

THE WHITCOMB LOCOMOTIVE COMPANY

Rochelle, Illinois

TO THE OPERATOR AND MAINTENANCE MAN

Every Whitcomb locomotive is the product of a Company which has not only pioneered the development of internal combustion motive power, but is sincerely interested in assuring the success of every Whitcomb installation.

A locomotive, like any other piece of machinery, requires the same intelligent attention from engineer and mechanic alike as is accorded the finest precision tool within a factory. In spite of weight and size, its construction involved working to extremely close tolerances. Engine, power transmission equipment, control mechanism, brake system, axle assembly, etc., reflect the same degree of accuracy as is found in more delicate equipment. However, the locomotive must perform in all kinds of weather and under the most severe conditions. While every effort has been made to circumvent trouble, nevertheless the success of any operation rests largely on the shoulders of those in direct charge.

These instructions are intended solely for your guidance. Thoughtful observance of routine inspection and service adjustments will invariably forestall failures. "An ounce of prevention is still worth a pound of cure", and it is easier to correct a fault of a minor nature than undertake a major repair job.

"Your Boss" and "Our Customer" are one and the same. He will be just as quick and willing to reward merit as he will to criticize an unsatisfactory service schedule. Consequently our mutual interests demand performing to the best of our ability. If these instructions are not as clear as you think they should be, we shall be glad to answer your questions in detail. If you encounter difficulties with the locomotive, please do not lose sight of the fact we are as close to you as your nearest telephone, telegraph office, or mailbox.

KEEP 'EM ROLLING!

THE WHITCOMB LOCOMOTIVE COMPANY

45-TON, 0-4-4-0 OR 0-4-0 TYPE DIESEL ELECTRIC LOCOMOTIVE

INSTRUCTION BOOK

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THE WHITCOMB LOCOMOTIVE COMPANY

45TON, 0-4-0 OR 0-4-4-0 TYPE: DIESEL ELECTRIC LOCOMOTIVE

EQUIPMENT

ENGINE AND EQUIPMENT

Engines

Two (2) Diesel Engines, each being complete with the necessary equipment and accessories required for this type of locomotive.

Engine Cooling System

Two (2) Whitcomb Standard Type Radiators, each being complete with an upper tank, lower tank, core, necessary water connections to the engine and manually-operated Radiator Shutters. Capacity of each engine cooling system 16 gallons.

Engine Starting System

Electrical Engine Starting Equipment complete with the necessary switches and controls is provided for the cranking of each Diesel Engine.

Engine Throttle Control

The throttles of both Diesel engines are controlled from the operator's control station through a Whitcomb Flexible Cable control.

ELECTRICAL EQUIPMENT

Main Generators

Two (2) Main Generators, each being of the single bearing, self excited type, having battery boosted field excitation. Each Main Generator is directly connected to and driven by a Diesel Engine.

Traction Motors

Two (2) Traction Motors - each being of the series wound type and geared to the axle through a triple reduction gear unit. Each Traction Motor receives the full power output of one Main Generator.

Reverser

One (1) Reverser - being of the rotary drum, electro-magnetically controlled, air-operated type, is provided for the purpose of selecting the traction motor rotation for either forward or rearward locomotive travel.

Controller

One (1) Controller - being of the rotary drum type and located at the operator's control station. This controller has three (3) positions for the control of the reverser.

Control Equipment

The control equipment of this locomotive is of the electro-magnetic type.

Batteries

The Batteries are of sufficient capacity to supply the electrical needs of this locomotive.

ELECTRICAL EQUIPMENT (Cont'd.)Battery Charging

A Generator driven from each engine and the necessary voltage control equipment is furnished for the charging of the batteries.

Locomotive Lighting

This locomotive is provided with two (2) headlights (one at each end of the locomotive), one (1) cab light and Instrument Panel Lighting.

LOCOMOTIVE - GENERALTrucks

Two (2) Whitcomb Swivel Trucks - each having a truck frame, driving axle, driven axle, reduction gear unit, side rods, spring rigging, traction motor, and foundation brakes.

Driving Axle

Two (2) Driving Axle Assemblies (one on each truck) - each consisting of an axle shaft with two (2) wheels, a reduction gear unit axle gear and two (2) cranks pressed thereon, and two (2) roller bearing equipped axle boxes.

Driven Axle

Two (2) Driven Axle Assemblies (one on each truck) - each consisting of one axle shaft with two (2) wheels and two (2) cranks pressed thereon and two (2) roller bearing equipped axle boxes.

Side Rods

Four (4) Side Rods complete with bronze bushings. The Side Rods are for the purpose of connecting the cranks on the driving axles to the cranks on the driven axles and in this manner the power to drive the locomotive is distributed to all the wheels.

Spring Rigging

With this locomotive either the coil or semi-elliptical type of spring suspension might be used.

If the coil spring type of spring suspension is used, the spring rigging for each truck will consist of sixteen (16) coil springs, eight (8) spring pockets with pins, and four (4) spring equalizers.

