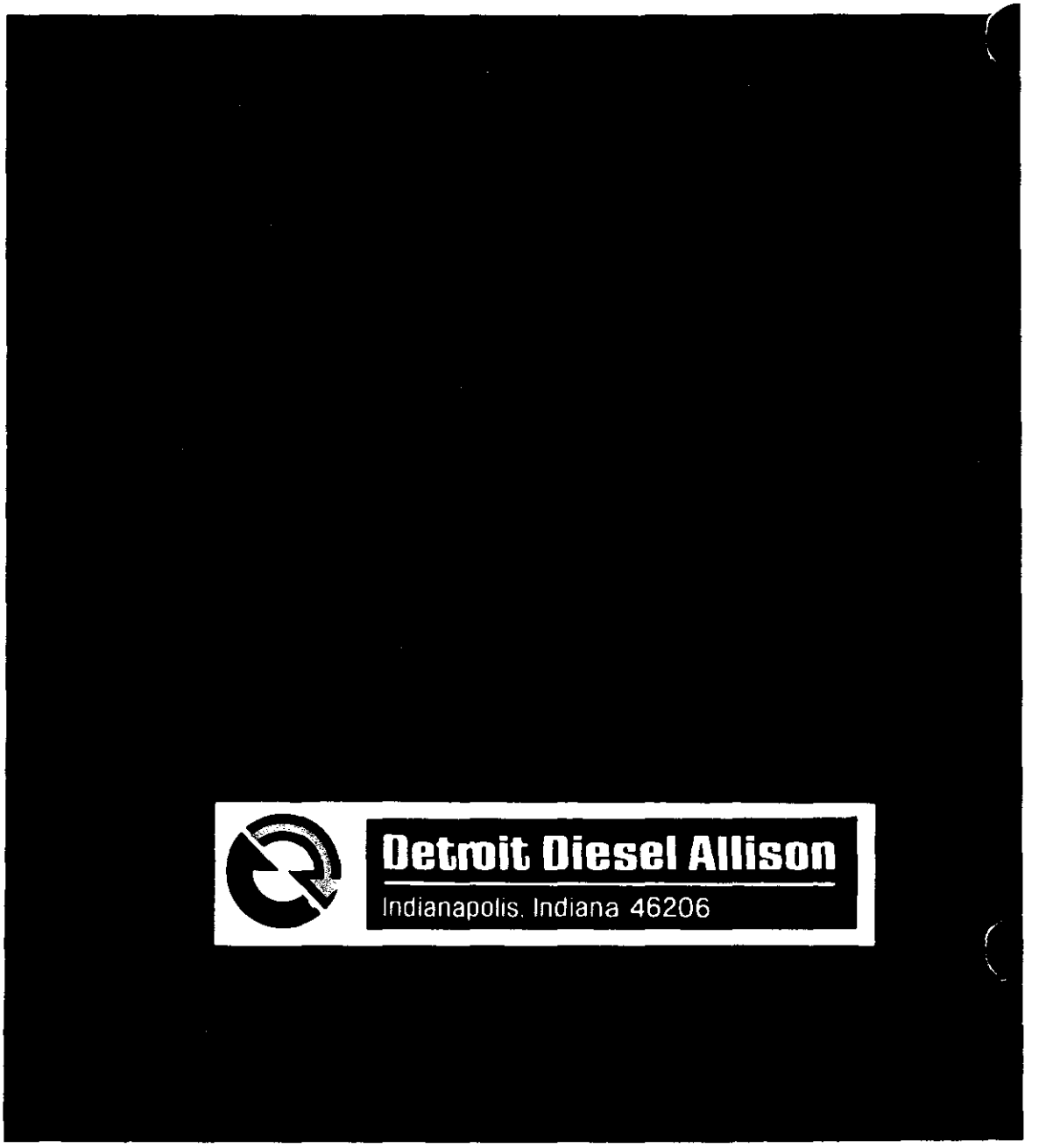
The Allison Powershifts



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Allison CLT-654 Transmission Date 9/9/76 No. 75

I. Introduction

The Allison CLT-654 Transmission has been designed in conjunction with the MT-600 Transmission and built specifically for Off-Highway applications. This transmission is basically a hauling unit which can be used in scrapers up to 100,000 lbs. (45,360 kg) GVW for twin engine and transmission models, or 60,000 lbs. (27,200 kg) GVW for single engine and transmission models.

The CLT-654 consists of a torque converter, constant mesh planetary gearing, hydraulically actuated multiple disc clutches, automatic hydraulic gear selection in forward ranges 2 thru 5, a lockup clutch effective in 4th and 5th ranges, and a customer supplied drop box.

The CLT-654 input ratings are as follows:

Maximum Net Torque	480 lb. ft. (651 Nm)
Maximum Net Horsepower	160 HP (119 Kw)
Maximum Engine Speed	3000 RPM
Maximum Turbine Torque	1000 lb.ft. (1356 Nm)

II. Product Description

1. Mounting - Initial release of the CLT-654 will have a remote mount configuration. Mounting specifications are determinant upon the type of driving axle used. There are two (2) side pads on converter housing and trunnion mounts will be required on customer supplied drop box.

2. Torque Converter

The following torque converter is available on the CLT-654:

Model	Stall Torque Ratio
TC-405	2.75

3. Output Configuration

The output rotation (as viewed from the input) is clockwise in all forward ranges, the same as the input.

4. Control Valve Body

A hydraulically actuated control valve body is used to provide automatic gear selection in the 2-4 or 2-5 selector positions. First, and first to second range shifts are mechanically actuated. Shift modulation will be an external control function utilizing a cam and cable design.

5. Planetary Gearing and Clutches

The CLT-654 utilizes planetary gear sets and clutch packs to provide five (5) forward gear ranges and one (1) reverse. The planetary gears are straight cut, spur type, in constant mesh. The hydraulically actuated, spring released, multiple disc clutch packs are self-compensating for wear and transmission oil lubricated.

6. Lockup

The lockup feature enables the pump and turbine elements of the torque converter to turn in unison at engine speed. The lockup clutch in this model is automatically engaged and disengaged in 4th and is applied continuously in 5th.

7. Parking Brake Provision

Because both the parking brake and drop box are customer supplied for the CLT-654 no provision has been made for a parking brake on the basic model.

8. Neutral Start Switch Provision

A provision for a neutral start switch installation is standard for the CLT-654. The internal shift lever is used to mechanically energize the vehicle starter circuit when the transmission is in neutral. The customer supplied neutral start switch can be mounted directly into the transmission case from the outside and connected to the starter circuit by means of weather proof connectors.

III. Specifications

1. Dry Weight 670 lbs. (304 kg.)

2. Overall Dimensions

Length 45 in. (1143 mm)

Height from base of sump to centerline	14.9 in. (376 mm)
Width	19.2 in. (488 mm)

3. Oil System

Sump	Integral		
Input Pressure Pump	Two (2) gear, positive displacement		
Oil Capacity (Initial fill)	21 qts.	20	liters
(refill)	20 qts.	19	liters
Maximum Oil Temperature to cooler	250°F (121°C)		
Normal Operating Temperature	160°F to 180°F (71°C to 82°C)		
Oil Filter	Replaceable cartridge located in sump pan		
Oil Type	Must be C2 or approved oil. Reference: Sales Brief #42.		

Main Pressure			
Reverse	300	psi	(2068 kPa)
Forward (1, 2, 3, and 4th converter phase)	200	psi	(1379 kPa)
Forward (4th lockup & 5th lockup)	150	psi	(1034 kPa)
Neutral	200	psi	(1379 kPa)

4. Power Take-off Provision

The CLT-654 offers an option, a converter driven, SAE 6-bolt PTO provision. This SAE regular duty PTO is rated at 300 lb.ft. (41.5 m. kgf. or 407 Nm) at 2100 to 3000 RPM.

5. Overall Transmission Gear Ratios*

Range	Ratio
First	8.04:1
Second	3,58:1
Third	2.09:1
Fourth	1.39:1
Fifth	1.00:1
Reverse	5.67:1

*Does not include torque converter ratio.

6. Drive Range Selection

Range selection is made by means of a customer supplied shift tower and selector lever located in the cab. Typical shift tower quadrant markings are shown below.

R	Reverse
N	Neutral
1	First, and first hold
2	Second and second hold
2-4	Second, third, fourth and fourth hold
2-5	Second, third, fourth, fifth

When the selector lever is placed in either 2-4 or 2-5, the transmission automatically progresses to each successive gear until the desired speed is achieved. Closed throttle downshifting is also automatic, from 5-2 or 4-2. There is a range hold, independent of the automatic downshift feature, in first, second, fourth and fifth. For maximum reduction, first range must be manually selected, and at the driver's discretion shifted into second range or either of the two automatic ranges.

IV. References

1. Sales Briefs

Number	Subject
9	Temperature and Pressure Gages
42	Oil Recommendations
45	Towing of Vehicles
56	Paint Specifications
65	Driveline Angularity

2. Manuals and Parts Catalogs

SA	Service Manual
SA	Parts Catalog

3. Application Specification Drawings

Number	Subject
AS 36-003	External Hydraulic Circuit Requirements
AS 36-006	Converter Driven PTO
AS 36-007	Manual Range Selector Control Data
AS 36-016	Modulator Installation
AS 36-017	Modulator Design Requirements
AS 36-030	Basic 600 Series Installation Drawing
AS 36-031	CLT 650 Installation Drawing
AS 36-032	Remote Input Option
AS 36-033	Electrical Circuit Requirements

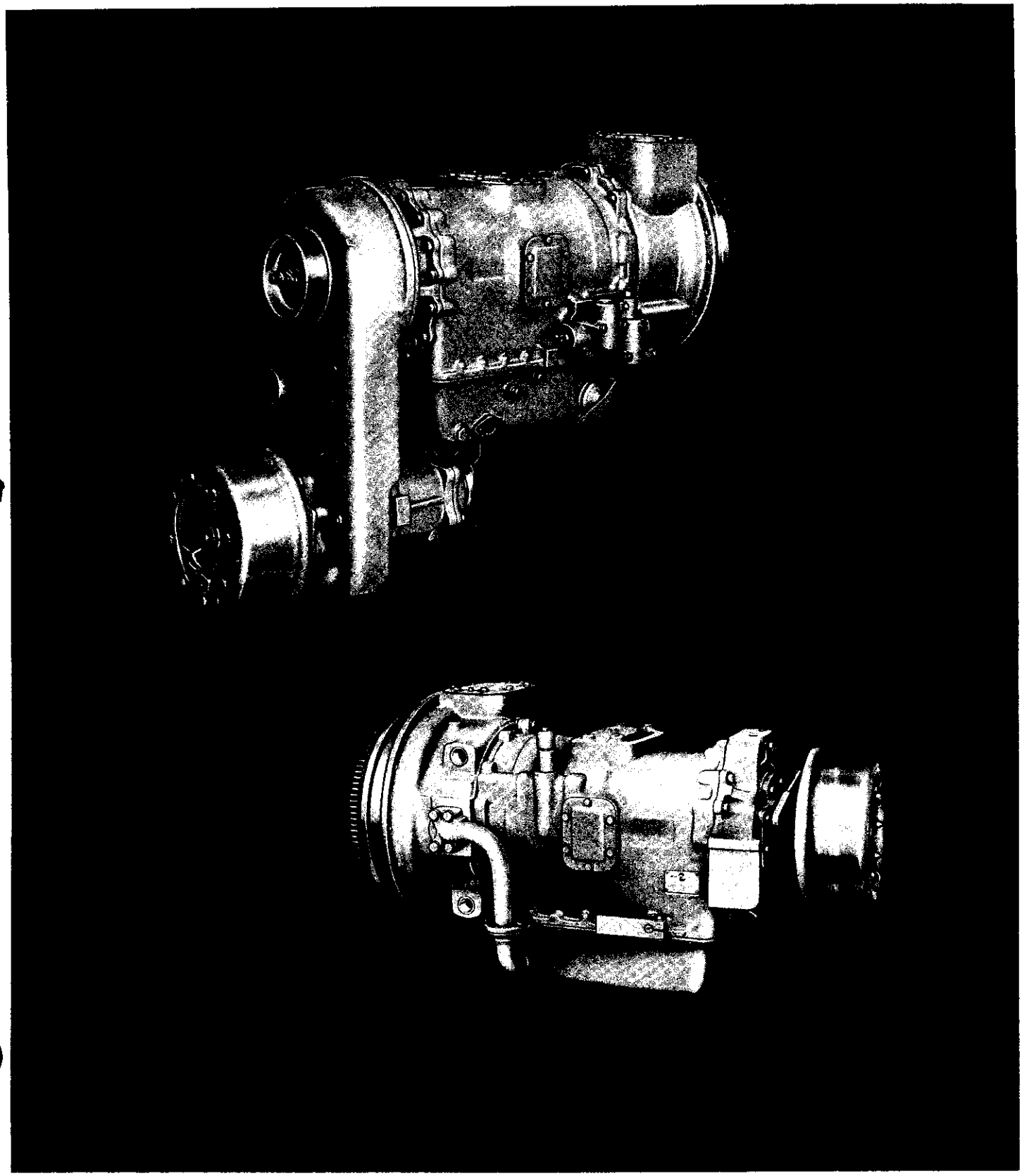
Allison Transmissions

hauling models

C (L) (B) T 4000

200 to 350 hp

(149 to 261 kW)



