

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE
MANUAL

CRANE-SHOVEL, CRAWLER MOUNTED
121/2-TON, 3/4-CU YD; DIESEL ENGINE
DRIVEN (BUCYRUS-ERIE MODEL 22BM)
FSN 3810-869492

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**OPERATOR AND ORGANIZATIONAL MAINTENANCE
MANUAL
CRANE-SHOVEL, CRAWLER MOUNTED; 12½-TON,
¾CU YD; DIESEL ENGINE DRIVEN
(BUCYRUS-ERIE MODEL 22BM)
FSN 3810-869-3092**

List of Illustrations

			Paragraph	Page
CHAPTER	1.	INTRODUCTION		
Section	I.	General.....	1-1--1-3	1-1
	II.	Description and data.....	1-4--1-6	1-1--1-6
CHAPTER	2.	OPERATING INSTRUCTIONS		
Section	I.	Service upon receipt of materiel.....	2-1--2-9	2-1--2-20
	II.	Movement to new worksite.....	2-10, 2-11	2-28
	III.	Controls and instruments.....	2-12, 2-13	2-31
	IV.	Operation under usual conditions.....	2-14--2-22	2-39--2-55
	V.	Operation under unusual conditions.....	2-23-- 2-27	2-58--2-59
CHAPTER	3.	OPERATOR'S MAINTENANCE INSTRUCTIONS		
Section	I.	Basic issue items.....	3-1, 3-2	3-1
	II.	Lubrication instructions.....	3-3, 3-4	3-1
	III.	Preventive maintenance checks and services.....	3-5, 3-6	3-3
	IV.	Troubleshooting.....	3-7, 3-8	3-6
	V.	Maintenance of engine clutch assembly, release mechanism control levers and turntable swinglock.....	3-9--3-12	3-7
	VI.	Maintenance of fuel system components.....	3-13, 3-14	3-12
	VII.	Maintenance of engine cooling system components.....	3-15, 3-16	3-15
	VIII.	Maintenance of electrical system components.....	3-17, 3-18	3-16
	IX.	Maintenance of transmission assembly.....	3-19	3-18
	X.	Maintenance of wheels and tracks.....	3-20--3-22	3-18
	XI.	Maintenance of cab components.....	3-23, 3-24	3-22
	XII.	Maintenance of crane, shovel, and earthmoving equipment..... components	3-25--3-37	3-24--3-30
CHAPTER	4.	ORGANIZATIONAL MAINTENANCE INSTRUCTIONS		
Section	I	Repair parts, special tools, and equipment.....	4-1--4-3	4-1
	II	Preventive maintenance checks and services.....	4-4, 4-5	4-1
	III.	Troubleshooting.....	4-6, 4-7	4-1
	IV.	Radio interference suppression.....	4-8--4-11	4-3
	V.	Maintenance of engine cylinder head and valve mechanism.....	4-12, 4-13	4-3--4-7
	VI.	Maintenance of engine oil cooler and oil filter assembly, and main clutch adjustment.....	4-14--4-16	4-7
	VII	Maintenance of clutch release mechanism control levers, and turntable swing lock.....	4-17, 4-18	4-10
	VIII.	Maintenance of engine fuel system components.....	4-19--4-27	4-12
	IX.	Maintenance of engine exhaust system components.....	4-28--4-30	4-22

* This manual supersedes Operator and Organizational maintenance portion of TM 5-3810-289-15, 3 July 1968.

