x 86 Pitches, Rocker Joint Type 9600 Series, ET Guide (three copper guide links)	<b>93-03</b>	<b>HV-040, (Can Use HV-075)</b>
<b>AX4N</b> With 2.5, 3.0 Liter Vulcan and Duratec Engines	3/8 Pitch x 3/4 Wide x 86 Pitches, Rocker Joint 8600 Series (2 blue links side by side)	<b>04-Up</b>	<b>HV-075</b>
<b>AX4N</b> 4.6L 4V, 4.2L	3/8 Pitch x 7/8 Wide x 88 Pitches, Rocker Joint Type 9600 or 8600 Series (one blue guide link) 2004 change to 8600 Series from 9600 (Both will work)	<b>95-Up</b>	<b>HV-042</b>
<b>AX4S</b> (Windstar) (Freestar AX4N)	3/8 Pitch x 3/4 Wide x 88 Pitches, Round Pin Type (two copper guide links)	<b>96-11/04</b>	<b>HV-041</b>
<b>4F50N</b> With 3.9 Liter Engine	3/8 Pitch x 3/4 Wide x 88 Pitches, Rocker Joint 8600 Series (two copper guide links)	<b>05-Up</b>	<b>HV-092</b>
<b>CD4E</b> (Contour/Mondeo 2.0L)	.4346 Pitch x 3/4 Wide x 90 Pitches, Rocker Joint Type, ET Guide (one copper guide link)	<b>94-02</b>	<b>HV-043</b>
<b>CD4E</b> (Mystique/Cougar 2.0L)	.4346 Pitch x 3/4 Wide x 90 Pitches, Rocker Joint Type, ET Guide (one copper guide link)	<b>98-02</b>	<b>HV-043</b>
<b>CD4E</b> (2.5L/3.0L V6)	.4346 Pitch x 1 Wide x 92 Pitches, Rocker Joint Type 8600, ET Guide (two copper guides separated by two silver guide links)	<b>94-Up</b>	<b>HV-044</b>
<b>CD4E</b> (1.8L/2.0L I4) Mazda	.4346 Pitch x 3/4 Wide x 92 Pitches, Rocker Joint Type, ET Guide (two copper guide links next to each other)	<b>94-04 (2.5L 2000-04)</b>	<b>HV-045</b>

## AXOD



### Note: CD4E ET Guide Upgrade:

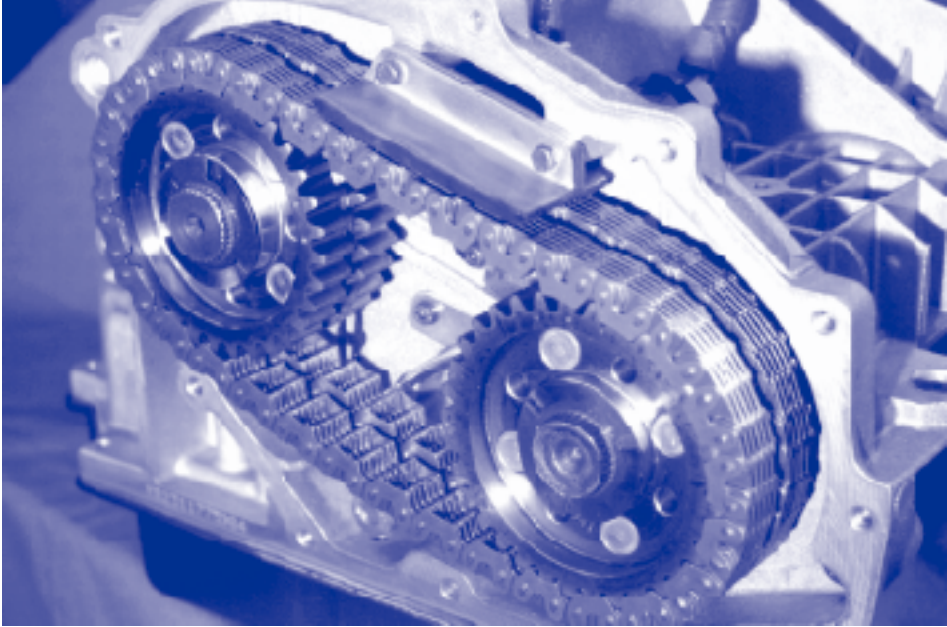
**HV043** Used with the 2.0 Liter Engine, F3RZ7G249A, F6RZ7G249AA

**HV044** Used with the 2.5 and 3.0 Liter Engines through 99, F5RZ7G249C, F6RZ7G249CA

**HV045** Used with 2.0 Liter Probe, the later 2000 Model Yr 2.5L are 3/4 Wide, F5RZ7G249B, F6RZ7G249BA

**The latest CD4E chains use the ET Guide Technology for better wear characteristics and load distribution. The earlier non ET Guide chains should be replaced with the newer chains when the unit is down.**



Transmission	Description	Year	Morse Part Number
<b>DaimlerChrysler</b>			
<b>A606</b>	One Chain – 1-3/4 Wide x 62 Pitches, Rocker Joint Type – 4539777 Discontinued, convert to TK004 and update sprockets	<b>93-94</b>	<b>TK004</b>
<b>A606</b>	Two Chain – (Gemini® Design) 3/4 Wide x 62 Pitches, Rocker Joint Type, ET Guide – 4659190	<b>95-03</b>	<b>HV-047</b>
<b>A606</b> Gemini Kit	Chain/Sprocket/Snubber Package (to update) 93-94 (Except Prowler Application)	<b>93-03</b>	<b>TK004</b>
<b>A606</b>	Sprocket - 32 Teeth - 4659232 Drive (3.2L and 3.5L Engines)	<b>95-03</b>	<b>HS001</b>
<b>A606</b>	Sprocket - 33 Teeth - 4659233 Driven (3.2L and 3.5L Engines)	<b>95-03</b>	<b>HS002</b>
<b>A606</b> Prowler	Sprocket - 31 Teeth - 4659831 Drive (2.7L and 3.5L Prowler Engines)	<b>97-03</b>	<b>HS009</b>
<b>A606</b> Prowler	Sprocket - 34 Teeth - 4659834 Drive (2.7L and 3.5L Prowler Engines)	<b>97-03</b>	<b>HS010</b>
<b>A606</b> Prowler Kit	Chain/Sprocket/Snubber Package (31 Drive, 34 Driven Sprockets)	<b>97-03</b>	<b>TK005</b>
<b>A606</b>	Snubber - 4659187	<b>all</b>	<b>HVS-047</b>
<b>42LE Morse Gemini® A606</b>			
			