specifications

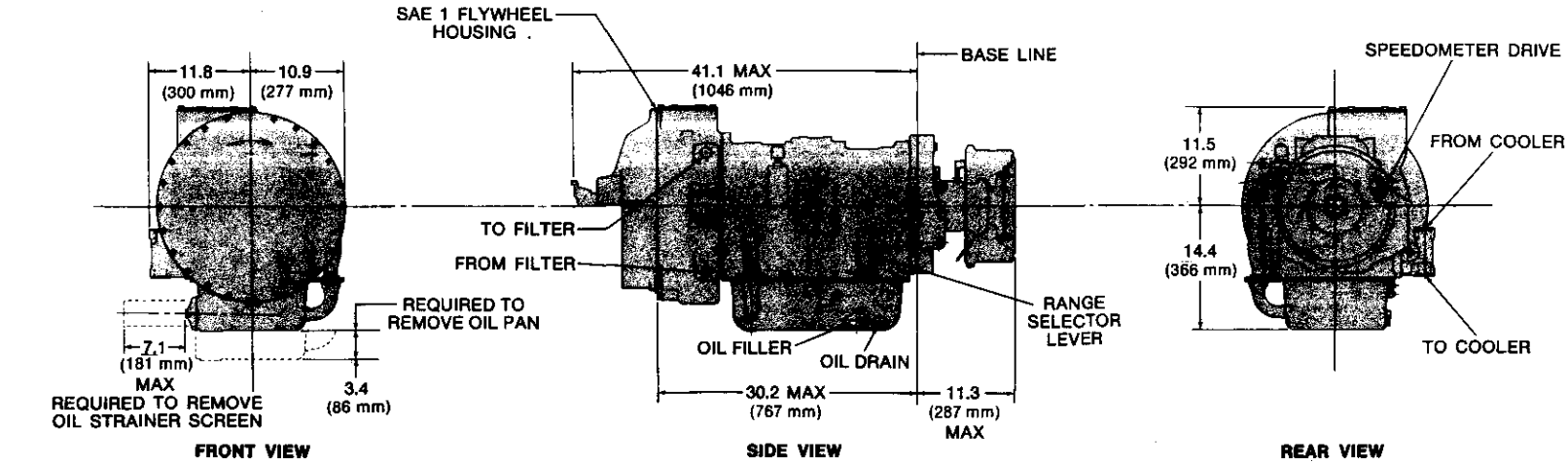
applicable power	Input	200 to 350 hp (149 to 261 kW)
rating	Input speed, max Input torque, max (net)	2500 rpm 775 lb ft (1051 N·m) (general); 880 lb ft (1193 N·m) (truck)
rotation	Input—right hand Output—right hand (forward ranges)	
mounting	Direct mounted Remote mounted	SAE 1 flywheel housing with flex disk drive; two side mounting pads or two top mounting holes at rear (straight through) or trunnion rear mounting (transfer gear) Trunnion front mounting with two side mounting pads or two top mounting holes at rear (straight through); two 4-bolt SAE 1 front mounting pads with trunnion rear mounting (transfer gear)
torque converter	Type Stall torque ratios Lockup clutch, automatic	Single-stage, 3-element, polyphase TC 430 - 3.56 TC 495 - 2.21 TC 450 - 3.20 VTC 470 - 2.95 (open); 2.031 (closed) TC 470 - 2.84 VTC 490 - 2.62 (open); 1.86 (closed) TC 490 - 2.46 VTC 495 - 2.29 (open); 1.88 (closed) Effective all forward ranges or 2nd thru 6th (optional)
hydraulic retarder	Type Capacity (torque absorption)	Vaned rotor between fixed vanes 950 lb ft (1288 N·m) or 600 hp (447 kW) at 3300 rpm (rotor speed)
gearing	Type: Range gearing Transfer gearing Gear ratios: First Second Third Fourth Fifth Sixth Reverse Transfer gear	 Constant mesh, spur type, planetary Constant mesh, spur type, in-line Basic (1.41 steps) / Optional (1.31 steps) 4.00 / 3.00 2.82 / 2.28 2.00 / 1.73 1.41 / 1.31 1.00 / 1.00 0.71 / 0.76 4.77 / 2.85 1.02 (standard); 1.29 (optional)
clutches	Hydraulic-actuated, spring-released, oil-cooled, multidisk, self-adjusting (automatic compensation for wear)	
flanges	Input (remote mounted) Output	Mechanics 7C; Spicer 1500, 1550, 1650, 1700 Mechanics 7C, 8C, 9C; Spicer 1700, 1800; Rockwell 7N
parking brake	Type Size	Drum, internal-expanding shoe 12 x 5 in. (343 x 127 mm)
power takeoff (4)	Engine driven (1):* Type Standard rating Heavy-duty rating Ratio Converter driven (3): Type Rating** Ratio	 SAE 8-bolt, heavy-duty Intermittent—200 hp (149 kW) at 2100-2500 rpm Continuous—100 hp (175 kW) at 2100-2500 rpm Intermittent—260 hp (194 kW) at 2100-2500 rpm Continuous—200 hp (149 kW) at 2100-2500 rpm 1.35 x engine speed Top—SAE 8-bolt Side—SAE 6-bolt 120 hp (90 kW) at 2100-2500 rpm N, 1, 3, 5, R—1.00 x turbine speed 2, 4, 6—1.41 or 1.31 x turbine speed
speedometer drive	Size Ratio	SAE 5/32 (3.96 mm), heavy duty Straight thru—0.5 x output speed Transfer gear—1.02 or 1.28 x output speed
control valve body	Manual controlled, hydraulic operated valve system	
oil system	Oil type Capacity (excluding external circuit) Sump Filter and cooler (customer furnished)	Hydraulic transmission fluid, type C-2 8¾ US gal (33 litres) Integral Remote mounted
size	 Length, max Width Height Weight (dry)	Straight through / Transfer gear 52.45 in. (1332 mm) / 59.56 in. (1513 mm) 23.42 in. (595 mm) / 23.42 in. (595 mm) 25.89 in. (657 mm) / 37.54 in. (953 mm) 955-1115 lb (432-462 kg) / 1255-1495 lb (572-680 kg)

* Requires wet flywheel housing. ** Simultaneous power takeoff operation is not to exceed published rating.

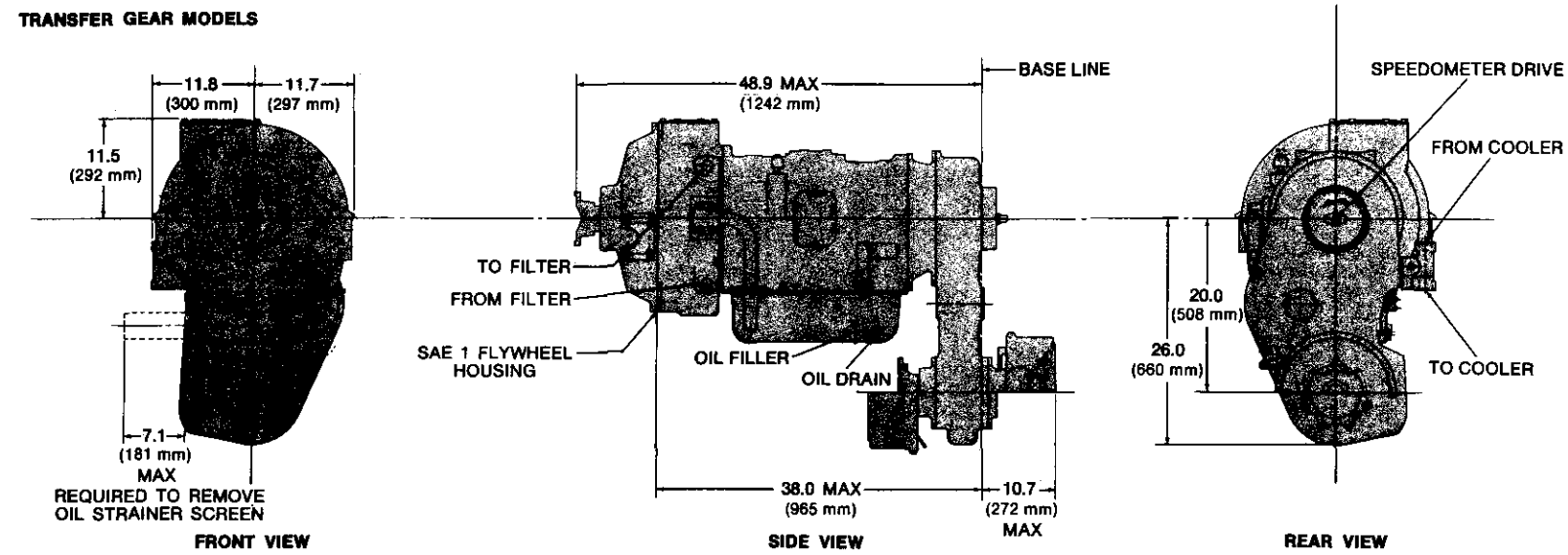
Note: All data and specifications subject to change without notice.

mounting dimensions

STRAIGHT THROUGH MODELS



TRANSFER GEAR MODELS



Note: Dimensions are given in inches with metric value in parentheses.

options

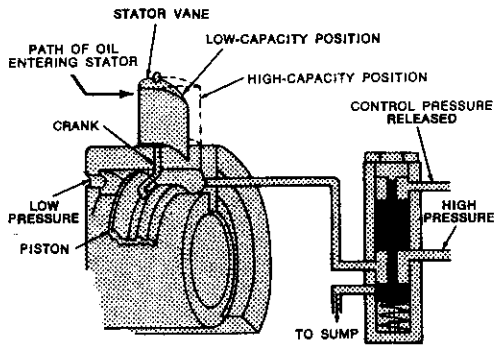
- Transmission remote mounted, or direct mounted on engine
- Automatic lockup clutch
- Variable input capacity converter
- Hydraulic retarder
- Straight through or transfer gear
- Front or rear output disconnect (transfer gear models)
- Parking brake
- Choice of popular flanges
- Engine-driven or converter-driven power takeoffs

variable input capacity converter

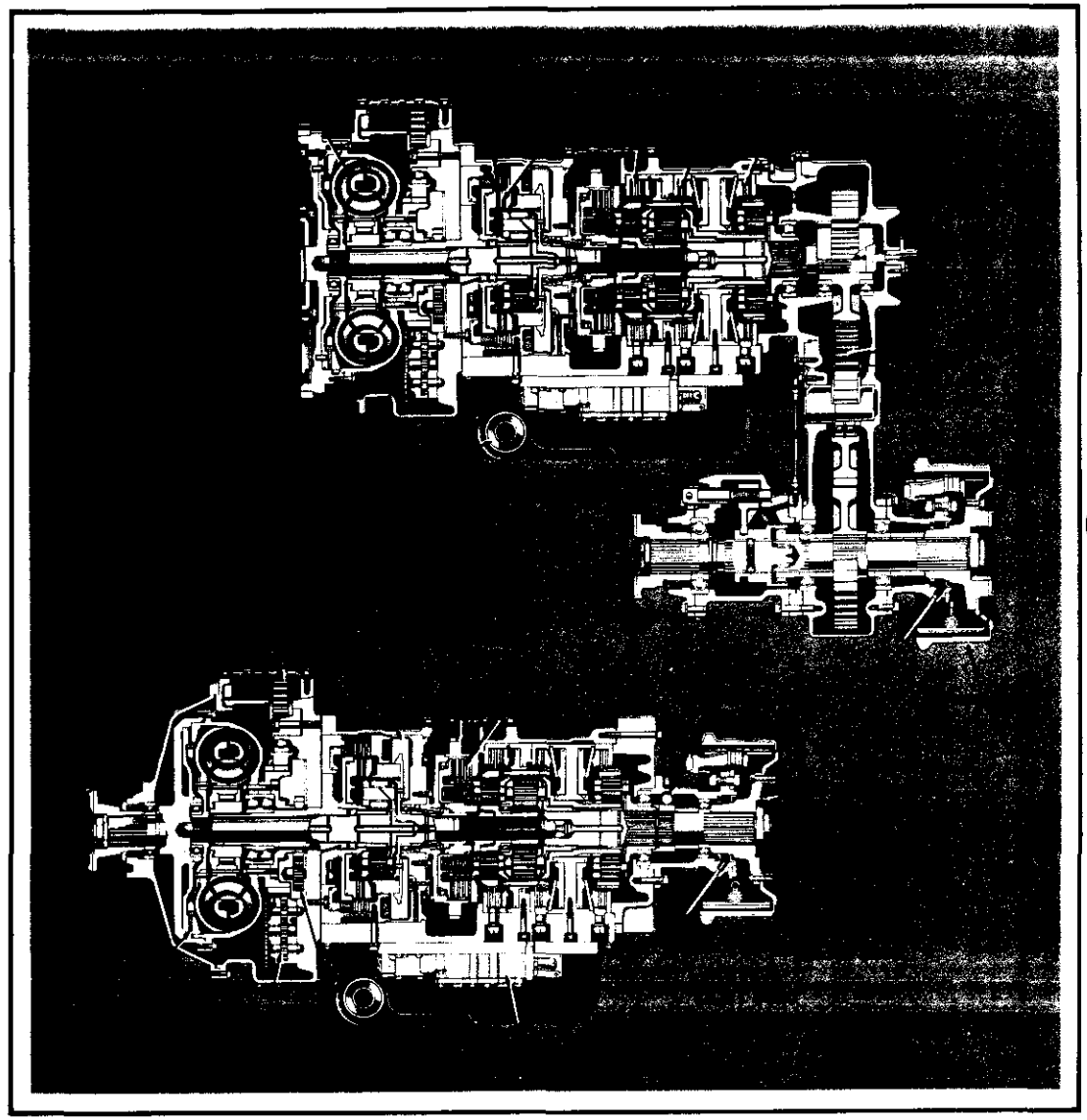
Among the optional features available for the 4000 series hauling transmissions is the variable input capacity converter. A variable position stator blade assembly in the torque converter provides ability to vary converter absorption capacity. It allows the converter to match auxiliary or primary power requirements without compromising performance. Only one engine is necessary to provide a desired degree of power at the point where it is needed most at the moment—the auxiliary equipment for work, the wheels for roading, or the desired combination of both.

The stator vanes are located on cranks which fit in a groove in the hydraulic piston. As the piston moves, the angle of the stator vane changes. The piston movement is controlled by manual release of a valve which directs high pressure oil against one side of the piston, acting against a constant low pressure oil applied to the other side.

With the stator vanes in the normal or high-capacity (fully open) position, all of the power is absorbed by the converter and transmitted through the driveline to the wheels. Applying high pressure causes the piston to move the vanes to the low capacity (partially closed) position. Less power is absorbed by the converter and more power is directed to the power takeoff and auxiliary equipment.



C(L)(B)T 4000 powershift transmission



Detroit Diesel Allison
Division of General Motors Corporation
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SA 1113F 374

Litho U.S.A.

Allison Transmissions

Sales Brief

Date 12-4-75 No. 57 REV E

HT-70 and CLBT-4460 Series Torqmatic Transmissions

I. Introduction

This Sales Brief is being revised to update the material to the latest changes.

The HT-70 and 4460 are full torque shifting transmissions used for applications in the 200 to 350 gross horsepower range. These models are six speed forward, one speed reverse integral designs which utilize a single stage, multiphase, three element hydraulic torque converter; a lockup clutch; constant mesh planetary gearing; hydraulically actuated, multiplate clutches that automatically compensate for wear; and a hydraulic control system. In addition, an integral hydraulic retarder (torqmatic brake) is standard on the HT-70 and is available as an option on the 4460 series transmissions.

The HT-70 is a "fully automatic" transmission used in fire and rescue and a variety of on and off-highway truck applications. This transmission is controlled through a cab mounted shift tower which provides a selection of four forward drive ranges, neutral and reverse. The operator is able to select the most advantageous gear range to meet driving conditions. For example, the 1-2 range is used for starting with heavy loads or off-highway driving, the 3-4 range for city driving, the 3-5 range for suburban areas, and the 3-6 range for general highway driving. The torque converter operates in 1st, 3rd, and reverse gears for starting acceleration and heavy loads. Once the vehicle is moving in the forward direction, the lockup clutch automatically engages to provide maximum fuel economy.

The CLBT-4460 is a six speed forward full powershift transmission designed for on and off-highway trucks, scrapers, oil field equipment, and rubber tire tractors. The CLBT-4460 requires a gated shift tower arranged to provide six forward gear positions, a neutral, and a reverse position. The lockup clutch feature is an optional feature on the 4460.

Revised

The input ratings on the HT-70 and CLBT-4460 are as follows:

	HT-70	4460
Maximum Input Torque (lb.ft.)	775 (1.31) 880 (1.41)	880 (General) 670 (Agr. Tractor)
Input Full Load Governed Speed:		
Minimum	2100 RPM	
Maximum	2500 RPM	2500 RPM
Maximum Gross Engine Horsepower	350 HP	350 HP

II. Product Description

1. Torqmatic Converter:

The following torque converter models are available for both the HT-70 and 4460 transmissions.

Model	Stall Torque Ratio
TC-430	3.55
TC-450	3.19
TC-470	2.84
TC-490	2.46
TC-495	2.21
VTC-490	2.62 - 1.86
VTC-495	2.29 - 1.88

2. Lockup Clutch:

The lockup clutch engages automatically in all forward gears providing direct drive through the torque converter thereby improving fuel economy. An optional system with lockup in all forward ranges except 1st gear is available for applications such as scrapers where this system is advantageous.

3. Planetary Gearing:

Two sets of planetary gears are available for use in the HT-70 transmission. The standard planetary set provides a 1.31:1 step gear ratio between each gear. An optional planetary set providing a 1.41:1 step gear ratio is also available.

The 4460 transmission offers only the 1.41:1 step gear ratio planetary set.

4. Output Configuration:

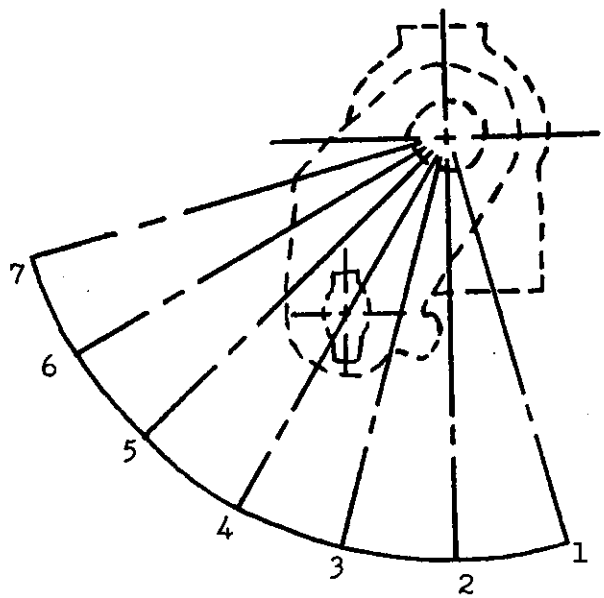
The straight through version is standard on both the HT-70 and 4460 series transmissions.