		Paragraph	Page
Section	X.	Maintenance of engine cooling system components.....	4-31--4-34
	XI.	Maintenance of electrical system components.....	4-35--4-46
	XII.	Maintenance of transmission assembly, wheels and track components	4-47--4-50
	XII.	Maintenance of cab components	4-51--4-52
	XIV.	Maintenance of crane boom assembly, dragline, and clamshell front end equipment.....	4-53--4-61
	XV.	Maintenance of clutch and brake assemblies	4-62--4-64
	XVI.	Maintenance of chain case assembly, cone rollers, and gear case ... covers	4-65--4-67
	XVII.	Maintenance of shovel front end equipment	4-68--4-73
	XVIII.	Maintenance of backhoe front end equipment	4-74--4-79
APPENDIX	A.	REFERENCES.....	A-1—A-7
	B.	MAINTENANCE ALLOCATION CHART	B-1--B-4
	C.	BASIC ISSUE ITEMS LIST	C-1--C-4
INDEX			I-1

LIST OF ILLUSTRATIONS

<i>Figure No.</i>	<i>Title</i>	<i>Page</i>
1-1	Right front view of model 22BM crane-shovel	1-2
1-2	Left rear view of model 22BM crane-shovel	1-3
1-3	Crane boom angle chart	1-7
1-4	Electrical system, schematic diagram (sheet 1 of 2)	1-8
1-4	Electrical system, schematic diagram (sheet 2 of 2)	1-9
2-1	Battery cable connections.....	2-2
2-2	Installation of counterweight and boom angle indicator (sheet 1 of 2).....	2-3
2-2	Installation of counterweight and boom angle indicator (sheet 2 of 2).....	2-4
2-3	Operating levers	2-5
2-4	Operating pedals	2-6
2-5	Crowd clutch linkage.....	2-6
2-6	Forward brakeband.....	2-7
2-7	Jib boom cable reeving diagram	2-8
2-8	Dragline and clamshell front end attachment.....	2-9
2-9	Backhoe and shovel front end attachment	2-9
2-10	Dragline fairlead, removal and installation	2-10
2-11	Dragline cable reeving	2-11
2-12	Drag chain clevis, removal and installation	2-12
2-13	Tagline unit, removal and installation	2-12
2-14	Clamshell cable reeving.....	2-13
2-15	Backhoe boom support cribbing	2-14
2-16	Backhoe cable reeving	2-15
2-17	Roller and spacer arrangement	2-16
2-18	Roller assembly, shaft and spacers	2-17
2-19	Crowd chain sprocket, removal and installation	2-18
2-20	Shovel components	2-19
2-21	Crowd chain adjusting bracket.....	2-20
2-22	Shovel boom support cribbing	2-20
2-23	Shovel cable reeving	2-21
2-24	Dipper trip cable reeving.....	2-22
2-25	Dipper trip clutch adjustment	2-22
2-26	Dipper adjustment	2-23
2-27	Backhaul cable adjustment.....	2-24
2-28	Saddle block wearing plate adjustment.....	2-24
2-29	Piledriver, assembly and disassembly (sheet 1 of 3)	2-25
2-29	Piledriver, assembly and disassembly (sheet 2 of 3)	2-26
2-29	Piledriver, assembly and disassembly (sheet 3 of 3)	2-27
2-30	Crane-shovel mounted on trailer.....	2-29
2-31	Counterweight blocking	2-30
2-32	Engine controls and instruments (sheet 1 of 2).....	2-32
2-32	Engine controls and instruments (sheet 2 of 2).....	2-33
2-33	Operating controls	2-34
2-34	Dragline operating controls.....	2-35
2-35	Clamshell operating controls	2-36
2-36	Backhoe operating controls	2-37
2-37	Shovel operating controls	2-38
2-38	Starting the engine (sheet 1 of 2).....	2-40
2-38	Starting the engine (sheet 2 of 2).....	2-41
2-39	Stopping the engine.....	2-42
2-40	Operating the crane-shovel, spotting operation (sheet 1 of 2).....	2-43
2-40	Operating the crane-shovel, spotting operation (sheet 2 of 2)	2-44
2-41	Operating the crane-shovel, hoisting and lowering operation (sheet 1 of 2)	2-45
2-41	Operating the crane-shovel, hoisting and lowering operation (sheet 2 of 2)	2-46
2-42	Operating the crane-shovel, swinging operation (sheet 1 of 2)	2-47
2-42	Operating the crane-shovel, swinging operation (sheet 2 of 2).....	2-48
2-43	Operating the crane-shovel, propelling	2-49
2-44	Operating the crane-shovel, steering	2-50
2-45	Operating the dragline (sheet 1 of 2)	2-51
2-45	Operating the dragline (sheet 2 of 2)	2-52
2-46	Operating the clamshell (sheet 1 of 2)	2-53
2-46	Operating the clamshell (sheet 2 of 2)	2-54
2-47	Operating the backhoe (sheet 1 of 2).....	2-54

