BUCYRUS®

Technical Manual

the gear, all clearance bolts will have to be inserted into this half (as far as they will go) before the other gear half can be assembled.

CAUTION — DO NOT DAMAGE THREADS DURING ASSEMBLY

MOUNT SECOND GEAR HALF

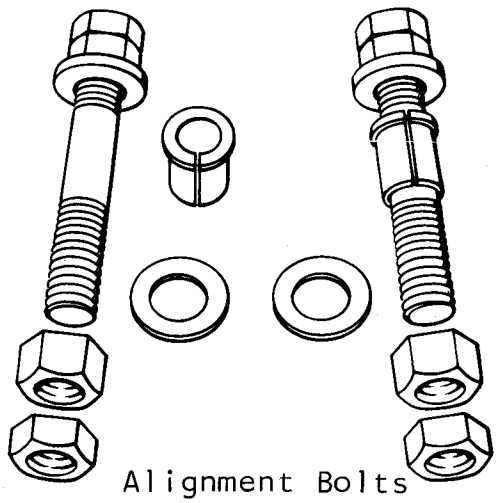
Make a final check for bumps and burrs on the mounting flanges and mating surfaces of both gear halves. Bring the second half of the gear into position. Assemble so that the stamped match marks all appear at the same split. Secure the gear half against the mounting flange with three bolts, one near each split and one 90° from split. These bolts should be snug enough to insure metal-to-metal contact, but not so tight that this gear half cannot be shifted slightly. Align the reamed alignment holes in the splits as accurately as possible by shifting the top half of the gear. Use jackscrews, screw jacks, or hydraulic jacks.

INSTALLATION OF ALIGNMENT BOLTS

ALIGNMENT BOLT ASSEMBLY

An alignment bolt assembly consists of:

Tapered alignment bolt
Split sleeve
Two washers
Two standard nuts
Two lock nuts



Alignment Bolts

Figure 3

Four of these assemblies are furnished with each gear.

ALTERNATE METHOD FOR CHECKING TOOTH CONTACT AND BACKLASH

If it is not possible to use a feeler gauge due to space limitations, proper contact pattern must be obtained by the trace method. Satisfactory contact patterns are shown in Figure 14.

After a correct contact pattern has been established, check the backlash with an indicator, as shown in Figure 12. Determine proper backlash from Table 3. Care should be exercised in adjusting pedestals to establish correct backlash. Use indicators at each pedestal for equal in or out movement so as not to affect a change in contact setting. After proper backlash has been obtained, recheck contact.

