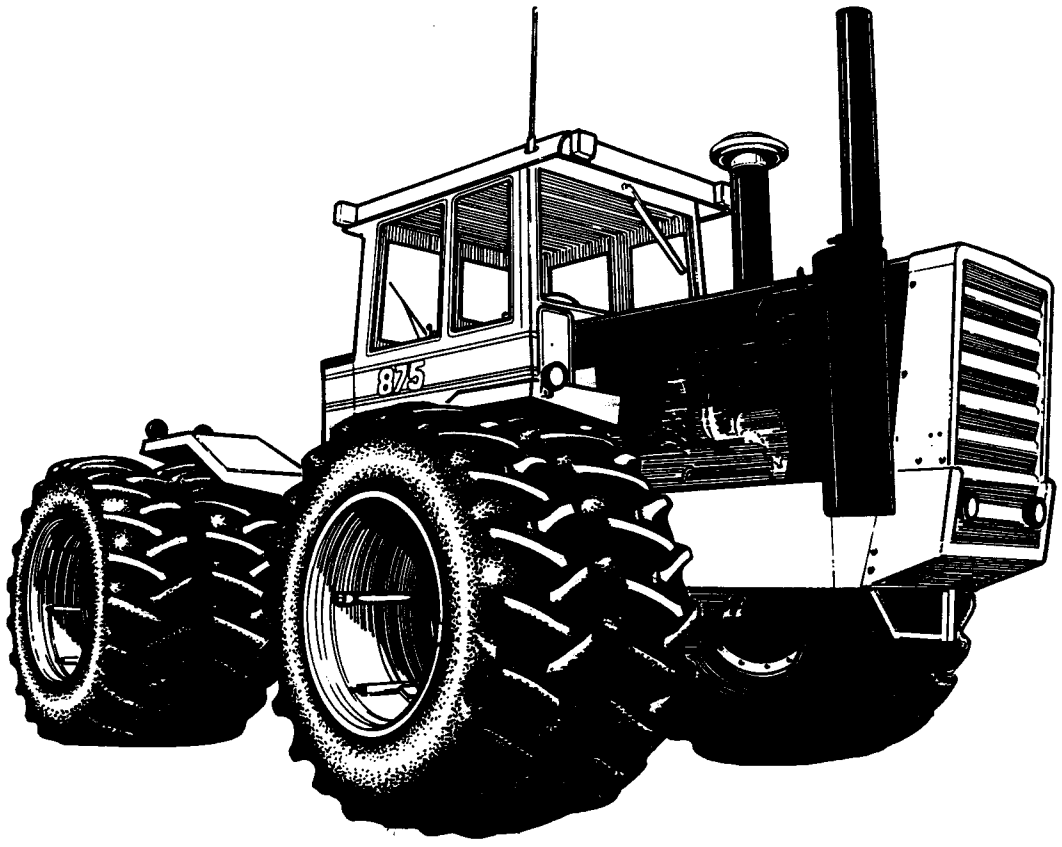
VERSATILE

Service Manual

FORD
NEW HOLLAND

Tractors
835, 855, 875, 895,
935, and 950

1977 – 1980



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Reprinted

LARGE TRACTOR SERVICE MANUAL

Models 835, 855, 875, 895, 935, 950

VERSATILE*

VERSATILE MANUFACTURING COMPANY
A division of Versatile Cornat Corporation
1260 CLARENCE AVE., WINNIPEG,
MANITOBA, CANADA, R3T 1T3/(204) 284-6100

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FOREWORD

This service manual provides instructions for troubleshooting, removal, inspection, replacement and overhaul of 1980 model 835, 855, 875, 895, 935 and 950 VERSATILE® tractor components.

The service manual should be used in conjunction with the parts manual for the specific model year.

A table of contents precedes each section providing detailed coverage of the information contained within that section. The index at the end of the book should ease location of specific information, and an up-to-date list of Cummins Distributors is provided following the index.

REVISIONS AND ADDITIONS

The purpose of a loose-leaf service manual is to enable us to keep the book updated.

When changes are made, pages will be forwarded to you marked either as replacement or additional pages.

Replacement pages will carry the same page number as the original. Discard the original page and insert the replacement page in its place. Added pages will carry the original page number plus an alphabetical suffix. Insert these pages after the existing page.

Please fill in the feedback page at the back of the book and return it to Versatile Manufacturing Company. Such information you can supply will help us improve our service manuals in the future.

SAFETY

This section contains general safety precautions which should be thoroughly studied, and practiced, by all service personnel.

GENERAL SAFETY

1. Mount a fire extinguisher near the service area. Maintain it as recommended by the manufacturer and be familiar with its use.
2. Never operate the tractor in a closed building. If it is absolutely necessary to do so, be sure the building is well ventilated.
3. Always keep sleeves, jackets or other clothing relatively tight and belted, since loose clothing might catch in moving tractor parts.
4. Do not jump from the tractor cab. There is a danger of catching clothing on protruding parts. Use steps and handholds when mounting and dismounting tractor.
5. Before beginning any maintenance procedure, park the tractor on a level, clear area. Shut down the engine and remove the ignition key; set the parkbrake and chock the front and back of at least two wheels. Ensure that all operating controls are in the neutral position. Always disengage the PTO clutch and three-point hitch.
6. Never leave an implement in the raised position; always lower it to the ground.
7. Never attempt to start or operate tractor controls except from the operator's seat.

TOWING AND TRANSPORT SAFETY

1. Use a strong chain, cable or towbar and attach securely to the front frame plate or drawbar of tractor. Do not tow tractor faster than 15 mph (25 km).
2. Use a trailer having a carrying capacity of at least 30,000 lb (13 600 kg) to haul tractors.
3. Securely chain the tractor to the trailer, block the wheels and engage the parkbrake and articulation lock to prevent tractor movement.

JACKING SAFETY

1. Select a jack strong enough to carry the load. The minimum jack required is five ton capacity (4.5 t).
2. Stabilize the tractor by engaging the parkbrake and articulation lock, and chocking or blocking the wheels securely.
3. Brace the center pivot frame by applying a strong wedge on the frame pivot and engaging the articulation lock to prevent jackknifing.
4. Place the jack securely under the axle tube, frame, or drawbar where it is strong enough to support the lifted weight.
5. Use a heavy block as a base for the jack if working on the ground. It should be long enough to keep the jack from tipping, sinking or shifting. Any additional blocking should be under the jack.
6. Jack up the front and/or rear frame just enough to install steel safety stands under the axle tubes or frame.
7. Check the jack position after it has started to lift. Lower the jack immediately if it starts to lean. Reset the jack, block the tractor more securely and lift again.
8. Keep the tractor stable by not raising it so high that it will slide off the jack saddle.
9. Place support stands under the tractor. Lower the jack and let the tractor rest on the stands. This provides solid support for the tractor when the jack is removed.

HOIST SAFETY

1. Use a chain hoist and frame to lift the tractor properly. The minimum capacity required for the hoist is 10 tons (9 t); for the A-frame or overhead support, 7-1/2 tons (6.8 t); and for the support stands, three tons (2.7 t).

