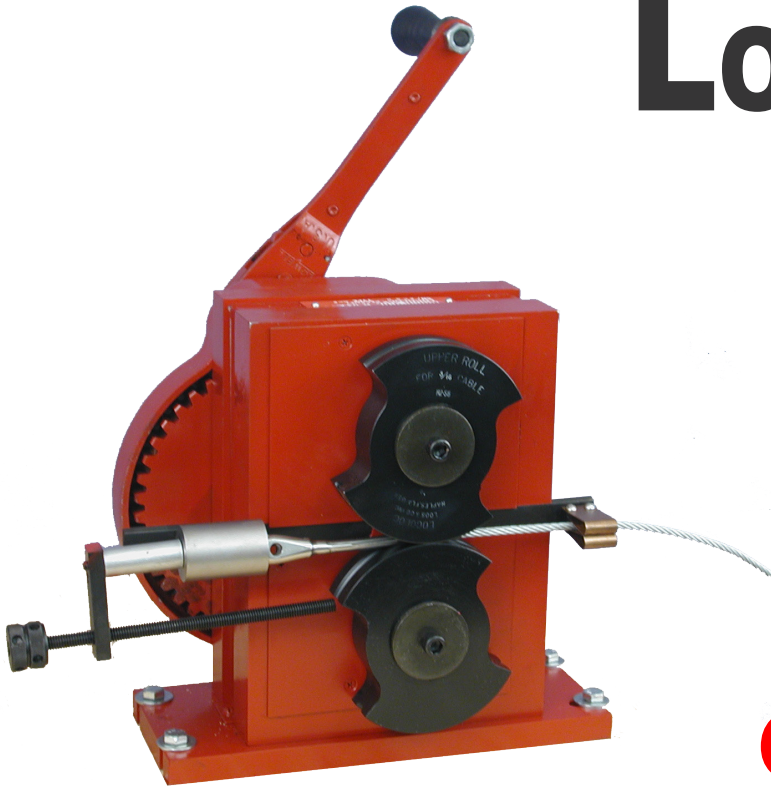




LocoLOC® - Kearney Swaging Machine Tools



Operator's Manual

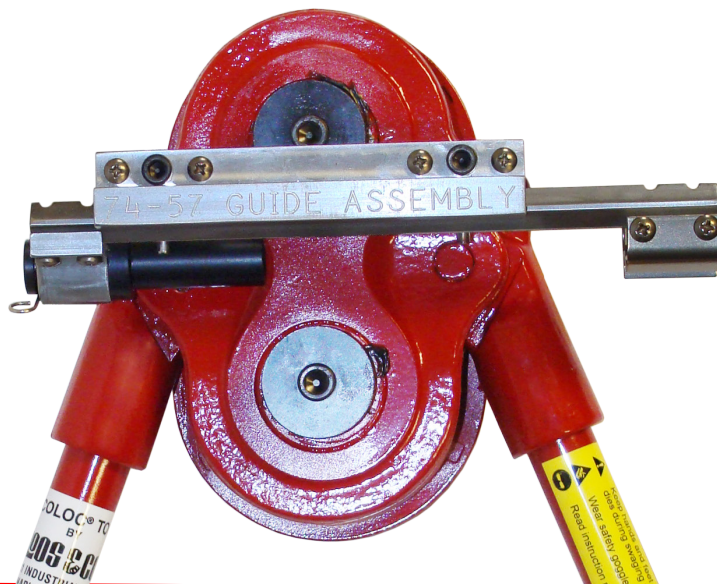


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Introduction

The purpose of this manual is to give our customer, the operator, all the information we have gathered through the years of operation of these swaging machines so that the operator can accomplish the attachment of terminals to his steel cables easily, with maximum confidence in the strength and durability of the result, and at minimum cost.

For many years the Kearney Swaging Tools, Type I and Type II, have been marketed by **LOOS & CO.** We purchased the Kearney Company in the Fall of 1976 and are now manufacturing these tools ourselves. These tools conform to MIL Spec MIL-S-6180. We have seen no reason to make any significant changes in the portable Type I tool, but we have re-designed the bench model Type II, to facilitate manufacture and at the same time enables us to offer optional features that improve the adaptability of this model to the customer's convenience.

Identification

As presented in the **LOOS & CO.** Catalog, the **LOCOLOC**® portable manual swaging machine is designated Type I, and the **LOCOLOC**® bench mounted swaging machine, in either manual or powered configuration, is designated Type II. The Type I machine is covered in Part I of this manual and the Type II machines are covered in Part II.

Swaging

The swaging process, as applied to the attachment of terminals to steel cables, is technically cold roll forging. The metal of the terminal, under the pressure applied by the roll dies of the machine, flows into such intimate engagement with the strands of the cable that the terminal cannot be separated from the cable even if the pull on the cable exceeds its breaking strength.

Cables

Any standard size galvanized or stainless steel cable up to 3/8" diameter can have MS type terminals, such as those shown in Appendix A of this manual, swaged onto it by one or the other of the **LOCOLOC**®-Kearney Swaging Machines. If the cable is plastic coated, this coating must be removed over the length to be engaged with the terminal after swaging. The length to be stripped can be calculated from the data given on the MS drawing of the pertinent terminal. All these drawings are included in Appendix A of this manual. It is also essential that the diameter of the cable over the plastic coating be no larger than the diameter of the terminal shank swaging, "A". This is to prevent the roll dies, as they come off the terminal shank, from exerting pressure on the plastic causing it to flow up the cable.

Dimensional Data

As noted above, the MS drawings of the standard cable terminals, giving complete dimensional data are reproduced in Appendix A of this manual, along with a tabulation by diameter and construction of all types of cable to which these terminals can be successfully swaged by the **LOCOLOC**®-Kearney Swaging Machine Tools. If a combination of cable and terminal is desired, either of which is not included in the above data, we urge that you consult **LOOS & CO** for specific recommendations.

Note that terminals should not be swaged onto cables having non-metallic cores or strands. Note also that any terminal made of the same material and having a shank of the same bore, outside diameter and length as the MS terminal for the cable size being used is suitable even if the details of the terminal head differ from the MS type. See SAE AS10081.

Section One

This portable, hand operated roll type swaging machine, shown in Figure I-1, will swage MS type terminals onto galvanized and stainless steel cables from 1/16" diameter up to and including 3/16" diameter. Marine-industrial terminals can also be assembled if the terminals have the same outside diameters and bore diameters as standard MS terminals before swaging. The **LOCOLOC**®-Kearney Type I Roll Swaging Kit, which includes the machine, a full set of roll dies, terminal gauges, and feed guide adapters in a steel carrying and storage case, is pictured in Figure I-2 and itemized in Table I-1.

Type I Swaging Machine

Figure I-2.



Table I-1 - Type I Portable Swaging Machine Kit - Loos Part No. M1-K

Index No	Loos Part Number	Old Part Number	Part Name	Qty
1	M1 (74)	74	Swaging Machine with Case, Allen Wrench, Feed Guide Assy. and Feed Guide Adapters.....	1
2	M1-B2	12748-10	Shank-Type Ball Terminal Roll Assembly (for 1/16 inch cable).....	1
3	M1-B3	12748-11	Shank-Type Ball Terminal Roll Assembly (for 3/32 inch cable).....	1
4	M1-B4	12748-12	Shank-Type Ball Terminal Roll Assembly (for 1/8 inch cable).....	1
5	GA-B24	12971-1	Ball-Type Terminal Gauge (1/16 - 1/8 inch cable).....	1
6	M1-S2	13655-7	Straight-Shank Terminal Roll Assembly (for 1/16 inch cable)	1
7	M1-S3	13655-17	Straight-Shank Terminal Roll Assembly (for 3/32 inch cable)	1
8	M1-S4	13655-27	Straight-Shank Terminal Roll Assembly (for 1/8 inch cable)	1
9	M1-S5	13655-37	Straight-Shank Terminal Roll Assembly (for 5/32 inch cable)	1
10	M1-S6	13655-47	Straight-Shank Terminal Roll Assembly (for 3/16 inch cable)	1
11	GA-S26	12971-2	Straight-Shank Terminal Gauge (1/16 - 3/16 inch cable)	1

Straight Shank Terminals

Setting Up The Machine

Select from the kit the matched pair of roll dies suited for the size cable onto which you are preparing to swage a terminal. Each roll die has the nominal cable size for which it is suited stamped on the flat sides. Install the roll die marked "UPPER" on the top shaft of the machine so that the word "UPPER" stamped on one flat side of the roll die is visible. Install the other roll die of the matched pair, marked "LOWER", on the bottom shaft of the machine so that the word "LOWER" stamped on one flat side of the roll die is visible and the two pins protruding from that face are on the outside. When the keys in the shafts engage the keyways in the roll die, the rolls are properly indexed with one another. Push the rolls all the way onto the shafts by hand and secure them with the special flat washers and cap screws as shown in Figure I-3.

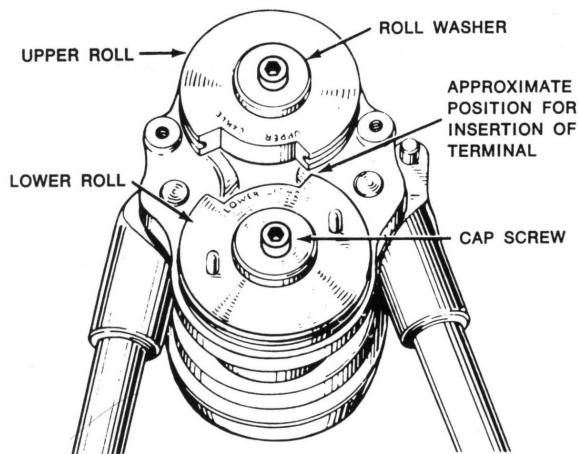


Figure I-3. Rolls Installed on Swaging Machine

Insert the proper size feed guide adapter in the feed guide assembly. The two feed guide adapters in the kit are marked with the range of cable sizes with which each should be used. Secure the adapter with the spring wire keeper shown at the extreme left hand end of the feed guide assembly in Figure I-4. Attach the feed guide assembly to the machine with the two socket head bolts as shown in Figure I-4.

The machine is now ready to receive and swage the cable-terminal assembly.

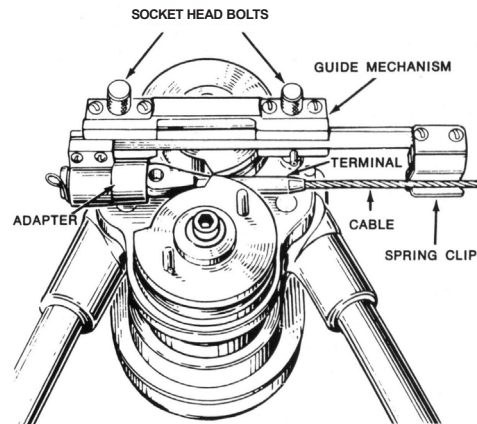


Figure I-4. Starting Positions of Swaging Operation

Preparing the Cable and Terminal

It is essential that the cable and the terminal you select to swage onto it are both of the proper size. Check the cable diameter with a micrometer and, using the gauge included in the kit, Figure I-5, check the outside diameter of the terminal shank to be sure it corresponds to the size of the cable. Complete dimensional data on cables and terminals that can be assembled successfully by the **LOCOLOC**®- Kearney Type I Swaging Machine are presented in Appendix A of this manual.

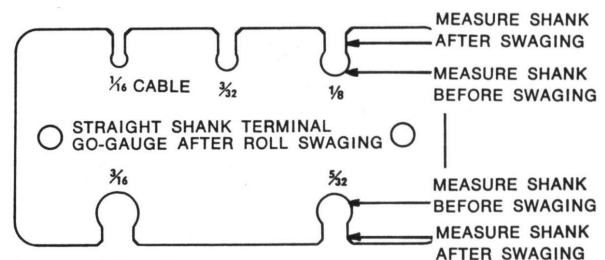


Figure I-5. Terminal Gauge

The cable is a fairly close fit in the bore of the terminal before swaging. It is important that the end of the cable be cut cleanly and squarely and that individual wires be prevented from brooming out. If necessary re-cut the cable to obtain a good end. **LOOS & CO** offers a full line of cable cutters which perform this operation excellently. Ask for full information.

It is also important that the terminal and the cable be engaged over the full length of the terminal bore so that the full strength of the swaged joint will be realized. Probe the bore of the terminal with a stiff wire to make sure that the depth of the bore is as specified in Appendix A for that particular terminal and that the bore is not plugged by dirt, chips or other foreign objects.



Figure 1

Push the cable into the fitting until the end of the cable reaches the bottom of the bore. Mark the cable at point (A) as shown in Figure 1.



Figure 2

Place the cable besides the fitting shank and have mark (A) placed flushed with the bottom of the shank. Mark the shank at point (B) using the end of the cable as shown in Figure 2.

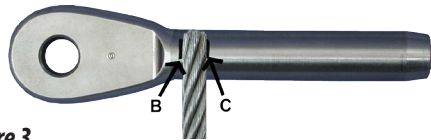


Figure 3

Place the cable next to the mark (B) and mark the shank at point (C) as shown in Figure 3.

