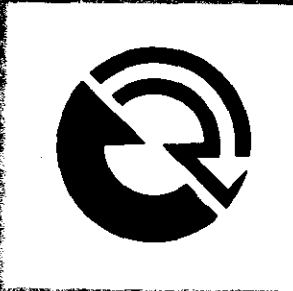


SALES AND APPLICATIONS

data

ALLISON TRANSMISSIONS



OFF-HIGHWAY DATA BOOK INDEX

Volume I

I. Condensed Catalog

SA 1232

Allison Off-Highway Transmissions

II. Specification Data Sheets and Sales Briefs

Sales Brief Index

Cycling Transmissions

TT, TRT, TTB-2000
Specification Sheet
Sales Brief
Operators Manual

SA 1610
58L
SA 1336

TT-3000
Specification Sheet
Sales Brief
Operators Manual

SA 1518
77A
SA 1336*

TT, TRT-4000
Specification Sheet
Sales Brief
Operators Manual

SA 1154D
71E
SA 1336

CRT-3000
Specification Sheet
Sales Briefs
Operators Manual

SA 1069H
38F, 52E
SA 1355

CRT-5000
Specification Sheet
Sales Briefs
Operators Manual

SA 1573
78B, 37E
SA 1355

Hauling Transmissions

CLT-3000
Specification Sheet
Sales Brief
Operators Manual

SA 1080E
54F
SA 1354

CLT-600
Specification Sheet
Sales Brief
Operators Manual
Mechanics Tips

Not Available
75
SA 1475*
SA 1491*

CLBT-4000	
Specification Sheet	SA 1113F
Sales Brief	57E
Operators Manual	Not Available

CLBT-700	
Specification Sheet	SA 1388B
Sales Brief	72G
Operators Manual	SA 1475
Mechanics Tips	SA 1491

CLBT-5000/6000	
Specification Sheet	SA 1216E
Sales Brief	53K, 37E
Operators Manual	SA 1318

DP-8000	
Specification Sheet	SA 1150D
Sales Brief	64I
Operators Manual	SA 1318

Industrial Torque Converters

Specification Sheet	SA 1352
Operators Manual	SA 1405

TC-300	
Sales Brief	60G

TC-400/500	
Sales Brief	35I

TC-800/900	
Sales Brief	59D

*Transmission model will be included in next revision of manual.

III. General Sales Briefs & Miscellaneous

Sales Briefs

9J	Temperature & Pressure Gauges
28J	Oil Filters
40B	Implement Pumps - CRT-300 Series
42K	Oil Recommendations
56B	Paint Specifications
65	Driveline Angularity Recommendations

IV. Match Charts

Index
200, 300, 400, 500, 600, 800, 900 Series Converters

V. Converter Curve Listings

Engine-Converter Match Listing - SA 1307A

Volume II

VI. AS Drawings

Index

- General
- Physical Adaptations

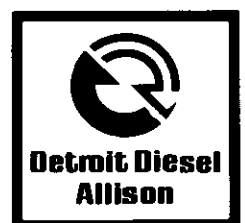
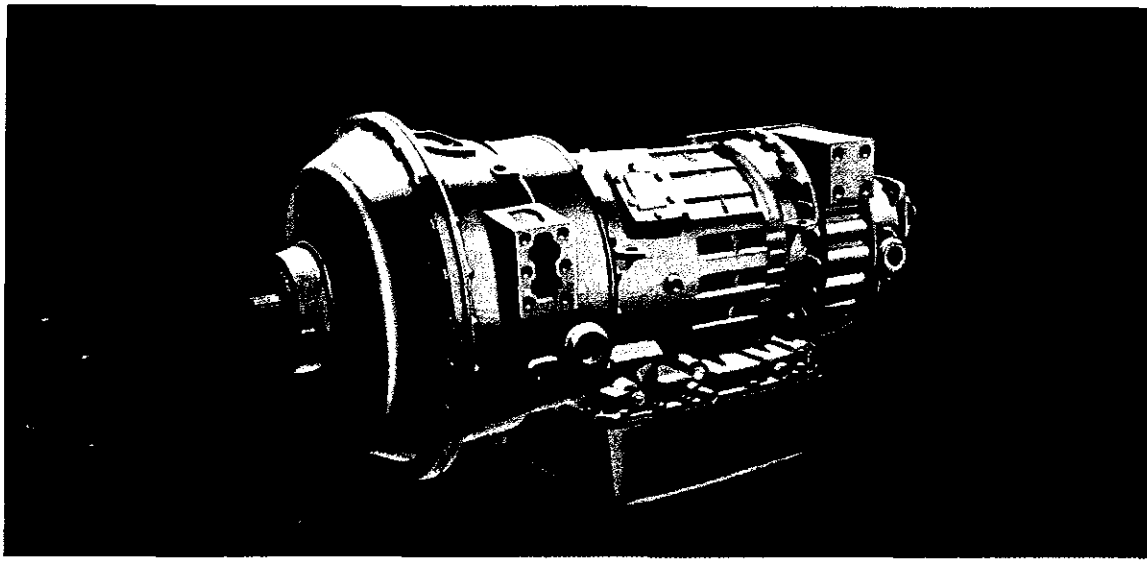
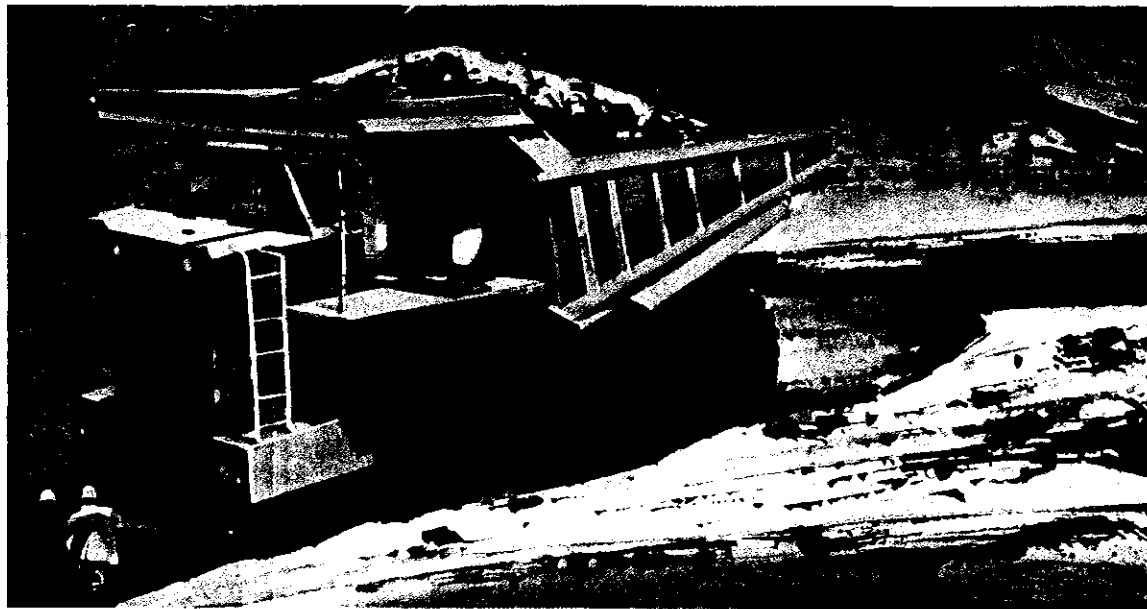
Sections

-00, 04, 22, 31, 32, 33, 34, 36, 40, 42, 44, 45, 51, 52, 56, 58, 80, 81



Allison Transmissions

for
off-highway
applications



Introduction

This catalog will acquaint you with Allison Powershift and Automatic Transmissions for on/off-road hauling and cycling vehicles.

It includes information about . . .

- Allison Transmission performance capabilities
- Optional equipment for different applications
- Cost-cutting advantages
- Available control systems
- Specifications and models
- Parts and Service support

Proven performance

Allison Powershifts were the first powershift transmissions to appear on

the construction scene, and they have received outstanding acceptance since their introduction. Over 200 OEM's currently offer Allison Powershifts in over 1000 equipment models.

Detroit Diesel Allison manufactures a total line of Powershift and Automatic Transmissions and torque converters for on-highway and off-highway applications. That variety, along with the experience gained from over one million Allison Transmissions produced since 1948, means that you get a proven, efficient, and durable product.

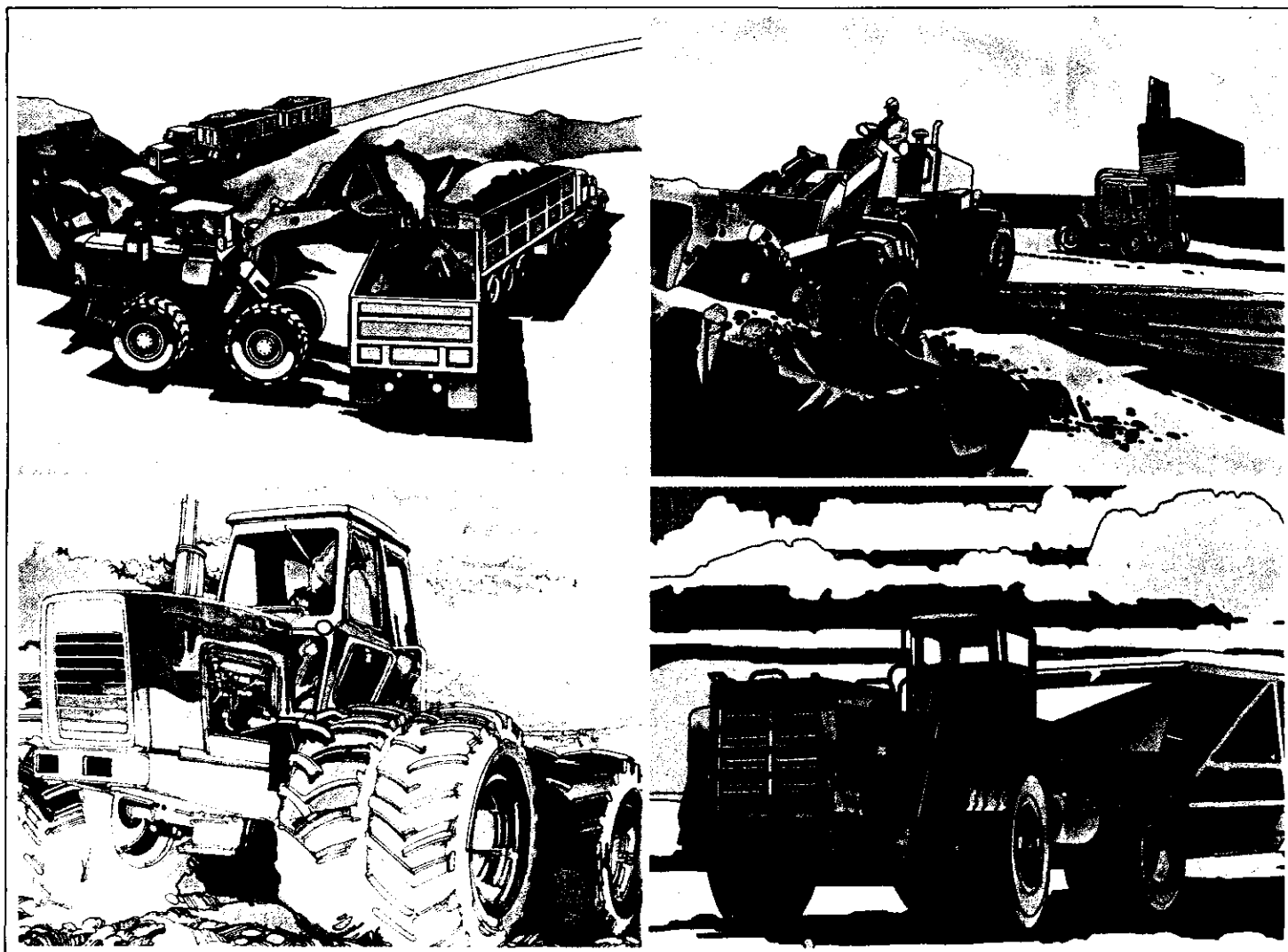
Design adaptability

Allison Powershifts and Automatic Transmissions are built to fit almost any

construction, industrial, or agricultural equipment need.

Allison Transmission design enables them to be adapted easily to vehicles requiring either straight-thru or drop box transmission configurations. The design also incorporates multiple power takeoff positions directly from the engine or torque converter.

This adaptability is one reason why Allison Transmissions have been chosen for such a wide variety of construction, industrial and agricultural vehicles by such a large number of original equipment manufacturers. You can find just the equipment you need—and it is likely to have an Allison Transmission available.



Allison Transmission Advantages

Acceleration and performance

The combination of the Allison torque converter and planetary gear system provides smooth, immediate acceleration under any load and terrain condition and permits quick, full-power shifts in all speed ranges. In addition, engine lugging and drive line shock is reduced to a level that considerably improves vehicle component life.

All this is achieved because the torque converter hydraulically and automatically multiplies engine output torque in relation to load and speed demands in the speed range selected. The equipment can therefore operate at top efficiency all the time.

Improved operator efficiency

The Allison Transmission design eliminates the need for clutch pedals and reduces the number of shift levers the operator must manipulate. His shifting duties are limited to the selection of the direction and the speed range.

The hydraulically controlled gear ratios provide constant speed control for precision work. There is no guesswork about shifting. The operator can concentrate more attention on his steering and implement or accessory controls. His feel of the load and terrain or highway is better. The simplification of the job and the reduction of fatigue result in improved driver efficiency.

Lower operating costs

Allison planetary gear clutches are hydraulically actuated and self-adjusting for their lifetime. There is no mechanical dry clutch to replace when worn or damaged.

Hydraulic torque conversion and automatic gear ratio selection within any speed range eliminate both mis-shifts and engine overload. Parts replacement costs are cut because damage and wear are eliminated or reduced to minimum.

There is no fuel waste with Allison Transmissions, because the power output is automatically matched to the load and travel demands, and the engine is operating efficiently at all times—in any speed range.

Increased vehicle availability and productivity

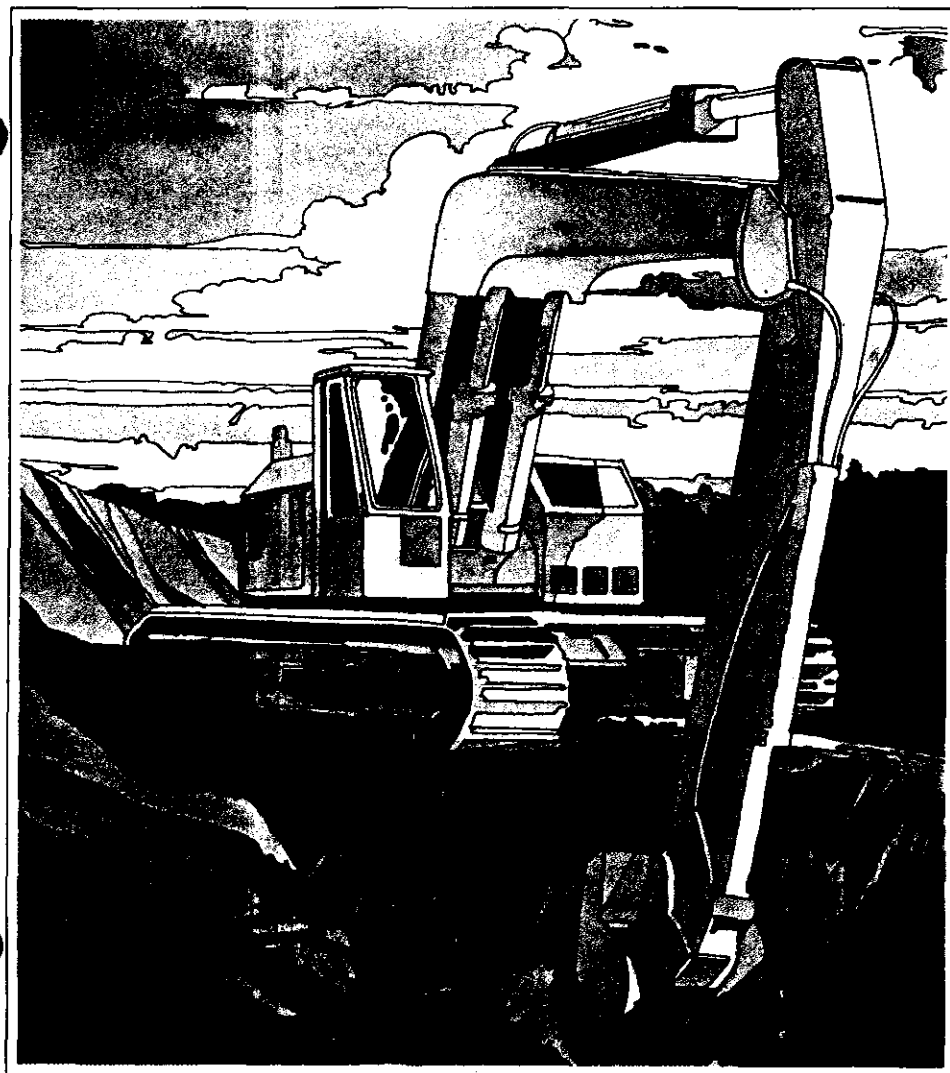
The hydraulic cushion inherent in the Allison Torque Converter reduces shock and strain on the engine, axles, universal joints, and driveline components. This cushion not only prevents harmful engine lugging and resulting damage but also protects all parts of the transmission itself from harmful stress.

This protective factor helps to reduce vehicle downtime for vehicles equipped with Allison Transmissions. Machine availability is therefore higher whenever there's work to be done, and each vehicle is on the job more hours during its lifetime, producing more income for you.

Greater ruggedness and longer life

The gear teeth in the Allison Transmission planetary gear system are subjected to far less stress than those in non-planetary systems. The transfer of work from sun gear to ring gear to planet pinion gears distributes the torque forces involved over a greater total area, and thereby reduces the torque load on any one gear or gear tooth.

In addition, the high-strength, low-stress Allison Transmission planetary gear teeth are crowned, induction hardened, frozen, and heat treated to insure maximum toughness and fatigue-resistance.



Hauling Transmissions

Vehicles for hauling operations

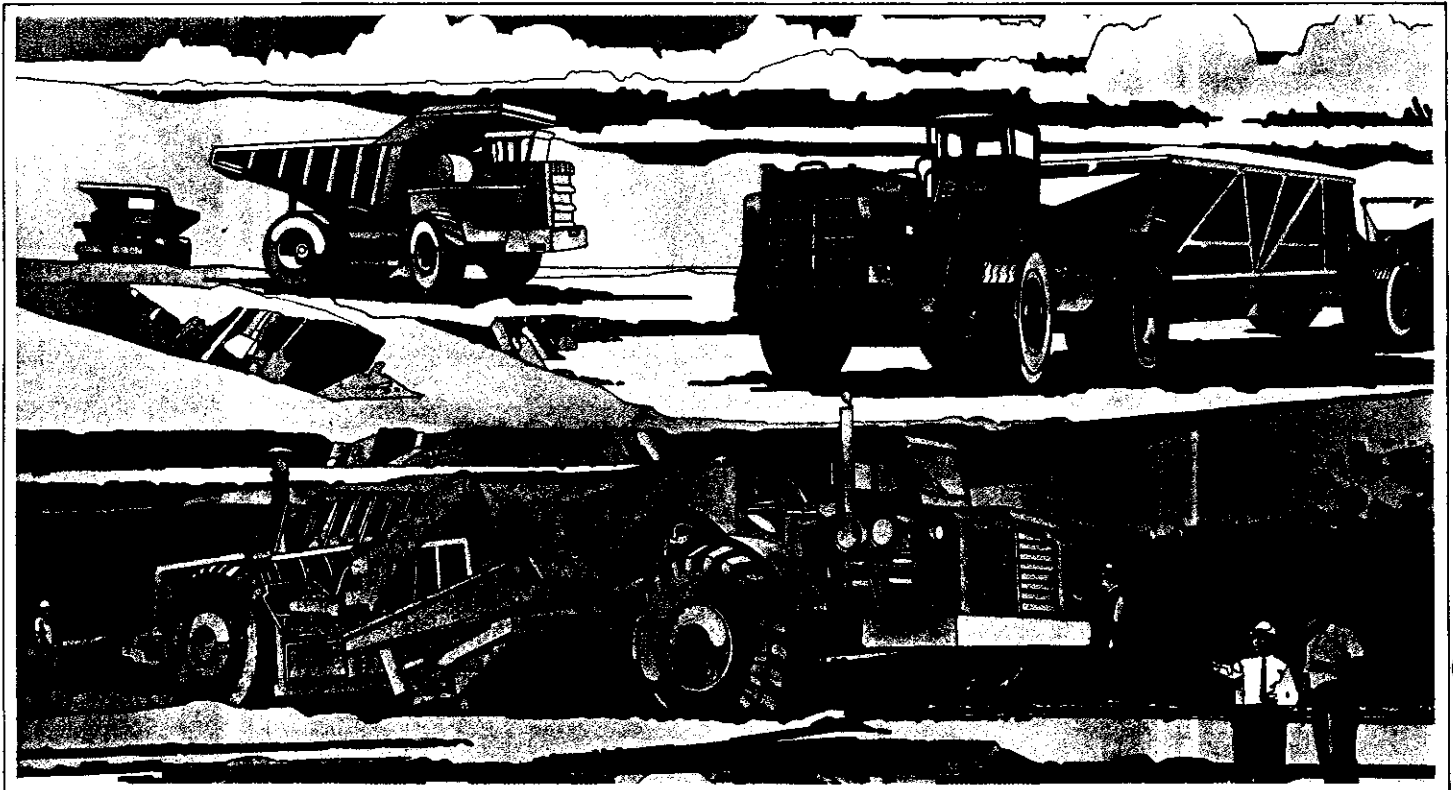
There is an Allison Powershift or Automatic transmission for practically every type of vehicle used in on/off road hauling operations. This category of equipment includes almost any truck, tractor, or service unit of 100 to 1050 HP that must travel at near-normal speeds on the highway, and at lesser speeds off the highway.

Allison hauling transmissions are therefore available, according to size, with either 4, 5 or 6 forward speed ranges, and 1 reverse. Such features as an integral lockup clutch, hydraulic retarder, and variable input capacity converter can be incorporated.