2. Protect yourself from injury as the tractor is being raised by doing the following:

   a) Do not stand on the tractor as you are lifting.

   b) Keep hands away from pinch points where the chain links tighten or the chain is against the tractor frame.

   c) Do not let the tractor swing and strike personnel or the frame as it leaves the ground.

   d) Keep support stands nearby and place under the tractor when proper height is reached.

   e) Do not go under a tractor supported by a chain hoist. Place support stands under the tractor before working under tractor.

3. The transmission alone weighs approximately 1 200 lb (550 kg). Extreme care must be exercised when hoisting, lowering or moving the transmission.

MAINTENANCE SAFETY

1. Shut down the engine before performing any maintenance procedure.

2. Be alert when approaching the tractor while it is running, especially the PTO, articulation joint and three-point hitch.

3. Use the articulation lock on the tractor during overhaul operations.

4. Do not oil, grease or adjust the tractor while it is in motion. Do not leave the engine running while the tractor is being adjusted, cleaned or repaired.

5. Before beginning work on any hydraulic system component, move all implement control levers to the full forward position several times to dissipate all pressure. If a three-point hitch is fitted, select the DOWN position. Disconnect any component that may be connected to the hoses.

6. Wear a face shield or goggles to protect your eyes, and heavy gloves to protect your hands, when searching for hydraulic leaks or charging the air conditioning system.

7. Escaping hydraulic oil under pressure can penetrate the skin, causing severe personal injury. Use a piece of cardboard or wood when searching for leaks. If injured, get immediate medical attention.

8. Do not smoke and avoid open flames when filling the batteries.

9. Shut down the engine and remove the ignition key before disconnecting or servicing PTO drivelines.

10. Do not remove the cooling system pressure cap while the engine is hot. Allow it to cool to less than 165°F (74°C).

11. Stop the engine before making any linkage adjustments.

12. Welding fuel tanks is dangerous and is not recommended.

13. Repair adhesive is a petroleum distillate and easily flammable. Keep the adhesive and its vapours from heat, sparks and flame. During application, and until the vapour is gone, avoid using spark-producting electrical equipment. Keep the container tightly closed when not in use.

FUEL AND FLUID SAFETY

1. Do not smoke and avoid open flame when:

   a) filling the fuel tanks

   b) filling the batteries

   c) working near a disassembled air conditioning system. Refrigerant vapour and flame combined produce lethal phosgene gas.

2. Add coolant to the radiator only when the engine is stopped. Turn the radiator cap slightly to relieve pressure before removing the cap.

3. Do not use an open pail or can for transporting fuel. Use only an approved container manufactured for that purpose.

4. If clothes should become splashed with fuel, change immediately. Fuel-soiled clothes are an extreme fire hazard.

5. Dispose of all fuel-soaked rags. Do not leave them lying around a work area where they may be exposed to flame, spark or cigarette smoking.

SECTION 1: SERVICING

Table of Contents

SECTION 1: SERVICING

1 Introduction

This section contains general information about specifications, capacities, lubricants, fluids and fuels for the tractor as a whole rather than having the information scattered throughout the other sections. A troubleshooting subsection will make reference to other service sections in the manual, which cover the tractor in greater detail.

2 Towing/Transporting

2.1 GENERAL

When towing or transporting a four wheel drive tractor, follow the recommendations listed below:

2.2 TOWING

If towing is required, the following procedures are recommended:

1. Securely attach a strong chain, cable or towbar to front plate or drawbar of tractor.

2. If possible, let engine run to utilize hydrostatic steering.

3. Always tow tractor slowly to allow its operator full control.

NOTE

If engine cannot be started, pull tractor in a gradual arc across the field. Steering tractor will be difficult.

- CAUTION

DO NOT TOW TRACTOR FASTER THAN 10 MPH (17 km/h).

DO NOT SLIDE TRACTOR FROM SIDE TO SIDE TO MANEUVER INTO PLACE FOR REPAIR; DAMAGE TO DRIVE TRAIN MAY RESULT.

4. Use a strong front end loader to pick up either front or rear of tractor and push (and articulate) into service area.

5. Disconnect drivelines when transmission or axles need repair or overhaul.

6. If axle is broken, remove side covers from planetary hubs and pull planetaries out.

7. Cover exhaust stack to prevent turbocharger from seizing. This applies when engine cannot be started.

2.3 TRANSPORTING

For long distances, hauling the tractor on a trailer is best. Practice the following procedures when hauling is necessary:

1. Check with local authorities as to laws, permits and other information required to transport large machinery.

2. Use a trailer having a carrying capacity of 30 000 lb (13 608 kg) to haul tractors and other large machinery.

3. Use "wide load" signs and equip trailer with clearance lights to indicate load to other vehicles.

4. Equip trailer with a winch of minimum 10 ton (10 tonne) capacity to pull tractor onto trailer.

5. Chain tractor securely to trailer to prevent tractor movement or tipping.

6. Block wheels and engage parkbrake to prevent tractor movement.

7. Regularly inspect chains looking for cracks, gouges, wear, bent links, worn or bent hooks. Repair any damage.

8. Cover exhaust pipe to prevent turbocharger from seizing.

3 Hoists and Jacks

3.1 GENERAL

Hoists and jacks are most useful in properly servicing the tractor. Observe the following recommendations to aid in working safely on the tractor or any other equipment.

3.2 JACKS

Improper use of jacks or lifting devices may result in serious accidents. Consider the following recommendations when raising the tractor using a jack:

1. Select a jack strong enough to carry the load. The minimum jack required is five ton (5 tonne) capacity.

2. Use jack carefully; dropping or tossing may distort or crack jack housing, causing jack failure.

3. Take care of jack by using proper lubricants as specified in operating instructions. Do not use leaky jacks to lift heavy equipment.

4. Stabilize tractor by placing transmission in gear, engaging parkbrake, chocking or blocking wheels securely.

5. Before jacking, engage tractor articulation lock to prevent jackknifing.

6. Work only on level, firm surfaces so jack will lift straight up and down.

7. Place jack securely under axle tube, frame, or drawbar where it is strong enough to support the lifted weight.

8. Use a heavy block as a base for jack if working on ground. It should be long and wide enough to keep jack from tipping, sinking or shifting. Any additional blocking should be under the jack.

9. Jack up front and/or rear frame just enough to install steel safety stands under axle tubes or frames.

10. Check jack position after it has started to lift. Lower jack immediately if it starts to lean. Reset jack; block tractor more securely and lift again.

11. Keep tractor stable by not raising so high that it may slide off jack saddle.

12. Remove jack handle from mechanical jacks when not in use to prevent being struck by handle.

13. Hold handle of mechanical jack firmly to prevent kicking as tractor is being raised or lowered.

14. Place support stands under tractor. Lower jack and let tractor rest on stands. This provides a solid support for tractor when jack is removed.

3.3 HOISTS

Improper hoisting equipment can cause accidents and injuries. Practise the following:

1. Use a chain hoist and frame to lift tractor properly. The minimum capacity required for the hoist is ten tons (10 tonnes); for A-frame or overhead support is seven and one-half tons (7.5 tonne); and for the support stands is three tons (3 tonne).