<b>Imports</b>			
<b>Saab T37</b> (Special Order)	Non-Turbo - 3/8 Pitch x 1 Wide x 76 Pitches, Rocker Joint Type	<b>72-78</b>	<b>HV-003</b>
<b>Saab T37</b> (Special Order)	Turbo - 3/8 Pitch x 1 Wide x 76 Pitches, Rocker Joint Type	<b>79-Up</b>	<b>HV-023</b>
<b>Tercel A55</b>	3/8 Pitch x 3/4 Wide x 62 Pitches, FWD 4WD	<b>79-86</b>	<b>HV-101</b>
<b>Volvo XE90 PTU</b>	.4346 x 1-1/4 Wide x 62 Pitches, Rocker Joint Type	<b>04-Up</b>	<b>HV-094</b>

## Transfer Case Chains by Transfer Case Model to Corresponding OEM

### NEW PROCESS/NEW VENTURE GEAR

Case Model	OEM Mfg	Notes	Morse Part Number	Nominal Chain Dimensions
119	Chrysler Jeep	80-88 Jeep	HV-015	3/8 Pitch x 1-3/4 W x 98 Pitches - RJ
120	GM	GMT360, Trailblazer SS, Special Lacing Pattern	HV-512	.375 Pitch x 1-1/4 W x 86 Pitches - RJ
125 / 140 WK	Ford & Jeep	Ford Australia, Full Time, Jeep Grand Cherokee 2005	HV-059	.375 Pitch x 1-1/4 W x 86 Pitches - RJ
129	Chrysler Jeep	80-88 Jeep	HV-015	3/8 Pitch x 1-3/4 W x 98 Pitches - RJ
140	Chrysler Jeep	Single speed Grand Cherokee 2005-Up (Snubber HVS-071)	HV-089	3/8 Pitch x 1-1/4 W x 86 Pitches - RJ
144HB	Chrysler	Dodge Durango ST	HV-072	.375 Pitch x 1-1/4 W x 98 Pitches - RJ
149	GM	Full Time full size truck, Silverado SS and GMC Sierra Denali	HV-072	.375 Pitch x 1-1/4 W x 98 Pitches - RJ
203	Chrys/Ford/GM	73-78	HV-005	3/8 Pitch x 2-1/2 W x 98 Pitches - RJ
203	Chrys/Ford/GM	78-79	HV-009	.5033 Pitch x 2 W x 72 Pitches - RJ
207	Chrysler	84-88 Jeep	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
208	Chrysler Jeep	80-88 Jeep	HV-014 (RJ)/ HV-025 (RP)	.5033 Pitch x 1-1/4 W x 72 Pitches
208	Ford	80-88	HV-012	.5033 Pitch x 1-1/4 W x 84 Pitches - RP
218	GM/AM General	86-99 (Hummer)	HV-026	.5033 Pitch x 1-1/2 W x 72 Pitches - RP
219	Chrysler Jeep	80-90 Jeep	HV-015	3/8 Pitch x 1-3/4 W x 98 Pitches - RJ
225	Ford	Land Rover	HV-083	3/8 Pitch x 1-3/4 W x 90 Pitches - RJ
226/126	GM	Active on Demand, GM 360, 370 Envoy and Trailbrazer	HV-059	.375 Pitch x 1-1/4 W x 86 Pitches - RJ
228, 229	Chrysler Jeep	80-90 Jeep	HV-015	3/8 Pitch x 1-3/4 W x 98 Pitches - RJ
231A	Chrysler Jeep	89-up Jeep	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
231C/233C	GM	W2.8L 89-Up	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
231C/233C	GM	W4.3L 89-98	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
231D	Chrysler	89-up Jeep	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
233 Electric	Chrysler Jeep	95-Up Jeep	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
231/233HD	GM	T Truck S10, Dodge Dakota	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
236/136	GM	98-Up Blazer, Bravada, & Astro Van	HV-062	3/8 Pitch x 1 W x 98 Pitches - RJ
235	VW Porsche	VW and Porsche SUV	HV-082	3/8 Pitch x 1.5 W x 98 Pitches - RJ
241	Jeep	Part Time Jeep Rubicon	HV-081	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
241C/243C	Chrysler/GM	GM 89-98, 243 Electric Shift, Dodge Full 93-98	HV-025	.5033 Pitch x 1-1/4 W x 72 Pitches - RP
241G2	Dodge	Part time electric Shift, Ram 1500 Standard 2002 - May 2004	HV081	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
241G2 + Off Road	Dodge	Part time electric Shift, Ram 1500 Standard, June 2004 and up	HV-072	.375 Pitch x 1-1/4 W x 98 Pitches - RJ
241HD	Chrysler	Dodge 90-99	HV-031	.5033 Pitch x 1-1/2 W x 72 Pitches - RP
242/244	Chrysler Jeep	89-2000 Jeep	HV-028	.5033 Pitch x 1 W x 72 Pitches - RP
242 / 242 WJ	Chrysler	Durango, Dakota and Jeep with 5.2L and 5.9L Engines 98-04	HV-063	3/8 Pitch x 1-1/4 W x 98 Pitches - RJ