A three gear transfer case is available as an option on the 4460 with either the standard 1.02:1 ratio or the optional 1.29:1 ratio.

The optional transfer gear case can be mounted onto the transmission housing in one of seven positions. The seven positions are located 15° apart in the clockwise direction as shown below.

Note: A front mounted parking brake is available at positions No. 5, 6 or 7 only.

VIEW FROM REAR



5. Mounting:

The type of available mounting is dependent on the output configuration as follows:

Straight Through Models

Direct Engine - SAE #1, *dry flywheel housing, two mounting pads at rear.

*A wet flywheel housing is required on all models with an engine driven PTO.

Remote - Two front mounting pads, trunnion rear mounting.

Note: The HT-70 series is presently available for engine mounting only.

Transfer Case Models (4460)

Direct Engine - SAE #1- wet flywheel housing, trunnion rear mounting.

Remote - Two front mounting pads, trunnion rear mounting.

6. Oil Filter:

A customer furnished full flow oil filter must be used with both the HT-70 and 4460 series. The filter must be remote mounted in compliance with installation drawing AS 44-004. Provisions for remote mounting the filter are supplied on the transmission.

7. Transmission Breather:

An integral mounted transmission breather is standard on all models. If the transmission application is such that the integral breather is exposed to unusually severe dirt conditions or is inaccessible for servicing, a plug assembly with a 1/4 NPSC female straight pipe thread, which will fit the present opening on the transmission case, can be ordered. A hose assembly to remote mount the breather in an accessible and clean location can be added to this adapter.

Only one breather is required! Do not install a second breather on the oil fill tube. Oil fill tube covers or openings should fit tightly to prevent dirt infiltration.

8. Speedometer Drive:

Type - SAE Heavy Duty

Ratio - Straight Through Models

.5 times output shaft speed

Transfer Case Models

Standard - 1.02 times output shaft speed.
Optional - 1.29 times output shaft speed.

III. Optional Features

1. Integral Hydraulic Retarder

The hydraulic retarder (Torqmatic brake) provides additional braking to supplement the vehicle service brakes. This feature is especially beneficial for retarding vehicles on favorable grades.

The retarder is located behind the splitter planetary gear set. This

location results in two retarder rotor speeds in relation to turbine speed. The retarder speeds and ratings are as follows:

HT-70 with 1.31:1 gear step ratio

1st, 3rd and 5th range:

Rotor Speed = Turbine Speed
Capacity Rating = 220 HP at 2500 RPM rotor speed

2nd, 4th and 6th range:

Rotor Speed = 1.31 times Turbine Speed
Capacity Rating = 585 HP at 3300 RPM rotor speed

4460 and HT-70 with 1.41:1 gear step ratio

1st, 3rd and 5th range:

Rotor Speed = Turbine Speed
Capacity Rating = 220 HP at 2500 RPM rotor speed

2nd, 4th and 6th range:

Rotor Speed = 1.41 times Turbine Speed
Capacity Rating = 630 HP at 3500 RPM rotor speed

2. Power Take Offs:

A. Engine Driven (Requires Wet Flywheel Housing)

Mounting Flange - SAE 8 bolt, heavy duty type

Rating: Standard PTO

Intermittent:	200 HP @ 2100 RPM and above-500 lb.ft. below 2100 RPM
Continuous:	100 HP @ 2100 RPM and above-250 lb.ft. below 2100 RPM

Heavy Duty PTO

Intermittent:	260 HP @2100 RPM and above-650 lb.ft. below 2100 RPM
Continuous:	200 HP @ 2100 RPM and above-500 lb.ft. below 2100 RPM

Ratio (PTO Drive Gear Speed - RPM) - 1.35 times engine speed

Gear Data - 6 pitch, 25 degree pressure angle, 40 teeth

B. Converter Driven (Three Possible Positions)

Mounting Flange - 1. Top - SAE 8 Bolt Aperature
2. Side - Two SAE 6 Bolt Aperature (either side of main housing)

Rating (Continuous) - 120 HP @ 2100 RPM Maximum Torque (PTO Drive Gear to PTO) - 300 lb.ft.

Ratio - Models with 1.31:1 Gear Step Ratio

Neutral (no load), 1st, 3rd, 5th and Reverse - equal to turbine speed

2nd, 4th and 6th - 1.31 times turbine speed

Models with 1.41:1 Gear Step Ratio

Neutral (no load, 1st, 3rd, 5th and Reverse - equal to turbine speed

2nd, 4th and 6th - 1.41 times turbine speed.

Note: The speed relationship between the converter driven PTO gear and engine speed in neutral varies inversely as load is applied. Performance curves defining this relationship are available upon request.

Gear Data - 6/8 pitch, 20 degree pressure angle, 78 teeth

3. Parking Brake:

Type - Drum, 12 x 5

Rating - 90,000 inch lbs. (manufacturer's rating for run in condition - burnished)

Note: The parking brake is available on all straight through models. Transfer case models may have the parking brake specified on the rear output flange. The brake may also be specified for the front output flange on transfer case models in positions No. 5, 6 or 7 as shown in Article 4, "Output Configurations", under Item II, Product Description.

4. Flanges:

Input (Remote Mounted 4460 Models Only)

"A" Position - Spicer 1500, 1550, 1650, 1700 and Mechanics 7C

Inline Output

"B" Position - Spicer 1700, 1800, Mechanics 7C, 8C and 9C.

Front Output (4460 Transfer Case Models)

"C" Position - Spicer 1800, Mechanics 7C, 8C, 9C and Rockwell 7-H.

Rear Output (4460 Transfer Case Models)

"D" Position - Spicer 1700, 1800, Mechanics 7C, 8C, 9C, Rockwell 7-N and brake only.

5. Output Disconnects (4460):

There are three optional output disconnects available:

1. Front Output - "C" Position only
2. Rear Output - "D" Position only
3. Rear Output - "B" and "D" Positions only

IV. Specifications

1. Weight (dry lbs. - approximate):

Basic Model (HT-70 and 4460) -	970 lbs.
With transfer case (4460) -	260 lbs. (add)
With remote mount (4460) -	50 lbs. (add)
With parking brake (HT-70 and 4460) -	60 lbs. (add)
With output disconnect (4460) -	80 lbs. (add)
With engine driven PTO (HT-70 and 4460) -	40 lbs. (add)
With converter driven PTO (HT-70 and 4460) -	10 lbs. (add)

2. Rotation:

Input - right hand
Output - same as input

3. Overall Transmission Gear Ratios:

HT-70

Lever Position	Standard Ratios	Optional Ratios
1-2	3.00:1	4.00:1
	2.28:1	2.82:1
3-4	1.73:1	2.00:1
	1.31:1	1.41:1
3-5	1.73:1	2.00:1
	1.31:1	1.41:1
	1.00:1	1.00:1
3-6	1.73:1	2.00:1

Lever Position	Standard Ratios	Optional Ratios
3-6	1.31:1	1.41:1
	1.00:1	1.00:1
	.76:1	.71:1
Reverse	2.85:1	4.77:1

4460

Lever Position	Standard Ratios
First	4.00:1
Second	2.82:1
Third	2.00:1
Fourth	1.41:1
Fifth	1.00:1
Sixth	.71:1
Reverse	4.77:1

Transfer Gear Ratio - (Standard) - 1.02:1
(Optional) - 1.29:1

4. Oil System:

Sump - integral
Oil capacity - initial fill 8-3/4 gals.
refill 6-1/2 gals.
Oil cooler - remote mounted (supplied by customer)
Oil specifications - hydraulic transmission fluid, Type C-2
Input pressure pump -
Type - external tooth spur gear, positive displacement, engine driven, dual section.
Capacity - converter section: 22 GPM @ 1800 RPM and 90 PSI
main pressure section: 16 GPM @ 1800 RPM and 200 PSI
Scavenge pump (used with wet flywheel housing)
Type - external tooth spur gear, positive displacement, engine driven, 1 or 2 section.
Function - scavenges wet type flywheel housing and/or transfer case on 4460.
Oil Filter - remote mounted (supplied by customer)

Pressure Data (HT-70) -	1.31	1.41
Main (at 1000 engine RPM output stalled -	160-194 PSI	210-260 PSI
Converter-in (full throttle stall) -	50-90 PSI	50-90 PSI
Lockup -	80-101 PSI	116-140 PSI

Pressure Data (4460)

Main (at 1000 engine RPM, output stalled)

Forward ranges - 175-205 PSI
Reverse range - 235-280 PSI
Converter-out - 40-65 PSI
Lubrication - 25-30 PSI

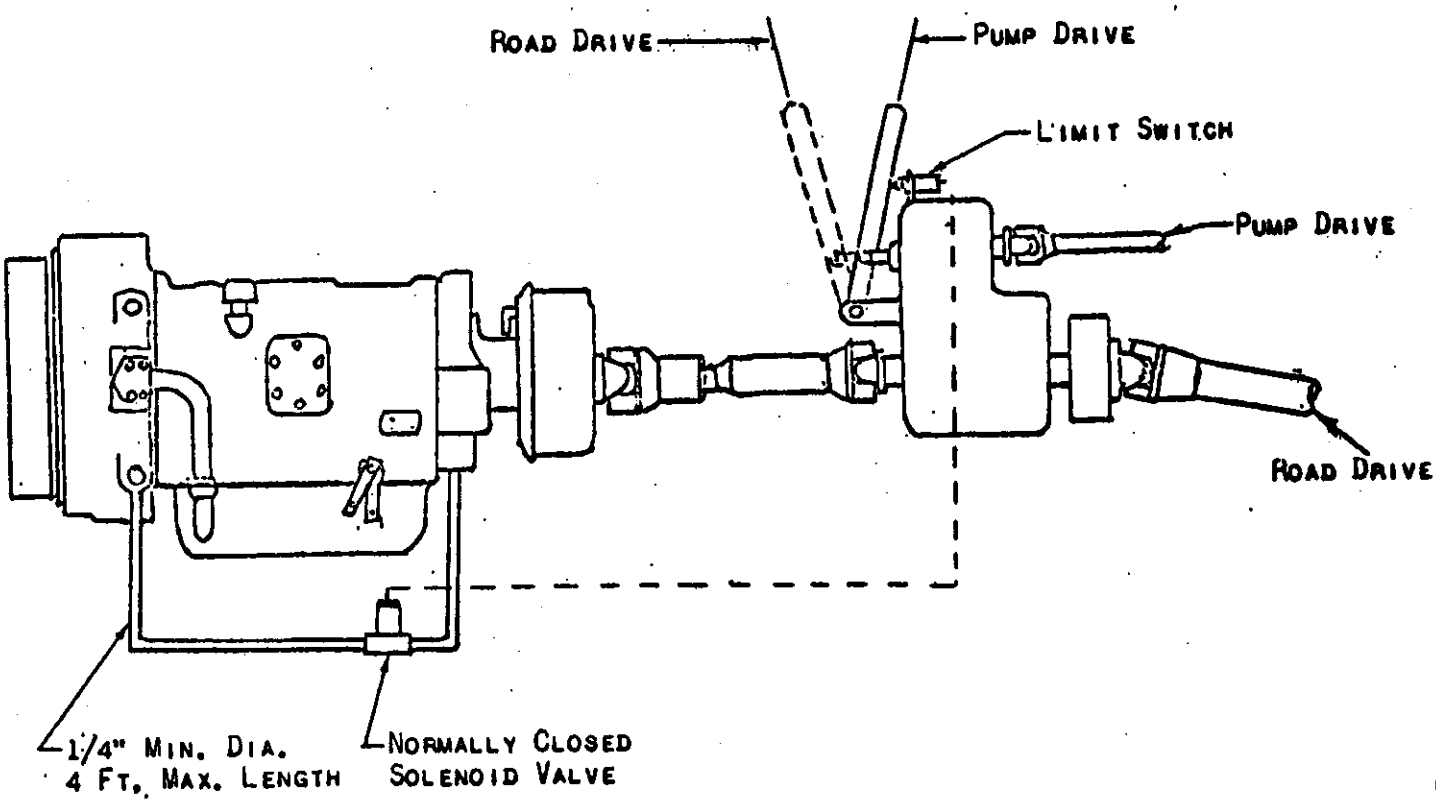
V. Specialized Applications

1. Fire and Crash Trucks:

A simple modification to the HT-70 transmission can be made to hold sixth gear range during pumping operation in fire and crash truck applications utilizing a split shaft PTO. To accomplish the sixth gear hold, a 1/4" minimum diameter line, not to exceed 4 ft. in length, must connect the converter housing main pressure tap to the G_2 pressure tap on the transmission rear cover. A normally closed solenoid valve and an interlock between the controls of the split shaft PTO must be included in this line.

The interlock insures that main pressure is supplied to the G_2 line only when the split shaft PTO is in the pumping position. The solenois is energized when the pump drive is selected and allows main pressure to enter the G_2 circuit causing the transmission to shift to high range lockup. When the 3-6 range is selected with pump drive, the transmission will operate in 6th gear under all throttle linkage positions above 800 engine RPM. Do not modify the throttle valve (TV) operation in any manner. The TV must maintain its normal relationship to the engine throttle position. The following sketch illustrates a typical set up.

Note: It is the vehicle manufacturer's responsibility to supply external plumbing and other controls.



The following method of operation is required with the above modifications on the HT-70 transmission.

1. Shift to neutral range.
2. Idle the engine.
3. Engage parking brake.
4. Shift split shaft PTO to pump drive from road drive.
5. Disengage parking brake.
6. Shift transmission to 3-6 range.

NOTE: Before disengaging the pump drive, the transmission must be shifted to neutral in order to prevent engine stall.

2. VIP (Variable Input Power) Converter:

The VTC-490 and VTC-495 VIP converters are available as an option for HT-70 and 4460 Series transmissions. The use of the VIP converter has proven desirable for elevating scrapers and various crash truck applications. The VIP converter is designed to allow the operator to change the converter absorption capacity by changing the stator vane angle.

In the normal open position, the VIP converter absorbs full engine power for propelling the vehicle. In the closed position, the converter is unable to absorb full engine power thus allowing as much as 40% of the engine power for driving accessory equipment such as the elevator on an elevating scraper or a pump on a crash truck.

A single lever control provided by the vehicle manufacturer operates the hydraulic system that controls the stator vane angle. All external controls must be customer furnished.

