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WICKHAM & CO. TYPE RAILBUS

Nos. Sc. 79965 — Sc. 79969

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GENERAL DESCRIPTION

Single unit railbus with driving compartment at each end.
Single engine only. Seating capacity—48.

TECHNICAL DATA

Type				1A
Weight in running order				11½ tons
Tractive effort:-				
1st Gear	2nd Gear	3rd Gear	4th Gear	
Wheel base ...	...	...	19ft. 0ins.	
Wheel diameter ...	...	...	2ft. 9ins.	
Width overall ...	...	...	9ft. 3ins.	
Length overall ...	...	...	38ft. 0ins.	
Height overall ...	...	...	12ft. 5ins.	
Minimum curve negotiable ...	...	...	2 Chains	
Maximum speed at maximum governed engine revs.:-				
1st Speed	2nd Speed	3rd Speed	4th Speed	
12 m.p.h.	20 m.p.h.	31 m.p.h.	50 m.p.h.	
Gearbox ratios:-				
1st Gear	2nd Gear	3rd Gear	4th Gear	
4.07:1	2.42:1	1.608:1	1:1	
Fuel capacity ...	...	...	70 gallons for engine and heater.	
Lubricating oil sump capacity...	...	...	4 gallons.	
Wickham Freeborn clutch capacity	...	...	1/5th pint.	
Gearbox oil capacity ...	...	...	1½ gallons	
Final drive oil capacity ...	...	...	6 pints	
Cooling water capacity...	...	...	10¼ gallons.	
Control system ...	...	...	Manual throttle. Electro-pneumatic gears.	
Brake system ...	...	...	Compressed air and hand brakes.	
Warning device ...	...	...	Compressed air operated.	

ENGINE

One 6-cylinder 8.143 litre horizontal oil engine ...	...	H. Meadows 6 HDT.500. 105 BHP @ 1,800 r.p.m.
Compression ratio ...	...	16:1.
Bore ...	...	120m.m. = 4.724 in.
Stroke ...	...	120m.m. = 4.724 in.
Firing order ...	...	1, 5, 3, 6, 2, 4.
Rotation ...	...	Clockwise.
Fuel injector type ...	...	C.A.V. B.K.B. L97S. 5039.
Fuel injector lifting pressure ...	...	2,500 lbs./sq. in. (170 Atmos).
Fuel pump type ...	...	C.A.V. monobloc.

TRANSMISSION

Clutch ...	...	Wickham "freeborn" clutch.
Gearbox ...	...	S.C.G. type RIIC—4 speed epicyclic.
Final drive reversing arrangement ...	...	Wickham type D final drive gearbox. Axially sliding dog clutch between bevel gears.
Final drive gear ratio ...	...	3.45:1.

AUXILIARIES

Batteries	...	...	...	NIFE type LR17, 18 cells 24 volt 170 amp./hr.
Alternator	...	...	...	C.A.V. type AC.8, driven off front end of engine.
Rectifier for alternator...	...	...	...	C.A.V. Germanium type RUG.4.
Lighting	...	...	...	24 volt.
Starter motor	...	...	...	C.A.V.
Compressor	...	...	...	Clayton-Dewandre type, belt driven.
Railbus heating equipment	...	...	...	Smith's combustion air heater.
Windscreen wipers	...	...	...	Compressed air operated.
Demister	...	...	...	Hot air obtained from passenger heating air duct.
Speedometer	...	...	...	Smith's (mechanical).

DRIVER'S CONTROLS

1. Electrical control switch (Yale type with removable key).
2. Throttle handle (detachable) incorporating the Deadman's device.
3. Gear change selector lever (gate change) and indicator light.
4. Reversing lever (detachable).
5. Engine "Start" button.
6. Engine "Stop" button.
7. Battery ammeter, charge/discharge.
8. Switches: Demister, Panel light, Interior lights (2), Destination indicator light, Code and head lights (4).
9. Windscreen wiper valve.
10. Buzzer.
11. L. & R. hand "sliding door control" buttons.
12. L. & R. hand "sliding door open" indicator light (Red).
13. Engine oil pressure indicator light (Red).
14. Water temperature indicator light (Amber).
15. Reservoir air pressure gauge.
16. Speedometer—marked for gear change speeds.
17. Brake cylinder pressure gauge.
18. Dual horn control.
19. Hand brake wheel.
20. Driver's air brake handle.
21. Railbus heater switch and indicator panel (one end only).
22. Deadman's hold over button on R/H. cantrail.
23. CO₂ portable fire extinguishers (one in each driving compartment).
24. Retractable steps operating knob (two in each driving compartment).