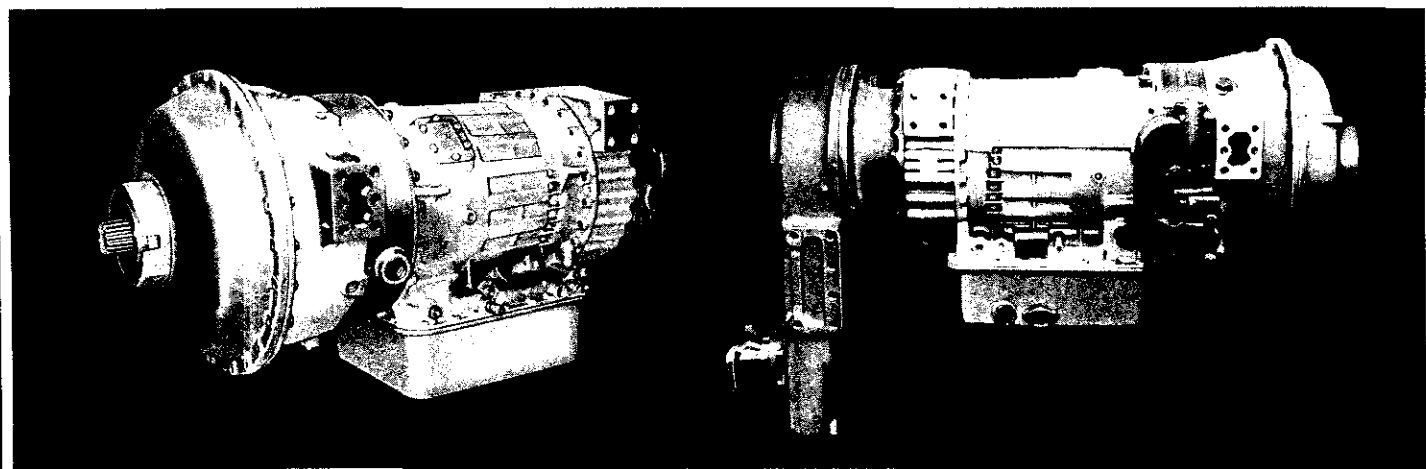
Explanation of hauling model designations

- CT —Converter-Transmission Package
- CLT —Above with Lockup Clutch
- CLBT—Above with Hydraulic Retarder
- DP —Dual Path Transmission With Lockup Clutch and Hydraulic Retarder
- V —Variable Input Capacity Converter

TYPE OF VEHICLE AND APPLICATION	HORSEPOWER RANGE	TRANSMISSION MODEL
CRANE CARRIERS, RUBBER-TIRE TRACTORS, SNOW PLOWS, TRACKLAYING TRANSPORTS	100-200 200-266 Up to 475	AT 540 MT 654 CR CLBT 750
CABLE PULLERS, MOTOR GRADERS, STRADDLE TRUCKS	100-200 200-266	AT 540 MT 654 CR
BOTTOM DUMP TRUCKS	200-266 Up to 475 325-675 700-1050	MT 654 CR CLBT 750 CLBT 5000/6000 DP 8000
DRAW WORKS AND DRILLING EQUIPMENT	Up to 475 325-675 700-1050	CLT 750 CLBT 5000/6000 DP 8000
LOGGING TRUCKS, OIL WELL CEMENTING, FRACTURING, WORKOVER AND SERVICING RIGS, OFF-HIGHWAY REAR DUMPS	200-266 Up to 475 325-675 700-1050	MT 654 CR CLBT 750 CLBT 5000/6000 DP 8000
OFF-HIGHWAY HAULING TRUCKS TRACTORS (4-WD AGRICULTURAL)	200-266 Up to 475 325-675 700-1050	MT 654 CR CLBT 750 CLBT 5000/6000 DP 8000
SCRAPER TRACTORS	Up to 475 325-675	CLBT 750 CLBT 5000/6000
SPECIAL PURPOSE TOOLS AND EQUIPMENT	700-1050	DP 8000
TOW TRACTORS AND TUGS	100-200 Up to 475 325-675	AT 540 CLBT 750 CLBT 5000/6000
TRACTORS (2-WD AGRICULTURAL), FERTILIZER SPREADER/SPRAYER, BANKOUT WAGONS, COMBINES/HARVESTERS	60-200 150-266 Up to 425	AT 540 MT 600 HT 700



Hauling Operations—Series CL(B)T 750 (DB)

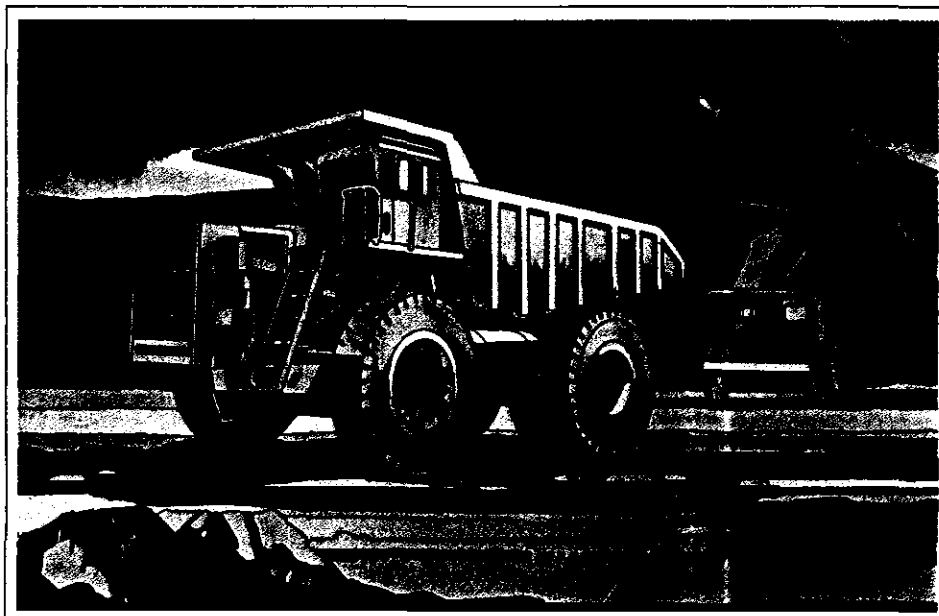


The first fully automatic transmission for on/off highway hauling vehicles is the Allison CLBT 750. It is the one of its kind—in a family of transmissions that has already done much pioneering.

The CLBT 750 is matched to vehicles powered by as much as 475 horsepower, and is applicable to heavy-duty work such as construction, mining, and logging.

Features and options

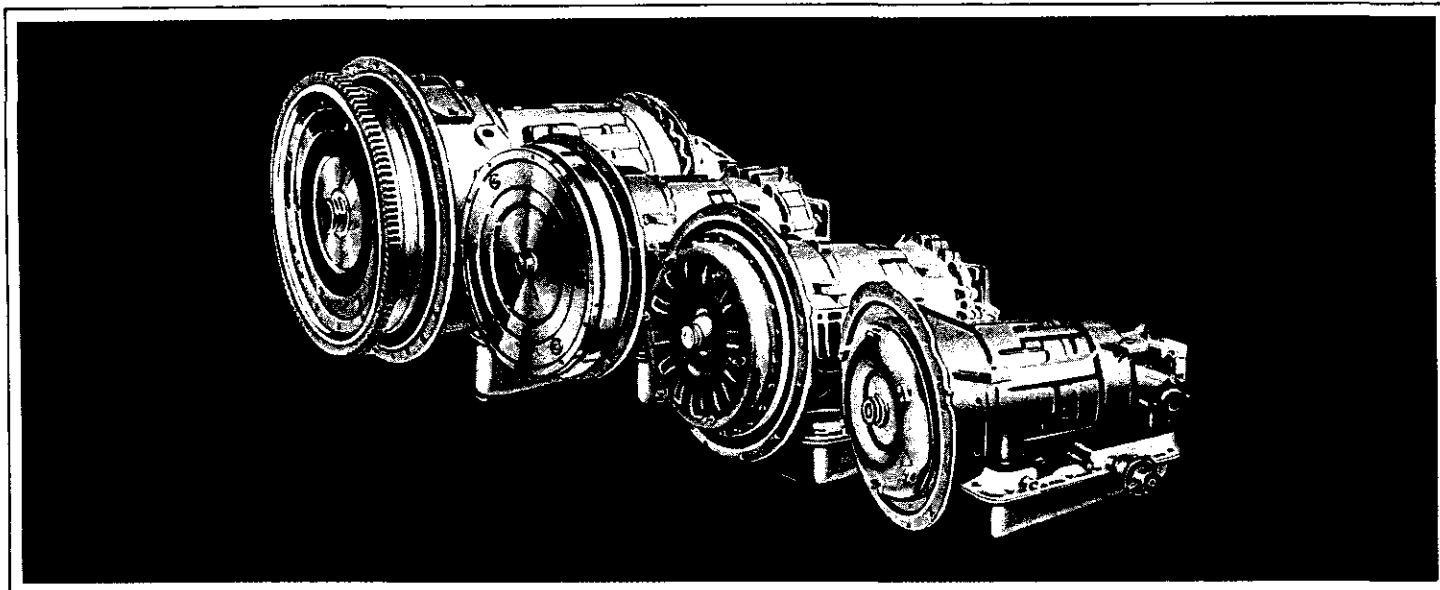
- Engine mount or remote mount
- Lockup clutch
- Automatic upshifting and downshifting in all ranges above second, with hold in each range
- Hydraulic retarder
- Provisions for engine- and/or converter-driven power takeoff
- Choice of torque converters to match wide range of diesel engines
- Choice of straight-through or drop-box models



ITEMS	MODELS					
	STRAIGHT-THRU		DROP BOX: GENERAL*		DROP BOX: SCRAPERS	
SPEEDS FORWARD	5		5		5	
SPEEDS REVERSE	1		1		1	
MAX. INPUT SPEED	2500 RPM		2500 RPM		2500 RPM	
MAX. INPUT TORQUE	1300 lb ft	1762 N·m	1300 lb ft	1762 N·m	775 lb ft	1051 N·m
APPROX. DRY WEIGHT	975 lbs	442 Kg	1475 lbs	670 Kg	1475 lbs	670 Kg
(ADD) RETARDER	200 lbs	90.7 Kg	200 lbs	90.7 Kg	200 lbs	90.7 Kg
APPROX. OVERALL LENGTH	47.8 in	1214 mm	55.8 in	1417 mm	55.8 in	1417 mm
REMOTE MOUNT	54.6 in	1387 mm	62.5 in	1590 mm	62.5 in	1590 mm
APPROX. OVERALL HEIGHT	26.1 in	665 mm	37.7 in	958 mm	37.7 in	958 mm

*Except where disconnects are used

Hauling Operations—AT, MT & HT Automatics



Features and options

- Converter-driven power takeoff
- Neutral start switch
- Reverse signal switch
- SAE regular speedometer drive
- Drum-type parking brake
- Mechanical shift modulation control (MT and HT)
- Choice of converters
- Driver controlled hydraulic retarder
- Inhibitors to prevent harmful downshifts or reverse shifts

AT Series

	NET INPUT POWER	INPUT SPEED	NET INPUT TORQUE	LENGTH	WIDTH	HEIGHT	WEIGHT (DRY) (APPROX.)
	235 hp (175 kW) (max)	2400-3200 rpm* (diesel) 3200-4000 rpm* (gasoline)	385 lb ft (522 N·m) (max)	27.22 in (691 mm) (max)	20.72 in (526 mm)	18.90 in (480 mm)	275 lbs (125 kg)

MT Series

	250 hp (186 kW) (max)	4000 rpm* (max) 2200 rpm* (min)	480 lb ft (651 N·m) (max)	30.70 in (780 mm) (max)	19.25 in (489 mm)	21.60 in (549 mm)	510 lbs (231 kg)
	250 hp (186 kW) (max)	4000 rpm* (max) 2200 rpm* (min)	480 lb ft (651 N·m) (max)	36.23 in (920 mm) (max)	19.25 in (489 mm)	21.60 in (549 mm)	540 lbs (245 kg)
	250 hp (186 kW) (max)	3000 rpm* (max) 1900 rpm* (min)	780 lb ft (1060 N·m) (max)	30.42 in (773 mm) (max)	19.25 in (489 mm)	21.60 in (549 mm)	600 lbs (272 kg)
	266 hp (198 kW) (max)	3000 rpm* (max) 1900 rpm* (min)	780 lb ft (1060 N·m) (max)	36.23 in (920 mm) (max)	19.25 in (489 mm)	21.60 in (549 mm)	625 lbs (285 kg)

HT Series

	425 hp (317 kW) (max)	2800 rpm* (max) 1800 rpm* (min)	1220 lb ft (1654 N·m) (max)	37.40 in (950 mm) (max)	22.50 in (572 mm)	25.60 in (650 mm)	775 lbs (350 kg)
	425 hp (317 kW) (max)	1950 rpm* (max) 1800 rpm* (min)	1220 lb ft (1654 N·m) (max)	37.50 in (950 mm) (max)	22.50 in (572 mm)	25.60 in (650 mm)	775 lbs (350 kg)
	425 hp (317 kW) (max)	2800 rpm* (max) 1800 rpm* (min)	1220 lb ft (1654 N·m) (max)	41.00 in (1041 mm) (max)	22.50 in (572 mm)	25.60 in (650 mm)	925 lbs (420 kg)

*Full load Governed

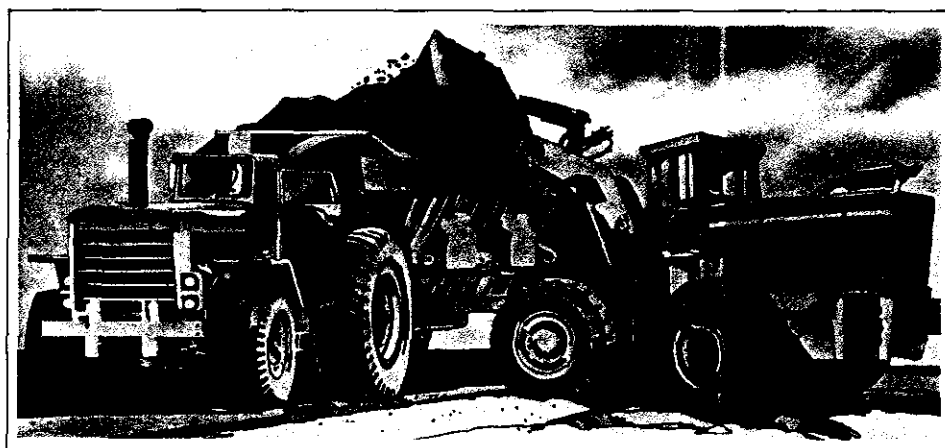
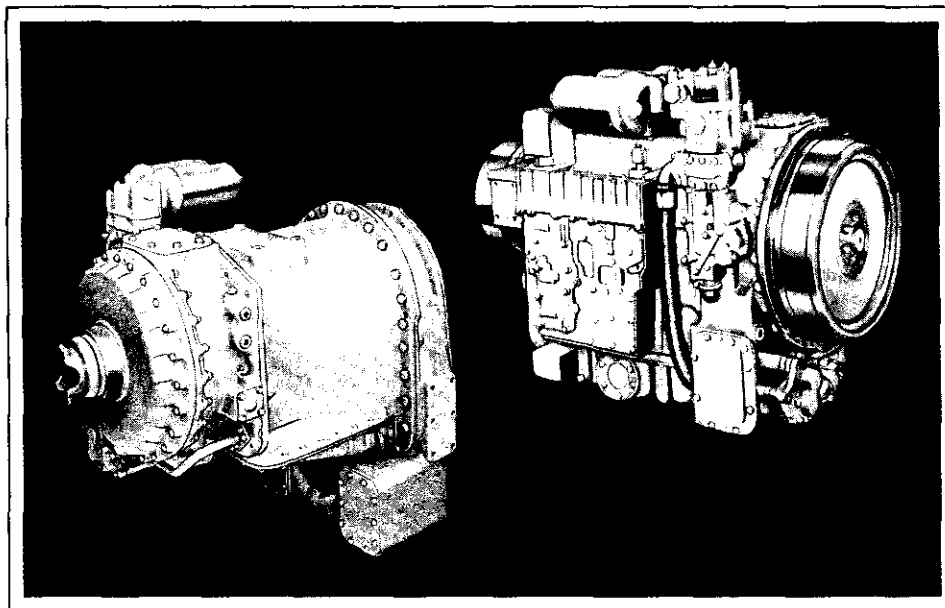
Hauling Operations—Series CL(B)T 5000/6000

The planetary range gears and splitter gears in the CLBT 5000/6000 models provide 6 forward speed ranges and 1 reverse. Yet these units are amazingly compact and lightweight. All transmission driveline elements are contained in one case.

These are the transmissions employed in the majority of on/off highway hauling vehicles and rated up to 675 GHP. They are highly regarded by their users in logging, construction, and the oil fields because they move higher tonnage and greater yardage easily, smoothly, and fast.

Features and options

- Engine mount
- Remote mount
- Drop box (5000) or straight-thru
- Choice of popular drive flanges
- Lockup clutch
- Parking brake
- Speedometer drive
- Power takeoffs at top, side, or both
- 12 torque converter ratios and capacities
- Variable input capacity converter
- Manual electric shift control . . . 12 or 24 volt, with downshift inhibitors as standard
- Hydraulic retarder
- Optional automatic electric shift control . . . 12 or 24-volt, with downshift inhibitors
- Remote or integral oil filter



ITEMS	MODELS					
	5860		5960		6061	
SPEEDS FORWARD	6		6		6	
SPEEDS REVERSE	1		1		1	
MAX. INPUT SPEED	2500 RPM		2500 RPM		2500 RPM	
MAX. INPUT TORQUE						
GENERAL APPLICATION	1100 lb ft	1491 N·m	1270 lb ft	1722 N·m	1660 lb ft	2251 N·m
TRUCK APPLICATION	1195 lb ft	1620 N·m	1350 lb ft	1830 N·m	1800 lb ft	2439 N·m
APPROX. DRY WEIGHT						
STRAIGHT-THRU	2165-2445 lbs	980-1109 kg	2165-2445 lbs	980-1109 kg	2165-2445 lbs	980-1109 kg
DROP BOX	2165-3090 lbs	980-1490 kg	2165-3090 lbs	980-1490 kg	2165-3090 lbs	980-1490 kg
APPROX. OVERALL LENGTH	57 in		57 in		57 in	
APPROX. OVERALL HEIGHT						
STRAIGHT-THRU	35 in	889 mm	35 in	889 mm	35 in	889 mm
DROP BOX	45 in	1143 mm	45 in	1143 mm		

Hauling Operations—Series DP 8000

To keep ahead of the growing demand for bigger hauling vehicles with higher-horsepower engines, and to provide transmissions with less bulk and weight to handle this increased power, Detroit Diesel Allison engineers have broken the "transmission-horsepower-barrier" with the dual path 8000 series transmission. The dual path 8000 series is a high capacity single-package transmission matched to engines up to 1050 GHP.

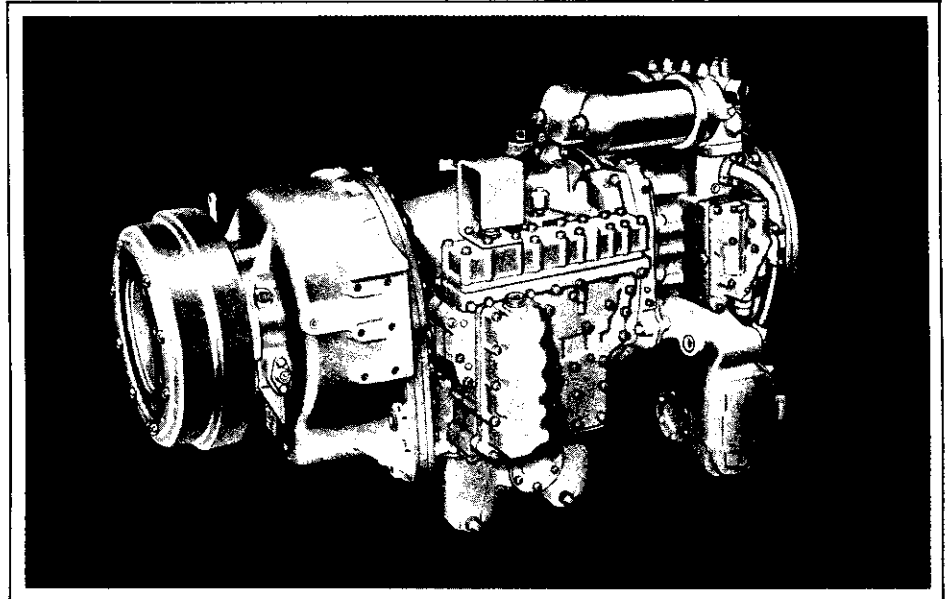
Higher horsepower capacity is possible in this compact transmission because torque is divided between the main shaft and the range clutches and gears. In low gear (first), all the torque is transmitted by the main shaft. In other gears (second through sixth), torque is divided between the main shaft and the range clutch and planetary section.

Before leaving the transmission, the divided torque is recombined in a sturdy combining planetary gear set.

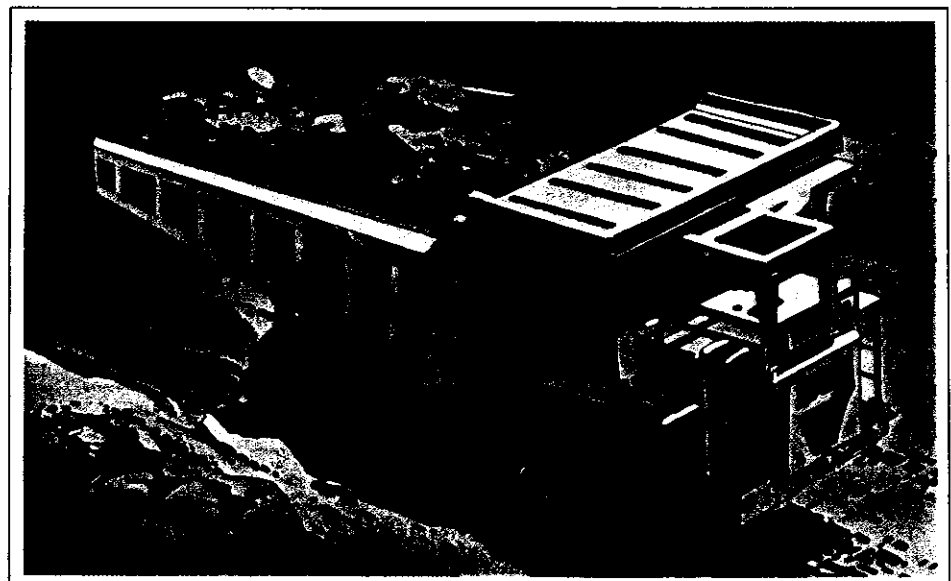
The dual path design has these outstanding advantages: (1) high-capacity transmission in a compact-package (2) reduced stress on gears and shafts and (3) increased durability and reliability.

Features and options

- Engine mount
- Remote mount
- Straight-thru output
- Popular drive flanges
- Automatic lockup clutch
- Remote or integral oil filter
- Parking brake
- Engine-driven power takeoff at top, side or both
- Hydraulic retarder
- Speedometer drive
- Manual or automatic electric shift control with either 12 or 24-volt power supply, with downshift inhibitors
- Manual hydraulic shift control



ITEMS		MODEL 8961	
RANGES FORWARD		6	
RANGES REVERSE		1	
MAX. INPUT SPEED		2300 RPM	
MAX. INPUT TORQUE		2960 lb ft	4014 N•m
APPROX. DRY WEIGHT		3700 lbs	1678 kg
APPROX. OVERALL LENGTH		60 in	1524 mm
APPROX. OVERALL HEIGHT		39 in	991 mm



Hauling Features and Options

Variable input capacity converter

An Allison Transmission option for hauling vehicles is the variable input capacity converter.

With this system, the vanes in the stator section of the converter are rotated by a piston that is controlled by hydraulic pressure. When these variable-pitch vanes are fully open, all engine power is absorbed by the torque converter and transmitted through the driveline to the wheels. But with the vanes in the partially closed position, less power is absorbed by the converter, and part of the power is directed instead to the power takeoff and accessory implements.