If the semi-elliptical type of spring suspension is used, the spring rigging for each truck will consist of two (2) semi-elliptical springs, two (2) spring equalizers, and four (4) spring hangers with hanger keys and hanger pins.

Reduction Gear Units

Two (2) Whitcomb Triple Reduction Gear Units - each being of the axle hung spring suspended type and through which the power of a traction motor is transmitted to the driving axle of one truck.

Brake System

Two (2) Foundation Brake Assemblies - (one on each truck) - each being of the lever type with a single brake shoe contacting the tread of each wheel.

The foundation brake assemblies are air-operated for service braking and a hand brake that is connected to the foundation brakes of only one truck is provided for holding the locomotive at rest when it is not in service.

EQUIPMENT

LOCOMOTIVE - GENERAL

Air Compressor

Two (2) Air Compressors - each being belt driven from a pulley mounted on the armature shaft extension of a main generator and being complete with the necessary governors and unloader.

Sanders

This locomotive is provided with air-operated sanders for the sanding of the rails in both directions of locomotive travel.

Instrument Panel

Located at the operator's control station is an Illuminated Instrument Panel, having the necessary gauges to show the engine temperatures, engine oil pressures, battery charging rate, air reservoir pressure and brake operating pressures. Also mounted on the instrument panel or on another panel in convenient reach of the operator are switches for the control of the locomotive lighting and engine starting.

Warning Signals

The warning signals consist of an air-operated bell and an air-operated whistle or horn.

Couplers and Release Rigging

Link and Pin or Automatic Couplers with the necessary release rigging are provided to meet the operating needs as specified by the purchaser.

Window Wipers

Two (2) Air-Operated Window Wipers - one for the front cab windows and one for the rear cab window on the operator's side of the cab.

Cab Heating

A hot water heater, or heaters, is provided for the heating of the locomotive cab. A switch, or switches, is provided for the control of the heater motor or motors.

THE WHITCOMB LOCOMOTIVE COMPANYDIESEL-ELECTRIC LOCOMOTIVEOPERATING PRECAUTIONS

In the interest of safe and practical locomotive operation, the operator must exercise the following precautions:

1. Do not make contact with any moving parts of an engine or equipment driven by said engine while the engine is running.
2. Do not make contact with the main electrical power circuit while the engine is running.
3. Do not attempt to make adjustments on any unit of electrical equipment while the locomotive is in operation.
4. Do not attempt to close motor contactors or move the reverser by hand while an engine is running.
5. Do not move the Controller Handle from the Off position to that of the Forward or Reverse position or move said Controller handle to change the direction of locomotive travel until the Throttle Handle has been moved to the Engine Idle position and the locomotive has been brought to a stop.
6. Do not operate the locomotive if the engine temperature gauges show abnormally high engine operating temperatures or if the oil pressure gauges show abnormally low engine lubricating oil pressure.
7. Do not operate the locomotive until test brake applications and brake rigging inspections have been made and said brakes are found to be in good working order.
8. While operating the locomotive wheel slippage and wheel sliding should be held to a minimum so as to eliminate undue wheel and rail wear.
9. While operating the locomotive all hood doors and control cabinet doors must be kept closed.
10. At no time should this locomotive be operated at speeds greater than miles per hour.
11. Do not start the locomotive in motion without giving adequate warning and receiving the positive assurance that the movement of the locomotive and the train, if said locomotive is coupled to a train, will not endanger the life of anyone.
12. Do not attempt to start the engine, or engines, or operate the locomotive until you have thoroughly read these operating instructions, or until you have been taught by a capable instructor.

A GOOD OPERATOR IS A SAFE OPERATOR!

TONNAGE RATING FOR 45 OR 50-TON DIESEL ELECTRIC LOCOMOTIVE

2 Engine 1600 or 1800 R.P.M.
 130 H.P. INPUT to each generator for Traction
 2 - 189-R-5 Traction Generators
 2 - 1443-A Traction Motors
 22 to 1 Gear Ratio: 33" Wheels
 6 Lbs. Per Ton Train Resistance

<u>Continuous Train Movement</u>	<u>50-Ton</u>	<u>45-Ton</u>
Level Tangent Track	1700 Tons	1700 Tons
1/4% Ruling Grade	960 "	960 "
1/2% " "	635 "	635 "
1% " "	365 "	365 "
1-1/2% " "	250 "	250 "
2% " "	180 "	180 "
2-1/2% " "	140 "	140 "
3% " "	110 "	110 "

<u>Three-Mile Train Movement</u>	<u>50-Ton</u>	<u>45-Ton</u>
Level Tangent Track	2000 Tons	2000 Tons
1/4% Ruling Grade	1120 "	1120 "
1/2% " "	755 "	755 "
1% " "	445 "	445 "
1-1/2% " "	310 "	310 "
2% " "	230 "	230 "
2-1/2% " "	180 "	180 "
3% " "	145 "	145 "

