DEPARTMENT OF THE ARMY TECHNICAL MANUAL **TM 5-3810-207-35**

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER **TO 36C23-3-37-21**

FIELD AND DEPOT MAINTENANCE MANUAL
CRANE-SHOVEL, BASIC UNIT, TRUCK MTD
20 TON, 3/4 CU YD, GASOLINE DRIVEN
6 X 6 (QUICKWAY MODEL M-200)
NON-WINTERIZED
CRANE SERIAL NUMBERS 20-026 THROUGH 20-500
CARRIER SERIAL NUMBERS 59-026C THROUGH 59-500C
(FSN 3810-542-4982)
WINTERIZED TO MINUS 65 DEGREES
CRANE SERIAL NUMBERS 20-001 THROUGH 20-025
CARRIER SERIAL NUMBERS 59-001C THROUGH 59-025C
(FSN 3810-542-4980)

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
JUNE 1962

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***TM 5-3810-207-35**
TO 36C23-3-37-2

TECHNICAL MANUAL
No. 5-3810-207-35
TECHNICAL ORDER
No. 36C23-3-37-2

DEPARTMENT OF THE ARMY

AND THE AIR FORCE

WASHINGTON 25, D. C., 27 June 1962

FIELD AND DEPOT MAINTENANCE MANUAL

CRANE-SHOVEL, BASIC UNIT TRUCK MOUNTED: 20 TON 3/4 CU YD; GASOLINE DRIVEN, 6x6 (QUICKWAY MODEL M-200) NON-WINTERIZED CRANE SERIAL NUMBERS 20-026 THROUGH 20-500 CARRIER SERIAL NUMBERS 59-026C THROUGH 59-500C (FSN 3810-542-4982) WINTERIZED TO MINUS 65 DEGREES CRANE SERIAL NUMBERS 20-001 THROUGH 20-025 CARRIER SERIAL NUMBERS 59-001C THROUGH 59-025C (FSN 3810-542-4980)

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*This manual supersedes TM 5-3810-207-35, 1 February 1960, including 1, 2 October 1961.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of field and depot maintenance personnel maintaining the Quickway Model M-200 Crane-Shovel. They provide information on the maintenance of the equipment which is beyond the scope of the tools, equipment, personnel, or supplies normally available to using organizations.

b. Appendix I contains a list of applicable publications. The Maintenance Allocation Chart is in TM 53810-207-20. Field and depot maintenance repair parts are listed in TM 5-3810-20735P.

c. Numbers in parentheses on illustrations indicate quantity. Numbers preceding nomenclature callouts on illustrations indicate the preferred maintenance sequence.

d. Report all deficiencies in this manual on DA Form 2028. Submit recommendations for changes, additions, or deletions to The Commanding General, Military Construction Supply Agency/U. S. Army Engineer Maintenance Center, Corps of Engineers, ATTN: MCSDM, P. O. Box 119, Columbus 16, Ohio. Direct communication is authorized.

e. Report unsatisfactory equipment performance and suggestions for equipment improvement as specified in AR 700-38.

2. Record and Report Forms

For record and report forms applicable to field and depot maintenance, refer to TM 38-750.

Note. Applicable forms, excluding standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

Section II. DESCRIPTION AND DATA

3. Description

A general description of the crane-shovel, the location and description of the identification and instruction plates, and information on the difference in models are contained in TM 5-3810-207-10. A more detailed description of the components is contained in TM 5-3810-207-20. The repair and maintenance instructions are described in appropriate sections of this manual.

4. Tabulated Data

a. Craneshovel.

Manufacturer	Quickway Truck Shovel Co.
Model number	M-200
Designated use	Back hoe, crane, clamshell, dragline, shovel and pile, driver

b. Crane Engine.

Engine	Gasoline
Manufacturer	Continental Motors Corp.
Model	BS-415
Serial numbers	20-001 through 20-500
Horsepower	110 at 1800 rpm (revolutions per minute)
Number of cylinders	6
Cooling	Liquid
Compression at cranking	Cold 100 lb (pounds) hot speed 125 lb
Bore	414 in. (inch)
Stroke	4 in.
Displacement	415 cu. in. (cubic inches)
Governed speed	1800 rpm
Oil pressure at 1800 rpm	40-50 lb
Minimum oil pressure (at 7 lb idle)	
Firing order	1-5-3-6-2-4

Valve springs:
Outside diameter .....1.3125 in.
Wire size .....0.172 in.
Force required to compress spring to 1.67 in .....58.8 lb ±*3.5 lb
Force required to compress spring to 1.226 in .....137 lb + 7 lb

c. Crane Engine Repair and Replacement Standards. Table I lists manufacturer's sizes, tolerances, clearances, and maximum allowable wear and clearance.

d. Carrier Engine.

