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

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY
MARCH 1970

TECHNICAL MANUAL
No. 5-3810-289-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 13 *March 1970*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL
CRANE-SHOVEL, CRAWLER MOUNTED; 12½-TON, 3/4CU YD; DIESEL ENGINE DRIVEN (BUCYRUS-ERIE MODEL 22BM)
FSN 3810-869-3092

_____

List of Illustrations

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

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

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

b. Instructions for Administrative Storage an Destruction of Materiel to Prevent Enemy Us 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 121/2-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

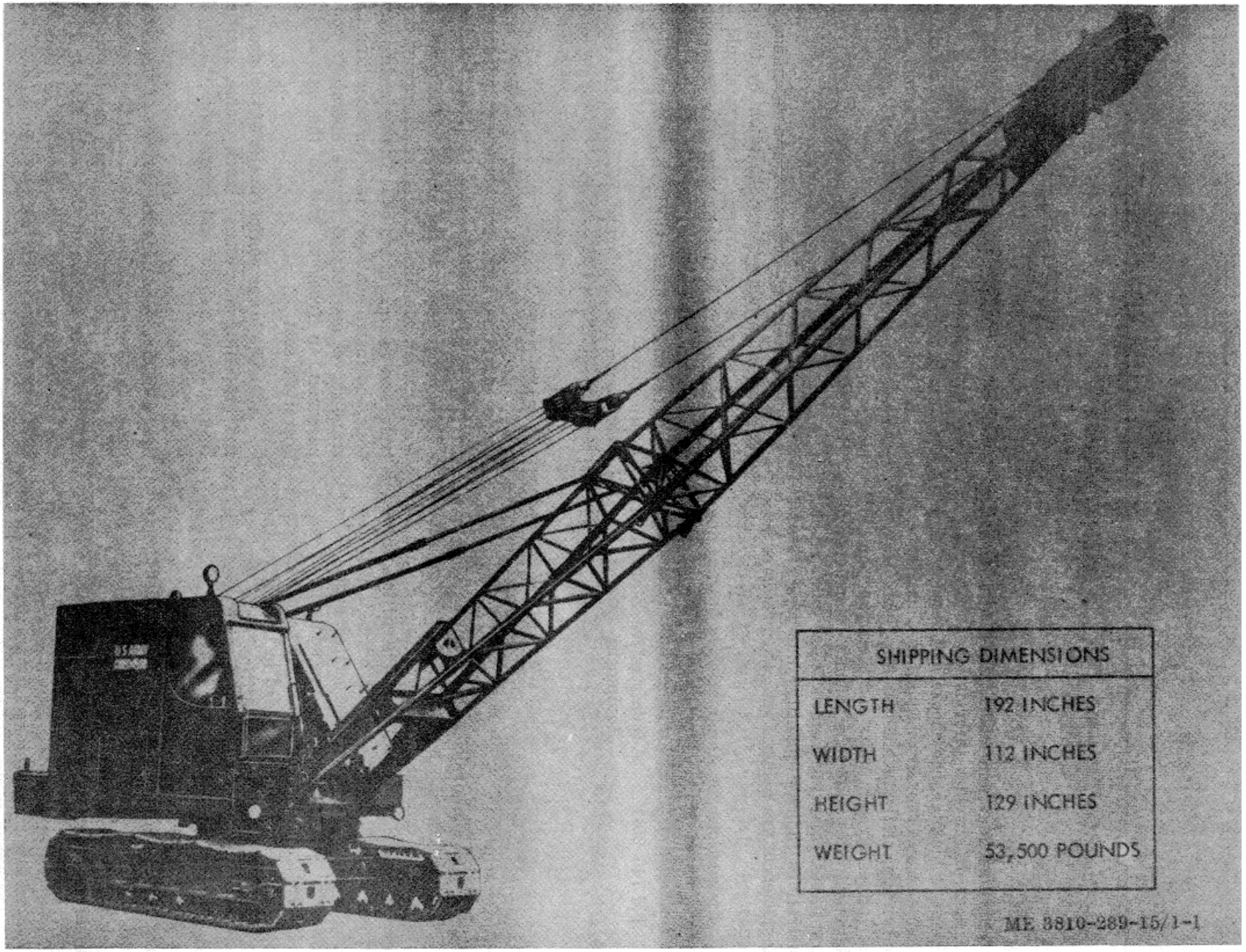

Figure 1-1. Right front view of model 22BM crane-shovel.