<i>Figure No</i>	<i>Title</i>	<i>Page</i>
2-47	Operating the backhoe (sheet 2 of 2).....	2-55
2-48	Operating the shovel (sheet 1 of 2).....	2-56
2-48	Operating the shovel (sheet 2 of 2).....	2-57
3-1	Oil filter service.....	3-2
3-2	Engine clutch assembly.....	3-8
3-3	Engine clutch assembly inspection.....	3-9
3-4	Control levers.....	3-10
3-6	Swing lock adjustment.....	3-11
3-6	Air cleaner service.....	3-13
3-7	Fuel tank and cap, service and replacement.....	3-14
3-8	Belt adjustment.....	3-15
3-9	Alternator belt.....	3-17
3-10	Track idler service (inner side view).....	3-19
3-11	Track idler service (outer side view).....	3-20
3-12	Track belt and roller chain adjustment.....	3-21
3-18	Seat assembly adjustment.....	3-23
3-14	Boom assembly inspection.....	3-25
3-15	Operating clutch inspection.....	3-26
3-16	Operating clutch adjustment.....	3-27
3-17	Steering clutches adjustment.....	3-28
3-18	Boom hoist brakeband adjustment.....	3-29
3-19	Digging lock.....	3-31
4-1	Valve cover replacement.....	4-4
4-2	Rocker arm adjustment (tappet clearance).....	4-5
4-3	Rocker arm adjustment (locknut torque).....	4-6
4-4	Oil cooler, removal and installation.....	4-8
4-5	Oil cooler disassembly.....	4-9
4-6	Swing lock replacement.....	4-11
4-7	Fuel pump filter screen service.....	4-13
4-8	Fuel lines and fittings replacement.....	4-14
4-9	Fuel lines and fittings.....	4-15
4-10	Fuel inlet and drain connection.....	4-16
4-11	Shutdown valve replacement.....	4-17
4-12	Air cleaner replacement.....	4-18
4-13	Fuel filter replacement.....	4-19
4-14	Primer assembly service and replacement.....	4-20
4-15	Throttle control assembly.....	4-21
4-16	Air intake manifold replacement.....	4-23
4-17	Muffler and exhaust pipe replacement.....	4-24
4-18	Exhaust manifold replacement.....	4-25
4-19	Radiator, service and replacement.....	4-27
4-20	Belt adjustment.....	4-28
4-21	Thermostat testing.....	4-29
4-22	Thermostat and thermostat housing replacement.....	4-30
4-23	Fan blade replacement.....	4-31
4-24	Alternator test connection (sheet 1 of 2).....	4-33
4-24	Alternator test connection (sheet 2 of 2).....	4-34
4-25	Alternator replacement.....	4-35
4-26	Starting motor, internal wiring diagram.....	4-36
4-27	Starting motor, removal and installation.....	4-37
4-28	Solenoid testing.....	4-38
4-29	Solenoid replacement.....	4-39
4-30	Engine safety control replacement.....	4-40
4-31	Horns, lights and control panel.....	4-41
4-32	Battery and battery cable replacement.....	4-43
4-33	Transmission shaft.....	4-45
4-34	Upper track support rollers.....	4-46
4-35	Lower track support rollers.....	4-47
4-36	Track belt, removal and installation.....	4-48
4-37	Cab assembly.....	4-50
4-38	Seat assembly, removal and installation.....	4-52
4-39	Reeving boom suspension cable.....	4-54
4-40	Reeving crane hoist cable.....	4-55
4-41	Boom point sheaves.....	4-56
4-42	Boom, removal.....	4-57