VI. References

1. Sales Briefs:

Number	Subject
9	Temperature and Pressure Gauges
42	Oil Recommendations
44	Front Trunnion Support Recommendations
45	Towing of Vehicles
46	Power-Take-Off Units
56	Paint Specifications
65	General Recommendations for Driveline Angularity

2. Manuals and Catalogs

SA Number	Publication
SA-1125	4460 Parts Catalog
SA-1128	HT-70 Parts Catalog
SA-1130	4460 Service Manual
SA-1142	HT-70 Service Manual
SA-1167	VIP Service Manual Supplement

3. Quick Match Charts:

SA Number	Converter Model	SA Number	Converter Model
SA-1176	TC-430	SA-1342	TC-495
SA-1177	TC-450	SA-1206	VTC-490
SA-1178	TC-470	TC-13880	VTC-495
SA-1179	TC-490		

4. Installation Drawings:

AS Number	Subject	Product
AS 00-001	Master Physical Adaptation Chart	HT-70 & 4460
AS 00-003	Transmission Trunnion Support	HT-70 & 4460

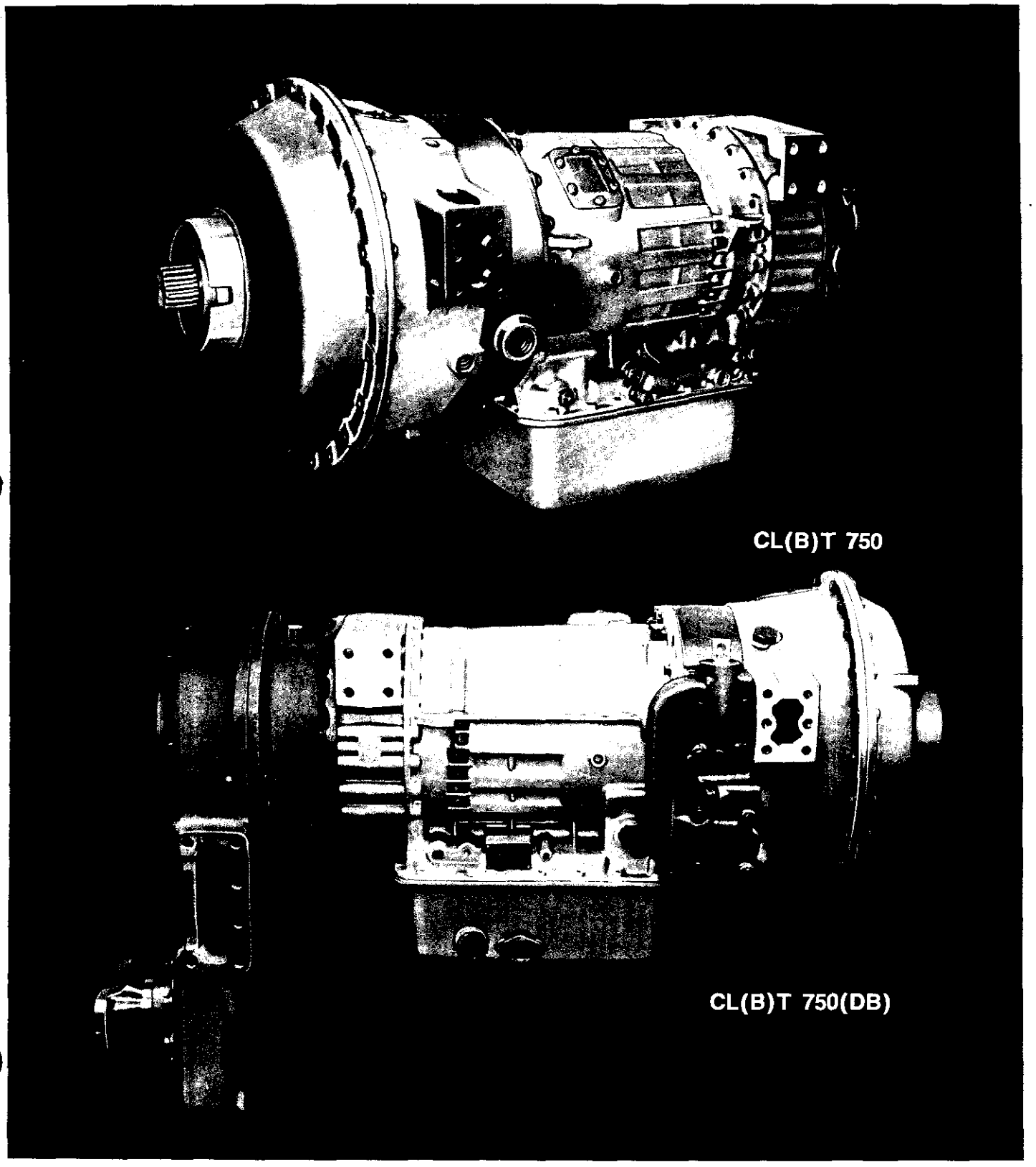
AS Number	Subject	Product
AS 00-004	Filter Installation Data	HT-70 & 4460
AS 00-011	Drive Flange Options	HT-70 & 4460
AS 00-019	Remote Mounted Breather Option	HT-70 & 4460
AS 00-029	Selector Lever Chart	4460
AS 40-001	Installation Diagram	HT-70
AS 40-003	External Hydraulic Circuit	HT-70
AS 40-016	Manual Range Selector Control Data	HT-70
AS 40-017	Throttle Valve Control Data	HT-70
AS 40-020	Retarder Horsepower Absorption	HT-70
AS 40-023	Cooler Oil Flow	HT-70
AS 44-001	Installation Diagram - Straight Through Models	4460
AS 44-004	External Hydraulic Circuit	4460
AS 44-005	Installation Diagram - Transfer Case Models	4460
AS 44-008	Top PTO - Engine Driven	HT-70 & 4460
AS 44-009	Side PTO - Transmission Driven	HT-70 & 4460
AS 44-010	Top PTO - Transmission Driven	HT-70 & 4460
AS 44-013	Front Output Disconnect	4460
AS 44-017	Rear Output Disconnect	4460
AS 44-018	Retarder Horsepower Absorption	4460
AS 44-023	Cooler Oil Flow	4460
AS 44-025	VIP Converter Air Control Option	HT-70 & 4460
AS 44-027	Parking Brake Option	HT-70 & 4460
AS 44-028	Transfer Case Parking Brake Option	4460

For further information contact Transmission Sales, Department 7341, Detroit Diesel Allison Division of General Motors, P. O. Box 894, Indianapolis, Indiana 46206.

Allison Transmissions automatic models

CL(B)T 750
CL(B)T 750(DB)

475 hp*
(354 kW)*



CL(B)T 750

CL(B)T 750(DB)

*For engines up to 475 hp (354 kW) gross

specifications

rotation	Straight through and drop box models	Input—right hand (viewed from input)	Output-right hand in forward ranges (viewed from input)
rating		Straight Through Model & Drop Box (General)*	Drop Box Model Scraper Applications
	Input power, max (net)	425 HP (317 kW)	300 HP (224 kW)
	Input speed, max	2500 RPM	2500 RPM
	Input torque, max (net)	1300 lb. ft. (1762 N•m)	775 lb. ft. (1051 N•m)
		*Except where disconnects are used.	
mounting	Direct mounted	SAE 1 flywheel housing with flex disk drive & one 4-hole SAE mounting pad on each side of rear adapter housing or 6-hole SAE drop box mounting pads.	
	Remote mounted	Trunnion front mount with one 4-hole SAE mounting pad on each side of rear adapter housing or 6-hole SAE drop box mounting pads.	
torque converter	Type	Single stage, polyphase, 3-element	
	Available torque converter models and ratios	TC-470-3.04	TC-497-2.70**
		TC-490-2.46	TC-498-2.35**
		TC-495-2.21*	TC-499-2.13*
	Variable capacity converter	VTC-497-2.42 (Open) 1.84:1 (Closed)	
	Lockup clutch	Effective in all forward ranges or 2nd through 5th ranges (optional).	
		*Available in drop box model only	
		**Available in straight through model only	
hydraulic retarder (optional)	Type	Coupling type rotor between fixed stators	
	Capacity	365 HP (272 kW) absorption @ 2100 RPM rotor speed	
drop box disconnects (optional)		Disconnects are available at all three locations: B, C and D	
gearing	Type	Constant mesh, spur type planetary	
		Standard Straight Through & Drop Box Models	Alternate Drop Box Model Only
	Gear ratios*		
	First	5.18	7.97
	Second	3.19	3.19
	Third	2.02	2.02
	Fourth	1.38	1.38
	Fifth	1.00	1.00
	Reverse	4.72	4.72
	Transfer Gear	1.00	1.00
	*Does not include torque converter ratios.		
clutches	Hydraulically-actuated, spring-released, oil cooled, multidisk, self-adjusting (automatic compensation for wear)		

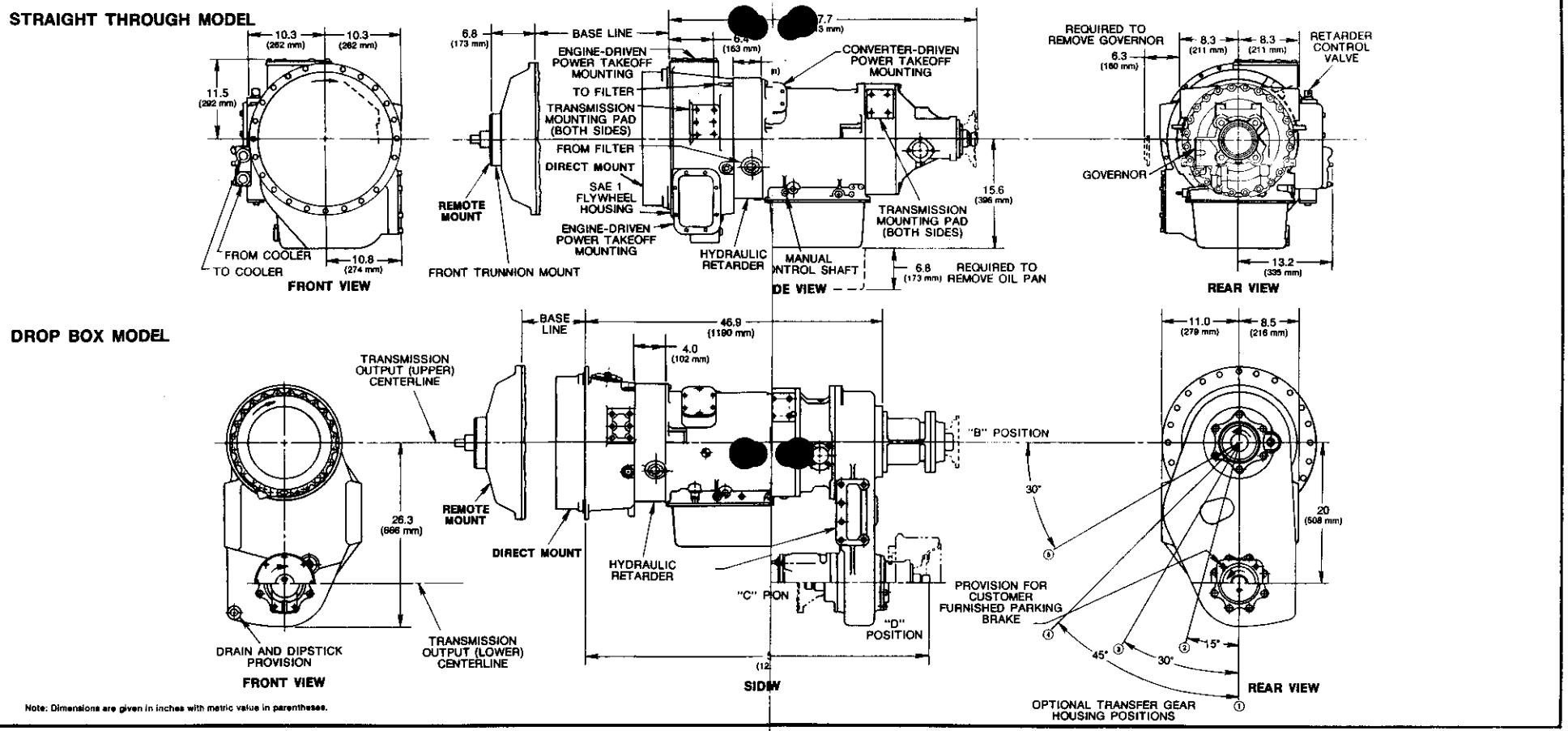
specifications

parking brake*	Type Size	Drum, internal expanding shoe 12 x 5 in. (305 x 127 mm)	
power takeoff* (optional)	Engine driven (2) Location Size of opening Ratio Rating (2100-2500 RPM) Each PTO opening Combined Converter driven (1) Location Size of opening Ratio Rating	One on top and one on left side of converter housing at 7 o'clock position as viewed from output SAE 8-bolt Top—1.35 x engine speed Side—0.84 x engine speed Intermittent—260 HP (194 kW) Continuous—200 HP (149 kW) 400 HP (298 kW) Top, left side of main housing at 10 o'clock position as viewed from output SAE 6-bolt 1.00 x turbine speed (all ranges) Intermittent—250 lb. ft. (339 N•m) Continuous—200 lb. ft. (281 N•m)	
speedometer drive* (not available on drop box model)	Type	6-tooth spiral drive gear SAE heavy duty	
control valve body	Type	Hydraulically controlled valve body with manual shift from first to second and automatic range selection above second with hold feature in any range.	
shift modulation	External control	Mechanical*	
oil system	Transmission Oil type Capacity (less external lines) Sump Filter* Drop box Capacity Oil type	Straight-Through Model Hydraulic transmission fluid type C-3 7.0 U.S. Gal. (26.5 liters) Integral External, remote mounted	Drop Box Model Hydraulic transmission fluid type C-3 7.0 U.S. Gal. (26.5 liters) Integral External, remote mounted 1.0 U.S. Gal. (3.8 liters) 30 Weight, C-3
size	Length (Engine mount) (Remote mount) Width Height Weight (dry)	Straight Through Model 47.8 in (1214 mm) 54.61 in. (1387 mm) 24.5 in (622 mm) 26.1 in (665 mm) 1175 lb. (533 kg) (approx)	Drop Box Model 55.8 in. (1417 mm) 62.5 in. (1590 mm) 24.5 in. (622 mm) 37.7 in. (958 mm) 1675 lb. (760.7 kg) (approx.)

*Not supplied on transmission but is supplied by vehicle manufacturers.

NOTE: All data and specifications subject to change without notice.

mounting dimensions

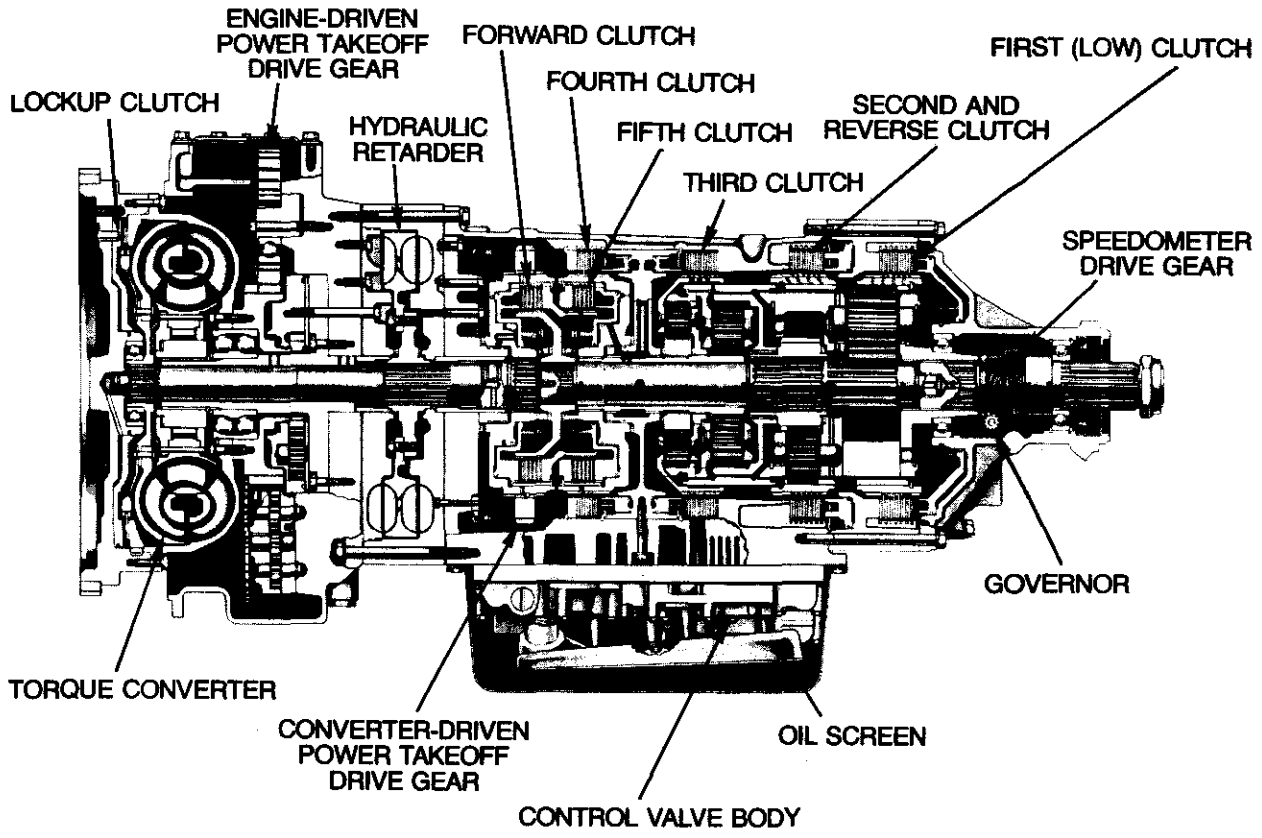


Note: Dimensions are given in inches with metric value in parentheses.

design features

- For diesel engines up to 475 hp (354 kW)
- Transmission remote mounted or direct mounted on engine
- Five forward gear ranges, one reverse
- Automatic upshifting and downshifting in all ranges above second with hold in each range
- Hydraulic retarder with modulation (optional)
- Mechanical shift modulation control
- Multidisk, self-adjusting hydraulic clutches
- Provision for engine-driven and/or converter-driven power takeoff
- Inhibitors to prevent harmful downshifts or reverse shifts
- Choice of converters to match wide range of diesel engines
- Variable input capacity converter
- Provision for neutral start switch; reverse signal switch; SAE heavy-duty speedometer drive; drum-type parking brake
- Optional drop box configuration
- Five optional transfer gear housing positions (see rear view with drop box)
- Output disconnects available in three locations on the dropbox model (flange positions B, C, and D)
- Optional manual automatic controls

CL(B)T 750
automatic transmission

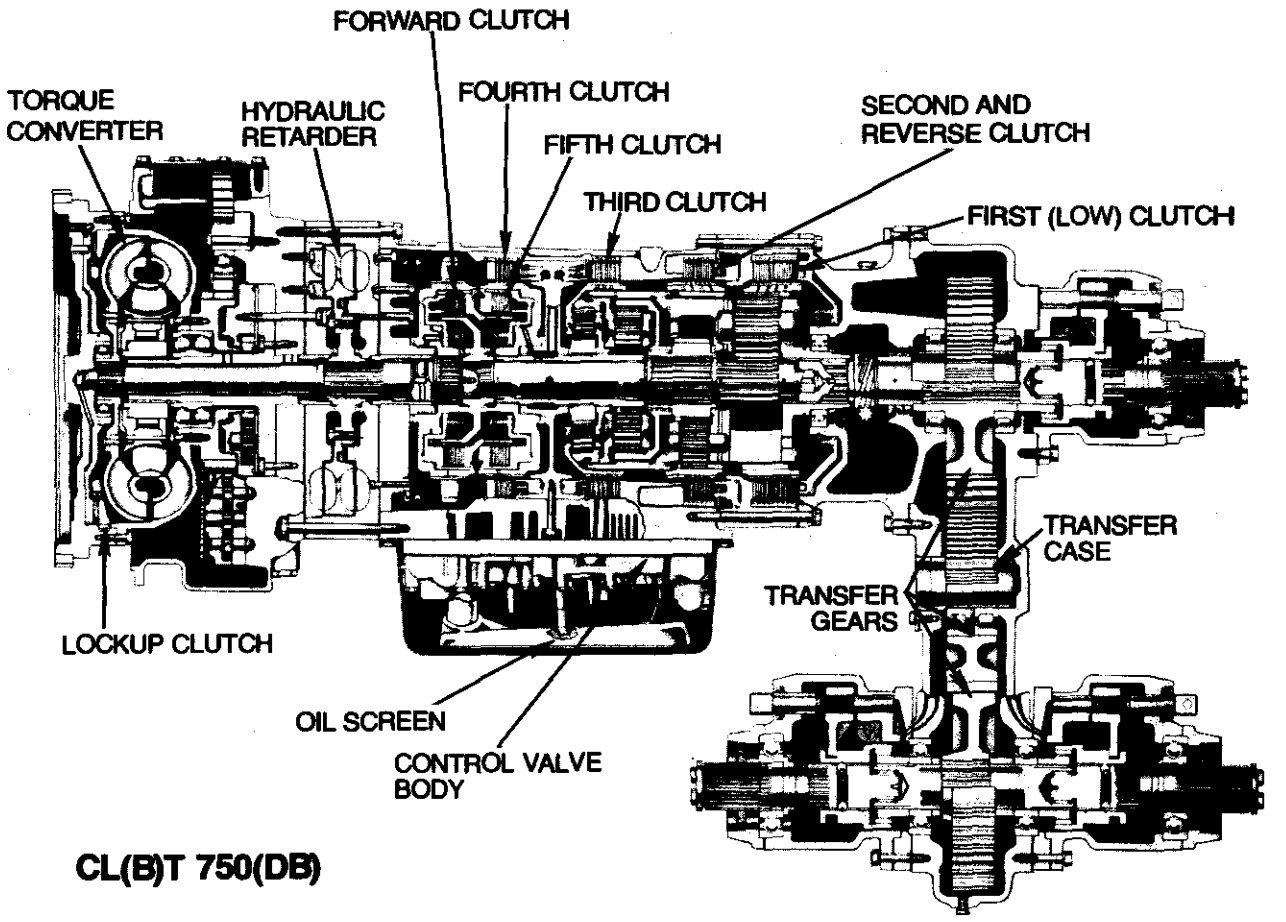


CL(B)T 750

The CL(B)T 750 transmission is designed for use in off-highway operations such as heavy-duty rear dump trucks up to 135,000 pounds (61,236 kg) GVW—logging trucks, refuelers, and special equipment trucks up to 200,000 pounds (90,720 kg) GCW, for single engine scrapers up to 110,000 pounds (50,349 kg) GVW, and for twin scrapers up to 130,000 pounds (58,968 kg) GVW. It is adaptable to diesel engines up to 475 horsepower (354 kW) and may be remote or direct mounted to the engine.

The CL(B)T 750 has five forward ranges and one reverse, with automatic shifting occurring in second through fifth range. This automatic operation permits maximum performance, as vehicle speed and load

CL(B)T 750(DB) automatic transmission

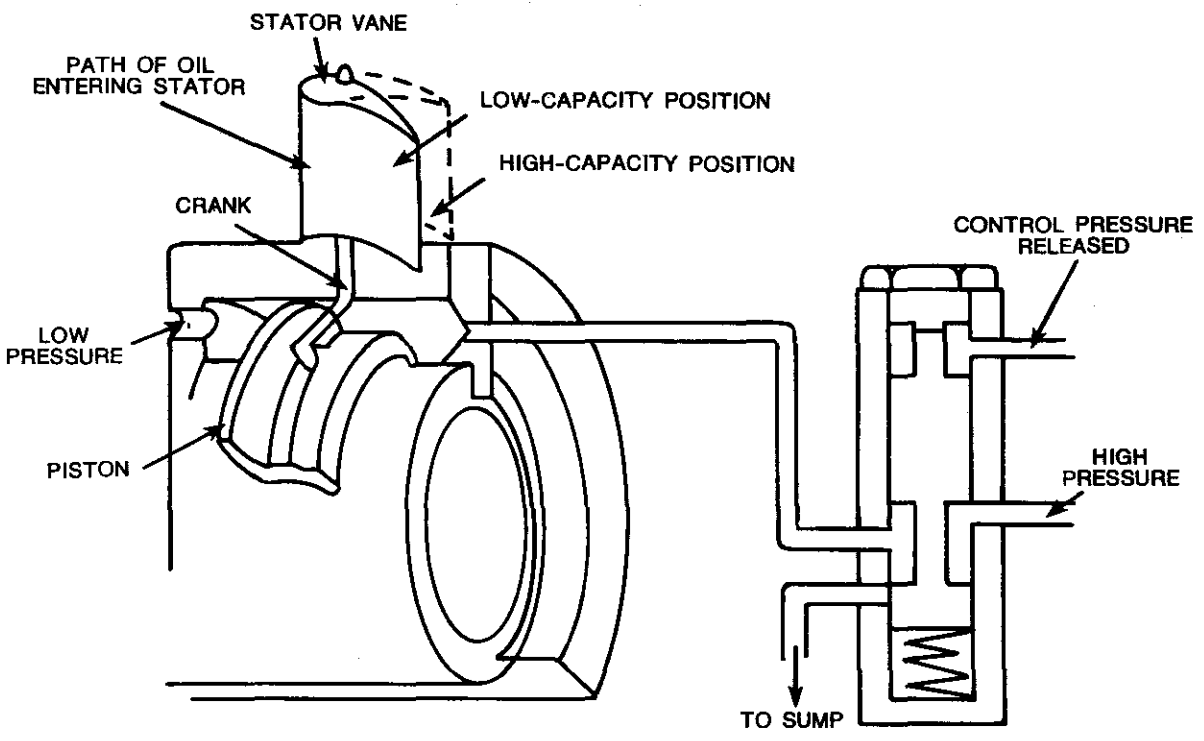


CL(B)T 750(DB)

demand change, with little effort on the part of the vehicle operator. Built-in inhibitors prevent harmful downshifts or reverse shifts at any significant speed.

This automatic transmission is offered in straight through and dropbox versions. The dropbox can be located in five radial positions on the transmission. Other options offered with this transmission include a hydraulic retarder which provides greater downhill braking control and reduces the wear on the service brakes. There are also provisions for engine-driven and/or converter-driven power takeoffs. The CL(B)T 750 and CL(B)T 750(DB) are capable of satisfying virtually all auxiliary drive and power takeoff requirements.

variable input capacity converter



Among optional features available for the CL(B)T 750 Series hauling transmission is the variable input capacity converter. A variable position stator blade assembly in the torque converter provides ability to vary converter absorption capacity. It allows the converter to match auxiliary or primary power requirements without compromising performance. Only one engine is necessary to provide a desired degree of power at the point where it is needed most at the moment—the auxiliary equipment for work, the wheels for roading, or the desired combination of both.

The stator vanes are located on cranks which fit in a groove in the hydraulic piston. As the piston moves, the angle of the stator vane changes. The piston movement is controlled by a valve which directs high pressure oil against one side of the piston, acting against a constant low pressure oil applied to the other side.

With the stator vanes in the normal or high-capacity (fully open) position, all of the power is absorbed by the converter and transmitted through the drive line to the wheels. Applying high pressure causes the piston to move the vanes to the low capacity (partially closed) position. Less power is absorbed by the converter and more power is available to the power takeoff for operating auxiliary equipment.

Detroit Diesel Allison
Division of General Motors Corporation
Indianapolis, Indiana 46206

SA 1388B 8-77 Litho in U.S.A.

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Allison Transmissions

700 SERIES CONVERTER DRIVEN

POWER TAKEOFF

RATING INCREASE

PUB. NO. 1

DATE MARCH 1978

DETROIT DIESEL ALLISON DIVISION
GENERAL MOTORS CORPORATION
P. O. BOX 894
INDIANAPOLIS, INDIANA 46206
ATTENTION: SALES DEVELOPMENT H-4

FORM 8514

Detroit Diesel Allison
Division of General Motors Corporation

Indianapolis Operations

P. O. Box 894
Indianapolis, Indiana 46206
Phone: (317) 244-1511
Cable: GM COMM IND A

SUBJECT: 700 Series Converter Driven P.T.O.
Rating Increase

REFERENCE: PIM 364

The ratings for the 700 series converter driven power takeoff have been increased as follows:

	Previous Rating	New Rating
Intermittent	250 lb. ft.	400 lb. ft.
Continuous	206 lb. ft.	300 lb. ft.

Allison Transmissions

Sales Brief

Date March, 1977 No. 72 G

ALLISON CL(B)T 750 TRANSMISSIONS

I. Introduction

The Allison CL(B)T 750 has been designed and built for off-highway applications. This transmission is basically a hauling unit which can be used in rear dump trucks up to 61,236 kg (135,000 lbs.) GVW, logging and special equipment trucks up to 90,720 kg (200,000 lbs.) GCW, and in fire and crash truck applications. For single engine scrapers, 49,696 kg (110,000 lbs.) GVW, and for twin scrapers, 58,968 kg (130,000 lbs.) GVW.

The CL(B)T 750 transmission consists of a torque converter, constant mesh planetary gearing, hydraulically actuated multiple disc clutches, integral lockup clutch, oil supply and sump, optional hydraulic retarder, optional engine driven PTO, optional converter driven PTO, and automatic range selection in forward drive ranges 2 through 5, with hold feature in any range.

The CL(B)T 750 input ratings are as follows:

	Straight Through Model *Drop Box General	Drop Box Model Scraper Applications
Maximum Net Torque	1762 Nm (1300 lb.ft.)	1051 Nm (775 lb.ft.)
Maximum Engine Speed (RPM)	2500 RPM	2500 RPM
Maximum Net Horsepower	317 kW (425 HP)	224 kW (300 HP)

*Except where disconnects are used.

II. Product Description

1. Mounting

Straight Through Model

Direct Engine:	Mounting direct to SAE #1 automotive housing with two mounting pads at rear. Hub adapter and flex plates are customer supplied
Remote (Optional):	Trunnion mount at front with two side pads at rear.

Where 7.97 1st gear or disconnects are used, see Figure II.

Allison Division of General Motors Corporation P.O. Box 894 Indianapolis, Indiana 46206

Drop Box Model

Direct Engine: Mounting direct to SAE #1 automotive housing with two mounting pads at transmission rear or drop box side. Hub adapter and flex plates are customer supplied.

Remote (Optional): Trunnion mount at front with two side pads at transmission rear or drop box side.

NOTE: Mounting requirements are determined by the type of driving axle. Where a suspended type axle is used, the drop box side pads must be utilized.

2. Torque Converter

The following torque converter models are available on the CL(B)T 750:

Model	Stall Torque Ratios	Availability	
		Straight Through	Drop Box
TC 470	3.04:1	X	X
TC 490	2.46:1	X	X
TC 495	2.21:1		X
TC 497	2.70:1	X	
TC 498	2.35:1	X	
TC 499	2.13:1		X
VTC 497	2.42:1 (Open) 1.84:1 (Closed)	X	X

3. Output Configuration

On the straight through version, the output is in line with the input. The output rotation (as viewed from the input) is clockwise (in all forward ranges), the same as the input.

The drop box version has a 1:1 ratio and can be mounted in one of five positions. The five positions are located 15 degrees apart in the clockwise direction, as shown on Figure 1.

4. Speedometer Drive

The drive gear for speedometer drive is standard on the straight through model CL(B)T 750. The transfer gear configuration does not have provision for speedometer drive.

Type: 12/16-20 UNEF-28 thd. through boss heavy duty plug type.

Drive Gear Data: 6 teeth, 20 normal pitch, 85 degrees, 2' 33" right hand helix angle, 20 degrees normal pressure angle.

Driven Gear: Customer supplied

5. Control Valve Body

A hydraulic actuated control valve body is used to provide automatic gear selection in the 2-5 selector position. First and second ranges may be manually selected. Shift modulation is an external control, utilizing a cam or cable design, a low forece bell crank and cable, or air modulator design. Shift controls and modulator controls are customer supplied.

6. Planetary Gearing and Clutches

The CL(B)T 750 utilizes planetary gear sets and clutch sets to provide five forward gear ranges and one reverse. The planetary gears are straight cut spur type in constant mesh. They are hydraulically actuated, spring released, multiple disc clutch sets and self-compensating for wear and are transmission oil lubricated.

7. Lockup

The lockup feature enables the pump and turbine elements of the torque converter to turn in unison at engine speed. Lockup is standard in all forward ranges. Optional lockup control is available with lockup eliminated in first gear. (Scraper models only)

8. Output Disconnects on Drop Box Model (Optional)

Output disconnects are available at all three locations.

9. Hydraulic Retarder (Optional)

The hydraulic retarder consists of a vaned rotor that spins between cast stator vanes in the retarder housing. It is located between the converter housing and the planetary gear sets. Retarder braking is obtained by stroking the retarder manual control valve, which directs transmission oil to enter the retarder housing. The impacting action of the oil against the stator vanes generates heat in the oil which is absorbed horsepower. The oil is then circulated through the transmission oil cooler to dissipate heat. Partial braking can be obtained by stroking the manual control valve part way to modulate the oil fill pressure to the retarder. With the manual control valve in the "off" position, oil is evacuated from the retarder, leaving no drag on the rotor. Hydraulic retarder capacity at 2100 RPM rotor speed - 365 HP (272 kW).

10. Backup Signal Provisions

A reverse pressure tap is provided in the transmission case to accept a customer supplied pressure switch. The switch reacts to reverse oil pressure and energizes backup lights or similar reverse signal accessories.

11. Parking Brake Provisions

The provisions for mounting a 12 X 5 (305 X 127mm) internal expanding shoe parking brakes are furnished on the CL(B)T 750. The parking brake is customer supplied.

12. Neutral Start Switch Provisions

Provisions for neutral start switch installation are standard on the CL(B)T 750. The internal shift lever is used to mechanically actuate a switch in the vehicle starter circuit when the transmission is in neutral. The customer supplied neutral start switch can be mounted directly into the transmission case from the outside and connected by means of weather-proof connectors.

13. Manual Powershift and Automatic Operations

A new feature for the CL(B)T 750 transmission is available in kit form to provide a manual or powershift mode of operation. The manual shift mode allows upshifts to be made regardless of transmission output speed and prevents automatic downshifts. In addition to the powershift mode, the normal automatic operation is maintained so that either manual or automatic shifting can be selected for installations where the transmission serves a dual purpose. Typical installations that would require this system use the transmission in the power train for roading the equipment and also to power some working machinery located on the vehicle when it is stationary. In these dual purpose applications, roading of the vehicle will only be permitted in automatic mode. For pictorial information, see AS 45-052.

III. Specifications

1. Dry Weight 420 kg (925 lbs.)

Remote Mount, (add)	22.7 kg	(50 lbs.)
Engine driven PTO, (add)	22.7 kg	(50 lbs.)
Retarder, (add)	90.7 kg	(200 lbs.)
Transfer gearbox, (add)	250 kg	(550 lbs.)

2. Oil System

Straight Through and Drop Box Configuration

Sump	Integral	
Input Pressure Pump	Positive displacement, gear type	
Oil Capacity (initial fill)	22.7 liters (24 quarts)	- Transmission only
(refill)	20.8 liters (22 quarts)	
Maximum Oil Temperature	121.1 degrees C. (250 degrees F.)	
Normal Operating Temperature	71.1 degrees C. to 82.2 degrees C (160 degrees F. to 180 degrees F.)	

Revised Oil Level for CL(B)T Transmissions:

(Full 38.0 mm (1.50 inches) below sump pan splitline)
(Add 63.5 mm (2.50 inches) below sump pan splitline)

2. Oil System - Continued

Oil Filter	Remote Mounted (Customer Supplied)
Oil Type	Hydraulic Transmission Fluid - Type C-3
Main Pressure	
Forward & neutral	1040-1240 kPa (150-180 psi)
Reverse	1660-2060 kPa (240-300 psi)

Drop Box Configuration

Drop Box Sump	*Approximately 3.8 liters (8 pints)
Oil Type	30 weight, C-3

**Varies with output options and optional configuration.*

3. Power Takeoff Drive Provision (Optional)

Engine Driven

Top Mounting Pad

Mounting Flange	SAE 8-bolt	
Intermittent Rating	194 kW (260 HP)	@ 2100-2500 RPM
Continuous Rating	149 kW (200 HP)	@ 2100-2500 RPM
Ratio	1.35 X engine speed	
Gear Data	6-pitch 25 degrees pressure angle, 40 teeth	

Side Mounting Pad

Mounting Flange	SAE 8-Bolt	
Intermittent Rating	194 kW (260 HP)	@ 2100-2500 RPM
Continuous Rating	149 kW (200 HP)	@ 2100-2500 RPM
Ratio	.84 X engine speed	
Gear Data	6-pitch 25 degrees pressure angle, 64 teeth	

Converter Driven

Mounting Flange	SAE 6-bolt
Location	10 o'clock position (as viewed from the rear)
Gear Data	6/8 pitch 20 degrees pressure angle, 78 teeth
Rating Heavy Duty	542 Nm (400 lb.ft.) Intermittent
	407 Nm (300 lb.ft.) Continuous
Ratio	1.00 X turbine speed (all ranges)

4. Overall Transmission Gear Ratios*

Range	Standard Straight Through & Drop Box Models	Alternate Drop Box Model Only
First	5.18:1	7.97:1
Second	3.19:1	3.19:1
Third	2.02:1	2.02:1
Fourth	1.38:1	1.38:1
Fifth	1.00:1	1.00:1
Reverse	4.72:1	4.72:1
Transfer Gear	1.00:1	1.00:1

**Does not include torque converter ratio.*

5. Drive Range Selection

Control of the transmission is by means of a selector lever and shift tower located in the cab of the vehicle. A shift tower provides for neutral, reverse, and all five forward range positions. A typical quadrant with gears available in each range position is as follows:

R - Reverse
N - Neutral
D - 2C - 2L - 3C - 3L - 4C - 4L - 5C - 5L
4 - 2C - 2L - 3C - 3L - 4C - 4L
3 - 2C - 2L - 3C - 3L
2 - 2C - 2L
1 - 1C - 1L (Except scraper models - 1C only)

If the transmission is placed in any of the forward ranges, 2 through D, the transmission automatically starts in second range. For maximum reduction, the transmission should be placed in the 1 range position to move the vehicle and at the operator's discretion, placed in any of the succeeding ranges for either a manual shift or an automatic shift sequence. The transmission can be held in any of the five forward ranges at governed engine speed subject to automatic downshift. In ranges 1 and 2, the unit will not downshift.

IV. Reference

1. Sales Briefs

Sales Brief	Subject
9	Temperature and Pressure Gages
42	Oil Recommendations

2. Manuals

SA Number	Publication
SA-1314	CL(B)T 750 Service Manual
SA-1315	CL(B)T 750 Parts Catalog
SA-1491	Mechanics Tips
SA-1475	Operators Manual

3. Application and Specification Drawings

Drawing	Subject
AS 00-001	Transmission Drive Adaptation Chart
AS 00-003	Trunnion Support Requirements
AS 00-050	Drive Flange Information
AS 45-030	Basic Installation Drawing
AS 45-032	Installation Drawing - CLT 750
AS 45-033	Engine Driven PTO Input Housing Option
AS 45-035	Hydraulic Retarder Option
AS 45-036	Output Transfer Gear Housing Option
AS 45-037	Shift Modulator Installation Requirements
AS 45-038	External Hydraulic Circuit Requirements
AS 45-040	External Electric Requirements
AS 45-042	Manual Shift Control Data
AS 45-043	Speedo Drive Data (Straight Through Only)
AS 45-044	Drive Flange Option
AS 45-045	Parking Brake Provision
AS 45-046	Transmission Driven Side PTO Option
AS 45-047	Transfer Case Drive Flange Data
AS 45-052 (sh.1&2)	Manual/Automatic Controls
AS 45-054	Oil Level and Dip Stick Requirements
TC-15490	Retarder Absorption Chart
TC-15491 (sh.1&2)	Cooler Circuit Oil Flow

Sales Development

DROP BOX POSITIONS

VIEW FROM REAR

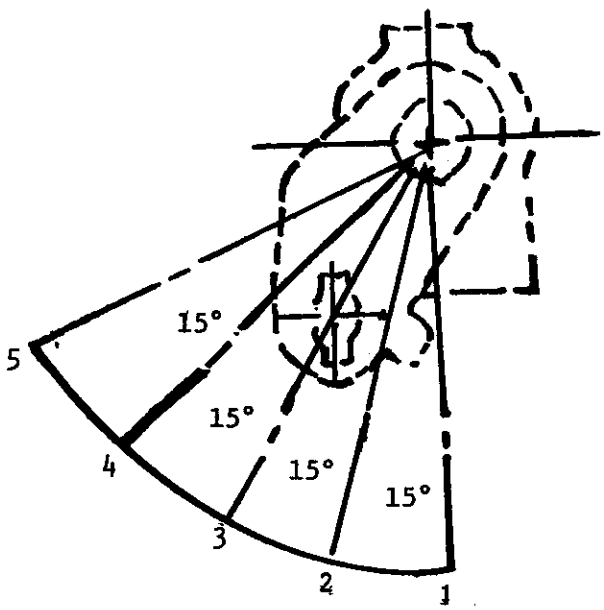


FIGURE I

CLBT 750 DROP BOX RATING

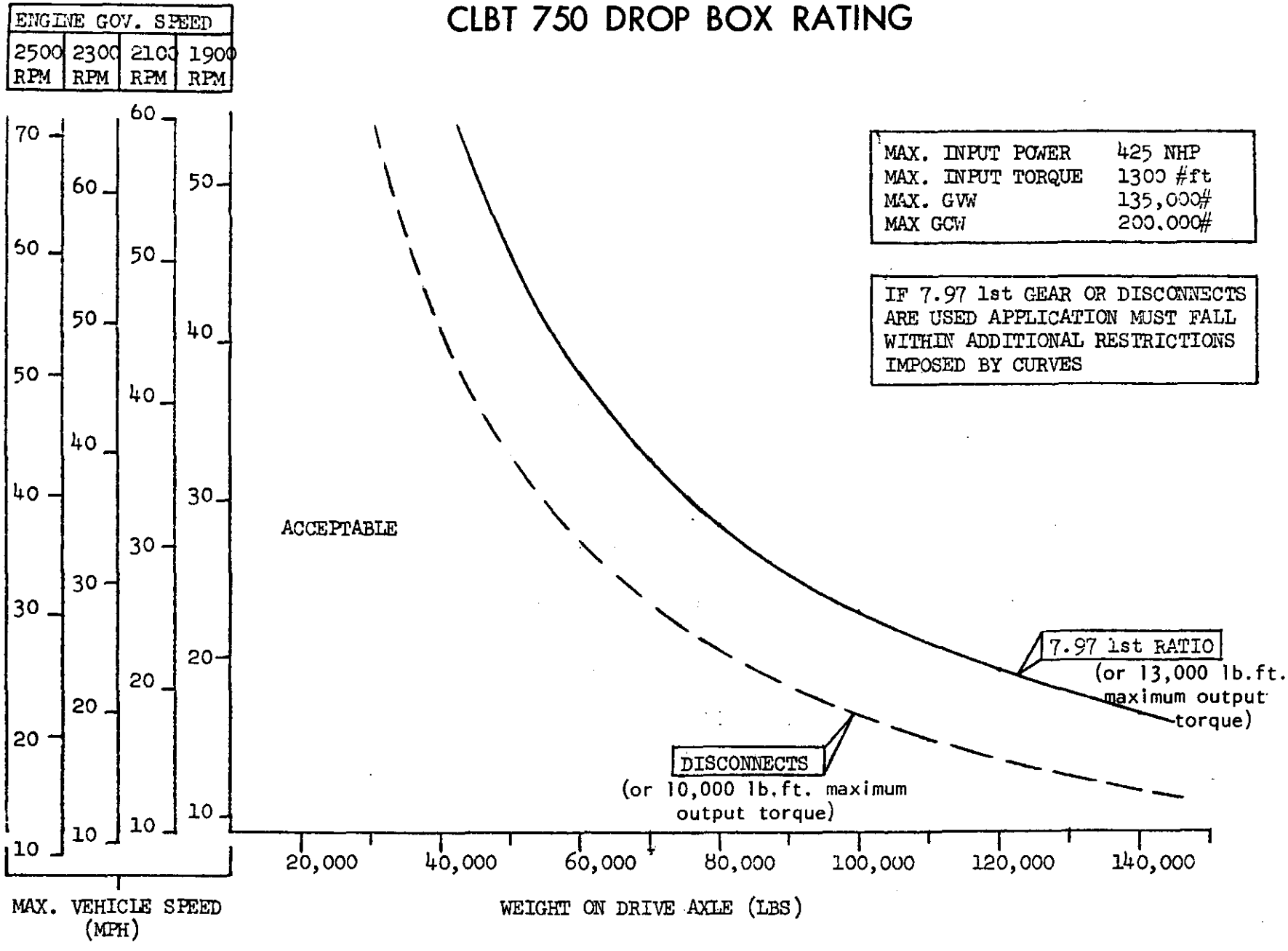


FIGURE 11

Allison Automatic Transmissions

Operators Manual

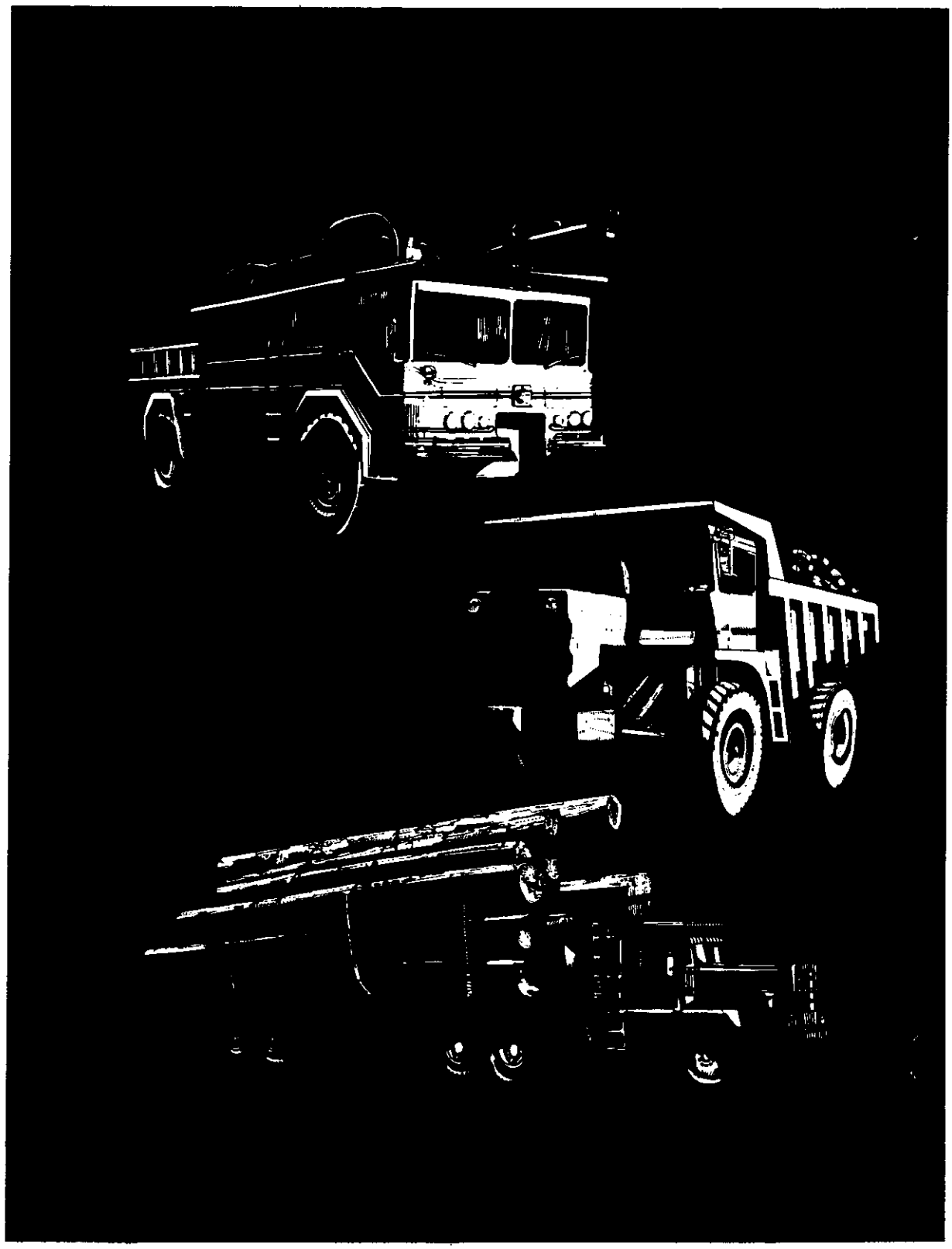
700 SERIES
OFF-HIGHWAY MODELS

CLBT 750

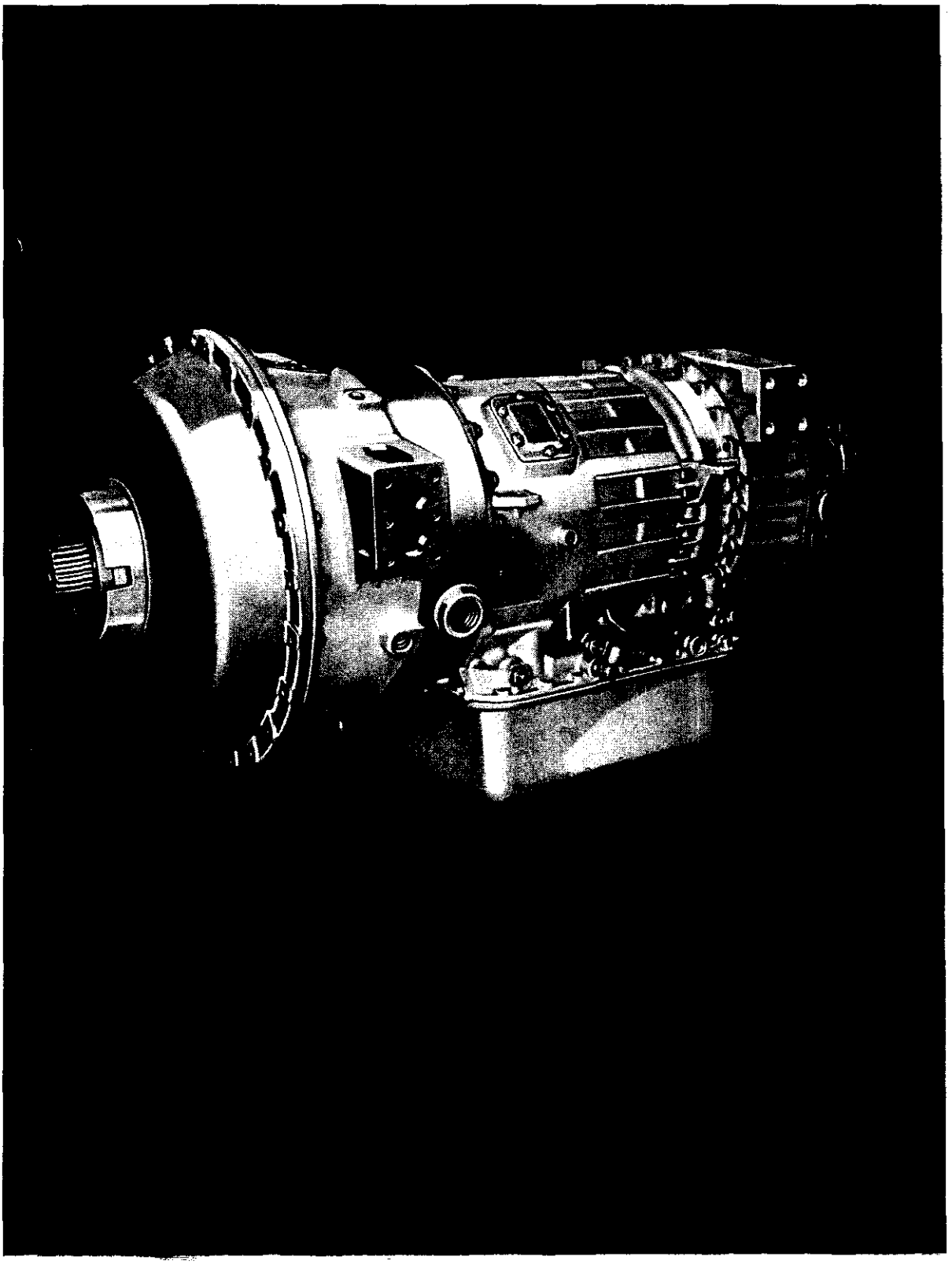
CLT 750

Allison Automatics

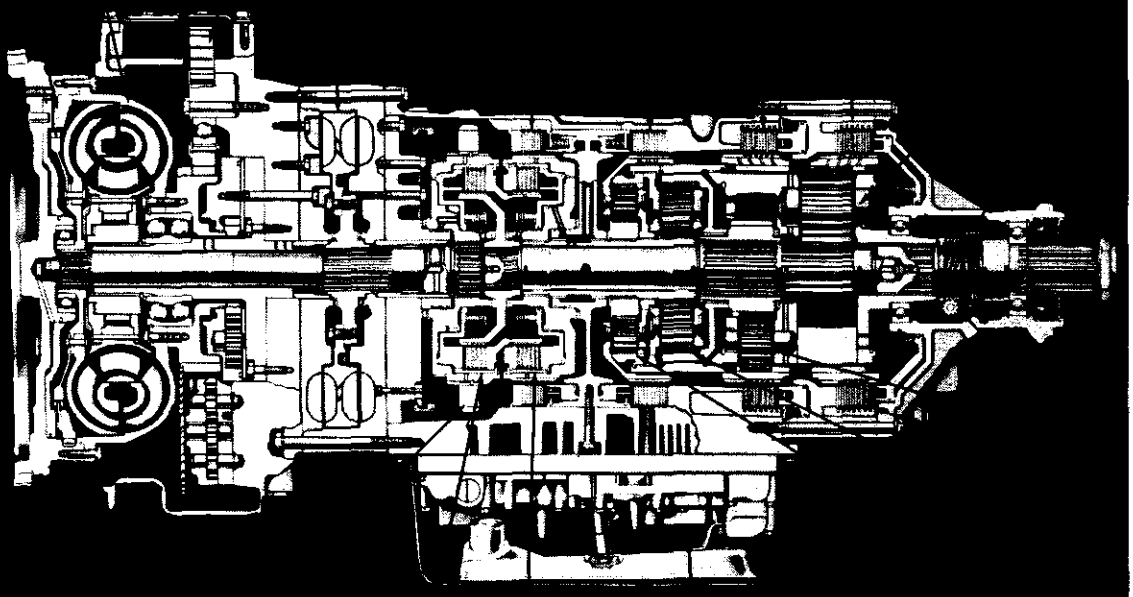
On The Haul Road



omponents and Features



Components—Cont.



AUTOMATIC SHIFTING, 5 SPEEDS

POWER TAKEOFF DRIVES

TORQUE CONVERTER,
LOCKUP CLUTCH

Components—Cont.

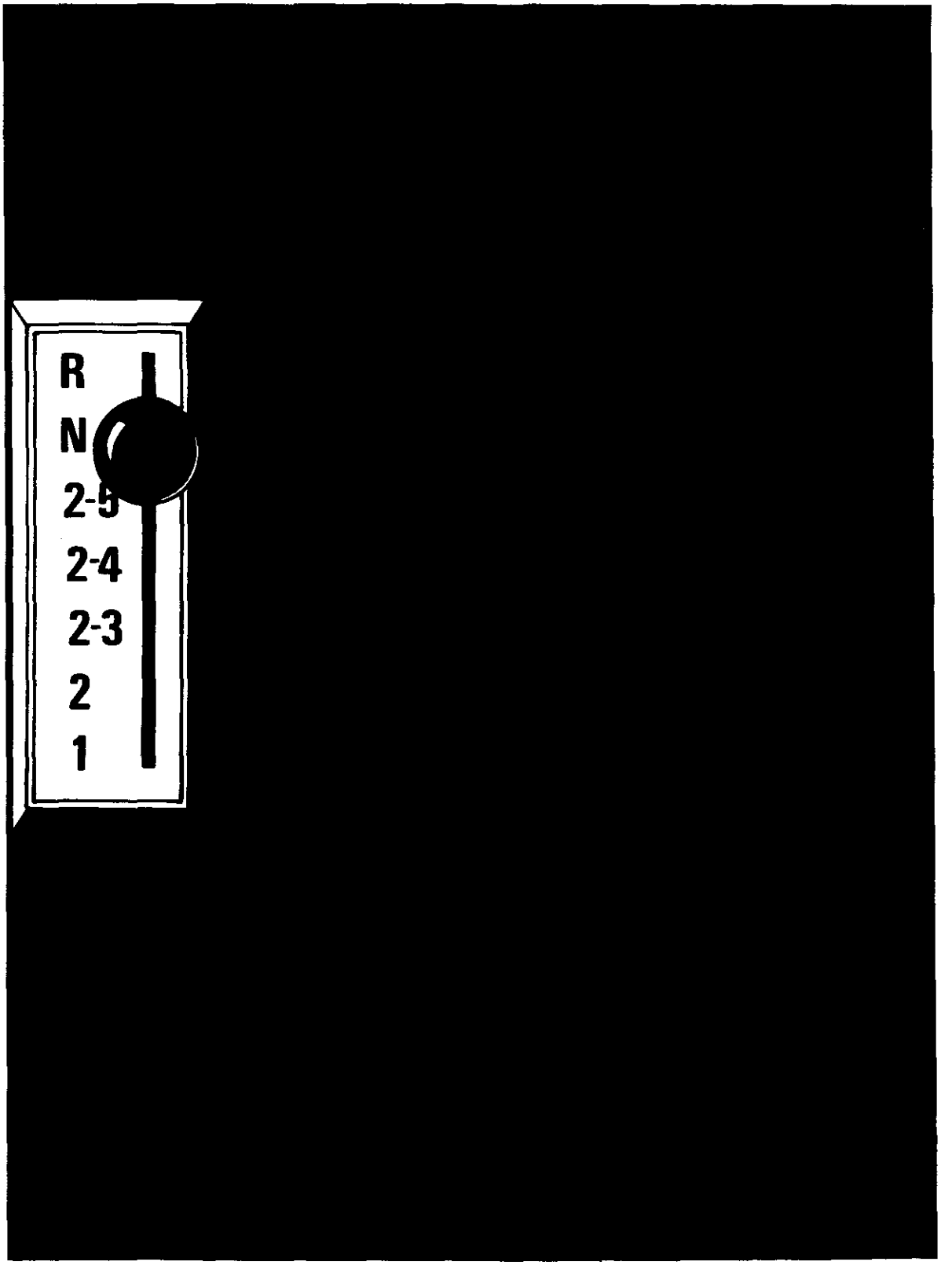
YDRAULIC RETARDER (CLBT 750)

COOLER, FILTER CIRCUITS

HROTTLE ACTUATED MODULATOR

Range Selector Positions

WARNING—Allowing your vehicle to coast in neutral is not recommended. This practice can result in severe transmission damage. Engine braking and hydraulic retarder action (CLBT) are not available during neutral coast



)riving Tips

ANGE SELECTION

ACCELERATOR CONTROL

USING THE ENGINE TO
SLOW THE VEHICLE

)WNSHIFT CONTROL

Driving Tips—Cont.

USING THE HYDRAULIC RETARDER (CLBT)

DRIVING ON ICE OR SNOW

ROCKING OUT

DOWNSHIFT OR REVERSE INHIBITOR FEATURE

TOWING OR PUSHING

)riving Tips—Cont.

ARKING BRAKE

EMPERATURES

CAUTION: The engine should never be operated for more than 30 seconds at full throttle with the transmission in gear and the output stalled. Prolonged operation of this type will cause the transmission oil temperature to become excessively high and will result in severe overheat damage to the transmission.

Power Takeoff Operation

CONVERTER-DRIVEN PTO

ENGINE-DRIVEN PTO

;are and Maintenance

ERIODIC INSPECTIONS

IPORTANCE OF PROPER OIL
EVEL

OIL SPECIFICATIONS

L CHECK PROCEDURE

Care and Maintenance—Cont.

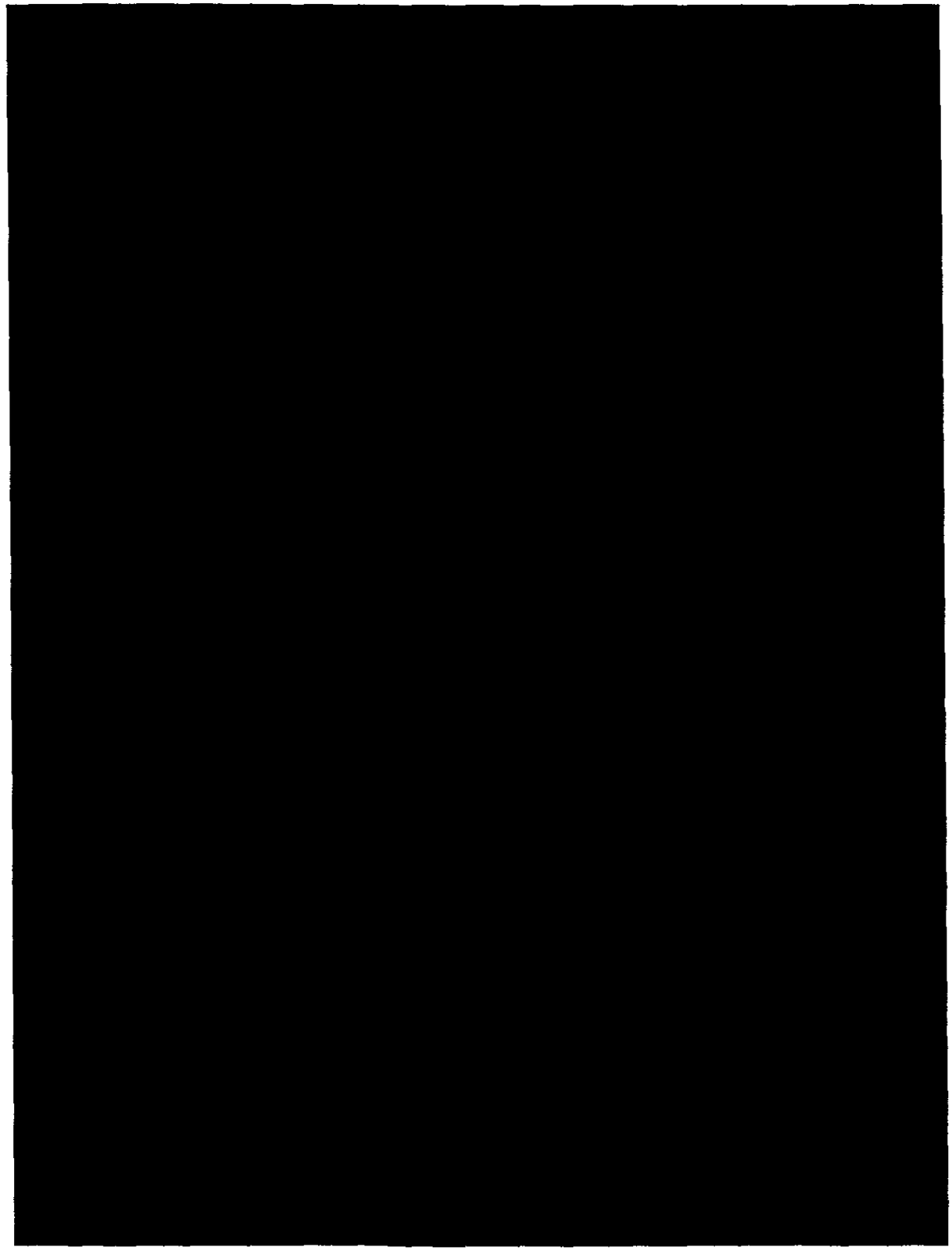
KEEPING OIL CLEAN

HOW TO KEEP LITTLE PROBLEM
FROM BECOMING BIG PROBLEM

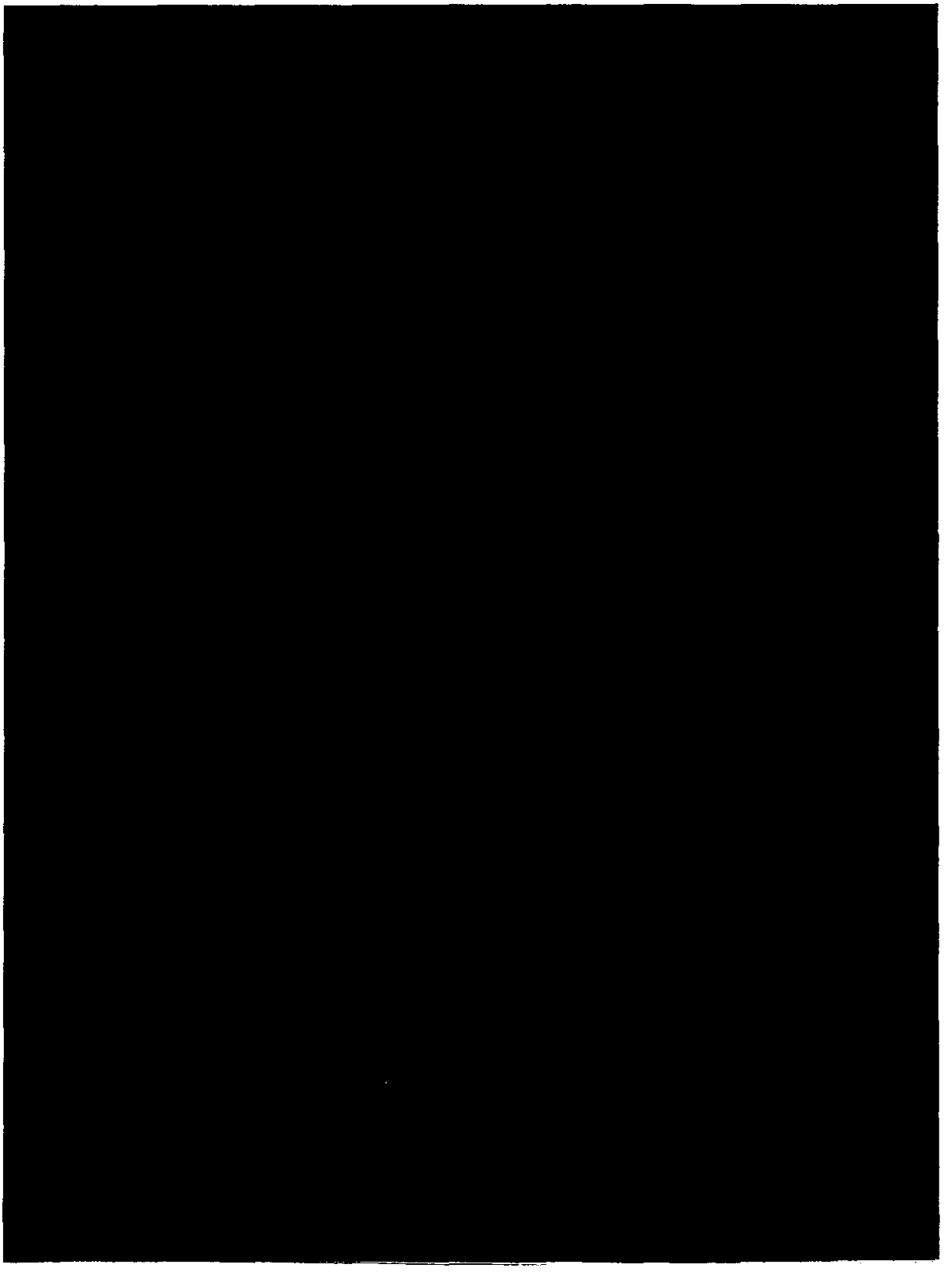
CAUTION: Containers that have been used for anti-freeze solution should not be used for oil going into the transmission.