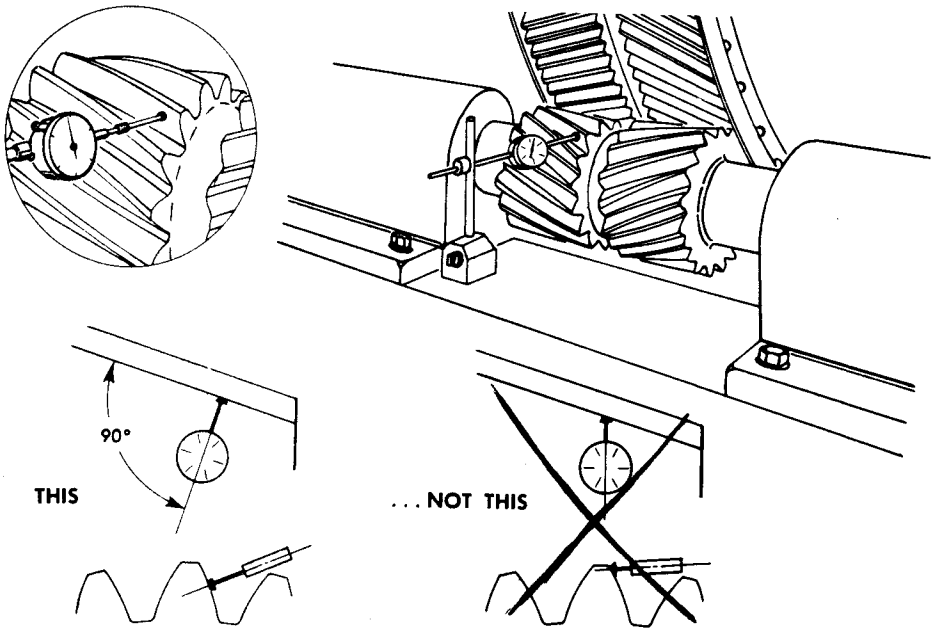


Figure 12

COMPRESSOR OUTFIT DATA

Compressor Outfit	Compressor with Flywheel	Aftercooler or Outlet Tube	Belt (s) ①	Qty.	Motor Characteristics	Flywheel	Motor (Engine) Pulley	Engine or Motor	Check Valve
NM-531	220-4551②	NJ-404	BT-46	1	115 DC	220-458	PU-117	Special Motor	None
PH-501	121-578	PH-101	BT-22	1	115-60-1	NC-419-2	PU-1171	MO-4077	None
			BT-19	1	115-50-1		PU-1173	MO-4079	
			BT-22	1	230-60-1		PU-1171	MO-4078	
			BT-19	1	230-50-1		PU-1173	MO-4080	
PH-502	121-578	PH-101	BT-22	1	(for 60 Cyl.)	NC-419-2	PU-1171	None	None
PH-513	121-578	PH-101	BT-19	1	(for 50 Cyl.)	NC-419-2	PU-1173	None	
PJ-501-1	1202-557-1	PJ-401	BT-9	1	115/230-60-1	120-458	PU-1412	MO-4184	None
			BT-69	1	115/230-50-1		PU-1411	MO-4185	
PJ-521	1202-4512-1②	PJ-402	BT-66	1	115/230-60-1	120-458	PU-1174	MO-4184	None
			BT-67	1	115/230-50-1		PU-1175	MO-4185	
PJE-501	1202-557-1	PJ-401	BT-69	1		120-458	PU-1170	UAJE-410-5	None
PJE-521	1202-4512-1②	PJ-402	BT-10	1		120-458	PU-227	PJE-401-1	None
PL-501-1	220-546	41185-009	BT-69	1	115/230-60-1	120-458	PU-2128	MO-6000	None
			BT-49	1	115/230-50-1		PU-2119	MO-6002	
PL-502-1	220-546	41185-009	BT-70	1	115/230-60-1	120-458	PU-2121	MO-6000	None
			BT-72	1	115/230-50-1		PU-2126	MO-6002	
PL-504	220-541-3	41185-009	25223-557	1	115/230-60-1	220-458	PU-2421	27713-114	None
			BT-46	1	115/230-50-1		25252-102	27713-113	
PLE-501-1	220-546	41185-009	BT-9	1		120-458	(PU-2125)	NJE-401-3	None
PLE-502-1	220-546	41185-009	BT-49	1		120-458	(PU-1223)	NJE-401-3	None
PLE-504	220-541-3	41185-009	BT-17	1		220-458	(25252-031)	25512-009	None
TUC-501-1	230-555-2	UC-412	BT-44	3		230-457	(PU-293)	TUC-404	None
P-TVD-501●	432-553	TVD-401	BT-48	3		432-2	(w-engine)③	TVD-410	None
P-TVD-525	432-553	TVD-401	BT-48	3		432-2	(w-engine)③	TVD-410	None
P-TVDS-501●	432-553	TVD-401	BT-48	3		432-2	(w-engine)③	TVD-410	None
P-TVDS-525	432-553	TVD-401	BT-48	3		432-2	(w-engine)③	TVD-410	None
P-TVN-501-2	445-566-1	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-401-1	None
P-TVN-502-3	445-566-1	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-401-1	None
P-TVN-503-2	445-566-1	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-402-1	None
P-TVN-504-3	445-566-1	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-402-1	None
P-TVNS-501-1	445-566-1	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-401-1	None
P-TVNS-502-2	445-556-1	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-401-1	None
P-TVNS-503-1	445-553-2	(Inner) TVP-418 (Outer) TVP-419	BT-127	4		445-2	(PU-1628)	TVN-402-1	None