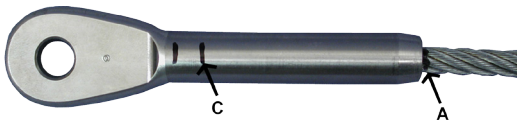


Figure 4

Push the cable back into the fitting until the mark (A) is flush with the bottom of the shank again. Start your swaging at mark (C) on the shank as shown in Figure 4.

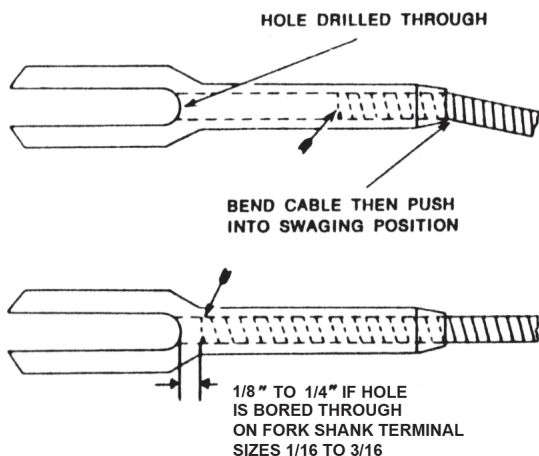


Figure I-6. Insert Cable in Terminal

Insert the cable to approximately half the depth of the bore and, taking hold of the cable close to the end of

the terminal, bend it sharply enough to set a bend into the cable as shown in Figure I-6.

This is to ensure that the terminal will not move on the cable while they are being inserted in the swaging machine. On Fork Shank Terminals sizes 1/16" to 3/16", push the cable into the terminal until the end of the cable reaches the end of the bore. Pull the cable back 1/8" to 1/4" short of the end of the bore, as shown in Figure I-6. The cable-terminal assembly is now ready to be swaged.

Swaging

Grasp the two pins protruding from the face of the lower roll in the machine and rotate the roll until the cutaway portions of the two rolls are centered opposite one another, providing a space to insert the cable-terminal assembly between the rolls. Place the cable-terminal assembly in the feed guide with the free end of the terminal resting against the feed guide adapter. Slide the feed guide assembly to the right as far as it will go and then, by hand, rotate the lower roll counterclockwise until the two rolls meet in contact with the terminal one cable diameter away from its head as shown in Figure I-4. **Support cable from back of swage to help eliminate the shank from bending from the curve in hanging cable.**



Figure I-7. Flash Left on Terminal Shank After First Pass

Operate the handles of the swager in a ratcheting manner until the rolls have passed completely over the terminal sleeve. When the first pass has been completed a longitudinal fin or flash on two diametrically opposite sides will be noticeable on the swaged portion of the shank, as shown in Figure I-7.



Figure I-8. Terminal that has been properly swaged.

To eliminate longitudinal fin, rotate the terminal 90 degrees from the first position and pass it through the rolls as outlined in preceding instructions. After the second pass, the terminal shank will appear smooth and round, as shown in Figure I-8.

Measure the diameter of the terminal shank with the gauge, as shown in Figure I-9. The shank should now slide through the slot from one end of the swaged portion to the other except for the slight flash which will be left after the second pass.

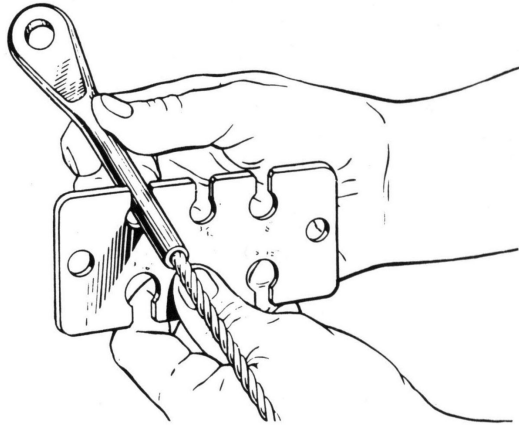


Figure I-9. Gauging Terminal Shank After Swaging

The diameter over flash should not exceed the shank diameter after swaging by more than 0.010 inch. The gauge is made to pass a terminal which has been reduced to the proper diameter as specified in applicable MS drawings except over flash. If the terminal has not been sufficiently reduced, an additional pass may be necessary to reduce it to the required diameter. Rotate the terminal 45 degrees for the third pass to make the terminal more uniformed.

Caution

Over-swaging will only cause work hardening, or may lead to embrittlement which may induce terminal cracking. For this reason, we advise that you **never use more than four passes**. If four passes are required on any job, and after the fourth pass the diameter of the sleeve has not been reduced to the proper size, survey the equipment and recheck instructions in order to determine what is causing the problem.

Shank Ball Terminals

The rolls for swaging shank type ball terminals have the cable sizes for which they are designed stamped into their front faces, along with the designations "UPPER" and "LOWER". Unlike the rolls for straight shank terminals, these rolls each have four active arcs separately by four clearance flats. The active arcs are numbered, 1, 2, 3, 4, and these numbers are stamped into the front faces of the rolls at the midpoint of the respective arcs. At the midpoint of the groove in each active arc is a pocket sized to match the ball of the terminal being swaged.

Like the lower rolls for straight shank terminals, these lower rolls are fitted with two pins protruding from their faces to enable the operator to turn the rolls by hand.

Setting Up The Machine

Select the pair of the rolls marked with the size of the cable to which you wish to attach the terminal. Install the roll marked "UPPER" on the top shaft of the machine so that the word "UPPER" stamped on the flat side of the roll is visible. Install the other roll of the matched pair marked "LOWER" on the lower shaft of the machine so that the word "LOWER" stamped on one flat side of the roll is visible and the two pins protruding from that face are on the outside.

When the keys in the roll shafts engage the keyways in the rolls, the rolls are properly indexed with respect to one another. Push the rolls all the way onto the shafts by hand. Do not use tools to force the rolls onto the shafts; this should not be necessary. Secure the rolls by means of the roll washers and cap screws as shown in Figure I-3.

Attach the feed guide assembly to the machine with the two socket head screws as shown in Figure I-11. (The feed guide adapter has no function in connection with ball type terminals and should be removed.) The machine is now ready to receive and swage the cable-terminal assembly.

Preparing the Cable and Terminal

Select a shank type ball terminal to fit the size of cable being used; refer to MS20664 in Appendix A. Gauge the terminal carefully to make certain that it is not oversize. The terminal shank should fit into the circular opening on the side of the gauge which is marked "SHANKS", as shown in Figure I-10. The ball should fit into the circular opening at the side of the gauge marked "BALLS". Locate the ball of the terminal lengthwise on the cable as required for the particular application and mark this location so that it can be checked when the cable and terminal are in the machine ready for swaging.

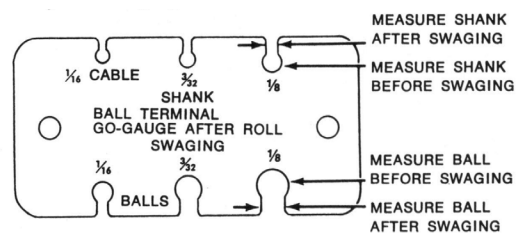


Figure I-10. Ball Terminal Gauge

Swaging Single Shank Type Ball Terminals

With the single shank-type ball terminal correctly located on the cable, use the two pins on the lower roll to rotate the rolls until the ball has just started to enter the socket at the No.1 position on the rolls. Be sure that the terminal is properly positioned with the shank sleeve pointing toward the right, as shown in Figure I-11.

Roll the ball through the No.1 position on the rolls slowly to compress the terminal on the cable. Make certain that the ball enters the socket accurately in order to prevent distortion of the ball.

To remove the ridge left by the first pass, rotate the terminal 90 degrees from the first position and reposition the rolls so that the terminal ball is just ready to enter the ball socket No.2. Roll through the No.2 position.

Repeat the same procedure at the No.3 and No.4 position on the rolls. Rotate the cable and terminal 45 degrees before making the third pass and 90 degrees before making the fourth pass. Rotate 90 degrees and roll through No.2 position again to help eliminate remaining flash if desired.

Gauge the shank and ball for proper size with the ball terminal gauge. If further reduction is necessary, pass the terminal through the No.4 position a second time, rotating the terminal 90 degrees from position used in preceding pass for this final pass.

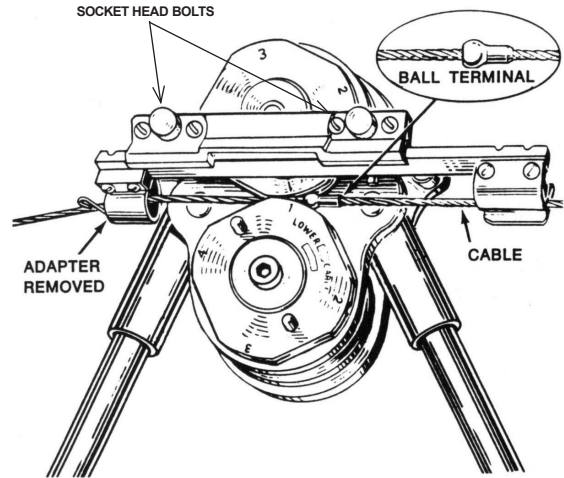


Figure I-11. Swaging Single-Shank Ball-Type Terminals

The ball terminal gauge is designed to measure the diameter of the shank and ball between "flash" after swaging.

Swaging Double Shank-Type Ball Terminals MS20663

Each end of a double shank-type ball terminal is swaged in the same manner as the single shank terminal. Swage the right hand end of the terminal completely through all four positions. Then reverse the cable-terminal assembly in the feed guide and swage the other end in the same manner.

Table I-2 Trouble Shooting

TROUBLE	PROBABLE CAUSE	REMEDY
TERMINAL SHANKS ARE NOT ROUND AFTER SWAGING	Swaging with unmatched rolls. Swaging with damaged rolls.	Install correct rolls (ref. to page 3). Replace damaged rolls.
TERMINAL SHANKS NOT SUFFICIENTLY REDUCED IN SIZE	Use of improper size rolls. Damaged bearings in the swaging machine, allowing rolls to separate.	Install correct size rolls. Replace damaged bearings.
TERMINAL SHANKS BEND DURING SWAGING	Swaging with unmatched rolls. Failure to use feed guide assembly properly.	Install correct rolls. Be sure to use the feed guide assembly with the cable and terminal in proper position.
BALL-TYPE TERMINALS NOT ROUND AFTER SWAGING	Balls not being properly fed into roll recesses. Swaging with unmatched rolls. Loose or worn roll keys. One of the rolls installed upside-down.	Make certain that balls are properly located before each pass. Install correct rolls. Replace with new keys. Refer to page 3, for proper installation of rolls.

Trouble Shooting

If acceptable results are not obtained, either the preceding instructions are not being followed completely, or non-standard cables and/or terminals are being used, or the swaging machine is in need of overhaul and repair. Possible troubles and suggested remedies for them are listed in Table I-2.

Maintenance of Swaging Machine

Cleaning

Dust, dirt, or other foreign material should not be allowed to collect on the swaging machine; it will eventually work its way into the mechanism and cause excessive wear and damage.

Before installing a set of rolls, wipe their active surfaces carefully with a clean soft cloth to be sure no grit will mark the surfaces of the swaged terminals or scratch the working surfaces of the rolls.

Stubborn accumulations of grease or other sticky material can usually be removed by wiping with a petroleum base solvent. Clean grooves of new Dies to remove the black protective coating before swaging.

Lubrication

Each swaging machine is packed with lubricant when it is assembled at the factory, and no periodic lubrication is required. If and when the machine is disassembled for overhaul or repair, the bearings and gear teeth should be packed lightly with extreme-pressure low-temperature grease MIL-G-7118 or equivalent.

Corrosion Protection

When not in use, the swaging machine should be stored in its carrying case and the case in turn should be kept in a dry location. It is recommended that a bag of silica gel be kept in the carrying case and dried out periodically. Each time a set of rolls dies is removed from the swaging machine the exposed portions of the roll shafts should be coated with clean corrosion resistant oil such as WD 40®.

Contact of bare hands with the working surfaces of the rolls dies must be avoided to prevent finger print corrosion.

Overhaul and Repair of Type I Swaging Machine

LOOS & CO offers complete overhaul, repair, and parts replacement service for all **LOCOLOC®**- Kearney Type I Swaging Machines. Ship your machine to our factory, prepaid, and we will determine the extent of the repairs and parts required, advise you of the cost, and await your instructions.

We have specialized tools and gauge, a stockroom of replacement parts, and a group of experienced people who are assembling, using, disassembling and inspecting these machines every day. We believe we can inspect and overhaul your swaging machine easier, faster, and at lower cost that you can. We urge you to take advantage of this service.

However, if you prefer the do-it-yourself approach, you will find the following instructions helpful.

Disassembly

The exploded assembly drawing, Figure I-12, shows the individual parts of the Type I Swaging Machine and indicates their relative positions when assembled. Use this drawing as a guide for disassembling the machine.