**NEW PROCESS/NEW VENTURE GEAR**

Case Model	OEM Mfg	Notes	Morse Part Number	Nominal Chain Dimensions
242KJ	Jeep	Jeep Liberty Select Trac 02-Up	HV-062	3/8 Pitch x 1 W x 98 Pitches - RJ
242ECE	Chrysler Jeep	Jeep Europe XJ & ZJ	HV-061	.5033 Pitch x 1 W x 72 Pitches - RJ
242H	GM/AM General	AMG Hummer H1	HV-060	.5033 Pitch x 1-1/4 W x 72 Pitches - RP
243G2	Dodge	Part time electric Shift Ram 1500, 2002 - May 2004	HV-081	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
243G2	Dodge	Part time electric Shift, Ram 1500 Optional All 4WD June 2004 and up	HV-072	.375 Pitch x 1-1/4 W x 98 Pitches - RJ
244DR (Heavy Duty)	Dodge	2004 Dod Dakota w/4.7L and 5.9L on Quad Cab	HV-072	.375 Pitch x 1-1/4 W x 98 Pitches - RJ
244HB	Dodge	Dodge Durango Gemini System, 2004 and up	TK006	Two Sprockets (HS014) and Two Chains (HV084)
244HB	Dodge	Chains (2)	HV-084	.375 Pitch x .625 W x 98 Pitches - RJ
245	Jeep	2-Speed Low Range Grand Cherokee 2005-Up (Snubber HVS-071)	HV-090	3/8 Pitch x 1-1/4 W x 86 Pitches - ZX Design
246	GM	99 SUV Only, One Blue Guide Link	HV-063	3/8 Pitch x 1-1/4 W x 98 Pitches - RJ
246	GM	99-Up GMT 800, 2000-Up Full Size SUV (3 Blue Guide Links)	HV-072	3/8 Pitch x 1-1/4 W x 98 Pitches - RJ
247	Chrysler Jeep	99 Jeep Grd Cherokee	HV-071	3/8 Pitch x 1 W x 98 Pitches - RJ
			HVS-071 Snubber	5-1/2 Long x 1.125 W x 3/4 High (2 holes)
249	Chrysler Jeep	92-98 Jeep	HV-034	3/8 Pitch x 1-1/4 W x 98 Pitches - RJ
261/263	GM Full Time	GMT 800 (3 Blue Guide Links) 99+	HV-072	3/8 Pitch x 1-1/4 W x 98 Pitches - RJ
261HD/263HD	GM Part Time	GMT 800 Full Size K Truck	HV-069	3/8 Pitch x 1-1/2 W x 98 Pitches - RJ
261SHD/263 SHD/HD2	Chrysler D/C	2001-Current	HV-074	.4346 Pitch x 1-1/2 W x 84 Pitches - RP
271/273 Electric Shift	Ford	98-Up F250/350/450/550 (03 Dodge)	HV-064	.4346 Pitch x 1-1/2 W x 98 Pitches - RP
276	Land Rover	Land Rover 6x6 Third Axle	HV-506	.5033 Pitch x 1-3/4 W x 40 Pitches - RP

RJ = Rocker Joint    RP = Round Pin

**MAGNA STEYR**

Transfer Case Application	Description	Year	Morse Part Number
BMW — Snubber used with ATC 400, ATC 500	Short Snubber Design	03-Up	HVS-072
BMW X3 — Single Speed Case with TOD (ATC 400)	.375 Pitch x 1-1/4 W x 80 Pitches - RJ	03-Up	HV-086
BMW X5 — Single Speed with TOD (ATC 500)	.375 Pitch x 1-1/4 W x 86 Pitches - RJ Special Lacing Pattern, 2 Blue Links	03-Up	HV-087
BMW X5 — Single Speed Case with TOD (LWX500)	.375 Pitch x 1-1/4 W x 86 Pitches - RJ, One Blue Link	01-02	HV-088/ HV-059
GM — NP8, NP1 & NP2 (LD)	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ	2008-UP	HV-501
GM — NP8, NP1 & NP2 (HD)	.4346 Pitch x 1-1/2 W x 84 Pitches - RJ	2008-UP	HV-502
GM — NP1 & NP2 (SHD)	.4346 Pitch x 1-1/2 W x 84 Pitches - RP	2008-UP	HV-074
Land Rover — 2-Speed Case with Locking Center Differential	.375 Pitch x 1-3/4 W x 84 Pitches - RJ	04-Up	HV-085
Mercedes M	.375 Pitch x 1-1/2 W x 84 Pitches - RJ	03-Up	HV-091
Mercedes M — Dual Clutch 2-Speed	.375 Pitch x 1-3/4 W x 84 Pitches - RJ	2005-Up	HV-098

