# SECTION I — DESCRIPTION AND SPECIFICATIONS





## 1. GENERAL DESCRIPTION

The description given herein and the information contained in this manual pertains to the Model HD 21A tractor (standard model), unless otherwise stated.

Model HD 21A tractors prior to tractor Serial No. 9001 are 44,000 pound, track-type tractors, powered by a 6 cylinder, 4-stroke cycle, supercharged, "Allis-Chalmers," model HDS 844 engine.

Model HD 21A tractors Serial No. 9001 to 11001 are 44,500 pound, track-type, tractors powered by a 6 cylinder, 4-stroke cycle, turbocharged, "Allis-Chalmers," model HDT 844 engine.

Model HD 21A tractors effective with tractor Serial No. 11001 are 44,500 pound, track-type tractors, powered by a 6 cylinder, 4-stroke cycle, turbocharged, "Allis-Chalmers," model 21000 engine.

Power from the engine is transmitted through a single plate, over-center type engine clutch to the torque converter, which automatically multiplies the engine torque to meet the varying load requirements. The power is transmitted from the torque converter to the transmission through a drive shaft universal joint assembly. From the transmission the power is transmitted to the bevel gear, and from the bevel gear through the steering clutches to the final drives and the track drive sprockets.

On Model HD 21 tractors prior to Serial No. 9001, the torque converter in combination with the transmission provides forward speeds in low gear up to 3 M.P.H.; forward speeds in high gear up to 7.5 M.P.H.; and reverse speeds up to 5.5 M.P.H.; under a full governed engine speed of 1800 R.P.M.

On Model HD 21 tractors effective with Serial No. 9001, the torque converter in combination with the transmission provides forward speeds in low gear up to 3.1 M.P.H.; forward speeds in high gear up to 8 M.P.H.; and reverse speeds up to 6 M.P.H.; under a full governed engine speed of 1825 R.P.M.

Hydraulic steering controls, mechanical self-energizing brakes, a wide and adjustable operator's seat, and an unobstructed view of the front of both tracks assure easy, positive control of the tractor at all times.

The Standard Model HD 21A tractor is equipped with a torque converter; engine decelerator pedal (tractors Serial No. 9001 and above); hydraulic steering controls; wrap-around radiator guard; 24 inch, heat-treated, integral grouser track shoes; positive seal heavy-duty truck wheels, track idlers, and track support rollers; full width crankcase guard; truck wheel, track idler, and track sprocket guards; front pull-hook; 24 volt electric starting and lighting equipment; oil pressure, fuel pressure, temperature, and ammeter gages; pusher-type fan; and front bumper.