CONTROLS ON SIDE OF RAILBUS

- | | | |
|---|---|--|
| 1. Battery isolating switch. | } | Fitted into small control box
on radiator side of railbus—
opened by a carriage key. |
| 2. Local engine "Start" button. | | |
| 3. Local engine "Stop" button. | | |
| 4. Engine oil pressure gauge. | | |
| 5. Hand throttle control—cable type. | | |
| 6. Fuel tank contents gauge, both sides of fuel tank. | | |
| 7. Water header tank contents gauge—one side of railbus only. | | |

FUSES FITTED

Two fuse boxes under each control desk. Identification of each fuse marked on underside of each fuse box cover.

GENERAL INFORMATION

The throttle handle is coupled to the engine fuel pump throttle control by MECHANICAL linkage.

The reversing lever and gear change selector are operated by electro-pneumatic (E.P.) valves, therefore, **DO NOT USE FORCE WHEN MOVING THESE CONTROL LEVERS.**

The throttle and electrical control system operates from either end of the railbus but on this type **cannot** be linked to another railbus.

Any failure of the control air pressure resulting in a severe drop in pressure will return the gears to neutral. The engine continues to run—it is **NOT** controlled by air pressure.

The throttle handle is also the Deadman's device and, if it is allowed to spring up, after about six seconds delay the air brake will be applied. To reset the Deadman's device the throttle handle must be moved back to **OFF** position before the handle can be depressed to regain control.

The gear selector handle and reversing lever are mechanically interlocked. The gear selector handle is locked in the neutral position and cannot be moved until the reversing lever is moved to the **FORWARD** or **REVERSE** position.

Note: There are five positions, including reverse, in the gear selector gate, but **REVERSE** position in the **GEAR SELECTOR GATE** is **NOT USABLE.**

The reversing lever cannot be moved unless the gear selector lever is in **NEUTRAL.**

SPECIAL NOTE

DO NOT MOVE THE GEAR CHANGE SELECTOR HANDLE FROM THE NEUTRAL POSITION UNTIL READY TO START THE RAILBUS, except when "toggling up" the gearbox brake bands.

Indicator Lights

1. Engine oil pressure indicator lights—**RED**, normally dim—bright on fault.
2. Engine water temperature indicator lights—**AMBER**, normally dim—bright on fault.
3. Sliding door indicator lights—**RED**—illuminated when a door is open.
4. Gear change indicator lights—**RED**—illuminated if a gear is not engaged.

DRIVER'S DAILY DUTIES WHEN IN SERVICE

1. Obtain the satchel containing the control switch key, reversing lever, throttle handle and carriage key.
2. Check that—
 - (a) the detonator cases are intact;
 - (b) the handbrake is **ON** in the leading driver's compartment;
 - (c) the handbrake is **OFF** in the trailing driver's compartment.
3. Lock door of trailing driving compartment.

At Convenient Time during Turn

1. Make a short inspection of the railbus and check that the apparatus is generally in good working condition. Check fuel tank level and radiator header tank water level.
2. Toggle up the gearbox brake bands as follows:—
 - (a) Check that full air pressure is available;
 - (b) STOP the engine;
 - (c) With the reversing lever in FORWARD position, move the gear selector handle to engage 1st, 2nd and 3rd gears (not 4th) about six times, pausing in each gear position to allow the brake bands to engage fully;
 - (d) Return the gear selector handle to NEUTRAL;
 - (e) Restart engine as required.

Report all known defects at end of turn.

STARTING THE ENGINE

1. Check that battery isolating switch is in the "ON" position.
2. Check that the handbrake is ON, then turn the control switch key to the ON position.
3. Check that the gear selector is in NEUTRAL position in the gate, i.e., reversing lever removed from the control panel.
4. If at least 75 lbs./sq. in. air pressure is available in the system and the engine is warm it may be started from the driving compartment.

The procedure is as follows:—

- (a) Depress the throttle handle to engage the Deadman's device, then move it to partly open the throttle;
- (b) Press the "START" button and release it immediately the engine fires.

When the engine has started, return throttle handle to IDLING position.

Note: If the engine does not start within approximately three seconds, release "START" button for not less than ten seconds to allow engine to come to rest and the oil pressure indicator light to glow brightly before pressing button again.

If the engine refuses to start, check fuel tank contents gauge for fuel content and ensure that fuel cock is open. Start engine locally as shown in item 5.

5. If 75 lbs./sq. in. air pressure is not available in the system, or the engine is cold, it must be started from the side of the railbus. The procedure is as follows:—

In Driving Compartment

- (a) Check that the handbrake is ON, then place the control switch key into the ON position.
- (b) Check that the gear selector handle is locked in the NEUTRAL position and the reversing lever removed from the control panel.

At Side of Railbus

- (c) Unlock the cover over the start button panel with the carriage key provided (start button panel on radiator side of the railbus);
- (d) Pull the fuel injector pump hand throttle control to "Full Open" position and hold it there;
- (e) Press the "Start" button and release it immediately the engine starts;

- (f) Release the hand throttle control gradually until the engine runs at idling speed—do not race the engine.

In Driving Compartment

- (g) The throttle handle may be operated to run the engine up to build up air pressure. When the air pressure has built up to 75 lbs./sq. in. place the reversing lever into position in the control panel.

WITH THE ENGINE RUNNING

- (a) Check that there is 100/110 lbs./sq. in. air pressure on the main reservoir gauge;
- (b) Release the throttle handle. Check that the Deadman's device operates and that after six seconds delay the brakes are applied;
- (c) Check that the air pressure has again built up to approximately 85 lbs./sq. in.;
- (d) Check operation of both sliding doors in conjunction with their indicator light. **THESE DOORS ARE NOT INTER-LOCKED WITH THE AIR BRAKE SYSTEM;**
- (e) Apply the air brake—check air brake pressure—50 lbs./sq. in., and then release the hand brake in the driving compartment.
- (f) Check operation of both sets of retractable steps. (NOTE. —these steps can only be operated when the air brake is fully applied.)

STARTING THE RAILBUS

- (a) Obtain control of the Deadman's device and hold the throttle in the Idling position. Check that the sliding doors are closed;
- (b) Partially release the air brake;
- (c) **WITH THE ENGINE IDLING** place the reversing lever into **FORWARD**, then move the gear selector handle into the 1st gear gate (if 1st gear does not engage the indicator light on the gear control column will remain illuminated);
- (d) Release the air brake fully by placing brake handle to **OFF** position. The railbus should not be moved with the brakes dragging;
- (e) After a pause of **NOT LESS THAN TWO SECONDS** from the moment of selecting first gear, open the throttle. As the railbus speed increases, change gear as indicated on the speedometer.

The correct speeds are as follows:-

1st Gear	...	0—12 m.p.h.
2nd Gear	...	12—20 m.p.h.
3rd Gear	...	20—31 m.p.h.
4th Gear	...	Over 31 m.p.h.

GEAR CHANGING

(a) Changing up

When the speedometer indicates the correct changing speed—

1. Return throttle handle to **IDLING** position and at the same time place the gear selector lever into **NEUTRAL**.
2. **PAUSE FOR FOUR SECONDS**, then select the next higher gear position.

3. **AGAIN PAUSE FOR TWO SECONDS** before reopening the throttle handle.
4. Change gear progressively in the same manner until top gear is engaged.

Note: DO NOT MOVE THE GEAR SELECTOR HANDLE UNTIL THE ACTUAL GEAR CHANGE IS TO BE MADE.

(b) **Changing down**

When the speedometer needle has dropped to a speed that indicates that a change down is necessary:-

1. Return the throttle handle to IDLING position, and immediately select the next lower gear.
2. **PAUSE FOR TWO SECONDS**, then re-open the throttle.

Note: DO NOT MOVE THE GEAR SELECTOR HANDLE UNTIL THE ACTUAL GEAR CHANGE IS TO BE MADE.

COASTING

When the maximum running speed required is obtained, this can be maintained by easing back the throttle handle towards the IDLING position. **NO FREE WHEEL FITTED. DO NOT COAST IN NEUTRAL.**

STOPPING THE RAILBUS

1. Return the throttle handle to IDLING and hold in that position.
2. Apply the air brake as required.
3. When almost at a stand return the gear selector handle to a NEUTRAL position in the gear change gate.

Note: If the railbus speed has been reduced, e.g., due to a signal check, and if the signal is placed into the clear position before the railbus is brought to a stand, release the air brake and change down **progressively** to the gear responding to the actual road speed.

CHANGING ENDS

1. When the railbus has been brought to a stand, release the throttle handle and allow the Deadman's device to operate, check by reading the air brake gauge that the brakes are applied.
2. Place the air brake handle to OFF position.
3. Remove the throttle handle and reversing lever.
4. Place control switch in the OFF position and remove key.
5. Lock driving compartment door and remove key.
6. Proceed to the other end of the railbus and place throttle handle into position. Place control switch into the ON position, then place reversing lever in FORWARD OR REVERSE as required.

REVERSING THE RAILBUS

If it is necessary to reverse the railbus without changing ends:-

1. **STOP THE RAILBUS.**
2. With the engine idling, move the reversing lever to REVERSE.
3. Proceed as for "Starting the Railbus", items (c) to (e).

STOPPING THE ENGINE

1. Return the throttle handle to Idling position, then release to Deadman's position.
2. Check that the air brake is ON.
3. Place the reversing lever into NEUTRAL position.
4. Press engine "Stop" button and hold in that position until engine has stopped.
5. Apply the handbrake.

STABLING THE RAILBUS

After stopping the engine by the method shown above:-

1. Check that the handbrake is applied.
2. Place air brake valve to OFF position.
3. Remove reversing lever and throttle handle. Place control switch in OFF position and remove key.
4. Shut off compartment heater if in use.
5. Lock the driving compartment doors.
6. Return the satchel containing the reversing lever, throttle handle, control switch key and carriage key to the Running Foreman or other responsible person on duty.

TRAIN HEATING

Heating is by means of hot air suitably directed into the passenger compartment of the vehicle. The operation of the heater is automatic apart from switching on and operating the heat control.

To operate the heater, turn heater switch in a clockwise direction to FULL HEAT position. This supplies current to the glow plug (an Element) and the glow plug light on the Indicator panel should be illuminated. If this fails, return switch to the OFF position and do not attempt to restart.

After a period of about 45 seconds the air fan light will be illuminated on the indicator panel, denoting that the heater fan and fuel pumps are running. In approximately 3½ minutes the glow plug indicator light will be automatically extinguished.

If the oil fails to ignite in the above period, the fan and fuel pump is automatically switched off, and it is then necessary to return the control switch to OFF and re-start.

Not more than three attempts should be made to start the apparatus.

If the switch is in the Full Heat position and the heater cuts OUT, the indicator light will be extinguished. Return the switch to OFF, then attempt to restart the heater as described above.

To admit cold air to the compartment, turn the control switch in the anti-clockwise direction past the OFF position to COLD.

FAULTS IN TRAFFIC

If the engine stops whilst railbus is running, stop the railbus, place the gears into NEUTRAL, then attempt to restart by depressing the local "Start" button, not more than three times. If this fails to restart the engine, lock the final drive in NEUTRAL.

Railbus will then require towing to a terminal point.

To Lock Final Drive in Neutral

Place gear selector handle and reversing lever into NEUTRAL, then at the rear of the final drive casing, move the isolating lever to the Middle or Neutral position and secure in that position by the drop catch provided. Check that the main propeller shaft to the final drive can be rotated by hand.

Note: If it is not possible to move the isolating lever due to air pressure against the reverse piston, or it slams over to the other direction of travel, blow down the main air reservoir through the pet tap provided and then set the isolating lever.

ASSISTING DISABLED RAILBUS

In an emergency a disabled railbus may be assisted by another railbus or diesel train or by a locomotive coupled by means of the special towing hook and coupling provided.

Great care must be taken in carrying out any emergency movement, and a speed of 15 m.p.h. must not be exceeded. See instructions under "Towing".

FAILURE OF CONTROL EQUIPMENT

Driving controls in leading driving compartment failed:-

Remove control switch key, throttle handle and reversing lever, then proceed to the opposite driving compartment and endeavour to gain control. Then act in accordance with the Appendix Instructions for the Working of Diesel Mechanical Cars—Driving Apparatus Disabled.

FIRE PRECAUTIONS

Portable fire extinguishers are provided for use in the event of an outbreak of fire. A CO₂ type in each driving compartment and a "Water" type in the luggage compartment.

WARNING HORNS

When sounding the horn to comply with Rule 127 and the Appendix Instructions, operate the lever in such a manner to give the 2-tone sound that these horns are designed to emit. This is of the utmost importance, and if the horn is defective it must be reported immediately.

TOWING

A special coupling is provided to tow these vehicles, but due to no buffers being fitted, the railbus can only be towed at a maximum speed of 15 m.p.h. and when slowing down or stopping, extra care is necessary to avoid damage to the towed end of the railbus from impact with the towing vehicle or locomotive.

The final drive must be isolated before vehicle is towed.