<i>Figure No</i>	<i>Title</i>	<i>Page</i>
4-43	Splice bolts	4-59
4-44	Boom assembly, exploded view.....	4-60
4-45	Dragline bucket, disassembly and reassembly	4-62
4-46	Dragline fairlead, disassembly and reassembly	4-63
4-47	Clamshell bucket, disassembly and reassembly.....	4-64
4-48	Boom cribbing method.....	4-65
4-49	Jib boom assembly, exploded view.....	4-66
4-50	Jib boom mast assembly, exploded view.....	4-67
4-51	Clutch and brakebands, removal and installation (Sheet 1 of 2)	4-69
4-51	Clutch and brakebands, removal and installation (sheet 2 of 2)	4-70
4-52	Gear case sump	4-72
4-53	Cone roller replacement	4-78
4-54	Front frame cover	4-74
4-55	Rear frame cover.....	4-75
4-56	Bevel gear case cover	4-76
4-57	Shovel dipper assembly, removal and installation.....	4-77
4-58	Saddle block, disassembly and reassembly	4-78
4-59	Backhoe dipper assembly, exploded view	4-80
4-60	Backhoe handle and pitch brace assembly, exploded view.....	4-81
4-61	Backhoe A-frame assembly, exploded view.....	4-82
4-62	Backhoe boom assembly, exploded view	4-83

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual contains instructions for use by personnel to whom model 22BM crane-shovel is issued. It provides information on operation preventive maintenance checks and services, and maintenance and repair of equipment, accessories, components, and attachments. Also included are descriptions of main units and their functions, their relationship to other components. Numbers in parentheses following nomenclature callouts or illustrations indicate quantity; numbers preceding nomenclature callouts indicate preferred sequence.

b. Instructions for Administrative Storage and Destruction of Materiel to Prevent Enemy Use are contained in the following technical manuals:

TM 740-90-1	Administrative Storage of equipment
TM 750-244-3	Destruction of Materiel to Prevent Enemy Use

1-2. Maintenance Forms and Records

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-3. Reporting of Errors

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Section II. DESCRIPTION AND DATA

1-4. Description

a. *General.* The model 22BM crane-shovel (fig. 1-1 and 1-2) is a crawler-mounted lifting crane which can be converted to a dragline, clamshell backhoe, shovel, or pile driver. The lifting crane consists of a 30-ft, two-section boom, a 12 1/2-ton capacity hook block, and associated cables. The boom can be lengthened by the addition of sections between the upper and lower boom section. In addition, a jib can be added to the end of the upper boom assembly. The lifting crane can be used for unloading heavy cargo, placing steel beams in construction work, and other heavy lifting jobs. Load control afforded by the regular hoist line is supplemented by an independent boom hoist. Full power control of both raising and lowering the boom permits accurate spotting of the load in the horizontal as well as the vertical plane.

b. *Basic Crane-Shovel.* The basic crane-shovel is divided into three sections: the front end equipment, the upper works, and the lower works.

(1) The front end equipment consists of the crane, dragline, clamshell, backhoe, pile driver, and

shovel components.

(2) The upper works consist of the revolving frame, main machinery, engine, operating controls, and the operator's cab. The necessary controls and instruments provided for operating the crane-shovel are located in the operator's compartment, in front of and to the left of the operator's seat.