## BORG WARNER TORQUE TRANSFER SYSTEMS

Case Model	OEM Mfg	Notes	Morse Part Number	Nominal Chain Dimensions
1305	Chrysler Jeep	73-79 Jeep	HV-007	3/8 Pitch x 2-1/2 W x 96 Pitches - RJ
1345	Chrysler Jeep	CJ7 w/Auto Overdrive	HV-007X	3/8 Pitch x 2-1/2 W x 92 Pitches - RJ
1345	Ford	Fd 80-82, 150, 250, 350	HV-013	.5033 Pitch x 1-1/2 W x 86 Pitches - RJ
1350	Ford, Chrysler	Fd 80-83, Jeep 84-88	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
1354 ES Part Time	Ford	2005-UP Sport Trac, Explorer Sport	HV-505	.5033 Pitch x 1 W x 62 Pitches - RP
1354	Ford	Fd 90-Up	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
1354	Ford	2000 Sport Trac, Explorer Sport	HV-068	.5033 Pitch x 1 1/4 W x 62 Pitches - RP
1356	Ford	Fd 80-96 F Series/Bronco	HV-012	.5033 Pitch x 1-1/4 W x 84 Pitches - RP
1361	Range Rover	Range Rover 88-96	HV-049	.5033 Pitch x 2 W x 74 Pitches - RJ Spring Lk
1370	GM	80-Up Full Size Truck	HV-025	.5033 Pitch x 1-1/4 W x 72 Pitches - RP
1372*	GM	90-95 L Van All WD with Straight Pitch	HV-032	3/8 Pitch x 1-3/4 W x 86 Pitches - RJ Note: 2 blue links & rounded link backs
1372*	GM	90-97 S Blazer Trk/Bravada/ Cyclone/Typhoon with random pitch	HV-033	3/8 Pitch x 1-3/4 W x 86 Pitches - RJ Note: 1 blue link & combination round/ square link backs
4401	GM	GMC 3500	HV-025	.5033 Pitch x 1-1/4 W x 72 Pitches - RP Block Lace
4402	Hyundai	A1 Van, Galloper	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
4404	Ford	Explorer/ Mountaineer to 97	HV-051	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ Note: 1 blue link
4404 w/5 Liter	Ford	Explorer/ Mountaineer with 5 Liter Engines 98-2000	HV-070	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ Note: 2 blue links separated by one link
4405	Ford	Explorer to 97	HV-051	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ
4405	Ford	Explorer 9/98-Up (width chg) TOD	HV-067	.4346 Pitch x 1 W x 74 Pitches - RJ
4406	Ford	F150/250 Man & Electronic Shift 96-4/98	HV-052	.4346 Pitch x 1-1/4 W x 86 Pitches - RP
4406	Ford	May 98-Up F150, F250 LD, F150 Manual Shift, Electronic Shift, Width change 5/98	HV-066	.4346 Pitch x 1 W x 86 Pitches - RP
4406 TOD	Ford	F250 96-Up, Expedition and Navigator 99+	HV-053	.4346 Pitch x 1-1/4 W x 86 Pitches - RJ
4407	Ford	F350/F250 HD	HV-054	.5033 Pitch x 1-1/2 W x 84 Pitches - RP
4408	Daewoo	Previously Sang Yang	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
4409	Mercedes	Mercedes 97-Up	HV-055	.4346 Pitch x 1-1/2 W x 70 Pitches - RJ
4410	Ford	Explorer 5.0L 2001	HV-078	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ
4411	Ford	Explorer 4.0L 2001	HV-067	.4346 Pitch x 1 W x 74 Pitches - RJ
4411 TOD	Ford	2002 Aviator, Mountaineer	HV-067	.4346 Pitch x 1 W x 74 Pitches - RJ
4412 TOD	Ford	2005 Explorer/Mountaineer	HV-067	.4346 Pitch x 1 W x 74 Pitches - RJ
4414 OD	Ford	2006 Explorer/Mountaineer	HV-078	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ
4416 TOD	Ford	Expedition, Navigator 2001	HV-053	.4346 Pitch x 1-1/4 W x 86 Pitches - RJ
4417 TOD	Ford	2006 Expedition/Navigator	HV-076	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
4422	Isuzu	Isuzu 95-Up	HV-056	.4346 Pitch x 1-1/4 W x 70 Pitches - RJ
4423/4421	Ssangyong	Sport utility vehicle - Ssangyong 4400143015	HV-051	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ
4424 ESOF	Hyundai	Terracan, Highlander, A1, Kia BL 2001 and up	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
4424 TOD	Hyundai	Terracan, Highlander, A1, Kia BL 2001 and up	HV-070	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ Note: 2 blue links separated by one link
4426 TOD	Ssangyong	2003-Up Ssangyong A100 Rodius, Y250 Rexton	HV-067	.4346 Pitch x 1 W x 74 Pitches - RJ

## BORG WARNER TORQUE TRANSFER SYSTEMS

Case Model	OEM Mfg	Notes	Morse Part Number	Nominal Chain Dimensions
4426 2-Sp ESOF PT	Ssangyong	Ssangyong Y250 Rexton, C100 Actyon, Q100PU, D100 Kron	HV-027	.5033 Pitch x 1 W x 62 Pitches - RP
4427	Ssangyong	2005-Up D100, Y250, Y300	HV-070	.4346 Pitch x 1-1/4 W x 74 Pitches - RJ Note: 2 Blue links separated by one link
4430 FT 1-Sp TORSON	Audi	AU 756	HV-096	.4346 Pitch x 1-1/4 W x 80 Pitches - RJ
4454 ES/MS PT	Telco	Telco India 1999-Up	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
4462	Range Rover	Land rover 97-Up	HV-057	.5033 Pitch x 2 W x 80 Pitches - RJ
4455 ES/MS PT	Mahindra	Mahindra India	HV-022	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
4470	GM	Full Size Truck 3500/K30 90-96	HV-031	.5033 Pitch x 1-1/2 W x 72 Pitches - RP
4472	GM	90-97 L Van	HV-032	3/8 Pitch x 1-3/4 W x 86 Pitches - RP Note: 2 blue links & rounded link backs straight pitch
4472	GM	90-97 S10/96 Van Safari	HV-033	3/8 Pitch x 1-3/4 W x 86 Pitches - RJ Note: 1 blue link & combination round/square link backs random pitch
4473	GM	GM 610 G Van (Silverado) 2002 and up	HV-076	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
4476	GM	Full Time	HV-076	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
4476	GM	Cadillac SRX 2003 and up	HV-080	.375 Pitch x 1-1/2 W x 74 Pitches - RJ
4477 TOD	GM	Cadillac CTS	HV-099	.375 Pitch x 1-1/4 W x 74 Pitches - RJ ZX
4479 FT 1-Sp	GM	2006 Cadillac STS 6 sp w/V8	HV-097	.375 Pitch x 1-1/2 W x 74 Pitches - RJ ZX
4476, 4479	GM	Cadillac 265, 295 2004 and up	HV-095	.375 Pitch x 1-1/2 W x 74 Pitches - RJ
4481, 4482	GM	GMT820, LD, Tahoe, Yukon, Warrior, Avalanche	HV-076	.4346 Pitch x 1-1/4 W x 84 Pitches - RJ
4484	Hummer/GM	Full Time Hummer 2	HV-077	.4346 Pitch x 1-1/2 W x 84 Pitches - RJ
4484 FT 2-Sp	GM	2007 Hummer 2	HV-502	.4346 Pitch x 1-1/2 W x 84 Pitches - RJ
4485 FT 1-Sp	GM	2007 Excaltade, Tahoe, Yukon	HV-502	.4346 Pitch x 1-1/2 W x 84 Pitches - RJ
4493, 4494 FT 2-Sp	GM	2005 Hummer 3 GM 345	HV-055	.4346 Pitch x 1-1/2 W x 70 Pitches - RJ

\*Important Noise Situation RJ = Rocker Joint RP = Round Pin

### GM L Van All Wheel Drive Astro, Safari, and Cargo Applications with BW 1372/4472 Transfer Case - HV032 (Straight Pitch)

The HV032 and the HV033 applications should not be consolidated or substituted for each other. The HV032 is a straight pitch design, and the HV033 is a random pitch design. If the rebuilder uses the HV033 Random Patterned Chain in the L Van application, the vehicle operator may hear an unsatisfactory “moan” or “boom” noise from the vehicle’s driveline during operation.