<u>One-Mile Train Movement</u>	<u>50-Ton</u>	<u>45-Ton</u>
Level Tangent Track	2400 Tons	2400 Tons
1/4% Ruling Grade	1410 "	1410 "
1/2% " "	955 "	955 "
1% " "	570 "	570 "
1-1/2% " "	395 "	395 "
2% " "	300 "	300 "
2-1/2% " "	235 "	235 "
3% " "	195 "	195 "

<u>One-Half Mile Train Movement</u>	<u>50-Ton</u>	<u>45-Ton</u>
Level Tangent Track	*2680 Tons	*2410 Tons
1/4% Ruling Grade	1620 "	1620 "
1/2% " "	1100 "	1100 "
1% " "	660 "	660 "
1-1/2% " "	460 "	460 "
2% " "	350 "	350 "
2-1/2% " "	280 "	280 "
3% " "	230 "	230 "

*Limited by 30% adhesion, 5 Lbs. per Ton for Acceleration.

These trailing loads are based on both power plants operating at full speed and horsepower. The overload tonnages cannot be hauled if the locomotive has been operating up to continuous temperature limits. A 15-minute cooling period must be interposed before the overload operation is started if the equipment has been operating up to A.I.E.E. limits.

THE WHITCOMB LOCOMOTIVE COMPANYDIESEL-ELECTRIC LOCOMOTIVE OPERATIONPREPARATION FOR STARTING THE DIESEL ENGINE

As this locomotive is equipped with a Diesel Electric Power Plant, the following inspections and preparations must be made before starting the Diesel Engine.

If the locomotive has two (2) Diesel Electric Power Plants, the following inspections and preparations must be made of each power plant before starting the Diesel Engines.

1. Check the engine and the equipment driven by said engine to make sure that it turns over freely.
2. Check the lubricating oil levels in the engine and compressor crank-cases to make sure it is sufficient for safe operation.
3. Check all external moving parts to make sure they are properly lubricated.
4. Check the engine cooling system to make sure that it is sufficiently full of clean soft water or anti-freeze solution.
5. Inspect all drive belts to make sure they are sufficiently tight and in good condition.
6. Check the fuel oil supply to make sure it is sufficient for the locomotive operation.

Note: If the engine is equipped with a Kerosene Water Heater, said heater must be shut off before the engine is started.

After the preceding inspections have been made and the power plant (or power plants) is found to be in good order, the following preparations must be made prior to the starting of the Diesel Engine or Engines:

- 1a. Close the Battery Switch or Circuit Breaker (located in the Control Cabinet).
- 1b. Close the Traction Motor Cut-Out Switches - if used. (located in the Control Cabinet).
2. Move the Controller Handle to the Off position.
3. Open the Control Switch - if used.
4. Move the Throttle Hand Lever to the position for 1/2 engine speed.
5. Close the Air Reservoir Drain Cocks.

The power plant (or power plants) having been prepared in the preceding manner, the Diesel Engine (or Diesel Engines) is ready for starting and should be started in accordance with PART III-B of these instructions.

THE WHITCOMB LOCOMOTIVE COMPANY
DIESEL ELECTRIC LOCOMOTIVE OPERATION
STARTING THE DIESEL ENGINE
(Main Generator Type Starting)

The engine or engines being prepared for starting in accordance with PART III-A of these instructions, the engine starting shall take place in the following manner:

Located on the instrument panel is the engine starting switch.

Note: If the locomotive has two Diesel Engines, two starter switches are provided, one for each engine.

When two engines are to be started, each engine should be started separately and the starting procedure of each engine will be as follows:

To start the Diesel Engine after said engines have been properly prepared as stated in PART III-A of these instructions, press the "Starter Button" which will close a magnetic switch and connect the battery circuit to the Main Generator Starting Windings and, through the Main Generator, crank the Diesel Engine.

If the engine is in good working order, properly prepared, and receiving a sufficient supply of fuel, it should start within 20 seconds of cranking.

If the engine has been cranked for a 20-second period and fails to start, delay the second cranking period two minutes so as to allow starting motor to cool.

If the engine does not start after two 20-second periods, refer to the Engine Builder's Instruction Book and make the needed corrections, in accordance with the Engine Builder's instructions, before making another attempt to start said engine.

Note: Avoid long engine cranking periods - this practice puts too great a load on the batteries.

After said engine or engines are started, check lubricating oil pressure gauge of each engine to make sure that the oil pumps are functioning. Also, check the ammeters on the instrument panel to make sure that the generators are functioning properly.

Before starting the locomotive in operation, the engine must be left to run at 1/2 speed until it has had a chance to warm up.

Caution: If at any time the lubricating oil pressure should drop below normal, stop the engine so as to prevent any serious damage to said engine.

THE WHITCOMB LOCOMOTIVE COMPANYDIESEL ELECTRIC OR MECHANICAL LOCOMOTIVE OPERATIONSTOPPING THE DIESEL ENGINE

In stopping the Diesel Engine, the load must be removed and the engine permitted to run at idle speed for about two minutes before stopping.