● Compressor Outfit Discontinued

Compressor Outfit	Compressor with Flywheel	Aftercooler or Outlet Tube	Belts (s) ①	Qty.	Motor Characteristics	Flywheel	Motor (Engine) Pulley	Engine or Motor	Check Valve
47225-412	44643-501	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-127	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2634 PU-2633 PU-1589	MO-6400 MO-6403 MO-6403	SKK-502
47225-413	44643-801	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-48	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2631 PU-2632 PU-1151	MO-6400 MO-6403 MO-6403	SKK-502
47225-414	44643-801	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-48	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2631 PU-2632 PU-1151	MO-6400 MO-6403 MO-6403	SKK-502
47225-709	44643-501	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-127	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2634 PU-2633 PU-1589	MO-6400 MO-6403 MO-6403	SKK-502
47225-710	44643-501	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-127	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2634 PU-2633 PU-1589	MO-6400 MO-6403 MO-6403	SKK-502
47225-711	44643-801	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-127	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2631 PU-2632 PU-1151	MO-6400 MO-6403 MO-6403	SKK-502
47225-712	44643-801	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-126	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2631 PU-2632 PU-151	MO-6400 MO-6403 MO-6403	SKK-502
47225-713	44643-701	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-127	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2634 PU-2633 PU-1589	MO-6400 MO-6403 MO-6403	None
47225-714	44643-701	(Inner) 41313-004 (Outer) VFF-405	BT-48 BT-48 BT-127	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2621 PU-1151 PU-1148	MO-6400 MO-6403 MO-6403	None
47225-902	44643-801	(Inner) 41313-004 (Outer) VFF-405	BT-126 BT-126 BT-48	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2631 PU-2632 PU-1151	MO-6400 MO-6403 MO-6403	SKK-502
47242-102	4464-801	41177-005	JH-1035	2	115/230-60-1 115/230-50-1 208-220/440-60-3 208-220/440-50-3	330-457	PU-1610 PU-2202 PU-1610 PU-2202	MO-6000 MO-6002 MO-6006 MO-6006	SKK-502
47243-005	44642-801	41177-005	BT-146	2	115/230-60-1 115/230-50-1 208-220/440-60-3 208-220/440-50-3	330-457	PU-2229 PU-2210 PU-2229 PU-2210	MO-6100 MO-6102 MO-6103 MO-6103	SKK-502
47243-403	44642-801	41177-005	BT-146	2	230-60-1	330-457	PU-2229	MO-6100	SKK-502
47244-003	44642-801	41177-005	BT-146 BT-37 BT-146 BT-37	2 2 2 2	115/230-60-1 115/230-50-1 208-220/440-60-3 208-220/440-50-3	330-457	PU-1629 PU-1630 PU-2211 PU-1631	MO-6200 MO-6202 MO-6204 MO-6204	SKK-502
47244-201	44642-801	41177-005	BT-147 BT-148 BT-147 BT-148	2 2 2 2	230-60-1 230-50-1 208-220/440-60-3 208-220/440-50-3	330-457	25235-438 PU-1635 25235-438 PU-1635	MO-6300 MO-6302 MO-6303 MO-6303	SKK-502
47244-403	44642-801	41177-005	BT-146 BT-37 BT-146 BT-37	2 2 2 2	115/230-60-1 115/230-50-1 208-220/440-60-3 208-220/440-50-3	330-457	PU-1629 PU-1630 PU-2211 PU-1631	MO-6200 MO-6202 MO-6204 MO-6204	SKK-502
47246-406	44643-801	(Inner) 41313-004 (Outer) VCF-423	BT-62 BT-62 UAO-15	3 3 3	230-60-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2631 PU-2632 PU-1151	MO-6400 MO-6403 MO-6403	SKK-502
47246-407	44643-801	(Inner) 41313-004 (Outer) VCF-423	BT-131 BT-62 BT-131 BT-131	3 3 3 3	230-60-1 230-50-1 208-220/440-60-3 208-220/440-50-3	432-2	PU-2608 PU-2628 PU-2608 PU-2628	MO-6300 MO-6302 MO-6303 MO-6303	SKK-502

A length of tubing comes from the air receiver and connects to the valve on the pressure switch. When the pressure in the air receiver reaches the cut out pressure it activates the pressure switch and instead of turning the motor off it allows the air from the air receiver to pass through the valve and operate the valve mechanisms thus unloading the compressor.