(3) The lower works consist of the steering and propelling machinery, truck frame, crawler frames, track rollers and idlers, and the track belts.

c. *Dragline.* The dragline consists of the crane boom, fairlead, dragline bucket, and the hoist and drag cables. The fairlead assembly is mounted inside the lower section of the boom feet to guide the bucket drag cable. The dragline is used for excavating materials below machine level.

d. *Clamshell.* The clamshell consists of the crane boom, clamshell bucket, and tagline. The

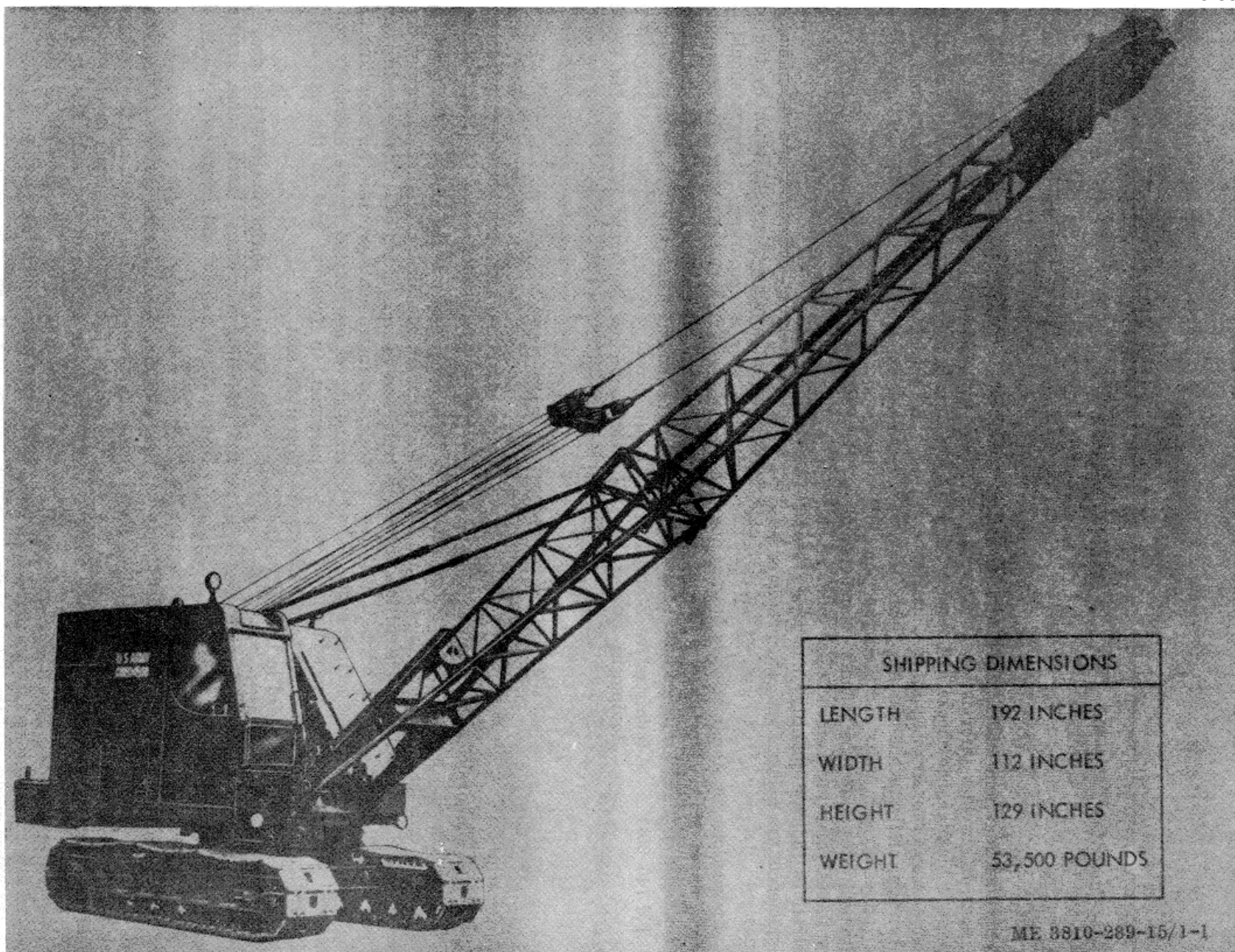


Figure 1-1. Right front view of model 22BM crane-shovel.