After the engine has run at idling speed for about two minutes, remove the stop pin from the quadrant and move the "Throttle Handle" all the way toward the forward end of the locomotive to the "Engine Off" position.

Note: If, for some unknown reason, the engine does not stop after the "Throttle Handle" has been moved to the "Off" position, pull the emergency shut-off control and in this manner shut off the fuel supply to the engine.

DIESEL ELECTRIC LOCOMOTIVE OPERATION

LOCOMOTIVE - GENERAL

After the Diesel engine or engines have been started, they should be left to run at 1/2 speed until a sufficient air pressure has been pumped into the main air reservoir. (See PART IV-C of these instructions.)

When the air pressure has become great enough, make test brake applications to make sure that the brakes are in good operating condition. (See PART IV-C of these instructions.)

The air brakes found to be in good operating condition, the Throttle Handle must be moved to the Engine Idle position before preparing the locomotive electrical equipment for operation (see PART IV-B of these instructions). The engine idle position is made possible through the use of a removable stop pin in the quadrant, or a permanent quadrant stop.

The general operation procedure of the locomotive after the engines have been started and air pumped into the main reservoir to a sufficient pressure, shall be as follows:

1. Move the Throttle Handle to that of the Engine Idle position.
2. Apply the Air Brakes.
3. Release the Hand Brake all the way.
4. Close the Control Switch or Circuit Breaker - (If used).
5. Move the Controller Handle to the position for the desired direction of locomotive travel.
6. Release the Air Brakes.
7. Move the Throttle Handle slowly in the direction to increase the speed of the engine which, through the function of the electrical equipment, will furnish power to the electric traction motors and propel the locomotive.
8. Do not operate the locomotive at speeds greater than 20 miles per hour.

Stopping of the Locomotive and Train

To stop the locomotive and train, if said locomotive is coupled to a train, shall take place as follows:

1. Move the Throttle Handle to Engine Idle position.
2. Apply the Air Brakes. (See PART IV-C - Air Brake Operating Instructions.)

To Reverse the Locomotive

1. Move the Throttle Handle to the Engine Idle position.
2. Apply the Air Brakes bringing the locomotive and train to a complete stop.

LOCOMOTIVE - GENERAL

To Reverse the Locomotive (Cont'd.):

3. Move the Controller Handle to the position for the opposite direction of locomotive travel.
4. Release the Air Brakes.
5. Proceed with regular locomotive operation.

To Stop the Diesel Engine:

1. Move the Controller Handle to the Off position.
2. Refer to PART III-C of these instructions, entitled "Stopping the Diesel Engine."

Sander Operation:

This locomotive is equipped with sanders for sanding the rails in both directions of locomotive travel.

Located at the operator's control station is a sander valve having a vertical handle. This sander valve handle has three positions. The vertical position is the neutral position, while the forward position is for sanding the rails for forward locomotive travel, the rearward position is for sanding the rails for the rearward locomotive travel.

These sanders are provided for rail sanding when additional tractive force is needed in the starting of the train, when the rail is wet and slippery.

In applying sand to the rails, quick successive movements of the sand valve handle should be made between the neutral position and the position for the direction of the locomotive travel. Long applications of the sander valve will only waste sand.

Rail sanding should only be done when absolutely necessary.

THE WHITCOMB LOCOMOTIVE COMPANYDIESEL ELECTRIC LOCOMOTIVE OPERATIONELECTRICAL OPERATION INSTRUCTIONS

This locomotive is equipped with electrical equipment for a Diesel Electric type of locomotive.

The operation of this locomotive is not like that of a steam or mechanical drive locomotive, but must be operated in a manner that will not subject either Diesel engine or the electrical equipment to any needless abuse. For safe locomotive operation, the locomotive must be operated within the tonnage ratings given in PART II-B of these instructions.

The electrical equipment of the locomotive serves as the transmission means by which the power of the Diesel engine is transmitted to the wheels. The electrical transmission is made possible through an electric generator, driven by the Diesel engine, furnishing electrical energy to the traction motor that is geared to the axle.

The main electrical power circuit is controlled through a reverser, a controller, magnetic contactors, and a throttle switch,

The Reverser governs the main power circuit in a manner that permits the traction motor rotation to be changed to suit the direction of the desired locomotive travel.

The Controller, located at the operator's control station, controls the reverser position.

The Magnetic Contactors control the main power circuits between the generators and the traction motors.

The Control Switch or Circuit Breaker -(If used) is provided for the control of the main battery circuit that operates the magnetic contactors,

The Throttle Switch Controls the functions of the magnetic contactors and the interlocks of the control equipment through the movement of the Throttle Handle.

In the operation of the locomotive, the operator selects the direction of locomotive travel by the moving of the Controller Handle to the proper position for desired locomotive travel direction and closes the main power circuit from the generator to the traction motor through the closing of the throttle switch, by moving the throttle handle in the direction to increase the speed of the engines.