When removing parts, carefully observe positions of spacer washers and other parts to assure correct reassembly. It should be noted that the longer shaft extensions on upper and lower roll shafts (44 and 45) are toward the top of the swager. The roller bearings (37) have been pressed into the front and back plates (38 and 52). Use an arbor press and a proper size arbor to remove them to avoid damaging the bearings and the plates.

Cleaning

Metal parts should be cleaned by immersing them in cleaning solvent.

Stubborn accumulations should be removed with a small bristle brush while holding parts in the solvent.

Inspection

With the swaging machine either partially, or completely disassembled, inspect all parts visually for cracks, broken gear teeth, distortion, extreme wear on gear teeth or bearings, and any other form of visible damage.

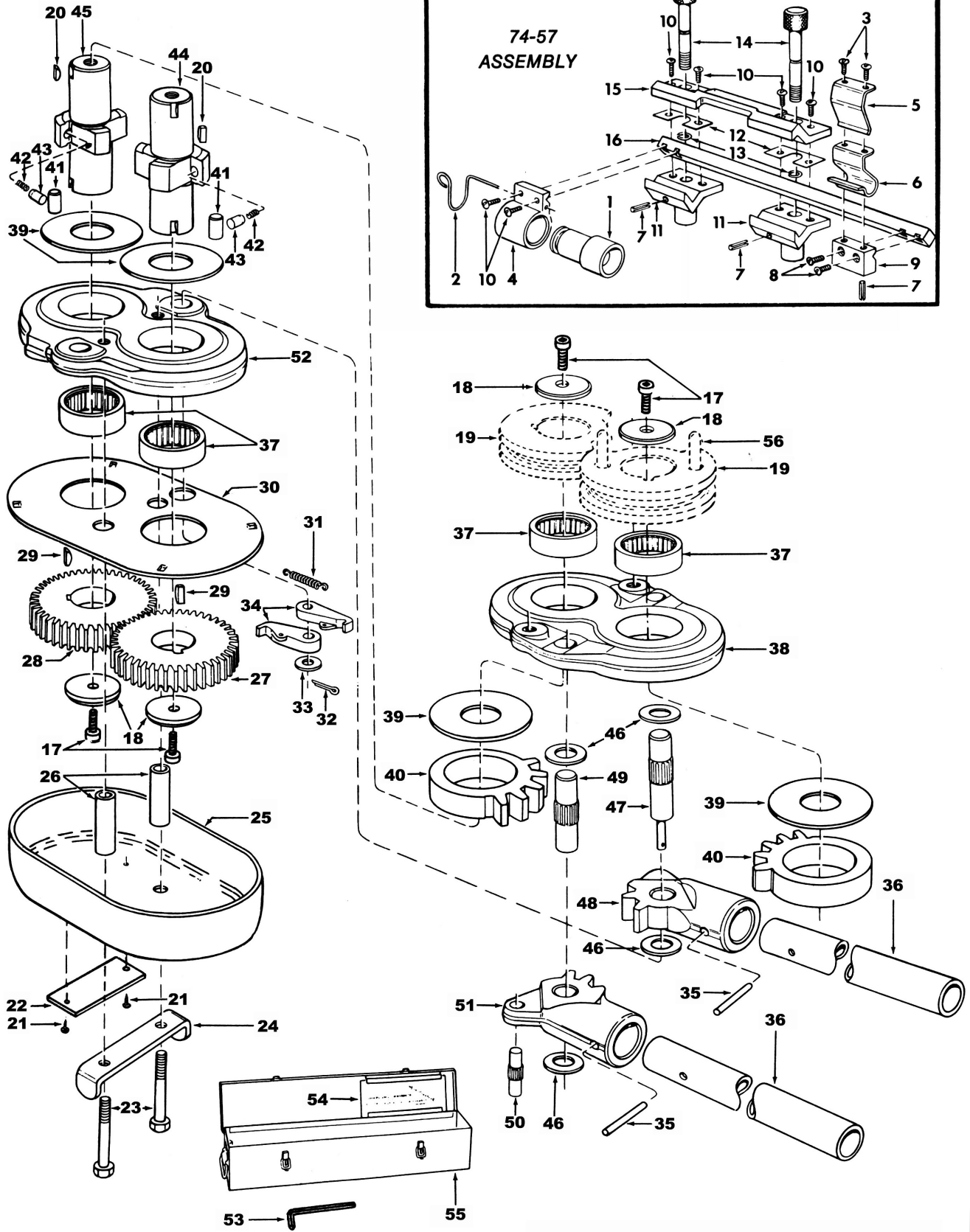


Figure I-12.

Table I-3 Replacement Parts List Type I Swaging Machine

Loos Part No. Ref. No.	Old Part No.	Description	Qty
-1	13781-1M	Socket - Medium	1
	13781-1S	Socket - Small	1
-2	13773	Retainer - Socket	1
-3	62338-04	Screw- Round head, machine, steel, cadmium plated, No. 8-32 x 1/4 inch long	2
-4	13778	Bracket - Socket	1
-5	13780-1	Clip - Front	1
-6	13780	Clip - Back	1
-7	66103-8	Pin - Sel-Lok spring, 5/32 x 1/2 inch lon	3
-8	62138-7	Screw - Fillister head, machine, steel , cadmium plated, No.8-32 x 7/16 inch long	2
-9	13779	Adapater	1
-10	62338-08	Screw - Round head, machine, steel, cadmium plated, No 8-32 x 1/2 inch long	6
-11	13774	Post - V-way	2
-12	13776	Shim	AR
	13776-1	Shim	AR
	13776-2	Shim	AR
-13	13773-1	Retainer	2
-14	13772	Socket Head Bolt	2
-15	13771	Cover - V way	1
-16	13775	Slide	1
-17	62449-10	Screw - Allen head, cap, steel, 5/16-24 x 5/8 inch long	4
-18	9546	Washer	4
-19	--	Roll Assemblies (For details see Table I-1)	-
-20	13227-1	Key - Woodruff	2
-21	62569-03	Screw - Drive, stainless steel , No.4 x 3/16 inch long	2
-22	1330-10	Plate -Name	1
-23	62449-32	Screw - Allen, cap, steel, 5/16-24 x 2 inch long	2
-24	20436	Rest - Foot	1
-25	12949	Gear - Cover	1
-26	20435	Sleeve - Gear Housing	2
-27	12962	Gear - Lower	1
-28	12961	Gear - Upper	1
-29	13227	Key - Woodruff	2
-30	20437	Plate - Gear Housing	1
-31	13224	Spring - Tension	1
-32	60916-08	Pin - Cotter, 1/16 x 1/2 inch long	1
-33	13229	Washer - Latch	1
-34	13223	Latch - Reverse	2
-35	9552	Rivet - Handle	2
-36	9555	Handle	2
-37	63842-2	Bearing - Roller, McGill SK-5881	4
-38	9536-2	Plate - Front	1
-39	13036	Washer - Thrust	4
-40	9538	Ring - Clutch	2
-41	9542	Roller - Clutch	8
-42	9544	Spring - Clutch Roller	8
-43	9543	Holder - Spring	8
-44	9547-1	Shaft - Lower roll	1
-45	9548-1	Shaft - Upper Roll	1
-46	13034	Washer - Spacer	4
-47	13023	Shaft - Drive Pinion, Left	1
-48	9539	Pinion - Drive , Left	1
-49	9541	Shaft - Drive Pinion, Right	1
-50	13228	Pin - Stop	1
-51	9540	Pinion - Drive, Right	1
-52	9537-2	Plate - Back	1
-53	64386-07	Wrench - Allen, 1/4 inch	1
-54	--	Instruction Manual	-
-55	13658	Case - Carrying	1
-56	--	Pin - Black Steel Spiral, 1/4 x 1/4 inch	2
74-57	13656	Guide Assembly - Feed (Contains Parts 74-1 through 74-16)	1

Replace all parts showing wear or damage. It is advisable to inspect highly stressed parts by the magnetic-particle (MAGNAFLUX®) inspection method. This is particularly true of the clutch rings (40, Figure I-12).

Re-Assembly

Refer to Figure I-12 as a guide for location of parts and proper order of re-assembly. Special attention should be given to the following items: Pack all bearings (37) with grease and press them into their respective recesses, using care to avoid damage to bearing shells. Bearings can be more easily installed if bearing recesses are wiped lightly with oil before installation. Be sure to use an arbor press with the proper size arbor to avoid damage to bearings or housings in which they are located.

Care should be exercised when installing springs on the ratchet pawls (34) or in free-wheeling rollers (41) to avoid damage to springs, and insure freedom of operation.

Be sure to install upper and lower roll shafts (44 and 45) with the longer ends of the shafts pointing upward.

Timing

When installing gears (27 and 38, Figure I-12) it will be necessary to mesh the gears to provide proper timing of the two roll shafts (44 and 45). This is accomplished by positioning the shafts so that the two keys will be

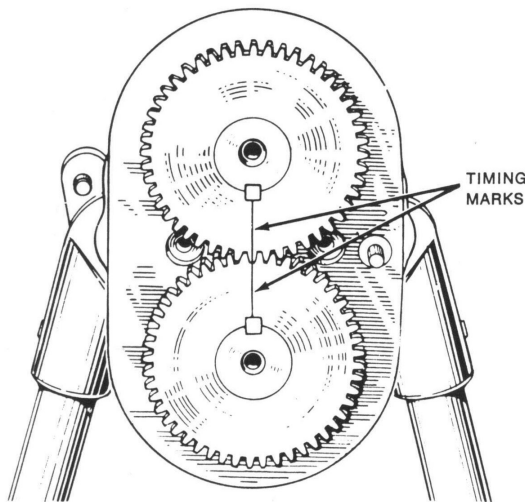


Figure I-13 Gears Meshed for Correct Timing

facing each other and centered on a line directly through the center of each shaft and keyway, as shown in Figure I-13.

With shafts in this position, the gears can be slipped into position and meshed. This will insure proper timing for correct operation of the rolls.

NOTE : As re-assembly progresses, feel all fits to make certain that no binding occurs due to improper assembly or nicks and rough spots on parts which may have been overlooked during the inspection procedure.

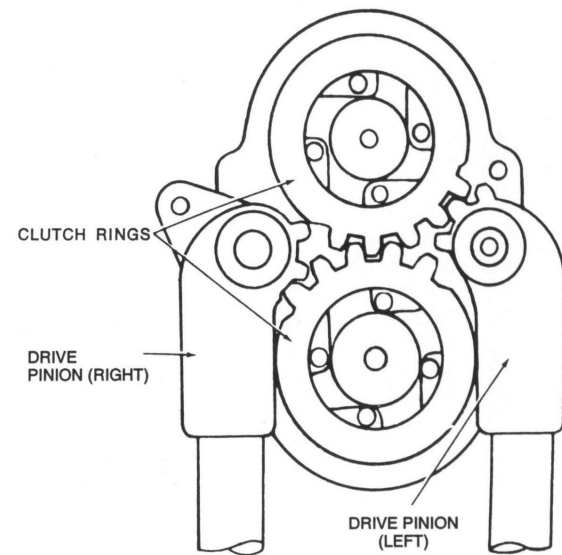


Figure I-14. Correct Meshing of Clutch Rings and Pinion Drive Shafts (Rear View)

Testing After Repairs

After repairs to the swager have been completed, select a typical terminal and swage it to a piece of scrap cable.

Observe performance of the swager during the swaging operation and inspect the swaged terminal to make sure that results are as described in preceding instructions.

If any doubt exists regarding the strength of the swaged joint, perform a conventional "pull" test. If the terminal has been properly swaged, the cable will break before the joint will separate.