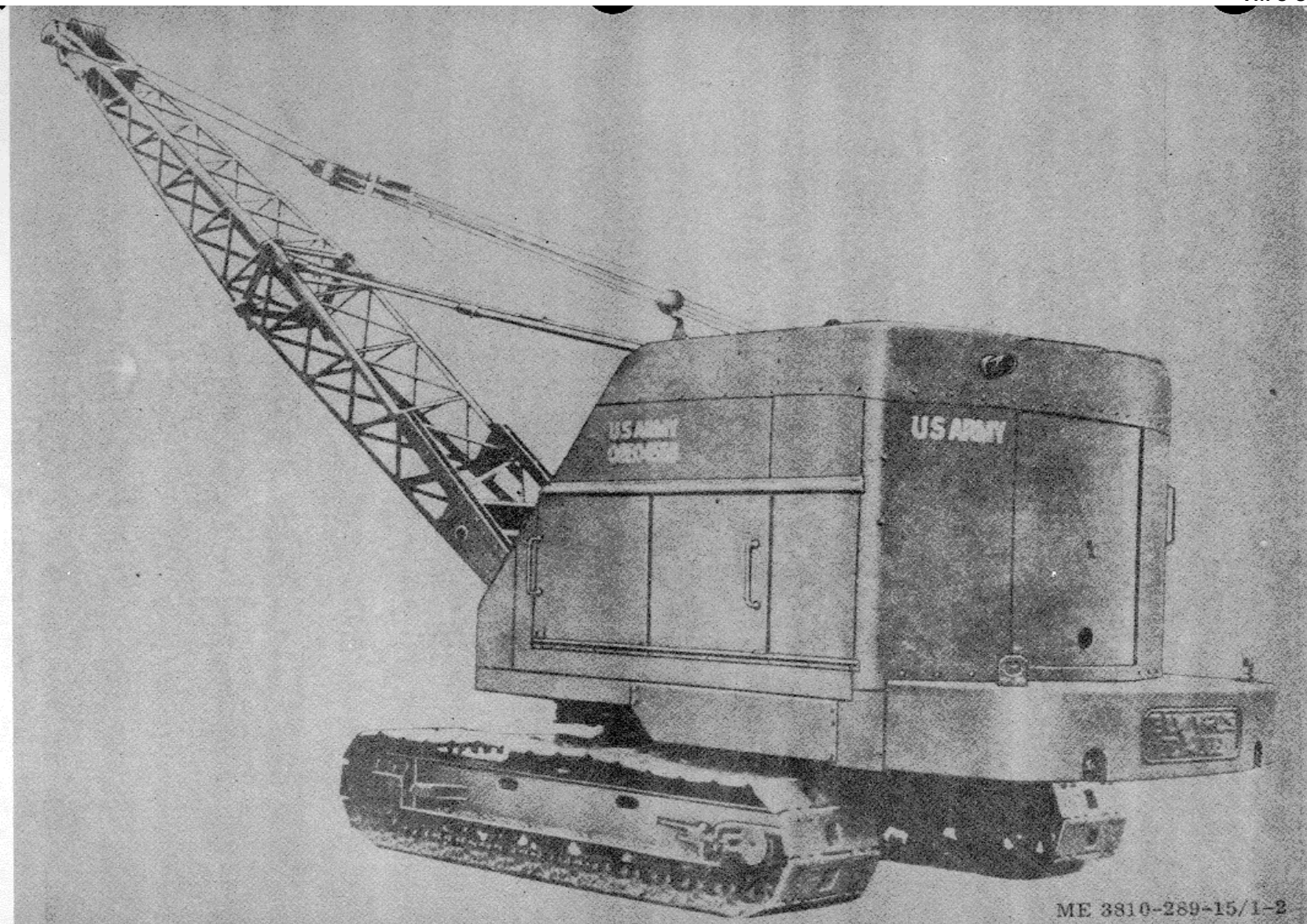


Figure 1-2. Left rear view of model 22BM crane-shovel.

clamshell may be equipped with teeth for excavating, or without teeth for rehandling material in a stock pile. The tagline prevents bucket oscillation during operation.

e. Backhoe. The backhoe consists of the 'backhoe boom, dipper, dipper handle, and an auxiliary A-frame. The dipper handle is hinged at the point to allow scoop action by the dipper as pulled in toward the boom. The digging a of the backhoe is opposite that of the shovel.

f. Shovel. The shovel consists of a shovel boom dipper, dipper handle, and a dipper trip mechanism. A shipper shaft and saddle block mounted midway in the boom, holds and guides the dipper handle. The shovel is used for scooping away from the machine.

g. Piledriver. The piledriver uses the boom. Hammer leads are attached to the point to hold the pile in driving position and the hammer. The hammer leads consist of or section and four lower sections, comprising foot pile-driving lead assembly. The top section is fifteen feet long. Each of the four lower sections is ten feet long. The lead assembly can be used all drop hammers weighing up to 3,000 pounds and with all air, steam, or diesel hammers weighing up to 12,000 pounds. It is adaptable power-excavator-crane-shovels listed in STD-179-8, tables I, II, and III. At the end of the lead assembly, a catwalk attached between brackets on the boom foot and lower section holds the lead assembly in driving position. The catwalk assembly consists of two changeable outer sections, each 7 feet, 8 inches long, and one telescoping inner section, 8 feet long.

h. Power. Power to operate the crane-shovel is supplied by a 6-cylinder, 4 cycle, naturally-aspirated diesel engine. The power is transmitted from the engine, through the power takeoff unit, the chain drive transmission, to the main machinery controlling the crane-shovel operations.

1-5. Identification and Tabulated Data

a. Identification.

(1) Crane-shovel. The plate indicate make, model, serial number and other basic information about the crane-shovel.

(2) Transportation data plate. The contains transportation information regarding shipment of the crane-shovel.

(3) tipper section plate. The plate identifies the proper upper boom section to be used with a particular unit, as called out by a serial number on the plate.

(4) Lower section plate. The plate identifies the

proper lower boom section to be used with a particular unit, as called out by a serial number on the plate.

(5) Cold starting plate. The plate gives instructions on starting in cold weather.

b. Tabulated Data.

(1) Crane-shovel.

Manufacturer	Bucyrus-Erie Co.
Model.....	22BM
Type.....	Crawler mounted
Serial numbers	129566-129742
	129905-130081
	131944-131963
	132052-132151

(2) Engine.

Manufacturer	Cummins
Model.....	JN-6-1
Number of cylinders	6
Type of engine.....	Diesel
Cycle	4
Unit	Fan to flywheel
Bore (in.).....	4% in.
Stroke (in.).....	5 in.
Displacement (cu. in.).....	401
Compression ratio	16.3 : 1
Type drive	Mechanical
Type air intake	Naturally aspirated
Altitude-range (ft.).....	0-5000+107°F
Rotation	Counterclockwise
Cooling	Liquid
Fuel	Diesel fuel oil
Exhaust valve opens	62° BBC
Exhaust valve closes	44° ATC
Intake valve opens	44° BTC
Intake valve closes	40° ABC
Gross 3 HP	101
Lubrication	Pressure
Firing order	1-5-3-6-2-4

(3) Starting motor.

Manufacturer	Leece-Neville
Model.....	M001093018
Volts	24
Mfg. No.....	186763

(4) Accessories.

(a) Alternator.

Make.....	Leece-Neville
Model.....	A001300ZAC
Amps	60
Mfg. No.....	183380

(b) Air cleaner element.

Make.....	Donaldson
Model.....	FWA08-0022
Type.....	Dry

(c) Governor.

Make ----- Cummins
 Type ----- Mechanical variable speed

(d) Fuel injector.

Make ----- Cummins
 Model ----- PT

(e) Fuel pump.

Make ----- Cummins
 Model ----- G

(f) Fuel filter.

Make ----- Fram
 Model ----- FRM-1826

(g) Batteries.