Engine .....Gasoline
Manufacturer .....Continental Motors Corp.
Model .....SS 6749
Serial numbers .....59001C through 59500C
Horsepower .....227 at 2600 rpm
Number of cylinders 6
Cooling .....Liquid
Compression at cranking.....Cold 80 lb hot 85 lb speed
Bore .....5 3/8 in.
Stroke .....5 1/2 in.
Displacement .....749 cu in.
Governed speed .....1650 rpm
Cycle 4
Rotation of flywheel end.....Counterclockwise
Firing order 1-5-3-6-2-4
Valve springs:
Wire gage:
Outer .....0.225 in.
Inner .....0.172 in.
Force required to compress inner spring to 2.59375 in. 41 lb min to 49 lb max
Force required to compress inner spring to 2.03125 in. 95 lb min to 105 lb max
Force required to compress outer spring to 2.75 in. 85 lb min to 95 lb max
Force required to compress outer spring to 2.1875 in. 192 lb min to 20 lb max
Valve seat angle .....45 deg (degrees)
Valve face angle.....45 deg

e. Carrier Engine Repair and Replacement Standards. Table II lists manufacturer's sizes, tolerances, clearances, and the maximum allowable wear and clearance.

Table I. Crane Engine Repair and Replacement Standards.

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear	Maximum allowable clearance
	Min	Max.	Min	Max.		
Crane Engine						
Pistons:						
Piston to cylinder			0. 004	0.004		
Piston pin hole in piston (dia)	1.2498	1.2501	0.0001	0.0002		
Ring groove dia:						
1st (top)	3.770	3. 780				
2d and 3d	3.834	3.844				
4th	3.794	3.804				
Ring groove width:						
1st	0.097	0.098				
2d and 3d	0.1265	0.1275				
4th	0.251	0.252				
Ring land dia						
1st	4.216	4.220				
2d	4.220	4.224				
3d and 4th	4.225	4.229				
Skirt dia (perpendicular to pin bore)	4.245	4.247				
Piston rings:						
1st (chrome) (compression):						
Width	0.0925	0.0935				
Thickness	0.202	0.212				
Gap clearance			0.013	0.025		
Side clearance			0.0035	0.0055		

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear	Maximum allowable clearance
	Min	Max.	Min	Max.		
2d and 3d (compression):						
Width	0.123	0.124				
Thickness	0.170	0.180				
Gap clearance			0.013	0.025		
Side clearance			0.0025	0.0045		
4th (oil)						
Width	0.248	0.249				
Thickness	0.170	0.180				
Gap clearance				0.013	0.025	
Side clearance				0.002	0.001	
Piston pin.						
Length	3.620	3.625				
Pin dia	1.2498	1.2500				
Pin to piston			0.0001	0.0002		
Bushing id (finished)	1.2503	1.2506				
Bushing length	1.552	1.572				
Bushing od	1.4420	1.4440				
Connecting rods.						
Length (center to center)	8.246	8.248				
Bushing hole dia	1.437	1.438				
Bearing hole dia	2.7130	2.7135				
Bearing thickness.	0.0748	0.0753				
Width at bearing end	1.6775	1.6795	0.006			0.010
Crankshaft.						
Main journal dia	2.9985	2.9995	0.0025	0.0025		
Main journal limits			0.0012	0.0039		
Crankshaft end play			0.005	0.008		
Crankpin dia	2.560	2.561	0.0026	0.0026		
Crankpin limits			0.0014	0.0039		
Crankpin length	1.6855	1.6875				
Camshaft						
Journal dia (all)	2.242	2.243				
Cam lift:						
Intake	0.3395					
Exhaust	0.352					
Camshaft bushing id	2.2445	2.2450	0.0015	0.0030		
Camshaft end play			0.005	0.009		
Valves.						
Valve length (overall)	6 1/16					
Stem dia	0.4335	0.4345				
Head dia:						
Intake	1.995	2.005				
Exhaust	1.620	1.630				
Valve and seat angle	45°					
Stem clearance (desired):						
Intake			0.0025	0.0025		
Exhaust			0.0055	0.0055		
Stem clearance (limits):						
Intake			0.0015	0.0035		
Exhaust			0.0045	0.0065		
Valve guide.						
Length						
Intake	2 13/16					
Exhaust	3 3/8					
Outside dia:						
Intake and exhaust	0.813	0.814				