Thus, with just one engine, the desired degree of power can be directed to the point where it's needed most at the moment—the implements for work, the wheels for roading, or the desired combination of both. A neat concept . . . available in all Allison hauling transmissions except the DP 8000.

Hydraulic retarder braking system

In the 750, 5000, 6000, and 8000 series hauling transmissions, a hydraulic retarder is available for precise downhill control. The retarder is standard on the 8000 series transmission and optional on all other series.

When descending grades or slowing down on level terrain, the operator can utilize the transmission for braking power by operating either a hand lever or foot pedal which activates the hydraulic retarder. The advantages of the hydraulic retarding system can be measured in both safety and dollars. Since the retarder is located ahead of the planetary range gear section, it operates in all forward ranges, as desired. It can therefore be used in these ranges for controlled, safe descent of grades. Excessive use of service brakes and the resulting wear and replacement expense are reduced. Job cycles are speeded up. The vehicle drivetrain is protected from overspeed and possible repair costs. Brake grabbing and skidding are averted.

Automatic electric shift control

The Allison Automatic Electric Shift Control system is a standard feature of the DP 8000 hauling transmissions. It incorporates all the components, functions, and advantages of the Electric Shift Control, but adds one more major element—automatic electronic computerized control.

This system takes note, simultaneously, of vehicle speed, driver power demand, and the required changes in gear ranges and ratios. Precise electronic timing assures that all shifts will take place at the exact instant that enables the vehicle to perform best.

This is the most advanced method yet developed to reduce the incidence of driver error in shifting, the time required for driver training, and the cost of repairs for damaged transmission components.

Manual electric shift control

An exclusive manual Electric Shift Control system is standard in the Allison CL(B)T 5000 and 6000 series for trucks and scrapers.

Because of the trend to vehicles carrying bigger loads, driver location is being moved farther away from the transmission. These increased distances can complicate the mechanical shift-linkage systems and can cause misalignment, resulting in false shifts or damage to the transmission.

The Electric Shift Control system eliminates lengthy and complex mechanical linkage and its related problems. Installation of the control in the vehicle is simple because there are just 3 components—the shift tower, the wiring harness, and the valve body. The system operates on 12 or 24 volts.

It is completely sealed, is not affected by adverse climatic conditions, and does not require regular adjustment so common to mechanical linkage.

Should the need arise, the control system wiring can be quickly disconnected and reconnected. Component replacement is simple and fast because all the electrical parts are modular. Maintenance on other vehicle components becomes easier because there is no mechanical linkage to disassemble or to get in the way.

Automatic Operation

Some Allison Transmissions include the benefit of completely automatic shifting. Automatic capability is included as standard on the CLBT 750 and optional on the CLBT 5000, 6000 and DP 8000 series.

This automatic operation permits maximum vehicle performance with little effort on the part of the operator. The transmission automatically selects the proper range, and built-in inhibitors prevent harmful downshifts or reverse shifts at excessive speeds.



Cycling Transmissions

Vehicles for cycling operations

Allison cycling transmissions can be matched to engines of up to 465 GHP. They have been adapted to equipment requiring direct engine-mount or remote-mount, straight-thru, or drop box installation. Variations of 2, 3 or 4 forward and/or reverse speed ranges are offered, according to model application and size. Twin Turbine models provide 4 forward speed ranges with only 2 mechanical gears, for space-saving economy.

Soft Shift feature means that nearly any vehicle that requires a fast, smooth, shock-absorbing reversing capability is best equipped with an Allison Powershift.

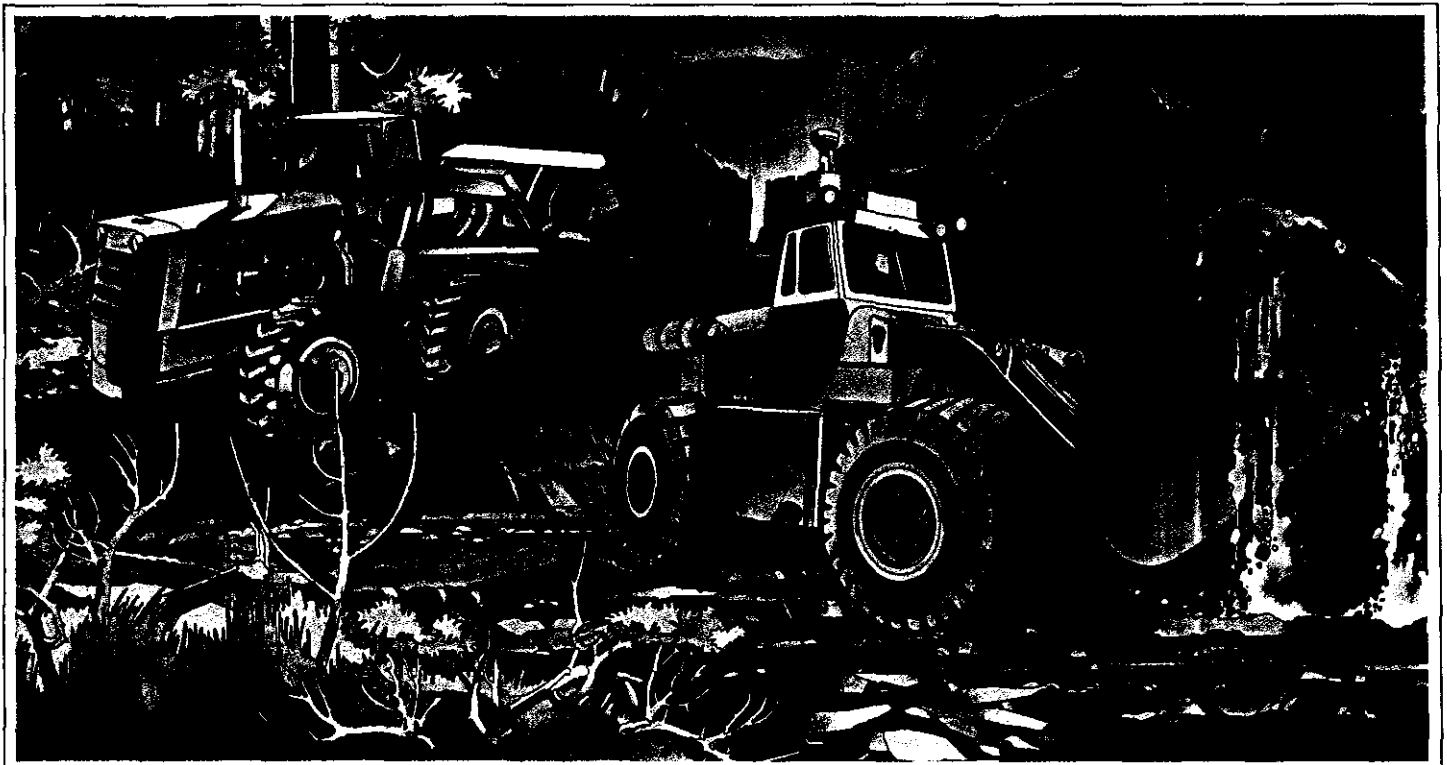
Explanation of cycling model designations

CRT—Converter Reversing Transmission
TT —Twin Turbine Converter Transmission

TRT—Above with Equal Reverse Speeds

TTB—Twin Turbine Converter Transmission with Internal Service Brake.

CYCLING OPERATIONS—APPLY TO		
TYPE OF VEHICLE AND APPLICATION	HORSEPOWER RANGE	TRANSMISSION MODEL
EARTH AUGERS	70-190 150-250	TT 2000 TT 3000
HYDRAULIC CRANES	70-190 150-250 150-370	TT 2000, TRT 2000 TT 3000 TT 4000, TRT 4000
LIFT TRUCKS, RUBBER TIRE TRACTORS, MOTOR GRADERS, MIXING EQUIPMENT	70-190 150-250 150-370 175-465	TT 2000, TRT 2000 TT 3000 TT 4000, TRT 4000 CRT 5000
LOG SKIDDERS, PULPWOOD PORTERS	60-110 70-190	AT 540 TTB 2000
SHOVEL LOADERS	70-190 150-250 150-370 175-465	TT 2000, TRT 2000 TT 3000 TT 4000, TRT 4000 CRT 5000
LOG LOADERS	70-190 150-250 150-370 175-465	TT 2000, TRT 2000 TT 3000 TT 4000, TRT 4000 CRT 5000
RAIL SWITCHERS	70-190 175-465	TT 2000, TRT 2000 CRT 5000
CRAWLER TRACTORS	175-465	CRT 5000



Cycling Operations—Twin-Turbine Series TT, TRT & TTB 2000

Series TT 2000

The distinctive feature of the TT, TRT, TTB Powershift series is a twin-turbine torque converter. Essentially, this is a unit which has two turbines, one inside the other. Each turbine drives a different combining gear set, which drives the forward-reverse range gears.

When the load is started, oil flow within the converter causes the first turbine to turn, driving a low speed combining gear which, in turn, drives the range gears. As the load is reduced, due to increased vehicle movement, the higher velocity oil flow reaches the second turbine and causes it to turn. This drives the range gears through a higher speed combining gear. (The first turbine and its combining gear freewheel when the second turbine is operating at higher speeds.)

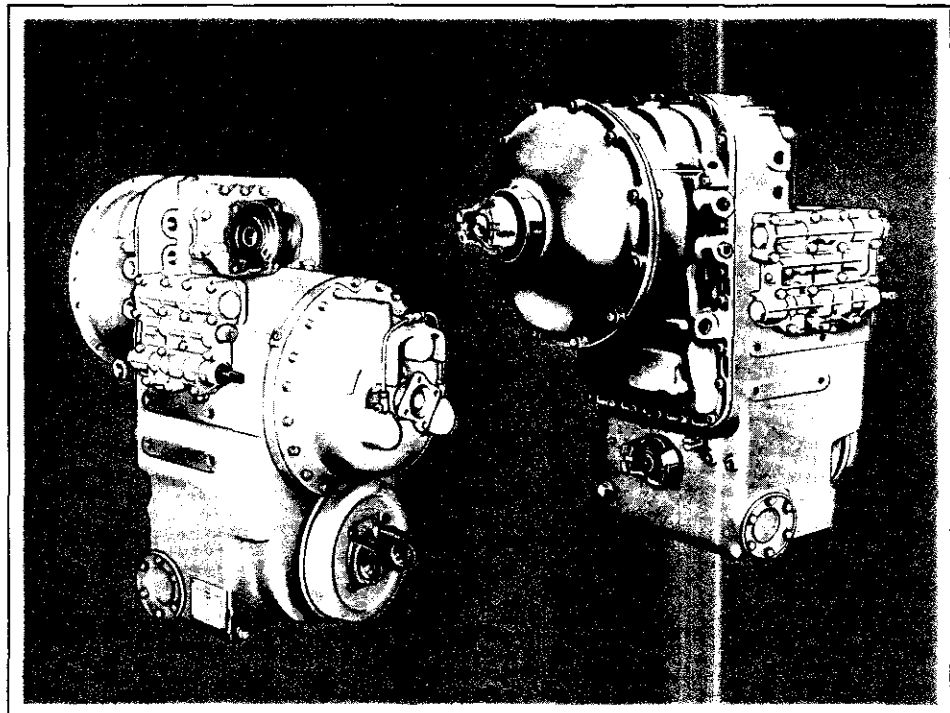
The result is automatic 2-speed performance from the torque converter. When this is combined with two speeds in the range gearing, you get 4-speed performance. Yet the operator only has two forward (and one or two reverse) shift lever positions to select.

The TT, TRT, and TTB 2000 transmissions are matched to a broad variety of vehicles up to 190 GHP, including front-end loaders, rubber tire tractors, switchers, lift trucks, cranes, and other material handling equipment.

Features and options

- Soft Shift
- Engine mount
- Remote mount
- Torqmatic coupling
- Wet or dry converter housing
- Twin turbine converter elements

- Clutch cutoff control valve
- Inching control valve
- Implement pump drive
- Steer pump drive
- Parking brake
- Speedometer drive
- Up to fifteen torque converter selections
- Front output disconnect
- Choice of popular drive flanges
- Integral service brake
- "Skidmatic" option



ITEMS	MODELS									
	TT 2221-1 TT 2421-1		TRT 2211-3 TRT 2411-3		TRT 2221-1 TRT 2421-1		TRT 2221-3 TRT 2421-3		TTB 2221-1 TTB 2421-1	
SPEEDS FORWARD	4		2		4		4		4	
SPEEDS REVERSE	2		2		4		4		2	
MAX. INPUT SPEED	3000 RPM		3000 RPM		3000 RPM		3000 RPM		3000 RPM	
MAX. INPUT TORQUE	310 lb ft	420 N·m	310 lb ft	420 N·m	310 lb ft	420 N·m	310 lb ft	420 N·m	310 lb ft	420 N·m
APPROX. DRY WEIGHT	760 to 965 lbs	345 to 438 kg	660 to 810 lbs	299 to 367 kg	760 to 965 lbs	345 to 438 kg	660 to 810 lbs	299 to 367 kg	760 to 965 lbs	345 to 438 kg
APPROX. OVERALL LENGTH	36 in	914 mm	39 in	967 mm	40 in	1016 mm	39 in	991 mm	37 in	940 mm
APPROX. OVERALL HEIGHT	35 in	889 mm	24 in	610 mm	35 in	889 mm	24 in	610 mm	35 in	889 mm

Cycling Operations—Twin-Turbine Series TT 3000 & TT 4000

TT 3000

The TT 3000 series transmission is basically a torque converter-planetary gear transmission combined in a single, compact package. The Twin Turbine design of the TT 3000 permits it to be matched with power plants of up to 250 GHP.

The "Soft Shift" system is a standard feature of the TT 3000 transmission. This system gives smooth shifting at full power while changing directions of travel. The complete TT 3000 package offers faster hydraulic action, increased torque capacity, longer brake life and reduced cycle time.

TT 3000 features and options

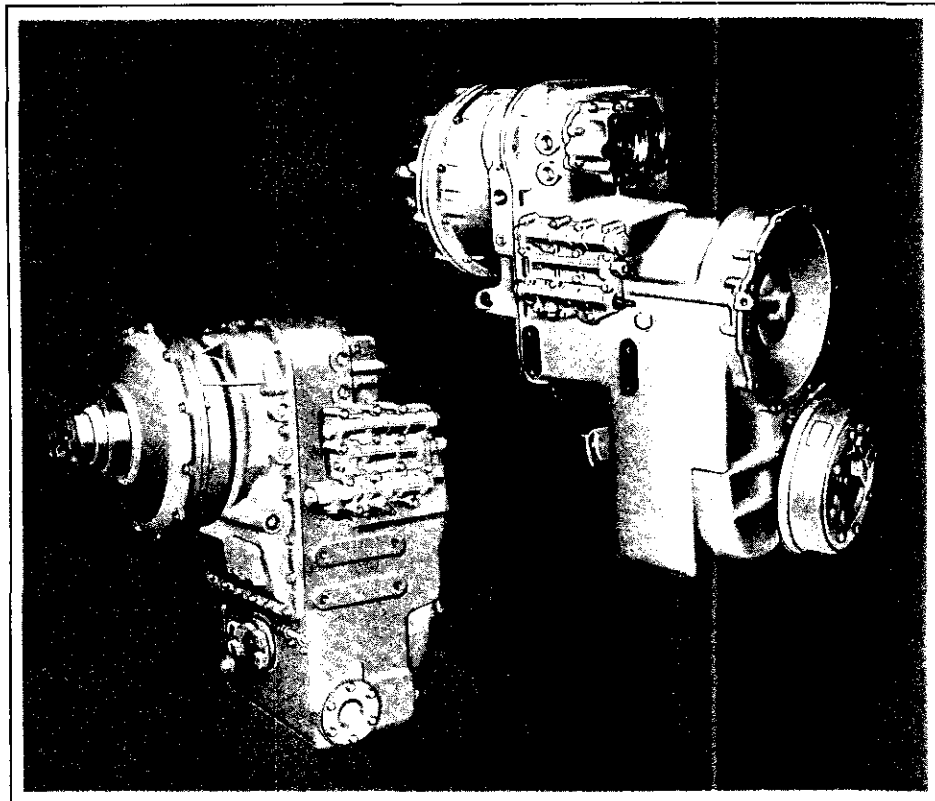
- Soft shift
- Engine mount
- Remote mount
- Air or hydraulic clutch cutoff control valve
- Inching control valve
- Drum-type parking brake
- Choice of popular flanges
- Torqmatic coupling
- Front output disconnect
- Steer pump drive
- Implement pump drive
- Speedometer drive

Series TT 4000

The higher-capacity TT 4000 and TRT 4000 Powershift series bring all the advantages of twin turbine performance to larger cycling equipment up to a rating of 370 GHP. These advantages include delivery of high output torque at vehicle stall when the load demand is greatest, as well as delivery of the high efficiency necessary for peak performance when you're operating at less than full load conditions. Another advantage is automatic determination of the torque and speed output for work and travel in any range, low or high. Low range, of course, provides maximum crowd.

TT 4000 features and options

- Soft shift
- Engine mount
- Remote mount
- Air or hydraulic clutch cutoff control valve
- Inching control valve
- Drum-type parking brake
- Choice of popular flanges
- Torqmatic coupling
- Front output disconnect
- Steer pump drive
- Implement pump drive
- Speedometer drive (TT 4720 only)



ITEMS	TT 3420	
SPEEDS FORWARD	4	
SPEEDS REVERSE	2	
MAX. INPUT SPEED	2800 RPM	
MAX. INPUT TORQUE	400 lb ft	542 N·m
APPROX. DRY WEIGHT	1000 lbs	454 kg
APPROX. OVERALL LENGTH	30 in	762 mm
APPROX. OVERALL HEIGHT	35 in	881 mm

ITEMS	MODELS			
	TT 4720		TRT 4820	
*RANGES FORWARD	4		4	
*RANGES REVERSE	2		4	
MAXIMUM INPUT SPEED	2800 RPM		2800 RPM	
MAXIMUM INPUT TORQUE	440 to 530 lb ft	597 to 719 N·m	630 lb ft	854 N·m
APPROX. DRY WEIGHT	1495 lbs	678 kg	1640 lbs	744 kg
APPROX. OVERALL LENGTH	47 in	1204 mm	47 in	1204 mm
APPROX. OVERALL HEIGHT	43 in	1085 mm	43 in	1085 mm

*Converter twin turbine design spans range of two gear sets.

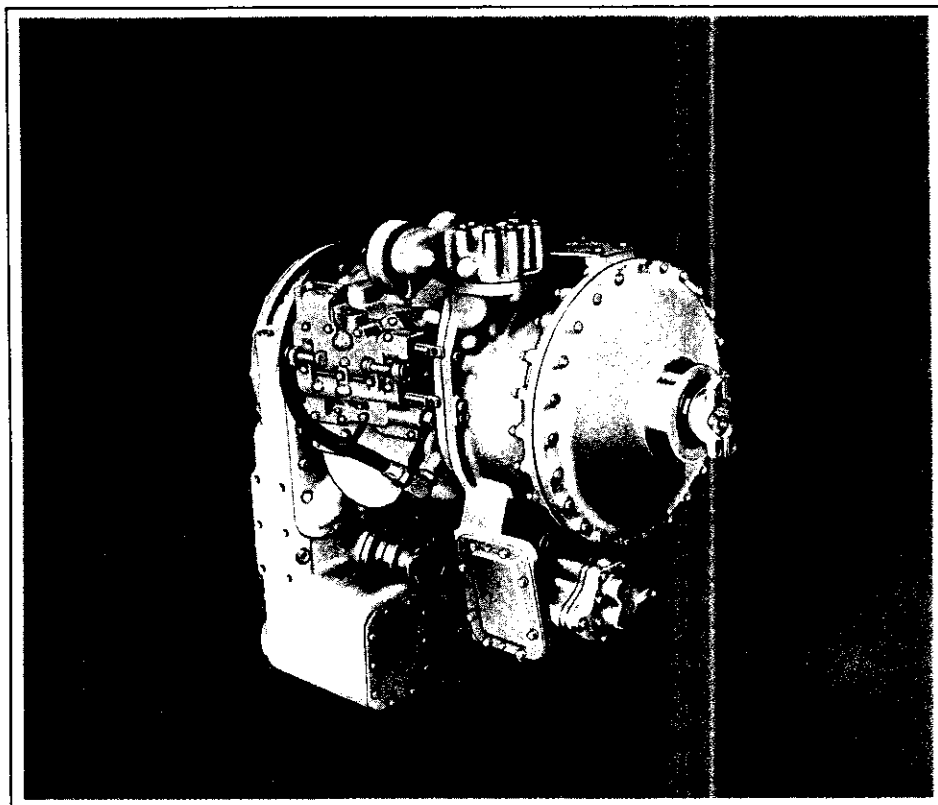
Cycling Operations—Series CRT 5000

The CRT Powershift transmission consists of a torque converter, a forward and reverse planetary gear combination, and two planetary gear range sets with a direct rotating clutch. The hydraulically actuated clutches provide fast, smooth, full-power shifting in all of the 3 forward and 3 reverse speed ranges, and smooth transition between forward and reverse range operation. Forward or reverse operation is selected by a single directional lever, and the range selector lever is moved only to change the speed range.

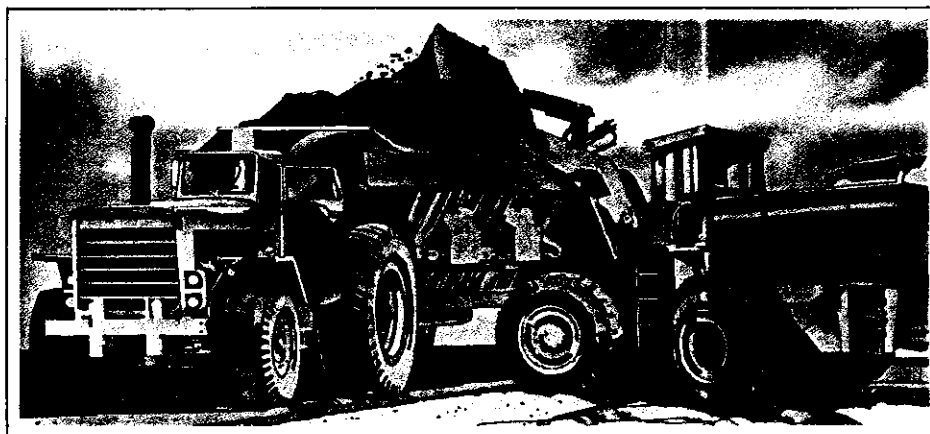
CRT transmissions pioneered powershift cycling operations. They set the standard for speed, productivity, and long-life reliability in hundreds of cycling applications. They are applicable to compactors, material handling units, log loaders, motor graders, rubber tire tractors, shovel loaders, mining equipment, winches and hoists, crawler tractors, and many other types of cycling equipment up to 465 GHP.