With a slight change in wiring an outfit with a magnetic unloader can be changed to start and stop operation. A selector switch can be obtained that permits choice of start and stop or constant running operation.

SAFETY VALVES. Safety valves on air receiver are set at the factory. to a pressure approximately 15 lbs. higher than the rated pressure of the outfit to protect it against excessive pressure. An improperly operating or leaking valve should be repaired or replaced immediately.

CHECK VALVE. The check valve allows air to flow from the compressor aftercooler through the check valve toward the air receiver, but not to flow in the opposite direction. This permits the CPR or pressure switch release valve to exhaust the air from the aftercooler when the compressor stops.

When the compressor is compressing air (See Figure 19) valve (B) is held down and off its seat. When compression is stopped spring (A) and air pressure forces valve (B) up and closed.

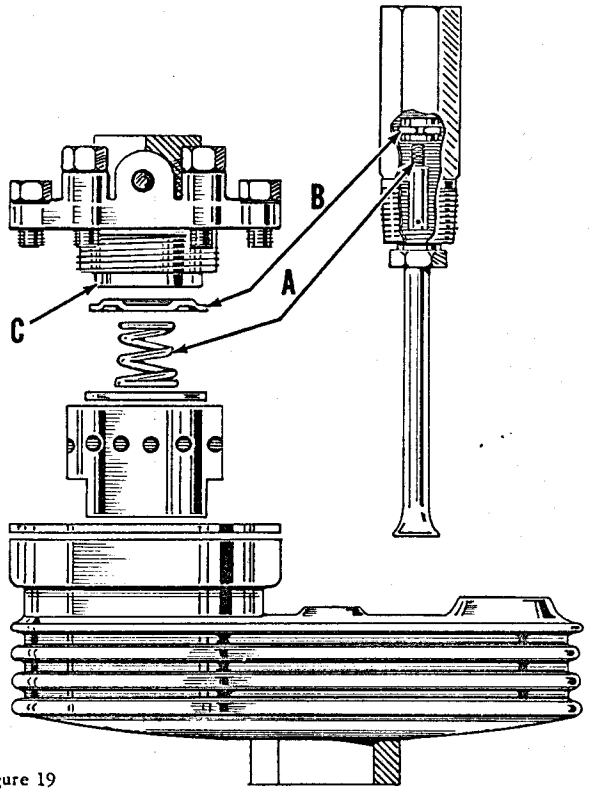


Figure 19

PREVENTIVE MAINTENANCE

WEEKLY.

Replenish oil to full position. DO NOT OVERFILL. Overfilling causes excessive oil usage. See "LUBRICATION" under "INSTALLATION".

Drain air receiver. Portable air compressor outfits and other compressor outfits with small air receivers, and standard outfits operating in high humidity conditions should be drained daily.

Check safety valve by pulling on ring or lever to unseat it. If not operating correctly replace or repair immediately.

Clean air strainers. Felt type strainers should be washed in non explosive solvent, allowed to dry, and reinstalled (DO NOT OIL). If using air gun to dry hold at least 6 inches from strainer. Metal screen type strainers should be washed in non explosive solvent, dried, and dipped in oil before reinstalling. A dirty air strainer decreases compressor efficiency and increases oil usage. In an exceptionally clean location the strainer can be cleaned less frequently.