Conversely, if the HV032 straight pitch chain (all rounded back links) is used in the GM S Blazer truck, the Bravada, Cyclone, and Typhoon applications that use the BW 1372/4472 with a random chain design, the vehicle owner will hear a whistle or whining noise.



**Morse TEC  
Limited Edition  
BorgWarner, Torque-On-Demand®  
Transfer Case  
Part Number 5005831  
Watch for promotions during the year!**



**OTHER APPLICATIONS: 100 SERIES ARE MANUFACTURED BY MORSE TEC, JAPAN**  
**(This series is special order)**

OEM Mfg	Notes	Morse Part Number	Nominal Chain Dimensions
Austin	Maxi Allegro	HV-008	3/8 Pitch x 1 W x 74 Pitches - RJ
BMW 325 I	4WD Pre 1988	HV-024	3/8 Pitch x 1-3/4 W x 68 Pitches - RJ Straight Pitch (All rounded Link Backs)
BMW 325 I	4WD 89-90	HV-024R	3/8 Pitch x 1-3/4 W x 68 Pitches - RJ Random Pitch, Rounded & Square Link Backs
Dodge Ram 50	4WD 80-Up	HV104	3/8 Pitch x 1-3/4 W x 82 Pitches - RJ
Ford Aerostar	(Dana TC28) 90-97	HV-048	3/8 Pitch x 1-1/4 W x 86 Pitches - RP
Geo Tracker	Suzuki Sidekick 88-Up	HV-110	3/8 Pitch x 1 W x 68 Pitches - RP
Isuzu Trooper	Truck 84-Up	HV-102	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
Mazda	Van & Pickup 84-Up	HV-105	3/8 Pitch x 1-3/4 W x 80 Pitches - RJ
Mazda	MPV 89-Up	HV-111	7/16 Pitch x 1-1/2 W x 84 Pitches - RJ
Mitsubishi	Montero (4WD) 80-Up	HV-104	3/8 Pitch x 1-3/4 W x 82 Pitches - RJ
Mitsubishi	Forte, Montero, Montero Sports Nov 90+	HV-112*	7/16 Pitch x 1-1/2 W x 70 Pitches - RJ
Mitsubishi	Forte, Montero, Montero Sports Nov 90+	HV-113*	7/16 Pitch x 1-1/4 W x 68 Pitches - RJ
Mitsubishi	Montero, Montero Sports Jul 93+	HV-114*	7/16 Pitch x 1-3/4 W x 70 Pitches - RJ
Mitsubishi	Montero Sports 8/98+	HV-115*	3/8 Pitch x 1-1/2 W x 80 Pitches - RJ
Nissan	Pathfinder/Truck 85-Up	HV-106	3/8 Pitch x 1-3/4 W x 88 Pitches - RJ
Nissan	Pathfinder 7/95-Up	HV-116*	7/16 Pitch x 1-1/4 W x 76 Pitches - RJ
Nissan	Van 86-Up	HV-107	3/8 Pitch x 1-1/4 W x 88 Pitches - RJ
Safari	Safari 87-Up	HV-108	3/8 Pitch x 1-7/8 W x 88 Pitches - RP
Scout II, IHC	(4WD) 73-79	HV-006	3/8 Pitch x 2 W x 92 Pitches - RJ
Suzuki, Chev Tracker	Suzuki Vitara/Chev Tracker 8/96-Up	HV-118*	3/8 Pitch x 1 W x 68 Pitches - RJ
Toyota	4-Runner/Truck 84-86	HV-102	.5033 Pitch x 1-1/4 W x 62 Pitches - RP
Toyota	4-Runner/Truck 87-7/88	HV-109B*	7/16 Pitch x 1-1/2 W x 74 Pitches - RJ Random pattern, springload
Toyota	4-Runner/Truck 87-93	HV-109B*	7/16 Pitch x 1-1/2 W x 74 Pitches - RJ Random pattern, springload
Toyota	4-Runner, Tacoma 4/93-Up	HV-117*	7/16 Pitch x 1-1/4 W x 74 Pitches - RJ Latest Link Profile
Toyota	Van 85-Up	HV-103	.5033 Pitch x 1 W x 62 Pitches - RP
Getrag	Specialty Gearbox	372828	3/8 Pitch x 1-1/4 W x 66 Pitches - RJ

\*Special Order Only RJ = Rocker Joint RP = Round Pin

# Interchange

OEM	NAME	MORSE #
11428	NVG	HV005
13433	NVG	HV009
13797	NVG	HV012
13798	NVG	HV014
15027	NVG	HV015
15569	NVG	HV022
15908	NVG	HV022
16067	NVG	HV026
16417	NVG	HV027
16418	NVG	HV028
16624	NVG	HV025
16977	NVG	HV061
17167	NVG	HV022
17536	NVG	HV031
17550	NVG	HV034
17577	NVG	HV060
21967	NVG	HV074
22182	NVG	HV069
22500	NVG	HV062
23750	NVG	HV063
24273	NVG	HV064
26976	NVG	HVS071
27293	NVG	HV059
30965	NVG	HV071
31534	NVG	HV072
38985	NVG	HV081
433782	DANA	HV048
474613	GM	HV009
801145	CHRYSLER	HV007
2922578	SUZUKI	HV118
3821373	CHRYSLER	HV005
4115334	GM	HV009
4167995	CHRYSLER	HV025*
4338935	CHRYSLER	HV027
4446464	AMC	HV022
4539777	CHRYSLER	HV046
4636961	CHRYSLER	HV022
4638890	CHRYSLER	HV028