CRT 5000 features and options

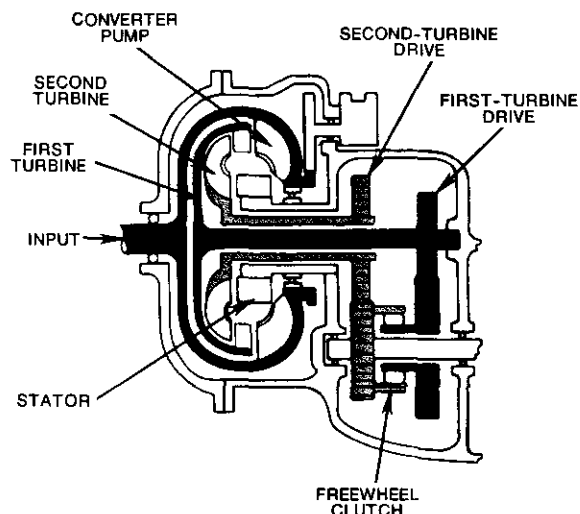
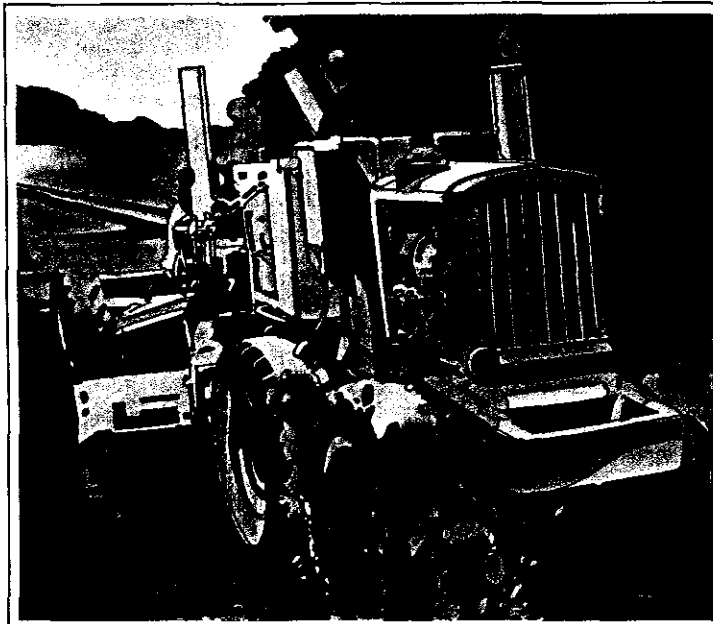
- Remote mount
- Engine mount
- Drum-type parking brake
- Integral or remote-mounted oil filter
- Speedometer drive
- Choice of popular flanges
- Power take-off on side or rear of converter housing
- Air or hydraulic clutch cutoff control valve



ITEMS		MODEL 5631	
SPEEDS FORWARD		3	
SPEEDS REVERSE		3	
MAX. INPUT SPEED		2500 RPM	
MAX. INPUT TORQUE		833 lb ft	1129 N·m
APPROX. DRY WEIGHT		2400 lbs	1089 kg
APPROX. OVERALL LENGTH		50 in	1270 mm
APPROX. OVERALL HEIGHT		42.7 in	1967 mm



Cycling Features and Options



Twin-turbine principle

The 2000 Series Powershifts contain a twin-turbine torque converter. Essentially, this is a unit which has two turbines, one inside the other. Each turbine drives a different combining gear which drives the forward-reverse range gears.

When the load is started, oil flow within the converter causes the first turbine to turn, driving a low speed combining gear which, in turn, drives the range gears. As the load is reduced, due to increased vehicle movement, the higher velocity oil flow reaches the second turbine and causes it to turn. This drives the range gears through a higher speed combining gear. (The first turbine and its combining gear freewheel when the second turbine is operating at higher speeds.)

The result is automatic 2-speed performance from the torque converter. When this is combined with two speeds in the range gearing, you get 4-speed performance. Yet the operator only has two forward (and one or two reverse) shift lever positions to select.

Skidmatic for logging

A special TTB 2000 version, known as "Skidmatic" is designed specifically for skidding logs. Besides the internal service brake that is "wood's proof," it has an integral, converter-driven PTO for winching on the fly so that the winch line is protected hydraulically from shock and

whip. The TTB 2000 Powershift transmission is particularly adaptable to cycling applications—such as front end loaders and fork lifts—where adverse operating conditions render the service brakes inoperable. The TTB 2000 series provides for two engine-driven accessory PTO's—supplying power takeoff for hydraulic pumps, for steer or dozer blade control, or for any other accessory. Most important is an integral, multi-disk hydraulic service brake, enclosed and protected by the transmission housing. It is self-adjusting and oil cooled during application. With the mechanical brake at the rear output, two independent braking systems assure maximum safety.

Soft shift

In vehicles equipped with Allison Powershift cycling models, full-speed, full-power directional shifts can be made smoothly and without undue shock because of a new, standard feature called "Soft Shift."

Soft Shift is a system of orifices and a trimmer in the main control valve body which modulates pressure to a new dual-area piston providing a progressive application of force on the clutch. The metered flow of oil controls the shift shock automatically during clutch engagement. With Soft Shift, there is no more slowing down to shift, no more dangerous stalls.

Due to full-power shifting, the engine of a vehicle equipped with Soft Shift can run at a higher average rpm—which means faster hydraulic action. The torque capacity of the transmission has been significantly increased, providing reverse strength for larger, more powerful engines. Among the other benefits of Soft Shift are prolonged driveline service, decreased brake wear, and reduced cycle time.

Integral service brake

The TTB 2000 transmission incorporates an integral, multi-disk hydraulic service brake, enclosed and protected by the transmission housing. It is self-adjusting and oil cooled during application. With the mechanical brake at the rear output, two independent braking systems ensure maximum safety.

The TTB 2000 is applicable to engines in the 70 to 150 horsepower range and can be remote mounted or direct mounted on the engine with flex plate drive. Like other Allison Powershift cycling units, it incorporates a clutch cut-off principle to divert the desired part of engine output from travel power to implement power.

This transmission is particularly adaptable to log skidders and material handling applications where adverse operating conditions render ordinary types of service brakes inoperable.

Additional Hauling & Cycling Transmission Features

Hydraulic control

The standard shift control system for Allison Powershift transmissions is hydraulic and operated with a manual shift lever. There is no clutch pedal and therefore no manual clutching by the driver. Hydraulically actuated clutches within the planetary gear system do all the work.

For hauling operations, Allison Transmissions are available with a direct lockup feature.

For cycling operations, such as earth loading work, Allison Powershifts are available with a clutch cutoff valve actuated by brake pedal pressure—hydraulic or air. In effect, this automatic cutoff control shifts the transmission to neutral for fast bucket operation and returns it to the selected range gear for fast travel when the pedal is released. For lifting and materials handling, the Allison Powershift has a hydraulic valve for precise inching control in spotting loads. Faster cycle time results from the use of either system.

Control valve bodies are easily serviced. They are located externally on the transmission, or in the oil pan. Special screens and filters are provided to maintain ultra-clean oil for these controls. The results of these refinements are extra reliability and serviceability.

Easier serviceability

Only one operation is involved if it is ever necessary to remove an Allison

Transmission from the vehicle for service. The planetary gear train and torque converter form an integral, one-piece unit. In some competitive systems, two separate units must be removed, disassembled, repaired, reassembled, and reinstalled. In such instances, time lost and costs incurred mount considerably.

Straight-thru or drop-box design

Most Allison Transmissions offer straight-thru or drop-box configurations. The choice is determined, of course, by the general design and requirements of the vehicle. Four-wheel-drive machines, for example, do not require a separate transfer case when equipped with a drop-box powershift.

Either front-disconnecting or solid-shaft outputs can be specified in drop-box units. Twin Turbine Powershifts for cycling vehicles are available in either short or long-drop configurations. For hauling vehicles, numerous transfer case positions are offered.

Integral PTO provisions

Both hauling and cycling models in the Allison Transmission line are furnished with integral power takeoff provisions. In most hauling and cycling operations, the implements or accessories can be driven directly from the converter or engine.

In Allison cycling transmissions, implement pump pads are built-in. Directly connected with the engine input,

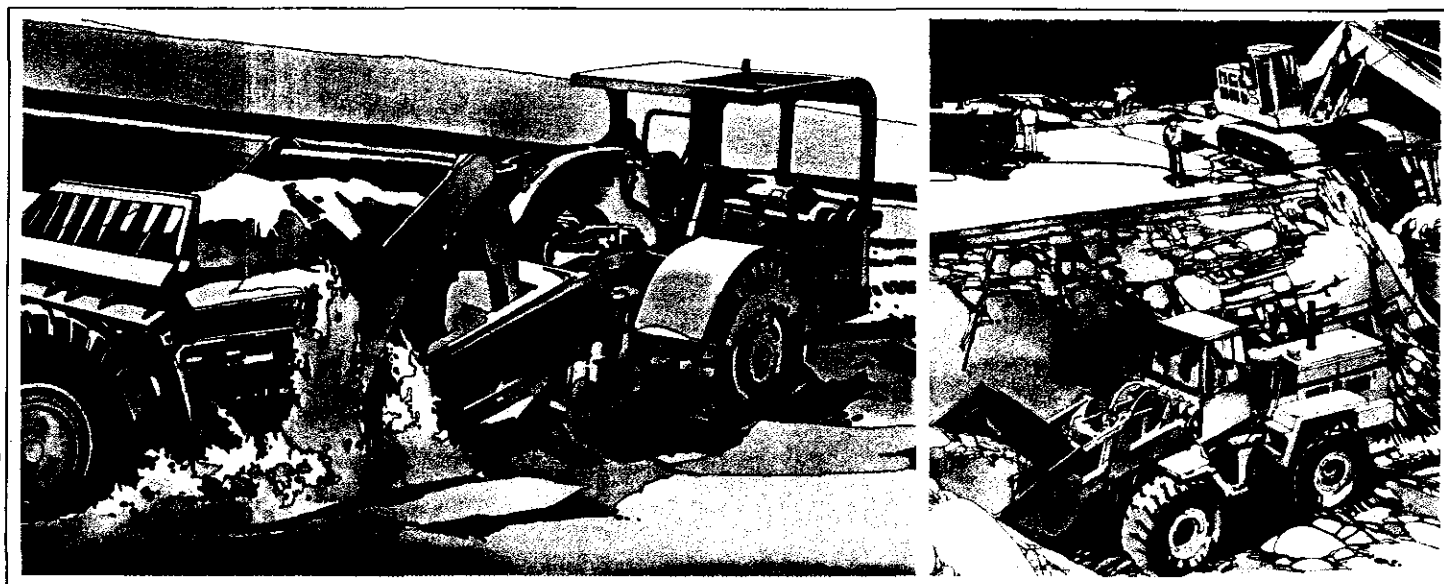
they require no connecting gears to attach pumps or drives. This reduces initial installation expense and simplifies maintenance.

In Allison hauling units, there are two types of built-in PTO's. Converter-driven PTO pads provide power for pump drives, dump body controls, and other pump uses. Where high horsepower accessories are involved, engine-driven PTO's are provided.

Widest network of sales, service, and parts assistance

The worldwide organization of Detroit Diesel Allison Distributors means that sales, service and parts assistance are never beyond reach for owners of Allison Transmissions.

In addition, Detroit Diesel Allison Distributors offer more than parts and service support. They assist in other areas, such as equipment selection, the areas of informing, planning, advising, ordering, delivery, custom fabrication and installation, and personnel training. They are also an expert remanufacturing source for reliable remanufactured transmissions. They are a part of the most complete parts and service backup organization in the industrial transmission industry . . . and are a meaningful adjunct to Allison Transmissions.



Industrial Torque Converter Series—TC 300, 400, 500, and 800-900

Vehicles for converter operations

Allison Industrial Torque Converters were designed for applications with engines from 150 to 600 hp. Five basic torque converter series cover the wide range of industrial applications combined with a variety of engines, and provide the necessary configuration for both mobile and industrial type services. This includes the heavy-duty output shafts designed to handle side loads for such applications as cranes, shovels, and for oil field services.

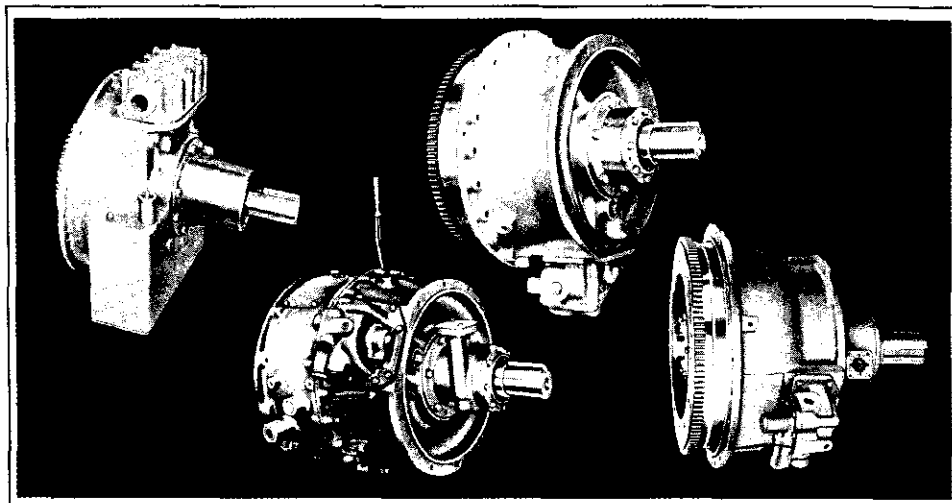
Explanation of converter model designation

L —Lockup
A —Governor accessory drive
O —Overrunning clutch
RD—Rear disconnect clutch
D —Front disconnect

Type of Vehicle and Application	Horsepower Range	Converter Model
Backhoes, Rail Equipment, Winches and Hoists	80-150	TC 300
	150-250	TC 400
	200-400	TC 500
	300-400	TC 800
Cranes, Draglines, Shovels	80-150	TC 300
	150-250	TC 400
	200-400	TC 500
	300-400	TC 800
Ditchers and Trenchers, Earth Augers, Log Skidders, Mat'l Handling Equipment, Tow Tractors, Utility Trucks	80-150	TC 300
	150-250	TC 400
	200-400	TC 500
	300-400	TC 800
Drilling Rigs, Oil Field Equipment, Rock Crushers	150-250	TC 400
	200-400	TC 500
	300-400	TC 800
	300-600	TC 900
Motor Graders, Ski Tows, Snowplows	80-150	TC 300
	150-250	TC 400
	200-400	TC 500
	300-600	TC 900
Pump Drives	300-400	TC 800
	300-600	TC 900

A few of the advantages of Allison Torque Converters include:

- High torque capability
- Matches power to load
- Low shock loading
- Smooth starting
- Ease of operation



Model	TC 350	TC 370
Stall torque ratio (max)	3.09	2.47
Input speed (max)	3000 rpm	3000 rpm
Input torque (max)		
lb. ft.	280	360
N-m	380	488
Weight	202 to 302 lb (92 to 137 kg)	

Model	TC 430	TC 450	TC 470
Stall torque ratio (max)	3.55	3.20	3.04
Input speed (max)	3000 rpm	3000 rpm	3000 rpm
Input torque (max)			
lb. ft.	615	615	615
N-m	834	834	834
Weight	400 to 583 lb (181 to 264 kg)		

Model	TC 530	TC 540	TC 550	TC 560	TC 570	TC 580
Stall torque ratio (max)	3.58	2.95	3.43	2.74	3.26	2.67
Input speed (max)	2500 rpm	2500 rpm	2500 rpm	2500 rpm	2500 rpm	2500 rpm
Input torque (max)						
lb. ft.	865	865	865	865	865	865
N-m	1173	1173	1173	1173	1173	1173
Weight	420 to 650 lb (191 to 295 kg)					

Model	TC 840	TC 850	TC 940	TC 950
Stall torque ratio (max)	2.92	3.98	2.71	3.67
Input speed (max)	2100 rpm	2100 rpm	2100 rpm	2100 rpm
Input torque (max)				
lb. ft.	1065	1065	1065 (1470*)	1065 (1470*)
N-m	1444	1444	1444 (1993*)	1444 (1993*)
Charging oil pump capacity				
Standard pump (1600 rpm)	24.5 gpm (1.55 litre/s)		24.5 gpm (1.55 litre/s)	
Optional pump (1750 rpm)	—		40 gpm (2.52 litre/s)	
Weight	698 to 815 lb (317 to 370 kg)			

*with optional charging oil pump



Detroit Diesel Allison
Division of General Motors Corporation

Indianapolis, Indiana 46206



SALES BRIEF INDEXSerial No.

9 J	Temperature and Pressure Gauges
28 J	Oil Filters
35 I	TC 400 & 500 Series Converters
37 E	Housing Gasket - 5000/6000 Transmissions
38 F	CRT 3321 and CRT 3331 Transmissions
40 B	Implement Pumps - CRT 3000 Series Transmissions
42 J	Oil Recommendations - Industrial Converters/Allison Transmissions
52 E	CRT 3531 Transmissions
53 K	5000 & 6000 Series Transmissions
54 F	CT, CLT 3341, 3441, 3461 and 3361 Transmissions
56 B	Paint Specifications
57 E	HT 70 and CLBT 4460 Series Transmissions
58 L	TT and TRT 2000 Series Transmissions
59 D	TC 800 and 900 Series Converters
60 G	TC 300 Series Converter
64 I	DP 8000 Series Transmissions
65	General Recommendations for Driveline Angularity
68 I	AT 540 Automatic Transmissions
69 I	HT 700 Automatic Transmissions
70 F	MT 600 Automatic Transmissions
71 E	TT 4700 and TRT 4800 Series Transmissions
72 G	CLBT 750 Series Transmissions

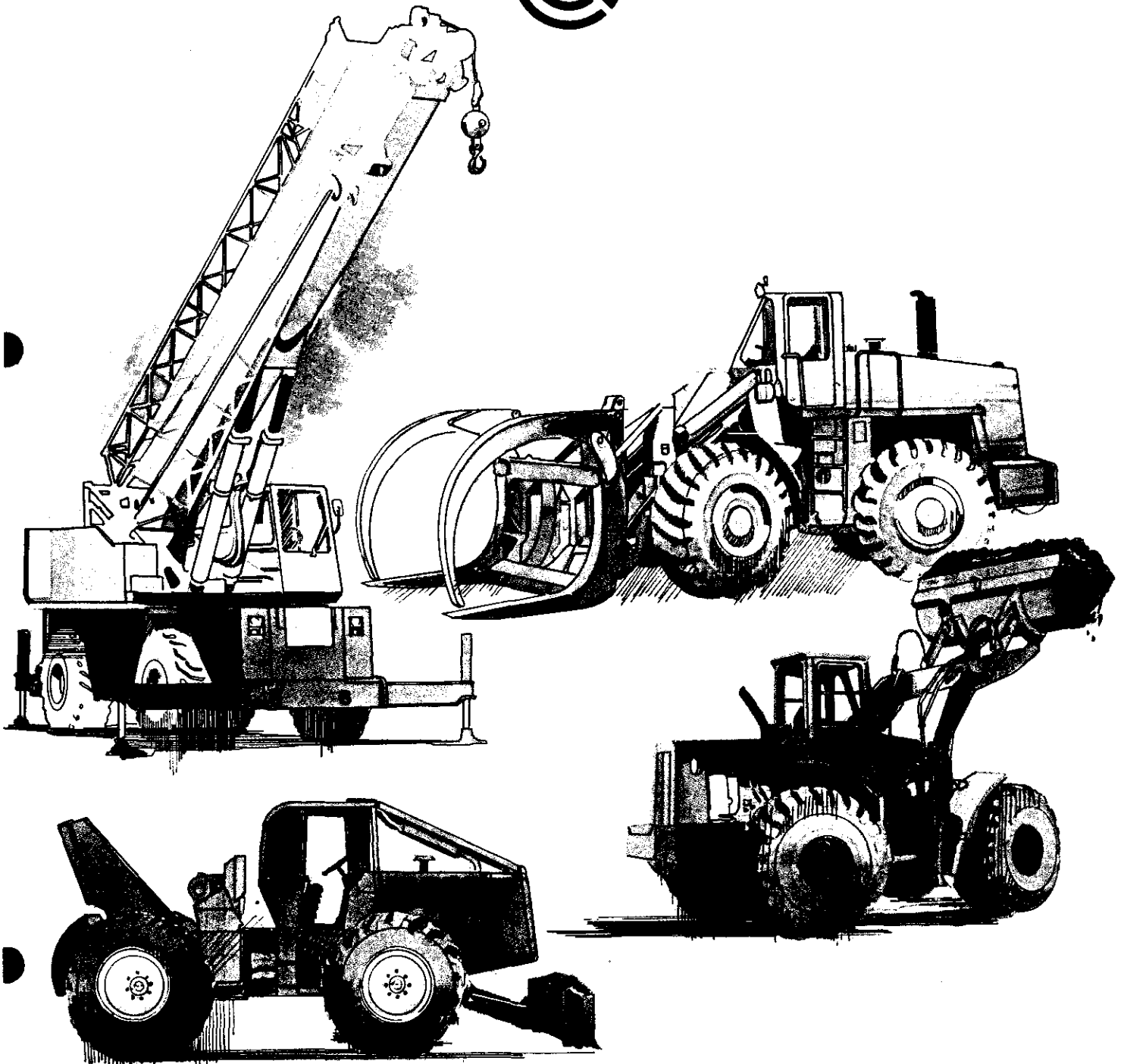
Serial No.

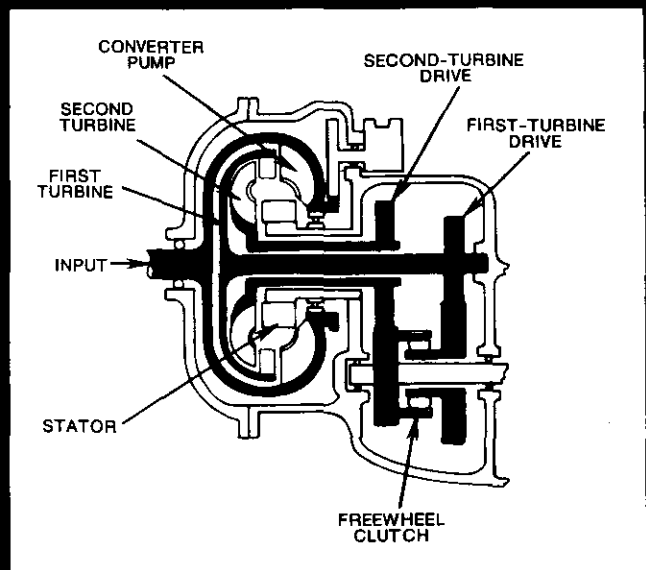
74 A	Allison V730D Automatic Transmissions
75	Allison CLT 650 Transmissions
76 A	Allison MT 644 & MT 654 CR Transmissions
77 A	Allison TT 3420 Transmissions
78 B	CRT 5633 Series Transmissions
79	AT 543 Automatic Transmissions

Sales Development

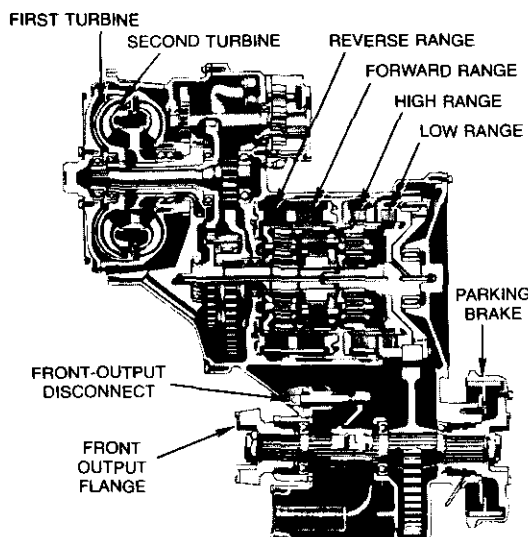


Allison Twin-Turbine Cycling Transmissions

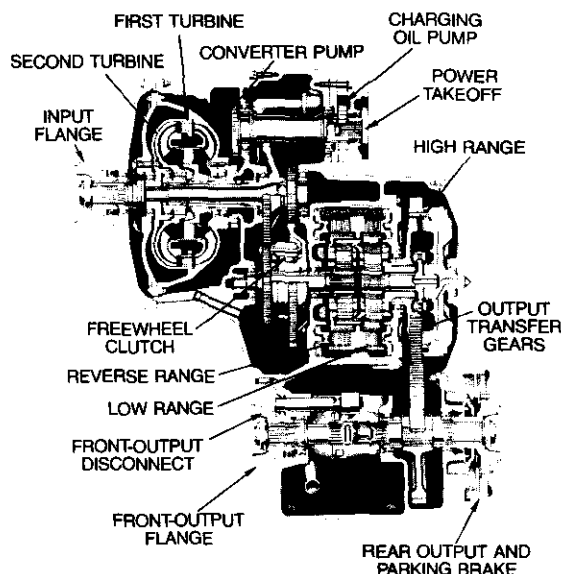




T(R)T 4820



TT 2221-1



Acceleration and performance

The combination of the Allison torque converter and planetary gear system provides smooth, immediate acceleration under full load and rough terrain condition and permits quick, full-power shifts in all speed ranges. In addition, engine lugging and drive line shock are reduced to a level that considerably improves vehicle component life.