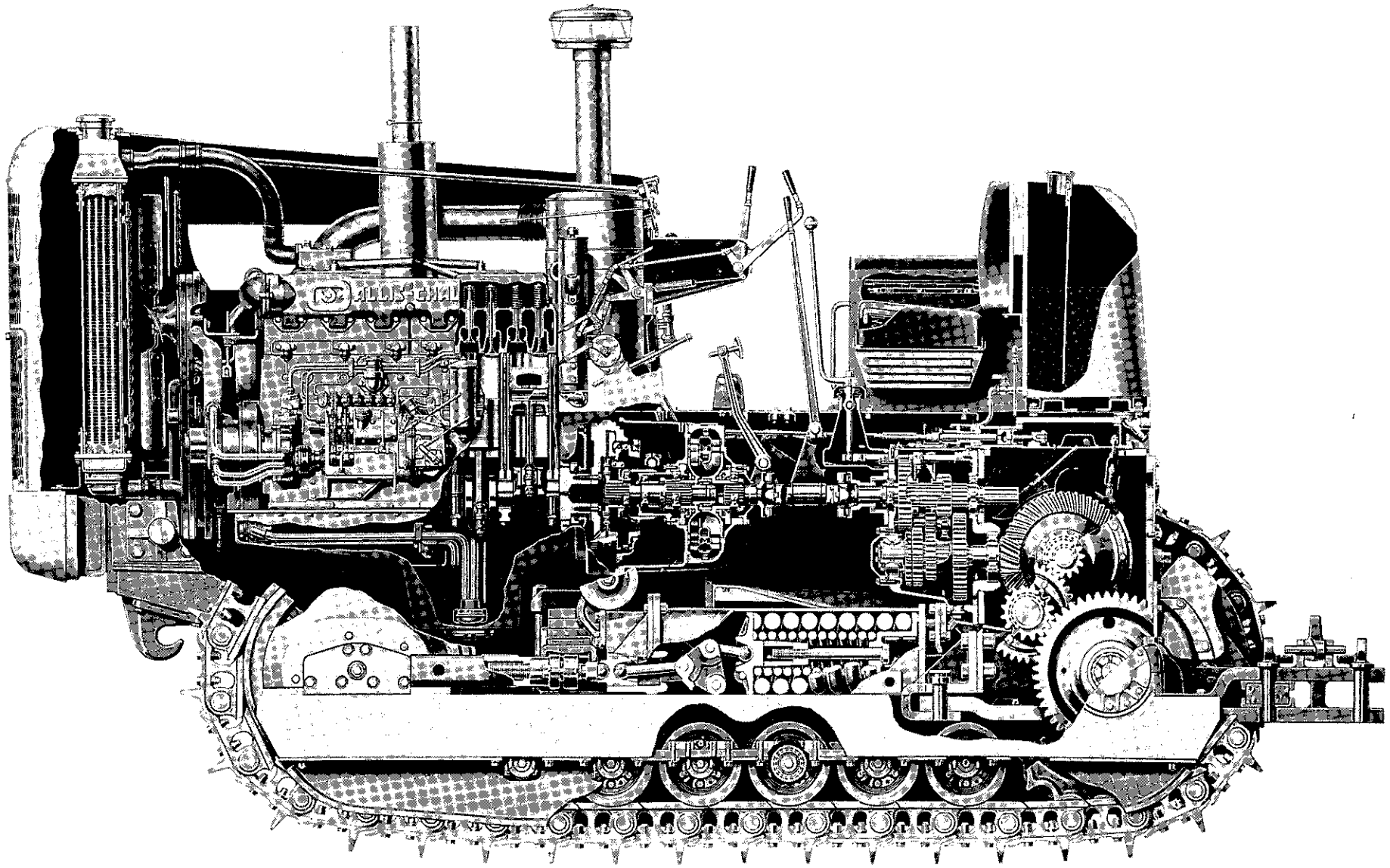

*Fig. 1 — HD 21A Tractor with HDS 844 Engine — Sectional View*

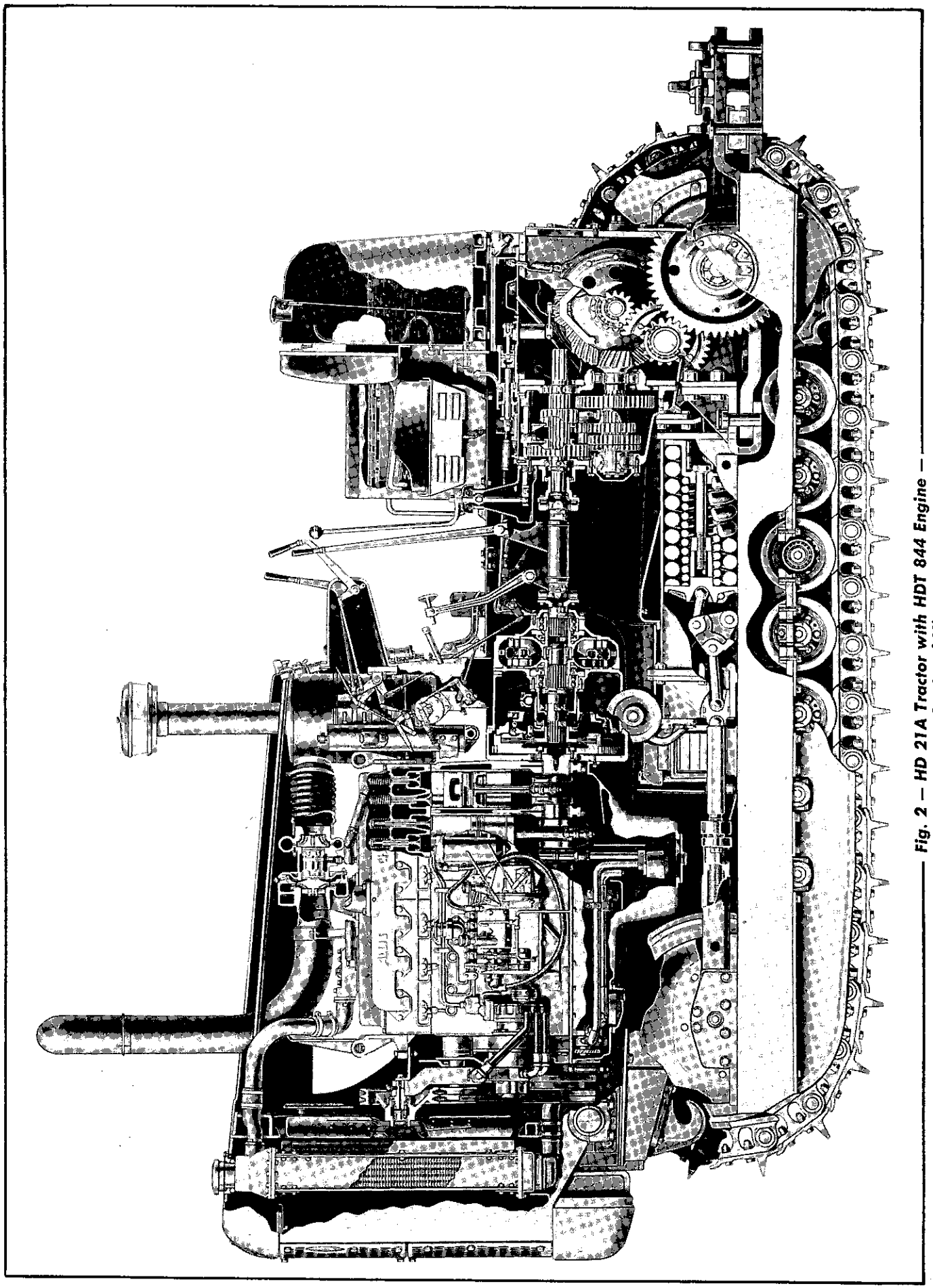

*Fig. 2 – HD 21A Tractor with HDT 844 Engine – Sectional View*

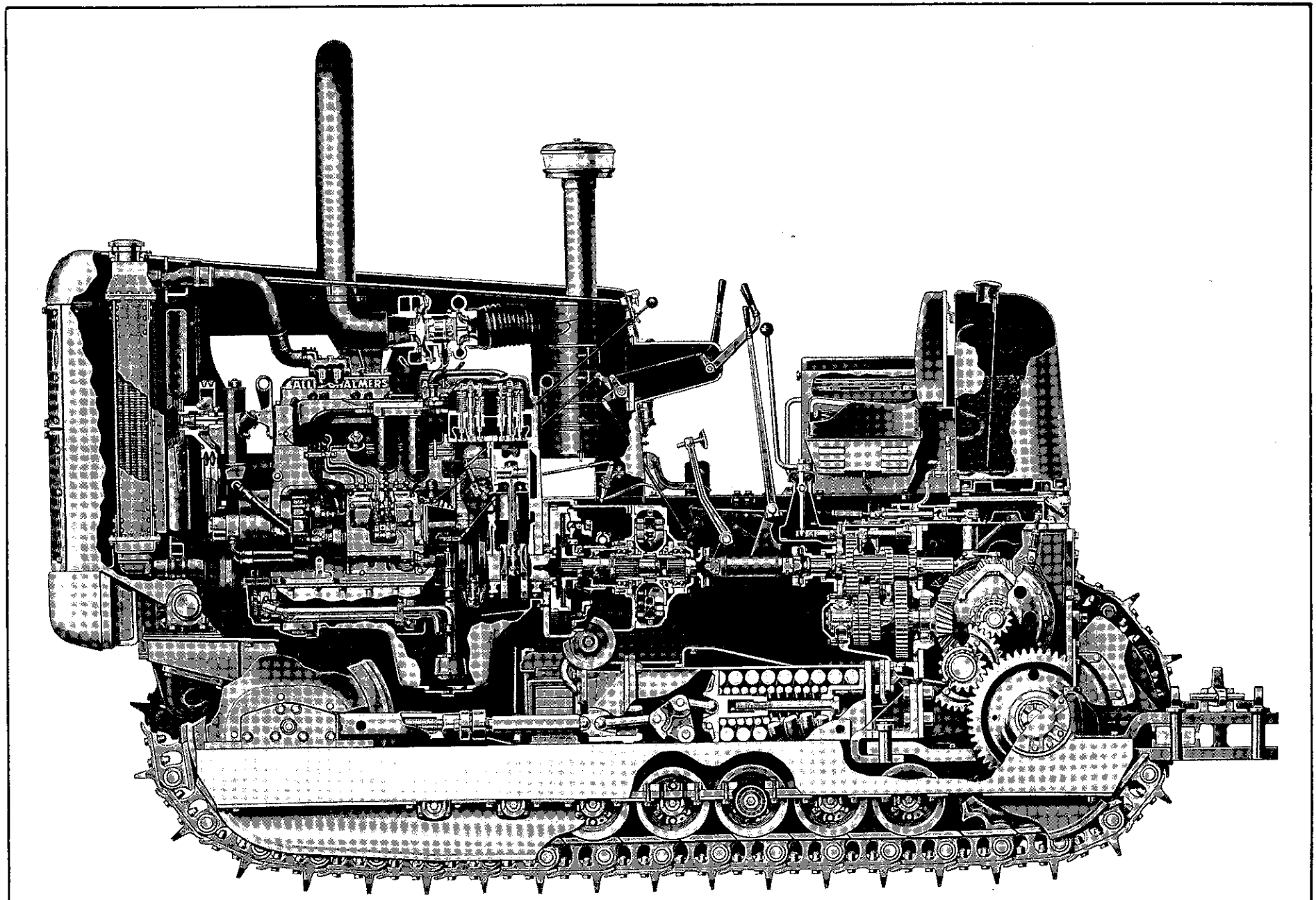

*Fig. 3 — HD 21A Tractor with 21000 Engine — Sectional View*

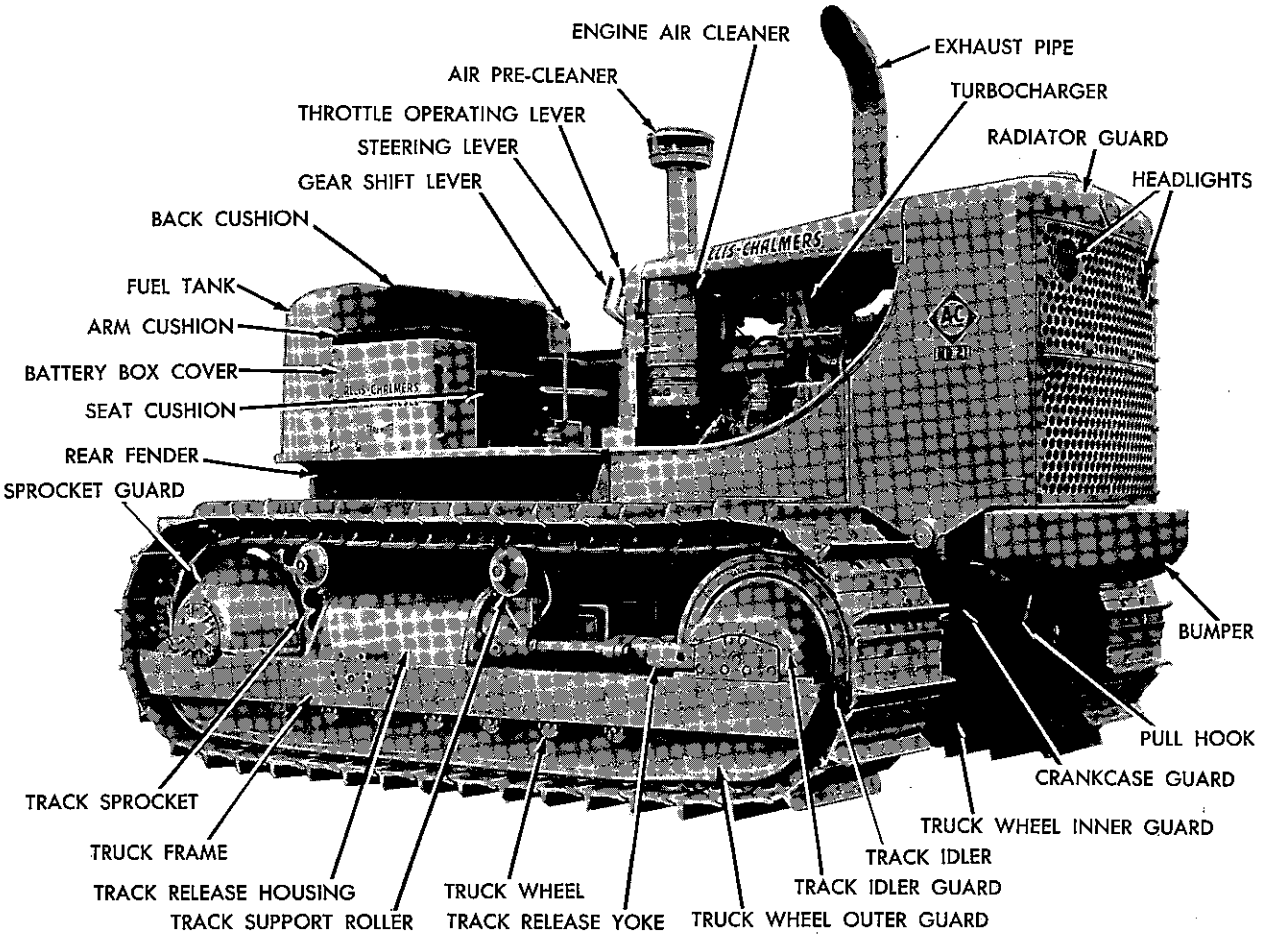


***Fig. 4 — HD 21A Tractor with 21000 Engine — ¾ Right Front View***

# 2. GENERAL SPECIFICATIONS