OEM	NAME	MORSE #
4659187	CHRYSLER	HVS047
4659190	CHRYSLER	HV047
4659232	CHRYSLER	S123B
4659233	CHRYSLER	S122A
4728159	CHRYSLER	HV034
4746147	CHRYSLER	HV031
4746257	CHRYSLER	HV025
5003453AA	CHRYSLER	HV063
5012322AB	CHRYSLER	HV071
5080215AA	CHRYSLER	HV081
5086328AA	CHRYSLER	HV064
5740090	AM GENERAL	HV026
6273991	GM	HV005
8130977	CHRYSLER	HV014
8134471	CHRYSLER	HV022
8624944	GM	HV001
8625946	GM	HV001
8632901	GM	HV010
8635171	GM	HV016
8637187	GM	HV019
8643337	GM	HV019
8646116	GM	HV018
8653991	GM	HV019
8660099	GM	HV018
8679627	GM	HV037
8682603	GM	HV035
8685784	GM	HV038
8709272	SAAB	HV003
12384954	GM	HV074
12473234	GM	HV069
12474602	GM	HV072
12544311	GM	HV025
12544694	GM	HV031
12544695	GM	HV025
12547628	GM	HV062
14037982	GM	HV014
14071706	GM	HV022
14079006	GM	HV022

OEM	NAME	MORSE #
15547422	GM	HV025
15580279	GM	HV025
15581813	GM	HV027
15619392	GM	HV031
15634064	GM	HV033
15635937	GM	HV022
15963558	GM	HV032
19132837	GM	HV097
19151772	GM	HV502
24200738	GM	HV039
24200771	GM	HV036
24202447	GM	HV035
24206043	GM	HV038
24206266	GM	HS003
24206267	GM	HS004
24206268	GM	HS005
24206269	GM	HS006
24206270	GM	HS007
24206271	GM	HS008
24206434	GM	HV065
24210129	GM	HV058
24229085	(2) GM	HV093
30651660	VOLVO	HV094
2922560A01	SUZUKI	HV110
2922560A00	GEO	HV110
35735010	ISUZU	HV102
83503146	CHRYSLER	HV027
83504575	CHRYSLER	HV028
88935661	GM	HV059
89059571	GM	HV055
96067054	SUZUKI	HV110
3315201J00	NISSAN	HV108
3315230C00	NISSAN	HV107
3315233G01	NISSAN	HV106
331520W410	NISSAN	HV116
3315230C00	NISSAN	HV107
501309297	BMW	HV024
501311424	BMW	HV024R

## Interchange (Continued)

OEM	NAME	MORSE #	OEM	NAME	MORSE #	OEM	NAME	MORSE #
1345143002	WARNER GEAR	HV012	4472143001	WARNER GEAR	HV032	F6RZ7G249BA	FORD PROBE	HV045
1350143001	WARNER GEAR	HV022	8971292370	ISUZU	HV056	F5TZ7A029A	FORD	HV054
13611343001R	WARNER GEAR	HV049	13630591010	HONDA	HV004	F65Z7A029AA	FORD	HV052
1370143001	WARNER GEAR	HV025	25780016010	TOYOTA	HV101	F68P7G249AA	FORD	HV041
1370143002	WARNER GEAR	HV031	27241226319	BMW	HV024	F70Z7G249AA	FORD	HV042
1372143001	WARNER GEAR	HV033	0435143002V	BLMC/WOLSELEY	HV002	F75Z7A029AA	FORD	HV053
3578116010	TOYOTA	HV101	0437143001X	SAAB	HV023	F87Z7A029BB	FORD	HV070
3629328010A	TOYOTA	HV103	12352L1101	NISSAN	HV020	J8130831	CHRYSLER	HV015
3629328010	TOYOTA	HV103	13611343001R	RANGE ROVER	HV049	J8134471	CHRYSLER	HV022
3629335010	TOYOTA	HV109B	3080173001DA	ISUZU	HV102	M50117945	MAZDA	HV105
3629335020	TOYOTA	HV109B	3090173001DA	TOYOTA	HV102	MD446415	MITSUBISHI	HV115
3629335010	TOYOTA	HV109B	3315201J00	NISSAN	HV108	MD704196	CHRYSLER	HV104
3629335021	TOYOTA	HV109B	3315233G01	NISSAN	HV106	MD738550	MITSUBISHI	HV113
3629335030	TOYOTA	HV117	3629328010A	TOYOTA	HV103	MD886422	MITSUBISHI	HV112
3629335031	TOYOTA	HV117	42169C1	IHC	HV006	MD936280	MITSUBISHI	HV114
4351430021	SAAB	HV003	D4TZ7A029A	FORD	HV005	RTC6041	LR/RR	HV049
4400143002	WARNER GEAR	HV051	D8TZ7A029A	FORD	HV009	R50117945B	MAZDA	HV111
4400143005	WARNER GEAR	HV053	E0T27A029A	FORD	HV012	XL2Z7A029AA	FORD	HV051
4400143006	WARNER GEAR	HV056	E0T27A029B	FORD	HV013	XL2Z7A029BB	FORD	HV067
4400143007	WARNER GEAR	HV052	E2T27A029A	FORD	HV012	XL3Z7A029AA	FORD	HV066
4400143009	WARNER GEAR	HV055	E3T27A029A	FORD	HV022	XR83320	LR/RR	HV049
4400143010	WARNER GEAR	HV027	E6DZ7G249A	FORD	HV021	1L2Z7A029LA	FORD	HV078
4400143013B	WARNER GEAR	HV066	E6SP7G249AA	FORD	HV021	1L5Z7A029AA	FORD	HV068
4400143014	WARNER GEAR	HV067	E8DZ7G249A	FORD	HV029	3L5Z7A029AA	FORD	HV022
4400143015	WARNER GEAR	HV051	F09Z7A029A	FORD	HV048	5F2P7G249AA	FORD	HV092
4400143017	WARNER GEAR	HV070	F3DZ7G249A	FORD	HV040	5L5Z7A029AA	FORD	HV505
4400143021B	WARNER GEAR	HV068	F3RP7G249DA	FORD	HV043	4F2Z7G249AA	FORD	HV042
4400143023A	WARNER GEAR	HV076	F3RP7G249FA	FORD	HV045	4F1Z7G249AA	FORD	HV075
4400143024A	WARNER GEAR	HV080	F3RP7G249GA	FORD	HV044	473564B000	HYUNDAI	HV027
4400143025A	WARNER GEAR	HV077	F3RZ7G249A	FORD	HV043	47356H1000	HYUNDAI	HV070
4400143027	WARNER GEAR	HV078	F5DZ7G249A	FORD	HV042	88996485	GM	HV076
4401143001	WARNER GEAR	HV025	F50P7G249AA	FORD	HV042	88996668	GM	HV080
4407143001	WARNER GEAR	HV054	F57Z7A029A	FORD	HV051	88984521	GM	HV077
4411143003	WARNER GEAR	HV067	F5RZ7G249B	FORD	HV045	7L1Z7A029A	FORD	HV076
4411143005	WARNER GEAR	HV067	F5RZ7G249C	FORD	HV044	8L8Z6G249A	FORD	HV044
4462143001	WARNER GEAR	HV057	F6RZ7G249AA	FORD 2.0L	HV043			
4470143001	WARNER GEAR	HV031	F6RZ7G249CA	FORD 2.5L	HV044			