OIL AND OIL FILTER CHANGE

Owner Assistance



Owner Assistance—Cont.



ervice Literature

CLT, CLBT 700 Series Transmission
Service Manual SA 1314

CLT, CLBT 700 Series Transmission
Parts Catalog SA 1315

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Off-Highway Models

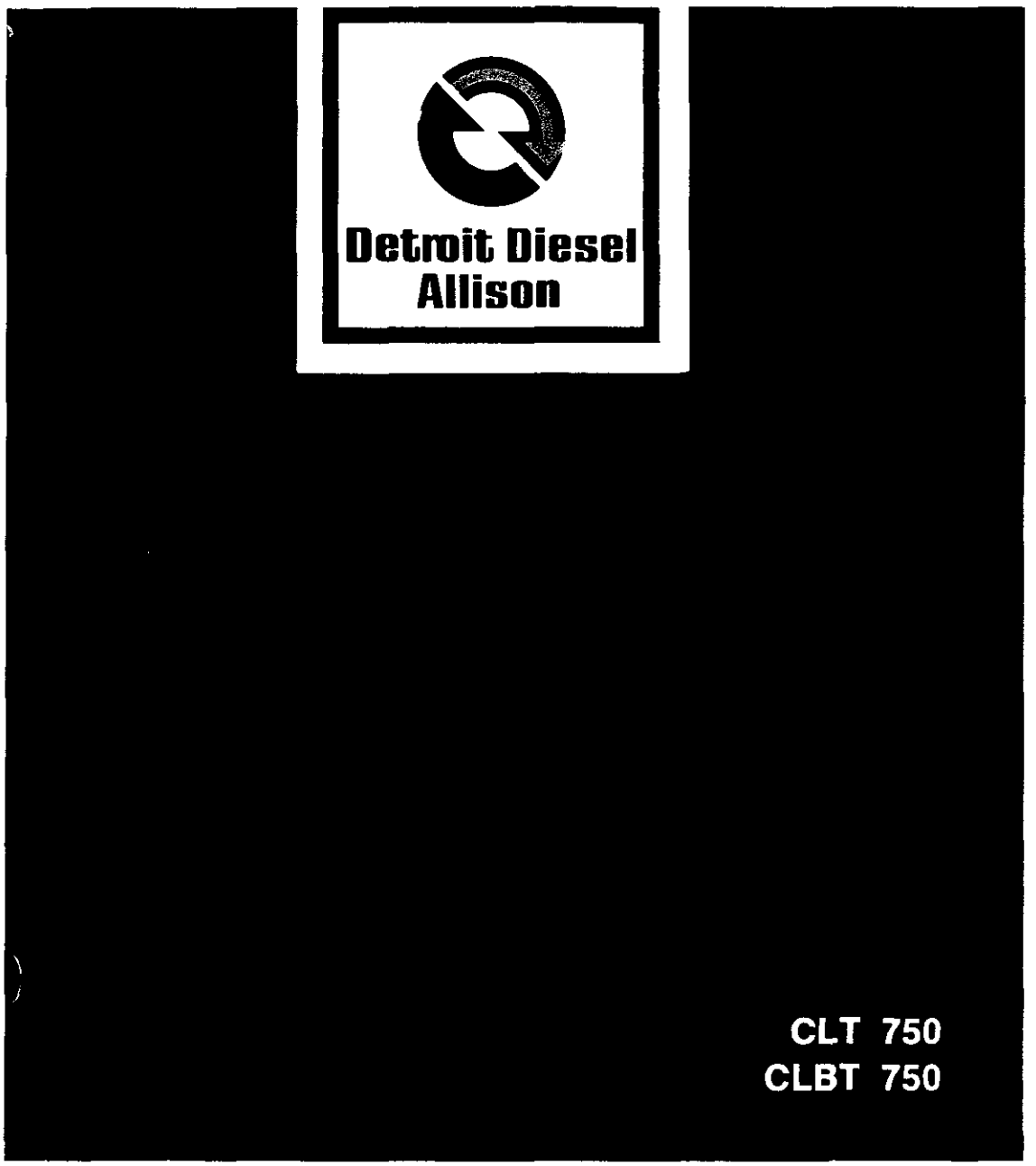

TABLE OF CONTENTS

ILLUSTRATION LIST

FOREWORD

This handbook is a ready reference for the mechanic removing, installing or maintaining the CLT 750 or CLBT 750 Off-Highway Automatic Transmission. All features of both the vehicle and transmission that become involved in the removal and installation procedures are discussed. The information presented will help the mechanic to remove, install and maintain the transmission in a manner that assures the utmost in satisfactory operation and long service life.

SECTION I

REMOVING TRANSMISSION FROM VEHICLE

1-1. DRAINING TRANSMISSION

The transmission should be drained before it is removed from the vehicle.

- Remove the oil drain plug from the right side of the transmission oil pan. Examine the drained oil for evidence of water, or debris that indicates failure of internal components.
- Reinstall the oil drain plug.
- Remove the oil fill tube assembly if it will interfere during transmission removal.
- Disconnect all other oil lines from the transmission. Remove the lines from the vehicle if they will interfere during transmission removal. Plug openings to keep dirt from entering the oil system.

1-2. DISCONNECTING CONTROLS

Controls, if not completely removed, should be disconnected from the transmission and positioned so they do not interfere with transmission removal.

- Disconnect all linkage or cables for shifting, shift modulation, hydraulic retarder operation, parking brake, and speedometer.

  NOTE: *If not already marked, put a center-punch mark on the transmission range selector lever, adjacent to the index mark on the selector shaft, before removing the lever.*

- Remove the modulator and modulator actuator rod (loose in transmission housing) from the transmission.

- Disconnect the power takeoff from its driven equipment. Disconnect the PTO controls. Remove the PTO completely if it will interfere with transmission removal.
- Disconnect any electrical leads or capillary tubes to neutral start switch, reverse signal, heaters, or pressure and temperature sensors.

1-3. UNCOUPLING FROM DRIVELINE, ENGINE

- Disconnect the vehicle driveline from the transmission output flange or yoke. Disconnect the input drive flange or yoke (remote mounted). Position the disconnected shafts to avoid interference with transmission removal.
- Figure 1-1 shows a typical method of coupling the engine and transmission (engine mounted). Remove the drive bolts that secure the flex plate to the converter drive cover.

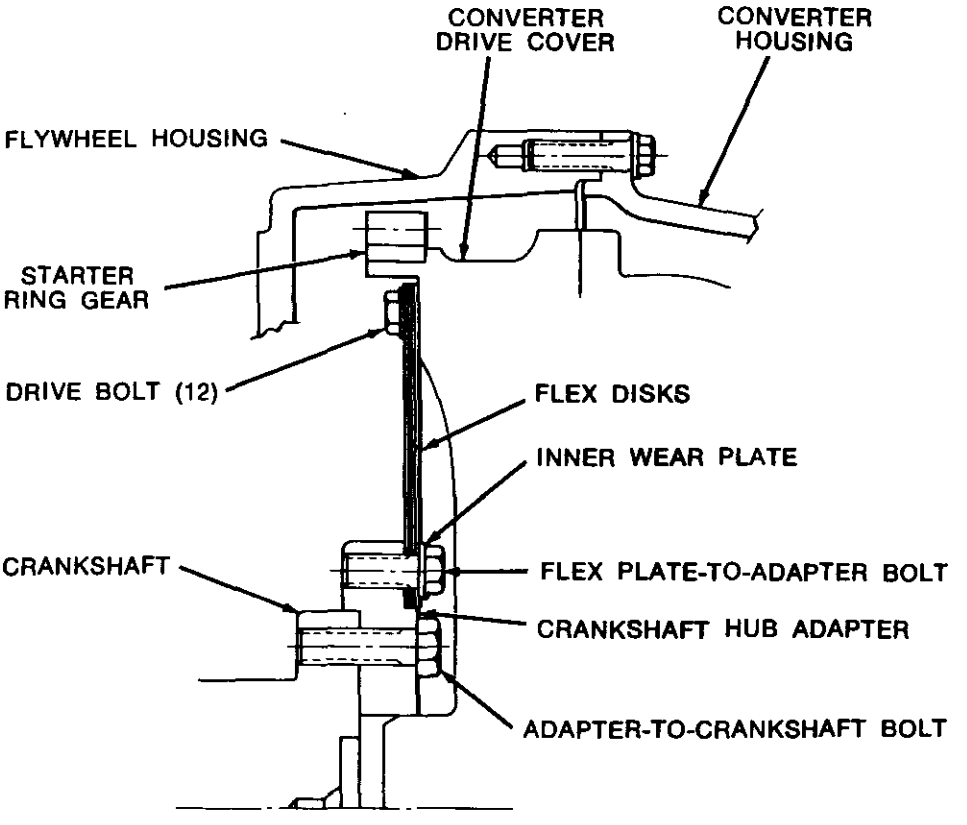

Figure 1-1. Typical method of coupling transmission to the engine.

1-4. REMOVING MOUNTING BOLTS

- If the transmission mountings support the rear of the engine, place a jack or other support under the engine.
- Support the transmission securely on a jack, hoist, or other removal equipment.
- Remove all bolts, spacers, and supports that attach the transmission to the engine and vehicle.

1-5. REMOVING THE TRANSMISSION

- Move the transmission away from the engine until completely clear of the engine. Remove the adapter ring and/or gasket (if used).
- Raise or lower the transmission as required to remove it from the vehicle.

1-6. REBUILD, OVERHAUL INSTRUCTIONS

Refer to the current edition of Service Manual SA 1314 for rebuild or overhaul of the transmission.

SECTION II

PREPARING TRANSMISSION FOR INSTALLATION

2-1. CHECKING FLYWHEEL (engine-mounted models)

- Check the 12-bolt circle at the front of the flywheel. The ½-20 threads must be undamaged, and the holes free of chips or foreign material.
- Check the pilot boss (at center of flywheel) for damage or raised metal that would prevent free entry into the flex disc hub (adapter).
- Check the starter ring gear for excessive wear or damage. Check welds that retain the ring gear (where applicable).

2-2. INSTALLING BRAKE, OUTPUT FLANGE

- Check the rear oil seal for failure or damage. For replacement instructions, refer to Service Manual SA 1314.
- Lubricate the oil seal with oil-soluble grease.
- Check the output flange or yoke for damage or wear. The oil seal contact surface must be smooth and regular to prevent oil leaking past the rear oil seal.
- Install the parking brake assembly. Tighten the bolts to the torque recommended by the vehicle manufacturer.
- Install the output flange or yoke. The brake drum, if it mounts ahead of the flange or yoke, must be attached before the flange is installed, and its bolts tightened to the torque recommended by the vehicle manufacturer. Be sure the flange or yoke hub is seated against the transmission rear bearing.
- The flange is retained by a self-locking nut. If the nut has been used previously it may have lost its self-locking ability. A new nut is recommended. Apply molybdenum

disulphide grease (Molycote G or equivalent) to the output shaft threads. Tighten the nut to 750-1000 lb ft (1017 to 1356 Nm) torque.

- If the brake drum mounts behind the flange or yoke, install the drum and retain it with bolts or nuts (as required). Tighten the bolts or nuts to the torque recommended by the vehicle manufacturer.

2-3. INSTALLING INPUT FLANGE (remote-mounted)

- Check the front oil seal for failure or damage. For replacement instructions, refer to Service Manual SA 1314.
- Lubricate the oil seal with oil-soluble grease.
- Check the input flange or yoke for damage or wear. The oil seal contact surface must be smooth and regular to prevent oil leaking past the front oil seal.
- Install the input flange or yoke. Be sure it is seated against the bearing in the front of the transmission front cover.
- The flange is retained by a self-locking nut. If the nut has been used previously it may have lost its self-locking ability. A new nut is recommended. Apply molybdenum disulphide grease (Molycote G or equivalent) to the input shaft threads. Tighten the nut to 600-800 lb ft (814 to 1084 Nm) torque.

2-4. INSTALLING RANGE SELECTOR LEVER

- Loosen the clamp bolt in the range selector lever.
- Locate the punch mark that was put on the outer side of the lever (para 1-2) when removed.
- Spread the clamp end of the lever, and install the lever so that the punch mark alines with the index mark on the end of the transmission selector shaft. Push the lever onto the shaft until the splines fully engage.

  CAUTION: *Do not drive or force the lever onto the shaft. Internal damage to the transmission might result.*

- Tighten the clamp bolt to retain the lever.

2-5. INSTALLING PTO (applicable at any location)

Space limitations will determine whether the PTO should be installed before or after the transmission is installed.

- The prescribed backlash between the drive gear (in transmission) and driven gear (in PTO) is 0.005-0.025 inch (0.127-0.635 mm) for the engine-driven PTO's, and 0.018-0.024 inch (0.457-0.635 mm) for the converter-driven PTO.
- Establish the proper backlash by selecting the proper thickness shims (gaskets) when mounting the PTO.

  CAUTION: *Cork or other soft gaskets cannot be used to mount the PTO. Use only shims or gaskets recommended by the PTO manufacturer.*

- For a PTO mounted on the transmission main housing, gear backlash between the driven gear in the PTO and the driving gear in the transmission can be measured through the inspection port provided in the PTO housing.
- For a PTO mounted at either the top or side of the converter housing, the prescribed blacklash is in addition to that already provided between the drive gear in the transmission and its driving gear at the rear of the torque converter pump. Thus, it is necessary to measure the drive gear-converter pump gear backlash before installing the PTO.
- On PTO assemblies that require pressure lubrication, install the lubrication tube and fittings. The lubrication oil comes from the line returning to the transmission from the oil cooler. Oil flowing to the PTO should pass through a 0.060 inch (1.52 mm) restrictor (orifice or fitting). A maximum of 0.110 inch (2.79 mm) orifice size is permissible. This restriction is usually provided in the PTO assembly.

2-6. INSTALLING SHIFT MODULATION CONTROL

The shift modulation control should be installed after the transmission is installed. Refer to paragraph 4-9.

2-7. INSTALLING OIL FILLER TUBE

The oil filler tube may be installed before the transmission is installed into the vehicle, unless its presence will interfere with transmission installation.

- Install the oil filler tube and gasket. Aline any brackets with their attachment location, and install two $\frac{5}{16}$-24 bolts with lockwashers, into the oil pan boss to retain the tube assembly. Tighten the bolts to 14-18 lb ft (19 to 24 Nm) torque.
- Fasten the upper end of the oil filler tube with brackets and bolts as required.