FOR MODELS HD 21A, HD 21F, AND HD 21G TRACTORS

## GENERAL SPECIFICATIONS:

**Overall Length:**
- HD 21A (tractors prior to Serial No. 9001) ..... 16 ft. 2¾ in.
- HD 21A (tractors Serial No. 9001 and above) and HD 21F ..... 16 ft. 5 in.
- HD 21G (bucket down) ..... 21 ft. 2 in.

**Overall Height (without stacks):**
- HD 21A and HD 21F ..... 8 ft. 2 15/16 in.
- HD 21G ..... 8 ft. 10 in.

**Overall Width (with standard track shoes):**
- HD 21A (tractors prior to Serial No. 9001) ..... 9 ft. 1¼ in.
- HD 21A (tractors Serial No. 9001 and above) and HD 21F ..... 9 ft. 1 1/16 in.
- HD 21G ..... 9 ft. 3 in.

**Ground Clearance:**
- HD 21A and HD 21F ..... 16⅛ in.
- HD 21G ..... 16⅜ in.

**Drawbar Height (center line of jaw):**
- HD 21A and HD 21F ..... 19⅞ in.
- HD 21G ..... 20⅛ in.

Lateral Drawbar Movement ..... 44 in.

**Shipping Weight (Approximate):**
- HD 21A (tractors prior to Serial No. 9001) ..... 44,000 lbs.
- HD 21A (tractors Serial No. 9001 and above) ..... 45,500 lbs.
- HD 21F ..... 46,200 lbs.
- HD 21G ..... 66,500 lbs.

**Number of Track Shoes (Each Track):**
- HD 21A (tractors prior to Serial No. 9001) ..... 37
- HD 21A (tractors Serial No. 9001 and above) and HD 21F ..... 40
- HD 21G ..... 42

**Height of Grouser:**
- HD 21A and HD 21F ..... 2¾ in.
- HD 21G ..... 1¼ in.

Diameter of Track Shoe Shoulder Bolt (all models) ..... 29/32 in.

Diameter of Track Pins (all models) ..... 1⅞ in.

Diameter of Track Pin Bushings (all models) ..... 2⅞ in.

**Length of Track on Ground:**
- HD 21A and HD 21F (40 link track) ..... 10 ft. ⅛ in.
- HD 21G (42 link track) ..... 10 ft. 9⅛ in.

**Width of Standard Track Shoes:**
- HD 21A and HD 21F ..... 24 in.
- HD 21G ..... 22 in.

**Maximum Width of Track Shoes Available:**
- *HD 21A and HD 21F ..... 28 in.
- **HD 21G ..... 22 in.

**Ground Contact Area (with standard shoes):**
- HD 21A and HD 21F ..... 5,766 sq. in.
- HD 21G ..... 5,681.5 sq. in.

**Ground Pressure:**
- HD 21A (standard 24" integral grouser track shoes) ..... 7.9 P.S.I.
- HD 21F (standard 24" integral grouser track shoes) ..... 8.1 P.S.I.
- HD 21G (standard 22" semi-grouser track shoes) ..... 11.7 P.S.I.
- Tread Width (center-to-center of track) ..... 84 in.

*Extra wide shoes materially decrease the life of any track assembly. Twenty-six inch or twenty-eight inch shoes should be used only when requirements will justify the resulting decreased life of the track assembly.

**Full grousers are recommended only for extreme traction conditions such as snow or ice.

## TRACTOR SPEEDS (at rated engine speed):

**HD 21A (tractors prior to Serial No. 9001):**

| | |
|---|---|
| Low | 3.0 M.P.H. |
| High | 7.5 M.P.H. |
| Reverse | 5.5 M.P.H. |

**HD 21A (tractors Serial No. 9001 and above):**

| | |
|---|---|
| Low | 3.1 M.P.H. |
| High | 8.0 M.P.H. |
| Reverse | 6.0 M.P.H. |

**HD 21F:**

| | |
|---|---|
| Low | 3.1 M.P.H. |
| High | 8.0 M.P.H. |
| Reverse | 4.5 M.P.H. |

**HD 21G:**

| | |
|---|---|
| Low | 3.0 M.P.H. |
| High | 7.8 M.P.H. |
| Reverse | 4.3 M.P.H. |

## STEERING:

| | |
|---|---|
| Method | Clutches |
| Controls | Hydraulic |

**Turning Radius:**

| | |
|---|---|
| HD 21A (tractors prior to Serial No. 9001) | 10 ft. 4 in. |
| HD 21A (tractors Serial No. 9001 and above) and HD 21F | 10 ft. 8 in. |
| HD 21G | 14 ft. 9¾ in. |

## ENGINE:

| | |
|---|---|
| Make | "ALLIS-CHALMERS" Diesel |

**Model:**

| | |
|---|---|
| HD 21 (tractors prior to Serial No. 9001) | HDS 844 |
| HD 21 (tractors Serial No. 9001 and above) | HDT 844 |
| HD 21 (tractors Serial No. 11001 and above) | 21000 |

**Type:**

| | |
|---|---|
| HD 21 (tractors prior to Serial No. 9001) | 4-stroke cycle (supercharged) |
| HD 21 (tractors Serial No. 9001 and above) | 4-stroke cycle (turbocharged) |

| | |
|---|---|
| Lubrication | Full Pressure |
| Fuel Used | Diesel Fuel |
| Fuel Supplied by | "American Bosch" Fuel Injection Pump |
| Number of Cylinders | 6 |
| Compression Ratio (tractors prior to Serial No. 11001) | 13.3:1 |
| Compression Ratio (tractors Serial No. 11001 and above) | 14.5:1 |
| Bore | 5¼ in. |
| Stroke | 6½ in. |
| Piston Displacement | 844 cu. in. |
| Crankshaft Rotation (when viewed from fan end) | Clockwise |
| Number of Main Bearings | 7 |

**Rated R.P.M. (governed at full load):**

| | |
|---|---|
| HDS 844 (tractors prior to Serial No. 9001) | 1800 R.P.M. |
| HDT 844 (tractors Serial No. 9001 to 11001) | 1825 (+ 10 or — 5) R.P.M. |
| 21000 (tractors Serial No. 11001 and above) | 1825 (+ 10 or — 5) R.P.M. |

**Low Idle Speed R.P.M.:**

| | |
|---|---|
| HDS 844 (tractors prior to Serial No. 9001) | 525 (+ or — 25) R.P.M. |
| HDT 844 (tractors Serial No. 9001 to 11001) | 525 to 550 R.P.M. |
| 21000 (tractors Serial No. 11001 and above) | 575 (+ or — 25) R.P.M. |

**High Idle Speed R.P.M.:**

| | |
|---|---|
| HDS 844 (tractors prior to Serial No. 9001) | 1875 (+ or — 25) R.P.M. |
| HDT 844 (tractors Serial No. 9001 to 11001) | 1900 to 1925 R.P.M. |
| 21000 (tractors Serial No. 11001 and above) | 1945 (+ or — 10) R.P.M. |

## ENGINE — *Continued*

**Valve Timing — HDS and HDT 844 Tractors Prior to Serial No. 11001):**

| | |
|---|---|
| Intake Valve Opens B.T.D.C. | 30° |
| Intake Valve Closes A.B.D.C. | 35° |
| Intake Valve Open — Duration | 245° |
| Exhaust Valve Opens B.B.D.C. | 50° |
| Exhaust Valve Closes A.T.D.C. | 70° |
| Exhaust Valve Open — Duration | 300° |

**Valve Timing — 21000 (Tractors Serial No. 11001 and Above):**

| | |
|---|---|
| Intake Valve Opens B.T.D.C. | 20° |
| Intake Valve Closes A.B.D.C. | 40° |
| Intake Valve Open — Duration | 240° |
| Exhaust Valve Opens B.B.D.C. | 45° |
| Exhaust Valve Closes A.T.D.C. | 15° |
| Exhaust Valve Open — Duration | 240° |
| Firing Order | 1 - 5 - 3 - 6 - 2 - 4 |

**Generator Speed:**

| | |
|---|---|
| HDS 844 (tractors prior to Serial No. 9001) | 1.59 x Crankshaft Speed |
| HDT 844 and 21000 (tractors Serial No. 9001 and above) | 1.5 x Crankshaft Speed |

**Fuel Transfer Pump Speed:**

| | |
|---|---|
| HDS and HDT 844 (tractors prior to Serial No. 11001) | 2.25 x Crankshaft Speed |
| 21000 (tractors Serial No. 11001 and above) | 2.00 x Crankshaft Speed |
| Fuel Injection Pump Speed | .5 x Crankshaft Speed |
| Fuel Injection Pump Timing Gage Thickness (tractors prior to Serial No. 11001) | .275 in. |

**Fuel Injection Pump Timing:**

| | |
|---|---|
| HDS and HDT 844 (tractors prior to Serial No. 11001) | 18° B.T.D.C. |
| 21000 (tractors Serial No. 11001 and above) | 34° B.T.D.C. |
| Tachometer Drive Shaft Speed | 1.5 x Crankshaft Speed |
| Hydraulic Pump Speed | 1.5 x Crankshaft Speed |
| Water Pump Speed | 1.5 x Crankshaft Speed |

## TORQUE CONVERTER:

| | |
|---|---|
| Make | "Twin Disc" |
| Type | Three Stage |
| Torque Ratio Increase (at stall) | |
| Tractors prior to Serial No. 9001 | 4.4:1 |
| Tractors Serial No. 9001 and above | 4.26:1 |
| Fluid Used | Diesel Fuel |
| Fluid Supplied | Under Pressure from Fuel Transfer Pump |

## CAPACITIES (Approximate):

| | METRIC MEASURE | U. S. STANDARD MEASURE |
|---|---|---|
| **Cooling System:** | | |
| HD 21A and HD 21F | 75.7 liters | 20 gals. |
| HD 21G | 68.1 liters | 18 gals. |
| **Crankcase and Filter:** | | |
| HDS 844 (prior to Serial No. 9001) | 28.4 liters | 7½ gals. |
| HDT 844 and 21000 (Serial No. 9001 and above) | 29.3 liters | 7¾ gals. |
| Transmission Case | 35.9 liters | 9¾ gals. |
| Final Drives (each) | 28.4 liters | 7½ gals. |
| Fuel Tank and Converter System | 548.9 liters | 145 gals. |
| Usable Fuel Tank Capacity | 511 liters | 135 gals. |
| **Track Release Housing (each):** | | |
| HD 21 (prior to Serial No. 9001) | 20.8 liters | 5½ gals. |
| HD 21 (Serial No. 9001 and above) | 13.2 liters | 3½ gals. |

| | | |
|---|---|---|
| **Air Cleaner:** | | |
| HD 21 (prior to Serial No. 9001) | 5.7 liters | 1½ gals. |
| HD 21 (Serial No. 9001 and above) | 6.6 liters | 1¾ gals. |
| Steering Hydraulic System (tractors prior to Serial No. 11001) | 10.4 liters | 2¾ gals. |
| Steering Hydraulic System (tractors Serial No. 11001 to 12001) | 9.5 liters | 2½ gals. |
| Transmission, Bevel Gear, and Steering Clutch Compartments (tractors Serial No. 12001 and above) | 151.4 liters | 40 gals. |
| Fuel Injection Pump Oil Sump (tractors prior to Serial No. 9355) | .946 liter | 1 qt. |
| Governor Oil Sump (tractors prior to Serial No. 9355) | .118 liter | ¼ pt. |
| Support Roller (each) | .625 kg. | 1¼ lbs. |
| Track Idler (each) | 2.5 kg. | 5 lbs. |
| Truck Wheel (each) | 1.25 kg. | 2½ lbs. |

*The Allis-Chalmers Manufacturing Company reserves the right to make changes in the above specifications or to add improvements at any time without notice or obligation.*

## 3. SPECIFICATIONS OF LUBRICANTS

### A. Engine Crankcase Lubricant

USE NON-CORROSIVE "DIESEL" ENGINE CRANKCASE OIL CONTAINING ADDITIVES WHICH WILL PREVENT SLUDGE OR GUM DEPOSITS.

Use oils of the following viscosities:

| Atmospheric Temperature | Viscosity |
|---|---|
| 32° F. and above | Use SAE 30 |
| 0° F. to 32° F. | Use SAE 20W |
| 0° F. and below | Use SAE 10W |

The oil should meet the American Petroleum Institute (API) Diesel classification of "For Service DS" or "Series 3."

"For Service DS" or "Series 3" oils contain additives which promote general cleanliness within the engine and prevent the formation of sludge, hard carbon, and varnish deposits on/or within engine parts.

Detergent type oils will become darker in color within a short period of operation. The darkening of the oil is due to minute particles of carbon being suspended in the oil. One of the primary functions of a detergent type oil is to hold the carbon particles in suspension; therefore, darkening of the oil is normal and should not cause concern.

Suppliers of lubricants recognize the importance of the qualities required for use in our equipment and they are cooperating fully to assure the use of only those oils which fulfill these requirements. The lubricant supply source is to be held responsible for the results obtained from their product.

Proper operation and maintenance of the engine are necessary to obtain the desired results from the lubricating oil. NOTE: *If "For Service DS" or "Series 3" oil is not available through your oil distributor in the viscosities recommended, use oil of the viscosity recommended by the particular oil distributor and/or supplier.*

For additional information regarding engine lubricating oil, contact your "Allis-Chalmers" Dealer.

### B. Fuel Injection Pump and Governor Lubricant

On tractors prior to Serial No. 9355, lubricate the fuel injection pump and governor with oil of the same viscosity as that used in the engine crankcase. Effective with tractor Serial No. 9355 the fuel injection pump and governor are pressure lubricated from the engine lubrication system.

### C. Air Cleaner

Use oil in the air cleaner of the same viscosity as that used in the engine crankcase. CAUTION: *Do not use an oil that foams.*