After the Diesel engines have been started, the electrical operation of the locomotive must proceed as follows:

1. Move the Throttle Handle to Engine Idle position.
2. Move the Controller Handle to the Off position.

ELECTRICAL OPERATION INSTRUCTIONS

3a. Check to make sure that the Battery and Motor Cut-out Switches are closed; if said switches are used (said switches are located in the control cabinet).

3b. Check to make sure that the Circuit Breaker is closed; if said circuit breaker is used (said circuit breaker is located in the control cabinet).

The three preceding items being cared for, the electrical equipment of the locomotive is now ready for operation, which will proceed as follows:

1. With the Throttle Handle in the Engine Idle position, move the Controller Handle to the position for the desired direction of locomotive travel.

Note: With the Controller Handle moved to the position for the desired direction of locomotive travel, the Reverser in the control cabinet is moved to the position that will connect the traction motors to the generator so that said traction motors will have the proper rotation for the desired direction of locomotive travel.

2. Move the Throttle Handle slowly in the direction to speed up the engine.

Note: With the Controller Handle and the Reverser in their proper position for the desired direction of locomotive travel, the movement of the Throttle Handle in the direction to speed up the engine closes the Throttle Switch which energizes the magnet coil on the magnetic contactor allowing said magnetic contactors to complete the main power circuit between the generator and the traction motor.

As the engine speed and power increases, the generator speed and power also increase, supplying the traction motor with the needed energy to propel the locomotive. The speed of the engine governs the speed of the locomotive and in this manner it is readily seen that the Throttle Handle at the operator's control station is the operator's control to govern the speed of the locomotive.

When the locomotive is to be brought to a stop, the Throttle Handle should be moved to the Engine Idle position so as to open the Throttle Switch and allow the contactors to open the main power circuit between the generator and the traction motor.

Caution: At no time shall the operator endeavor to manipulate the control of the electrical equipment so as to use said equipment for the braking of locomotive.

Note: If the locomotive is equipped with two generators and two or more traction motors, the operation of the electrical equipment will be the same as that set forth in these instructions.

Should the operator desire more detailed information regarding the electrical equipment of this locomotive, he should refer to the Westinghouse Electric and Manufacturing Company's instruction book.

DIESEL OR GASOLINE ELECTRIC OR MECHANICAL LOCOMOTIVE OPERATIONSTRAIGHT AIR AND HAND BRAKE

The Air and Hand Brake Equipment is the means of operating the foundation brakes on the locomotive.

The Air Brake Equipment is provided to operate the foundation brakes for service braking, while the Hand Brake is provided for holding the locomotive at rest while it is not in operation.

The Air Brake Equipment on this locomotive is of the straight air type and operates only the brakes of the locomotive. Located at the operator's control station is the brake valve, and through its manipulation the air brakes of the locomotive are controlled.

The function of this straight air brake equipment is such that the brake valve controls the flow of air from the main air reservoir to the brake cylinders that operate the foundation brakes.

At the operator's control station, in plain view of the operator, is an air gauge having two hands. One hand shows the main reservoir pressure, while the other shows the brake cylinder pressure.

Before the locomotive is put in service, the air pressure gauge should show a main reservoir pressure of at least 70 pounds.

As the brake valve controls the admission and exhaust of the air to and from the air brake cylinders, the operator should acquaint himself with the operation of the brake valve before starting the locomotive in motion. The Brake Valve Handle is in the Release position when it is all the way to the left and when said brake valve handle is moved 90 degrees to the right, from that of the release position, it is moved to its Full Service position. The travel of the brake valve handle from the Release position to that of the Full Service position is a gradual scale of air brake application.

The brake valve is of the self-lapping type and will maintain constant brake cylinder pressure in respect to the brake valve handle position. The operator can readily see the effect of the various stages of air brake application by moving the brake valve handle from Release position 1/4 from the distance in the direction for service brake application, watching the air gauge and observing the brake cylinder pressure. Moving the Brake Valve Handle to 1/2, 3/4 and Full Service positions and observing the increase in brake cylinder pressures, at the various positions of the Brake Valve Handle, will show the operator the approximate positions for the amount of brake cylinder pressure desired.

The operator must, so far as possible, avoid quick and heavy air brake application, as this practice will cause the wheels to lock and slide along the rail wearing flat spots on the wheel treads.

THE HAND BRAKE

The Hand Brake used on this locomotive is either of the "Staff" or "Wheel" Type, and is connected through a chain to the locomotive foundation brakes.

This Hand Brake is intended only for holding the locomotive at rest, and when it is applied it must be securely locked in applied position.

When the locomotive is in operation this Hand Brake must be fully released.