2. Never overload a hoist or frame beyond its carrying capacity.

3. Inspect chains regularly looking for cracks, gouges, wear, or bent links. Repair any damage.

4. Inspect hooks regularly and replace any that are bent, cracked, sprung or worn. If in doubt, compare dimensions of new hook with the old one. Replace if there are any differences in size or shape.

5. Select suitable, balanced lift point on tractor frame. Place hook and frame directly over point of lift.

6. Set chain to prevent pull point from slipping.

7. Protect yourself from injury as tractor is being raised by observing the following safety rules:

a) Never stand on tractor as you are lifting.

b) Keep hands clear from pinch points where chain links tighten or chain is against tractor frame.

c) Do not let tractor swing and strike personnel or frame as it leaves the ground.

d) Keep support stands nearby and place under tractor when desired height is reached.

e) Never go under tractor supported by a chain hoist. Place support stands under tractor before working under tractor.

4 Specifications and Capacities

4.1 GENERAL

The specifications and capacities apply to the Models 835, 855, 875, 895, 935 and 950 tractors.

4.2 DIMENSIONS

Wheelbase — 130 in. (3 300 mm)

Tread with 20.8 × 38 single tires — 72 in. (1828 mm) between centers

Overall length without three-point hitch — 253 in. (6426 mm)

Overall width with 20.8 × 38 single tires — 93 in. (2362 mm)

Cab height with 20.8 × 38 single tires:

Model 835 — 126 in. (3200 mm)

Models 855, 875, 895, 935, 950 — 126-3/4 in. (3 220 mm)

Maximum allowable height (Clearance for bridges, overpasses, etc.) with 20.8 × 38 single tires and with antenna vertical at height of 30 in. (762 mm):

Model 835 — 156 in. (3962 mm)

Models 855, 875, 895, 935, 950 — 156 3/4 in. (3981 mm)

Turning Radius:

216 in. (5486 mm) with 24.5 × 32 singles

222 in. (5638 mm) with 30.5 × 32 singles

236 in. (5994 mm) with 18.4 × 38 duals

239 in. (6070 mm) with 20.8 × 38 duals

Nominal turning radius — 203.5 in. (5168 mm) measured to centerline of 72 in. (1828 mm) tread.

4.3 TIRE SIZE AND TRACTOR WIDTH

Table 1-1 shows tractor width with various tires for all models.

TABLE 1-1: Tractor Width, Tire Sizes, Shipping Weights

Model 835 TIRE SIZE	STACK HEIGHT	CAB HEIGHT	TREAD INNER	TREAD OUTER	WIDTH INNER	WIDTH OUTER	FRONT AXLE WEIGHT		TOTAL WEIGHT SHIPPING	
18.4 x 38-R1 Duals	137	123.5	72	118	91.5	137.5	13 433	6092 kg	19 826	8991 kg
† 20.8 x 38-R1 Singles	139.5	126	72	—	93	—	12 570	5701 kg	18 100	8209 kg
20.8 x 38-R1 Duals	139.5	126	72	122	93	143.5	13 852	6282 kg	20 664	9371 kg
24.5x32-R1 Singles	139	125.5	72	—	97.5	—	12 880	5841 kg	18 720	8490 kg
24.5x32-R2 Goodyear R&C	140	126.5	72	—	97.5	—	12 958	5877 kg	18 877	8561 kg
24.5x32-R2 Firestone R&C	140.5	127	72	—	97.5	—	12 997	5894 kg	18 953	8595 kg
30.5x32-R1 Singles	137.5	124	79.125	—	109	—	13 140	5959 kg	19 240	8726 kg
30.5x32-R2 Goodyear R&C	141.5	128	79.125	—	109	—	13 398	6076 kg	19 757	8960 kg
30.5x32-R2 Firestone R&C	140.5	127	79.125	—	109	—	13 529	6136 kg	20 017	9078 kg
18.4x38-R2 Goodyear R&C Duals	140	126.5	72	90.4	118	136.4				
18.4x38-R2 Firestone R&C Duals	139	125.5	72	90.4	118	136.4				
20.8x38-R2 Goodyear R&C Duals	141	127.5	72	93.1	122	143.1				
20.8x38-R2 Firestone R&C Duals	140.75	127.25	72	92.8	122	142.8				
30.5x32 United Singles	137.5	124	79.12	—	110.12					

Models 935, 950 TIRE SIZE	STACK HEIGHT	CAB HEIGHT	TREAD INNER	TREAD OUTER	WIDTH INNER	WIDTH OUTER	FRONT AXLE WEIGHT		TOTAL WEIGHT SHIPPING	
18.4x38-R1 Duals	142.25	124.25	72	118	91.5	137.5	13 238	6004 kg	19 771	8966 kg
† 20.8x38-R1 Singles	144.75	126.75	72	—	93	—	12 375	5612 kg	18 045	8184 kg
20.8x38-R1 Duals	144.75	126.75	72	122	93	143.5	13 657	6194 kg	20 609	9346 kg
24.5x32-R1 Singles	144.25	126.25	72	—	97.5	—	12 685	5753 kg	18 665	8465 kg
24.5x32-R1 Duals	144.25	126.25	72	129	97.5	154.5	14 236	6456 kg	21 767	9872 kg
24.5x32-R2 Goodyear R&C	144.5	126.5	72	—	97.5	—	12 763	5788 kg	18 822	8536 kg
24.5x32-R2 Firestone R&C	145	127	72	—	97.5	—	12 802	5806 kg	18 898	8571 kg
30.5x32-R1 Singles	142.75	124.75	79.125	—	109	—	12 945	5871 kg	19 185	8701 kg
30.5x32-R2 Goodyear R&C	146	128	79.125	—	109	—	13 203	5988 kg	19 702	8935 kg
30.5x32-R2 Firestone R&C	145	127	79.125	—	109	—	13 334	6047 kg	19 962	9053 kg

Models 855, 875, 895 TIRE SIZE	STACK HEIGHT	CAB HEIGHT	TREAD INNER	TREAD OUTER	WIDTH INNER	WIDTH OUTER	FRONT AXLE WEIGHT		TOTAL WEIGHT SHIPPING	
18.4x38-R1 Duals	137.75	124.25	72	118	91.5	137.5	13 593	6165 kg	20 106	9118 kg
†20.8x38-R1 Singles	140.25	126.75	72	—	93	—	12 730	5773 kg	18 380	8336 kg
20.8x38-R1 Duals	140.25	126.75	72	122	93	143.5	14 012	6355 kg	20 944	9498 kg
24.5x32-R1 Singles	139.75	126.25	72	—	97.5	—	13 040	5914 kg	19 000	8617 kg
††24.5x32-R1 Duals	139.75	126.25	72	129	97.5	154.5	14 607	6624 kg	22 134	10 038 kg
24.5x32-R2 Goodyear R&C	140	126.5	72	—	97.5	—	13 118	5949 kg	19 157	8688 kg
24.5x32-R2 Firestone R&C	140.5	127	72	—	97.5	—	13 157	5967 kg	19 233	8722 kg
30.5x32-R1 Singles	138.25	124.75	79.125	—	109	—	13 300	6032 kg	19 520	8853 kg
30.5x32-R2 Goodyear R&C	141.5	128	79.125	—	109	—	13 558	6149 kg	20 037	9087 kg
30.5x32-R2 Firestone R&C	140.5	127	79.125	—	109	—	13 689	6208 kg	20 297	9205 kg
18.4x38-R2 Goodyear R&C Duals	140	126.5	72	90.4	118	136.4				
18.4x38-R2 Firestone R&C Duals	139	125.5	72	90.4	118	136.4				
20.8x38-R2 Goodyear R&C Duals	141	127.5	72	93.1	122	143.1				
20.8x38-R2 Firestone R&C Duals	140.75	127.25	72	92.8	122	142.8				
30.5x32 United Singles	138.25	124.75	79.12	—	110.12	—				

†NOTE: Tractor must not be ballasted with these tires.
NOTE: Shipping width is the same as width inner above.
NOTE: Unless otherwise stated, above weights are in lbs., and lengths are in inches.
††NOTE: Dimensions with standard 10.5 in. wide spacer.