All this is achieved because the torque converter hydraulically and automatically multiplies engine output torque in relation to load and speed demands in the speed range selected. The equipment can therefore operate at top efficiency all the time.

Improved operator efficiency

The Allison Transmission design eliminates the need for clutch pedals and reduces the number of shift levers the operator must manipulate. His shifting duties are limited to the selection of the direction and the speed range.

The hydraulically controlled gear ratios provide constant speed control for precision work. There is no guesswork about shifting. The operator can concentrate more attention on his steering and implement or accessory controls. His feel of the load and terrain or highway is better. The simplification of the job and the reduction of fatigue result in improved driver efficiency.

Lower operating costs

Allison planetary gear clutches are hydraulically actuated and self-adjusting for their lifetime. There is no mechanical dry clutch to replace when worn or damaged.

Hydraulic torque conversion and automatic gear ratio selection within any speed range eliminate both mis-shifts and engine overload. Parts replacement costs are cut because damage and wear are eliminated or reduced to minimum.

There is no fuel waste with Allison Transmissions, because the power output is automatically matched to the load and travel demands, and the engine is operated efficiently at all times—in any speed range.

Increased vehicle availability and productivity

The hydraulic cushion inherent in the Allison Torque Converter reduces shock and strain on the engine, axles, universal joints, and driveline components. This

cushion not only prevents harmful engine lugging and resulting damage but also protects all parts of the transmission itself from harmful stress.

This protective factor helps to reduce vehicle downtime for vehicles equipped with Allison Transmissions. Machine availability is therefore higher whenever there's work to be done, and each vehicle is on the job more hours during its lifetime, producing more income for you.

Greater ruggedness and longer life

The gear teeth in the Allison Transmission planetary gear system are subjected to far less stress than those in non-planetary systems. The transfer of load through planetary gear sets distributes the torque forces involved over a number of sets of gear teeth and thereby reduces the torque load on any one gear or gear tooth.

In addition, the high-strength, low-stress Allison Transmission planetary gear teeth are crowned, induction hardened, frozen, and heat treated to insure maximum toughness and fatigue-resistance.

Easier serviceability

Only one operation is involved if it is ever necessary to remove an Allison Transmission from the vehicle for service. The planetary gear train and torque converter form an integral, one-piece unit. In some competitive systems, two separate units must be removed, disassembled, repaired, reassembled, and reinstalled. In such instances, time lost and costs incurred mount considerably.

Widest network of sales, service, and parts assistance

The worldwide organization of Detroit Diesel Allison Distributors means that sales, service and parts assistance are never beyond reach for owners of Allison Transmissions.

In addition, Detroit Diesel Allison Distributors offer more than parts and service support. They assist in other areas, such as equipment selection, the areas of informing, planning, advising, ordering, delivery, custom fabrication and installation, and personnel training. They are also an expert remanufacturing source for reliable remanufactured transmissions. They are a part of the most complete parts and service backup organization in the industrial transmission industry . . . and are a meaningful adjunct to Allison Transmissions.



Detroit Diesel Allison
Division of General Motors Corporation

Indianapolis, Indiana 46206

T(R)T 2000

applicable power	Input	70 to 175 hp (52 to 130 kW)							
rating	Input speed, max Input torque, max (net)*	3000 rpm 310 lb ft (420 N•m)							
rotation	Input—right hand Output (-1 model)—right hand (forward ranges) Output (-3 model)—left hand (forward ranges)								
speeds	Forward Reverse	TT(B) 2221, 2421 TRT 2221, 2421 TRT 2211, 2411 4 4 2 2 4 2							
mounting	Direct mounted (dry converter housing) Remote mounted (wet converter housing)	SAE 3 flywheel housing with flex disk drive, 2 side mounting pads Input flange or Torqmatic® coupling, 2 side mounting pads							
torque converter	Type 2-stage, 2-phase, 4-element								
	Stall torque ratio:								
	Standard				Optional				
	0.826:1 T ₂ Ratio				1.21:1 T ₂ Ratio				
	Series	Ratio	Series	Ratio	Series	Ratio	Series	Ratio	
	TT 220	5.47	TT 270	6.97	TT 242	3.52	TT 426	4.78	
gearing	TT 230	7.53	TT 424	6.70	TT 252	5.09	TT 427	3.40	
	TT 240	5.44	TT 425	5.19	TT 262	3.32	TT 447	3.34	
	TT 250	7.45	TT 444	6.79	TT 272	4.81			
	TT 260	5.11	TT 445	4.92					
	Type: Converter and transfer gears—Constant mesh, spur, in-line Range gears —Constant mesh, spur, planetary								
	Standard Ratios				Transmission Model				
gearing	Forward		Reverse		Forward		Reverse		
	Low	High	Low	High	Low	High	Low	High	
	2.66	.70	1.96	—	TT(B)-2221-1, 2421-1	3.90	1.02	2.88	—
	2.03	.70	1.96	—	TT(B)-2221-1, 2421-1	2.97	1.02	2.88	—
	2.15	.57	1.59	—	TT(B)-2221-1, 2421-1	3.16	.83	2.33	—
	1.64	.57	1.59	—	TT(B)-2221-1, 2421-1	2.40	.83	2.33	—
	2.40	—	2.32	—	TRT-2211-3, 2411-3	3.51	—	3.40	—
	2.03	.74	1.96	.71	TRT-2221-1, 2421-1	2.97	1.08	2.88	1.04
	1.64	.60	1.59	.58	TRT-2221-1, 2421-1	2.40	.87	2.33	.84
	6.61	2.40	6.40	2.32	TRT-2221-3, 2421-3	9.69	3.51	9.38	3.40
	2.40	.83	2.32	.80	TRT-2221-3, 2421-3	3.51	1.21	3.40	1.17

*Subject to selection of torque converter ratio.

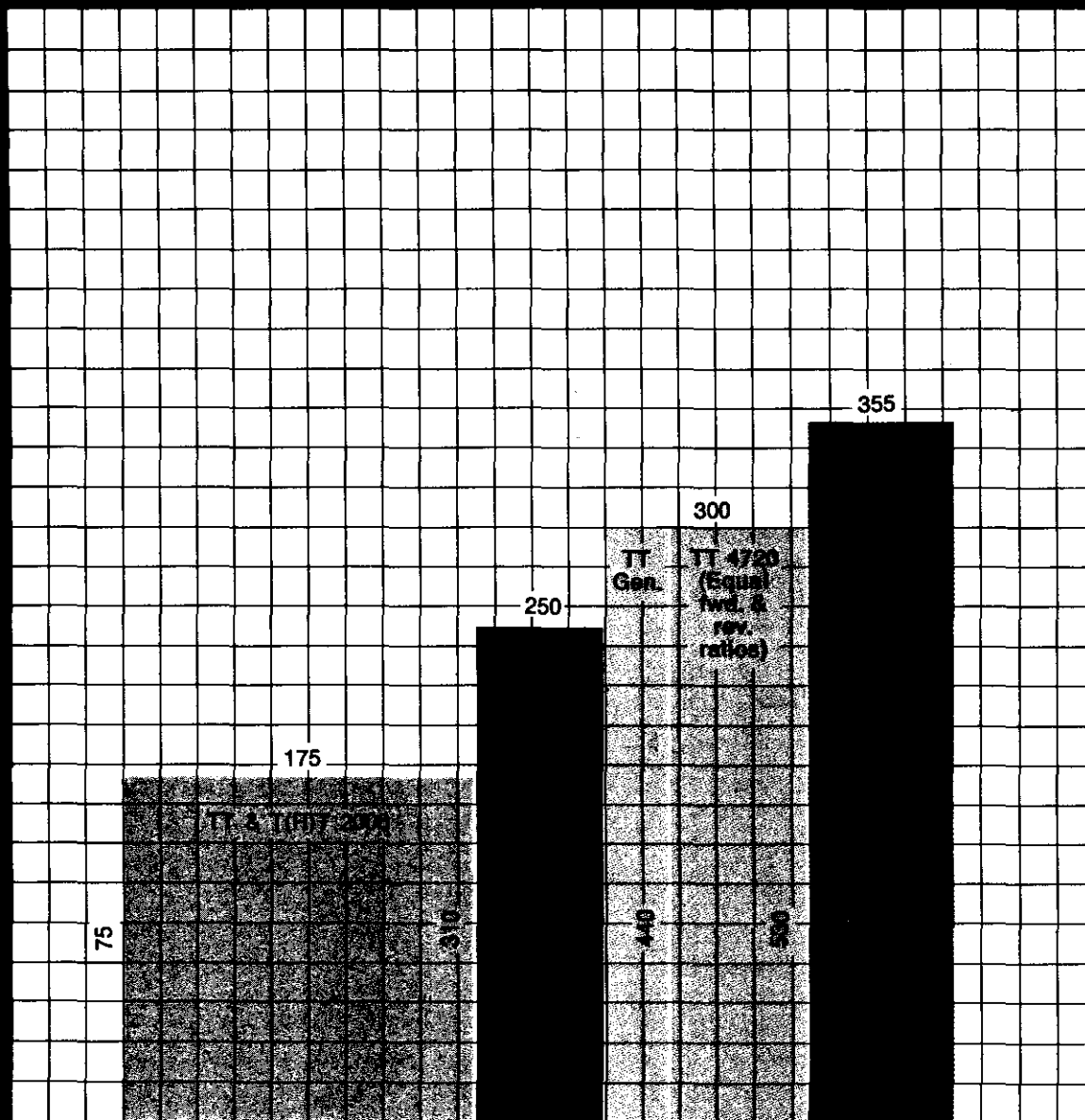
TT 3000

applicable power	Input	150 to 250 HP (112 to 186 kW)					
rating	Input speed (max) Input torque, max (net)	2800 RPM 400 lb ft (542 N·m)					
rotation	Input—right hand Output—right hand (forward ranges)						
speeds	Forward Reverse	4 2					
mounting	Direct mounted (front) Remote mounted (front)	Modified SAE-3 Flywheel Housing with Flex Disc Drive. Four 5/8-11 Tapped Holes inside pads, one pad each side. Input Flange or Torqmatic® Coupling; 2 side mounting pads					
torque converter	Type	2-stage, 4-element, twin-turbine		Standard		Optional	
	Stall torque ratio			0.826 T ₂ ratio		1.21 T ₂ ratio	
				Series	Ratio	Series	Ratio
				TT 424	6.70	TT 426	4.78
				TT 425	5.19	TT 427	3.40
				TT 444	6.79	TT 447	3.34
				TT 445	4.92		
				TT 464	6.72		
			TT 465	4.67			
gearing	Type	Spur		Standard		Optional	
	Range gearing	Constant mesh, planetary		0.826 T ₂ ratio		1.21 T ₂ ratio	
	Transfer gearing	Constant mesh, in-line		Forward		Forward	
		overall transmission ratios—		Reverse		Reverse	
		.846 drop box		Low High		Low High	
				2.516 .699 2.321		3.687 1.024 3.401	

TT 4720		
rotation	Input—right hand Output—right hand (forward ranges)	
rating	Input power (gross) Input speed, max Input torque, max (net)	300 hp (224 kW) 2800 rpm 400* lb ft (597 N·m)
speeds	Forward Reverse	4 2
mounting	Direct mounted Remote mounted	SAE 2 flywheel housing with flex disk drive; two mounting pads, each side Input flange or Torqmatic® coupling; two mounting pads, each side
torque converter	Type Stall torque ratio	2-stage, 2-phase, 4-element, twin-turbine TT 425—5.2 TT 430—6.6 TT 445—4.9 TT 450—6.3
gearing	Type: Range gearing Transfer gearing	Constant mesh, spur type, planetary Constant mesh, spur type, in-line
	Gear ratios (includes transfer gear ratios): Forward low Forward high Reverse low Reverse high	2.71 (2.18*) 3.21 (2.58*) 0.73 (0.73) 0.86 (0.86) 1.98 (1.98) 2.35 (2.35)

*Rating is 530 lb ft ((719 N·m) with optional 2.18:1 and 2.58:1 Forward Low Ratios.

T(R)T 4820		
rotation	Input—right hand Output—right hand (forward ranges)	
rating	Input power (gross) Input speed, max Input torque, max (net)	355 hp (265 kW) 2800 rpm 630 lb ft (854 N·m)
speeds	Forward Reverse	4 4
mounting	Direct mounted Remote mounted	SAE 2 flywheel housing with flex disk drive; two mounting pads, each side Input flange or Torqmatic® coupling; two mounting pads, each side
torque converter	Type Stall torque ratio	2-stage, 2-phase, 4-element, twin-turbine TT 465—4.7 TT 470—6.0 TT 625—5.2 TT 645—4.9
gearing	Type: Range gearing Transfer gearing	Constant mesh, spur type, planetary Constant mesh, spur type, in-line
	Gear ratios (includes transfer gear ratios): Forward low Forward high Reverse low Reverse high	2.58 0.69 2.35 0.63





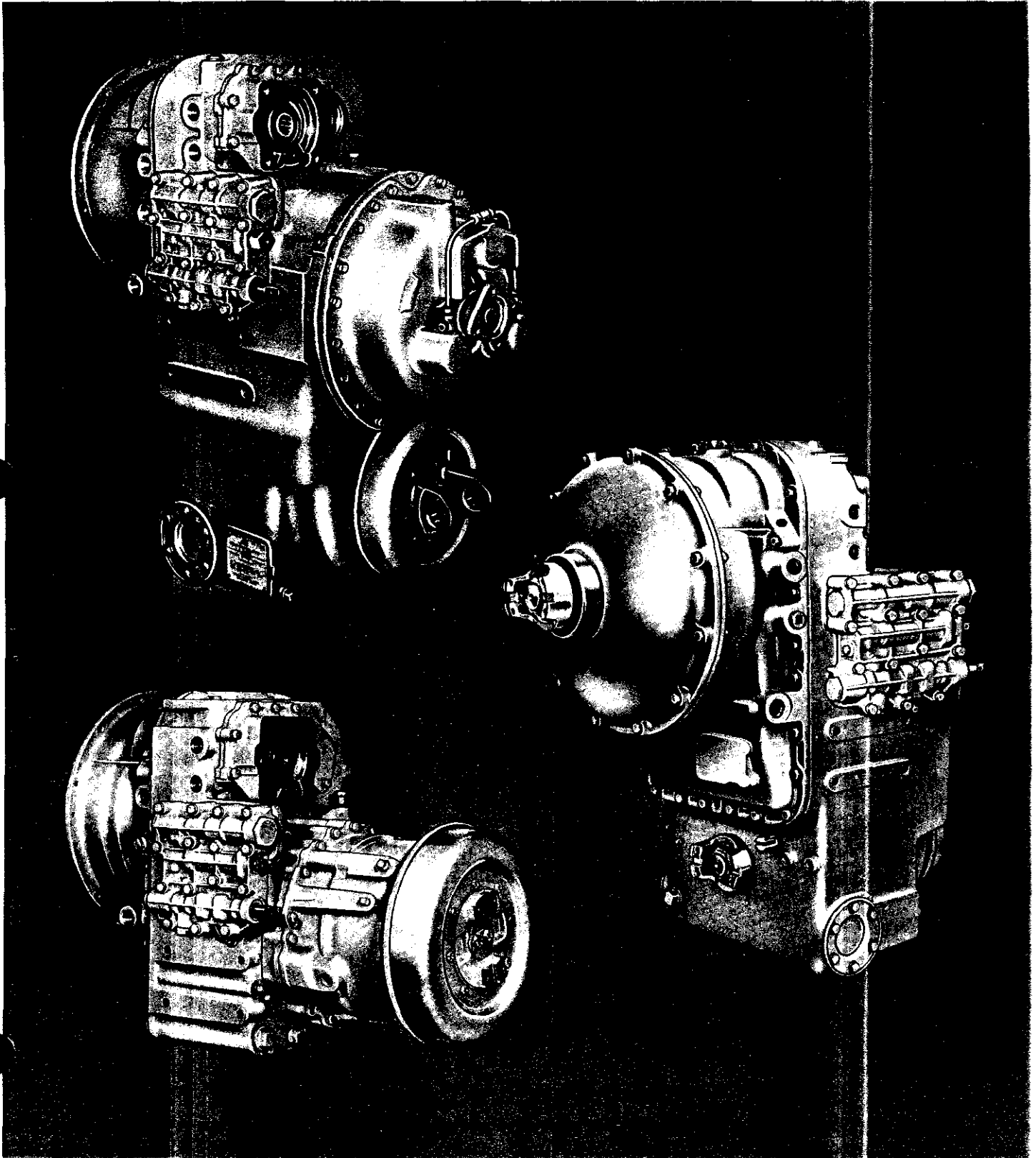
Allison Transmissions

cycling models

TT, TRT, TTB 2000

70 to 175 hp

(52 to 130 kW)



specifications

applicable power	Input	70 to 175 hp (52 to 130 kW)
rating	Inout speed, max Input torque, max (net)*	3000 rpm 310 lb ft (420 N·m)
rotation	Input—right hand Output (-1 model)—right hand (forward ranges) Output (-3 model)—left hand (forward ranges)	
speeds	Forward Reverse	TT(B) 2221, 2421 TRT 2221, 2421 TRT 2211, 2411 4 4 2 2 4 2
mounting	Direct mounted (dry converter housing) Remote mounted (wet converter housing)	SAE 3 flywheel housing with flex disk drive, 2 side mounting pads Input flange or Torqmatic® coupling, 2 side mounting pads
torque converter	Type Stall torque ratio: Standard 0.826:1 T ₂ Ratio Optional 1.21:1 T ₂ Ratio	2-stage, 2-phase, 4-element
	Series Ratio Series Ratio Series Ratio Series Ratio	
	TT 220 5.47 TT 270 6.97 TT 242 3.52 TT 426 4.78	
	TT 230 7.53 TT 424 6.70 TT 252 5.09 TT 427 3.40	
	TT 240 5.44 TT 425 5.19 TT 262 3.32 TT 447 3.34	
	TT 250 7.45 TT 444 6.79 TT 272 4.81	
	TT 260 5.11 TT 445 4.92	
gearing	Type: Converter and transfer gears—Constant mesh, spur, in-line Range gears —Constant mesh, spur, planetary Standard Ratios Transmission Model Optional Ratios	
	Forward Reverse Forward Reverse Forward Reverse	
	Low High Low High Low High Low High Low High	
	2.66 .70 1.96 — TT(B)-2221-1, 2421-1 3.90 1.02 2.88 —	
	2.03 .70 1.96 — TT(B)-2221-1, 2421-1 2.97 1.02 2.88 —	
	2.15 .57 1.59 — TT(B)-2221-1, 2421-1 3.16 .83 2.33 —	
	1.64 .57 1.59 — TT(B)-2221-1, 2421-1 2.40 .83 2.33 —	
	2.40 — 2.32 — TRT-2211-3, 2411-3 3.51 — 3.40 —	
	2.03 .74 1.96 .71 TRT-2221-1, 2421-1 2.97 1.08 2.88 1.04	
	1.64 .60 1.59 .58 TRT-2221-1, 2421-1 2.40 .87 2.33 .84	
	6.61 2.40 6.40 2.32 TRT-2221-3, 2421-3 9.69 3.51 9.38 3.40	
	2.40 .83 2.32 .80 TRT-2221-3, 2421-3 3.51 1.21 3.40 1.17	
clutches	Hydraulically-actuated, spring-released, oil-cooled, multidisk, self-adjusting (automatic compensation for wear)	
flanges	Input (remote mounted) Output	Mechanics 4C, 5C, 6C, 7C; Rockwell 5N; Spicer 1480; Mechanics 5C (2221), 6C (2421) with Torqmatic® coupling Mechanics 4C, 5C, 6C, 7C; Rockwell 5N, 6N; Spicer 1480
integral service brake	Type Rating (static capacity) Cooling	Hydraulic, multidisk, self-adjusting 3000 lb ft (4067 N·m) at transmission output shaft with 1500 psi (10,342 kPa) brake apply pressure Forced oil flow
parking brake	Type Size	Drum, internal-expanding shoe -1 model—10 x 1½ in. (254 x 38 mm) -3 model—13¾ x 2 in. (340 x 51 mm)
power takeoff	Implement pump drive: Size Rating (either drive or total or both) Steer pump drive (optional): Size Rating (either drive or total or both) Ratio (both pumps) Converter-driven: Rating Speed Coupling flange	SAE C, 4-bolt or 2-bolt (optional); SAE B, 2-bolt; SAE BB spline (optional) Intermittent—110 hp (82 kW) at 2000-3000 rpm Continuous— 90 hp (67 kW) at 2000-3000 rpm SAE A, 2-bolt; SAE B spline (optional) 30 hp (22 kW) at 2000-3000 rpm 0.91 (standard) or 1.0 (optional) x engine speed Continuous—full input hp Same as range gear input Spicer 1410
(TTB 2000 only)		
control valve body	Either clutch cutoff control or inching control valve, optional	
oil system†	Oil type Capacity (excluding external circuit) Sump Filter and cooler (customer furnished)	Hydraulic transmission fluid, type C-3 -1 model—8½ US gal (32 litres) -3 model—6½ US gal (25 litres) Integral Remote mounted

specifications (cont.)