THE VEICONS Locomotive Company
DIESEL ELECTRIC LOCOMOTIVE OPERATION
DEAD HEADING

When this locomotive is to be coupled into a train for Dead Head Movement, the following instructions must be followed:

The air brake equipment must be prepared in the following manner:

1. Move the Brake Valve Handle to that of Release position.
2. Open Main Air Reservoir Drain Cocks.

The Electrical Equipment must be prepared in the following manner:

1. Open the Control Switch at the Operator's station - if used.
2. Move the Controllers Off position.
- 3a. Open the Main Battery Switches - if used. (Said switches are located in the control cabinet).
- 3b. Open the Circuit Breaker - if used (said circuit breaker is located in the control cabinet).

After the air brake and electrical equipment has been prepared, make the following preparations:

1. Inspect all Hood Doors to see that they are closed and locked.
2. Release Hand Brake all the way.
3. Check all Cab Windows to see that they are closed and locked.
4. Close and lock Cab Doors.

When the locomotive is coupled to the train it must be next to that of the caboose or behind the pusher locomotive if one is used at the rear end of the train.

The Dead Heading speed shall not be more than 15 M.P.H.

THE WHITCOMB LOCOMOTIVE COMPANYDIESEL OR GASOLINE ELECTRIC OR MECHANICAL LOCOMOTIVE OPERATIONDOUBLE - HEADING

When two locomotives are coupled into a train, both locomotives will be operated in the same manner as that set forth in PART IV of these instructions.

When starting the train an operator shall be in the cab of each locomotive and the power of the second locomotive be applied first. This is particularly true of the second locomotive if said locomotive is a pusher or midway in the train. The purpose of the advance power application of the second locomotive is to relieve the drawgear and couplers of the train of as much strain as possible.

If a train is heavy enough to require two locomotives to move it, the braking of the train must be done with both locomotives. The brakes of the second locomotive shall be applied a little in advance of the forward locomotive and the brake applications of both locomotives shall be gradual so as to minimize the danger of derailment.

Do not double-head this locomotive unless it is an absolute necessity.

THE WHITCOMB LOCOMOTIVE COMPANY
DIESEL ELECTRIC LOCOMOTIVE OPERATION
LAY-UP OF LOCOMOTIVE

To lay-up the locomotive the following must take place:

1. Stop the Engines as previously explained in PART III-C.
2. Set the Hand Brake (with the Air Brakes released.)
- 3a. Open the Main Battery Switches - if used (said switches are located in the control cabinet).
- 3b. Open the Circuit Breaker - if used (said Circuit Breaker is located in the control cabinet).
4. Check all the Hood Doors to see that they are closed and locked.
5. Check to see that the Controller Handle is in the "Off" Position.
6. Be sure that all Light Switches are in the "Off" position.
7. Close and lock all Cab Windows.
8. Close and lock both Cab Doors.
9. Bleed Air Tanks.
10. If the locomotive is laid-up in a territory where it may be subjected to freezing weather, the engine cooling system must be completely drained or be filled with an anti-freeze solution strong enough to withstand the most severe temperature that the territory might be subjected to.

0-4-0 or -0-4-4-0 TYPE, DIESEL ELECTRIC LOCOMOTIVELUBRICATION SCHEDULEENGINE

The Lubrication Schedule, as it is stated in the following instructions, is based on normal operating conditions with the engine temperatures being within the range of 150° Fahrenheit.

If the locomotive is being operated under conditions where the engine temperatures are either below or above this range for more than 20% of the operating time, it will become necessary to check the lubricating oil levels and to change the engine lubricating oil supply at more frequent intervals.

The following Engine Lubrication Schedule must be followed carefully. Only the lubricating oils specified by the Engine Builder may be used.

Every 8 Operating House:

1. Check the lubricating oil level in the Crankcase.
2. Check the lubricating oil level in the Injection Pump.
3. Check the lubricating oil level in the Governor Housing.

If the oil levels stated in Items 1, 2 and 3, are not up to the full make, add the needed amount of oil.

Note: Items 2 and 3 do not apply to a Cummins Diesel Engine.

If Oil Bath Type Air Cleaners are used, renew the oil and fill to the proper level.

Every 75 Operating Hours:

1. Drain the Crankcase and refill with new oil.
2. Drain the Injection Pump case and refill with new oil.
3. Drain the Governor Housing and refill with new oil.

Note: Items 2 and 3 do not apply to a Cummins engine.

4. Lubricate the Fan Bearings - use Texas Company #00 Pressure Gun Grease or its equivalent.

Every 150 Operating Hours:

1. **Clean the Lubricating Oil Filters (See Engine Builder's Instructions).**
2. **Clean the Crankcase Breather Filter (See Engine Builder's Instructions.)**

ENGINE (Cont'd.)

Every 300 Operating Hours:

1. Drain and flush out the crankcase and refill with new oil.
2. Oil the Starting Motor Armature Bearings - 1 to 2 drops of oil for each bearing (use new Engine Lubricating Oil).
3. Oil the Battery Charging Generator Armature Bearings - 3 to 4 drops of oil for each bearing (use new engine lubricating oil).

Notes: Item 2 does not apply if Main Generator Engine Starting is used.
Item 3 does not apply if belt driven Auxiliary Generators are used.

COMPRESSOR

The Compressor Lubrication Schedule must be carefully followed. Only the lubricating oils specified by the compressor builder may be used.

Every 8 Operating Hours:

Check the crankcase oil level - add oil if needed.

Every 150 Operating Hours:

Drain the Crankcase and refill with new oil.

Every 300 Operating Hours:

Drain and flush out the crankcase and refill with new oil.

ELECTRICAL EQUIPMENT

Main Generator Armature Bearing

One ounce of Westinghouse M-7280-1 grease after one month of service and every three months thereafter.

Caution: Do not over-lubricate this bearing (see Westinghouse Electric and Mfg. Company's Instruction Book).

Traction Motor Armature Bearing

One ounce of Westinghouse M-7280-1 grease for bearing at commutator end of motor after one month of service and every three months.

Caution: Do not over-lubricate the bearing (see Westinghouse Electric and Mfg. Company's Instruction Book).

The bearing at the pinion end of the traction motors are lubricated by the grease in the reduction gearing case.

Reverser

Use light machine oil on soft clean rag for lubrication of drum contacts. Care should be taken that any surplus oil should be wiped off. Drum bearings should be oiled very 30 days, with light machine oil. See Westinghouse Instruction Book for details of "Reverser" maintenance.

ELECTRICAL EQUIPMENT (Cont'd.)

Controller

Use light machine oil on soft clean rag for lubrication on drum contacts. Care should be taken that any surplus oil should be wiped off. Drum bearings should be oiled every 30 days with light machine oil. See Westinghouse Instruction Book for details of "Controller" maintenance.

LOCOMOTIVE - GENERAL

Side Rods or Crank Pin Connecting Rods

Lubricate with pressure grease every 4 hours of operation. Use #00 Texaco pressure gun grease or the equivalent.

Triple Reduction Drive (Check oil weekly, this is very important)

We recommend using SAE-110 oil in winter and SAE-160 in summer. Oil should be drained every three months and every six months case should be drained and flushed with fuel oil. The proper amount of oil to be used can be determined by removing pipe plug located on side of gear case. Case should be filled up until it runs out of this hole. Approximate case capacity 4-1/2 gals.

Axle Boxes (Roller Bearing Equipped)

Fill the axle boxes every 30 days with a pressure gun using Texaco #00 grease or the equivalent.

Brake - Foundation

All moving parts are to be lubricated every 30 days with heavy oil.

Air Brake Equipment

See Westinghouse Air Brake Instruction Book.

Hand Brake

Lubricate with light engine oil every 30 days.

Throttle Linkage - including control stand shaft and throttle lever.

1. Lubricate the push-pull cables with light pressure every 30 days.
2. Lubricate all ball joints, clevises, throttle handle, control stand shaft, etc., with light engine oil every two weeks.

Radiator Shutters

1. Lubricate the push-pull cables with light pressure grease every 30 days.

2. Shutter bearings and miscellaneous linkage to be lubricated every 30 days. Excess oil to be wiped off with a clean rag.

Cab Heater Motor Bearings

Light engine oil in winter. Do not over-lubricate these bearings.

FUEL OIL SPECIFICATION

See Engine Builder's Instruction Book.

THE WHITCOMB LOCOMOTIVE COMPANYC-4-4-0, DIESEL ELECTRIC LOCOMOTIVEINSPECTION AND SERVICE SCHEDULESpecial Notice to Maintenance Men

When the locomotive trucks are assembled at the factory, extreme care is exercised so as to make sure that the clearances between the axle boxes and the frame pedestal jaw faces do not exceed a total of $1/32$ of an inch.

Even though these clearances are carefully watched at the factory, it will be necessary to make a careful inspection of each truck after the locomotive has been in daily 12 hour service for a period of two weeks. If the clearances have increased to more than $1/32$ of an inch, it will be necessary to shim up the wear plates of the frame pedestal jaws.

The trucks must be inspected and the corrections made in accordance with the following instructions.

Instructions for Inspection and Correction
of
Axle Box Pedestal Jaw Clearances

1. Remove the side rods from both sides of the truck.
 2. With full reservoir air pressure, move the brake valve handle to a full service position watching the air gauge to make sure that the brake cylinder pressure is at least 40 pounds.
 3. Using a feeler gauge, check the clearance between the axle box and the pedestal jaw face, after which release the air brakes.
 4. If the clearance exceeds $1/32$ of an inch on either the driving and driven axles, shims must be added until the clearances are less than $1/32$ of an inch.
 5. To shim up the frame jaw of the driving axle, which is the axle having the triple reduction gearing mounted on it, the frame binders on both sides of the truck frame, the shims and wear shoes of the driven axle must be removed, keeping the shims together in the manner in which they are removed. The truck frame must then be jacked up until the axle boxes clear the truck frame pedestal jaw. Remove the wear plate from the pedestal jaw faces toward the end of the frame, add the needed amount of shim behind the wear plates, using jack screws to hold the wear plate and shims in place, after which weld these wear plates in position. After this shimming operation is completed, lower the truck frame making sure the axle boxes enter properly, and remount the binders at these frame jaws.
 6. To shim up the Driven Axle Box Pedestal Frame Jaws, mount the side rods on the crank pins and move the locomotive until the crank pins, on the side the shims are to be applied, are on a horizontal dead center. Replace the shims, adding the shims needed to reduce the clearance, and remount the binder.
- For replacing the shims on the other side, repeat the procedure as set for in the previous paragraph.

0-4-4-0 TYPE, DIESEL ELECTRIC LOCOMOTIVE

INSPECTION AND SERVICE SCHEDULE

The service life of this locomotive depends on the cleaning and maintenance given it. Therefore, it must always be kept clean and any oil or other leaks corrected immediately. Regardless of unfamiliarity with equipment, cleaning does not require any special talent.

Daily Inspection

(Do not overlook the fact there are 2 engines in each locomotive.)

Check engines for lubricating oil, fuel oil, water and air leaks.

Add necessary lubricating oil to bring to proper level.

Check brakes, piston travel, and wheels for flat spots.

Check amount of cooling water.

Check sandars.

Check Bell.

Check Horn.

Check batteries by noting speed of engine when starting.

Check battery charging equipment.

Check cooling fan and compressor belts.

Check headlights and cab lights.

Check oil in air compressors.

Blow out main air reservoir.

Check water pump for leaks and repairs.

Items not listed and found defective must be taken care of at once.

While engine operating, look over engine for fuel leaks and listen for tappet knocks.

Check side rod bearings for wear and replace if they are worn more than 1/16 inch.

Weekly

Check air compressor air intake filters.

Oil Bell.

Drain water from fuel tank.

Blow out generators, motors and cabinets if dirty (do not use more than 25 pounds air pressure).

INSPECTION AND SERVICE SCHEDULE

Weekly (Cont'd.)

Clean fuel filters.

Check and service air cleaner for engine.

Two Weeks

Check governor and throttle linkage - make any needed adjustments.

Check battery water level and gravity and record all readings.

Clean lube oil filters. (See Engine Instructions Book).

Monthly

Check Diesel engine valve clearance while engine is still very warm.

This adjustment to govern for both air intake and exhaust valves.

Check hand brakes.

Check generator and traction motor bearings.

Repair oil, water and air leaks.

Check all fuse clips for loose connections.

Check all brushes, replacing all those necessary.

Clean main generator.

Clean traction motors. (Remove oil and grease before blowing.)

Drain, wash and refill engine cooling water system. To wash out radiator we suggest using two cans of Young's cleaner per radiator, dissolved in the cooling water, run engines for approximately 15 minutes, drain and refill with fresh water.

Clean air compressor valves.

Tighten all loose nuts, screws, etc.

Inspect all relay and switch contacts.

Check cylinder head hold-down studs, nuts and fuel valve stud nuts.

Check blow by compression at breather to determine if excessive while engine is idling.

Blow air (50# pressure - reverse flow) through radiators to blow out dirt.

Check and adjust all V-belts to proper tension and renew any that will not operate for another 30 days.

Check cylinders for good firing.

All oil leaks must be corrected and any oil that has leaked into or on traction motors must be washed off before blowing motors with air.

INSPECTION AND SERVICE SCHEDULE

Monthly (Cont'd.)

All cables must be cleaned. If defective, cables must be rewrapped and printed with standard insulating varnish.

Three Months

Lubricate main generator ball bearings.

Change oil in air compressor crankcase and wash out crankcase.

Six Months

Remove reverser controller pistons, clean and lubricate.

Remove and clean fuel valves WITH BRUSH.

Examine triple reduction gear units. Drain and refill with fresh oil.

One Year

Make all test prescribed for monthly inspection and megger and high potential tests.

Make complete inspection of all main and connecting rod bearings.

Wash out all journal boxes and fill with fresh grease.

Two Years

Inspect pistons and rings, renew them if necessary.

Recondition valves and seats.

Four Years

Remove all traction motors and generators for reconditioning.

NOTICE TO OPERATING AND MAINTENANCE MEN

The operating conditions of a locomotive is a governing factor in the establishing of routine lubrication, inspection and service schedules.

It is impossible, however, to establish definite lubrication and service schedules to fit any and all operating conditions, so in view of this fact, the lubrication, inspection and service schedules as set forth in PARTS VI and VII are based on normal operating conditions where the temperatures outside of the locomotive cab are between 15° F. and 95° F. and on the basis of 12 hours per day operation for six days per week at 50 % hauling capacity,

Should the locomotive be subjected to operating conditions more severe than those stated in the preceding paragraph, modify the schedules shown in PARTS VI and VII to meet the operating conditions.