Weights given apply only to the 855 and 875. Weights for the 895 are not known at time of publication.

4.4 TIRE INFLATION

For proper tire inflation, follow the recommendations listed (Ref. Table 1-2).

TABLE 1-2: Tire Inflation Chart

TIRE SIZE	PLY RATING	LITTLE OR NO BALLAST	MAX BALLAST OR HEAVY LOAD
18.4 x 38†	6	16 psi	16 psi
20.8 x 38†	8	16 psi	20 psi
24.5 x 32	10	18 psi	20 psi
30.5 x 32	10	16 psi	16 psi

† NOTE: When used as duals, minimum tire pressure is 12 psi. Use ballast on duals only.

4.5 WEIGHTS

Table 1-3 lists the maximum operating weight and recommended range of operating weight for all models. (For shipping weight see Table 1-1).

For detailed recommendations of operating weights, consult Specifications Section of Operator's Manual for each model.

TABLE 1-3: Operating Weights

	835	855	875	895	935	950
Maximum Operating Weight	28 000 lb (12 700 kg)	28 000 lb (12 700 kg)	29 500 lb (13 380 kg)	32 500 lb (14 750 kg)	32 500 lb (14 750 kg)	32 500 lb (14 750 kg)
Recommended Range of Operating Weights	24 000 to 26 000 lb 10 890 to 11 790 kg	24 000 to 26 000 lb 10 890 to 11 790 kg	26 500 to 29 000 lb 12 020 to 13 150 kg	29 300 to 31 000 lb 13 290 to 14 060 kg	29 300 to 31 000 lb 13 290 to 14 060 kg	29 300 to 31 000 lb 13 290 to 14 060 kg

4.6 ENGINES

MODEL 835

Cummins NT-855-C230. 855 cu in. (14 L) turbocharged Big Cam CONSTANT POWER inline six-cylinder diesel engine

Maximum brake horsepower — 230 (171.5 kW) at 2100 rpm

Maximum torque — 800 lb ft (1085 N·m) at 1400 rpm

Full-load governed speed — 2100 rpm (r/min)

Full-throttle no-load speed — 2400 rpm

Idle speed — 1000 rpm

Bore — 5.50 in. (140 mm)

Stroke — 6.00 in. (152 mm)

Displacement — 855 cu in. (14.0 L)

Compression ratio — 14.1:1

Lubrication system — Oil capacity is 35 qt US (33 L). Full flow oil filter with spin-on bypass oil conditioner filter and oil-to-water cooler. 30° angular capability oil pan.

MODEL 855

Cummins NT-855-C250. 855 cu in. (14 L) turbocharged Big Cam CONSTANT POWER inline six-cylinder diesel engine

Maximum brake horsepower — 250 (186 kW) at 2100 rpm

Maximum torque — 850 lb ft (1152 N·m) at 1400 rpm

Full load governed speed — 2100 rpm

Full-throttle no-load speed — 2250 to 2300 rpm

Idle speed — 1000 rpm

Bore — 5.50 in. (140 mm)

Stroke — 6.00 in. (152 mm)

Displacement — 855 cu in. (14.0 L)

Compression ratio — 14.1:1

Lubrication system — Oil capacity is 35 qt US (33 L). Full flow oil filter with spin-on bypass oil conditioner filter and oil-to-water cooler. 30° angular capability oil pan.

MODEL 875

Cummins NT-855-C280. 855 cu in. (14 L) turbocharged Big Cam CONSTANT POWER inline six-cylinder diesel engine.

Maximum brake horsepower — 280 (209 kW) at 21 r/min

Maximum torque — 920 lb ft (1 247 N·m) at 1 400 r/min

Full-load governed speed — 2 100 r/min

Full-throttle no-load speed — 2 250 to 2 300 r/min

Idle speed — 1 000 r/min

Bore — 5.50 in. (140 mm)

Stroke — 6.00 in. (152 mm)

Displacement — 855 cu in. (14.0 L)

Compression ratio — 14.1:1

Lubrication system — Oil capacity is 35 qt US (33 L). Full flow oil filter with spin-on bypass oil conditioner filter and oil-to-water cooler. 30° angular capability oil pan.

MODEL 895

Cummins NT-855-C310. 855 cu in. (14 L) turbocharged and aftercooled Big Cam CONSTANT POWER inline six-cylinder diesel engine.

Maximum brake horsepower — 310 (231 kW) at 2 100 r/min

Maximum torque — 980 lb ft (1 330 N·m) at 1 400 r/min

Full-load governed speed — 2 100 r/min

Full-throttle no-load speed — 2 250 to 2 300 r/min

Idle speed — 1 000 r/min

Bore — 5.50 in. (140 mm)

Stroke — 6.00 in. (152 mm)

Displacement — 855 cu. in. (14 L)

Compression ratio — 14.1:1

Lubrication system — Oil capacity is 34 qt US (32 L). Full flow oil filter with spin-on bypass oil conditioner filter and oil-to-water cooler. 30° angular capability oil pan.

MODEL 935

Cummins VT-903-C330. 903 cu in. (14.8 L) turbocharged CONSTANT POWER diesel engine

Maximum brake horsepower — 330 (246 kW) at 2 400 r/min

Maximum torque — 848 lb ft (1 150 N·m) at 1 800 r/min

Full-load governed speed — 2 600 r/min

Full-throttle no-load speed — 2 850 to 2 910 r/min

Idle speed — 1 000 r/min

Bore — 5.50 in. (140 mm)

Stroke — 4.75 in. (121 mm)

Displacement — 903 cu in. (14.8 L)

Compression ratio — 15.5:1

Lubrication system — Oil capacity is 26 qt US (25 L). Full flow oil filter with spin-on bypass oil conditioner filter and oil-to-water cooler. 30° angular capability oil pan.

MODEL 950

Cummins VT-903-C350. 903 cu in. (14.8 L) turbocharged diesel engine

Maximum brake horsepower — 348 (260 kW) at 2 400 r/min

Maximum torque — 848 lb ft (1 150 N·m) at 1 800 r/min

Full-load governed speed — 2 400 r/min

Full-throttle no-load speed — 2 550 to 2 640 r/min

Idle speed — 1 000 r/min

Bore — 5.50 in. (140 mm)

Stroke — 4.75 in. (121 mm)

Displacement — 903 cu in. (14.8 L)

Compression ratio — 15.5:1

Lubrication system — Oil capacity is 26 qt US (25 L). Full flow oil filter with spin-on bypass oil conditioner filter and oil-to-water cooler. 30° angular capability oil pan.

4.7 COOLING SYSTEM

Capacity:

Model 835 — 46 qt US (43.5 L)
Models 855, 875 — 47 qt US (44.5 L)
Model 895 — 61 qt US (58 L)
Models 935, 950 — 54 qt US (51.1 L)

Model 835 — 930 sq in. (6000 cm^2)
Models 855, 875, 895, 935, 950 — 1080 sq in. (6970 cm^2)
Models 935, 950 — 7 fins per in. (2.8 per cm)
Models 835, 855, 875, 895 — 9 fins per in. (3.5 per cm)

Independent surge tank (all models)

Fan: (6 blade sucker type). 28 in. (711 mm) dia.

Pressure cap: 7 psi (48 kPa) (all models)

Coolant pump capacity:

Models 835, 855, 875, 935 — 144 gpm (US) (545 L/min) at 2 100 r/min

Model 895 — 145 gpm (US) (553 L/min) at 2 100 r/min

Model 950 — 117 gpm (US) (443 L/min) at 2 400 r/min

4.8 AIR CLEANER

6.0 in. (152 mm) dia outlet to engine
8.0 in. (203 mm) dia inlet to cleaner
Dual element, dry type with safety element
Strata tube pre-cleaner, exhaust aspirated
Restriction indication gauge on instrument panel

Engine air flow:

Model 835 — 760 cfm (359 L/s)
Model 855 — 790 cfm (373 L/s)
Model 875 — 830 cfm (392 L/s)
Model 895 — 900 cfm (425 L/s)
Model 935 — 930 cfm (439 L/s)
Model 950 — 840 cfm (396 L/s)

4.9 EXHAUST SYSTEM

All models have rubber mounted mufflers and a built-in vacuum aspirator for engine air precleaner.

5 in. (127 mm) dia inlet pipe (all models)

Muffler — One 8.25 × 11.5 in. (210 × 292 mm) elliptical × 40 in. (1016 mm) muffler, all models

4.10 FUEL TANK

Capacity — 185 gal US (700 L), all models

Two saddle-type, low mount tanks with 2.0 in. (50.8 mm) crossover tube, single 2.5 in. (63.5 mm) filler neck on both tanks. Remote breather 24 in. (610 mm) above tank.

4.11 COLD START AID

Type — Ether, operated from instrument panel. Approximately 120 shots per 710 cc canister.

4.12 CLUTCH

Models 835, 855, 875, 935, 950 — 14 in. (350 mm) two plate dry type, self-adjusting with 5/8 in. (16 mm) release. Pull type with angle spring.

Model 895 — 15.5 in. (395 mm) two plate dry type, self-adjusting with 5/8 in. (16 mm) release. Pull type with angle spring.

All models:

Hub — 1.75 in. (45 mm) × 10 spline, spring loaded hub discs

Greasable shaft bearing with slinger and greasable release bearing

Foot operated, mechanically actuated with spring assist

Integral disc type torque limiting transmission brake

Safety start switch, located on clutch pedal. Clutch pedal must be depressed before engine cranking motor can be energized.

4.13 BRAKES

All models — 17.0 in. (432 mm) disc and caliper, self-adjusting, driveline mounted

Twin piston, non-floating caliper hydraulically actuated by a single foot pedal

Parkbrake integral with hydraulic brake, self-adjusting, actuated by over-center lever

4.14 TRANSMISSION

All models:

12-speed constant mesh with sliding collar shifting

4 horizontal shafts, vertically arranged, 3 in. (76 mm) dia. drilled for lubrication, except bottom countershaft.

Independent lubrication system with pump, 10 micron filter, cooler, steel lines and wire braid hose, dash-mounted oil pressure warning light.

Oil capacity — 21.5 qt US (20.3 L)

Helical forward gears with straight cut (spur) reverse gears

One dash mounted, incline shift, range lever

One floor mounted gearshift lever

Models 835, 855, 875 and 895 — Five field speeds between 4.1 and 7.3 mph (6.6 and 11.7 km/h)

Models 835, 855, 875 and 895 — Speeds at 2 100 r/min and 24.5 x 32 tires, 31.5 in (800 mm) loaded radius tires (Ref. Table 1-4).

Models 935 and 950 — five field speeds between 40 and 7.2 mph (6.4 and 11.6 km/h).

Model 935 — Speeds at 2 400 r/min and 2 600 r/min and 24.5 x 32 tires, 31.5 in. (800 mm) loaded radius tires (Ref. Tables 1-5 and 1-6).

TABLE 1-4: (835, 855, 875, 895 — 2 100 r/min)

	RANGE 1		RANGE 2		RANGE 3		RANGE 4	
	mph	km/h	mph	km/h	mph	km/h	mph	km/h
Gear 1	2.6	4.2	3.0	4.8	3.5	5.7	4.1	6.6
Gear 2	4.7	7.6	5.5	8.9	6.3	10.1	7.3	11.7
Gear 3	9.2	14.8	10.7	17.2	12.3	19.8	14.3	23.0
Reverse	3.4	5.5	3.9	6.2	4.5	7.2	5.2	8.4

TABLE 1-5: (935 and 950 — 2 400 r/min)

	RANGE 1		RANGE 2		RANGE 3		RANGE 4	
	mph	km/h	mph	km/h	mph	km/h	mph	km/h
Gear 1	2.5	4.0	3.0	4.8	3.3	5.3	4.0	6.4
Gear 2	4.5	7.3	5.4	8.7	6.0	9.7	7.2	11.6
Gear 3	8.8	14.1	10.5	16.9	11.7	18.8	14.1	22.6
Reverse	3.3	5.3	3.9	6.2	4.3	6.9	5.2	8.3

TABLE 1-6: (935 — 2 600 r/min)

	RANGE 1		RANGE 2		RANGE 3		RANGE 4	
	mph	km/h	mph	km/h	mph	km/h	mph	km/h
Gear 1	2.7	4.3	3.2	5.2	3.6	5.8	4.3	6.9
Gear 2	4.9	7.9	5.9	9.4	6.5	10.5	7.8	12.6
Gear 3	9.5	15.3	11.4	18.3	12.7	20.4	15.2	24.5
Reverse	3.5	5.7	4.2	6.7	4.7	7.5	5.6	9.0

4.15 DRIVELINES

Engine to transmission — transmission to axles. PTO drivelines (835, 855, 875, 935, 950).