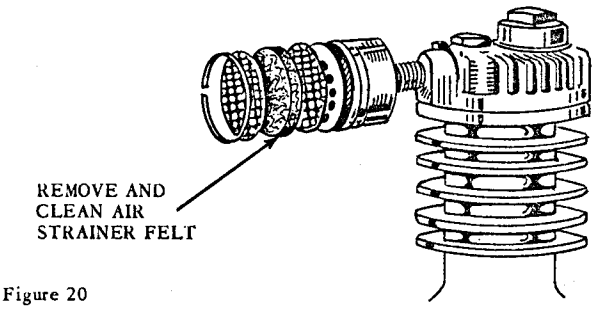


Figure 20

INSPECT AIR STRAINER WEEKLY.
REMOVE AND CLEAN.

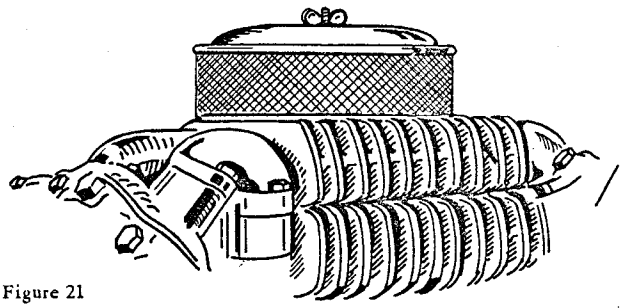


Figure 21

Clean fins on cylinders, heads, intercoolers, aftercoolers and any other parts of compressor or outfit that has collected dust or dirt. A clean compressor runs cooler.

Check belt tension; should be tight enough to prevent slipping but NO TIGHTER.

MONTHLY.

Change compressor crankcase oil. In extremely clean operating conditions the oil need be changed only at the end of 500 running hours or at the end of 6 months, whichever occurs first.

Do weekly preventive maintenance operations.

Listen for air leaks. Tighten leaking connections. Check pump up time (time from when compressor cuts in until it cuts out at maximum pressure) once a month with the tank outlet valve shut off. If the operating time becomes longer than normal, check intake for obstruction or clogged filter, and inspect the compressor intake and exhaust valves.

Pressure and speed should not exceed manufacturers limits. Stop, look and listen for any unusual noise vibration, belt slippage or other malfunction. Correct any trouble before it has a chance to develop into something serious.

PORTABLE OUTFITS. Check battery water level and tires. Lubricate wheel bearings annually.

STORAGE. If compressor is driven by an engine, see engine manufacturer literature.

If compressor can be run for at least one half hour every month (must get up to operating temperature) no special compressor precautions need be taken.

When a compressor or outfit is to be put in storage or not used for a period of more than 2 months, the regular lubricating oil should be drained out and replaced with rust inhibitive oil.

The compressor should then be run long enough to let it reach its normal operating temperature. While it is running allow about one ounce of the rust inhibitive oil to be drawn into the air intake. This procedure should protect the compressor for a period of one to two years depending on storage conditions.

Store the compressor inside. If not practical make sure it is adequately covered for protection against the elements.

Outfits equipped with batteries should have the batteries removed, stored in a warm place to prevent freezing, and be recharged monthly.

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BRUSHES (continued)

b. The brush should be ground in with 2/0 or 3/0 sandpaper until the contact surface conforms to the contour of the commutator. This can be done as follows:

After placing the brush in the holder, release the spring and insert a piece of No. 2/0 or 3/0 sandpaper (rough side to brush) between brush and commutator. The sandpaper should be a little wider than the brush. With maximum spring pressure exerted on the brush, hold the sandpaper close to the commutator and draw it in the direction of rotation. Than lift the brush, push the paper back and repeat the operation until the brush has been shaped to an even contact with the commutator. Be sure to raise the brushes before moving the sandpaper back for the next stroke. In removing the sandpaper from the commutator, do not raise the sandpaper as so doing will usually ruin the fit on the brush. Brushes should not be installed and allowed to fit themselves by wear, as this method will usually cause sparking or scoring before the brush wears in.

c. After the brushes are sanded in, the armature, commutator, commutator risers and brush assembly should be thoroughly cleaned with dry compressed air of all carbon and copper cuttings to prevent the possible grounding or short circuiting of these parts. Failure to do this has resulted in costly shutdowns due to damaged armatures.

d. After grinding in the brushes, they should be run in under light loads for a while. This allows the surface to set, or wear itself in better before heavy loads are put on. When the commutator has been used some time, it should present a chocolate brown color. It is preferable to install a complete set of brushes at a time rather than replace them singly.

the lubricant has been added, the generator or motor should be run with the bottom plug removed for approximately one-half hour to make certain all excess grease flows out. Do not forget to replace the plug.