Section Two

Type II Swaging Machine



Table II-1 - Type II Bench Swaging Tool Kit - Loos Part No. M2-K

Index No	Loos Part Number	Old Part Number	Part Name	Qty
1	M2 (84)	84	Roll Swaging Machine with Shipping Container/Bench, Wrench and Handle Extension	1
2	M2-B2	12548	Shank-Type Ball Terminal Roll Assembly (for 1/16 inch cable).....	1
3	M2-B3	12548-1	Shank-Type Ball Terminal Roll Assembly (for 3/32 inch cable).....	1
4	M2-B4	12548-2	Shank-Type Ball Terminal Roll Assembly (for 1/8 inch cable).....	1
5	M2-B5	12548-3	Shank-Type Ball Terminal Roll Assembly (for 5/32 inch cable)	1
6	M2-B6	12548-4	Shank-Type Ball Terminal Roll Assembly (for 3/16 inch cable).....	1
7	M2-B7	12548-5	Shank-Type Ball Terminal Roll Assembly (for 7/32 inch cable).....	1
8	M2-B8	12548-6	Shank-Type Ball Terminal Roll Assembly (for 1/4 inch cable).....	1
9	M2-S2	20438-2	Straight-Shank Terminal Roll Assembly (for 1/16 inch cable)	1
10	M2-S3	20438-3	Straight-Shank Terminal Roll Assembly (for 3/32 inch cable)	1
11	M2-S4	20438-4	Straight-Shank Terminal Roll Assembly (for 1/8 inch cable)	1
12	M2-S5	20438-5	Straight-Shank Terminal Roll Assembly (for 5/32 inch cable)	1
13	M2-S6	20438-6	Straight-Shank Terminal Roll Assembly (for 3/16 inch cable)	1
14	M2-S7	20438-7	Straight-Shank Terminal Roll Assembly (for 7/32 inch cable)	1
15	M2-S8	20438-8	Straight-Shank Terminal Roll Assembly (for 1/4 inch cable)	1
16	M2-S9	20438-9	Straight-Shank Terminal Roll Assembly (for 9/32 inch cable)	1
17	M2-S10	20438-10	Straight-Shank Terminal Roll Assembly (for 5/16 inch cable)	1
18	M2-S12	20438-12	Straight-Shank Terminal Roll Assembly (for 3/8 inch cable)	1
19	GA-S712	13329	Straight-Shank Terminal Gauge (7/32 - 3/8 inch cable)	1
20	GA-S26	12971-2	Straight-Shank Terminal Gauge (1/16 - 3/16 inch cable)	1
21	GA-B24	12971-1	Ball Type Terminal Gauge (1/16 - 1/8 inch cable)	1
22	GA-B58	17692	Ball Type Terminal Gauge (5/32 - 1/4 inch cable)	1
23	M2-SCA	17918	Spring Clip Assembly	1
24	M2-AA26	19837	Auxiliary Adapter with Bolt (for use with Straight Shank Terminal Rolls , 1/16 - 3/16 inch cable).....	1

The Type II Bench Type Swaging Machine is intended to be permanently mounted on a bench and used there rather than to be carried to the application. It can be manually operated or power driven at the option of the customer. It will assemble MS type terminals to standard galvanized or stainless steel cables from 1/16" diameter up to and including 3/8" diameter.

Marine-Industrial terminals can also be assembled if the terminals have the same outside diameters and bore diameters as standard MS terminals before swaging.

Roll dies sets (matched pairs) for swaging straight shank terminals are available in 10 sizes covering the range from 1/16" to 3/8" cable diameter. Roll die sets (matched pairs) for swaging shank-ball terminals are also available in 7 sizes covering the range from 1/16" to 1/4" cable diameters.

Shipping Container/Bench

LOOS & CO has designed for the new Type II Swaging Machine a new multi-purpose shipping container shown in Figure II-2, made of welded steel plate, with the object of assuring safe delivery of the machine to the customer and at the same time providing him with a sturdy bench on which to mount his swaging machine and a convenient storage cabinet for the dies and accessories.



Figure II-2 Shipping container/bench with manual machine ready for shipping.

Upon receipt of the shipping container/bench, the customer simply unbolts the machine, transfers it to the top, and, using the same bolts and the same

holes, secures it in the operating position, as shown in Figure II-3. Provision's are made for the attachment of heavy duty lockable industrial casters at the corners of the lower frame to facilitate moving the machine around the shop.

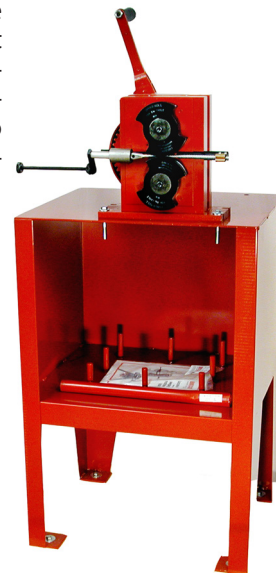


Figure II-3 Shipping container/bench with manual machine on top ready for use.

Power Drive

LOOS & CO also offers a power drive for optional application to the Type II Swaging Machine. This specially designed power drive consists of a reversible 1.5 HP single phase 115 volt motor, a right angle worm gear type speed reducer, a foot switch with 5 feet of cable for connection to electric power supply; two sprockets, a roller chain of proper length, a chain guard, and a steel base plate to which both the reduction gear housing and the swaging machine can be secured in their proper relative locations by cap screws. (See fig. II-6)

Power drive units will be shipped from the factory wired for 115 volts power supply and the 10 ft. 3-wire power supply cable will have a standard 3-prong plug (2 line and 1 ground) assembled to its free end. The connections at the foot switch and the motor will be made at the factory so as to ensure correct motor rotation.



Figure II-4 Power driven machine with foot switch & electric cables mounted on top of shipping container/bench.

Factory Installation

If so ordered, the Power Drive will be shipped from the factory assembled to the Type II Swaging Machine, as shown in Figure II-4. In this case, the assembly of the Type II Swaging Machine and the Power Drive is attached to and enclosed in the lower half of the shipping container/bench and the dies and accessories are secured in the upper half. Here again, upon receipt at the customer's plant, the assembly of the Type II Swaging Machine and Power Drive is detached from the shipping container/bench transferred to the bench surface, and secured there by inserting the shipping bolts into pre drilled holes in the bench.



Figure II-5 Shipping container/bench with power driven machine inside ready for shipping.

Customer Installation

If the customer wishes to convert a Type II manually operated Swaging Machine to Power drive he can obtain a Power Drive Kit, shown in Figure II-6, and assemble it to the machine in his own shop. Detailed instructions for making this conversion are given in Appendix B of this manual.



Figure II-6 Power Drive Kit laid out.

Swaging Straight Shank Terminals

Setting Up The Machine

All roll dies have stamped on their flat sides the nominal size of the cable with which they are designed to be used. Select the matched pair of roll dies marked with the nominal size of the cable on which you wish to swage a straight shank terminal. Install the roll dies on the shafts of the machine so that the word "UPPER" stamped on the flat side of the roll die on the upper shaft, and the word "LOWER" stamped on the flat side of the roll die on the lower shaft are visible as shown in the Figure II-7. This is necessary in order to be sure that the grooves in the working faces of the two roll dies are properly lined up with one another.

The single keys in the shafts and keyways in the roll dies will automatically position the two roll dies in the proper index relationship to each other. When the keys and keyways are lined up, push the roll dies all the way onto the shafts and secure them with the special flat washers and cap screws shown laid out in Figure II-7. Do not use tools to force the roll dies onto the shafts; this should not be necessary.



Figure II-7 Installing Roll Dies on Machine

Feed Guide Assembly

As its name suggests, the function of this component of the Type II Swaging Machine is to hold the cable and terminal in the proper position relative to the roll dies at the start of the swaging operation and to guide the movement of the cable toward the roll dies during the operation. It is a steel bar that slides in a slot in the roll side frame of the machine. It carries a spring clip that engages the cable, a socket that engages the head of the terminal, and a screw-adjusted stop. This stop is used, when the operator wishes to swage a run of several identical cable and terminal combinations, to enable him to set the feed guide carrying the cable and terminal at the same location relative to the roll dies each time he starts a new swaging operation. The adjustable stop is simply a $3/8 \times 16$ screw threaded into the crossbar. A knurled capstan nut is welded to the outboard end of the screw to serve as a convenient handle. A second knurled capstan nut is threaded onto the screw and bears on the crossbar to lock the screw in position. The inboard end of the screw strikes on the machine frame to stop the motion of the feed guide at the starting point to the swaging operation.



Figure II-8 Feed Guide Assembly installed in Machine

The feed guide assembly is shown, installed in the machine, in Figure II-8.

To remove feed guide assembly from the machine, detach the spring clip from the right hand end of the bar and slip the bar to the left until it comes out of the slot in the machine frame. (The spring clip is detached by removing the two flat head screws on the back of the bar.)

The socket at the left hand end of the bar is designed to accept terminal heads for cables larger than $3/16$ " diameter. With terminal heads for cables $3/16$ " diameter and smaller, the auxiliary adapter (Figure II-8) must be used.

To install the adapter, use an allen wrench to back out the $1/4$ " bolt located at the bottom of the socket. (This bolt holds the adjustable stop crossbar and cylindrical

spacer to the socket.) [Note: The outer hole in the crossbar is tapped $1/4 \times 20$, while the inner hold is drilled $1/4$ " and is not threaded]

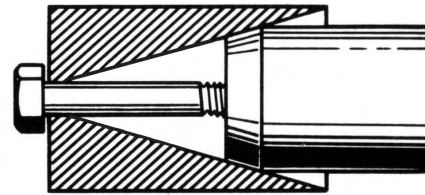


Figure II-9 Auxiliary adapter for Feed Guide.

Pass the $1/4 \times 28$ hex head bolt through the inner hole of the crossbar, the cylindrical spacer, and the bottom of the original feed guide socket and screw it into the auxiliary adapter. [Note: When feed guide socket is used alone, the bolt head is on the inside of the socket; when the adapter is used, the bolt is inserted from the opposite direction with its head on the outside of the crossbar.

Preparing the Cable and Terminal

It is essential that the cable and the terminal you select to swage onto it are both of the proper size. Check the cable diameter with a micrometer and, using the gauge included in the kit, Figure II-10, check the outside diameter of the terminal shank to be sure it corresponds to the size of the cable. Complete dimensional data on cables and terminals that can be assembled successfully by the **LOCOLOC**® - Kearney Type II Swaging Machine are presented in Appendix A of this manual.

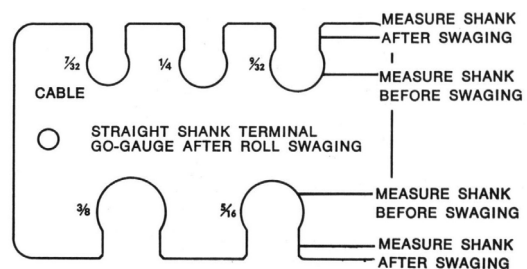


Figure II-10 Gauges for Straight Shank Terminals

Push the cable into the fitting until the end of the cable reaches the bottom of the bore. Mark the cable at point (A) as shown in Figure 1.



Figure 1



Figure 2

Place the cable besides the fitting shank and have mark (A) placed flushed with the bottom of the shank. Mark the shank at point (B) using the end of the cable as shown in Figure 2.

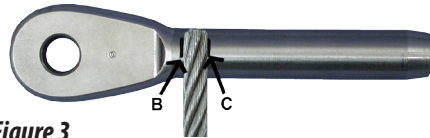


Figure 3

Place the cable next to the mark (B) and mark the shank at point (C) as shown in Figure 3.

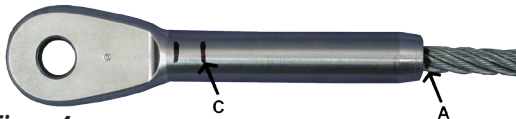


Figure 4

Push the cable back into the fitting until the mark (A) is flush with the bottom of the shank again. Start your swaging at mark (C) on the shank as shown in Figure 4.

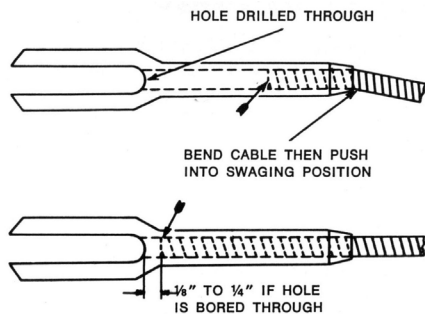


Figure II-11 Inserting Cable in Terminal Shank

Insert the cable to approximately half the depth of the bore and, taking hold of the cable close to the end of the terminal, bend it sharply enough to set a bend into the cable as shown in Figure II-11.

This is to ensure that the terminal will not move on the cable while they are being inserted in the swaging machine. On Fork Shank Terminals sizes 1/16" to 5/16", push the cable into the terminal until the end of the cable reaches the end of the bore. Pull the cable back 1/8" to 1/4" short of the end of the bore, as shown in Figure II-11. Pull the cable back 1/8" to 1/4" short of the end of the bore. The cable-terminal assembly is now ready to be swaged. **Support cable from back of swage to help eliminate the shank from bending from the curve in hanging cable.**

Swaging

The operating lever of the Type II Swaging Machine is similar to a large conventional ratchet wrench. A handle is attached to the outer end by a bolt to form a crank. To reverse the direction of rotation of the roll dies, remove the crank handle and then disengage the lever from the square stub shaft of the machine, turn the lever over and re-engage it. Disengage the internal reverse latch of the machine by pulling and holding out the wire loop that extends from the right side of the machine behind and above the Feed Guide.

When swaging the larger size terminals, more leverage is needed to operate the machine, remove the crank handle and slip the handle extension, Part No. 84-40, over the end of the operating lever to double its length.

The motor of the power-driven machine is reversible simply by reversing the throw of the foot switch. To cause the machine to turn the roll die in the normal direction for swaging - upper roll die clockwise - flip the hand switch lever to forward position and press the foot switch; to reverse flip the hand switch lever to the reverse position and press down on the foot switch. Be careful to allow the drive motor to come to a *full stop* before reversing. The internal reverse latch is not installed in the power-driven machines.