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear	Maximum allowable clearance
	Min	Min.	Min	Max.		
Inside dia:						
Intake----------	0.4360	0.4370	----------	----------	----------	----------
Exhaust----------	0.4390	0.4400	----------	----------	----------	----------
Valve seat face (top) to top of guide:						
Intake----------	1 1/78	----------	----------	----------	----------	----------
Exhaust----------	1 5/16	----------	----------	----------	----------	----------
Valve Springs.						
Outside dia:----------	1 5/16	----------	----------	----------	----------	----------
Wire size----------	0.0172	----------	----------	----------	----------	----------
Spring length (valve closed):						
Underload of 51.3 to 58.3 lb----------	1.67	----------	----------	----------	----------	----------
Tension limit (min weight closed)-------	----------	----------	----------	----------	----------	46.27 lb
Spring length (valve open):						
Underload of 130 to 144 lb----------	1.226	----------	----------	----------	----------	----------
Tension limit (min weight open)---------	----------	----------	----------	----------	----------	117 lb
Crankcase.						
Cylinder dia----------	4.249	4.251	----------	----------	0.008	----------
Main bearing bore in block----------	3.1913	3.1920	----------	----------	----------	----------
Tappet hole dia----------	1.125	1.126	----------	----------	----------	----------

Table II. Carrier Engine Repair and Replacement Standards.

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear	Maximum allowable clearance
	Min	Min.	Min	Max.		
Carrier Engine						
Pistons:						
Piston to cylinder (desired)----------	----------	----------	0. 008	0.008	----------	----------
Piston pin hole in piston (dia)	1.7499	1.7501	----------	----------	1.7503	
Ring groove dia:						
1st, 2d and 3d ----------	4.876	4.886	----------	----------	----------	----------
4th ----------	4.836	4.846	----------	----------	----------	----------
Ring groove width:						
1st ----------	0.0975	0.0975	----------	----------	0.1005	----------
2d and 3d ----------	0.1255	0.1265	----------	----------	0.1285	----------
4th ----------	0.2505	0.2512	----------	----------	0.2535	----------
Ring land dia						
1st ----------	5.333	5.337	----------	----------	----------	----------
2d----------	5.339	5.343	----------	----------	----------	----------
3d and 4th ----------	5.344	5.348	----------	----------	----------	----------
Skirt dia (perpendicular to pin bore)------	5.367	5.369	----------	----------	----------	----------
Piston rings:						
1st ring (top (chrome) (compression):						
Width----------	0.0925	0.0935	----------	----------	----------	----------
Thickness----------	0.208	0.218	----------	----------	----------	----------
Gap clearance----------	----------	----------	0.018	0.032	----------	----------
Side clearance----------	----------	----------	0.004	0.006	----------	0.0085
2d and 3d (compression):						
Width----------	0.123	0.124	----------	----------		----------
Thickness----------	0.208	0.218	----------	----------	----------	----------
Gap clearance----------	----------	----------	0.018	0.032	----------	----------
Side clearance----------	----------	----------	0.0015	0.0035	----------	0.006