In most cases, the main hoist, crowd and swing motors have no plug to be removed, but surplus grease will blow out in a pocket beneath the bearing housing. On vertical motors and some type of horizontal motors, plugs must be removed the same as for the generators.

As mentioned in the 250 hour interval procedure, the bottom plugs should always be removed before greasing to see that surplug grease escapes. Do not forget to replace the plug.

Approximately one every year, or after 7500 hours operating time, the bearing should be "purged" by pumping sufficient grease through the bearing while running, so new grease appears either at the shaft or at the bottom plug. If the grease comes out along the shaft, it is very important that this be kept wiped off until new grease appears. Finally clean off shaft thoroughly again after the machine has operated for 15 or 20 minutes. The new grease should appear first at the bottom hole, but sometimes it comes out first along the shaft.

If possible, approximately once every two years the bearings should be disassembled and all old grease removed by a thorough cleaning with light lubricating oil or petroleum solvent.

Each time the bottom plug is removed, a clean wire should be pushed into the hole to make certain the grease has not hardened to plug the hole.

One measuring tablespoonful is equal to imately one ounce of grease. Use General Electric Company ball bearing grease #D6A2A3 for General Electric Company equipment. Use Westinghouse Electric Corporation grease #1449556 for Westinghouse Equipment.

CAUTION: DO NOT MIX GREASES UNLESS THEY ARE OF THE SAME BASE AND WILL MIX. CHECK WITH GREASE MANUFACTURER IF THERE IS ANY QUESTION.

WELDING INFORMATION FOR MAINTENANCE OF MARION MACHINES

Component Part	Material - M.P.S. Symbol
Machinery Frame	CB, CD, F, FK
Machinery Guard (Note 1, Page 6)	F
Walking Crank	CC-9, CK, Mod. CN, C-74 Alloy
Main Rotating Gear	CC-2A, CC-2B, CC-6, CC-10, CD, CK, FT-1, AISI-1045
Racking	CC-2B, CC-10, CC-11, CH, CK-2, CL-2, FT-1, AISI-4328
Rail	CC-1, CC-10, CC-11, CK-2 & 3, FD, FE, AISI-4340
Sheet Metal (Note 1, Page 6)	F
Tub	F
Upper Frame	CB, F, FK, FT-1
Walking Shoe	F, FK
Walkway (Note 1, Page 6)	F

WELD ROD & PREHEAT RECOMMENDATIONS

Listed below are the recommended types of electrodes and preheats for welding steels designated by Marion Power Shovel Company's symbol

FIELD ERECTION

151-M

MANPOWER REQUIRED

Approximately 900 man hours and 70 hours mobile crane time required. Does not include hauling time. Man hours and crane time predicted on erection site adjacent to railroad siding with +40°F. and clear weather.

EQUIPMENT REQUIRED

2 - Mobile cranes with 30 ton capacity each with not less than 40' boom at minimum radius or one (1) mobile crane with equivalent capacity and rating.

1 - 300 Amp. welder.

1 - Set acetylene torch.

2 - 50 ton hydraulic jacks.

2 - 3 ton coffin hoists.

4 - 5' to 6' crow bars.

4 - 1-1/8" X 20' slings.

4 - 5/8" X 20' slings.

2 - 1/2" X 10' chokers.

1 - Set 1" drive socket wrench with sockets.

1 - Air or electric surface grinder.

2 - 6 pound sledges.

30 to 40 cross ties 8" X 8" X 8'.

1 - Lot miscellaneous flat blocking and hardwood wedges.

FIELD ASSEMBLY

1. Clear and level an erection area approximately 150/ X 150'.