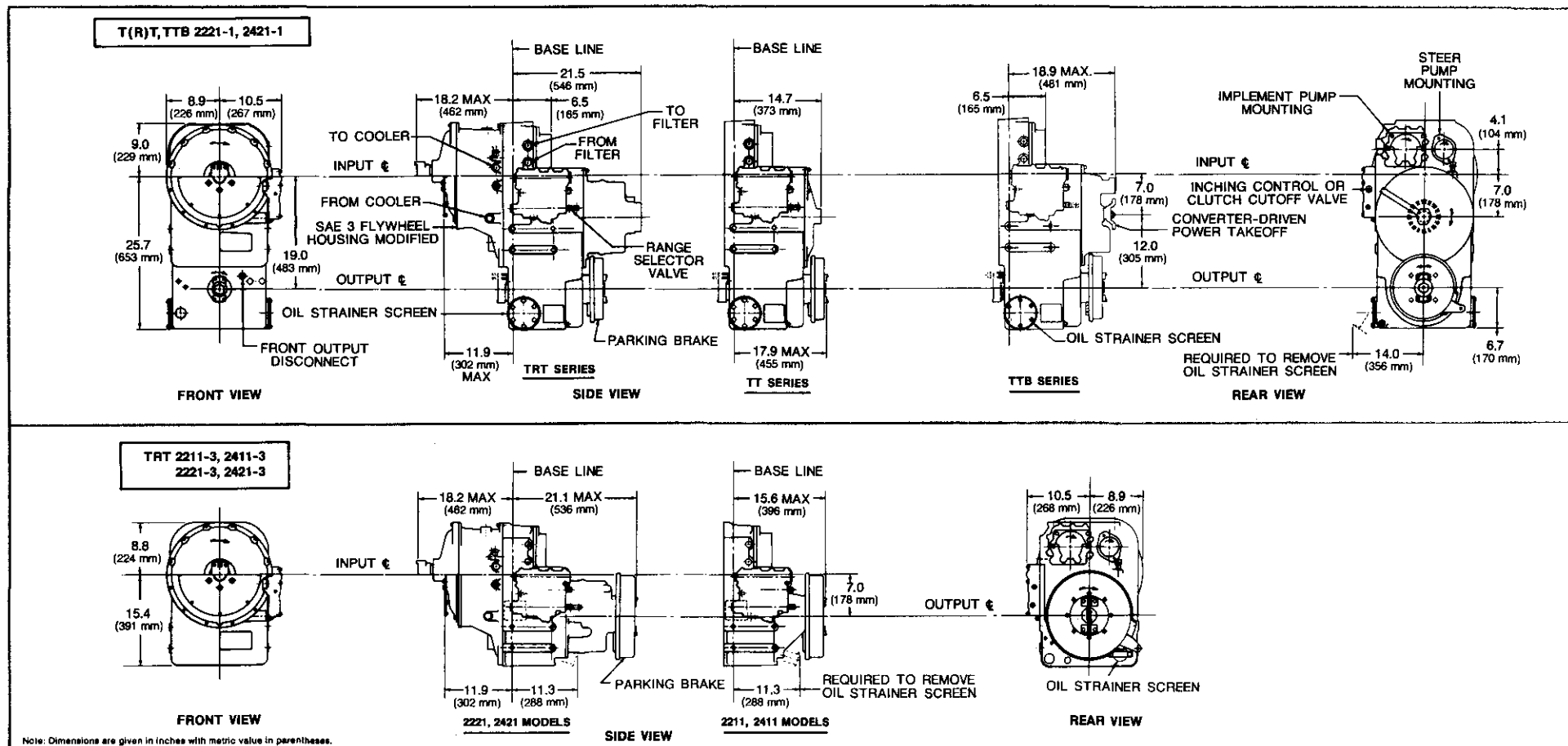
size	Length max: TTB Series TT series TRT series Width Height Weight	-1 model	-3 model
		37.10 in. (942 mm) 36.06 in. (916 mm) 39.69 in. (1008 mm) 19.36 in. (492 mm) 34.70 in. (881 mm) 760 to 965 lb (345 to 437 kg)	39.26 in. (997 mm) 19.36 in. (492 mm) 24.23 in. (615 mm) 660 to 810 lb (300 to 368 kg)

*Subject to selection of torque converter ratio.
†Totally enclosed system. No external lines except to oil cooler and oil filters.
Note: All data and specifications subject to change without notice.

options

- Transmission remote mounted, or direct mounted on engine with flex plate drive
- Torqmatic® coupling
- Wet or dry converter housing
- Steer pump drive (A or B spline)
- Clutch cutoff control valve (air or hydraulic)
- Log Skidder power takeoff provision
- Inching control valve
- Front output disconnect
- Parking brake
- Choice of popular drive flanges
- Speedometer drive (TT 2001-1 only)
- Implement pump drives
- Integral service brake (TTB models only)

mounting dimensions

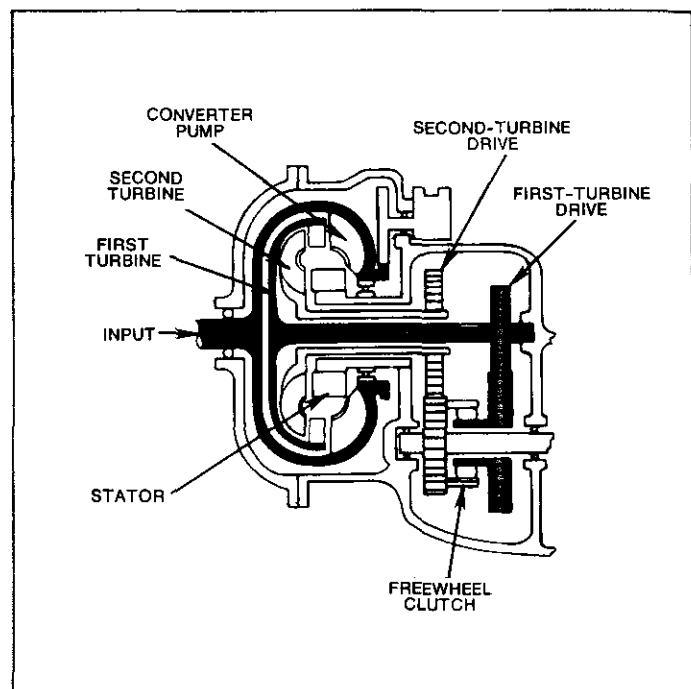


twin-turbine principle

The 2000 Series Powershifts contain a twin-turbine torque converter. Essentially, this is a unit which has two turbines, one inside the other. Each turbine drives a different combining gear which drives the forward-reverse range gears.

When the load is started, oil flow within the converter causes the first turbine to turn, driving a low speed combining gear which, in turn, drives the range gears. As the load is reduced, due to increased vehicle movement, the higher velocity oil flow reaches the second turbine and causes it to turn. This drives the range gears through a higher speed combining gear. (The first turbine and its combining gear freewheel when the second turbine is operating at higher speeds.)

The result is automatic 2-speed performance from the torque converter. When this is combined with two speeds in the range gearing, you get 4-speed performance. Yet the operator only has two forward (and one or two reverse) shift lever positions to select.



'soft shift' system

Smooth shifting at full power while changing direction of travel is the direct benefit of the new Soft Shift system—now a standard feature with all 2000 series transmissions.

Soft Shift is a system of orifices and a trimmer in the main control valve body which modulates pressure to a new dual-area piston providing a progressive apply force on the clutch. The metered flow of oil controls the torque peak automatically

during clutch engagement. With Soft Shift, there is no more slowing down to shift, no more dangerous stalls. Shift shock is reduced, because . . .

SOFT SHIFT CONTROLS THE POWER.

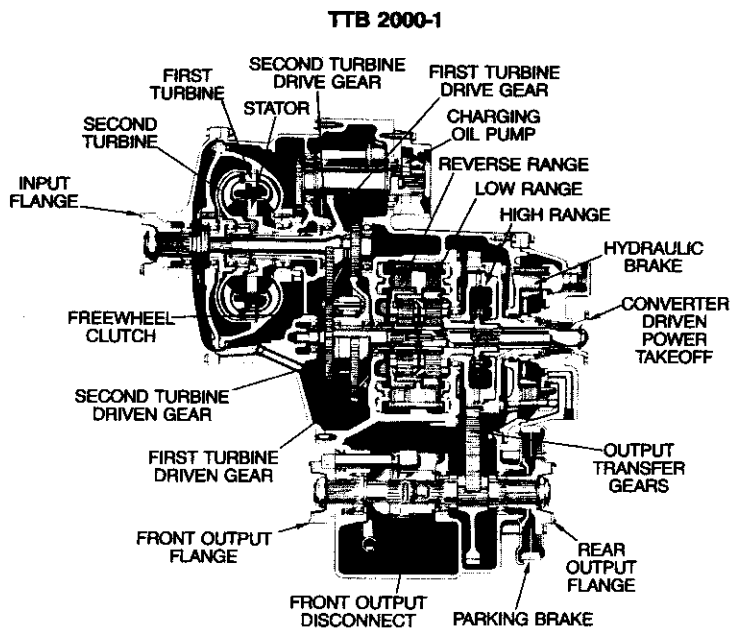
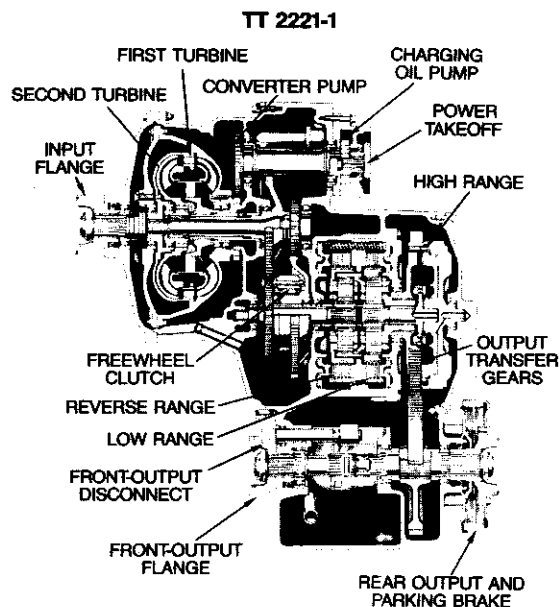
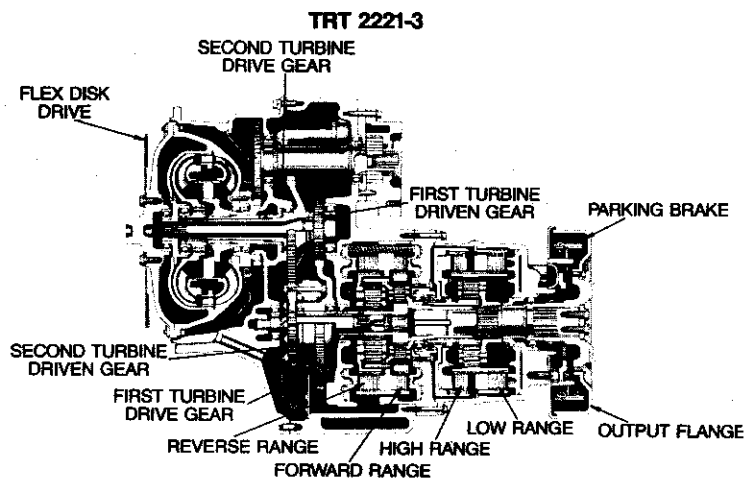
This twin-turbine transmission, together, with Soft Shift, offers an impressive array of advantages, including: faster hydraulic action, increased torque capacity; longer brake life; reduced cycle time.

skidmatic for logging

A special TTB 2000 version, known as "Skidmatic" is designed specifically for skidding logs. Besides the internal service brake that is "wood's proof," it has an integral, converter-driven PTO for winching on the fly so that the winch line is protected hydraulically from shock and whip. The TTB 2000 Powershift transmission is particularly adaptable to cycling applications—such as front end loaders and fork lifts—where adverse operating conditions render the service brakes inoperable. The TTB

2000 series provides for two engine-driven accessory PTO's—supplying power takeoff for hydraulic pumps, for steer or dozer blade control, or for any other accessory. Most important is an integral, multi-disk hydraulic service brake, enclosed and protected by the transmission housing. It is self-adjusting and oil cooled during application. With the mechanical brake at the rear output, two independent braking systems assure maximum safety.

T(R)T 2001-TTB 2001 powershift transmissions



Detroit Diesel Allison
Division of General Motors Corporation

Indianapolis, Indiana 46206

SA 1610 7/77

Litho in U.S.A.



Date April, 1977 No. 58L

T(R)T 22-2421 SERIES TRANSMISSIONS

I. Introduction

The 2001 series twin turbine transmissions were first released to production September, 1971. This series is a redesigned modern replacement of the original 2000 series twin turbine transmissions. The 2001 series is designed to provide full power directional shifting capability to most vehicle applications. The 2001 series transmissions are available in ten basic configurations as defined by the following model designations:

TT-2221-1	TTB-2221-1	TRT-2221-1
TT-2421-1	TTB-2421-1	TRT-2421-1
		TRT-2211-3
		TRT-2411-3
		TRT-2221-3
		TRT-2421-3

Definition of model designations is as follows:

TT-2221-1	Twin Turbine Converter
TT-2221-1	Transmission
TRT-2221-1	Equal Number of Forward/Reverse Ranges
TTB-2221-1	Internal Vehicle Service Brake
TT-2221-1	Transmission Capacity
TT-2221-1	Converter Capacity
TT-2221-1	Number of Forward Ranges
TT-2221-1	Indicates Number of Major Changes
TT-2221-1	With Dropbox (Long Drop) 19 inches (483 mm)
TRT-2221-3	No Dropbox (Short Drop) 7 inches (118 mm)

The 2001 series twin turbine transmission application list is nearly unlimited. This Allison transmission product is currently used in such applications as:

Wheeled Loaders	Logging Trucks	Railroad Switchers
Crawler Loaders	Crawler Tractors	Rail Maintenance Vehicles
Earth Augers	Water Drill Rigs	Mining Trucks
Hydraulic Cranes	Compactors	Log Skidders
Fork Lift Trucks	Scraper Tractors	Pneumatic Rollers
Straddle Carriers	Street Cleaners	Mill Trucks
Motor Graders	Snow Blowers	Barge Winches
Tow Tractors	Winches	

Acceptance into such diverse vocations as noted above had been possible because of the wide range of converter models, gear ratios and adaptation options available in the 2001 series.

II. Ratings

For a general guide to applications suitability, the 2001 series is rated as follows:

GVW:

Maximum GVW:

38,000 lbs. (17,237 kg) GVW for wheel loaders and other applications requiring full speed and full power directional shifting.

Input:

Maximum input torque:

310 lb. ft. (420 Nm) - loader applications

Maximum net engine power - 175 HP (130.5 kW)

Maximum input speed - 3000 RPM

See Rating Charts TC-7316, Sheets 1 and 2

Output:

Maximum output shaft torque - 3000 lb. ft. (4068 Nm) per output

Maximum converter output shaft (combining shaft)

Torque - 1240 lb. ft. (1681 Nm). Combining shaft torque equals converter stall torque ratio X input torque X converter second turbine ratio.

Note: The above ratings are based on engine data at:

SAE 1960	500 ft.	85 degrees F.
DIN 6270	300 M.	20 degrees C.

III. Mounting

The 2001 twin turbine series can be engine adapted:

Through an input drive shaft for remote engine/transmission mounting - See AS 22-003 and AS 22-008.

Through SAE #3 flywheel housing adaptation and flex disc drive with or without integral threaded nuts - See AS 22-003 and AS 00-016.

Through SAE #3 flywheel housing adaptation and optional grease ring drive - See AS 22-003 and AS 00-007.

NOTE: SAE #3 Converter housing size is applicable to TT-200 or optional TT-400 converters.

Engine mounted transmissions incorporate an oil sealing diaphragm to affect a dry converter housing.

The inertia of all applicable rotating converter input components, excluding oil and input flange is:

TT-200 engine mount	- .256 lb. ft. sec. ²	(.347 Kg M ²)
remote mount	- .232 lb. ft. sec. ²	(.314 Kg M ²)
TT-400 engine mount	- .276 lb. ft. sec. ²	(.374 Kg M ²)
remote mount	- .252 lb. ft. sec. ²	(.342 Kg M ²)

Chassis mounting pads are provided in 4-bolt configuration on either side of the main housing, located approximately 10 inches (254 mm) below the transmission input centerline on both short and long drop models. See AS 22-003 and AS 22-021.

Maximum tilt angles for intermittent operations including chassis mounting angle and terrain slopes have been analytically determined. The transmission should not be operated at continuous high speeds at the large tilt angles. These angles should serve as a general guide only and each installation involving a large tilt angle should be evaluated in reference to that application. The tilt direction is defined when viewing the transmission from the rear and is off the vertical.

<u>TT, TRT-2001-1, -3</u>	
<u>Intermittent</u>	<u>Direction of Tilt</u>
65°	Left
35°	Right
30°	Forward
20°	Rearward

IV. Converters

The twin turbine converter is comprised of seven sub-assembly groups.

- Converter Pump
- First Turbine
- Second Turbine
- Fixed Stator
- First Turbine Gears
- First Turbine Freewheel Clutch
- Second Turbine Gears

The converter output shaft, known as the combining shaft, is that part to which the second turbine driven gear is solidly attached. The first turbine also transmits torque to the combining shaft through the freewheel clutch.

Operation of the twin-turbine converter is defined in two phases.

Phase I - when both turbines transmit torque to the combining shaft. Phase I occurs during the lower converter speed ratios (from stall to that speed ratio when first turbine speed nearly equals converter pump speed, at which time the freewheel clutch disengages. During Phase I, the torque from the first turbine diminishes from maximum at converter stall to zero when the freewheel disengages. Torque from the

second turbine increases from zero at stall to maximum at the speed ratio the first turbine freewheels.

Phase II- represents the higher converter speed ratios from the time the first turbine freewheels up to 1:1 speed ratio when the first and second turbines are both rotating at the same rate of speed as the converter pump. During Phase II, only the second turbine transmits torque, during which the torque ratio diminishes with increasing speed ratio.

On the following page are graphical descriptions of twin-turbine converter operation: (Page 5)

Torque ratio and speed ratio of a twin-turbine converter is dependent on a combination of hydraulic and mechanical actions.

Because of the number of components and component options offered in the twin turbine converter line, many models are, or can be, made available.

On the following pages (Page 6) are Technical Data Charts showing the various standard TT-200 optional TT-400 converter models and their basic composition:

V. Range Gears and Clutches

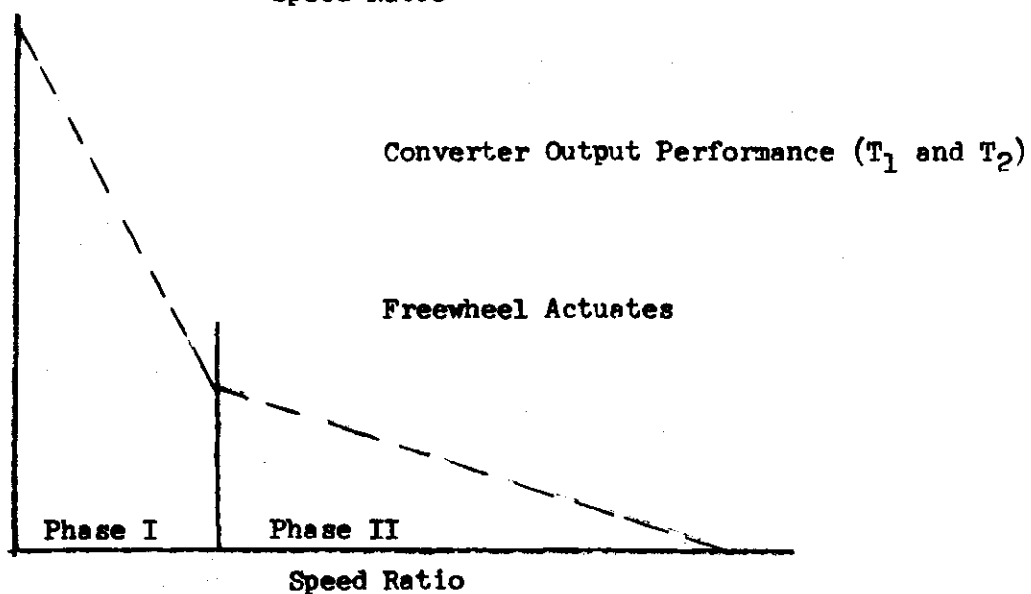
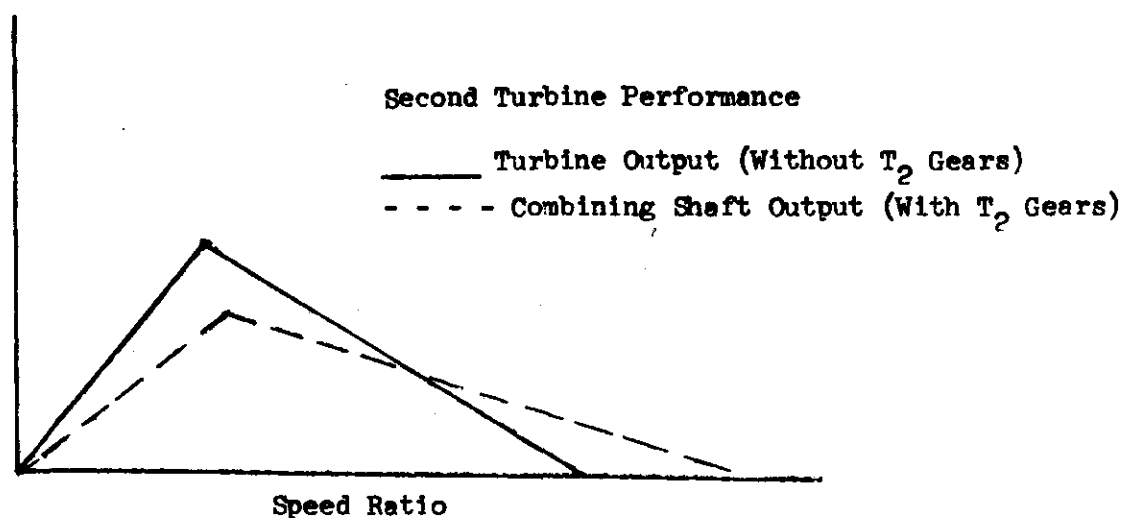
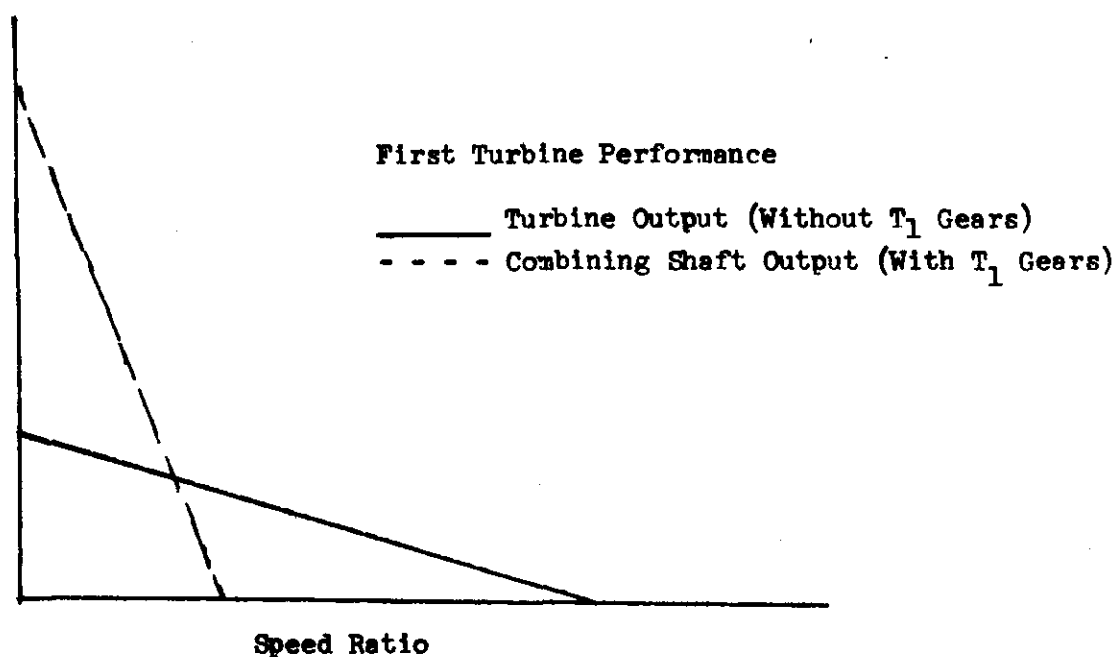
The TT/TTB-2001 transmission models use planetary gear sets and two-area clutch apply pistons in the low forward and reverse ranges. High range forward is by a direct drive clutch pack only.