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear	Maximum allowable clearance
	Min	Max.	Min	Max.		
4th ring (oil)						
Width	0.248	0.249				
Thickness	0.208	0.218				
Gap clearance	0.018	0.032	0.018	0.032		0.006
Side clearance	0.0015	0.0035	0.0015	0.0035		
Piston pin.						
Length	4.524	4.529				
Pin dia	1.7498	1.7500			1.7495	
Pin to piston			0.0001	0.0030		
Bushing id (finished)	1.7503	1.7505	0.0003-	0.0007		0.0017
Bushing length	1 15/16					
Bushing od	1.941	1.944				
Connecting rods.						
Length (center to center)	10.498	10.502				
Bushing hole dia	1.937	1.938				
Bearing hole dia	3.6915	3.6950				
Bearing thickness.	0.0950	0.0955			0.0945	
Width at bearing end	2.426	2.428	0.008	0.012		
Crankshaft.						
Main journal dia	3.749	3.750	0.0020	0.0046	3.748	0.005
Main journal limits			0.0012	0.004		
Crankshaft end play			0.005	0.008		0.010
Crankpin dia	3.499	3.500	0.002	0.004	3.498	0.0045
Crankpin limits			0.0005	0.0035		
Camshaft						
Journal dia (all)	2.2470	2.2480			2.2465	
Cam lift:	0.374					
Camshaft bushing id	2.2495	2.2500			2.2510	
Camshaft end play			0.004	0.006		
Tappets						
Tappet dia	0.6082	0.6087			0.6072	
Tappet guide id	0.6089	0.6101	0.0019	0.0002	0.6111	0.0029
Valves.						
Valve length (overall)	7 1/4					
Stem dia	0.4955	0.4965			0.4935	
Head dia	2.245	2.255				
Valve and seat angle	45°	45°				
Stem clearance (desired):						
Intake			0.002	0.002		
Exhaust .			0.0035	0.0035		
Stem clearance (limits*):*						
Intake			0.0008	0.0023		0.0043
Exhaust .			0.0025	0.0045		0.0065
Valve guides						
Length:						
Intake	3 13/16					
Exhaust	4 1/8					
Outside dia:						
Intake and exhaust	0.8755	0.8765				
Inside dia						
Intake	0.4973	0.4978			0.4993	
Exhaust	0.4990	0.5000			0.5015	
Cylinder head face to top of guide:						
Intake	1 17/32					
Exhaust	1 1/2					

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear	Maximum allowable clearance
	Min	Min.	Min	Max.		
Valve springs.						
Outside dia:						
Outer----------	1.8875	1.9075	----------	----------	----------	----------
Inner ----------	1.3550	1.3750	----------	----------	----------	----------
Wire gage:						
Outer .----------	0.225	----------	----------	----------	----------	----------
Inner----------	0.172	----------	----------	----------	----------	----------
Spring length (valve closed):						
Outer (under load of 85 to 95 lb)---------	2 3/4	----------	----------	----------	----------	----------
Inner (under load of 41 to 49 lb)----------	2 19/32	----------	----------	----------	----------	----------
Tension limits (in pounds):						
Outer (min weight closed)----------	----------	----------	----------	----------	----------	77 lb
Inner (min weight closed)----------	----------	----------	----------	----------	----------	37 lb
Spring length (valve opened):						
Outer (under load of 192 to 208 lb)------	2 3/4	----------	----------	----------	----------	----------
Inner (under load of 95 to 105 lb---------	2 1/32	----------	----------	----------	----------	----------
Tension limits (in pounds):						
Outer (min weight open)----------	----------	----------	----------	----------	----------	----------
Inner (min weight open)----------	----------	----------	----------	----------	----------	----------
Crankcase.						
Cylinder dia----------	5.375	5.377	----------	----------	5.385	----------
Main bearing bore in block----------	4.002	4.003	----------	----------	----------	----------
Rocker arms and Shaft						
Arm to shaft clearance----------	----------	----------	0.0005	0.0015	----------	----------

f. Carrier.

Manufacturer .....K. W. Dart Truck Co.
Model.....M-1200
Designed use.....Carrier of crane

g. Carrier Clutch.

Manufacturer .....Lipe-Rollway Corp.
Model.....150-1-466
Type.....ML

h. Transmission.

Manufacturer Fuller Manufacturing Co.
Model.....5-C-650

i. Transfer Case.

Manufacturer Rockwell Standard Corp.
Model.....T-226-B-15
Ratio 2.48-1

j. Front Axle.

Manufacturer Rockwell Standard Corp.
Model.....F234WX2
Ratio 10.17-1

k. Rear Axles.

Manufacturer Rockwell Standard Corp.
Front rear model.....RDFPX22
Rear rear model RDRPX46
Ratio10.26-1

l. Adjustments.

(1) Crane engine.

Spark plugs .....0.035 inch
Tappets (hot).....0.014-0.015 inch
Fan belt .....¼ to ½ in. depression midway between generator pulley and crankshaft pulley
Distributor.....0.020 inch

(2) Crane.

Swing clutch - 0.015 in. between drum and clutch lining at each point
Boom hoist brakeband .....¾ in. between head of
.....adjusting screw and
.....brake arm
Boom hoist return spring..... 1/32 in. between spring coils when brake is engaged

(3) Carrier engine.

Spark plugs ..... 0.035 inch
Fan belt ¾ to 1 in. depressed midway between generator pulley and crankshaft pulley
Distributor .....0.020 inch