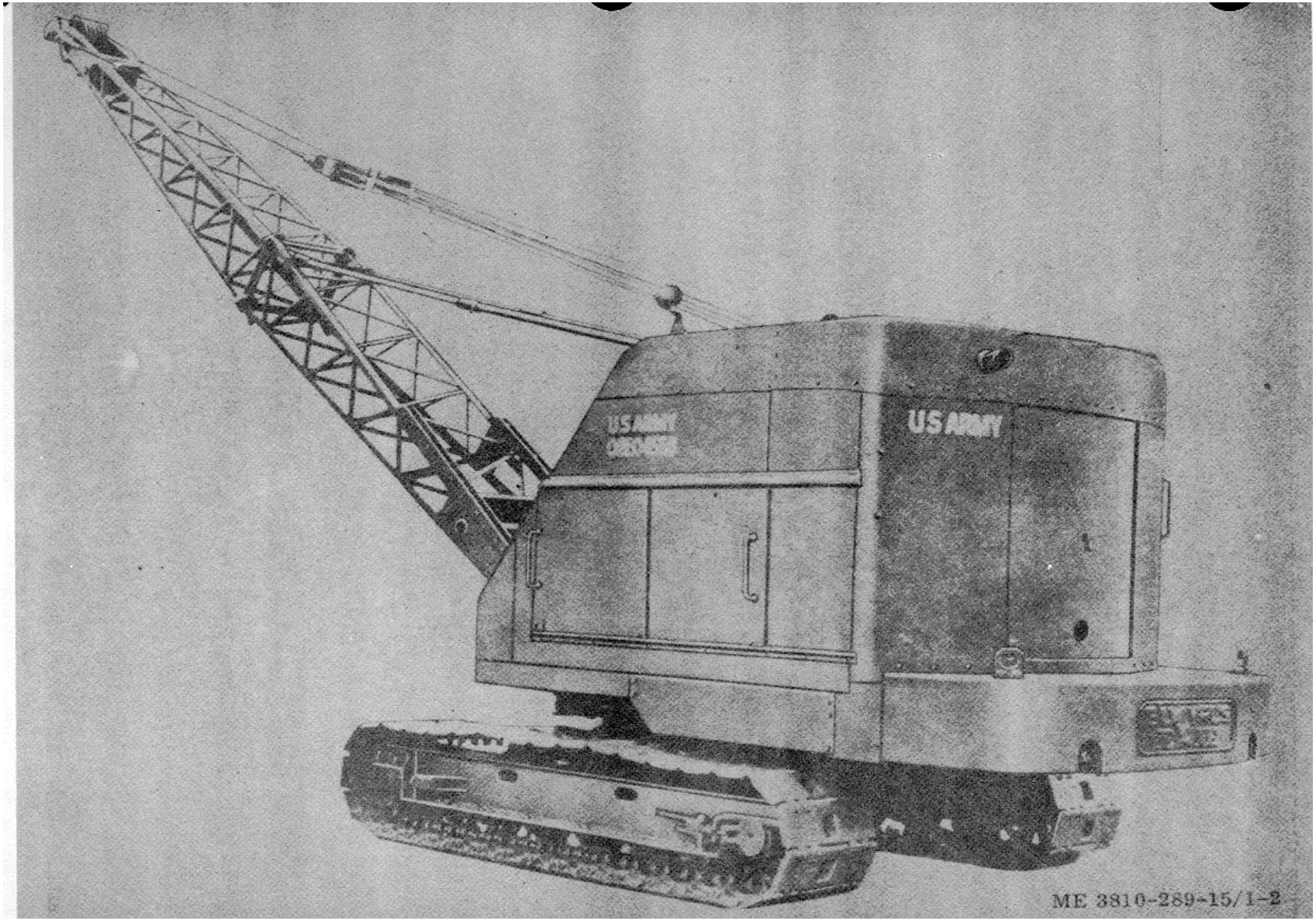

Figure 1-2. Left rear view of model 22BM crane-shovel.

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"	12,9000
	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
	40	24	21’ 0"	5,000
50	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
	40	43	38’ 9"	4,750
	50	21	23’ 0"	3,400
60	20	74	62’ 3"	12,200
	25	69	60’ 6"	8,950
	30	64	58’ 6"	6,900
	35	58	5 5’ 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.