\*HV025 is a round pin design which is the latest for the NVG 208 Dodge and NVG 241 GM & Dodge applications. The HV025 can replace the HV014 without sprocket problems in these applications.

## Troubleshooting Guide for Transmission and Transfer Case Hy-Vo Chain and Sprockets

SYMPTOM	CAUSE(S)	CURE(S)
<b>Excessive Chain Wear on the guide link inside flank area</b>	Sprockets misaligned or out of parallel.	Realign sprockets.
<b>Chain wear on Outside/Back of chain</b>	Interference with case and/or excessive elongation.	Replace chain and sprockets.
<b>Burnt Chain</b>	Overheating, lack of lubrication.	Replace chain and inspect the lubrication situation.
<b>Rusty Chain</b>	There may be corrosion in the system or inadequate lubrication.	Avoid abuse, replace sprockets, check for water in oil, replace any faulty seals or breather elements, and correct lubrication situation.
<b>Broken Links, Turned Pins</b>	Drive system may be overloaded or there may be excessive slack in the chain causing it to "jump teeth." Or, there may be a foreign object in the system.	Replace the chain, remove and repair the damage. Avoid overloading the drive system.
<b>Extreme flank wear</b>	Worn sprockets, lack of proper lubrication.	Replace sprockets and chain and correct the lubrication problem.
<b>Excessive premature Sprocket Wear</b>	Mismatched new and old sprocket.	Always replace both sprockets.
<b>Sprocket wear</b> — Light Wear — Heavy Wear - Pitting	A certain amount is normal.	For heavy wear: Replace both the sprocket and chain.
<b>Lubrication smells bad and is dark in color.</b>	Overheating.	Drain and flush the case, check for cause of overheating and damaged components, replace the chain, refill lubricant to manufacturer specifications.  In automatic transmissions, check for slipping clutches or a failed torque converter.
<b>Excessive noise or vibration</b>	Broken links, inadequate lubrication, misalignment, or eccentricity/face runout in sprocket.	Replace with properly machined sprockets, replace chain, check shafts of sprockets and realign, check bearings, correct any lubrication situation to manufacturer specifications.
<b>Milky or muddy Lubrication</b>	Probable water contamination.	Drain and flush case several times (at least three), check seals and breather components, check for other damaged components, replace chain and refill lubrication to manufacturer specs.



## Porque la Cadena Morse® Hy-VO®?

### Características y Beneficios de Diseño:

**Estilos de Diseño específicos de Aplicaciones:** Morse ofrece una completa línea de aplicaciones que incluye perno redondo, tres estilos de cadena con unión de perno oscilante, eslabones guía ET, y el nuevo sistema patentado Morse Gemini® system. Cada uno de estos estilos son específicos por aplicación dependiendo de las cargas, las condiciones operativas, y el espacio de operación. (No se recomienda substituir estilos de diseño, puesto que el acoplamiento con los engranes se vería afectado.)

**Eslabones Guía ET:** El nuevo diseño patentado de eslabones guía ofrece una mejor distribución de la carga durante la operación. El diseño de cadenas será perfeccionado basados en las conversiones de servicio en Equipo Original.

**Aleatorización de la Cadena:** Este es un diseño patentado que utiliza dos diferentes estilos de eslabones para eliminar las frecuencias creadas en el acoplamiento con el engrane. Los patrones son seleccionados cuando se realiza el diseño de Equipo Original para minimizar el ruido y los niveles de vibración, así como para optimizar las fuerzas operativas de cada aplicación.

### Características y Beneficios de Calidad:

**Calidad y Certificación de Equipo Original:** Además de tener la certificación QS 9000, los productos Morse HyVo, utilizan sólo aceros de la más alta calidad para los eslabones y los pernos. Esto significa que la lámina no tiene en sí inclusiones ni impurezas, contribuyendo a mejores características de tensión, fatiga y desgaste. Así mismo, el diseño y las tecnologías de manufactura especiales crean la cadena de mejor calidad en el mercado de refacciones.

### Notas Importantes para los Reconstructores:

**Elongación de Cadena:** A pesar de los productos Morse HyVo, son fabricados para tener una máxima duración, cuando el reconstructor tiene la unidad desmontada, los engranes y las cadenas deben ser verificados.

Recuerde que es muy difícil para el cliente de refacciones medir la elongación de la cadena. Una razón para esto es el movimiento del árbol de levas cuando la unidad se encuentra separada. En algunos casos, cuando el árbol de levas está fijo y sin cubierta, la estimación de una persona experimentada en el campo puede ser aceptable.

