INSTRUCTIONS
FOR
SPEED CONVERSION
OF
Oxweld
(TRAD-MARK)
CM-37
MACHINE CARRIAGES

This booklet gives directions for converting any CM-37 Machine Carriage for operation in any desired speed range.

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General Information

The CM-37 Machine Carriage was designed as a universal prime mover of wide flexibility, capable of performing the duties of the CM-8 and CM-21 machines as well as assignments of its own. To cover anticipated requirements, it was originally produced in three types:

(1) A Standard machine, using an 832:1 motor gear head reduction unit and having a speed range of 4 to 50 inches per minute.

(2) A High-Speed machine, identical with the Standard machine except that a 200:1 motor gear head reduction unit is used, giving a speed range of 15 to 210 inches per minute, and

(3) A Low-Speed machine identical with the Standard machine except that a change was made in the chassis gear train to provide a speed range of 1 to 15 inches per minute.

To provide still greater flexibility, and to more readily adapt the CM-37 to individual requirements, there has now been made available a series of gear reduction units which will enable the customer to select an operating range or ranges most suitable to his particular applications.

It is the purpose of this manual to provide instructions for customers desiring to convert any of the above-listed machines for operation within a new speed range, either by (1) substitution of an entire motor gear head reduction unit, (2) by gear substitution within the motor gear head reduction unit, or (3) by changing a portion of the chassis gear train. The first method is the most practical in cases where it is desired to have several interchangeable ratios on hand, being the one most easy to accomplish, while the latter methods are used for changes of a more permanent nature.

General Reduction Unit And Speed Ranges

The Motor Gear Head Reduction Unit is a double reduction unit. It consists of a primary stage and a secondary (output) stage. Motor Gear Head Reduction units are kept in stock in the following ratios, giving machine speed ranges as indicated:

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Ratio</th>
<th>Standard &amp; High-Speed Machine</th>
<th>Low-Speed Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>50V84</td>
<td>108:1</td>
<td>31 to 382</td>
<td>7-3/4 to 115</td>
</tr>
<tr>
<td>50V59</td>
<td>200:1</td>
<td>15 to 210</td>
<td>4-1/2 to 62</td>
</tr>
<tr>
<td>50V85</td>
<td>288:1</td>
<td>11-3/4 to 144</td>
<td>3 to 43-1/4</td>
</tr>
<tr>
<td>50V57</td>
<td>832:1</td>
<td>4 to 50</td>
<td>1 to 15</td>
</tr>
<tr>
<td>50V78</td>
<td>1024:1</td>
<td>3-1/2 to 40-1/2</td>
<td>7/8 to 12</td>
</tr>
</tbody>
</table>

The following table shows the component parts of the output (secondary) stage in each of the above gear reduction units. This is for use in the event that is required to change speed range by alteration of the internal stage instead of by substituting an entire unit. (Primary stage gears are the same for all gear units.)

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Countershaft &amp; Worm</th>
<th>No. Threads</th>
<th>Extension Shaft Worm Gear</th>
<th>Part No.</th>
<th>No. Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>108:1*</td>
<td>02N38</td>
<td>8</td>
<td>02N39</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>200:1</td>
<td>55W07</td>
<td>4</td>
<td>55W09</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>288:1*</td>
<td>02N26</td>
<td>3</td>
<td>02N05</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>832:1</td>
<td>54W97</td>
<td>1</td>
<td>55W03</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>1024:1*</td>
<td>02N23</td>
<td>1</td>
<td>02N23</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

*When these ratios are used, a blank dial must be installed in the speedometer and calibrated to the machine in small steps all across the dial.

The term "Oxweld" is a registered trade-mark of Union Carbide and Carbon Corporation or its Units.
SPEED CONVERSION CHART

TO CONVERT TO REQUIRES
Low-Speed Standard-Speed 1. Replacement of chassis worm gear and clutch gear (see Sec. II).

High-Speed 2. Replacement of speedometer with speedometer 37V20.

Standard-Speed Low-Speed 1. Replacement of gear unit by gear unit 50V59 (see Sec. I).

High-Speed 2. Replacement of chassis worm gear and clutch gear (see Sec. II).

High-Speed 3. Replacement of speedometer by speedometer 37V32.

High-Speed Low-Speed 1. Replacement of gear unit by gear unit 50V57 (see Sec. I).

High-Speed 2. Replacement of chassis worm gear and clutch gear (see Sec. II).


Standard-Speed 1. Replacement of gear unit by gear unit 50V57 (see Sec. I).

2. Replacement of speedometer by speedometer 37V20.

I-REPLACEMENT OF ENTIRE GEAR REDUCTION UNIT OR OUTPUT STAGE GEARING

1. Release the friction brake on the right side of the carriage cover by loosening the locknut and unscrewing the setscrew.

2. Unscrew the knob from the gear-shift handle.

3. Disconnect the speedometer cable by pulling the cable plug from the socket on the governor housing.

4. Remove the four socket-head screws holding the cover to the carriage chassis, and lift off the cover. (The cover cannot be removed completely at this time, since it is still connected to the chassis by electric wires. However, these wires are long enough to permit placing the cover on its side adjacent to the chassis.)

5. Stand the chassis on its left side.

6. Remove from the underside of the chassis the plate which covers the carriage terminal strip. This plate is secured by two round-head machine screws.

7. Disconnect the motor leads from the terminal strip. Mark the wires so that they can be replaced correctly.

8. Supporting the motor assembly with one hand, remove the four motor-mounting screws from the underside of the chassis.

9. Place the carriage on its wheels. Carefully withdraw the motor assembly, taking care not to lose the small coupling block which links the motor assembly output shaft with the drive shaft in the chassis.

10. Remove the gear reduction unit from the motor assembly by withdrawing the four screws which fasten it to the motor housing. If the unit does not dismount easily, tapping with a rawhide mallet on several sides will help loosen the seal. The gasket inserted between the motor and gear unit should be retained on the gear unit housing. Clean out the grease which fills the gear unit.

11. Remove the coupling from the output shaft of the gear reduction unit by driving out the taper pin.
12. If the entire gear reduction unit is to be replaced, the coupling removed in Step 11 must be transferred to the new gear reduction unit. Using a 1/8-in. (.125 + .003 - .001) drill, drill and ream a hole in the output shaft for the #0 x 1-1/4-in. taper pin. (When assembled, the end of the output shaft should be flush with the bottom of the slot in the coupling.) After installing the coupling, fill the gear reduction unit with Royco #6A grease. Mount the unit on the motor and assemble the machine as directed in steps 22 through 32.

If it is proposed to replace only the gearing in the output stage of the gear reduction unit, the following procedure applies: (Refer to Fig. 1)

13. Withdraw the extension (output) shaft and worm gear assembly from the gear reduction unit housing.

14. Remove the worm gear from the shaft by driving out the pin in the gear hub, and replace with the new worm gear (hub toward the coupling end of the shaft, and loose spacer sleeve on the hub side of gear).

15. Loosen the two socket-head setscrews in the hub of the countershaft worm gear.

16. Remove the cap in the housing at the worm end of the countershaft and remove the end thrust bearing parts, being careful not to lose the loose ball bearings.

17. Remove the countershaft by sliding it out through the bearing opening.

18. Install the new countershaft, assembling the original countershaft worm gear to it, hub toward the worm, and tighten the setscrews in the gear hub into the drilled spots in the countershaft.

19. Replace the end bearing parts, if they have become separated, in the following order: pivot, 8 ball bearings (use grease to hold them in place), cup, felt pad, then the bearing cap.

20. Replace the output shaft, then the output shaft coupling and taper pin. Fill the gear unit with Royco #6A grease.
21. Assemble the gear reduction unit to the motor in its original position.

22. The motor-governor-gear reduction unit assembly is now ready to be installed in the carriage chassis. This operation must be done carefully, due to the narrow clearances involved. The key which has been machined on the mounting pad of the assembly fits a corresponding machined slot in the bed of the chassis. The assembly must be slid slowly into position in the chassis, taking care that the various projections on the assembly do not bind with near-by parts of the machine. Before the assembly is completely seated, the small coupling block must be inserted in position to complete the coupling between the motor assembly output shaft and the chassis gear shaft. When the assembly is completely seated it must be held firmly in place, while the chassis is placed on its side and the four motor-mounting screws inserted through the underside of the chassis and tightened.

23. Connect the motor leads to the terminal strip as shown in Fig. 2 (for motors with 5 leads) or Fig. 3 (for motors with 6 leads).

24. Replace the carriage cover and screws.

25. Replace the gear-shift handle knob.

26. Connect the speedometer cable by inserting the cable plug into the socket on the underside of the governor.

27. To calibrate the speedometer, remove the speedometer shield by withdrawing the three screws which hold it in the machine cover, then lift out the speedometer. Replacement of the speedometer, if required, can be made at this point. This is done as follows:

Withdraw the three screws holding the speedometer in its mounting ring. Then disconnect the two-wire cord from the meter terminals. Remove the speedometer. Insert the new speedometer. Fasten it in place with the three screws. Attach the two-wire cord to the speedometer terminals (either wire can be attached to either terminal).

28. Plug the carriage cable into a power outlet and calibrate the speedometer as follows:

Adjust the governor speed control dial so that the carriage runs at about half speed. Measure the distance traveled by the carriage in one minute. Loosen the screw on the sliding contact of the calibration resistor. (This resistor is mounted on the back of the speedometer. See Fig. 5.) With the carriage running at the measured speed, adjust the position of the sliding contact until the reading of the speedometer agrees with this measured speed. Then tighten the contact screw. (The contact can be adjusted by hand without fear of electrical shock, since the resistor has no connection with any high voltage circuits within the carriage.)

29. Replace the speedometer and shield in the carriage cover and fasten them securely in place.

*If a ratio other than 832:1 or 200:1 has been installed, a blank dial must be installed in the speedometer and calibrated from low to high speed in small steps.
FIG. 4 SPEED CONVERSION --- CHASSIS GEAR REPLACEMENT

II-Conversion Instructions

Low-Speed to Standard-Speed
Standard-Speed to Low-Speed

A conversion of this type involves changes in the gearing located in the forward end of the carriage chassis. Figure 4 shows the locations of the parts to be changed, and the following chart lists by number the parts for each range:

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>37N40</td>
<td>8</td>
<td>37N59</td>
<td>23</td>
<td>37V20</td>
</tr>
<tr>
<td>Low</td>
<td>37N89</td>
<td>2</td>
<td>37N90</td>
<td>23</td>
<td>37V36</td>
</tr>
</tbody>
</table>

(Note: Early model carriages (those without an electrical reversing switch), use 2 worm gears and 2 clutch gears.)

Conversion procedure is as follows:

1. Remove the Motor-Governor-Gear Reduction Unit Assembly as outlined in Steps 1 through 9 in Part I.

2. Remove the chassis gear-box cover by withdrawing the six screws which hold it to the chassis. Remove the grease from the gear-box.

3. Disassemble the worm shaft as follows:
   Loosen the setscrew in the coupling on the rear of the shaft, pull off the coupling and remove the Woodruff key from the shaft. Drive out the pin which holds the rear collar to the shaft. Back off the two locknuts which hold the worm in place. Remove the bearing cap from the front end of the chassis by withdrawing its four screws, and pull the worm shaft with its forward bearing out through the forward bearing opening. NOTE: Earlier model carriages contain 2 of these worm shafts (see Fig. 4). The second shaft is removed in a similar manner.

4. Remove the clutch gear as follows:
   Remove the two locknuts from the drive wheel shaft on the right side of the carriage, pull off the drive wheel, then remove the bearing retainer and bearing by withdrawing the four flat-head attaching screws. Remove the clutch gear from the drive wheel shaft, and replace with the new clutch gear. Reassemble the bearing, bearing retainer and screws in the chassis, place the drive wheel on the drive wheel shaft and replace
the two wheel-retaining locknuts. (At this point the left clutch gear used in earlier models should be replaced in a similar manner.)