The TRT-2001 transmission models use planetary gear sets and two-area clutch apply pistons in the forward/reverse directional ranges. The high/low range section uses a single planetary gear set coupled with high and low range clutch packs.

All range clutches are multiple wet-disc packs designed to self compensate for wear. These clutches are lubricated and cooled by the transmission oil.

The TT/TRT-2001 series transmissions include two types of range clutch apply pistons. Both types are designed circular around the transmission center shaft to ensure an even distribution of clutch pack apply force circumferentially. For the application of non-directional range shifts, single hydraulic pressure area pistons are used. For the application of directional (forward/reverse) ranges shifts, pistons with two hydraulic pressure areas are used. These piston areas are circular.

Following are graphical descriptions of twin-turbine converter operation:



Converter Model Specifications for TT/TRT-2001 Transmissions
Standard TT-200 - 10.7 inches (272 mm.) Torus Diameter

Converter Model	Basic Capacity	T ₁ Gear Ratio	T ₂ Gear Ratio	T _o Ratio at Stall	Converter Elements			
					Pump	T ₁	T ₂	Stator
220	Low	2.50	.826	5.14	6778068	6773660	6778096	6777537
230	"	3.42	.826	7.05	"	"	"	"
240	Intermdt	2.50	.826	5.10	"	"	"	6773670
250	"	3.42	.826	7.45	"	"	"	"
242	"	2.50	1.21	3.31	"	"	"	"
252	"	3.42	1.21	4.78	"	"	"	"
260	High	2.50	.826	4.80	"	"	"	6773667
270	"	3.42	.826	6.56	"	"	"	"
262	"	2.50	1.21	3.12	"	"	"	"
272	"	3.42	1.21	4.52	"	"	"	"

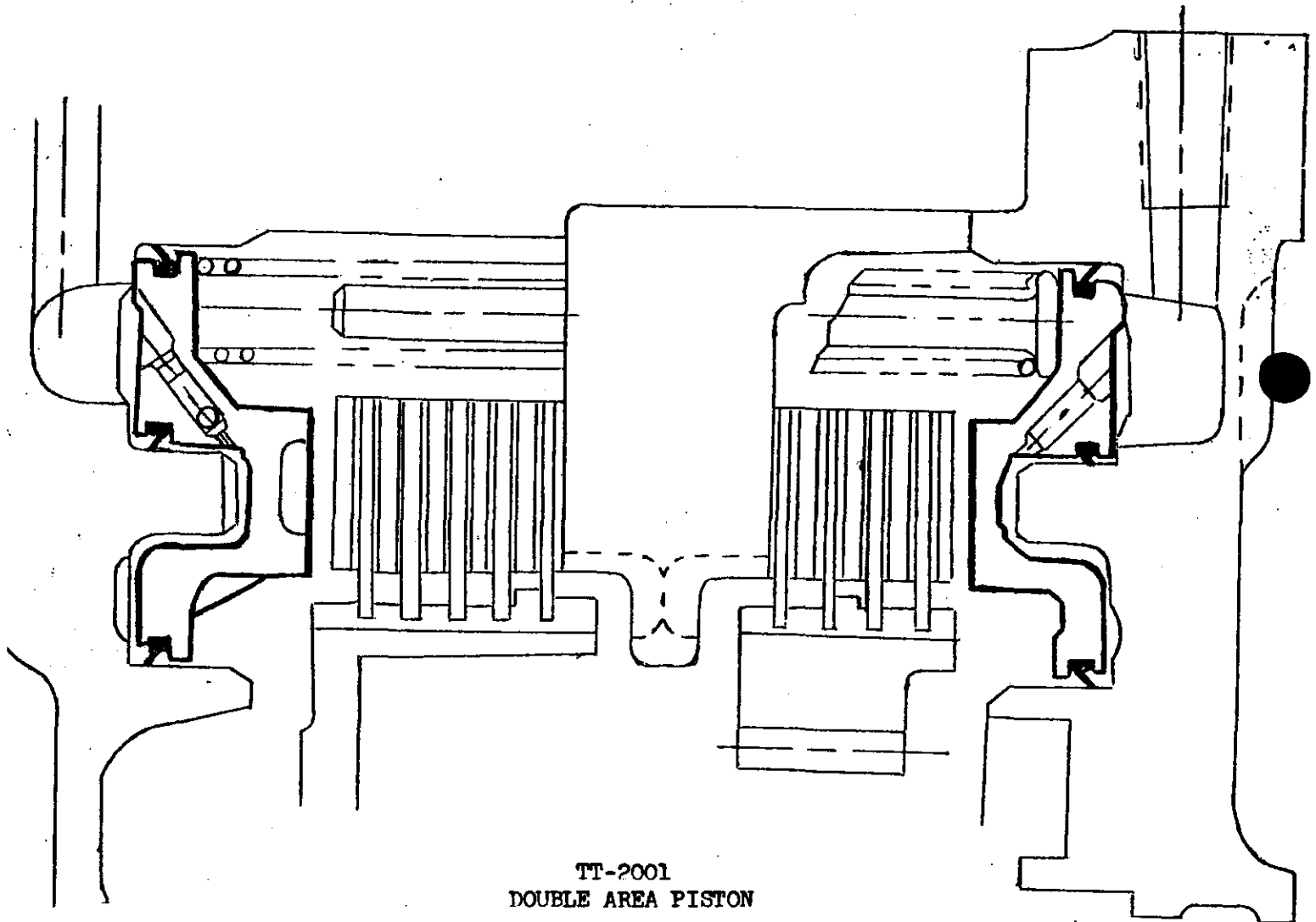
NOTE: The above stall torque ratios do not include the second turbine (T₂) gear ratio. The T₂ ratio is included in the advertised gear ratio.

Optional TT-400 - 12.2 inches (310mm.) Torus Dia.

Converter Model	Basic Capacity	T ₁ Gear Ratio	T ₂ Gear Ratio	To. Ratio at Stall	Converter Elements			
					Pump	T ₁	T ₂	Stator
424	Low	3.42	.826	6.70	6777575	6777578	6836093	6777577
425	"	2.50	.826	5.05	"	"	"	"
426	"	3.42	1.21	4.58	"	"	"	"
427	"	2.50	1.21	3.26	"	"	"	"
444	Intermdt	3.42	.826	6.79	"	"	"	6832000
445	"	2.50	.826	4.62	"	"	"	"
447	"	2.50	1.21	3.20	"	"	"	"

NOTE: The above stall torque ratios do not include the second turbine (T₂) gear ratio. The T₂ ratio is included in the advertised gear ratios.

with the inner and outer areas separated by oil seal rings. This two-area piston design allows smooth full power directional shifts with minimum torque peaks (shift shocks) on the vehicle driveline. The hydraulic apply pressure is directed behind the outer (primary) pressure area for initial clutch pack compression. During this compression, clutch slippage is reduced from maximum to zero as the hydraulic apply fluid is metered through a small hole in the apply piston from the outer to inner (secondary) piston areas. After completion of the directional clutch apply, both areas of the piston maintain full apply pressure to transmit torque through the selected range gearing.



TT-2001
DOUBLE AREA PISTON

Clutch apply modulation or slippage time is dependent on clutch capacity, and clutch capacity is dependent on piston area and hydraulic pressure. Therefore, to vary the clutch capacity for compatibility with light or heavy vehicles, the 2001 Series transmissions are offered with either of two regulated main hydraulic pressures. The two available main pressures are as follows:

Vehicle Weight (Max. Operating)	Main Pressure	Main Pressure Valve Body Spring	Pressure Gauge
28,000 lb. or less (12700 Kg or less)	138-165 PSI (952-1138 KPa)	6835377	6838456
More than 28,000 lb. (more than 12700 Kg)	165-195 PSI (1138-1345 KPa)	6835705	6838456

Note: Pressure gauge 6838456 is marked with red bands below 130 psi and above 195 psi. Between 130 and 195 psi is a green band indicating the safe operation range. Transmissions with the lower main pressure schedule should read in the lower green band. Transmissions with regulated high main pressure should show gauge pressure in the upper portion of the green band.

VI. Overall Mechanical Transmission Ratios

The 2001-1 transmission models are available with a choice of two drop box ratios. The TT/TTB models are offered with a choice of two low-forward planetary ratios. The TRT-2021-3 models are offered with a choice of underdrive or overdrive high/low planetary ratio spreads.

The following charts define the advertised gear ratios of the 2001 twin turbine transmissions.

TT/TTB-2021-1 Transmission Ratios

Production

Ranges	Second Turbine - T ₂	Planetarys			Advertised Ratio with Dropbox	
		Low	High	Reverse	.846	.684
Low	.826	3.81			2.662	2.153
High	"		1.00		.699	.565
Reverse	"			2.81	1.964	1.588
Low	.826	2.903			2.029	1.641
High	"		1.00		.699	.565
Reverse	"			2.81	1.964	1.588
Low	1.21	3.81			3.902	3.155
High	"		1.00		1.024	.828
Reverse	"			2.81	2.878	2.327
Low	1.21	2.903			2.974	2.404
High	"		1.00		1.024	.828
Reverse	"			2.81	2.878	2.327

For valid performance calculations, advertised gear ratios are applicable to only those converter torque ratios having a common T₂ ratio.

TRT-2021-1 Transmission Ratios

Production

Ranges	Second Turbine - T_2	Planetaries				Overall/Dropbox	
		Forward	Reverse	Low	High	.846	.684
Fwd. Low	.826	2.903		1.00		2.029	1.641
Fwd. Hi	.826	2.903			.363	.736	.595
Rev. Low	.826		2.81	1.00		1.964	1.588
Rev. Hi	.826		2.81		.363	.712	.576
Fwd. Low	1.21	2.903		1.00		2.974	2.404
Fwd. Hi	1.21	2.903			.363	1.078	.872
Rev. Low	1.21		2.81	1.00		2.878	2.327
Rev. Hi	1.21		2.81		.363	1.044	.844

TRT-2021-3 Transmission Ratios

Production

Ranges	Second Turbine - T_2	Planetaries				Overall Ratios
		Forward	Reverse	Low	High	
Fwd. Low	.826	2.903		2.757		6.611
Fwd. Hi	.826	2.903			1.00	2.398
Rev. Low	.826		2.81	2.757		6.397
Rev. Hi	.826		2.81		1.00	2.321
Fwd. Low	.826	2.903		1.00		2.398
Fwd. Hi	.826	2.903			.344	.826
Rev. Low	.826		2.81	1.00		2.321
Rev. Hi	.826		2.81		.344	.799
Fwd. Low	1.21	2.903		2.757		9.688
Fwd. Hi	1.21	2.903			1.00	3.514
Rev. Low	1.21		2.81	2.757		9.375
Rev. Hi	1.21		2.81		1.00	3.401
Fwd. Low	1.21	2.903		1.00		3.514
Fwd. Hi	1.21	2.903			.344	1.210
Rev. Low	1.21		2.81	1.00		3.401
Rev. Hi	1.21		2.81		.344	1.171

Repeat Note: Above advertised gear ratios are applicable to advertised converter torque ratios only when T_2 ratios are common.

TRT - 2011-3 Transmission Ratios

Production

Ranges	Second Turbine - T_2	Planetaries		Overall Ratio
		Forward	Reverse	
Forward	.826	2.903		2.398
Reverse	.826		2.81	2.321
Forward	1.21	2.903		3.514
Reverse	1.21		2.81	3.401

Note: Above advertised gear ratios are applicable to advertised converter torque ratios only when T_2 ratios are common.

VII. Output Configurations

The dash three (-3) or short drop models have a single output shaft rotating in forward ranges opposite the direction of the input (counter clockwise when viewed from the input or front).

The dash one (-1) or long drop models normally have dual (two) outputs on a single solid shaft 19 inches (483 mm) below the centerline of the input.

Rotation in forward ranges is same as the input (clockwise when viewed from the input or front). The dash one (-1) models can be obtained with optional dual outputs having a front shaft manual select disconnect or have a single rear output with the front output housing capped.

VIII. Power Takeoffs

The 2001 series twin turbine transmissions are offered with a maximum of three PTO's. Two PTO's, one standard and one optional, are engine driven and available to all models. The third and optional PTO is converter driven and available on TT and TTB models only.

Standard on all 2001 series engine driven PTO's is a constant supply of lubrication to the implement pump drive splines. To ensure maximum spline life, it is recommended that the constant lube configuration be used.

PTO Specifications

	Standard Engine Driven	Optional Engine Driven	Optional Converter Driven
Location	Upper Left Main Housing	Upper Right Main Housing	Rear Main Housing
Drawing	AS 22-030	AS 22-031	AS 22-026
Pad Sizes	SAE C 4-Bolt SAE C 2-Bolt SAE B 2-Bolt	SAE A 2-Bolt	Splined Shaft with Flange
Spline Sizes	SAE C SAE B	SAE A SAE B	
Speed Ratio	.909 x engine 1.0 x engine	.909 x engine 1.0 x engine	Combining shaft speed
Ratings	Intermittent 110 hp (82 Kw) Continuous 90 hp (67 Kw)	30 hp (22 Kw)	Intermittent Full engine hp

Because of lube provision, it will be necessary to use a sealing gasket and implement pump with a non-vented mounting flange. For details, see AS 22-030 or AS 22-031.

IX. Speedometer Drive

An optional SAE 5/32 heavy duty speedometer drive shaft is available on TT-2001-1 models only. Speedometer shaft speed equals transmission output shaft speed times dropbox ratio, i.e.:

Speedo drive rpm = combining shaft speed

See drawing AS 22-015

X. Control Valve Body

The 2001 twin turbine transmissions are equipped with two-spool valve bodies. One spool is for manual range selection, the other is for either standard clutch cut-off or optional inching control.

The clutch cut-off is used in applications where full engine speed is required for maximum implement drive speeds while the vehicle is stationary and it is not desirable to make a range shift to neutral. The CCO valve can be air or hydraulic actuated.

The optional inching control is available for applications where full engine speed for maximum implement drive is required simultaneously with slow vehicle maneuvering. The inching valve can be mechanically operated or by a hydraulic slave cylinder. During slippage of the range clutch, lubrication is directed over the appropriate clutch pack to provide maximum cooling and minimum wear on the clutch faces.

For hydraulic clutch cut-off	see AS 22-003 or AS 22-021
For air actuated clutch cut-off	see AS 00-027
For inching control	see AS 00-028

The range selector spool requires a maximum push or pull force of 35 lbs. (156 N) through each detent position.

XI. Internal Service Brake

The TTB-2001-1 models incorporate an integral vehicle service brake connected to the transmission dropbox drive gear. This brake is a multi-disc wet pack type of which speed is influenced by driveshaft rpm and dropbox ratio. Actuation is accomplished by hydraulic pressure on three radially located apply pistons from a customer supplied hydraulic brake system. The TTB service brake is self-adjusting and is cooled by transmission oil during application.

At maximum allowable brake system apply pressure of 1500 psi, (10,342 KPa) the static capacity of the internal brake is:

- 3200 lb. ft. (4339 Nm) at the transmission output shaft with .846 transfer gear ratio
- 2484 lb. ft. (3368 Nm) at the transmission output shaft with .684 transfer gear ratio

It must be remembered that frequent brake use creates heat being transferred to the transmission fluid. As such, it may be necessary to provide additional oil cooler capacity.

XII. Parking Brake

The drum type parking brake, optional to all models, is available in three configurations defined as follows:

<u>Applicable Transmissions</u>	<u>Parking Brake Description</u>
TT-2001-1	10 x 1.5 inch (254 x 38 mm) drum with standard pressure plate. Rating: 30,000 in. lb. (3389 Nm) at 1500 lb. (6672 N) apply lever force.
TTB-2001-1 TRT-2001-1	10 x 1.5 inch (254 x 38 mm) drum with pressure plate cut out to clear housing for TTB internal brake or TRT high/low range section. Rating: Same as TT-2001-1
TRT-2001-3	13.375 x 2 inch (340 x 51 mm) drum with standard pressure plate Rating: 45,000 in. lb. (5084 Nm) at 2100 lb. (9341 N) apply lever force

XIII. Reverse Warning

All 2001 series twin turbine transmissions are delivered standard with a 1/8 inch NPTF tapped hole in the valve body to transmit hydraulic pressure to a customer supplied switch for actuating lights, horns or other reverse warning devices.

The hydraulic pressure is that used to apply the reverse range clutch where pressure can range between 138-195 psi (952-1345 KPa).

A typical pressure switch would be the 2-pole Fasco Switch, P/N S-1733-1500 or equivalent.

XIV. Neutral Start Switch Provision

A tapped hole with a 9/16-18 UNF-2B thread is provided in the valve body of all twin turbine transmissions. This provision will receive a customer supplied, normally off linear switch such as the Cole Hersee, Part No. 92102-03 which includes a required .032 inch washer or J. Polak Part No. 361B switch which does not include but requires a .032 inch washer. It should be noted that when the neutral start switch is utilized, it will be in close proximity to the customer supplied mounting bracket.

A new drawing AS 00-052 has been prepared to describe the neutral start switch provision which is standard on all twin turbine transmissions.

No additional modifications will be required by the customer if this provision is not to be used, as all production transmissions will contain a threaded plug and washer sealing the tapped hole.

XV. Oil System

Lubrication and cooling is supplied by a single-element two-gear constant-displacement pump located behind the standard engine driven PTO and driven by the same internal shaft and gear.

Integral sump capacity (-1 models) 8.5 gal. (32 liters)
(-3 models) 6.5 gal. (25 liters)

Excluding external circuits -

Oil Type C-3 hydraulic transmission fluid - reference Sales Brief #42

Oil Filters - Customer Furnished

See Sales Brief #28 for suitable filter models

Instruments - Allison temperature gage 6830741 available with

1.22 M., 1.83 M. or 2.54 M. capillary tube lengths

See Sales Brief #9 for gauges

XVI. Limited Stroke Torqmatic ® Coupling

The Torqmatic Coupling design has been changed to limit the input torque to the rubber element. This new design will provide improved durability in those applications where high amplitude torsional vibrations are present. Another feature of this design is that should a rubber element fail, a mechanical drive through the Torqmatic Coupling is maintained until the machine can be shut down and the Torqmatic Coupling replaced.

As a higher torque load is applied to the rubber element, the pins rotate toward the ends of the slots. At approximately 405 lb.ft. the pins are in contact with the ends of the slots which makes a mechanical connection between the hub

and the flange. Additional torque loads are carried by the pins and not by the rubber element. The new coupling is available with Mech. 5C and Mech. 6C flange.

The axial length of the new coupling is .60 longer than the old Torqmatic® Coupling. This is necessary because of an additional lip required on the hub to hold the pins. This increase in axial length will affect interchangeability with the old Torqmatic® Coupling. In many applications the increased length can be compensated for in the slip joint or by shortening the input driveline. There will be cases where shortening the input driveline will make the driveline angle too high or where the input driveline cannot be shortened. In these applications, it will be necessary for the OEM to make whatever vehicle re-design is necessary to accommodate the new coupling. Because of the superior characteristics of the new coupling, the old coupling will not be maintained for service.

XVII. Weight

The following listed weights are dry and do not include parking brake or flanges.

<u>Model</u>	<u>Pounds</u>	<u>Kilograms</u>
TT-2001-1	760 - 815	345 - 369
TTB-2001-1	935 - 1000	424 - 453
TRT-2021-1	910 - 965	412 - 437
TRT-2011-3	660 - 700	295 - 317
TRT-2021-3	755 - 795	342 - 360

XVIII. Support Publications

A. Manuals and Catalogs:

SA 1336	Operators Manual
SA 1248	Parts Catalog
SA 1277	TT/TTB Service Manual
SA 1280	TRT Service Manual

B. Installation Specification Drawings

AS 00-016	Flex Plate Data
AS 00-026	Shift Tower Positions
AS 00-027	Air Actuated Clutch Cut-Off
AS 00-028	Inching Control
AS 00-052	Neutral Start Switch
AS 22-003	TT-2001-1 Basic Installation
AS 22-004	External Hydraulic Circuits
AS 22-008	Flange Chart
AS 22-015	TT-2001-1 Speedo Drive
AS 00-036	Flex Drive Characteristics
AS 00-045	Off-Highway Gauges
AS 00-051	Cooler Oil Flow
AS 22-016	TRT-2021-3 Basic Installation
AS 22-017	TRT-2021-1 Basic Installation

B. Installation Specification Drawings (Continued)

AS 22-021	TRT-2011-3 Basic Installation
AS 22-025	TT-2001-1 Rear Converter Drive Power Takeoffs
AS 22-026	TTB-2001-1 Service Brake & Converter PTO
AS 22-028	Implement and Steer Pump Clearance - TT-2001-1
AS 22-029	Implement and Steer Pump Clearance - TRT-2001-3
AS 22-030	Implement Pump Mounting Flange and Spline Information
AS 22-031	Steer Pump Mounting Flange and Spline Information

C. Miscellaneous Allison Literature

Installation Manual - Off-Highway Transmission

D. Converter Performance Charts:

SA-1186	TT-220
SA-1187	TT-230
SA-1188	TT-240
SA-1344	TT-242
-	TT-250
SA-1345	TT-252
SA-1189	TT-260
SA-1346	TT-262
SA-1190	TT-270
SA-1347	TT-272
SA-1479	TT-424
SA-1191	TT-425
SA-1348	TT-426
SA-1349	TT-427
-	TT-444
SA-1351A	TT-445
SA-1350	TT-447

For further information, please contact the Transmission Sales Department, J5, Detroit Diesel Allison Division, P. O. Box 894, Indianapolis, Indiana 46206.