4.16 AXLES

Spiral bevel differential with outboard planetary floating ring final drive

Differential ratio — 4.88:1

Planetary ratio — 5.625:1
Total ratio — 27.45:1

Oil capacity:

Model 835 — 38 qt US (36 L)
Models 855, 875, 895, 935, 950 — 41 qt US (39 L)
Lubrication — SAE 85W90 MIL-L-2105 gear oil

Wheel mounting bolts — Twelve 0.75 in. (19 mm) dia

Axle (front only) with No Spin Differential is optional equipment and recommended for continuous hillside operations and in areas with low traction conditions

4.17 STEERING

Articulated frame 42 degrees in each direction

Hydrostatic actuation

Two 3 in. (76 mm) × 16.5 in. (419 mm) stroke cylinders mounted with 1.25 in. (32 mm) self-aligning ball bushings

4.18 HYDRAULIC SYSTEM

Models 835, 855, 875, 895:

Type — open center, brake and clutch operable with engine off

Steering pump — gear type 2.16 cu in./rev (35.4 mm^3)/rev displacement. Drive ratio of 1.33:1. 26.1 gal US/min (5 360 L/s) at 2 100 r/min

Implement pump — gear type 1.73 cu in./rev (28.4 mm^3/rev) displacement. Drive ratio of 1.50:1. 23.6 gal US/min (5 940 L/s) at 2 100 r/min

One reservoir, vented with dipstick oil level check

Fluid — Hydraul 56

Filtration — 100 mesh reusable screen filter on suction line. 25 micron replacement element on return line

Cooler — connected in return oil line, mounted in front of radiator, hinges out for cleaning

Steering valve — 45 cu in./rev (738 cm^3/rev) displacement. 4.5 revolutions lock to lock.

Relief valve setting — 2 250/2 300 psi (15.5 MPa/15.9 MPa)

Implement valve — 4 spools flow control adjustable from 4 to 23.6 gal US/min (900 to 5 364 L/s) ± 10%. All spools pressure detent release at 2 100 psi (14.5 MPa) No. 1 spool (closest to window) includes float position and priority over all other spools. Relief valve setting 2 300 + 100-0 psi (15.86 MPa + 689-0 kPa)

Temperature sensor and warning light system, set for 197-205°F (91-96°C) to indicate high hydraulic oil temperature

Quick couplers — 4 male tips. Push to connect under pressure

Models 935 and 950

Type — open center, brake and clutch operable with engine off

Pump — gear type, dual sections. Steering section - 2.59 cu in./rev (42.5 cm^3/rev) displacement (front). Implement section. 2.37 cu in./rev (38.8 cm^3/rev) displacement (rear)

Drive — engine-mounted, gear-driven

Nominal flows:

Steering — 27 gal US/min (6 120 L/s) at 2 400 r/min (950). 29.15 gal US/min (6 060 L/s) at 2 600 r/min (935).

Implement — 24.6 gal US/min (5 580 L/s) at 2 400 r/min (950). 26.7 gal US/min (6 060 L/s) at 2 600 r/min (935).

One reservoir, vented with dipstick oil level check

Fluid — Hydraul 56

Filtration — 100 mesh reusable screen filter on suction line. 25 micron replacement element on return line

Cooler — connected in return oil line, mounted in front of radiator, hinges out for cleaning

Steering valve — 45 cu in./rev (738 cm^3/rev) displacement. 4.5 revolutions lock to lock. 30 in. lb (3.39 N·m) steering wheel effort at 10 rpm

Relief valve setting 2250 ± 50-0 psi (15.51 MPa + 344-0 kPa)

Implement valve — 4 spools flow control adjustable from 4 to 24.6 gal US/min (900 to 5 580 L/s) ± 10%. All spools pressure detent release at 2 100 psi (14.5 kPa). No. 1 spool (closest to window) includes float position and priority over all other spools.

Relief valve setting — 2 300 psi (+ 100) (– 0) (5.86 MPa (+ 689) (– 0 kPa)

Temperature sensor and warning light system, set for 197-205°F (91-96°C) to indicate high hydraulic oil temperature

Quick couplers — 4 male tips. Push to connect under pressure.

4.19 ELECTRICAL SYSTEM

12V — negative ground system

12 V — 75A alternator

Two 12V batteries, low maintenance, CBMA BC1 Group 80, cranking performance of 900 A, 29 plates per cell. Batteries are connected in parallel inside sealed compartment, swing out for service.

Circuit breakers — automatic resetting type

Eight 60 W working lamps

00 gauge cables connecting starter motor and batteries

Two red tail lamps for highway travel

4.20 FRAMES

Articulated frame, 4 wheel drive

Oscillates to 15 degrees in both directions. The subframe and rear frame are joined by a 2.25 in. (57.2 mm) ball-bushing and two 1.75 × 5.0 in. (44.5 × 127.0 mm) drag links mounted on 1.75 in. (44.5 mm) ball bushings

Front frame — 3/8 in. (9.5 mm) formed side plates with 1/2 in. (12.7 mm) rear end plate. Reinforcement near axle mounting pads.

Rear frame — 1/2 in. (12.7 mm) formed plate

4.21 DRAWBAR

Swinging clevis type — 1.75 in. × 5.0 in. (44.5 × 127.0 mm) steel with wear block, 1.5 in. (38.1 mm) dia

Height — 18 in. (457 mm) to top of main member

4.22 CAB

Independent module type with rollover protective structure (ASAE S336.1). Isolated on rubber mounts

Acoustically insulated interior

Tilted safety glass, side windows open to provide alternate exit

Height — 63 in. (1600 mm) outside

Width — 56 in. (1372 mm) outside

Tilt and telescopic steering column

Seat — swivel locking base, fully adjustable

Decelerator pedal — enables operator to decrease r/min without using throttle, third gear lockout prevents use while in road gear.

Internal door lock button with non-lockout safety feature, key actuated from outside

4.23 INSTRUMENT PANEL

Gauges — engine tachometer with hour meter, engine oil pressure gauge with automatic shutdown under 20 psi (138 kPa), engine temperature gauge with automatic shutdown over 205°F (96°C), electrical fuel level, voltmeter, air cleaner restriction

Warning lights — transmission oil pressure, parkbrake, alternator, hydraulic oil temperature

Keyswitch

Starter button

Manual override button for automatic shutoff system

Hazard warning — signal fasher combination

Light switch

Ether cold start aid control

International identification symbols on gauges and warning lights

4.24 HYDRAULIC CONTROL CONSOLE

Four remote implement hydraulic control levers

One three-point hitch depth control lever with adjustable depth limit spots (OPTIONAL LEVER)

Flow control to adjust speed of remote implement hydraulics

Rear wiper, 2 speed electric (option)

4.25 ENVIRONMENTAL CONTROL ROOF UNIT

24 000 BTU/h (7.9 kW) air conditioning evaporator core to cool cab air and remove humidity

Heater to warm cab and defrost windshield, adjustable defrosting louvre and heat louvres

Automatic shutdown of compressor if refrigeration pressures become excessive or if system becomes low on freon. Warning lamps indicate high or low pressure.

Three-speed pressurization and recirculation fan, adjustable air flow louvres, 600 cu ft/min (16 800 L/m).

Fan activates automatically when ignition key is turned on to prevent operation of tractor without cab pressurization

10.35 cu in. (170 ml) freon compressor, engine mounted, belt driven, controlled by electromagnetic clutch pulley

Windshield wiper — 2 speed electric

30 000 BTU/h (8.8 k/W) air conditioning condenser core located in front of radiator

4.26 RADIO (AM-FM) WITH CASSETTE

Side-loading cassette

Solid state circuitry

Tuning and balance controls

Volume and tone controls

4.27 OPTIONS

Three-point hitch:

Category IV narrow convertible to Category III wide

Quick attaching coupler (for use with three-point hitch)

Cab air intake filter system — for use in dusty operating conditions, draws air from above the cab roof

PTO — factory installed, models 835, 855, 875, 935 and 950. A governed engine speed of 2100 r/min is required to achieve 1 000 r/min for PTO driven equipment.

No Spin front differential only (recommended for continuous hillside operations and in areas with low traction conditions)

Tires:

24.5 × 32 singles
30.5 × 32 singles
20.8 × 38 singles
20.8 × 38 duals
18.4 × 38 duals
24.5 × 32 duals (models 855, 875, 895, 935, 950)

Rice and Cane, Goodyear 24.5 × 32 singles
Rice and Cane, Firestone 24.5 × 32 singles
Rice and Cane, Goodyear 30.5 × 32 singles
Rice and Cane, Firestone 30.5 × 32 singles
Rice and Cane 20.8 × 38 duals
Rice and Cane 18.4 × 38 duals
United 30.5 × 32 singles

Hydraulic coupler bracket (STD). For use on tractor without PTO and/or three-point hitch.

5 Fuels, Fluids and Lubricants

5.1 GENERAL

The following information lists the fuels, fluids, and lubricants to be used. Lubricant capacities for the various models are also listed.

5.2 FUEL

Specifications

No. 2 diesel fuel is recommended. No. 1 diesel fuel is also satisfactory. Any other fuel should meet the following specifications:

Sulfur content less than one percent

Sediment and water content less than 0.1 percent

Cetane number 40 or greater. A higher cetane number fuel may be required at low temperatures or high altitudes

Pour point below the lowest expected temperature

Ash content less than 0.02 percent

Viscosity range 0.021 — 0.089 sq in./s at 100°F (37.7°C)

Fuel capacity — 185 gal US (700 L)

Refuelling

Observe all cautions and warnings in the Safety Section at the beginning of this manual.

5.3 FLUIDS

Coolant Mixture

Water: Clean, preferably soft. Water suitable for drinking is adequate as a coolant

IMPORTANT

Do not use Dow Chemical therm 209 brand antifreeze; it is not compatible with the corrosion inhibitor.

Antifreeze: Commercial grade, ethylene glycol base, used in proportions recommended by the manufacturer

Coolant conditioner filter: (Dry Chemical Additive) used when coolant is replaced

Engine Coolant Capacities:

Model 835 — 46 qt US (43.5 L)
Models 855, 875 — 47 qt US (44.5 L)
Model 895 — 61 qt US (58 L)
Models 935, 950 — 54 qt US (51.1 L)

Brake Fluid — SAE specification 70R3

Hydraulic Fluid — Temperatures above 40°F (4.4°C), Esso Hydraul 56 or SAE 20 MS Motor Oil. Temperatures below 40°F (4.4°C), Dexron or 5W-20 MS Motor Oil

Liquid Ballast

The tire ballast consists of commercial Type 1 calcium chloride flake (77 percent $CaCl_2$) mixed with water (Ref. Table 1-7). If Type 2 flake (94 percent $CaCl_2$) is used, the weights given can be reduced by 25 percent

The 3-1/2 lb/gal (419.4g $CaCl_2$ /L H_20) solution is slush-free to —12°F (—24.4°C) and freezes solid at —52°F (—46.6°C). The 5 lb/gal (599.3 $CaCl_2$/L H_20) solution is slush-free to —52°F (—46.6°C) and will freeze solid at —62°F (—52.2°C)

TABLE 1-7: Liquid Ballast Calculations

US Measure	**Water Only**		**3-1/2 lb $CaCl_2$ Solution/Gal**			**5 lb $CaCl_2$ Solution/Gal**		
TIRE SIZE	GAL US WATER	LB WEIGHT	GAL US WATER	LB $CaCl_2$	TOTAL WEIGHT	GAL US WATER	LB $CaCl_2$	TOTAL WEIGHT
24.5 x 32	170	1418	146	511	1729	138	690	1841
30.5 x 32	217	1810	186	651	2202	175	875	2335
18.4 x 38	110	917	94	329	1113	89	445	1187
20.8 x 38[1]	140	1168	120	420	1420	114	570	1521
Metric (SI) Measure	**Water Only**		**419.4 g $CaCl_2$ Solution/L**			**599.3 g $CaCl_2$ Solution/L**		
TIRE SIZE	L WATER	kg WEIGHT	L WATER	kg $CaCl_2$	TOTAL WEIGHT	L WATER	kg $CaCl_2$	TOTAL WEIGHT
24.5 x 32	644	644	553	232	785	522	313	835
30.5 x 32	821	821	704	295	999	662	397	1059
18.4 x 38	416	416	356	149	505	337	202	539
20.8 x 38[1]	530	530	454	191	645	432	259	690

[1]Do not ballast when using 20 x 8 x 38 tires as singles.

5.4 LUBRICANTS

Table 1-8 lists the recommended lubricants for the tractor used for varying temperature conditions

American Petroleum Institute Lubricant Grades

CD—Service typical of supercharged diesel engines in high output, high speed duty. These oils provide protection from bearing corrosion and high temperature deposits in supercharged engines using fuels of a wide quality range.

SE — (to be used only in SE/CD blend). Oils designed for this service provide protection against oil oxidation, high temperature engine deposits, rust and corrosion in diesel engines

NOTE

Turbocharged tractors require oil with CD classification.

GL5 (MIL2105B) or (MIL2105C) — Gear lubricant for service GL5 (Hypoid gears) meeting specification MIL2105B and MIL2105C with no zinc additives

Lubricant Capacities

Engine Oil:

Models 835, 855, 875 — 35 qt US (33 L)
Model 895 — 34 qt US (32 L)
Models 935, 950 — 26 qt US (25 L)

Hydraulic system — 84 qt US (80 L)

Transmission — 21.5 qt US (20.3 L)

Axle (including 2 planetaries)

Models 835, 950 — 38 qt US (36 L)
Models 855, 875, 895, 935 — 41 qt US (39 L)

TABLE 1-8: Lubricant Chart

LOCATION	CONDITIONS	TYPE	GRADE
		Oils	
Engine Crankcase	Above 40°F (—4°C)	SAE 30	CD or SE/CD
	20°F to 60°F (—7°C to 16°C)	SAE 20-20W	CD or SE/CD
	—10°F to 30°F (—23°C to —1°C)	10W	CD or SE/CD
	Below —10°F (—23°C)	See 'Arctic Oil Recommendations' in Cummins Manual	
Transmission and Hydraulic System	Above 40°F (4°C) Below 40°F (4°C)	Hydraul 56 or equivalent SD SAE 5W-20	
Differentials and Axle Planetary Gears	Above 90°F (32°C) Below 90°F (32°C)	SAE 140 SAE 90	GL5 (MIL2105B)[1] or GL5 (MIL2105C)[1]
		Grease	
Pressure Grease Fittings	All	SAE High-temperature Multi-Purpose	

[1]No zinc additives

6 Lubrication

6.1 GENERAL

Table 1-9 lists the lube points on all models. Along with the table are lube point illustrations (Ref. Figure 1-1)

Refer to subsection 5 for capacities and requirements.

Notes

1. PLANETARIES AND DIFFERENTIALS
   To check a planetary hub, the drain plug on the hub is to be at the four o'clock or eight o'clock position. Remove filler plug and check fluid level. The axle differential level plugs are located on the input shaft side of the differential housings. When changing differential and planetary oil, flush before installing new oil.

2. CLUTCH SHAFT SUPPORT BEARING LUBRICATION
   Apply four strokes of grease gun to the shaft support bearing; and two strokes to the release bearing.

   NOTE

   Too frequent greasing could rupture the bearing seal and allow lubricant to enter the clutch assembly or dirt to enter housing.

3. DRIVE LINE STEADY BEARING
   The bearing is located in the swing frame between the transmission and rear differential. It is to be greased with three grease gun strokes of multi-purpose grease. The grease fitting is in the bearing housing and can be reached from under the rear frame section.

4. THREE POINT HITCH (OPTIONAL)
   The three point hitch requires regular service. Oil metal-to-metal parts of the hitch regularly and to grease the lube points. Annually, or every 400 hours, the draft arm pins (at the tractor frame) must be removed, cleaned and greased.

TABLE 1-9: Lubrication Points

LUBE POINT (Ref. Fig. 1-1)	DESCRIPTION	SERVICE POINTS	LUBRICANT
1	Check Engine Oil Level	1	Ref. Table 1-5
2	Drain Engine Oil	1	Ref. Table 1-5
3	Clutch Cross Shaft[2]	2	SAE Multi-Purpose Grease
4	Clutch Shaft Support[2] Bearing	1	SAE Multi-Purpose Grease
5	Upper Driveline U-joint (including PTO)	6	SAE Multi-Purpose Grease
6	Lower Driveline U-joint	8	SAE Multi-Purpose Grease
7	Driveline Steady Bearing[3]	1	SAE Multi-Purpose Grease

8	Check Transmission Oil		Ref. Table 1-5
9	Drain Transmission Oil	1	Ref. Table 1-5
10	Check Differential Oil (front and rear diff.)	2	Ref. Table 1-5
11	Drain Differential Oil[2] (front and rear diff.)	2	Ref. Table 1-5
12	Check Axle Planetary Gear Oil	4	Ref. Table 1-5
13	Drain Axle Planetary[2] Gear Oil	4	Ref. Table 1-5
14	Steering Cylinder Pivots	4	SAE Multi-Purpose Grease
15	Upper and Lower Main Frame Pivots	2	SAE Multi-Purpose Grease
16	Drag Link Pivot Bearings	4	Ref. Table 1-5
17	Main Frame Pivot	1	SAE Multi-Purpose Grease
18	Three-Point Hitch (Option)	10	SAE Multi-Purpose Grease
	Three-Point Hitch (Option) (oil metal-to-metal parts)		SAE 30
19	Grease Three-Point Hitch Draft Arm Pins[4]	—	SAE Multi-Purpose Grease
20	PTO Driveline U-Joint	4	SAE Multi-Purpose Grease
	Door and Window Hinge Pins (oil metal-to-metal parts)	5	SAE 30
21	PTO Steady Bearing	1	SAE Multi-Purpose Grease
22	PTO Driveline U-Joint (to PTO Box)	4	SAE Multi-Purpose Grease
	Grease Fitting, Three-Point Hitch	8	
23	Clutch Release Bearing	1	SAE High Temp. 300°F plus E.P. Grease

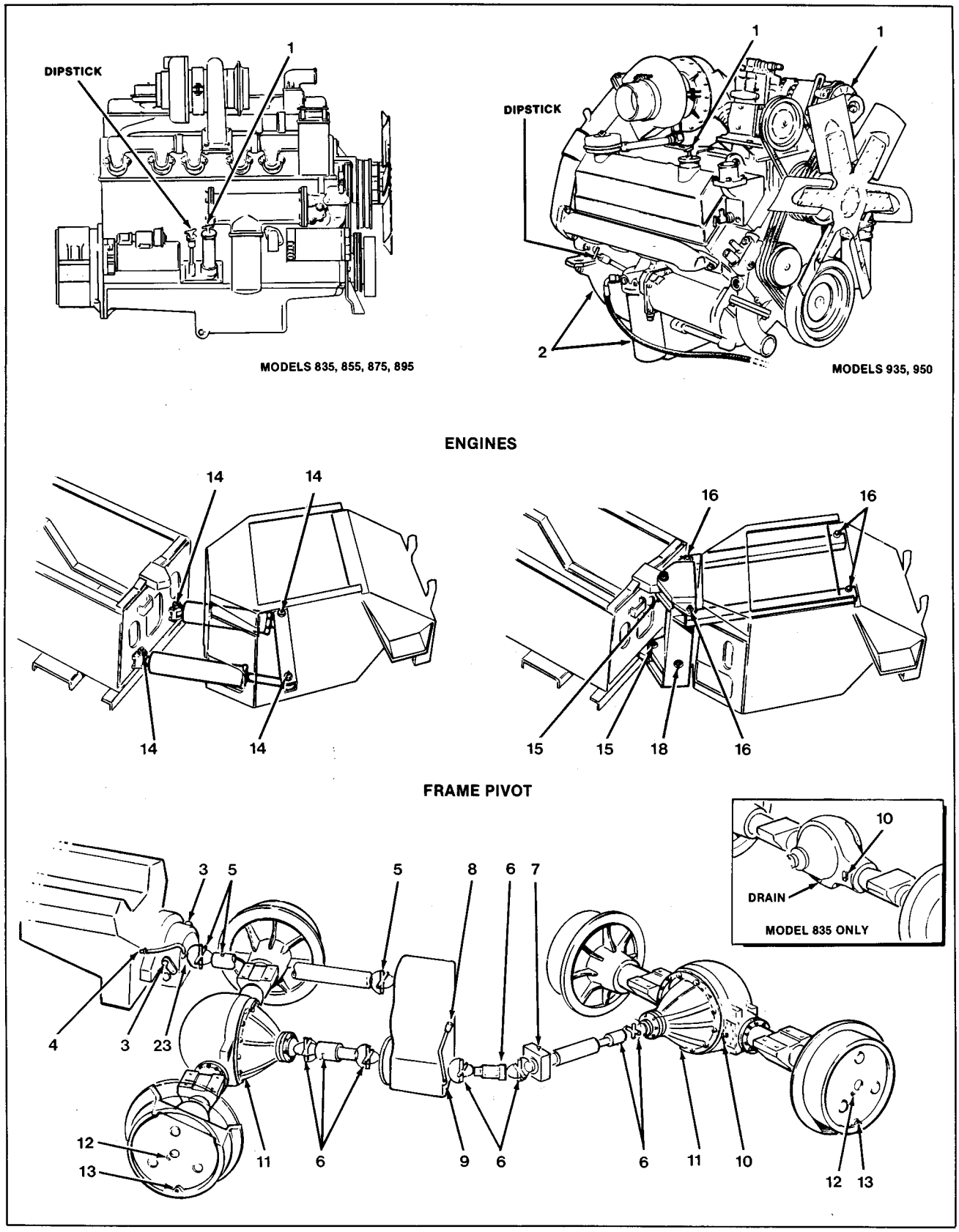

FIGURE 1-1: (Sheet 1) Lubrication Points