5. Reassemble the worm shaft(s) into the chassis, substituting the new worm gear(s) in place of the removed gear(s). (Refer to Fig. 4 for correct order of parts.) Then fill the gear box with Royco #6A grease.

6. Replace the gear box cover, making sure that its gasket is still intact and forms a good seal.

7. Reassemble the carriage as outlined in Steps 22 through 26, Part I.

8. Replace the speedometer with the new speedometer and calibrate, as outlined in Steps 27 through 29.

FIG. 5 ADJUSTMENT OF SLIDING CONTACT
INDUSTRIAL GASES
LINDE Oxygen, Nitrogen, Argon, Hydrogen
PREST-O-LITE Acetylene
LINDE Rare Gases: Argon, Neon, Helium, Krypton, Xenon

CALCIUM CARBIDE
UNION Carbide
CARBIC Processed Carbide

OXY-ACETYLENE EQUIPMENT
OXWELD Apparatus for:
- Welding, Cutting, Deserving, Hard-Facing,
- Heating, Forming, Flame-Hardening,
- Flame-Softening, Flame-Strengthening,
- Flame-Priming, Flame-Descaling, and
- Flame-Gouging
Acetylene Generators
Manifolds, Regulators and Valves
Welding Rods and Supplies
PREST-O-WELD Welding and Cutting Apparatus
PUROX Welding and Cutting Apparatus
PREST-O-LITE Air-Acetylene Apparatus and Small Tanks
CARBIC Acetylene Flood Lights
Acetylene Generators

SPECIAL MACHINES
LINDE Plate-Edge Preparation Equipment
Steel-Conditioning Machines
Sub-Zero Cold Treatment Equipment
OXWELD Oxy-Acetylene Cutting Machines
Pressure-Welding Machines

ELECTRIC WELDING EQUIPMENT
UNIONMELT Automatic Welding Apparatus and Supplies
HELIARC Welding Torches

SYNTHETIC GEM MATERIALS
LINDE Synthetic Sapphire, Ruby, and Spinel
Fine Alumina Abrasive

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation

DOMINION OXYGEN COMPANY, LIMITED, TORONTO

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4221 North Broad Street
PITTSBURGH 19, PA.
311 Ross Street

Central States
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230 North Michigan Avenue
CINCINNATI 6, OHIO
2506 May Street
CLEVELAND 14, OHIO
1513-17 Superior Avenue
DETROIT 2, MICH.
6-240 General Motors Building
3044 West Grand Boulevard
INDIANAPOLIS 4, IND.
729 North Pennsylvania Street
WILKESBARRE 6, PA.
1625 South 30th Street
MINNEAPOLIS 2, MINN.
927 Second Avenue, South
ST. LOUIS 8, MO.
4228 Forest Park Boulevard

Southern States
ATLANTA 3, GA.
310 Peachtree Street, N. E.
BIRMINGHAM 2, ALA.
1001-13 South 22nd Street
JACKSONVILLE 3, FLA.
2140 Dennis Street
MEMPHIS 5, TENN.
48 West McLemore Avenue
NEW ORLEANS 13, LA.
828-32 Howard Avenue

Southwestern States
DALLAS 1, TEXAS
2626 Commerce Street
DENVER 9, COLO.
685 South Broadway
HOUSTON 11, TEXAS
6119 Harrisburg Boulevard
KANSAS CITY 6, MO.
310 Baltimore Avenue
TULSA 3, OKLA.
614 National Bank of Tulsa Bldg.
320 South Boston Avenue

Western States
EL PASO, TEXAS
610 Texas Street
LOS ANGELES 14, CALIF.
416 West 8th Street
PHOENIX, ARIZ.
341 West Buchanan Street
PUEBLA 9, ORE.
1205 Northwest Marshall Street
SALT LAKE CITY 1, UTAH
362 Pierpont Avenue
SAN FRANCISCO 4, CALIF.
214 Sansome Street
SEATTLE 5, WASH.
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