Allison powershift transmissions

Operators Manual

**(Twin-Turbine
Models)**



**TT 2001
TRT 2001
TTB 2001
TT 4700
TRT 4800**

OPERATING INSTRUCTIONS

TRANSMISSION NAMEPLATE	6
JOB-MATCHED FEATURES	8
OPERATION	10
Starting	10
Range Selection	10
Clutch Cutoff Control	11
Inching Control	11
Driveline Disconnect	12
Engine-Driven Power Takeoffs	13
Converter-Driven Power Takeoffs	13
Temperature	13
Pressures	14
Pushing or Towing	14
Parking Brake	14
Service Brakes (TTB models only)	14

MAINTENANCE INSTRUCTIONS

A LOOK INSIDE . . . . .	.16
CARE AND FIELD MAINTENANCE . . . . .	.20
PERIODIC INSPECTION . . . . .	.20
IMPORTANCE OF PROPER OIL LEVEL . . . . .	.20
OIL LEVEL CHECK PROCEDURE . . . . .	.21
OIL SPECIFICATION . . . . .	.25
OIL AND OIL FILTER CHANGE . . . . .	.26
CHECKING AND ADJUSTING LINKAGE . . . . .	.29
BLEEDING INTERNAL BRAKE . . . . .	.32
CARE OF BREATHER . . . . .	.33
TROUBLESHOOTING . . . . .	.34
PRESERVATION AND STORAGE . . . . .	.38
SERVICE LITERATURE . . . . .	.42

THE TWIN-TURBINE TRANSMISSIONS

Allison manufactures twin-turbine transmissions for a broad range of cycling or range-reversing vehicles. Each transmission is controlled by one shift lever—no separate foot pedal is required. The twin-turbine torque converter produces the equivalent of two torque ranges for each operating gear. One turbine provides the high torque necessary for starting heavy loads—the other turbine automatically takes over after the load is rolling to produce more speed.

A planetary gear system, driven by the twin-turbine converter, provides the additional operating gear ratios. Thus, the available operating ranges are the result of the ratios automatically produced by the twin turbines and the operator-selected ratios produced by the planetary system.

OPERATING INSTRUCTIONS

TRANSMISSION NAMEPLATE

The model number, part number, and serial number are stamped in the transmission nameplate. These three numbers describe the transmission and all of its components. Use *all three* numbers when you are seeking information or ordering replacement parts for the transmission. Location of the nameplate varies with the particular type of transmission used in the vehicle. An illustration shows the nameplate and its location on various models.

For a handy, ready-reference, why not record the nameplate information onto the nameplate in the illustration.

Model Number

The letter prefix of the model number indicates the general type of transmission. The four-digit number indicates, in addition to series, range speeds, etc., those transmissions which have the soft shift features.

The numbers for transmissions with soft shift features will:*

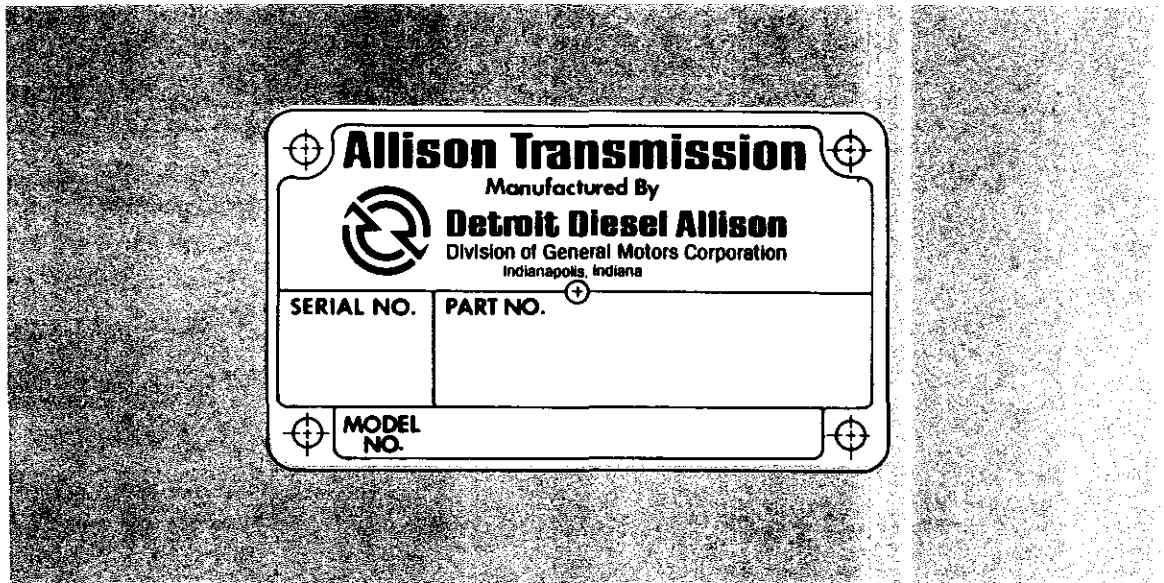
- begin with 2 and end with 1, or
- begin with 47 or 48

The numbers for transmission without soft shift features will:*

- begin with 2 and end with 0, or
- begin with 44 or 46

The dash number indicates a long or short center distance (center line of input shaft to center line of output shaft). The —1 indicates a long center distance (long drop) and a —3 indicates a short center distance (short drop).

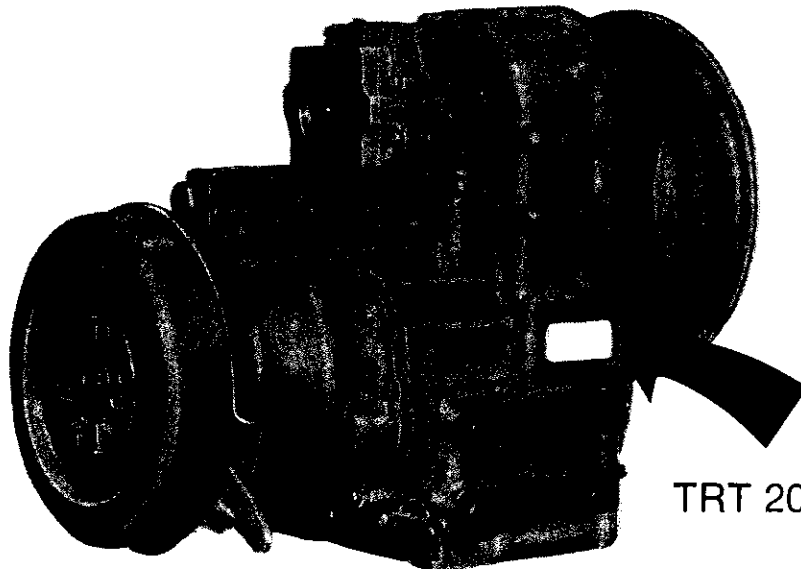
**Except for the shift characteristics, the operating and maintenance instructions in this manual apply to all models.*



TT 2001-1, TTB 2001-1,
TRT 2001-1



TT 4700-1
TRT 4800-1



TRT 2001-3

JOB-MATCHED FEATURES

The manufacturer of this vehicle has selected, from the TWIN-TURBINE family, the specific transmission to match the vehicle duty cycle and travel requirements. To match the duty cycle, the transmission is equipped with one or more of the following features.

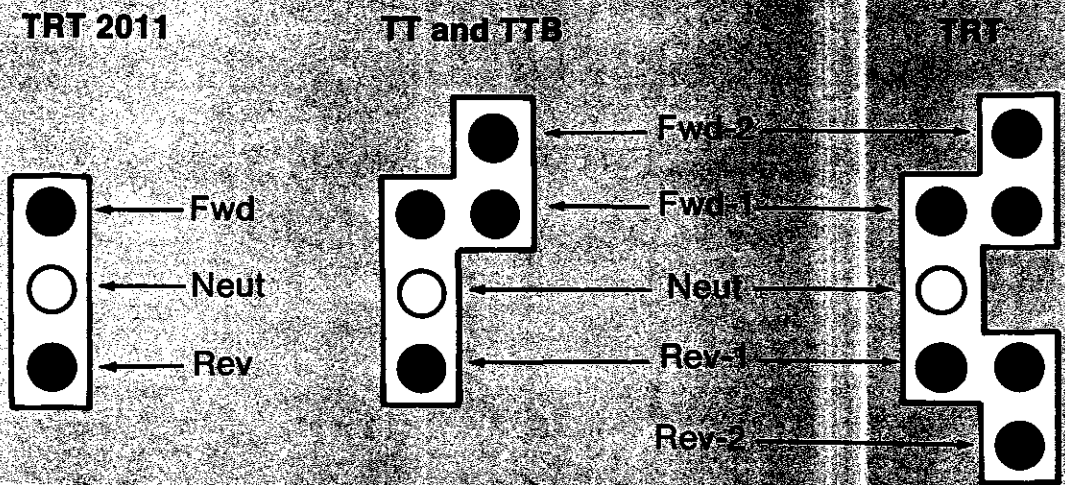
- Drive line disconnect—permits the operator to select two-wheel or four-wheel drive as desired (not used with short-drop applications).
- Clutch cutoff—permits the operator to divert engine power to the PTO-driven equipment.
- Inching control—permits the operator to maneuver vehicle in confined areas.
- Internal service brake—permits operator to work in dense brush, woods or mud without concern of fouling brake mechanism (used with TTB models only).
- Full power direction shifts—permits full power and/or full speed directional range shifts without harsh shift shocks (not available in TT/TRT 2000, 4400, and 4600 transmissions).

To match the travel requirements, the transmission has one of the following shift patterns.

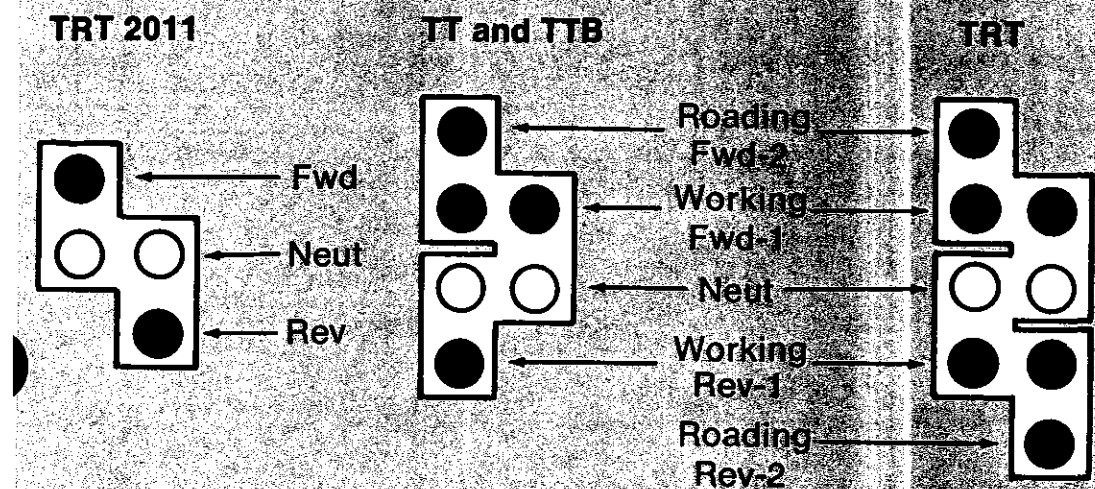
- The TT shift pattern provides two gears (2 range selections) in forward operation and one gear (1 range selection) in reverse.
- The TRT shift pattern provides equal range capability in either direction—two gears (2 range selections) in either forward or reverse operation or single range selection in either forward or reverse.

A single lever controls the functions of the transmission. Movement of the shift lever produces the selected gear ratio and direction. The shift patterns illustrated below are typical for the twin-turbine transmissions.

Soft Shift Patterns



Shift Patterns (without soft shift)



OPERATING INSTRUCTIONS

STARTING

To start the engine, place the shift control lever in neutral position, and actuate the starter. A neutral start switch (if used) will prevent the engine from starting if the control lever is in any other position.

RANGE SELECTION

Generally, satisfactory operation of the vehicle depends largely on the operator's judgment in selecting the proper range for the various operating conditions. There are, however, recommended range selections which match the torque to the working or roading conditions.

- Select the working range (Fwd-1 or Rev-1) when starting the vehicle in motion and for moving heavy loads. The working ranges produce a high torque at low speeds.
- Select the roading ranges (Fwd-2 or Rev-2) when distances and load permits. The roading ranges produce a lower torque at higher speeds.

Full-Power Shifts

- Any shift to a higher speed ratio (Fwd-1 to Fwd-2 or Rev-1 to Rev-2), in the same direction, can be made at full throttle and load. Best performance can be obtained by making the shifts at near engine governed speed.

- Any downshift to a lower speed ratio (Fwd-2 to Fwd-1 or Rev-2 to Rev-1) can also be made at full throttle and load, but not at a speed higher than the maximum speed attainable in the low range.

Directional Shifts

- *SOFT SHIFT SERIES*—Directional shifts can be made under full power and/or full speed conditions within the working ranges (Fwd-1 to Rev-1 or Rev-1 to Fwd-1). Directional shifts should not be made between the roading ranges; shifts of this nature will adversely affect clutch life.
- *WITHOUT SOFT SHIFT*—When shifting within the working ranges (FWD-1 to Rev-1 or Rev 1 to F1), the throttle should be closed and the vehicle braked to a reasonable speed. The shift to the opposite direction can then be made, after which the throttle may be opened again.

CLUTCH CUTOFF CONTROL

Some transmissions are equipped with a clutch cutoff control. This control eliminates the need to shift to neutral when full engine power is required to drive the PTO-driven equipment. The clutch cutoff is actuated whenever the operator applies the service brake. After the brake pedal passes through the initial portion of the stroke (some linkage has a detent), the clutches are completely released—when the brake pedal is released, the clutches are re-applied.

Because this feature would not be required for all operations, some vehicles include an override switch. This switch allows the operator to bypass the clutch cutoff control, whereby the transmission clutches are not affected by the service brakes. Also, some vehicles have two brake pedals, one applies the service brake only, the other pedal works in conjunction with the clutch cutoff.

INCHING CONTROL

Some transmissions are equipped with an inching control. This control permits better maneuverability—“inching” or “creeping” in confined areas while maintaining full throttle and hydraulic efficiency. The inching control is manually

actuated by the operator. Full application of the control will completely release the drive clutch; lesser application will allow partial slipping of the drive clutch. Thus, very slight or slow movements of the vehicle can be made with this control.

Although inching in high gear is permitted with some transmissions, the use of the inching control above creeping speed is not recommended. Refer to the following chart for the specific transmission model and the ranges in which inching is permitted.

Model	Inching ranges
TT,TTB 2001	Fwd-1 and Rev-1
TT 4700	Fwd-1 and Rev-1
TRT 2001	Fwd-1, Fwd-2, Rev-1 and Rev-2
TRT 2001 (underdrive)	Fwd-1 and Rev-1
TRT 4800	Fwd-1, Fwd-2, Rev-1 and Rev-2

DRIVELINE DISCONNECT

Some transmissions are equipped with a driveline disconnect. This feature permits the operator to select either a 4-wheel drive or 2-wheel drive as desired. Use the 2-wheel drive for roading on streets and highways. Use the 4-wheel drive for working off-the-road or when extra traction is required, such as operation in mud, snow, sand, etc.

The disconnect control should never be shifted while the vehicle is moving. However, when shifting from 2-wheel to 4-wheel drive, it may be necessary to move the vehicle slightly to aline the driveline splines for positive engagement.

NOTE: The parking brake will only hold the wheels of one driveline when the vehicle is in 2-wheel drive. To hold the additional wheels, shift the control of the 4-wheel (engaged) position.

ENGINE-DRIVEN POWER TAKEOFFS

Any pumps or accessories which need to operate any time the engine is running can be driven by the two power takeoffs on the transmission housing. These pumps or accessories are driven at or near engine speed.

CONVERTER-DRIVEN POWER TAKEOFF

Some TT and TTB 2001 models have a power takeoff located 12 inches above the output driveline at the rear of the transmission. The speed of the PTO-driven equipment is independent of any shifts. This permits the PTO drive gear to rotate at converter output speed regardless of the range selector position. The PTO-driven equipment can be operated when the vehicle is stationary and in neutral range, or when the vehicle is moving and in any operating range. When the transmission is in gear, application of the vehicle brakes will also stop the PTO-driven equipment. When the transmission is in neutral operation or clutch cutoff is included, application of the brakes will not affect the PTO operation.

TEMPERATURES

The normal operating temperature range for twin-turbine transmissions is 180-220°F. This temperature is indicated by the transmission oil temperature gage. When a continuous over-temperature condition (above 250°F, or in the red band *on oil temp gage*) is indicated, stop the vehicle and determine the cause.

The most common and easily remedied cause of overheating is due to extended operation under severe loading conditions. When this occurs, shift to neutral and run the engine for several minutes at 1200-1500 rpm until the temperature returns to normal. If the temperature does not return to normal, refer to the Troubleshooting portion in this manual for the other possible causes and remedies for overheating.

PRESSURES

The clutch pressure range for most twin-turbine transmissions is 165 to 195 psi. (Some selected applications have a pressure range of 138 to 165 psi.)

If the vehicle is equipped with a transmission clutch (oil) pressure gage, the gage will indicate the clutch apply pressure. During normal operation, the pressure will fluctuate during range shifts and will drop below normal during inching or clutch cutoff operation. If abnormal pressures are observed, refer to the Troubleshooting portion in this manual.

PUSHING OR TOWING

If a disabled vehicle must be pushed or towed farther than ½ mile, it is imperative that BOTH drive line shafts be disconnected. Failure to comply with the ½ mile limit may result in serious damage requiring complete overhaul of the transmission. If the distance is less than ½ mile, the drive line shafts may remain connected, and the vehicle must travel at a LOW speed.

PARKING BRAKE

There is no "park" position in the transmission shift pattern. Therefore, always apply the parking brake to hold the vehicle when it is unattended. Be sure the shift lever is in the neutral position.

SERVICE BRAKES (TTB models only)

TTB models are equipped with an internal, multidisk dynamic service brake which is controlled by the operator's foot pedal. The brake is self-adjusting and flow-cooled during application.

MAINTENANCE INSTRUCTIONS

A LOOK INSIDE

These transmissions include a twin-turbine torque converter, a planetary gear train, and a hydraulic control system which responds to the operator's movement of the range selector.

TWIN-TURBINE TORQUE CONVERTER

The twin-turbine torque converter extends the torque multiplication of the converter, in each gear range, providing broad torque coverage equal to two normal planetary gear ratios. This extended coverage is accomplished automatically and efficiently.

During operation, the first and second turbines function jointly or separately, depending upon the load demand and speed of the vehicle. The turbines are able to function jointly or separately by means of a freewheel clutch. At high-load demand and low speed, the freewheel clutch is engaged, causing both turbines to drive, and providing maximum input torque to the range gearing. As vehicle speed increases and load demand decreases, the second-turbine speed exceeds the first-turbine speed. The first turbine then freewheels, and the second turbine produces the power. Upon an increase in load demand and the resulting decrease in vehicle speed, the freewheel clutch automatically re-engages, causing both the first turbine and second turbine to again provide the necessary torque multiplication.

RANGE GEARING

The range gearing consists of a series of planetary gear sets. Each set includes an inner *sun gear*, four or more planet *pinion gears* united in a carrier, and an outer *ring gear*. Each planetary gear set is controlled by a clutch. Application of the clutch causes an interaction within the gear set which produces the selected speed ratio and direction of travel.

LOW-RANGE (TT). The low-range clutch holds the ring gear stationary, and the sun gear is the driving member. Thus, the planetary pinions drive the carrier at a reduced speed.

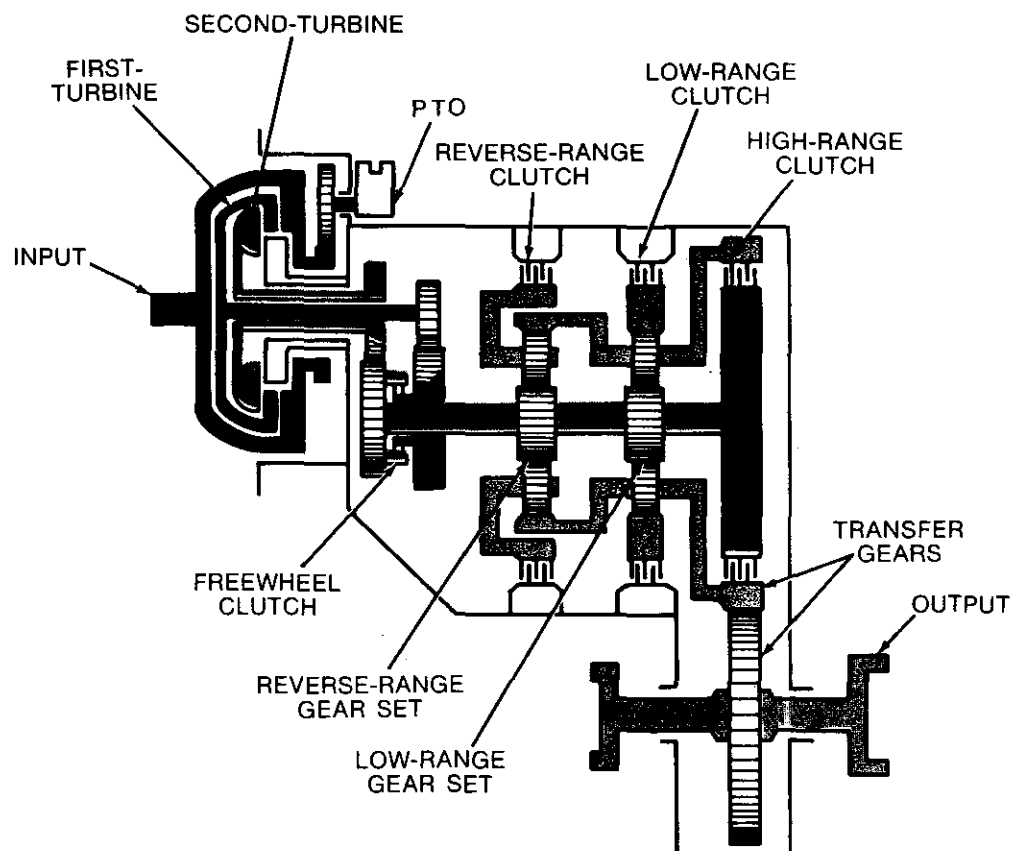
HIGH-RANGE (TT). The high-range clutch connects the transfer gears to the high-range clutch hub which is connected to the input shaft. Thus, a simple direct drive is produced from the input to the output.

REVERSE-RANGE (TT). The reverse-range clutch holds the planetary carrier, and the sun gear is the driving member. Thus the planetary pinions drive the ring gear in a reverse direction. This reverse torque drives the rest of the rotating members in a reverse direction.

FORWARD, LOW-RANGE (TRT). Both the forward clutch and low-range clutch are engaged. The forward clutch holds the ring gear stationary, and the sun gear is the driving member. Thus the planetary pinions drive the carrier at a reduced speed. The low-range clutch holds the ring gear stationary, and therefore the identical action occurs in the low-range planetary set as in the forward planetary. Thus, the reduced speed from the forward is reduced again to provide low-range at the output.

FORWARD, HIGH-RANGE (TRT). Both the forward clutch and high-range clutch are engaged. The forward clutch components perform in the same manner as in low-range operation. The high-range clutch locks the ring gear to the driving sun gear. This causes the carrier to rotate at the same speed as the driving sun gear. Thus, no speed increase or decrease occurs at this planetary gear set, and high-range is produced at the output.

REVERSE, LOW- OR HIGH-RANGE (TRT). The reverse clutch holds the planetary carrier, and the sun gear is the driving member. Thus, the planetary pinions drive the ring gear in a reverse direction. This reverse torque drives the rest of the rotating members in a reverse direction.



TYPICAL TT, LONG DROP TRANSMISSION