With either machine, rotate the roll dies until their clearance arcs are opposite as shown in Figure II-8. Place the assembled cable and terminal in the clearance space with the head of the terminal engaged with the terminal adapter as shown in Figure II-12. Press the cable into the spring clip on the right hand end of the Feed Guide. Inch the roll dies around until they are just touching, but not squeezing the terminal shank. Move the Feed Guide to the right until the roll dies are contacting at the proper location on the terminal shank to be swaged.

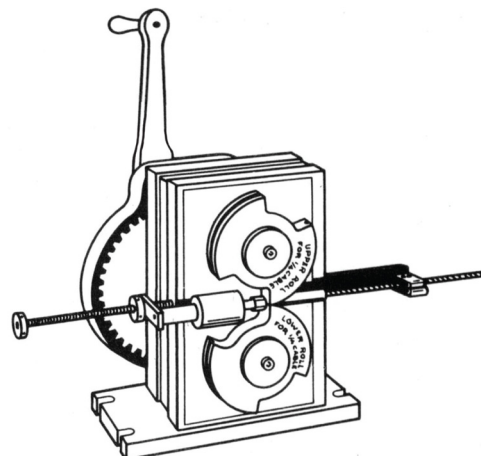


Figure II-12 Position of Rolls at Start of Swaging

As noted above in preparing the cable end terminal, if you are about to swage a number of identical cable-terminal assemblies, set the adjustable stop of the Feed Guide Assembly, as discussed in Feed Guide Assembly, so that you can repeatedly move the Feed Guide to this position relative to the dies.

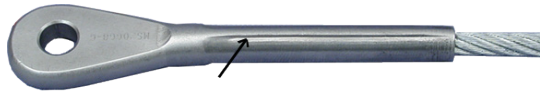


Figure I-7. Flash Left on Terminal Shank After First Pass

Rotate the roll dies until they have passed over the terminal shank.

When the first pass has been completed, a longitudinal fin or "flash" on two diametrically opposite sides of the terminal will be noticeable on the swaged portion of the shank, as shown in Figure I-7. To eliminate the longitudinal fin, rotate the terminal 90 degrees from the first swaging position and pass it through the rolls as outlined in preceding instruction. After the second pass the terminal shank will appear smooth and round, as in Figure I-8.

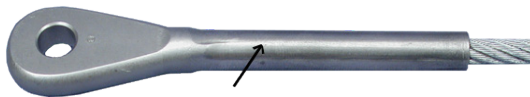


Figure I-8. Terminal that has been Properly Swaged

Finished fitting should look like this. Be sure fitting has been compressed the proper number of times.

Measure the diameter of the terminal shank with the gauge, as shown in Figure II-15. The shank should now slide through the slot from one end of the swaged portion to the other except for the slight flash which will be left after the second pass. The diameter over flash should not exceed the shank diameter after swaging as shown in Appendix A by more than 0.010 inch.

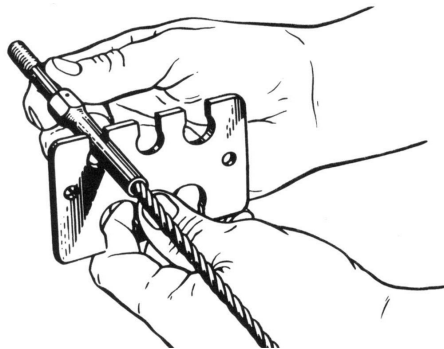


Figure II-15 Gauging Terminal After Swaging

The gauge is made to pass a terminal which has been reduced to proper diameter as specified in applicable MS drawings, except over flash.

If the terminal has not been reduced sufficiently, an additional pass may be necessary to reduce it to the required diameter.

Rotate 45 degrees for the third pass to make the terminal more uniform.

Caution

Over-swaging may cause work-hardening or lead to embrittlement which may induce terminal cracking. For this reason, we advise that you **never use more than four passes**. If four passes are required on any shank type terminal, and after the fourth pass the diameter of the shank has not been reduced to proper size, survey the equipment and re-check instructions in order to determine what is causing the trouble.

Swaging Shank Ball Terminals

The single shank ball terminals that can be swaged successfully with the Type II Swaging Machine are essentially defined by MS20664, a print of which is included in Appendix A of this manual. The size range, in terms of nominal cable diameter, is 1/16 - 1/4 inch.

To accommodate the ball in these terminals, the swaging dies are quite different from those used on straight shank terminals. Each roll die has four working arcs separated by four clearance flats. At the midpoint of each working arc is a pocket which receives the ball of the terminal. The four working arcs are numbered 1,2,3 and 4 in the order in which they are to be applied to the terminal, and these numbers are stamped on the flat side of the roll die near the midpoint of the appropriate working arc. The nominal size of the cable for which the roll die is to be used is also stamped on the flat side of each roll die. The roll dies are finished and supplied as matched pairs to ensure the proper alignment of the opposing grooves when they are mounted on the swaging machine. As shown in Figure II-16, one of the pair has the word "UPPER" stamped on its flat side, its mate is marked "LOWER".

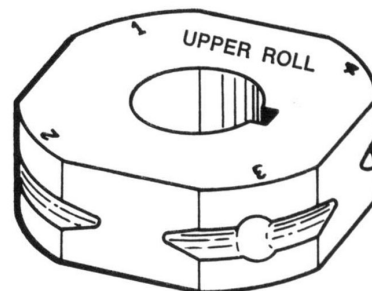


Figure II-16 Roll Die for Ball Terminals

Setting up the machine

Remove the terminal adapter at the left hand end of the Feed Guide and replace it with the extra spring clip shown in Figure II-19 and identified in Table II-1. The same flathead screws are used to attach either the adapter or the spring clip to the Feed Guide.

Select matched pair of roll dies marked for the size of the cable onto which you wish to swage a ball terminal. Install them on the swaging machine in the same manner as described on page 13 for the straight shank roll dies. Rotate the roll dies so that the clearance flats preceding the #1 working arc are parallel as shown in Figure II-17

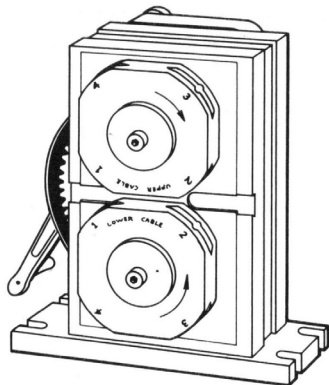


Figure II-17 Position of Rolls for Inserting Cable & Terminal Into Machine

The machine is now ready to receive and swage the cable-terminal assembly.

Preparing the Cable and Terminal

Select a single shank ball terminal of the proper size for the cable onto which it is to be swaged. Using the gauge of the proper size range, shown in Figure II-18, check the ball and shank of the terminal to be sure it is the correct size.

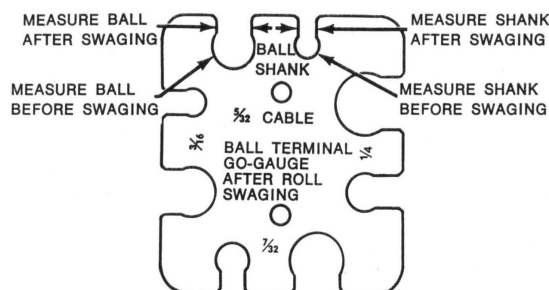


Figure II-18 Gauges for Ball Terminals

Locate the terminal lengthwise on the cable and mark the cable so that location of the terminal can be checked just before starting the swaging operation. Be sure that the shank is on the correct side of the ball for intended application.

The cable-terminal assembly is now ready to be swaged.

Swaging Single Shank Ball Terminals MS20664

Insert the cable-terminal assembly in the Feed Guide with the ball located approximately midway between the spring clips, and the terminal shank on the right hand side of the ball, as shown in Figure II-19. If the location of the terminal on the cable is at or so near the end that the cable can not be engaged with both spring clips, it must be engaged with the right-hand spring clip.

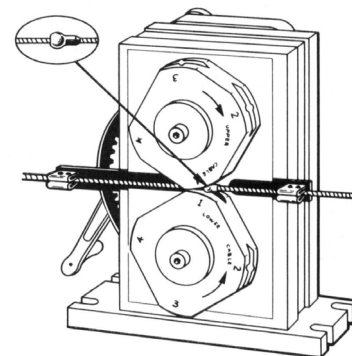


Figure II-19 Start of Swaging Ball Terminals

Inch the roll dies around until the ball has entered the #1 die pockets, but is not being squeezed as indicated in Figure II-19. Check the location of the terminal on the cable. When you are satisfied that this is correct, rotate the roll dies until the clearance flats between the #1 and #2 working arcs are parallel.

To remove the ridge or flash left on the terminal by the first pass, rotate the cable-terminal assembly 90 degrees around its own axis, and move the Feed Guide with the cable to the right. Inch the roll dies around until the ball is accurately engaged in the #2 pocket and then roll it through the #2 working arc.

Repeat the same procedure at the #3 and #4 arcs of the roll dies. Rotate the cable-terminal assembly 45 degrees before making the third pass and 90 degrees before making the fourth pass.

Rotate 90° and roll through #2 position again to help eliminate remaining flash if desired.

Gauge the shank and ball for proper size with the ball terminal gauge. If further reduction is necessary, pass the terminal through the No. "4" position a second time, rotating the terminal 90 degrees from the position used in preceding pass for this final pass. The ball terminal gauge is designed to measure the diameter of the shank and ball between "flash" after swaging.

Swaging Double Shank Ball Terminals MS20663

Each end of a Double Shank Ball terminal is swaged as described above as though it was a single-shank terminal completely through all four of the roll die working arcs. Then reverse the cable-terminal assemble in the Feed Guide and swage the other end in the same manner.

Trouble Shooting

If acceptable results are not obtained, either the preceding instructions are not being followed completely, non-standard fittings and/or cables are being used, or the swaging machine is in need of overhaul and repair. Possible troubles and suggested remedies for them are listed in Table II-2.

Table II-2 Trouble Shooting

TROUBLE	PROBABLE CAUSE	REMEDY
TERMINAL SHANKS ARE NOT ROUND AFTER SWAGING	Swaging with unmatched rolls. Swaging with damaged rolls.	Install correct rolls (Ref. to page 13). Replace damaged rolls.
TERMINAL SHANKS NOT SUFFICIENTLY REDUCED IN SIZE	Use of improper size rolls. Damaged bearings in the swaging machine, allowing rolls to separate.	Install correct size rolls. Replace damaged bearings.
TERMINAL SHANKS BEND DURING SWAGING	Swaging with unmatched rolls. Failure to use feed guide assembly properly.	Install correct rolls. Be sure to use the feed guide assembly with the cable and terminal in proper position.
BALL-TYPE TERMINALS NOT ROUND AFTER SWAGING	Balls not being properly fed into roll recesses. Swaging with unmatched rolls. Loose or worn roll keys. One of the rolls installed upside-down.	Make certain that balls are properly located before each pass. Install correct rolls. Replace with new keys. Refer to page 13, for proper installation of rolls.
REVERSE LATCH FAILS TO HOLD WHEN RATCHETING THE SWAGER	Broken reverse latch. Broken latch spring. Broken latch bolt.	Replace the reverse latch. Replace the reverse latch spring. Replace the latch bolt.
MACHINE BINDS OR LOCKS	Broken gear teeth on large reduction gear or gear shaft. Broken teeth on the 30-tooth gears.	Replace damaged parts. Replace damaged gears.

Maintenance Of Swaging Machine

Cleaning

Dust, dirt, or other foreign material should not be allowed to collect on the swaging machine; it will eventually work its way into the mechanism and cause

excessive wear and damage. Before installing a set of roll dies, wipe their active surfaces carefully with a clean soft cloth to be sure no grit will mar the surfaces of the swaged terminals or scratch the working surfaces of the roll dies.

Stubborn accumulations of grease or other sticky material can be usually be removed by wiping with a petroleum base solvent.

Lubrication

Each swaging machine is packed with lubricant when it is assembled at the factory, and no subsequent periodic lubrication is required. If and when the machine is disassembled for repair or overhaul, the old grease on the bearings and gear teeth should be cleaned out with solvent and these parts should be packed lightly with extreme-pressure low-temperature grease, MIL-G-7118 or equivalent.

Corrosion Protection

If the swaging machine is located in a dusty or humid environment, it is recommended that a hood of fairly heavy vinyl or canvas be used to cover it when it is not in use.

Contact of bare hands with the working surface of the roll dies must be avoided to prevent finger print corrosion.

Each time a set of roll dies is removed from the swaging machine, the roll dies and the exposed portions of the machine shafts should be lightly coated with a clean corrosion resistant oil, such as WD 40®.

Overhaul And Repair Of Type II Swaging Machine

LOOS & CO., Inc. Offers complete overhaul, repair, and parts replacement service for all **LOCOLOC®**- Kearney Swaging Machines. Ship your machine to our factory, prepaid, and we will determine the extent of the repairs and replacements required, advise you of the cost, and wait your instructions. We have specialized tools and gauges, a stockroom of replacement parts, and a group of experienced people who are assembling, using, disassembling, and inspecting these machines every day. We believe we can overhaul your swaging machine easier, faster, and at lower cost than you can. We urge you to take advantage of this service.

However, if you prefer the do-it-yourself approach, you will find the following instructions helpful. The reference number cited in the step-by-step instructions are used to identify the individual parts shown in the exploded assembly drawing, Figure II-20. They are also tabulated in Table II-3, where the corresponding part

names and numbers are listed. The exploded assembly drawing shows and identifies the parts of the Type II Swaging Machine and indicates their relative locations in the assembled machine.

Disassembly

Refer to Figure II-20 and Table II-3 on following pages.

Remove the cap screws (1) and washers (2) and remove the rolls (3). Remove the screws (4) and keys (5).

Remove the bearing cover plate (7) by removing the eight screws (6). Remove the felt washers (8).

On the crank side of the machine, remove the cap screw (1) and washer (9), then remove the hand crank (76).

Remove the gear guard (28) by removing the screws (26 and 27). The lift pin (29) will slide out with the guard.

Remove the large gear (31) by removing the cap screw (1) and washer (9), remove the key (30) and shim (32).

Remove the screw (34), washer (35), pin (33), and slide the crank shaft (36) out of its bearing (53).

Remove the two screws (39) and slide the center cover (40) off the frame members.

Turn the machine upside down. Remove the four cap screws (44) from base plate (72). With a mallet drive (72) base plate upward until removed from spiral roll pins. Remove spiral pins (43).

Remove the four cap screws (41). This will allow the crank side frame (54) to be separated from the roll side frame (71). Be sure to catch the spacer tubes (42).

Remove the gear shaft (58) by sliding it out of the bearing (53).

Remove the two 30-tooth gears (55 & 56), by sliding them off the shafts (59).

Remove shafts (59) from bearings (70), with an arbor press. Remove bearings (53 & 70) from roll side frame (71) and bearings (52 & 53) from crank side frame (54). To avoid damage to bearings, support them on inner races and do *not* use a hammer.

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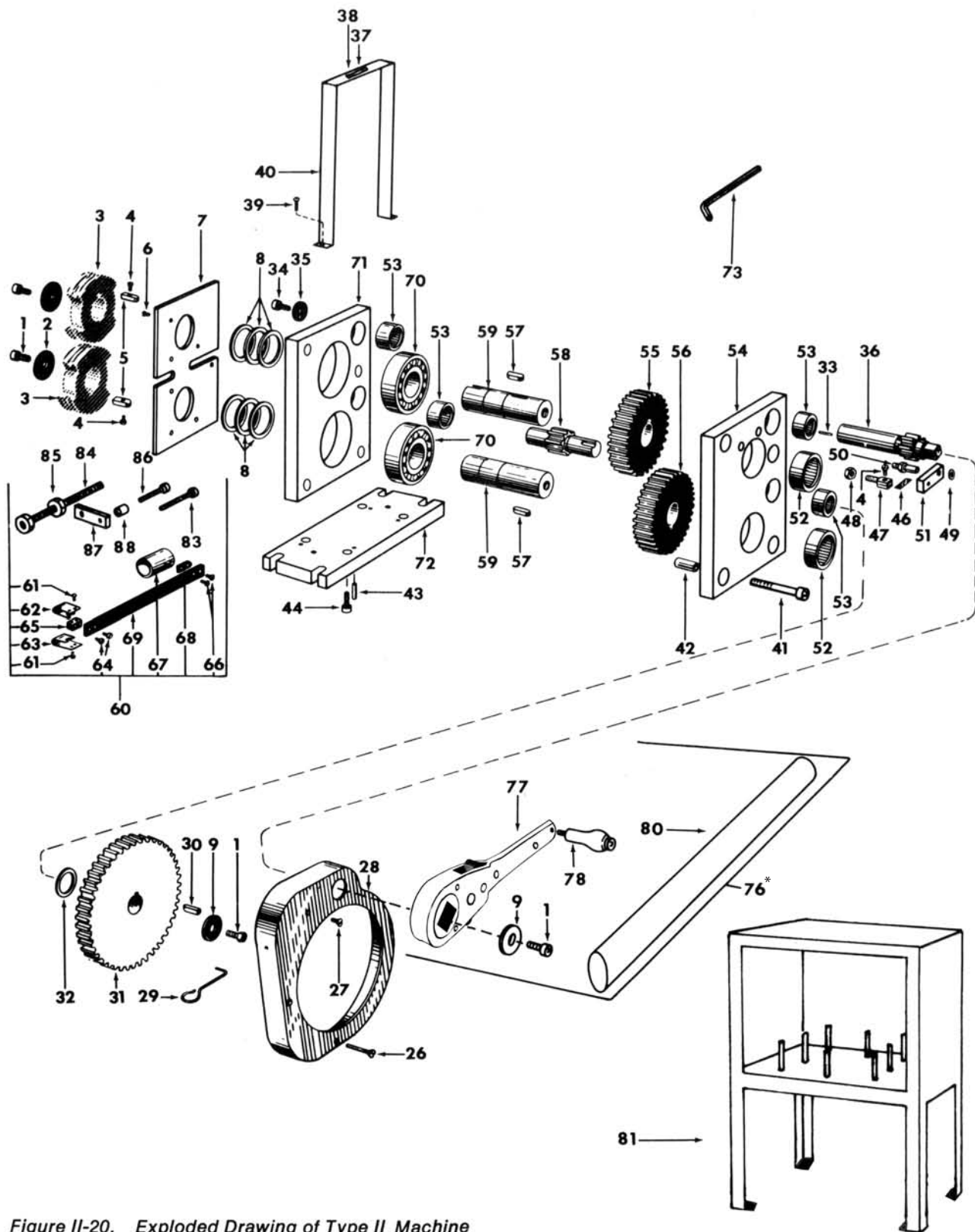


Figure II-20. Exploded Drawing of Type II Machine
 (*) 84-9 & 84-1 - Not included in Assembly

Table II-3 Replacement Parts List Type II Swaging Machine

Loos Part No. and Ref. No.	Old Part No.	Description	Qty
84-1	62450-12	Screw - Allen head, cap, blued, steel 3/8-16 x 3/4 inch long.....	4
-2	13468	Washer - Roll	2
-3	---	Roll Dies (Refer to Table II-1).....	--
-4	62139	Screw- Fillister head, machine, steel, cadmium plated, No. 10-32 x 1/2 inch long.....	3
-5	12585	Key.....	2
-6	62218-05	Screw - Flat head, machine, steel, No. 8-32 x 5/16 inch long.....	8
-7	13474	Plate - Bearing.....	1
-8	62890-01	Washer - Felt, 2 3/8 OD x 1 3/4 ID x 1/16 inch thick.....	6
-9	12565	Washer.....	2
-26	62239-28	Screw - Flat head, machine, steel, cadmium plated, No. 10-32 x 1-3/4 inch long.....	2
-27	62239-08	Screw - Flat head, machine, steel, cadmium plated, No. 10-32 x 1/2 inch long.....	1
-28	13482	Guard - Gear.....	1
-29	13489	Pin - Reverse latch lift.....	1
-30	12585-5	Key.....	1
-31	12558-2	Gear - 45 tooth.....	1
-32	66406-26	Shim - 1-5/8 OD x 1-1/8 ID x .020 inch thick.....	1
-33	61158-08	Pin - 1/8 inch diam. x 1/2 inch long.....	1
-34	62221-08	Screw - Flat head, machine, steel, 1/4-28 x 1/2 inch long.....	1
-35	12565-1	Washer.....	1
-36	12556-3	Shaft - Crank.....	1
-37	62569-03	Screw - Drive, stainless steel, No. 4 x 3/16 inch long.....	4
-38	1330-10	Plate - Name.....	1
-39	62319-12	Screw - Round head, machine, steel, No. 10-32 x 3/8 inch long.....	2
-40	13481	Cover - Center.....	1
-41	62452-48	Screw - Allen head, cap, steel 1/2-20 x 3 inch long with 1-3/8 inch threaded length.....	4
-42	13475	Tube - Frame spacer.....	4
-43	60949-20	Pin - Spiral roll 3/8 diam. x 1-1/4 inch long.....	4
-44	62450-20	Screw - Allen head, cap, steel 3/8 - 16 x 1-1/4 inch long.....	4
-46	13461	Spring - Latch.....	1
-47	13453	Adapter - Latch spring.....	1
-48	60663-16	Nut - Hexagon, jam, steel 3/8 - 16.....	1
-49	13460	Collar - Latch spacer.....	1
-50	13459	Bolt - Latch.....	1
-51	13458	Latch - Reverse.....	1
-52	63842-1	Bearing - Roller, McGill No. MO28.....	2
-53	63842	Bearing - Roller, McGill No. MO18.....	4
-54	12545-3	Frame - Crank side.....	1
-55	12557-4	Gear - 30 tooth, upper.....	1
-56	12557-5	Gear - 30 tooth, lower.....	1
-57	12585-3	Key.....	2
-58	12555-2	Shaft - Gear.....	1
-59	12549-3	Shaft - Roll.....	2
-60	13641	Assembly - Guide, terminal, with adjustable stop.....	1
-61	62338-04	• Screw - Round head, machine, steel, cadmium plated, No. 8-32 x 1/4 inch long.....	4
-62	13809	• Clip - Upper spring.....	1
-63	13810	• Clip - Lower spring.....	1
-64	62239-06	• Screw - Allen socket head, machine, steel, cadmium plated, No. 10-32 x 3/8 inch long.....	2
-65	13808	• Block - Clip.....	1
-66	62239-08	• Screw -Allen socket head, machine, steel, cadmium plated, No. 10-32 x 1/2 inch long.....	2
-67	13805	• Adapter - Large terminal.....	1
-68	13807	• Stop - Spacer.....	1
-69	13804	• Bar - Guide.....	1
-83	---	• Screw - Allen head, cap, machine, steel, black oxide, 1/4-28 x 3.75 inch long.....	1
-84	---	• Stud - Threaded, black oxide, 3/8-16 x 8 inch long.....	1
-85	---	• Nut - Knurled, black oxide, 3/8-16.....	1
-86	---	• Screw - Allen head, cap, machine, steel, black oxide, 1/4-20 x 2-1/2 inch long.....	1
-87	---	• Block.....	1
-88	---	• Spacer.....	1
-70	63842-4	Bearing - Roller, SKF No. 22309.....	2
-71	12546-3	Frame - Roll side.....	1
-72	12547-1	Plate - Base	1
-73	64386-06	Wrench Allen	1
-74	---	Operating & Maintenance Instructions.....	1
-76	---	Assembly - Ratchet Crank Handle.....	1
-77	---	• Lever - Ratchet, heavy duty, 3/4 inch.....	1
-78	---	• Handle - Swivel.....	1
-79	---	• Plate - Name.....	1
-80	---	• Lever - Handle extension.....	1
-81	---	Bench/Shipping container.....	1

NOTE: Older Type II machines contain parts which have become obsolete and are not shown in Figure II-20 nor listed in Table II-3. In case such parts are needed, please communicate with the factory.

Cleaning

Wash all parts in a petroleum base solvent, such as (Safety Kleen 105) Solvent, and dry them with an air blast.

Inspection

Check all parts visually for cracks, broken gear teeth, distortion, serious wear, and any other kind of visible damage or deterioration. Inspect the roller bearings for scored races and rollers or other evidence of wear; reject damaged or worn bearings. Inspect those portions of the shafts that the roller bearings run on for score marks, brinnelling, wear, and out-of-roundness; reject shafts exhibiting these conditions. Magnaflux® inspection of shafts and gears is recommended to disclose small cracks originating at changes of section, the corners of keyways, and the roots of gear teeth. Check all screws and tapped holes for damaged threads.

Examine the working surfaces of all roll dies with a magnifying lens in a good light. Any that show scratches, scoring, or abrasion should be replaced.

Keys should be a tight fit in shaft keyway and a very close sliding fit in gear or roll die keyways. If any looseness or backlash can be felt, replace the key with a new one.

Upon completion of inspection, those parts which have been accepted for further use should be cleaned again with solvent and wiped on all finished unpainted surfaces with a cloth that has been soaked in corrosion resistant oil and wrung out by hand. This is to prevent the development of finger print corrosion, and after this operation, the finished surfaces should not be touched with bare hands.

Reassembly

The step-by-step procedure for reassembling the Type II Swaging Machine is essentially the reverse of the disassembly procedure explained in paragraphs headed DISASSEMBLY, except for the necessity of meshing the roll shaft gears so that the two roll dies will be automatically placed in the proper phase relationship. This timing of the roll shafts is obtained by inserting the two

roll shafts (59) in their bearings on the roll side frame (71) and turning them so that the roll keys (5) are positioned and lined up as shown in Figure II-21. Holding the two shafts in this position, line up the keyways in the two 30-tooth gears (55 & 56) one at a time with the gear keys (57) in the shafts (59) and push the gears into mesh.

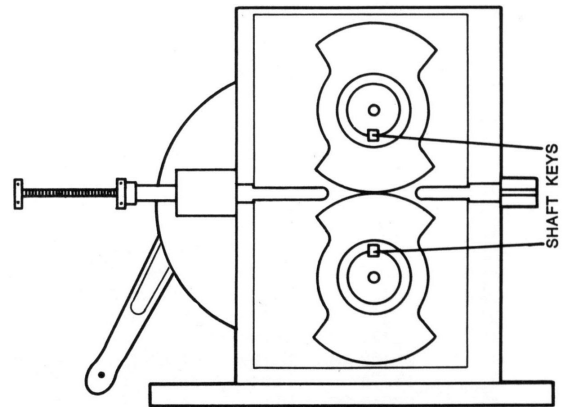


Figure II-21 Alignment of Keys for Proper Timing of Rolls

Testing After Reassembly

After repair have been completed, select a typical terminal and swage it to a piece of scrap cable.

Observe performance of the swager during the swaging operation and inspect the swager terminal to make sure that results are as described in preceding instructions.

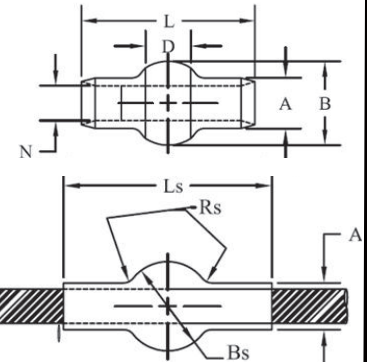
If any doubt exists regarding the strength of the swaged joint, perform a conventional "pull" test. If the terminal has been properly swaged, the cable will break before the joint will separate.

Appendix A

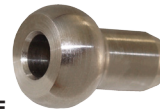
MS20663 - Double Shank Ball



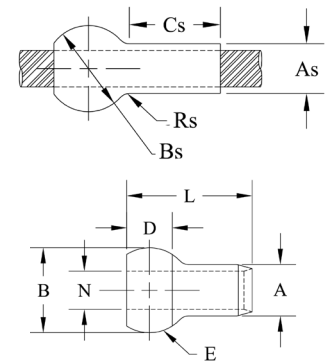
MS Part No.	Cable Dia.	A Dia.	As Dia.	B Dia.	Bs Spherical Dia.	D	L ±.0075	Ls Ref.	N Dia.	Rs Ref Rad
MS20663C2*	1/16	.127	.112	.207	.190	.114	.362	.390	.073	.014
MS20663C3*	3/32	.163	.143	.277	.253	.152	.525	.578	.104	.019
MS20663C4*	1/8	.218	.190	.345	.315	.1895	.688	.765	.139	.023
MS20663C5*	5/32	.254	.222	.419	.379	.227	.850	.953	.169	.028
MS20663C6*	3/16	.293	.255	.487	.442	.264	1.012	1.140	.201	.033
MS20663C7*	7/32	.347	.302	.555	.505	.3025	1.175	1.328	.233	.038
MS20663C8*	1/4	.401	.348	.624	.567	.3395	1.337	1.515	.264	.042
MS20663C9*	9/32	.439	.382	.694	.632	.3775	1.497	1.719	.297	.046
MS20663C10*	5/16	.475	.413	.763	.694	.4245	1.664	1.875	.328	.046



MS20664 - Single Shank Ball



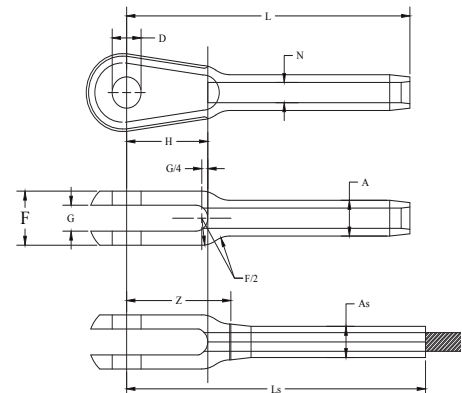
MS Part No.	Cable Dia.	A Dia.	As Dia.	B Dia.	BS Spherical Dia.	Cs	D	E Rad Ref	L	N Dia.	Rs Ref Rad
MS20664C2*	1/16	.132	.112	.212	.190	.156	.114	.0825	.2685	.073	.014
MS20664C3*	3/32	.168	.143	.282	.253	.234	.152	.110	.384	.104	.019
MS20664C4*	1/8	.223	.190	.350	.315	.313	.1895	.137	.500	.139	.023
MS20664C5*	5/32	.259	.222	.424	.379	.391	.2275	.165	.616	.169	.028
MS20664C6*	3/16	.298	.255	.492	.442	.469	.2645	.192	.730	.201	.033
MS20664C7*	7/32	.352	.302	.560	.505	.547	.3025	.220	.846	.233	.038
MS20664C8*	1/4	.406	.348	.629	.567	.625	.3395	.247	.962	.264	.042
MS20664C9*	9/32	.444	.382	.699	.632	.750	.3775	.302	1.193	.328	.046
MS20664C10*	5/16	.480	.413	.768	.694	.813	.4145	.302	1.193	.328	.046



MS20667 - Fork End Terminal



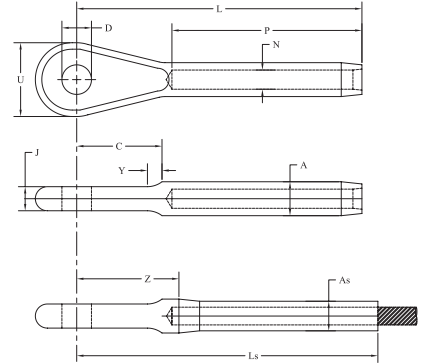
MS Part No.	Cable Dia.	A Dia.	As Dia.	D Dia.	F +.010 - .005	G	H	L +.020 - .000	Ls Ref.	N Dia.	U Dia.	Z Min.
MS20667-2*	1/16	.160	.138	.190	.218	.093	.500	1.572	1.75	.078	.344	.603
MS20667-3*	3/32	.218	.190	.190	.254	.108	.670	1.945	2.06	.109	.438	.757
MS20667-4*	1/8	.250	.219	.190	.383	.195	.735	2.352	2.61	.141	.547	.914
MS20667-5*	5/32	.297	.250	.250	.406	.202	.800	2.655	3.00	.172	.688	.967
MS20667-6*	3/16	.359	.313	.313	.543	.260	.880	3.071	3.24	.203	.781	1.133
MS20667-7*	7/32	.427	.375	.313	.625	.296	.970	3.440	3.74	.234	.906	1.252
MS20667-8*	1/4	.494	.438	.375	.688	.313	1.070	3.806	4.10	.265	.969	1.368
MS20667-9*	9/32	.563	.500	.438	.719	.327	1.170	4.120	4.48	.297	1.156	1.432
MS20667-10*	5/16	.635	.563	.438	.765	.348	1.268	4.438	4.86	.328	1.265	1.500
MS20667-12*	3/8	.703	.625	.500	.830	.380	1.525	5.333	5.74	.404	1.500	1.895
MS20667-14*	7/16	.781	.688	.562	.830	.380	1.776	6.102	6.57	.468	1.750	2.164
MS20667-16*	1/2	.844	.75	.625	1.035	.473	1.903	6.938	7.50	.531	1.875	2.313



MS20668 - Eye End



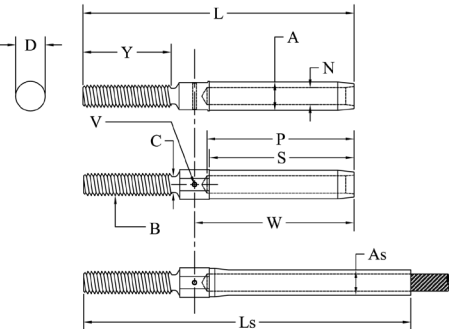
MS Part No.	Cable Dia.	A Dia	As Dia	C	D Dia.	J	L +.020 -.000	Ls Ref.	N Dia.	P	U +.025 -.010	R Ref.	Z Min.
MS20668-2*	1/16	.160	.138	.523	.190	.088	1.631	1.809	.078	1.042	.359	.072	.662
MS20668-3*	3/32	.218	.190	.707	.190	.103	2.043	2.160	.109	1.261	.438	.092	.856
MS20668-4*	1/8	.250	.219	.738	.190	.190	2.337	2.593	.141	1.511	.500	.103	.900
MS20668-5*	5/32	.297	.250	.831	.250	.197	2.684	3.029	.172	1.761	.640	.131	.997
MS20668-6*	3/16	.359	.313	.903	.313	.255	3.019	3.187	.203	2.011	.781	.155	1.082
MS20668-7*	7/32	.427	.375	1.007	.313	.291	3.382	3.678	.234	2.261	.813	.187	1.195
MS20668-8*	1/4	.494	.438	1.133	.375	.307	3.763	4.062	.265	2.511	.968	.221	1.326
MS20668-9*	9/32	.563	.500	1.257	.438	.322	4.153	4.512	.297	2.761	1.109	.251	1.465
MS20668-10*	5/16	.635	.563	1.373	.438	.343	4.546	4.969	.328	3.011	1.218	.281	1.609
MS20668-12*	3/8	.703	.625	1.688	.500	.375	5.562	5.968	.404	3.511	1.500	.320	2.124
MS20668-14*	7/16	.781	.688	1.968	.562	.375	6.398	6.867	.468	4.011	1.750	.350	2.460
MS20668-16*	1/2	.844	.750	2.115	.625	.468	7.323	7.886	.531	4.698	1.875	.406	2.698



MS21259 - Stud End Terminal



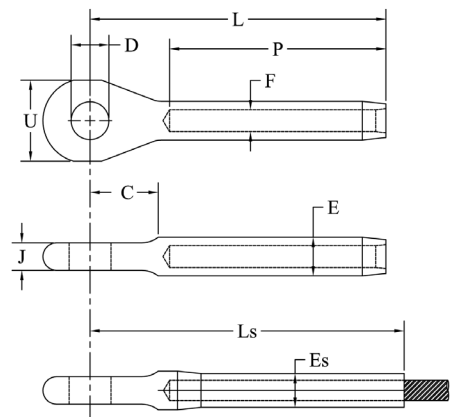
MS Part No.		Cable Dia.	Thread B UN-3A UNF-3A	A Dia.	As Dia.	C Dia.	D	L ±.063	Ls Ref.	N Dia.	P	S +.062 -.000	W	Y Ref.
RH Thread	LH Thread													
MS21259-2RH	MS21259-2LH	1/16	No.6-40	.160	.138	.121	.188	2.473	2.65	.078	1.042	.969	1.174	1.045
MS21259-3RH	MS21259-3LH	3/32	No.10-32	.218	.190	.169	.250	2.879	3.00	.109	1.261	1.188	1.411	1.204
MS21259-4RH	MS21259-4LH	1/8	1/4-28	.250	.219	.226	.313	3.333	3.59	.141	1.511	1.438	1.682	1.376
MS21259-5RH	MS21259-5LH	5/32	1/4-28	.297	.250	.226	.313	3.627	3.97	.172	1.761	1.688	1.958	1.376
MS21259-6RH	MS21259-6LH	3/16	5/16-24	.359	.313	.285	.375	4.002	4.17	.203	2.011	1.938	2.237	1.453
MS21259-7RH	MS21259-7LH	7/32	3/8-24	.427	.375	.347	.438	4.516	4.81	.234	2.261	2.188	2.518	1.625
MS21259-8RH	MS21259-8LH	1/4	3/8-24	.494	.438	.347	.500	4.937	5.24	.265	2.511	2.438	2.784	1.750
MS21259-9RH	MS21259-9LH	9/32	7/16-20	.563	.500	.405	.625	5.391	5.75	.297	2.761	2.688	3.076	1.875
MS21259-10RH	MS21259-10LH	5/16	1/2-20	.635	.563	.467	.688	5.844	6.27	.328	3.011	2.938	3.326	2.000
MS21259-12RH	MS21259-12LH	3/8	9/16-18	.703	.625	.529	.750	6.656	7.06	.404	3.511	3.438	3.828	2.250
MS21259-14RH	MS21259-14LH	7/16	5/8-18	.781	.688	.592	.812	7.437	7.91	.468	4.011	3.938	4.375	2.500
MS21259-16RH	MS21259-16LH	1/2	5/8-18	.844	.750	.592	.875	8.187	8.75	.531	4.698	4.625	5.093	2.500



EY1 - Marine Eye Terminal



Part No.	Cable Dia.	C Ref.	D +.010 -.015	E +.000 -.005	F	J ±1/32	L	P	U Ref.	After Swage Es +.000 -.009	After Swage Ls Ref.
EY1-2	1/16	.500	.264	.160	.078	.218	1.500	1.063	.594	.138	1.809
EY1-3	3/32	.500	.264	.218	.109	.218	1.580	1.188	.594	.190	2.250
EY1-4	1/8	.500	.264	.25	.141	.218	2.088	1.500	.594	.219	2.501
EY1-5	5/32	.580	.327	.297	.172	.281	2.355	1.688	.750	.250	2.954
EY1-6	3/16	.710	.389	.359	.201	.359	2.750	2.000	.875	.313	3.157
EY1-7	7/32	.800	.452	.427	.228	.406	3.220	2.313	1.000	.375	3.767
EY1-8	1/4	.900	.514	.494	.265	.468	3.625	2.500	1.125	.438	4.407
EY1-9	9/32	.990	.514	.563	.295	.468	3.795	2.688	1.125	.500	4.844
EY1-10	5/16	1.080	.64	.635	.328	.593	4.495	3.250	1.375	.563	5.188
EY1-12	3/8	1.150	.64	.703	.404	.593	4.930	3.500	1.375	.625	5.969
EY1-14	7/16	1.240	.765	.781	.468	.719	5.375	4.125	1.438	.688	6.750
EY1-16	1/2	1.290	.890	.844	.531	.844	6.250	4.750	1.875	.750	7.187



MS21260- Locking Stud Terminal

MS Part No.		Nominal Cable Diameter (Ref.)	Thread NF-3A UNF-3A	A Dia.	As Dia.	C +.006 -.000 Dia.	D Max	G Min.	
RH Thread	LH Thread								
MS212560L2RH	MS21260L2LH	1/16	No.6-40	.160	.138	.092	.188	.1139	.1094
MS212560S2RH	MS21260S2LH	1/16	No.6-40	.160	.138	.092	.188	.1139	.1094
MS212560L3RH	MS21260L3LH	3/32	No.10-32	.218	.190	.133	.250	.1638	.1568
MS212560S3RH	MS21260S3LH	3/32	No.10-32	.218	.190	.133	.250	.1638	.1568
MS212560L4RH	MS21260L4LH	1/8	1/4-28	.250	.219	.195	.313	.2224	.2152
MS212560S4RH	MS21260S4LH	1/8	1/4-28	.250	.219	.195	.313	.2224	.2152
MS212560L5RH	MS21260L5LH	5/32	1/4-28	.297	.250	.195	.313	.2224	.2152
MS212560S5RH	MS21260S5LH	5/32	1/4-28	.297	.219	.195	.313	.2224	.2152
MS212560L6RH	MS21260L6LH	3/16	5/16-24	.359	.313	.245	.375	.2830	.2754
MS212560S6RH	MS21260S6LH	3/16	5/16-24	.359	.313	.245	.375	.2830	.2754
MS21260-7RH	MS21260-7LH	7/32	3/8-24	.427	.375	.306	.438	.3454	.3378
MS21260-8RH	MS21260-8LH	1/4	3/8-24	.494	.438	.306	.500	.3454	.3378
MS21260-9RH	MS21260-9LH	9/32	7/16-20	.563	.500	.361	.625	.4052	.3972
MS21260-10RH	MS21260-10LH	5/16	1/2-20	.635	.563	.406	.688	.4678	.4597
MS21260-12RH	MS21260-12LH	3/8	9/16-18	.703	.625	.476	.750	.5285	.5201
MS21260-14RH	MS21260-14LH	7/16	5/8-18	.781	.688	.538	.812	.5909	.5826
MS21260-16RH	MS21260-16LH	1/2	5/8-18	.844	.750	.538	.875	.5909	.5826

Dash Number (Size)	L. ±.063	Ls (Ref.)	N Dia.	P	Q	S +.062 -.000	W	Y ±.047
L2	3.491	3.67	.078	1.042	1.319	.969	1.174	.375
S2	2.616	2.79	.078	1.042	1.319	.969	1.174	.375
L3	3.738	3.86	.109	1.261	1.581	1.188	1.411	.500
S3	2.863	2.98	.109	1.261	1.581	1.188	1.411	.500
L4	4.020	4.28	.141	1.511	1.863	1.438	1.682	.563
S4	3.145	3.40	.141	1.511	1.863	1.438	1.682	.563
L5	4.314	4.66	.172	1.761	2.157	1.688	1.958	.625
S5	3.439	3.78	.172	1.761	2.157	1.688	1.958	.625
L6	4.612	4.78	.203	2.011	2.455	1.938	2.237	.750
S6	3.737	3.90	.203	2.011	2.455	1.936	2.237	.750
-7	4.914	5.21	.234	2.261	2.757	2.188	2.518	.875
-8	5.218	5.52	.265	2.511	3.061	2.438	2.784	.875
-9	5.542	5.90	.297	2.761	3.385	2.688	3.076	1.000
-10	5.875	6.30	.328	3.011	3.718	2.938	3.326	1.000
-12	6.608	7.01	.404	3.511	4.281	3.438	3.828	1.125
-14	7.468	7.94	.468	4.011	4.812	3.938	4.375	1.250
-16	8.718	9.28	.531	4.698	5.562	4.625	5.093	1.250

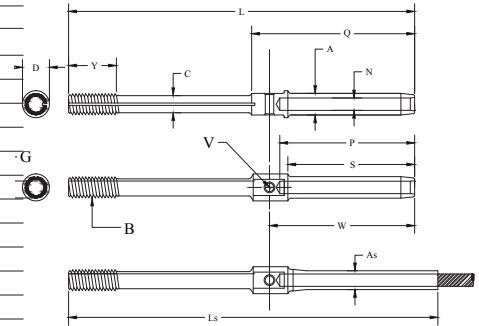


Table Of Cables

CABLE DIAMETER		CABLE CONSTRUCTION				
Inch	MM	1 x 7	1 x 19	7 x 7	7 x 19	
1/16	1.6	2	2	1,2,3	1,2	
3/32	2.5	2	2	1,2,3	1,2	
1/8	3.2	2	2	2,3	1,2,3	
5/32	4.0	2	2	2,3	1,2,3	
3/16	5.0	2	2	2,3	1,2,3	
7/32	5.5	2	2	2	1,2,3	
1/4	6.5	2	2	2,3	1,2,3	
9/32	7.5	-	2	2	1,2	
5/16	8.0	-	2	2,3	1,2,3	
3/8	9.5	-	2	2	1,2,3	

1. LOOS & CO. "BEST" Quality Military Standard Cable
2. LOOS & CO. "BETTER" Quality American Commercial Cable
3. LOOS & CO. "GOOD" Quality Import Cable Except for the 1/14 Diam. 7x19 "BETTER" Quality Cable which LOOS & CO. manufactures

only in stainless steel, all of the above cables are available in either galvanized carbon steel or stainless steel, either with or without a plastic coating.

Appendix B

Instructions for Assembling Motor Drive Kit with Type II Manual Swaging Machine

Refer to Figure II-20 for the location of the swaging machine parts mentioned below.

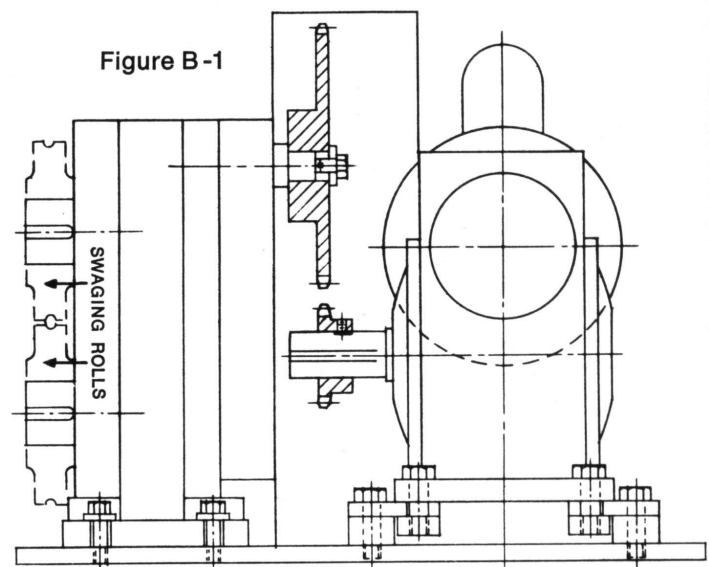
1. Take out caps screw -1 and washer -9 to move operating lever from square drive lug of crankshaft -36.
2. Take out screws -26 and -27 and remove gear guard-28.
3. Remove the internal reversing latch, which consist of the following parts:
 - 29 Lift Pin, Reverse Latch
 - 46 Spring, Latch
 - 47 Adaptor, Latch
 - 48 Hex Jam Nut, 3/8 x 3/16
 - 49 Collar, Latch Spacer
 - 50 Bolt, Latch
 - 51 Latch, Reverse

These parts may be discarded as they are not used with the motor drive.

4. Replace Gear Guard -28, securing it with Screws -26 and -27.
5. The drive motor and reduction gear, already assembled, are shipped mounted on a 12"x19"x1/2" steel baseplate, shown in Figure B-1 of this appendix. This plate is predrilled with the four mounting bolt holes for the Type II Swaging Machine. Place the swaging machine on the base plate and using 3/8 x 1 1/4" allen head bolts with flat washers secure the machine and the base plate to the bench.
6. Slice the smaller sprocket onto the output shaft of the speed reducer, but do not secure it.
7. Engage the roller chain with the two sprockets and then engage the larger sprocket with the square drive lung of the swaging machine. Secure it with caps crew -1 and flat washer -9.
8. Slide the smaller sprocket in or out on the output shaft of the speed reducer to align it with the larger sprocket and then secure it with the setscrew in its hub.
9. Adjust the spacing of two sprockets to obtain proper chain tension. The chain can be tightened by transferring flat washers on the mounting bolts of the reduction gear housing from the underside of the housing to upper side transferring rather than simply removing the flat washers avoids the

necessity of changing to shorter mounting bolt. Be sure to transfer the same number of washers on each of the four mounting bolts. A final fine adjustment can be obtained by loosening the mounting bolts of the Swaging Machine and sliding it on the base plate in the appropriate direction as permitted by its slotted mounting holes. The chain is properly tensioned when its slack permits a total crossways movement of the chain of 1/4 inch.

10. Install the Chain Guard between the motor drive unit and the swaging machine and secure it to the base plate with two hex head machine screws engaging tapped holes provided in the base plate.
11. Plug the electrical cord into a suitable electrical power supply (110 volt).



ATTENTION: LOCOLOC® -KEARNEY MACHINE OWNERS
SUBJECT: WARRANTY RESTRICTION INFORMATION

Several customers recently experienced poor performance with Type II LOCOLOC® -Kearney Swaging Machines when attempting to swage fittings onto cable. Reports of die breakage, gear damage and bearing wear have been recorded due to overloading the machine.

Since the Locoloc® -Kearney machine has been sold to the aircraft, marine, and industrial markets for over 50 years with virtually no complaints, we found it difficult to understand the sudden increase in these complaints.

We have run exhaustive tests to determine the cause of these failures. Now the answer is evident. Those customers experiencing problems were using fittings with a Rockwell hardness of over 62, A Scale.

Loos & Co., Inc., manufactures a complete line of MS and marine fittings. All of our fittings have a maximum Rockwell hardness of 62, A scale.

Those customers purchasing fittings from other manufacturers with Rockwell hardness in excess of 62, A scale were the only customers with complaints and machine failures.

Therefore, we must restrict our warranty on all Locoloc® -Kearney machines to the use of only Locoloc® fittings to fully guarantee the performance of our machines. We cannot be responsible for machine damage caused by another manufacturer's fittings that exceed Rockwell hardness of 62, A scale.

Obviously, there are certain fittings that will be swaged by Locoloc® -Kearney machines that we do not or cannot supply. When this occurs we request that you check the hardness of the fittings to determine that the maximum Rockwell hardness is 62, A scale. Again, we cannot be responsible for machine damage caused by another manufacturer's fittings that exceed Rockwell hardness of 62, A scale.

CAUTION: WHEN SWAGING FITTINGS ON TO 1 x 19 CABLE

When swaging fittings on to 1 x 19 construction wire rope, remember that there is little or no compression remaining in this construction. The wire rope itself is very solid with little or no "give."

A combination of a 1 x 19 construction wire rope manufactured on the "high side" of its tolerance and a fitting with a hole running on the "low side" of its tolerance (see dimensions for fittings under specifications) will exaggerate this problem. *(A swaging machine must have room to "flow" or "move" the steel in the fitting to form around the wire rope. There must be space to accomplish this.)*

In addition, many manufactures do not drill the hole in their fittings deep enough. This leaves a space at the base of the fitting of solid steel. This distance can vary from 1/4" up to over 1". The Locoloc® -Kearney machines simply cannot perform the impossible and swage solid metal, again there must be room for the steel to "move" or "flow."

When any of the situations above occur, the result can only be broken dies, sprung machines, ruined fittings and perhaps loss of expensive wire rope. The majority of cases could easily be avoided by checking the following before attempting to swage:

1. Diameter of wire - is it on high side of tolerance?
2. Inside diameter of fitting - will the wire rope fit with ease?
3. Depth of hole in fitting - do not attempt to swage over solid steel, begin swage at the bottom of the hole.
4. Hardness of steel - check Rockwell Hardness. See above.
5. Do not add leverage to your swaging machine by extending the handle beyond the length of the handle extension we supply. The handle is designed to accomplish the maximum compression for which the machine is designed. Adding to the handle length will result in broken dies, broken gears, and/or sprung frames and large repair costs.



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