Make ----- MIL-STD-MS 35000-3
 Type ----- 6 TH (dry charge)
 Volts ----- 12
 Qty ----- 4 ea

*(5) Capacities.**(a) Engine.*

Crankcase ----- 16 quarts
 Oil filter ----- 4 quarts
 Fuel tank ----- 50 gallons
 Fuel filter ----- 3 quarts
 Coolant system ----- 7 gallons

(b) Crane-shovel.

Transmission gear case ----- 3 quarts
 Machinery gear case ----- 8 gallons
 Propel gear case ----- 2 quarts

(6) Adjustment data. Refer to the appropriate chapter and paragraph for the adjustment of specific components.

(7) Settings.

Thermostat full open ----- 195'

(8) Nut and bolt torque data. Refer to appropriate paragraph for nut and bolt torque data.

(9) Maximum allowable lifting loads. Refer to figure 1-3 for crane boom angles.

Table 1-1. Operating Ranges

Boom length In feet	Radius in feet	Boom angle in degrees	Boom point pin height	Crane service
30	12	73	33' 6"	25,000
	15	67	32' 6"	19,000
	20	57	29' 9"	12,900
	25	44	25' 6"	9,600
	30	28	18' 6"	7,600
40	12	78	43' 9"	24,800
	15	73	42' 9"	18,800
	20	66	41' 0"	12,700
	25	57	38' 3"	9,400
	30	48	34' 6"	7,350
	35	38	29' 3"	6,000
50	40	24	21' 0"	5,000
	15	77	53' 3"	18,600
	20	71	51' 9"	12,400
	25	65	49' 9"	9,200
	30	58	47' 0"	7,150
	35	51	43' 6"	5,750
60	40	43	38' 9"	4,750
	50	21	23' 0"	3,400
	20	74	62' 3"	12,200
	25	69	60' 6"	8,950
	30	64	58' 6"	6,900
	35	58	55' 9"	5,550
	40	53	52' 3"	4,500
	50	39	42' 6"	3,150
	60	20	24' 9"	2,300

Note. The preceding ratings apply only to machines that are level and standing on hard level uniform supporting surfaces. Loads must be freely suspended. The radii specified are loaded radii. Ratings include blocks, hooks, slings, or other equipment used in handling loads. Proper care must be exercised by the operator at all times to avoid shock or side loadings on the boom. Loads do not exceed 75% of tipping loads with the machine in the least stable position. Loads shown in table 1-1 are for general crane service with the machine on firm, level ground. Maximum boom angle is 78%.

(10) *Recommended hoist tackle.*

Loads over---- 7,000 -----13,500 -----19,000
Parts of line----- 2 ----- 3 ----- 4

Deduct weight of hook blocks, hooks and from listed loads:

12%-ton double sheave swivel hook block

---- weighs----- 195 lbs

(11) *Jibs.* Use jibs for lifting crane service only. Allowable loads on main boom sheave, jib is attached, must be reduced as follows

15 ft jib ----- 800 lbs.

The allowable load over the jib sheave, at any radius from centerline of rotation of the machine, is the same load that may be lifted over the boom sheave (without jib) with boom lowered to that radius, but not to exceed 7,500 lbs. Maximum length of boom to which a jib may attached is 60 ft.

(12) *Machine equipment.* Structural steel angle boom: 7,000 lbs. of outside counterweight.

(a) *Hook block.*

Capacity----- 12.5 tons
Weight ----- 195 lbs

(b) *Wire rope specification.*

Pendant (2) ----- 1 in. dia. x 15 ft
Tackle rope ----- 1/2 in. dia. x 211 ft
Hoist rope ----- See table 4-2

(c) *Wiring diagram.* Refer to figure 1-4.

(d) *Shipping dimension and weights.* Refer to figure 1-1. Bridge weight classification is 27.

1-6. Difference in Models

This manual covers only the model 22BM crane-shovel. No known unit differences exist for the model covered by this manual.