Morse cuenta con equipo especial para medir los parámetros de elongación. Además cada aplicación puede ser diferente dependiendo de los parámetros de la aplicación.

Si no se utiliza el equipo adecuado para medir la elongación de la cadena, el rango de precisión o de error es de 50%. Cada aplicación tiene sus propias variaciones y las especificaciones recomendadas por el fabricante para las tolerancias de la cadena deben ser referenciadas.

**Si la cadena ha estado en servicio por más de 60,000 millas (95,000 kms),  
si la unidad está rasgada, si muestra  
signos de problemas, descuido o desgaste – reemplace la cadena.**





## Pourquoi la chaîne Hy-Vo® Morse®

### Caractéristiques de conception et avantages

**Applications des styles de dessin spécifiques:** Morse propose une ligne complète d'applications qui comprend des broches circulaires, trois sortes de chaînettes de raccordement de culbuteur, les chaînes de guidage ET et le Morse Gemini® system récemment breveté. Chacun d'entre eux est particularisé par des applications basées sur les charges, les conditions de fonctionnement, l'encombrement. (Substituer les styles de dessin n'est pas recommandé puisque l'enclenchement des pignons en serait affecté.)

**Chaînes de guidage ET:** Un dessin de chaîne de guidage récemment breveté permet une meilleure distribution de la charge lors du fonctionnement. Les dessins de chaînes seront améliorés sur les bases de conversions service OE.

**Randomisation de la chaîne:** C'est un dessin breveté utilisant deux styles différents de maillons pour supprimer les fréquences créées par l'enclenchement des pignons. Les modèles sont sélectionnés lors du dessin OE afin de minimiser les niveaux de bruit et de vibration et pour optimiser la durée de vie pour chaque application.

### Caractéristiques qualité et avantages

**Qualité et Certification OEM:** En plus d'avoir la certification QS 9000, les produits Morse Hy-Vo sont faits uniquement à partir des meilleures qualités de métal pour les maillons et les broches. Ceci signifie qu'il n'y a aucune inclusion ou pollution dans le métal lui-même. Ceci contribue à l'obtention des meilleures caractéristiques de fatigue, de ductilité et d'usure. Le dessin déposé ainsi que les techniques de fabrication contribuent à proposer la meilleure qualité de chaînes sur le marché.

### Remarques importantes d'entretien

**Allongement de la chaîne:** Même si les produits Morse Hy-Vo sont conçus pour durer, si l'unité est démontée, le réparateur devra faire une révision complète des pignons et de la chaîne.

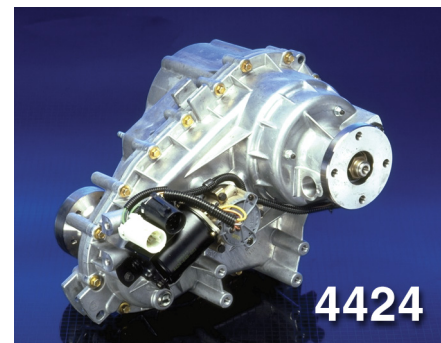
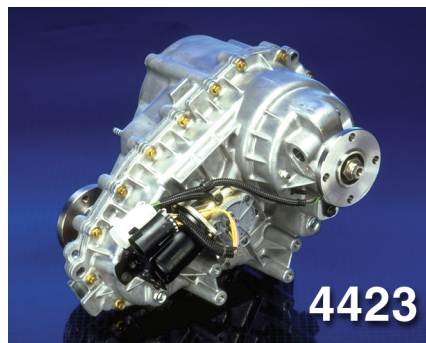
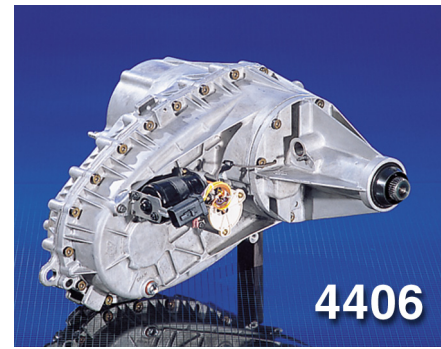
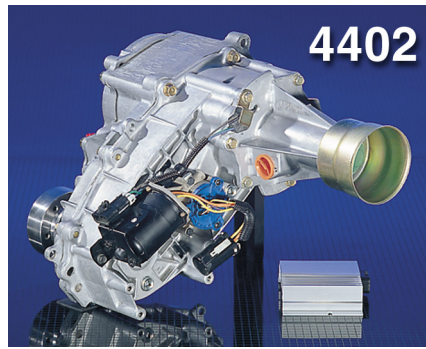
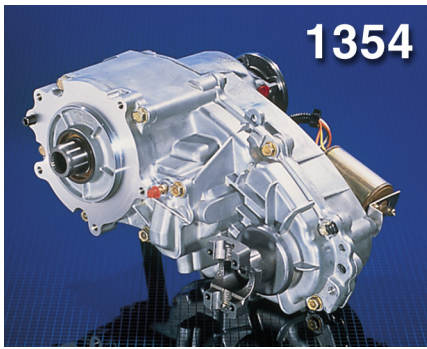
Il faut noter qu'il est très difficile pour un client de mesurer l'allongement de la chaîne. Notamment à cause du mouvement de l'arbre lorsque l'unité est démontée. Dans certains cas, lorsque les arbres sont fixés et le couvercle enlevé, l'avis d'une personne expérimentée est conseillé.

Morse a des équipements spéciaux pour mesurer les paramètres d'allongement. De plus, chaque application peut être différente en fonction des paramètres d'application.

Le pourcentage d'exactitude ou d'erreur est de 50% si l'on n'utilise pas le matériel adéquat pour mesurer l'allongement d'une chaîne. Chaque application a ses propres variations et les spécifications recommandées par le constructeur pour les tolérances des chaînes doivent être consultées.

**Il faut remplacer la chaîne:  
Tous les 60,000 miles, Si l'unité est arrachée, si l'unité présente des  
signes de défaillance, de mauvais entretien ou d'usage abusif.**

## BorgWarner TTS Transfer Case Photo Gallery



Notes: